

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

Facilities Manager

Volume 12 Number 2

APRIL 1996

Special Issue On
**Space
Management**



KNOW who. KNOW what. KNOW where. KNOW when. KNOW why.

When it comes to maintenance management, knowledge is power. Power over downtime. Power to pinpoint any problem anywhere. Power to predict. And no CMMS delivers this know-how more effectively and affordably than CHIEF ADvantage™ for Windows. Purchasing, planning & scheduling, asset history, component management, custom reports... they're all at your fingertips with the industry's most flexible solution. A solution that will always match your exact requirements. CHIEF ADvantage's comprehensive bar coding applications and seamless interfaces with predictive maintenance systems, minis, mainframes and more mean a Total Solution. And when you're ready to empower your people with Client/Server, look no further than CHIEF ADvantage. Total Maintenance Management, not just talk. See why more plants and facilities worldwide are turning to CHIEF ADvantage for Windows than to any other CMMS.

Call 800-CHIEF-GO today for your *FREE* demo disk.

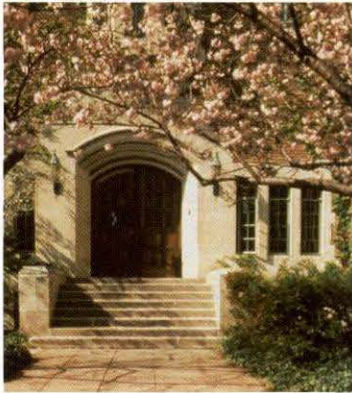
KNOW how. 
Total Maintenance Management

MAINTENANCE AUTOMATION CORPORATION

3107 W. Hallandale Beach Blvd., Hallandale FL 33009 800-CHIEF-GO FAX: 305-962-9046 <http://chief-software.com>

CHIEF ADvantage is a trademark of Maintenance Automation Corporation. Windows is a registered trademark of Microsoft Corporation.

FEATURES



16

Performance and Productivity: The Space Management Mandate

by Thomas C. Hier and
Gail B. Biddison

Cover photo courtesy of the Instructional Media
Center of Michigan State University.

24 Accountability and Results in Space Management

by Brenda Norman Albright

32 Space Counting is Not Space Management

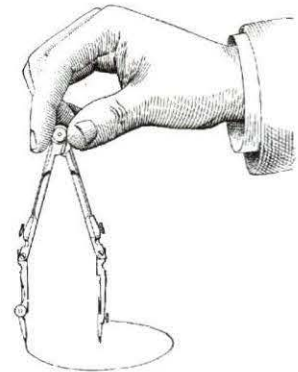
by Ira Fink, Ph.D., FAIA

36 Selecting the Right Space Planning Software

by Michel de Jocas

40 Communicating Space Management Needs With Credibility and Integrity

by Brenda Norman Albright



DEPARTMENTS

From the Editor.....	3
APPA News.....	5
Executive Summary.....	13
Space and Higher Education's Future by Wayne E. Leroy	
Focus on Management.....	14
Needed: A University Garage Sale by H. Val Peterson	

Regulatory Action.....	42
Confined Spaces: Defined and Simplified by J. Brent Kynoch	
Software & Solutions.....	46
2 Plus 1 Equals 21 by Howard Millman	
The Bookshelf.....	48
• Planning for Higher Education • Transforming Higher Education	
Coming Events	52
Index of Advertisers.....	52

FACILITY CONDITION ANALYSIS • elevator engineering • infrastructure: utility analysis • energy systems: evaluation and design • power plant:

cogeneration analysis • operations and maintenance analysis • construction management • deferred maintenance / capital renewal management • security analysis

- facility condition analysis
- elevator engineering
- infrastructure: utility analysis
- energy systems: evaluation and design
- power plant: cogeneration analysis

- operations and maintenance analysis
- construction management
- deferred maintenance / capital renewal management
- security analysis
- facility condition

analysis • **ELEVATOR ENGINEERING**

- operations and maintenance

analysis • elevator engineer

and maintenance analysis •

elevator engineering • **INFRASTRUCTURE: UTILITY ANALYSIS**

operations and maintenance

analysis • elevator engineer

and maintenance analysis •

elevator engineering • infras

analysis • construction may

- *infrastructure: utility an*

maintenance analysis • con

engineering • infrastructure

- *construction management*

infrastructure: utility analysis

management • deferred mai

analysis • **ENERGY SYSTEMS: EVALUATION AND DESIGN**

construction management •

utility analysis • energy su:

- deferred maintenance / car

energy systems: evaluation

management • deferred mai

analysis • energy systems:

deferred maintenance / capita

energy systems: evaluation a

DEFERRED MAINTENANCE / CAPITAL RENEWAL MANAGEMENT

infrastructure: utility analysis

management • deferred mu

infrastructure: utility analysis

management • deferred maintenance / capital renewal management • security analysis • facility condition analysis • elevator engineering • infrastructure: utility

analysis • energy systems: evaluation and design • power plant: cogeneration analysis • operations and maintenance analysis • construction management •

УДК 62-50

YOU AND US: PARTNERING

100 AND 1015 ... TAKING LEAD

FOR A HIGHER STANDARD

FOR A HIGHER STANDARD

THE CHINESE ECONOMY

ISES CORPORATION / 2165 West Park Court / Suite N / Stone Mountain, Georgia 30087 / Telephone: (770) 875-7376 / Fax: (770) 875-7623

YOU AND ISES ... PARTNERING
FOR A HIGHER STANDARD.



ISES
ISES CORPORATION

ISES CORPORATION / 2165 West Park Court / Suite N / Stone Mountain, Georgia 30087 / Telephone: (770) 879-7376 / Fax: (770) 879-7825

Facilities Manager

PRESIDENT: Douglas K. Christensen,
Brigham Young University

EXECUTIVE VICE PRESIDENT: Wayne E. Leroy
Alexandria, Virginia

PUBLICATIONS ADVISORY BOARD:

Ex-officio

Steve Glazner, APPA Director of
Communications, Chair

George F. Krell, Vice President for
Educational Programs, University of
Wyoming

Pieter J. van der Have, Vice President for
Information Services,
University of Utah

Thomas F. Vacha, Vice President for
Professional Affairs,
University of Delaware

Term ending July 1996

Brenda N. Albright, Higher Education
Consultant

James J. Murray III, American Council
on Education

Term ending July 1997

Jack Hug, University of California/
San Diego

Ronald R. Maassen, Waukesha County
Technical College

Term ending July 1998

Harvey H. Kaiser, Higher Education
Consultant

Margaret P. Kinnaman, University of
Maryland at Baltimore

EDITOR: Steve Glazner

ASSOCIATE EDITOR: Medea Ranck

ADVERTISING: Stephanie Gretchen

SUBSCRIPTIONS: Cotrenia Aytch

ART DIRECTION/TYPOGRAPHY: Chronicle
Type & Design

PRINTING: Good Printers

EDITORIAL OFFICE: 703-684-1446 ext. 236

FAX: 703-549-2772

E-MAIL: steve@appa.org, medea@appa.org

Facilities Manager (ISSN 0882-7249) is published quarterly (January, April, July, October) by APPA: The Association of Higher Education Facilities Officers, 1643 Prince Street, Alexandria, Virginia 22314-2818. Editorial contributions are welcome and should be sent to this address.

Of APPA's annual membership dues, \$40 pays for the subscription to *Facilities Manager* and *Inside APPA*. Additional annual subscriptions for both periodicals cost \$48 (\$60 for non-U.S. addresses). For information on rates and deadlines for display and classified advertising, telephone 703-684-1446 ext. 237.

Copyright © 1996 by APPA: The Association of Higher Education Facilities Officers. Contents may not be reprinted or reproduced in any form without written permission. The opinions expressed are those of the authors and do not necessarily reflect the views of APPA. Editorial mention of companies or products is for informational purposes only and should not be construed as an endorsement, actual or implied, by the Association.

POSTMASTER: Send address changes to *Facilities Manager*, 1643 Prince Street, Alexandria, VA 22314-2818.

From The Editor

Steve Glazner

Space management is one tricky subject. Just as "facilities management" once was seen simply as furniture inventory and placement, space management has evolved to meaning much more than simply counting your campus' square footage and knowing where to place that "surprise" new course offering or faculty office.

This issue of *Facilities Manager* focuses on some of the key trends occurring in the quickly changing realm of space management. And while we cannot cover this topic exhaustively in the limited space of the magazine, we feel that we have brought together some of the best minds working in the field today. Each of the authors brings years of experience and an exceptional level of expertise to their respective articles.

I am first extremely grateful to Tom Hier for serving as field editor for this theme issue. Tom is a consultant for higher education and an active supporter of APPA, and he has served as a faculty member for the annual Institute for Facilities Finance. In their opening feature, Tom and his partner Gail Biddison provide a context for the topic and clarify the nomenclature of space management.

Brenda Albright, formerly with the University of Maryland System and the Tennessee Higher Education Commission and now a private consultant, contributes two articles to this issue. In the first, she explains the issue of accountability in higher education and shares some efforts currently underway at the institutional and state levels. Her second article provides some solid advice for com-

municating your space management needs to your higher administration.

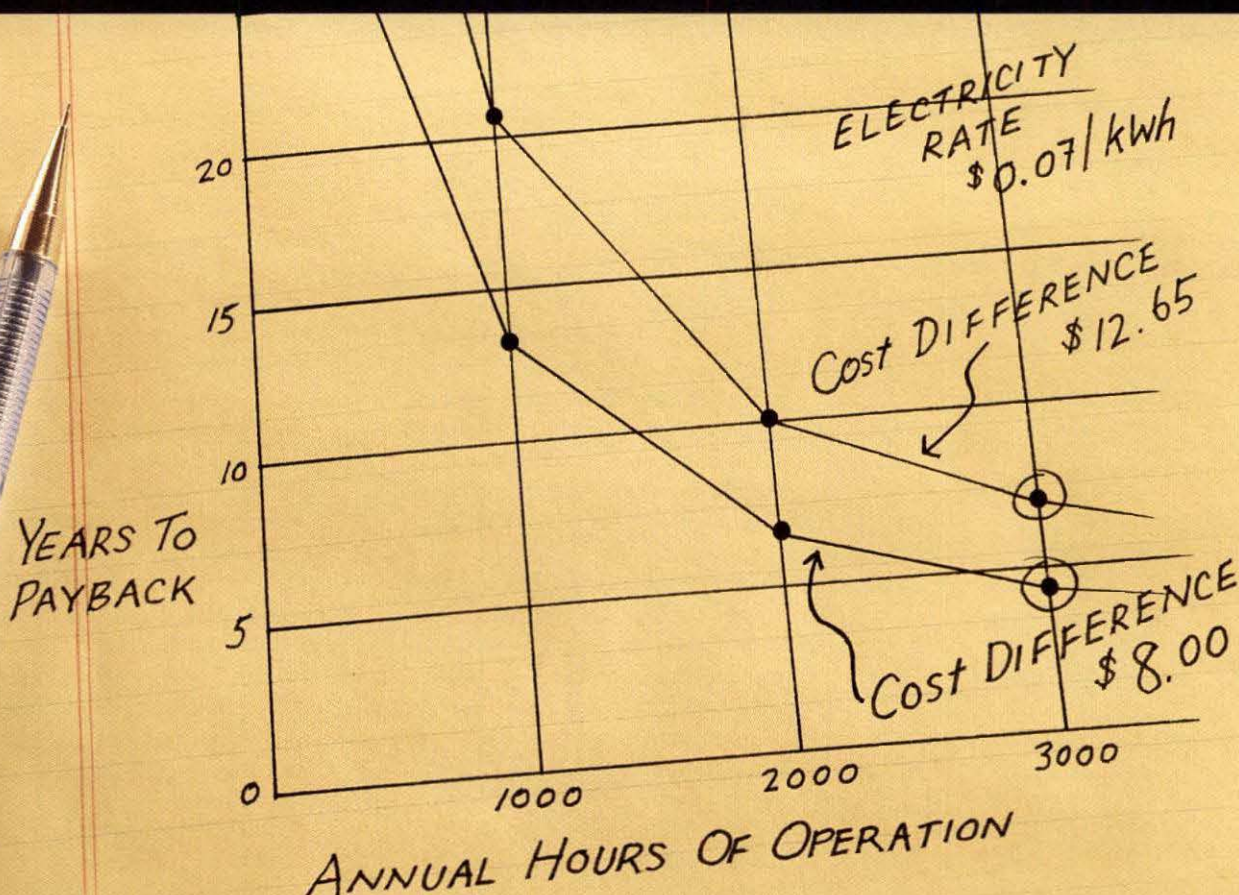
Many in the higher education facilities arena will know the name of Ira Fink. He worked for eleven years as the university community planner for the University of California System and is the author or coauthor of more than twenty books and numerous articles on university planning. His firm, Ira Fink and Associates, works exclusively with college and universities. The title of Ira's article says it all: "Space Counting is *Not* Space Management."

We are pleased to include Michel de Jocas' valuable guidelines for selecting a space planning software program, of which there are many on the market. His Canadian-based firm, Educational Consulting Services, has broad-based experience in space management/planning software and works with institutions throughout North America.

You'll also find in this issue several columns focused on the topic of space management, including Wayne Leroy's predictions on the importance of space management to higher education's future, a summary of several software programs from Universal Algorithms, a survey by John Casey, APPA's book review editor, on the recent literature of space management, and Val Peterson's practical solution to most institutions' space problems.

As always, we welcome your feedback, comments, ideas, and suggestions on anything we do in *Facilities Manager*. Thank you for your continued support, and I hope you enjoy this issue. ■

MAGNETIC BALLASTS MORE COST EFFECTIVE THAN ELECTRONIC? GO FIGURE.



When you do the math you'll find that the payback period for a new electronic ballast can be over six years.

Especially if you're installing them in a school, public library, or any office building or store where fluorescent lights are on 60 hours or less every week.

According to a recent DOE study,* an electronic ballast for a 2-F32 T8 fixture costs \$12.65 more than an energy efficient magnetic ballast. If it runs 3000 hours per year, you'll save only 26.7 kWh annually. At \$0.07 per kWh, that's \$1.87 a year in energy savings, or a simple payback of 6.8 years — not a good deal, especially when an acceptable payback on capital investments is nearly always less than three years.

Even if you pay a lower premium for electronic ballasts, as the chart shows, you may still wait too long for a payback on your investment.

To see if magnetic ballasts are more cost effective for you, just use this simple formula: $A \div B = \text{Years for Payback}$. (A = cost difference; B = power consumption difference in kW x annual operating hours x cost per kWh.)

Want more information? Call 800-CDA-DATA. Or write Copper Development Association, 260 Madison Avenue, New York, NY 10016. Also visit <http://www.copper.org>.



COPPER DEVELOPMENT ASSOCIATION INC.

* All calculations based on a 1995 DOE-sponsored Technical Support Document.

APPA News

APPA As I See It

by Ronald T. Flinn
APPA President-Elect
Assistant Vice President
for Physical Plant
Michigan State University

Being a part of physical plant operations at Michigan State University since the 1950s has not only been an advantage for my assignment on the campus but has also provided the opportunity to observe APPA grow and evolve over the decades. Beginning as a totally volunteer organization, it went on to establish an office, and then moved to Washington, D.C. with a full-time executive. Subsequently, it purchased its own building and developed a diverse staff. Its membership grew from a few hundred institutional members to nearly 1,500. In addition to the enormous quality improvement of the educational programs at the APPA annual meetings, what was once a one-week workshop has evolved to the three-track Institute for Facilities Management. The APPA organization has developed significantly and with a deep level of professionalism.

In the recent past, APPA has successfully addressed significant issues in a timely manner. In the 1970s the Energy Task Force tackled the energy crisis, and in the 1980s, the *Decaying American Campus* study dealt with deferred maintenance. In the 1990s, APPA has established a new region, expanding its membership internationally, introduced Internet technology through the APPANet Web site, and can boast that attendance at the APPA Institute is at an all-time high.

This growth and maturing are akin to a person moving from youth, through young adulthood, and approaching middle age. Understandably, a feeling of content-

ment is justified, but just as we must guard against smug complacency as individuals, APPA must also take stock as there is some evidence of drift.

- Membership growth has been quite slow for the last few years.
- Income expectations have not been achieved recently.
- Topical publications are not being developed as timely as desired.
- The Institute's curriculum is not as fresh as it once was.
- At times the members and regions feel APPA is more interested in worldly issues than their concerns.

APPA must recapture its youthful vigor and the ability to quickly respond to the changing scene. As E. Gordon Gee, president of The Ohio State University, recently stated, "We will be the architects of change or we will be its victims."

Being aware of the above concerns caused me to be all the more pleased that the Board of Directors was willing to take significant steps at its February meeting to revitalize APPA. They agreed on the following five strategies:

1. Increase the linkage between the regions and APPA.
2. Improve educational effectiveness.
3. Expand the use of APPANet.
4. Raise awareness of APPA and the role of the facilities officer among our institutions' senior officers.
5. Establish a process to understand stakeholders' needs.


The Board also directed Government Relations to concentrate on gathering and distributing information regarding regulations. This new focus allowed a shift of dollars, and the Board was able to authorize the Educational Programs Committee to undertake a study for updating the Institute's curriculum. In addition, the Board authorized an analysis of APPA's current hardware and software configuration to ensure that APPANet has the capability needed to fully serve our membership.

These recent Board actions convince me that APPA recognizes the need to regain a youthful vigor; it is capable of accurately forecasting future needs and is able and willing to act quickly to prepare for the changing scene. This is def-



START AT \$11¹²

Solid plastic parking blocks and composite speed bumps are lighter, stronger and more durable than concrete. SAVER BLOCKS™ are available in gray, yellow and handicapped blue, SAVER BUMPS™, in asphalt black and safety yellow.



START AT \$26²⁵

SAVE TIME with one person transport & installation. SAVE MONEY: SAVER BLOCKS start at \$11.¹² SAVER BUMPS start at \$26.²⁵. SAVER BLOCKS and SAVER BUMPS are environmentally friendly because they reduce the amount of material that would otherwise be placed in our landfills.

THE

PARKING BLOCK STORE

FOR STORE CATALOG
CALL TOLL FREE:

800-683-9963

a division of DCV, Inc. 

initely the attitude necessary to remain the facilities association of choice and truly become a global partner in learning. I am delighted to be a part of this chapter in APPA's history. ■

We've moved!

APPA has relocated to its new headquarters at 1643 Prince Street, Alexandria, Virginia 22314-2818. Our phone, fax, and e-mail numbers remain the same:
phone: 703-684-1446
fax: 703-549-2772 ■

Past President Jenkins Recognized for Service

APPA Immediate Past President Charlie Jenkins, whose passion for leadership through service drove his presidency last year, was awarded the Marianist Heritage Award by his school, Saint Mary's University of San Antonio, Texas, for his work in this area.

According to Jenkins, "This is recognition by the university community for



Rev. John Moder, President, St. Mary's University, presenting 1996 Marianist Heritage Award to Charles W. Jenkins.

our behaving the way I've encouraged the members to do—that is, to build relationships in addition to fixing stuff."

In presenting the award, the Reverend George Montague, chairman of the Marianist Forum, which selects the recipients, noted that Jenkins "has fashioned the Physical Plant Department into a real dynamic team....He frequently addresses his staff on the importance of service and the need to provide a service that demonstrates a caring attitude. He was instrumental in taking the mission statement of the administration and finance area and revising it so that it reflected the spirit of service."

The Marianist Heritage Award was created in 1981. Jenkins is the first person from the administrative and finance area to receive it. ■

REFRIGERANT PROBLEMS?

Here are 6 Solutions

1. Speed ~ We'll give you the fastest on-site recovery and reclamation service in the world.

2. Purity ~ We guarantee your reclaimed refrigerant will meet or exceed ARI 700 standards.

3. Response ~ Our Overnight Response Team responds instantly to emergencies.

4. Availability ~ We maintain a full stock of all common and many uncommon refrigerants.

5. Convenience ~ Our 7 facilities are strategically located throughout the country to provide you efficient service.



6. Peace of Mind ~ Our Refrigerant Banking Program releases you from the burdens of paperwork and inventory control while assuring effective management of your fully insured refrigerant resources.

Plus ~ Through an agreement with Environmental Support Solutions, Inc. we offer complete refrigerant management programs including refrigerant management software, equipment economic analysis, refrigerant site surveys and customized plans that assure EPA compliance.

HUDSON
TECHNOLOGIES, INC.
THE REFRIGERANT LEADER



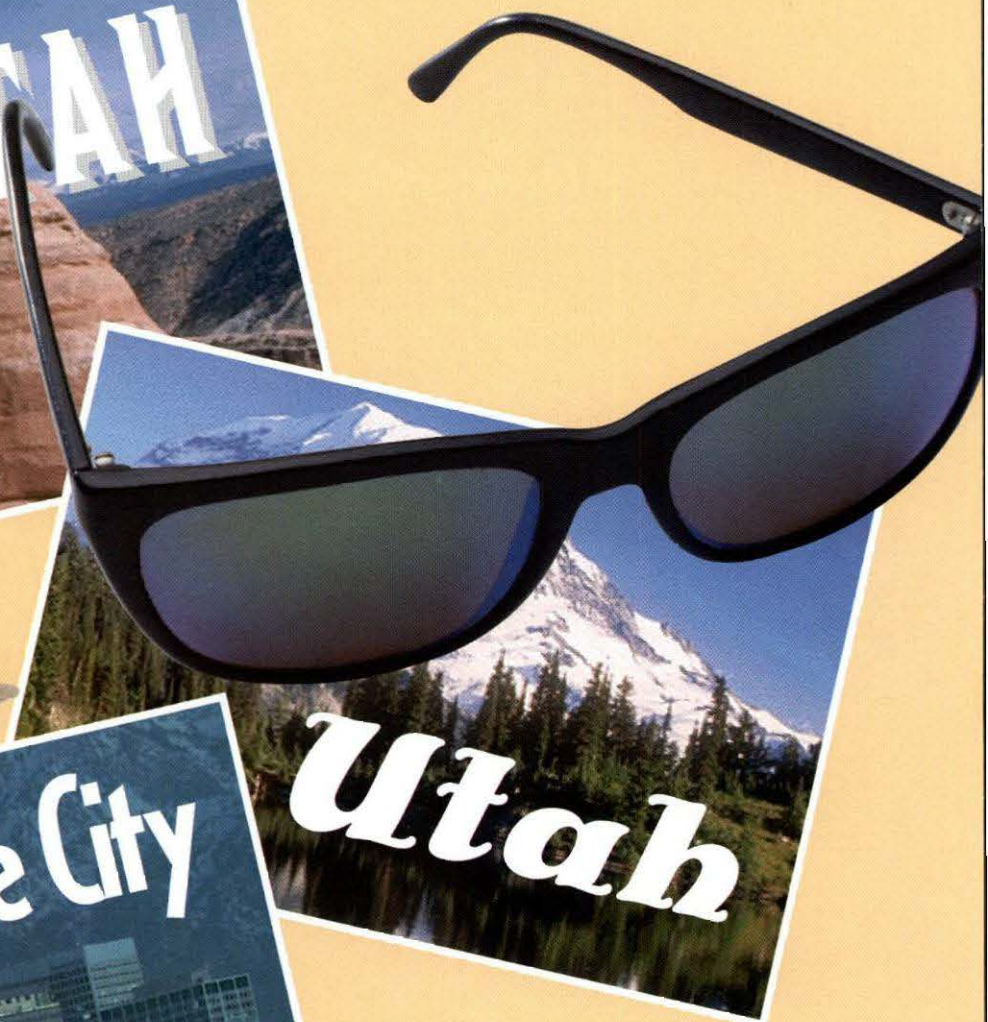
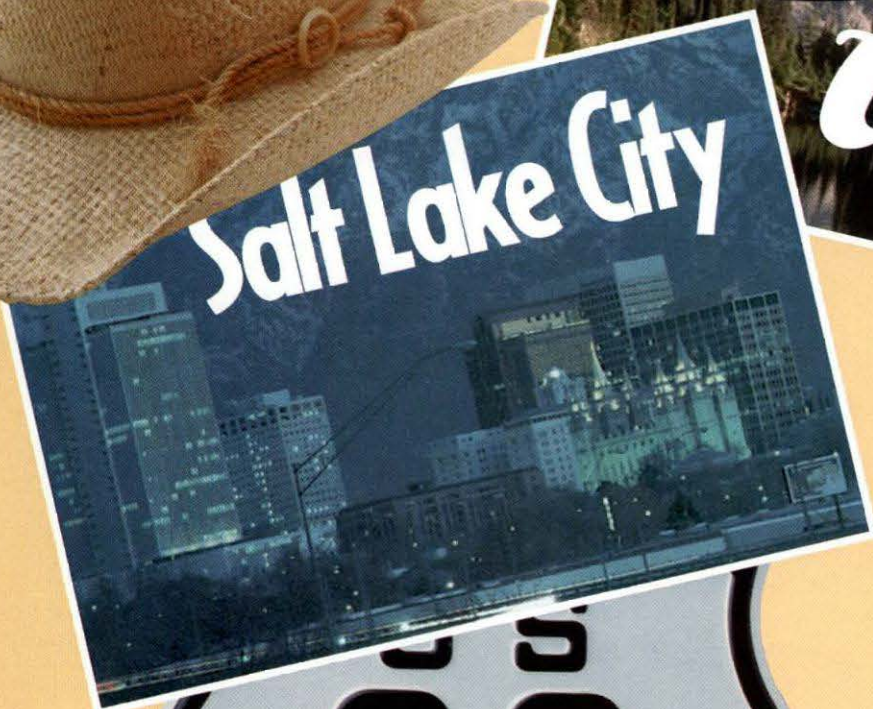
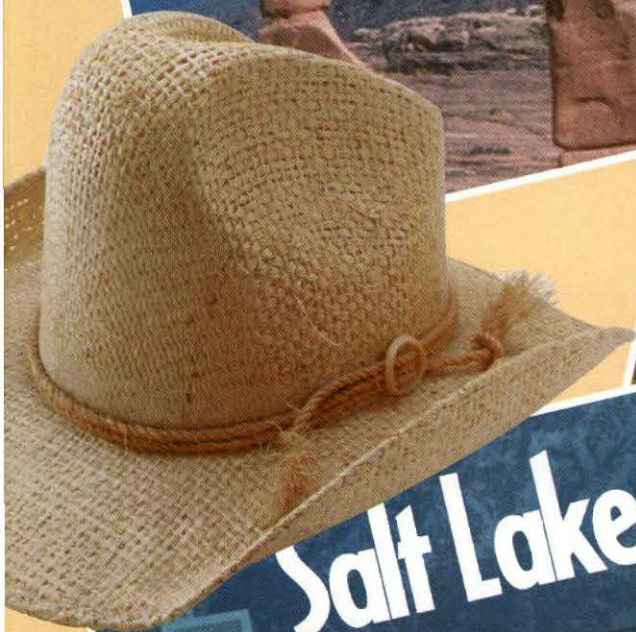
25 Torne Valley Road
PO Box 1187
Hillburn, NY 10931-9900
1-800 953 2244

Construction Up at Two- and Four-Year Colleges

U.S. two- and four-year colleges completed an estimated \$6.2 billion of construction projects in 1995, and are anticipated to complete another \$6.7 billion in 1996, according to a survey conducted for *School Planning & Management* magazine.

The survey shows that about two-thirds of the college construction dollars are spent on new buildings, and that most of the money goes toward classroom and science buildings. The most active regions in terms of college construction are the west and south. ■

Frontiers in Learning



1996 APPA
Educational
Conference & 83rd
Annual Meeting

July 21-23
Salt Lake City, Utah

New Frontiers, New and Better Ways of Doing Things



It's a new and rapidly changing world we live in. Why not have the security of knowing you are prepared for the changes coming, that you can lead or manage the change, and land on your feet even after all the dust settles. Changes in technology, economy, and demographics have created a new frontier for higher education. Like earlier pioneers, facilities professionals are confronted with new worlds to explore and new situations to work with. Be prepared by coming to APPA's 1996 Educational Conference and 83rd Annual Meeting.

The theme of this year's meeting invites facilities professionals to explore the frontiers presented by this new world. How can we adapt and succeed while maintaining the quality of higher education now and tomorrow?

APPA's 1996 Educational Conference and 83rd Annual Meeting is a key learning experience. The conference examines issues of leadership and cutting edge developments and fosters networking to share ideas and solutions with other facilities organizations.

The 1996 Educational Conference features a varied selection of educational opportunities. The program is divided into several tracks each day, so you can focus on one subject area or divide your time among topics.

Join us in Salt Lake City to learn new information, hone your skills, and rejuvenate your professional life.

Keynote Address – Savvy Networking – Making the Best Connections for Business and Personal Success

Sunday, July 21

Susan RoAne, author of two books on the power of networking, will show us how to meet and connect successfully with others.

For your professional and personal benefit it is imperative to connect with people, and Ms. RoAne will explain how to make those connections work for you.



Train-the Trainer

Do you like the Basic Tools for Facility Supervisors package but don't have staff trained to present the material? APPA members have asked for the opportunity of having an outside trainer instruct their on-staff trainers to better complete the Basic Tools package. Here is your chance! APPA has arranged a training session specifically on this package to be held at the annual meeting. Preregistration and fee required.

Principles of Organizational Excellence: A Management, Organizational Design, and Leadership System for the 21st Century

The Principles of Organizational Excellence (POE) represent the master system for managing, leading, and designing organizations for the next century. The POE are a unique blend of human and organizational models and principles that have been developed over the past 40 years. It combines TQM, empowerment, principle-centered leadership, reengineering, constraints management, and behavior management with the best leadership and management thinking in the last half of the 20th century. Come spend the day learning how to transform your organization. Preregistration and fee required.

For more information on the annual meeting, contact APPA's Education Dept. at 703-689-1446 ext. 230 or visit APPA's web site <http://www.appa.org>.

HOT SESSIONS!

The annual meeting focuses on timely issues of concern to facilities officers. Some of this year's sessions include

How to Inspect Your Facilities and Still Have Money Left to Repair Them

Go back to your campus with ideas on how to create your own in-house system that saves your infrastructure and money.

Performance Contracting for Energy Conservation and Capital Renewal

Learn how to make millions of dollars worth of mechanical, electrical, and control systems upgrades without any university- or state-provided funds.

Vision 2000: New Thinking for University Facilities Management

New thinking and vision with the proper installation of management systems will put facilities management on the cutting edge of the '90s and beyond. Come learn how.

Orientation: The Beginning of Excellence

By investing a little extra time in orienting a brand new employee you can make a great investment in excellence. Learn about this win-win opportunity.

Beyond Master Planning: The Anatomy of Campus Design

Learn about a new proven process to evaluate the character, condition, and maintenance of a school's campus, comparing those findings with the mission and budget, and taking action to bring the former in line with the latter.

Being the Provider of Choice in a Private University

Learn how to compete and overcome the barriers to become the facilities department of choice in an institution that has lots of options.

Change Management Strategies for Facilities Managers

Get a better idea of how prepared you and your organization are to assimilate major change. Then learn what key principles and steps you can take to increase your capabilities as change agents.

Physical Plant Multi-Craft Training Program: Developing a Technologically Advanced Workforce

Want to meet the demand for a highly skilled, cost-effective physical plant workforce while providing career opportunities and responding to a tight labor market? Then come learn about this multi-craft training program.

Award-Winning Environmental Management Program

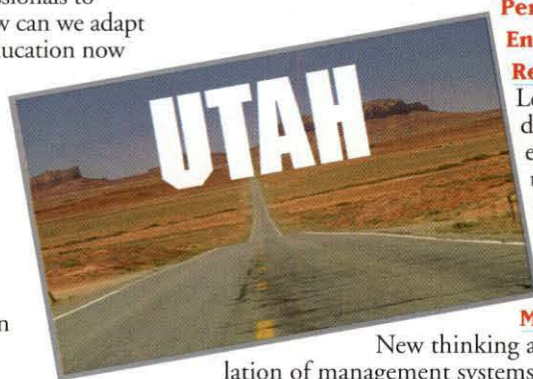
Come learn about what this multi-campus community college is doing to win numerous environmental awards: composting, energy savings, recycling, CFCs, excess chemical exchanges, micro-scale labs, and more.

The Classroom of the Future: The SUNY Brockport Experience

This presentation captures the collaborative efforts and technical design considerations included in the facility to accommodate the electronics and large television screens, in addition to providing television studio quality accommodations to enhance instruction.

Benchmarking: Work Measures that Produce Results

This presentation presents a set of performance measures and work indicators that can produce results quickly and effectively as part of a university's continuous improvement program. Come learn how to implement your own process.



1996 APPA Educational Conference & 83rd Annual Meeting

July 21-23 Salt Lake City, Utah

Frontiers in Learning

Thursday, July 18

10:00 am-12:00 n Regional Representatives Meetings
1:00-5:00 pm Executive Committee Meeting

Friday, July 19

8:00 am-5:00 pm 1995-96 Board of Directors Meeting

Saturday, July 20

8:00 am-12:00 n Committee Meetings
9:00 am-5:00pm Exhibitor Registration and Set-up
12:00-5:00 pm Member Registration
12:00-5:00 pm Welcome Desk Open
12:30-5:30 pm Train-the-Trainer (preregistration required)
1:00-5:00 pm Campus Tours
4:00-5:00 pm International Members Meeting
4:00-5:00 pm Past Presidents Meeting

Sunday, July 21

7:00-4:00 pm Member Registration
8:00 am-1:30 pm Exhibitor Registration and Set-up
8:30-4:00 pm Welcome Desk Open
7:30-8:30 am Breakfast & Meeting Kickoff
9:00-10:30 am Live Broadcast/Tabernacle
9:30-10:30 am Educational Sessions
10:45-11:45 am Educational Sessions
11:45 am-12:00 n Refreshments and Snacks
12:00-1:00 pm Educational Sessions
1:15-2:15 pm Opening Keynote Address
Presenter: Susan RoAne, author of two books on the power of networking
2:30-6:00 pm Exhibit Hall Open and Lunch

Monday, July 22

7:00-4:00 pm Member Registration
8:30-4:00pm Welcome Desk Open
7:30-8:45 am President's Breakfast
9:00-5:00 pm Principles of Organizational Excellence (preregistration required)
9:00-10:00 am Educational Sessions
10:00 am-12 n Exhibitor Registration
10:15-11:15 am Educational Sessions
11:30 am-12:30 pm Educational Sessions
12:00-3:00 pm Exhibit Hall Open and Lunch
3:00-4:00 pm Exhibitor/Vendor Technical Sessions
4:00-5:00 pm Networking/Roundtable Discussions
4:00-5:00 pm Military Reception

Tuesday, July 23

7:00-4:00 pm Member Registration
7:00-8:00 am Leadership Awards Program and Coffee Service
8:15-9:15 am Educational Sessions
9:00 am-11:00 am Exhibitor Registration
9:30-10:30 am Educational Sessions
10:30 am-1:30 pm Exhibit Hall Open and Brunch
1:30-3:45 pm Educational Sessions
4:00-5:30 pm Regional Meetings
6:00-9:30 pm Reception and Banquet
Speaker: Scott Adams, Dilbert Comic Strip Creator

Wednesday, July 24

8:00 am-3:00 pm 1996-97 Board of Directors Meeting

1996 Exhibitors to Date (as of March 5, 1996)

AEC Data Systems, Inc.
American Management Systems
American School & University
American Thermal Products
Anixter International Inc.
Applied Computer Technologies
ARMM Associates, Inc.
Ascension, L.C.
Avian Flyaway, Inc.
Best Lock Corporation
Black & Veatch
Blue Ridge Carpet Mills
Bonar Floors, Inc.
Brainerd Compressor Inc.
Building Operating Management
Burns & Roe Services Corporation
CBI Walker, Inc.
Ceramic Cooling Tower Company
CES/Way International, Inc.
Club Car
College Planning & Management

Comtec Industries
Country Roads
Courtaulds Performance Films
Custom Window Company
Cutler-Hammer
Dataquire
DFM Systems, Inc.
Diversey Water Technologies
DriTherm Inc.
E & I Cooperative
Edwards Engineering Corp.
EMCO
Engineering Associates, Inc.
Essex Industries, Inc.
Exeter Architectural Products
Facility Engineering Associates
Gage-Babcock & Associates, Inc.
General Meters Corporation
Genie Industries
George B. Wright Co., Inc.
Hesco Inc.
Hillyard, Inc.
HNTB Corporation
Horizon High Reach Inc.
HRP Associates, Inc.
Hubbell Lighting Inc.
Hudson Technologies

Inspec, Inc.
Intermountain Lock
Islandaire Inc.
Jenbacher Energie Systeme Ltd.
Johnson Controls, Inc.
Kattner/FVB District Energy
Kenall Lighting
Landis & Gyr Powers
Lerch Bates North America, Inc.
Locknetics Security Engineering
M.A.G. Eng. & Mfg. Co., Inc.
MacBall Industries
Maintenance Automation Corp.
Maintenance Warehouse
Management Advisory Group, Inc.
Marks USA
McCourt Mfg
MCP Urethanes
McQuay International
Milliken Carpet
Mity-Lite Tables, Inc.
Motion Control Engineering
Musco Lighting, Inc.
Nalco Chemical Company
Natare Corporation
NuTemp
Palmer Snyder Furniture Co.

PDS
Performance Roof Systems, Inc.
Peto Contract Associates
Polycoat Systems, Inc.
Power Access Corp.
Prism Computer Corporation
Pro-Team Backpack Vacuums
PSDI
Redicheck Associates
Rich & Associates
Roesel, Kent & Associates
Rolf Jensen & Associates
Rubber Products, Inc.
Safety Technology International Inc.
Santana Products, Inc.
Sarnafil, Inc.
Savage Engineering
Security Door
Servicemaster
Spectrum Industries, Inc.
Staefa Control System
StageRight Corp.
Stanley Consultants, Inc.
Sturdisteel Company
Tecogen
Telair Systems, Inc.
The Dorma Group

The Maiman Company
The Nemiroff Corporation
The Stubbins Associates/Acentech
The Watt Stopper, Inc.
The Western Group
The Wiremold Company
Thermal Pipe Systems, Inc.
This End Up Furniture Company
TSI Incorporated
United States Pumice Company
United Technologies Carrier
University Loft Company
UtiliCorp United
Venmar Ventilation Inc.
Victor Stanley, Inc.
Viron Energy Services
Vulcan Signs
Wausau Metals
Weil-McLain
Wescorp
World Dryer Corporation



We Do Windows '96.



And We Do Them For Less.

Let ABM Janitorial Services Be Your Partner In Cutting Your Campus Maintenance Costs.

For over 85 years, American Building Maintenance Company has provided high-quality contract maintenance services—without the high cost or the liability you would have if workers were employed by the campus.

We've learned our clients' real needs. Studied dozens of ways to save them money. Analyzed costs, productivity and quality levels so well that our clients can save as much as 15% over in-house programs. Without sacrificing quality.

You'll find that our proposals are detailed, accurate, and meet the unique demands of your campus. Building maintenance is all we do—and we've learned to do it very well indeed. More and more institutions are finding that an "operating partnership" with ABM Janitorial Services

for contract custodial, engineering services and grounds care are exactly what they need to operate with today's tight maintenance budgets.

Call today: 415-597-4500, Extension 148. Or write:

Robert Ramirez, Vice President,
ABM College and University Program. It's time.



ABM
AMERICAN BUILDING
MAINTENANCE CO.

Robert Ramirez, Vice President
College & University Program
American Building Maintenance Co.
50 Fremont Street, 26th Floor
San Francisco, CA 94105-2230
Fax 415-597-7160

a subsidiary of **ABM** Industries, Incorporated

Green Lights & Energy Star News

Several APPA member institutions are active in the Green Lights and Energy Star programs of the U.S. Environmental Protection Agency. Here is an update on their latest activities.

- Florida International University has now completed and reported 100 percent of its upgrades on more than 2.3 million square feet.
- Delaware State University at Dover recently joined the Green Lights program. The school has committed 1.2 million square feet to the program.
- The University of Missouri at Columbia is realizing great energy savings through its Energy Star buildings upgrades. Their pilot building, University Hall, is now saving 60 percent electricity and 87 percent gas usage. Utilities costs have decreased 68 percent, from \$3.92 per square foot down to \$1.26.

Resource Bank

MAPPA: The Midwest Association of Higher Education Facilities Officers, is the latest region to make its debut on the World Wide Web. The MAPPA Web site (<http://www.indiana.edu/>) will be added shortly to the APPA home page.

The Eastern Region also has a Web site. You can reach it at <http://www.erappa.org>.

The American Institute of Architects has added an electronic directory of AIA-member architects to its World Wide Web site. The directory allows searching by firm name, geographic location, key personnel, and service specialty. The directory is available through the AIA home page at <http://www.aia.org>. For more information, contact the AIA at 202-626-7463.

The National Roofing Contractors Association has published the third edition of the *NRCA Roofing and Waterproofing Manual*. The manual contains 600 pages of specifications, product information, and technical and practical application data. Cost of the manual is \$118 (\$98 for NRCA members), plus \$5 shipping and handling.

To order, contact NRCA at 800-323-9545.

ASHRAE, the American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc., announces the publication of *Application Guide for Absorption Cooling/Refrigeration Using Recovered Heat*. The guide explains how to use absorption technology in central plant cooling, commercial space cooling, and industrial uses where recoverable heat is available. The guide also contains a computer program that automates the application procedure, simplifying the initial selection and economics for a potential project. The guide is available for \$79 (\$53 for ASHRAE members). To order contact ASHRAE customer service at 800-5-ASHRAE.

Tools & Activities for a Diverse Workforce is a new publication from the American Society for Training and Development that features a selection of worksheets and exercises that human resource managers can use to plan and implement a diversity program. The book is priced at \$150 (\$140 members). For more information, call ASTD at 703-683-8100.

The Professional Grounds Management Society (PGMS) has published an updated edition of its *Grounds Maintenance and Estimating Guidelines*. The 36-page booklet covers all key areas of estimating for grounds management and is filled with tables, figures, and forms. Information includes: personnel cost calculations, sample annual overhead worksheet, capital costs calculations, hourly owning & operating cost estimate, landscape maintenance specifications, model landscape maintenance contract, fertilization application tables, and more. Copies are available for \$15 each; \$12 for quantities of three or more. Contact PGMS at 410-584-9754.

The Environmental Resource Guide, published in partnership between John Wiley & Sons and the American Institute of Architects, is a collection of comprehensive reports to help building

design professionals make informed choices of materials to achieve environmentally responsible designs. The publication includes comprehensive reports with analyses of building materials' impact on the environment and ecosystem, health and welfare, energy and building operations. The list price is \$175; to order contact John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158-0012.

Job Express Update

January 15, 1996

Director of Facilities Services, Knox College.

Director of Operations and Maintenance Services, University of California/San Diego.

Steam/HVACR Mechanic, Western Maryland College.

Facilities Manager (Madison, Wisconsin) and Facilities Manager (Findlay, Ohio), Koll Facilities Services.

Director for Utilities, Texas A&M University.

TURNING IDEAS INTO REALITY FOR THE UTILITY INDUSTRY



Consulting Engineers

ENGINEERING & CONSULTING SERVICES

6629 W. Central Avenue • Toledo, Ohio 43617
Phone 419-843-8200 • Fax 419-843-8020

Director of Buildings and Grounds,
Washington and Lee University.

Director of Planning & Construction,
University of Chicago Hospital.

Associate Director of Facilities Services,
University of California/Davis.

Director Facilities Development and
Management, Arizona State University
West.

Assistant Director for Utilities, Indiana
University.

Assistant Director/Energy Manager,
GMI Engineering & Management
Institute.

Chief Engineer, Facilities Management,
Murray State University.

Manager of Campus Cleaning, Sacred
Heart University.

February 1, 1996

Facilities Capital Project Manager,
Facilities Resource Management
Company.

Director of Facilities Management,
William and Mary.

Associate Director of Physical Plant for
Facilities Management and Associate

Director of Physical Plant for
Operations, University of

Illinois/Chicago.

Building Maintenance Superintendent
and Housekeeping Superintendent,
Cranbrook Educational Community.

Maintenance Director, Saint Andrew's
School.

Director Physical Plant Management,
California State University/
Northridge.

Director, Facilities Management,
Murray State University.

February 15, 1996

Director of Physical Plant, Southeastern
Louisiana University.

Director of Facilities, Town of Madison,
CT.

Facilities Capital Project Manager,
Facilities Resource Management
Company.

Director, Facilities Management,
Murray State University.

Project Manager, Salem State College.

Director of Physical Properties, Aurora
University.

Manager of Mechanical and Electrical
Systems, Brown University.

March, 1, 1996

Campus Facility Planner, University of
Wisconsin-Platteville.

Director of Physical Plant, St. Paul's
School (NH).

March 15, 1996

Vice Chancellor for Facilities, Board of
Regents of the University System of
Georgia.

Manager for Maintenance and
Renovations, University of North
Carolina at Greensboro.

Director of Facilities Management and
Planning, Eastern Connecticut State
University.

Director of Facilities Planning and
Operations, West Valley-Mission
Community College District (CA).

Supervisor of Mechanical Engineering,
University of Maryland, College Park.

Director, Facilities Planning, California
State University, Dominguez Hills.

Maintenance Services Manager,
Randolph-Macon College (VA).

Building Operations Manager, Detroit
Institute of Arts.

TOUGH FACILITY INFRASTRUCTURE DECISIONS?

... at **SVBK**

**when entrusted with your goals,
achieving them becomes ours.**

**Providing Consulting Services to Universities and
Institutions Nationwide**

- Fuel Supply Development
- Regulatory Support
- Project Financing Support
- Cogeneration Analyses
- Contract Negotiations
- Strategic Planning
- Risk Management
- Cost Recovery
- Supply Planning
- Privatization
- Feasibility Studies
- Public Procurements
- Conservation & Demand-Side Programs

SVBK CONSULTING GROUP

Engineers and Consultants

CHARLOTTE

101 S. Tryon Street
Suite 2450
Charlotte, NC 28280
(704) 347-8100
FAX (704) 347-8101

DENVER

4643 S. Ulster Street
Suite 1485
Denver, CO 80237
(303) 843-0600
FAX (303) 843-0529

ORLANDO

205 E. Central Blvd.
Suite 500
Orlando, FL 32801
(407) 872-1500
FAX (407) 843-3200

For information about advertising in
or subscribing to Job Express, contact
Cotrenia Aytch at 703-684-1446 ext.
235, or at cotrenia@appa.org.

Executive Summary

Space and Higher Education's Future

Wayne E. Leroy

Higher education has experienced tremendous changes in the last five years, and the issues affecting us have come in a never-ending stream of challenges—right-sizing, total quality management, privatization/outourcing, benchmarking, reengineering, customer service, and much more. This column gives me the opportunity to be a “crystal ball gazer” and focus on issues that will affect educational facilities in the coming years.

What fuzzy images in that crystal ball are becoming clarified? And how will those things impact campus facilities as we approach the year 2000? Well, to this crystal ball gazer, there are three major areas on which to focus: space management, the financing of higher education, and technological trends. In light of the theme of this issue of *Facilities Manager*, let's explore the issue of higher education facilities space.

At the beginning of the 1990s, higher education facilities in the United States had about 3 billion square feet of space. Statistics during the last five years indicate an average of \$6.5 billion of additional space is being built each year. This annual dollar amount equates to 500 million square feet of space, or a total of 3.5 billion square feet of space at the end of 1995.

Now let's shift our thinking about quantity of space to maintaining and operating that space. Even though in the last five years we have seen a 16 percent increase in the amount of space

on college and university campuses, we have seen only a 9 percent growth in the expenditures for maintenance and operations. We have seen institutions struggle to finance the costs associated with additional space, and other campus facilities experience continued usage, with declining resources for their care, operation, and maintenance. Institutions have been engaged in a precarious “juggling act” to finance facilities while receiving fewer resources from traditional sources such as state governments, and many have attempted to minimize the amount of annual tuition increases. Nonetheless, a financial tug-of-war has ensued on many campuses.

This phenomenon is nothing new to any facilities manager. As more space is added with little or no additional operating funds, two options become evident—do more with less or outsource.

We are currently on the threshold of a new challenge for higher education and electronic accessibility. How does higher education prepare itself for the “virtual learner,” as Don Norris calls that individual who wants to utilize Web sites and the Internet to support and enhance their educational experiences and needs? How do we incorporate new and innovative technology to support faculty in becoming more adept at their profession, that of teaching students? How can we assist the campus workforce in their quest of being efficient, effective, and productive? And—more important than all these questions—what changes and/or adaptations will facilities need to undergo to accommodate the learning environment of the twenty-first century.

The third and final challenge I foresee for the next five years will be the financing of higher education. For years we have relied on a traditional approach of allocating resources based on the number of people enrolled at the institution—FTEs, or full-time equivalent students. In recent years there has been a hue and cry from students, parents, potential employers, policymakers, and the public at large for changes in higher education. Some of the changes being called for include controlled costs, less bureaucracy, more accountability. In short, what is being demanded from higher education institutions is efficiency, effectiveness, and productivity.

Our educational institutions have tried a multitude of efforts to affect change; some have worked and

brought improvements, some have failed, and others are still being evaluated before a final determination can be made. However, there are two constants within higher education, two common denominators that you will find on every campus: students and space. Past history has focused on financing higher education using only one factor—students. I predict that the second common denominator—space—will become an equally important component for financing higher education. If space is to become a key item in the financing of higher education, then facilities managers must take the initiative to determine the amount and type of space on campus, assess the condition of that space, and determine the utilization of the space.

As we move toward the next century, I think we can all agree that change is here and more is coming, and the rapidity of those changes will only increase. The challenge is for all of us to determine what role space will play in the future of our individual institutions, and indeed all of higher education. ■



INFORMED* CUSTODIAL STAFFING SOFTWARE

**In a friendly Microsoft Windows
atmosphere:**

- Benchmark and justify your staffing level against national norms.
- Perform “what if” scenarios with the “click” of a button
- Establish balanced cleaning areas and multiple shift schedules.

From Jack C. Dudley, PE, Editor and Co-author of the APPA Publication *Custodial Staffing Guidelines for Educational Facilities*, who has refined those methods through added research and on-site consulting. The software, featuring those refinements, has received many excellent reviews by users since its' introductory offering late last year.

Several models are available starting at:

\$179

Call or Write Jack for Details.

* The Institute for Facilities Operations Research and Management Educational Development

5335 South Lakeshore Drive
Racine, Wisconsin 53403
(414) 552-8966

Wayne Leroy is APPA's executive vice president.

Focus on Management

Needed: A University Garage Sale

H. Val Peterson

I must admit that on occasion I succumb to the primal inner urge found within a fairly significant portion of the human population to bag a real bargain. In pursuit of that urge I have been known to strike out on a Saturday morning to stalk the

garage sale trail. On rare occasions I have even succeeded in procuring that elusive "once-in-a-lifetime" bargain. On the other hand, periodic necessity has dictated that I sponsor my own personal garage sale in order to free up enough space in the garage to park the family automobile.

While we recognize that the university has an organized and perfectly legitimate method of disposing of surplus property, that process deals only with items that are openly acknowledged as useless, nonfunctional, or obsolete.

As I look around at the crowded facilities within my institution, I have concluded that the university would benefit from having its own garage sale—a university-wide garage sale, if you will. While we recognize that the university has an organized and perfectly legitimate method of disposing of surplus property, that process deals only with items that are openly

acknowledged as useless, nonfunctional, or obsolete. What really concerns me are those forgotten items that are squirreled away in closets, storage rooms and other less-than-legal locations, or those items that are kept because someday they will surely be needed (most likely the day after hell freezes over).

Prior to this grandiose garage sale, we might even go so far as to require every faculty member, every administrator, and all staff to evaluate every piece of equipment and all materials that he or she is responsible for. Only those items in good condition or that have been used directly to support the mission of the institution during the past fiscal year would be retained. The remainder of the items would be part of the gigantic university garage sale. I have a good feel for the magnitude of this problem on our campus, but try to visualize, if you will, the space that could be freed up and gained in all our colleges and universities if each institution conducted its own garage sale.

The room that has housed broken desks and chairs for the past twenty years would be empty again and available for constructive use, like instructional or research. Those moth-eaten and dusty stuffed critters and the jars of pickled snakes could be transferred to someone's private trophy room or at least given a decent burial. Relics such as adding machines, typewriters, 64k personal computers, and other electronic equipment of a bygone era might be put to beneficial use by bargain-seeking retirees or donated to a museum. The space gained could be staggering, and who knows what skeletons would be unearthed.

Old and mysterious awards, certificates, plaques, trophies, and other memorabilia would disappear from offices and storage cabinets. Old copies of the *Chronicle of Higher Education*, the *Wall Street Journal*, *American School &*

New Facilities? Expansion? Renovation?

O'Brien-Kreitzberg understands the requirements of school construction, from monitoring budgets and schedules to safeguarding children during construction. We have managed the planning, design and construction of classroom buildings and support facilities for schools of all levels.

- Construction Management
- Project Management
- Schedule and Cost Control
- Estimating
- Value Engineering
- Quality Assurance
- Inspection/Quality Control
- Dispute Resolution

Clients include:

Camden Board of Education, NJ
New York City School Construction Authority, NY
Mars Area School District, PA
Maple Shade Township School District, NJ
North Allegheny School District, PA
Florence Township School District, NJ
Glendale Unified School District, CA
White Plains School District, NY

O'Brien-Kreitzberg

Professional Construction Managers

San Francisco	New York	Atlanta	Chicago	Other Offices	Internet
(415) 777-0188	(212) 921-9898	(404) 524-5505	(312) 263-0959	Nationwide	info@okpcm.com

Val Peterson is director of facilities management at Arizona State University in Tempe, Arizona, and an APFA Past President.

University magazine, and other journals and periodicals would free up space on bookshelves, storerooms, and more importantly in libraries, which could then replace them with more current periodicals or even computers.

And we should not ignore the teaching and research laboratories. Who knows what antiques would be found? The spaces occupied by discarded beakers, outdated chemicals, and broken test tubes alone could add significant usable storage.

Classroom closets never opened by instructors could be cleaned out and made available to start a new life as usable storage areas. Custodians could remove obsolete and unused cleaning products, broken equipment, and the pile of instructions and policy changes accumulated over the past thirty years. The maintenance shops could do well to clean house too. Not just cleaning house but removing accumulated pipe scraps, broken equipment, parts, fittings, nails, screws, and bolts that combine in weight to wreak havoc on the overloaded springs of each service vehicle. Shop storage could be greatly increased if those obsolete and never-to-be-used-again products were disposed of. Someone with appropriate authority could remove those items illegally stored under stairways, in corridors, hallways, and equipment rooms. Especially equipment rooms.

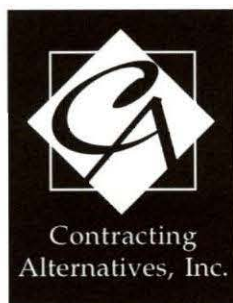
Assuming that every building was originally planned and built to include adequate storage (a questionable assumption indeed), the storage spaces would likely have been completely filled within the first year of building occupancy. The storage scenario usually goes like this: file cabinets fill up very fast, then portable storage units are brought in to accommodate a few more months of storage needs, and then arrives boxes of all sizes that are stored in every location imaginable and even some unimagined locations.

I do, however, have a major reservation about this garage sale. My concern: who will attend? My greatest fear is that our own faculty and staff will purchase most of the items and the whole operation will merely result in the removal of items from one storage location to then be placed in a new storage room for someone else's stock of useless items. Golly, there must be a way to do it right.

On my campus, I have a selfish rea-

son for sharing this idea with you. After working as a facilities manager for nearly thirty years, I would just once like to hear, when I ask a dean or department head about their most serious space need, something like, "I don't have any space needs—especially for storage." I recognize that I am dreaming to think a conversation such this would ever take place.

Of course, I have other dreams as well, like having an adequate budget sufficient to reduce deferred maintenance levels and to pay for unfunded mandates. I am cynical of the possibility that these funds will be forthcoming through normal funding channels, however, and have concluded that I may have a better chance if I make friends with Bill Gates. ■



Physical Plant Contracts Now Available

Based on solicitations successfully tested through years of experience in a university environment. Updated and improved as needed to meet today's standards, each complete document includes: Bid Instructions, Scope of Work, Technical Specifications, Terms and Conditions, and Pricing Schedules. Individual contracts and complete volumes are presented in a professional binder and available on computer diskette using your choice of WordPerfect or ASCII format.

Construction - Part A: Carpentry Services; Concrete Installation and Replacement Services; Drywall Services; Electrical Services; Excavation Services; Painting Services; Ready Mix Concrete; Resilient Flooring Services; and Suspended Ceiling Tile Services.

Construction - Part B: Crushed Stone Supplies; Doors, Windows, and Hardware Supplies; Electrical Supplies; Lumber and Building Supplies; Masonry Services; Masonry Supplies; Mechanical Services; Mechanical Supplies; and Plaster Services.

Buildings & Grounds: Atrium Plant Maintenance; Electrical Utility Services; Elevator Inspection Services; Elevator Preventive Maintenance Services; HVAC Preventive Maintenance Services; Pest Control Services; Refuse Collection Services; Trash Removal Services; and Tree Trimming Services.

	<u>Hard Copy</u>	<u>w / 3 1/2" Diskette</u>
<i>One Volume</i>	\$ 195	\$ 295
<i>Any 2 Volumes</i>	345	445
<i>Complete 3 Volume Set</i>	495	595
<i>Individual Contracts</i>	50	75

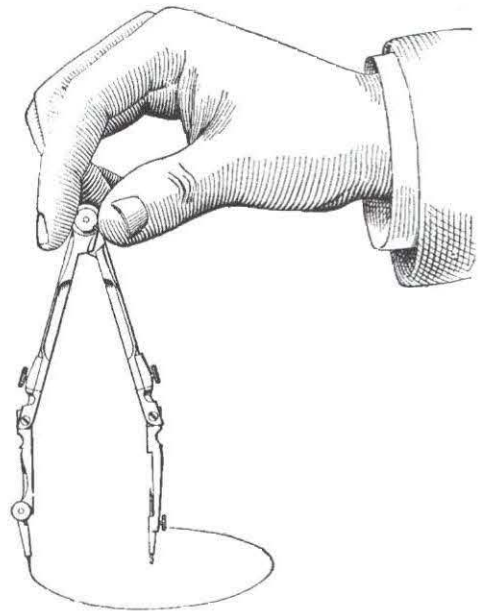
To place an order, obtain a current listing of available contracts, or to inquire about customized contract documents please contact:

Contracting Alternatives, Inc.

318 Clay Street, S.W., P. O. Box 1, Blacksburg, VA 24063-0001
Tel: 540 / 552-3577

Performance & Productivity:

The Space Management Mandate



by Thomas C. Hier and Gail B. Biddison

Tom Hier and Gail Biddison are principals in the Washington, D.C. firm of Biddison Hier, Ltd., providing facilities planning, space management, and strategic consulting services to colleges and universities. Hier is also a faculty member of the APPA Institute for Facilities Finance.

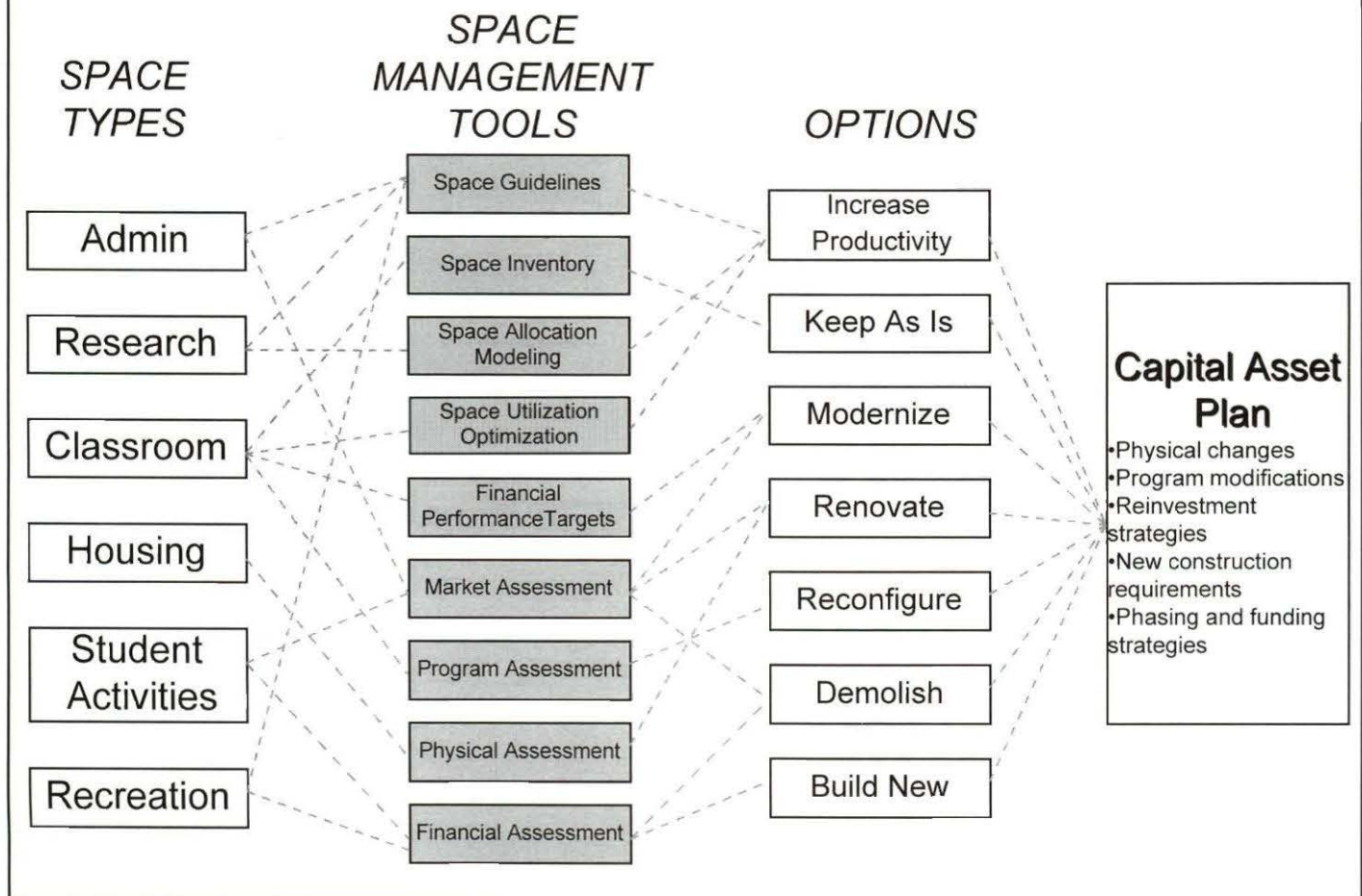
The importance of space management for colleges and universities can be summed up in a simple statistic—facilities are the largest asset on the balance sheet and worth many times an institution's liquid assets. All told, higher education owns and operates something on the order of 3 billion square feet of space with a replacement value exceeding \$300 billion.

Until fairly recently, however, the attention paid the physical assets of higher education lagged far behind the attention paid its liquid assets. The well documented deferred maintenance burdens of universities and the need for significant reinvestment to restore and modernize old facilities has attracted the notice of legislative bodies, governing boards, and senior officers of universities as never before and focused increasing attention on the emerging field of space management. APPA is including a separate chapter on space management for the first time in the third edition of the *Facilities Management* manual, scheduled for publication in early 1997.

What exactly is space management and what is it intended to do? Space management is the art and science of maximizing the value of *existing* space and minimizing the need for *new* space. It is predicated on the notion that the significant investment required to restore and modernize facilities is likely to outstrip the capital resources available for the foreseeable future and that realistic solutions to facilities needs must be found by combining active space management and judicious investment of capital. The primary objectives of space management are to:

- establish guidelines and methodologies for equitable distribution of space to all users based on actual need;
- set the parameters for objective evaluation of space use;
- ensure the efficient utilization of space; and
- establish a capital outlay budget and timetable for regular renewal and replacement of facilities and a separate, but coordinated, reinvestment and modernization plan for updating old facilities, removing hopelessly outmoded ones and adding new ones.

Developing a Capital Asset Plan



Why Space Management is Critical Now

Granting that universities are complex organizations, the complexities now facing facilities and space managers rank right up at the top. Consider the following:

1. Most colleges and universities have an inventory of buildings that date in age from the early years of the twentieth century (and some far older) right up to the 1990s, an inventory that in many cases has had no regular program of repair and renewal, nor even adequate daily maintenance.
2. Significant reinvestment in the buildings built in the 1960s and 1970s is required to replace systems that have outlived their useful lives, and, triggered by the investment this represents, to perform life safety and ADA upgrades.
3. Even if fully restored to "as built" condition, many campus facilities, from classrooms to dorm rooms, are program-matically outmoded.
4. The appetite for technology campus-wide is growing, with no end in sight.

Overlay onto these issues the requirement to manage these problems with budgets that have been cut regularly throughout the 1990s, and it is clear that the answers for the next decade lie in superior space management.

The Tools of Space Management

As the field of space management expands, new tools are

being developed alongside traditional tools to expand the range of options available to facilities and space managers.

Traditional Tools

Traditional tools have concentrated on measuring inputs. Perhaps the most familiar tool is **space guidelines**, which establish square footage standards for each type of institutional space. The existence of a published set of guidelines provides the facilities manager with a standardized measure for quantifying space requirements and allocating space for different uses. Guidelines have been published by various

Higher education owns and operates something on the order of 3 billion square feet of space with a replacement value exceeding \$300 billion.

national organizations and, for public institutions, by state governing bodies. In many cases, these guidelines have not been updated to account for the impact of technology, new pedagogies, and new ideas about classroom furnishings, and are not good standards for contemporary functional needs.



LSU SAVED A SMOOTH \$4.5 MILLION A YEAR IN ENERGY COSTS.

LIKE TO FIND OUT HOW?

HINT: TRY A FREE ENERGY SURVEY.

The free Energy Survey for companies or institutions with a million square feet of space or energy bills exceeding \$1,000,000 a year is the opening step in a process which can save you hundreds of thousands of dollars.

Believe it or not, it's that simple.

We have pioneered a method of financing energy-saving capital improvements out of existing budgets. You save year after year, without putting out a penny. It's very nearly too good to be true.

But it is. Call for details.

Lynn Talbot 713/666-3541
lat@cesway.com



CES/WAY INTERNATIONAL, INC.

5308 ASHBROOK • HOUSTON, TEXAS 77081

713/666-3541 • FAX 713/666-8455 • <http://www.cesway.com>



If guidelines are in place, a good first step is to evaluate if guidelines meet actual functional needs. Following this review, since space requirements vary according to the unique needs of each institution, ideally each campus should develop its own guidelines based on age and construction type of the buildings, specific teaching pedagogies, technological infrastructure, etc. Where states have imposed standards, public institutions will not have great latitude, although many states are reviewing their guidelines and institutions should take the opportunity to provide input into the revisions.

Another traditional tool is the **space inventory**, which is a record of the key characteristics of individual buildings and, within each building, individual rooms. Managers use this tool to determine, for example, how much space is allocated for administrative offices, where classrooms are located on campus, what spaces are coming due for painting or other routine maintenance, etc. Because the space inventory provides the baseline information for almost all space management analysis, it is critical that the inventory be comprehensive and up-to-date. The level of sophistication varies from campus to campus based on the degree of computerization and the size and skill of staff in surveying and maintaining the inventory.

Ideally, the space inventory will consist of computerized, relational databases containing the key building and room characteristics combined with a computer-aided design

(CAD) system that cross-references building and floor plans. Thus the space inventory can be readily updated to reflect modifications to use or configuration of space and the institution will have an accurate inventory of space allocation.

Space allocation modeling employs both space guidelines and the space inventory as inputs into a computer model to compare the amount of space that is actually allocated and/or required for a department or administrative unit based on functional requirements (e.g., personnel) versus the amount suggested by the institution's space guidelines. Space allocation modeling is useful in evaluating the distribution of existing space and to determine requirements for new space. For example, as a first step in a comprehensive space study, a facilities manager may run a comparative analysis of "actual" versus "guideline" square footage allocated to each academic department. Departments whose space allocations vary significantly from guidelines would be reviewed in greater depth (e.g., a walk-through of space followed by meetings with the department chair) to determine whether variances are justified based on real space needs or whether, through space reorganization and/or negotiation, some of the space might be reallocated to meet other pressing university space needs.

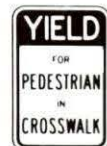
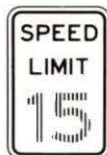
Productivity Tools

Whereas traditional space management tools measure inputs, a new class of tools—**space productivity measures**—

Buy direct from America's #1 Sign Source



Vulcan Signs



Call for a complete catalog of products.



1-800-633-6845

PO Box 1850 Foley, Alabama 36536

FAX 1-334-943-1544

"An Employee Owned Company"

Subscribing Member

APPA

measure outputs and outcomes, such as how well space is used. Information derived from **space productivity analyses** offers ways to improve space utilization. As such, these measures are likely to grow in importance as governing boards and legislators press colleges and universities to become more efficient and output-focused.

The most widely used space productivity tool is the **classroom space utilization assessment**, also called **classroom space optimization**, which determines quantitatively how well classrooms are used. Two key measures are: 1) room utilization, which quantifies how frequently classrooms are used during the day or week, and 2) seat utilization, which quantifies the percentage of seats occupied whenever a room is in use. With these two measures, a range of analyses can be produced that identify precise patterns of usage—by time of day, academic department/school, or intensity of seat utilization—and that suggest opportunities for increasing productivity and optimizing classroom space. Computer software is now avail-

able to produce utilization reports quickly and economically, but developing a plan to improve utilization is as much art as science. There are specialists who can assist institutions in interpreting data and developing strategies, policies, and procedures to improve classroom utilization.

The second space productivity mea-

Once targets are set, performance can be measured quantitatively and objectively, and the university can make informed decisions.

sure is the **financial performance target**, which applies to revenue-generating spaces, including most auxiliary operations and, in some cases, research space. Subjecting space to financial performance targets, while common in the private sector, is not a well-developed concept in the university world. Its

benefit is enormous; once targets are set, performance can be measured quantitatively and objectively, and the university can make informed decisions about ways to improve efficiency, reduce costs, and/or enhance revenues. In cases where performance targets are routinely not met, the university is in a position to assess the value of the function occupying the space vis-a-vis other competing demands for campus space.

Financial performance targets must be tailored to each space type. For example, in student housing, the campus may specify an overall financial rate of return or a level of "net revenues" as the financial performance target. Facilities in which sponsored research is conducted may carry a financial performance target based on the level of sponsored research dollars generated per square foot. Developing financial targets is usually an institution-wide activity requiring leadership from the finance office and collaboration with the operating units affected.

Capital Asset Plan—A Comprehensive Tool for Long-Term Space Management

Perhaps the single overriding challenge in space management is developing a framework or road map for making decisions about facilities in the context of a long-term plan. To draw on a familiar analogy, for many years colleges and universities have relied upon master plans to establish the general parameters for land use and new project planning, so that decisions regarding new construction were not made in an ad hoc fashion, inconsistent with long-term institutional objectives. The newest tool in the space management arsenal, and the facilities parallel to a master plan, is a **capital asset plan**. The capital asset plan charts a long-term plan for facility use and investment, including program changes, physical changes (both modernization and repair), projected capital outlays over a multi-year period, and phasing of cash flow.

A capital asset plan is essential to ensure that facilities investments are wisely made. A choice that confronts facilities officers on a daily basis is what investment to make in replacing or repairing building systems in the absence of a clear sense of the ultimate disposition of the building. Is the building so outmoded programatically that no investment should be made until it is

High Performance



Low Maintenance

World Dryer leads the way.

- Effective cost reduction
- Intelligent environmental choice
- Improved hand sanitation



The Leader in Warm Air Dryers Since 1948.
5700 McDermott Drive Berkeley, IL 60163
(708) 449-6950 Toll Free:
FAX: (708) 449-6958

In Canada: 5850 Keaton Crescent, Mississauga, Ontario L5R 3K2
(905) 507-1420 FAX: (905) 507-1777

reprogrammed and replanned? Is it so costly to restore that it makes better economic sense to tear it down? Worst-case scenarios are ones in which an institution may spend hundreds of thousands of dollars to replace windows, for example, on an aging, energy-inefficient building one year, only to determine later that the building should be decommissioned or demolished.

The capital asset plan utilizes four key tools:

- **market assessment**—Before making any major facility decisions and commitments of institutional resources, market research is critical to ensure that the customer satisfaction element is covered.
- **programmatic assessment**—A building evaluation based on current academic, administrative, or residential program, strategic plan and institutional mission determines which buildings meet program objectives in their current state, which need altering, and which can be reassigned to other, more appropriate campus needs.
- **physical assessment**—A physical review identifies deferred maintenance and capital renewal requirements, including interior and exterior structure, HVAC, plumbing, electrical, accessibility and life safety, and projects costs to correct deficiencies.
- **financial assessment**—A financial review establishes the baseline financial condition of a facility, including historical costs of operation, structure of existing debt service and, for revenue-producing facilities, net revenue.

The process of arriving at a capital asset plan combines these four tools and other space management tools as required, to develop options and ultimately arrive at an optimal strategy for long-term facilities renewal. A capital asset plan may be developed comprehensively for all campus space or by specific categories of space, such as classrooms, student housing, academic space, etc. Chart 1 shows a model process for developing a capital asset plan.

Conclusion

Higher education, like society in general, is adjusting to an era of limited resources and greater accountability

that is likely to continue into the twenty-first century. Senior officers, governing boards, and legislators, after decades of benign indifference, recognize the importance of good stewardship of facilities assets. Facilities managers will be called on not only to

increase the productivity of facilities but also to document the success of these efforts. Both old tools and new ones that utilize the power of technology and new processes are available to assist the facilities officer in meeting these challenges. ■

Benefits of a Capital Asset Plan

1. Sets out projected capital outlays for a multi-year period for facility improvements, including correcting deferred maintenance, reconfiguring, modernizing, upgrading, etc., so that cash flow can be managed and available monies yield greatest institutional value.
2. Establishes objectively the square footage that an institution has the resources to maintain appropriately and answers the question as to whether the current physical plant is affordable.
3. Provides objective framework for answering questions as to what to do with old buildings, i.e., reinvest, decommission, demolish, deaccession.
4. Ensures that the need for new construction is validated.
5. Provides a phasing plan to meet space needs and sustain the revenue base when buildings are taken out of service for renovation.
6. Provides an objective framework for space allocation among competing user groups.
7. Identifies legal exposure with respect to liability and safety issues arising from facilities deficiencies.

**We can
sparkle
your water in
over 350 ways!**

Neptune-Benson's family of fiberglass filters rounds out the most comprehensive line of filter systems in the industry. Also available: carbon steel/Flexsol 2000™, stainless steel, horizontal, vertical, multi-cell, ASME and split/flanged filter systems.

Over 350 models to fit any need, all NSF listed, with the best warranty in the business.

Since 1956, thousands of municipalities, schools, waterparks, YM/YWCA's, Boys/Girls Clubs, and hospitals have chosen Neptune-Benson.

Become part of the growing tradition.

"Celebrating 40 Years"

NEPTUNE  BENSON

One Bridal Avenue W. Warwick, RI 02893-0578

Phone: (401) 821-2200 Fax: (401) 821-7129

TOLL FREE: (800) 832-8002



One piece of equipment you
won't need when you upgrade to
our building automation system.

If you've put off improving
your building control



system because you already
have one in place, scrap that
excuse. Now you can have a
Metasys® Facility Management
System from Johnson Controls
without the added costs of rip-
ping out your current system.
With software from Centaurus
Systems, Metasys can now con-
trol equipment from Honeywell,
Robertshaw, Barber-Colman
and Landis & Gyr. And Metasys
already integrates over 200
kinds of equipment from 60
companies, allowing you to
operate everything from a
single workstation. It also pro-
vides the link to other open
system protocols like BACnet
and LONWORKS.™ And because
you can reuse your existing
fieldgear, it's truly an easy, low-
cost way to switch to a higher
level of operating efficiency. To
find out more about this latest
Metasys advantage, call us at
1-800-972-8040, ext. 278.
You've got a lot to gain. And
as we've said, very little to lose.

JOHNSON
CONTROLS

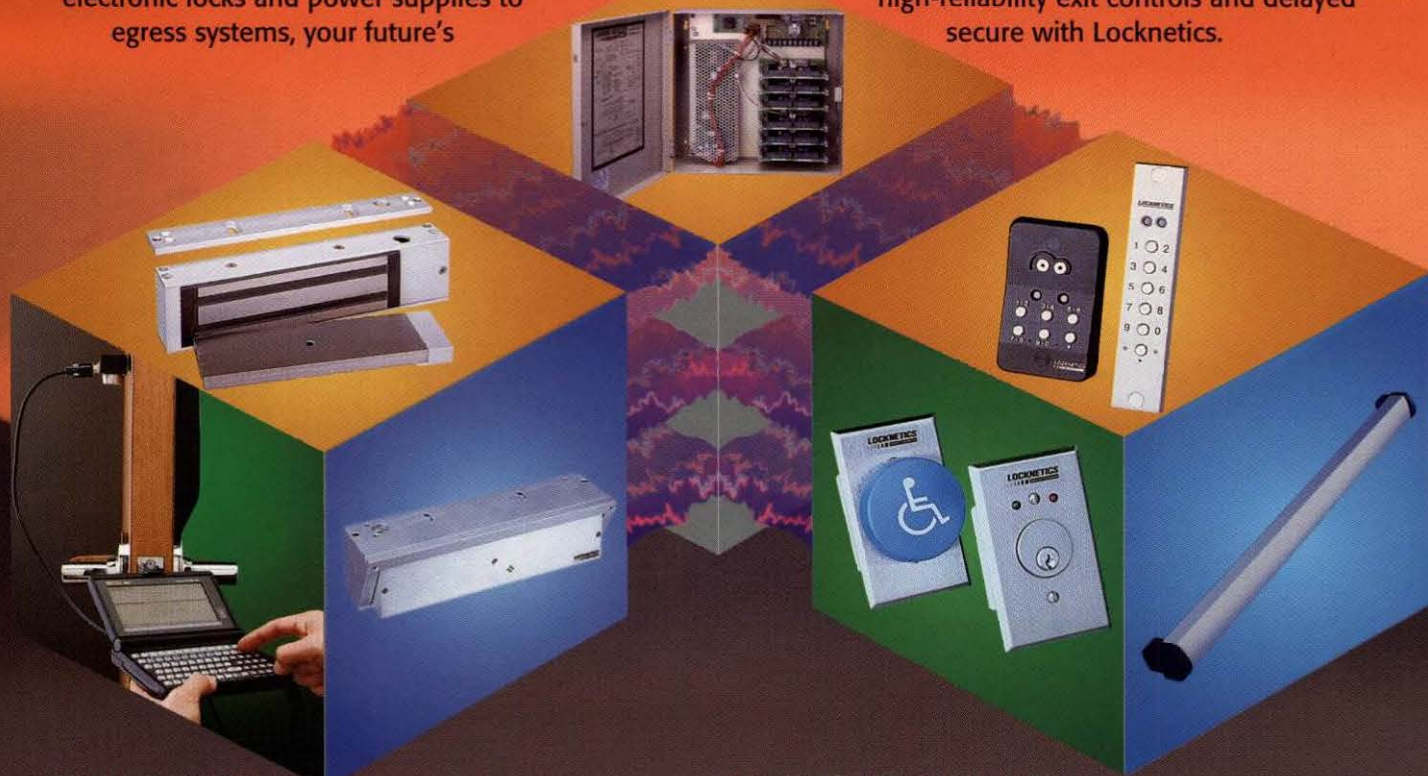
© 1995 Johnson Controls JC9579A

*LONWORKS is a trademark of
Echelon Corporation.*

SECURE YOUR FUTURE WITH... **LOCKNETICS**

|||■■■ Security Engineering

In the universe of electromagnetic and electromechanical locking devices and systems, Locknetics is the best way to secure *both* your facilities *and* your future. Non-stop product development gives us the "lock" on innovation... for the greatest array of devices and systems available. These modular products are designed to work with one another and with future electronic locks and power supplies to egress systems, your future's upgrades. From advanced access controls, high-reliability exit controls and delayed secure with Locknetics.



LOCKING DEVICES

Most Complete Line of Electromagnetic Locks and Systems Available

- From 500 to 3,000 lbs. holding force
- Wide range of models, including shear lock, surface-mount and delayed egress
- Modular design for integration with a range of access/exit control devices and systems

Computer Managed Electromechanical Locks

- 150 users/100-event audit trail
- Touch entry key or keypad access
- AA battery-powered, stand alone unit-80,000 activations
- Mortise or Cylindrical models for exterior/interior doors

POWER SUPPLIES

Low Voltage, Regulated, Filtered DC Power Supplies

- Field-selectable 12/24 VDC
- Built-in battery charger
- Time delay, door control and emergency relay options

ACCESS/EXIT CONTROLS

Versatile, Durable Keypad and Touch Entry Keys

- On board microprocessor controls
- Optional ports for communications with PC's
- Wide range of styles and materials, from aluminum and stainless to Lexan®

General Purpose & Heavy-Duty Pushbuttons

- SPDT or DPDT/normally-open or normally-closed styles
- Door frame or single gang electrical box mounting
- Cast housing for high frequency application

High Reliability Exit Bars

- Touch any point for release
- Available with infrared and capacitive sensor or electro-mechanical activation
- SPDT/normally-open and normally-closed styles

Call today for full product specifications and application assistance...

Secure your future with Locknetics.

LOCKNETICS

|||■■■ Security Engineering
a HARROW company

575 Birch Street, Forestville, CT 06010

860/584-9158 FAX: 860/584-2136

Accountability and Results in

SPACE MANAGEMENT

by Brenda Norman Albright

What do governors and legislators choose as the top priority issue for colleges and universities? *Accountability*, according to the American Association of State Colleges and Universities. Political leaders frequently reflect the interests and priority of business leaders and the general public, and a recent poll of business executives on "What is most important for the future" gives insights to how accountability will affect each of us.

Brenda Albright is a consultant to higher education based in Franklin, Tennessee. She most recently worked as vice chancellor for administration and finance for the University of Maryland System, and she served from 1986 to 1994 as deputy executive director of the Tennessee Higher Education Commission. Albright is a past member of the APPA Board of Directors, is an honorary member of APPA, and serves on APPA's Publications Advisory Board.

#1	Balancing the federal budget	29%
#2	Improving the U.S. education system	28%
#3	Helping to make U.S. companies more competitive globally	17%
#4	Cutting taxes	9%

—*Business Week*, June 5, 1995

All four priorities—balancing the budget, improving the U.S. education system, helping to make U.S. companies more competitive globally, and cutting taxes—directly affect us, the education system. This is not true for any other public service. Improving the U.S. education system, at 28 percent, ranks second only to balancing the budget, at 29 percent, as the most important action for the future.

What is Our Financial Future?

Elaine El-Khawas' annual analysis of institutional polls published in the American Council on Education's (ACE) *Campus Trends* 1995 shows that most institutions had budget

increases last year, yet many institutions anticipate tight finances in the near future. Almost half of the public institutions were expecting a budget cut during 1995-96. In projecting expected budget changes for the next five years, more than half of public institutions were expecting annual budgetary increases below 3 percent, clearly a no-growth or downsized budget environment for the public sector. The independent sector was more optimistic with only 2 percent expecting a budget cut in 1995-96 and 82 percent anticipating annual 3 percent or higher increases in the next five years.

What About Facilities Needs?

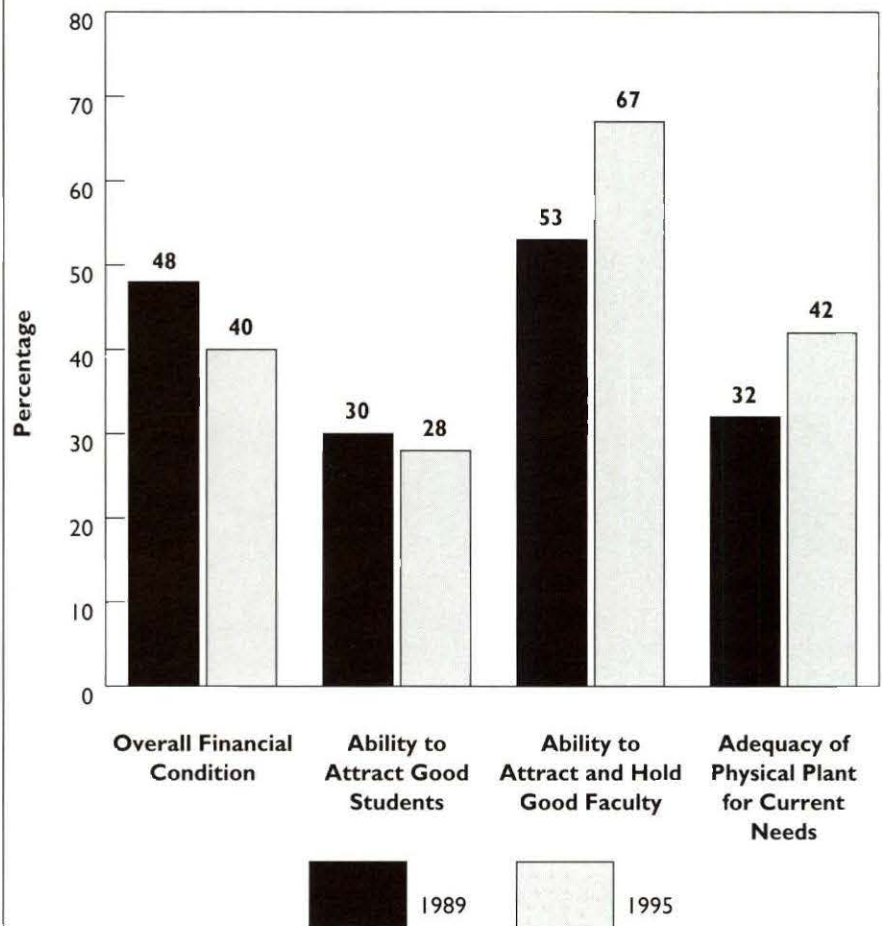
Campus leadership perspectives stress a significant gap in adequacy of physical plant for current needs and especially for campus needs ten years hence. The ACE poll shows that 42 percent of campuses rated physical plant as adequate for current needs, compared with 32 percent in 1989. Only three of ten institutions rate highly their ability to attract students, while two-thirds of institutions gave high ratings to their ability to attract and hold good faculty. Judgments about the future were particularly alarming—only 21 percent of all institutions (17 percent of public and 28 percent of independent) rated the adequacy of the physical plant as excellent or very good ten years from now.

The ACE poll parallels a 1994 state survey completed by the State Higher Education Executive Officers (SHEEO) and the National Association of College and University Business Officers (NACUBO). More than half the states reported that a lack of or limited funding for capital needs was a major weakness. The states also provided cost estimates for deferred maintenance ranging from 2 to 42 percent of replacement value, with two-thirds of the respondents indicating that the cost is less than 10 percent. If a large majority of campuses and states believe that our facilities and capital funding is inadequate for the future, what are the implications for facilities managers?

Current Accountability Efforts

Some national higher education associations have formed a Joint Commission on Accountability Reporting (JCAR) to produce a "recipe book for accountability reporting." JCAR consists of a Council of Presidents and Technical Working Groups developing recommended definitions, reporting formats, and data collection methods for placement rates and full-time employment, graduation, persistence, withdrawal,

Key Indicators of Institutional Health
(Percentage of Institutions Rating Items Highly)



Source: Campus Trends, 1989, 1995, American Council on Education.

licensure pass rates, student transfers to other education programs, student charges, and faculty activity. Efforts by other national organizations such as the NCAA affect all member institutions.

Within the past few years, about one-third of the states have adopted accountability reporting programs or policies. Almost all of these systems have been directed or influenced by external forces. Most state accountability systems focus on student learning and assessment, and many apply to the public sector exclusively. A 1994 Education Commission of the States publication, *Charting Higher Education Accountability*, reviews policies and performance indicators for ten states identified as the leaders in accountability. The authors note

continued on page 28

IT'S OLD, IT'S
IT'S COSTLY *and,*
QUITE POSSIBLY, ONE
of THE PREMIER
ARCHAEOLOGICAL
EXHIBITS ON *campus.*

INEFFICIENT BUILDINGS ARE EXPENSIVE TO RUN. And when the appearance suffers, they impact even bigger economic issues like student recruitment and retention and tuition revenues. Johnson Controls can help eliminate costly operational inefficiencies, while maintaining the character and integrity of your buildings. We offer a wide range of products, services and campus-wide programs such as performance contracting. Our goal is to be your partner in maximizing the performance and appearance of your entire campus. We'll help preserve your campus. And your capital. Give us a call at 1-414-274-4635.

JOHNSON
CONTROLS

NEFFICIENT,



continued from page 26

that accountability measures can guide state planning and budgetary decisions and monitor the public investment in higher education.

A growing trend is to link accountability measures to the budget and provide performance incentives. Tennessee was the first state to implement a performance funding program (1980); in the past five years, Missouri adopted a Funding for Results program, and Arkansas has implemented a Productivity Funding program. These programs focus student assessment in the context of meeting minimum performance standards, improvement, and results.

How Do Colleges and Universities View Accountability/Student Assessment Efforts?

The ACE polls show that two-thirds of campus leadership believe that student assessment will significantly improve undergraduate education (up from 54 percent in 1988) and have strong fears about misuse of effectiveness measures by external agencies (down from 78 percent in 1988). Most note,

however, that attention to assessment has resulted mainly in new reporting requirements.

Have campus fears been inhibitors to higher education taking the leadership role in developing accountability systems?

What is the Current Status of Accountability and Space Management?

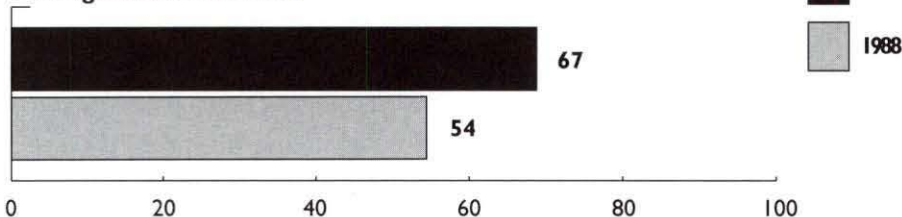
The gap in facilities needs versus available resources will likely result in more extensive accountability policies, including facilities and space management. Since the state is the source for most funding for space operations and construction for public institutions, it is likely that there will be increased activity at the state levels. Analyzing where we've been, where we are, and where we should be can help us shape future policies and reporting systems for space management. Many efforts are already in place.

• **The States' View.** Almost all states and institutions have financial information, policies and procedures, and audit systems to ensure that resources are expended in accordance with state regulations and law. Most states, colleges, and universities

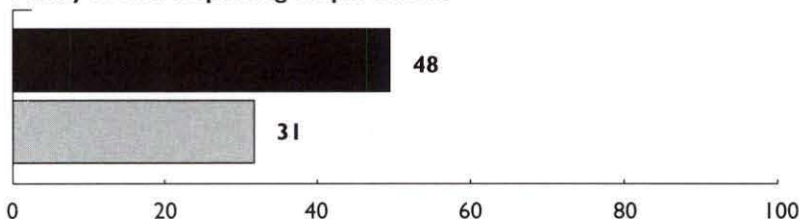
use certain efficiency and qualitative measures or tools, such as utilization studies, which report on space resources efficiencies and are used in developing space requirements, budgetary recommendations, and priorities. Some states, such as Tennessee, and many institutions have longstanding condition audit systems that are used both for reporting and for budget development. As a point of interest, although the political leadership in Tennessee has been very supportive in providing several years' funding for programs to remedy the deferred maintenance backlog, the legislature has included in its annual operating budget legislation a provision that institutions must expend at a minimum what the higher education formula recommends for maintenance and operation of physical plant. Arkansas, Arizona, and Maryland have developed policies of funding deferred maintenance in the operating budget using a formula or percentage of replacement value approach. While many states have deferred maintenance or replacement goals and programs, frequently the programs are not funded in times of fiscal restraint. Also, space and capital policies are commonly viewed as separate from other programs and from accountability reporting for academic programs. In *Charting Higher Education Accountability*, space-related accountability indicators were identified in only three of ten states—Kentucky (classroom utilization), New York (condition of campus facilities), and Wisconsin (maintenance investments and workplace safety). Generally, space capital funding is viewed as separate, rather than connected, to the overall institution accountability reporting and budget.

Changing Attitudes About Assessment
(Percentage of Administrators Agreeing With Each Statement)

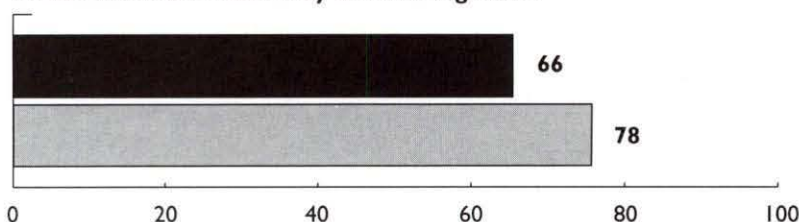
Student Assessment Will Significantly Improve Undergraduate Education



Thus Far, Attention to Assessment Has Resulted Mainly in New Reporting Requirements



Most Campus Officials Have Strong Fears About Misuse of Effectiveness Measures by External Agencies



Source: Campus Trends, 1988, 1995, American Council on Education.

- **Bond Rating Agency View.** External agencies, particularly bond rating agencies, focus on policies, practices, and financial measures. Moody's Investment Service analyzes internal (students, faculty, capital, finances, and management) and external (governmental, economic, and demographic environments) factors. Five major areas are analyzed: market position, financial performance, debt position, legal structure, and management. Debt position includes plans for any renovations or expansion of plan, financing of renovations or expansion projects, past and future, money contributed to support deferred maintenance from current operation, building audits to determine needs, how the university estimates deferred maintenance, and how the university decides when to issue debt to finance a project. Moody's emphasis on debt position and management activities in support of addressing deferred maintenance highlights the seriousness of explicitly addressing deferred maintenance in accountability systems. Moody's uses a series of enrollment, operating fund, endowment fund, and debt ratios in its analyses. In the debt area, two key ratios are endowment to debt and unrestricted available funds to debt. Moody's medians for various categories of institutions provide an excellent external benchmark for financial medians.

- **Professional Association View.** In the January 1996 issue of *Facilities Manager*, Margaret Kinnaman provides an overview of APPA's leadership in developing a Strategic Assessment Model with its fifteen core benchmarks. This effort is an important tool in future accountability activities. APPA's jump-start in assessment positions its members more effectively for shaping future accountability systems.

How Can We Change and Shape Policies and Accountability Reporting Systems to Achieve Real Reform Resulting in Long-Term Improvement?

Since the budget is the primary instrument by which states and institutions establish priorities and effect policies, it is appropriate to view accountability in the context of budgetary reform. Budgetary policies spawn certain behaviors. To improve quality, to maintain credibility, and to influence the priority of resources that flow to higher education, we must face truths and make tough decisions that can lead to improved teaching and learning, and greater productivity.

It is time to rethink our funding systems—to redesign them to better align values and rewards through linking funding to goals and success, and giving departments and institutions the responsibility for managing their resources more effectively.

The following list, while not exhaustive, identifies value-oriented changes for space management budgetary systems.

- **Move away from the concept of free space to responsibility for real costs.**

The two costliest components of higher education are instruction and facilities. Let's face the truth: "free space" is embedded within the higher education culture, with strong incentives for expansion and building new space, and few incentives for constraining space. Many campuses have more space than needed, creating a major cost liability.

While campuses could improve quality and efficiency and cut costs by reducing space or curtailing expansion plans, few choose to do so. Some states, like Tennessee, have experimented with budgetary incentives for mothballing or decom-

missioning space. These policies have not generally been effective. The allure of new buildings is powerful, and "taking away" space from departments or activities is simply too difficult to tackle. New space equals new capital and operating costs, but this budgetary linkage has been weak; frequently the budget for capital expenses has been solely borne by the state, or donors, or a separate pool of funds.

An emerging strategy with much promise has been adopted by the Ohio Board of Regents. Ohio's new capital allocation formula addresses the free space issue and accentuates campus responsibility for all aspects of space management. Each campus is held financially accountable for resource decisions and rewarded for restrained and responsible capital spending patterns. The new ground rules transform longstanding organizational roles, streamline a bureaucratic process, and place greater decision-making authority and responsibility with campuses. The new options include a pledge to use a portion of the college's future income to pay debt service as a part of the operating budget process. A strength is the explicit upfront accountability of the capital budgetary process. This Ohio approach parallels responsibility-centered management and budgetary processes in many private and public institutions that locate costs back to individual departments.

- **Place a high priority on remedying the deferred maintenance backlog.**

The 1989 report, *The Decaying American Campus: A Ticking Time Bomb*, by APPA/NACUBO/Coopers & Lybrand clearly defines "an alarming problem of staggering financial proportions." While some institutions and states have made significant progress with deferred maintenance, the truth is that more is needed. An ideal solution is a permanent commitment to address the backlog.

A desirable prototype may be the approach taken in Colorado, where 1993 legislation established a \$300 million trust fund to provide a stable, predictable, consistent source of revenue specifically for deferred maintenance. The concept of an irrevocable trust to protect higher education's physical assets is a value-oriented budgetary reform. While financial accounting standards require private institutions to depreciate facilities and establish capital reserve accounts, these practices are not in place in most of the public sector. Building "funded depreciation" reserve accounts into the operating funding system for public systems is another way to bring about value-oriented reform.

- **Communicate information on full costs, the cumulative nature of decision making, the connection of operating and capital budgets, and the accuracy of projections so that leaders can make long-term decisions.**

Peter Drucker said that "long-term planning does not deal with future decisions, but with the future of present decisions." Too often we in higher education have neglected the future costs of present decisions. Considerable effort and intensity is expended in justifying a particular capital project to leadership within a campus, the board of trustees, legislators, or governors. The context is often "annual"—this year we are requesting funds for this capital project even though decisions made today have a tremendous effect on future operating costs. And the effect is additive: the tremendous costs of today's project summed with the tremendous costs of yesterday's project can be overwhelming. Presenting operating costs, life-cycle costs, program costs, the cumulative effect

of decisions, implications for tuition and fee increases, and the operating budget provides an essential context for long-term decision making.

Because the operating and capital budget are sometimes viewed as separate rather than connected activities, it may appear that the source of funds is different. Alas, the source of funds is the same, only the appearance is a mirage. To the extent that institutions and states fund capital projects there are fewer resources available for other priorities. Similarly, when we present information about the future we usually make sophisticated projections, which are frequently wrong. Yet rarely are we accountable for these projections by assessing their accuracy and reporting our errors. Would routine reporting on the accuracy of our projections affect future projections?

- **Focus on an open, collaborative process.**

Reforming the budgetary process means moving from hierarchical to collaborative and continuous processes, from asking to negotiating, from limited participation to openness to all stakeholders, from structured to dynamic and communicative, from top down to bottom up, from vertical to horizontal. Of all these changes perhaps the most important is an open communications process from beginning to end. Faculty and students, as the customers, are the sources for quality and productivity gain, and their involvement in upfront decision making enhances the potential for success.

Reforming the budget requires a pragmatic shift in the expectation that the student and the taxpayer will continue to pay the freight to a stronger role for the students, faculty, and administration in assuming responsibility and collaboratively developing financial schemes that include productivity factors and reallocations. Adopting this philosophy makes all other pieces fall into alignment. Funding policies create a highly competitive environment that makes change difficult. Once a pattern is set, change upsets the status quo and thus is perceived as either a winning or losing financial proposition. Since winning or losing is relative and everyone cannot win, it's an accepted practice to reach consensus with the debate shifting from education policy and the financial incentives that support it to financial reality, i.e., the potential net gains or losses of departments or institutions in "sharing the pie." By bringing hidden agendas and all issues to the surface and focusing on collective goals, a strong consensus of all parties is achievable. Ohio again serves as an exemplary model for the changes to the capital policy involving the many stakeholders.

- **Introduce realism and performance standards into the process.**

Reforming the budgetary request means moving from asking for more resources than may be necessary to being realistic and using front-end targets, from one- to two-year cycles to multi-year contracts, from complexity to simplicity. Multi-year "contracts" may encourage higher education institutions to innovate and concentrate more on the teaching mission and productivity measures. Combining planning, operating and capital budgets, and accountability can improve the decision-making processes. Using outcome measures to show progress in achieving certain goals or standards, and then publicly measuring progress toward those goals and standards is central to the reform process.

We should not fear higher standards. We have an experience base on the effect of higher standards and accountability.

Within the past decade most state and institutions have raised standards for students, as evidenced through core curriculum and other measures. Many institutions opposed the raising of standards and predicted that enrollment would decline and access would be threatened. What actually happened was quite different. Students changed their behaviors to meet the new standards and enrollments actually increased! In the same way, let's assume that higher standards and accountability measures for space management will add value to what we do and produce a stronger higher education system for the future.

Conclusion

Emerging accountability strategies differ in process, focus, and structure from traditional approaches and go beyond incremental change by centering on improvement, responsibility, quality, and productivity. These value-oriented changes for space management budgetary systems may result in real reform, and more importantly, move toward a better led, better managed, and stronger educational system. ■

Sources

1. Brenda Norman Albright, "The Accountability Litmus Test: Long-Term Performance Improvement with Contained Costs," in *Assessing Performance in an Age of Accountability*, Gaither, G. (ed.), San Francisco: Jossey-Bass, 1995.
2. Brenda Norman Albright and Diane Suitt Gilleland, "A Clean Slate: Principles for Moving to a Value-Driven Higher Education Funding Model," in *Focus on the Budget: Rethinking Current Practice*, Epper, R.M. (ed.), State Higher Education Executive Officers and Education Commission of the States, Denver, Colorado: May 1994.
3. American Association of State Colleges and Universities, *Report of the States*, June 1994.
4. *Business Week*, June 5, 1995.
5. Education Commission of the States, *Charting Higher Education Accountability*, June 1994, Sandra S. Ruppert, Editor.
6. Elaine El-Khawas, American Council on Education, *Campus Trends* 1995.
7. Moody's Investor Service, *Higher Education and Not-for-Profit Institutions Ratings Group: An Overview*.
8. Moody's Investor Service, *Higher Education 1995 Medians*.
9. Ohio Board of Regents, "Decentralizing the Capital Budget Process," in *Regents Review*, "The New Policy in a Nutshell," and "The Development of the New Policy for Higher Education Capital Improvements: A Progress Report," August 15, 1995.
10. State Higher Education Executive Officers, SHEEO/NCES Communication Network News, Vol. 14, No. 1, March 1995 and Vol. 13, No. 5, December 1994.

Poor planning and placement of

SIGNS

Not enough or too many

SIGNS SIGNS

No compliance with ADA



Slow delivery of

S I G N S

Poor quality of

SIGNS

Confusing

← SIGNS →

Poor installation of

SIG VS

Why take chances with your wayfinding system?

INNERFACE[®]
ARCHITECTURAL SIGNAGE

"The Company That Does Things Right"

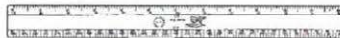
For a free brochure, video, local representative 800-445-4796 or in Atlanta (770) 921-5566.

SPACE COUNTING

is **NOT**

SPACE MANAGEMENT

by Ira Fink, Ph.D., FAIA



Campuses, particularly public institutions, need to find solutions to bridging the gap between current space guidelines or standards (entitlement) and future space allocation (resource management).

The management tools most campuses have available are based on space assignment policies (both written and unwritten), on space assignment process (both organizational and political), and on space assignment guidelines (to provide some level of equity among units or departments).

Because there is not a "market" or space costing mechanism to account for the use or reuse of space on most campuses, space once allocated generally becomes a fixed asset. Thus, if a unit or department has grown in the past, it is loathe to give up space if it is not needed. Space is held in inventory. Institutions today are moving away from the space collector's attitude of "just in case," to new models of "just in time" and "just for you." It is simply too expensive for a campus to have an inventory of unused, underused, or undiscovered space, while at the same time adding new space to the inventory.

Space Issues

The space management issues of most concern include:

- How academic department space is allocated on the campus.
- How administrative unit space is allocated.
- How to improve the allocation or reallocation of space.
- How to provide sufficient office and related support space.
- How to distribute space equitably among departments and units based upon real needs.
- How to recapture currently allocated space that may be in excess of need.

- How to measure how much space should be given to administrative units as well as academic departments.
- How to generate space management ideas and recommendations applicable to the unique environment of each campus.
- How to identify other campuses or organizations faced with the same problem and understand how these campus have solved their space management and allocation issues.

Office Space

One area in which campuses can concentrate their effort is in the management and distribution of office and support space. Offices (both faculty and administrative) and accompanying support space generally account for the largest single block of space on a campus. In space data collected from twenty-two comparable U.S. institutions, as shown in Table 1, office space accounts for 22 percent of all the square footage on a campus, whereas classrooms at major institutions account for usually less than 5 percent of the space and class labs less than 7 percent. (Community colleges are an obvious exception, where a preponderance of space is in classrooms and class laboratories.)

In the area of office space allocation—size, distribution, allocation, and use, campuses often do not have a policy on who does or does not receive a private office. On some campuses faculty have two offices—one in their research space, one with their department. While this may be a luxury at some campuses, it can be an important way to manage or use space at another.

Changes in Technology

Closely linked to the issue of office and support space is the change technology is bringing to the campus both in terms of office space needs and in classroom and class lab instructional

technology space needs. These space issues will become increasingly more difficult to solve in the years ahead, both in retrofitting the existing inventory to accommodate new instructional and information technology and also the space it requires. For example, a classroom that typically might have an average of 15 to 18 assignable feet per station would have less than one-half the square footage needed if every station in the room had a computer terminal.

Table 1

AVERAGE DISTRIBUTION OF SPACE AT 22 PUBLIC U.S. UNIVERSITIES, EXCLUDING HOUSING

Room Type	Average	Range
Classrooms	5.0%	3.3% to 12.1%
Teaching Labs	6.7%	4.3% to 19.5%
Research Space	15.3%	8.3% to 21.0%
Office Space	22.2%	11.0% to 26.9%
Library Space	6.4%	4.9% to 9.2%
Special Use	14.4%	8.9% to 25.8%
General Use	11.4%	8.3% to 19.0%
Support	14.8%	8.1% to 26.7%
Health Care	3.8%	0.9% to 5.5%
TOTAL	100.0%	

The changes in technology, which require everyday use of desktop computers and related equipment, result in the need for considerably larger amounts of office space, as well as more space within instructional areas. These needs were not considered in the space standards and guidelines developed for and used in higher education today, particularly in states such as California, as the current standards are a carry forward from the past to the present, not a projection of the needs of the future.

Staffing

Another change currently occurring in higher education is in instructional staffing, with more part-time and fewer full-time faculty and staff employees. The uneven growth in academic programs often results in a scattering of members of the same department into disparate locations when new positions are added. It also leads to a consideration of the need to share offices, a practice that is becoming more accepted, particularly in the private sector. Some companies reserve office space for employees by the hour or by the day, much the same way hotels rent out rooms for overnight.

The "ratchet" effect of space—that is, once space is acquired the owner or user of the space is loathe to give it up—has also created problems. Space is often hoarded, or kept within a unit's jurisdiction, "just in case." For example, if a department or unit is downsized, how is its excess space measured, recaptured, and reassigned, or reallocated to a unit with a current greater need? Office space assignment ought to be tied to the operating budget and approved staffing levels, in contrast to individual department or unit desires to acquire or hold on to space for unknown future needs.

Facility Database

It is important to recognize the role the campus facility database can play in the allocation or reallocation of space on campus. Counting space, and maintaining an up-to-date database, is important for many reasons. Besides the annual report, space data can provide one more tool in space management; without data, space management is strictly politics.

Space Use

Often the issue with space has less to do with how much space one has and more with how one uses the space. Campuses have tried various models to allocate or reallocate space within the overall enclosure of space on a campus, ranging from complete decentralization of space management to complete central control over space. Generally, the space problem on most campuses is solved by adding more space, rather than managing the asset.

How space is allocated is part of the culture of some campuses. As an example, both Purdue University and the University of Michigan have enrollments of 35,000 students. At Purdue, where space is centrally managed through the Office of Space Management and Academic Scheduling, they are able to meet their instructional needs with an inventory of 340 classrooms. At the University of Michigan, where space management is decentralized to the seventeen "entrepreneurial" colleges, a total of 690 classrooms are used for instruction. While there is no right or wrong in this example, it is clear that if space is in short supply on campus, centralized management and allocation may be a useful way to manage it.

Another common trait is to carve up larger spaces into smaller spaces—classrooms into offices, for example. This was the situation at Gonzaga University in Spokane, Washington, until a new building for the School of Education was built that allowed Gonzaga to reclaim classrooms that for years were out of the inventory, having been subdivided into office space.

Space Guidelines as Policy

Space guidelines or entitlement of space are, of themselves, policy. Every discussion of policy involves the comparison of what is or might be with newer guidelines of what is acceptable. The general result of changing space guidelines is that they serve as a control mechanism in a three-phase process: space need information is received, it is compared to guidelines or to actual space available, and an action is selected in response.

It is also important to look at the purpose of the space guidelines used by systems of higher education and see how they are currently used. There are a number of conditions that are necessary before any change is made in space guidelines. These include:

- Careful choice of appropriate variables for the space guidelines.
- Proven consistency among the space guidelines to make change possible.
- Known ability to select guidelines that have a good chance of being successful.

It is also important to identify campus space policies, as well as those of governing boards or state agencies that affect the allocation and distribution of space. The goal is to determine the overall allotment of space on the campus, and what effect different allocation and utilization systems would have in improving satisfaction and meeting needs.

Space Utilization Analysis-- Building Walkthrough/Program Review Form

1. SPACE INVENTORY

Building Number: _____ Building Name: _____
 Gross Square Feet: _____ Building Use: _____
 Assignable Square Feet: _____ Major Uses: _____
 Year Occupied: _____

2. SYSTEMS EVALUATION

	Yes	No	Comments
Flexible Design Concept			
Partitions (Movable or Rigid)			
Specialized Building Type			
Stationary Equipment			

3. SUITABILITY EVALUATION

Suitable

Unsuitable

	A	B	C	D	E	Comments
Circulation						
Conflicting Uses						
Crowding						
Functional Relationships						
Instructional Spaces						
Instructional Technology						
Research Space						
Working Environment						
Other						

4. COMMENTS

5. OVERALL BUILDING/PROGRAM RATING

_____ (A) Programmatically Optimum Space _____ (D) Programmatically Poor Space
 _____ (B) Programmatically Adequate Space _____ (E) Programmatically Unsatisfactory
 _____ (C) Programmatically Fair Space

Prepared by: _____ Date: _____

Approach

Space management is a multi-step process to:

- Provide mechanisms for identifying space needs, based upon both mission and organizational structure.
- Obtain information on the use and usefulness of space to satisfy current and future education needs.
- Assess the distribution of existing space.
- Analyze needs and recommend changes to accommodate growth or shifts in enrollment, in instructional programs, in improving interdepartmental and intradepartmental adjacencies, and provide flexibility for changes to occur and to accommodate growth.

The focus should be on solving space issues, whether it be the reallocation of office and related support space, or the placement of instructional space such as classrooms and class labs, which generally are fixed and therefore not as subject to reallocation.

Methodology

A step-by-step methodology should involve four types of information activities:

- Acquisition of space data or information.
- Analysis of the information.
- Comparison of needs and wants to space availability.
- Presentation of findings and recommendations for action.

One of the most significant challenges of data collection is to gather and present data in a form that is useful to decision makers. Changing how a campus allocates its investment in capital facilities will require a clear understanding of what exists, how it can be changed, and what the implications will be. To do so requires a space optimization study.

Space Guidelines vs. Space Allocation

Space guideline formulas, such as occur in California and many other states, provide a means to determine overall space needs or entitlement, but are not helpful in the actual distribution and allocation process. Moreover, for the most part, they are out-of-date. For example, the current standards do not account for extensive use of information and computer technology in the office and in the classroom and lab. They also fail to address other important campus needs such as student lounge or gathering space, or other space needs related to nonacademic needs.

To manage space, not just count it, it is important for a campus to develop new allocation models and methodologies to meet current conditions and future changing needs.

Benefits of Space Optimization

A space optimization study should provide the campus with useful products that can be used immediately for improving space allocation on campus. The primary product of the study should be reports that present space information, analysis, and specific recommendations for improving space utilization. Other valuable products and space management tools can include:

- Creation of facilities database as a flexible "relational" database. This will enable facilities personnel to plan, track, and report the new space assignments resulting from the implementation process. The database can also be tailored, such as for use by an internal audit department to help confirm facilities-related costs associated with sponsored research.

- As-built drawings that can be updated should be used as part of a building by building walk-through to record changed conditions to assist in future updates of existing drawings.

Key Objectives of Optimization Plan

A key objective of a space optimization study is to facilitate the implementation of the recommended plan. Too often facilities studies are performed without careful consideration of how the recommendations can be executed. When working with the vice presidents and deans, it is important to devote significant time to developing and testing practical space moves or migration steps needed to optimize use of space. These are critical to achieving important and successful outcomes of the study. The migration steps should be geared to solving the most urgent space problems first. They should maximize the use of valuable space, minimize the required number of disruptive and costly moves, and be accomplished within a reasonable budget.

In short, facilities and space are valuable university resources. Acquiring, renovating, reusing, or constructing new space represent a major, long-term financial commitment that will affect academic program offerings and administrative functions. The effective utilization of campus facility resources is the purpose of a space optimization study.

Optimization Study Process

A space optimization study process involves a number of steps. First, perform a facilities survey and develop a relational facilities database. Review the existing facilities database for currency and accuracy or create one if one does not currently exist. A review of the new or existing facilities database should record results of these primary tasks:

- A room-use survey of academic space (classrooms, class labs, instructional offices, conference rooms, support and research space) and administrative space.
- A building-by-building visual survey and assessment of the physical conditions of interior spaces. This includes verification of square footage areas in the database.
- A building-by-building visual survey of the programmatic capability and adequacy of the interior spaces. (A form used for this purpose is shown as Exhibit A.)

Second, perform a campus-wide needs assessment review. This work will involve research and field analysis of needs. It should include the following:

- Interviews of all deans and vice presidents to identify university goals, trends, general space needs, and adjacency requirements. (This may also include department chairs, and similar administrative unit directors.)
- In-depth interviews of all academic department chairs and selected administrative and student service unit heads to define trends and function, organization, staffing, space needs, and adjacency requirements.
- Development of a listing of requested physical adjacencies among academic and administrative units.

Third, complete the facilities optimization study. This can include performing a use study of classrooms and class laboratories. The type of study will record and analyze patterns of use by hour and day of week.

Lastly, develop planning alternatives and recommendations. During this analysis phase, a number of products can

be developed including optimization plan options that balance space needs and resources.

Study Application

Throughout the study process, and especially during the interviews, the key space utilization issues should be identified. This will likely include new space needs for some departments to address their issues, as well as identifying units that have an excess of space relative to their needs.

At that time it is important to determine space reallocation priorities based on the optimization study and ongoing academic and administrative policy commitments that require space modifications, including:

- Impact on the overall campus optimization plan;
- Total area of departmental assigned space (excluding classrooms and class labs);
- Impact on non-departmental related spaces (classrooms, class labs and any special building service requirements);
- Class schedule implications of university operations; and,
- Space planning concepts.

While the facilities optimization study will be a useful tool, prior to making actual facility changes, the campus will still need to:

- Conduct detailed unit/department space programming interviews and develop specific concept plans based on the optimization plan.
- Validate construction order-of-magnitude budget estimates based on current program requirements.
- Investigate building code implications.
- Evaluate, in detail, building system technical attributes (mechanical, electrical, structural).
- Prepare design drawings indicating the scope of the renovation.
- Develop outline specifications.
- Identify and initiate action on long lead items such as elevators.
- Maintain and update an implementation schedule.
- Recommend and implement a construction contractor procurement strategy.
- Develop a total project budget.
- Bid/negotiate construction contracts.

The Importance of Facilities

Facilities are important to the delivery of educational services and other aspects of a college's or university's mission. However, owning and operating campus facilities is expensive. Buildings are the largest component of an institution's capital budget and require a significant portion of its annual operating revenues.

Inefficient use of facilities and space increases the consumption of scarce resources. Acquisition or construction of additional building space represent major, long-term financial commitments that affect program offerings for a significant period of time.

The over-reaching goal is not simply to count campus space, but to understand and manage it as a resource that is subject to allocation and reallocation, the same as any other resource of the campus. Careful use of the resource will not only save money, but will aid the institution in meeting its higher education goals. ■

Selecting the Right

SPACE PLANNING SOFTWARE

by Michel de Jocas

Despite the significant contribution of academic organizations to the science, technology, and use of computers, there are several groups within most colleges and/or universities that are not exploiting the full potential of their computing equipment. The campus planning office is, unfortunately, one of these groups. Computers are certainly used by planners, but rarely are they used for purely planning and decision-making tasks. Why are planners not taking full advantage of the technology? One reason is the complexity involved in creating appropriate software.

Michel de Jocas is vice president of Educational Consulting Services (Canada) Inc., Toronto, Canada.

Planning is as much an art as it is a science. Can the "art" of planning be programmed into a machine? Can the intuition required for successful planning be made virtual? Can every exception to the rule be anticipated? *Should* machines plan? While other professions enjoy the benefit of computerization (for example, CADD applications have long been established to help architects, engineers, and scientists to produce and modify graphic representations of their ideas and concepts), campus planners have had little choice but to select applications that have been written for other uses or for a wider market.

Planning offices at colleges and universities can make better use of their PCs by selecting software applications that are suited to planning tasks, and by adopting the proper frame of mind when using them.

Good Software Emulates Good Planners

The criteria for good planning software are similar to the characteristics required for good planning practice. The similarities are revealing and offer many clues on how to select planning software. For example:

- *Both planners and software applications must easily answer "what if" questions. Both must be capable of introducing unforeseen planning variables at any time. Both must rely on solid facts and figures.*

Answering "what if" questions and introducing new variables into a planning model requires a flexible methodology, scrupulous logic, solid figures, steady nerves, and patience (especially twenty-four hours before that big presentation to the board of trustees).

Good planning software should be able to incorporate, at any time, new and unforeseen variables that need to be added to the planning parameters. Flexibility is of paramount importance. Often, planning recommendations are based on statistics, trends, etc. An application that can take this into account is particularly useful.

- *Good planners and good software packages must be versatile.*

Dedicated campus planners usually produce good plans that are formulated to serve the best interest of the entire institution—the greatest good for the greatest number. For the duration of any project or study, the office of the campus planner becomes the convergence point for ideas, issues, dreams, and realities that are shared or disputed among the campus community. To succeed in their work, planners must be versatile individuals who are capable of juggling academic, physical, financial, logistical, and many other concerns.

Good planning software must also be versatile. A single-purpose application, such as a "room inventory" package, will not be used to the same extent as an application that can simultaneously keep track of room inventories, the staff listings, building operating costs, etc. On the other hand, the all-inclusive package that claims to integrate all of these variables will often do so poorly. Versatility truly exists when the software package allows the user to customize its features at will so that the application will suit the task at hand.

- *Both planners and software must be "user-friendly."*

In a "collegial" environment, planning recommendations are more likely to be implemented when as much care and attention are paid to the planning process as to the final product. For the planner, being "friendly" to the campus users requires soliciting their input and participation in the planning process; this can ensure that they feel that they have ownership of the recommendations that ensue.

The same should be true of planning software. Applications that are too complicated or too unreliable do not, in the long run, prove useful. Applications that require special training, or that are supported by thick manuals are not user-friendly. If only a "chosen" few in the planning department know how to use such software, or worse, if one person alone understands how to use it or why it is useful to do so, the application will quickly cease to be used.

With the above criteria in mind, and assuming that the hardware platform is a typical PC or a network of PCs, it is time to start looking for the right planning applications.

Can the Criteria be Met?

Can any software application meet the criteria listed above? How can a single package achieve the flexibility, versatility, and ease of use that has been specified? Are we not describing some form of complicated expert system or artificial intelligence? In other words, a complicated and expensive pipe-dream? The answer to these legitimate questions is yes. And no.

The search for appropriate planning software will prove elusive and unrewarding if one is looking for an all-inclusive package that accepts data at one end and automatically spits out results at the other end. The search for good planning software can only be successful if the user is willing to invest some effort and imagination in shaping the application to meet his or her need. In fact, for many planners the search can end before it begins because the appropriate software is already installed on their machines: *a spreadsheet program.*

Beyond Adding Rows and Columns

The early success of the original spreadsheet applications, such as Multiplan and Lotus, was due to the ease of basic arithmetic calculations applied to tables of figures. This ability proved to be particularly useful in the business world. In fact, for a time, Lotus was the leading software company in the world. However, despite their usefulness for basic calculating, the earlier versions of spreadsheet applications would not meet the selection criteria for planning software listed earlier. Fortunately, this has changed.

The most recent versions of off-the-shelf spreadsheet applications can now tackle varied and complex planning issues. In addition to being more powerful, the newer versions of the software have been rewritten to be more friendly, reliable, flexible, and versatile. Statistical functions, database features, cross-tabulation capabilities, and automated chart generators are a few of the newer features that make the applications suited to planning tasks. Although fully understanding and mastering the features of current spreadsheets requires a certain investment of time and energy on the part of the planner, the advantages and rewards of doing so make it worth learning. Here are a few compelling reasons.

- Almost everyone who uses microcomputers has at least a minimal understanding and working knowledge of spreadsheets. This common software "interface" is usually shared between the planning office and the rest of the campus community; it can be an important time-saver. With spreadsheets, the generation and transfer of planning data becomes easy. Imagine asking the music department to amend your CADD drawings so that you can update the campus office directory. Imagine instead asking the music department to list on a formatted spreadsheet file, which you supplied, the room number, the room name, and the occupant's name for all the faculty and staff.
- Recent versions of spreadsheet applications now include functions that were previously handled only by dedicated database applications such as dBase, FoxPro, and Paradox. Spreadsheets now perform basic database management tasks with ease. They can display and process databases in remarkably visual, informative, and easy-to-control formats. Their sorting, filtering, outlining, and cross-referencing (or "pivot-table") functions are invaluable. Even extremely large databases can fit within the data analysis

capabilities of current spreadsheets. Through the use of help menus and manuals, most databases yield their hidden secrets and their revealing trends in a matter of seconds.

- Current spreadsheet applications can "upload" files from a variety of sources. The ease with which data can be transferred and parsed from non-spreadsheet formats is remarkable. There are still some glitches from time to time, but overall incompatibility problems that existed in the early days have been successfully overcome. As a result it is now possible to upload large files from the institution's main-frame system quite readily so they can be analyzed at will on the planner's PC.
- Current software applications can generate elegant charts and graphs with ease and speed. In fact, some users go overboard; self-restraint is advisable.

Making It All Add Up

As questions are asked and answered, as variables are added and withdrawn, as hypotheses are tested and scenarios explored, a typical spreadsheet file used for planning purposes changes in complexity, shape, and depth. But what answers can it provide? Three examples show how spreadsheet applications can be useful to planners:

Example #1: Classroom Section Hour Analysis

More and more academic departments complain that there is a shortage of classrooms on campus and that the rooms are too small. Tension develops between the campus scheduler, who feels that the classrooms are adequate, and departmental heads, who universally believe that more rooms are required. The campus planning office must review the situation.

A proven method of defining the optimum configuration (number of rooms and their sizes) is a section-hour analysis, whereby classrooms requirements are broken down by capacity (21 to 25, 26 to 30, 31 to 35, etc.) and weekly hours of use. Current room schedules, provided they are accurate, can be used as the source of data to carry out the analysis. If these schedules exist in a digital format, spreadsheet applications can be used to significantly speed up the analysis process. After "uploading" into the spreadsheet program and massaging the data to the appropriate format, the section-hour analysis can be performed by using the cross-tabulation features of the software.

Cross-tabulation will yield a table whereby the hours of use of classrooms are tabulated by section sizes (a demand of 142 hours a week for sections of 20 to 25 students, for example). Setting up the cross-tabulation and obtaining the results is almost instantaneous. Before the availability of spreadsheet programs, the same operation carried out by hand at a large campus could have taken weeks. With the results of the section-hour analysis in hand, it is possible to match optimum requirements against the existing classroom inventory and draw conclusions. With the same file it becomes possible to determine the average seat utilization of classrooms, daily and weekly scheduling peaks, overall room utilization, and other information.

Example #2: Space Programming

Once capital funding has been secured by an institution for the construction of a new building or the renovation of an existing one, several events must come together at once to get the project under way. Most planning activities will fall within the area of responsibility of the campus planning office. In

the pre-design stages of the project, a key task will be to finalize the space program for the new building. This seemingly simple task can prove to be time-consuming and frustrating because, as the building program is being honed, many parties will request information on its contents. The Building Committee will wish to be kept up to date on how the square footage of the building program adds up so that priorities can

**Good planning software
should be able to incorporate, at any time,
new and unforeseen variables
that need to be added to the
planning parameters.**

be established. The Architect Selection Committee may wish to provide bidders with an estimated footprint of the building, a preliminary vertical stacking arrangement, etc. Costing experts may need to have the space program broken down by various categories, and they may wish to apply per-square-foot unit costs to the project. The cost per square foot for a classroom or a gymnasium is quite different than that of a highly specialized laboratory; this needs to be considered in costing estimates.

Here again, the obvious choice of software for this type of data management is the spreadsheet. With current versions, it is relatively easy to generate the customized reports that each of the above parties require so that they can complete their tasks. Depending on the project's specific needs, these reports may be generated by filtering the data, by cross-tabulating it, by producing category outlines, etc. Distributing the information in digital format is easy since those requiring the data also have spreadsheet programs.

Example #3: Enrollment Management

Proficient enrollment forecasting and enrollment management is becoming an important function of institutional management, particularly for colleges and universities funded on a "per-FTE" basis. Again, spreadsheet applications are the obvious choice to carry out this forecasting work.

For the institutions serving a defined community, typical forecasts will be based on the actual enrollment figures of "feeder" schools in the region. If the base figures include the enrollments of lower grades, and if this information is available for a number of consecutive years, the spreadsheet's statistical and linear regression functions can be used to forecast the size of the total population eligible for admission on a long-term basis. Other variables and planning hypotheses are typically added to this basic model. Participation rates must be accounted for. Migration factors into and out of the region should be modeled. The state of the local economy, the impact of a marketing campaign, and several other types of variables that can affect the forecast, although harder to quantify, can also be included in the model.

Planners who are proficient at using spreadsheets will find them well suited to tackle the three examples listed above. But a word of caution: spreadsheet software makes it

so easy to change assumptions, percentages, and variables that, without careful thought about data inputs, the planner may draw, in the end, very skewed conclusions. If the spreadsheet model is not structured properly a definite risk exists of compounding error margins and multiplying the effect of erroneous assumptions.

One Final Advantage

The spreadsheet program, when used to the full extent of its features, empowers the planner. It allows the user to look at data in new ways and from a different perspective. For example, the campus classroom scheduling package used by the registrar's office may produce some reports that are useful to that department, but not so useful to the planning office. Having uploaded the registrar's data from another dedicated application onto a spreadsheet, the planning office does not have to accept at face value the utilization reports of the campus scheduler. With a minimal investment of time and effort, reports and analyses that are meaningful to the planner can be obtained.

Other Applications

There are protocols, languages, and packages on the market designed to bridge different hardware platforms and produce customized reports from the records and databases commonly used at educational institutions. But these are not as popular, affordable, and versatile for the non-specialist as spreadsheets. Experience has been that, in a planning environment and for planning problems, the data eventually ends up on a

spreadsheet program so that it can be analyzed in a more straightforward manner.

What Investments are Required?

Most planning offices already have the spreadsheet software and the appropriate hardware. To take full advantage of spreadsheet applications, a regular PC (486 or Pentium) with sufficient memory (8 megabytes or more of RAM) is recommended. In today's computer market, these are common, affordable specifications. When using the software, backing up the files is strongly recommended during every step of the process, not so much because the software often crashes, but because it is sometimes difficult, time consuming, or impossible to backtrack after certain commands and operations have been carried out. It is sometimes simpler to open a previously saved earlier version of the file and start again.

Learning to use an application and its features is the key to realizing the potential of a spreadsheet package as a general purpose tool for the planning office. The most important investment to be made by the planner is not in the software or the hardware, but in his or her time. This involves reading the manual to find out what functions, analysis tools, "wizards," and special features are available. But more importantly, the planner must experiment, practice, and sometimes use a trial-and-error approach. Soon the rewards and benefits will begin to materialize. The planner will find spreadsheets to be an indispensable instrument capable of tackling more and more complicated planning problems and tasks as an analysis tool, a data manager, or a problem solver. ■

Portable Spect-A-Lift® Saves Space, Time and Money!

And it meets all applicable ADA safety requirements

Facility and Maintenance Managers appreciate the Spect-A-Lift because it is portable, can be moved easily from one location to another, sets up in minutes, requires minimal floor space and can be stored in a 4 by 5 foot area. It rises quietly to stop automatically at any stage level within its 50" range, and plugs into any 110 volt outlet.

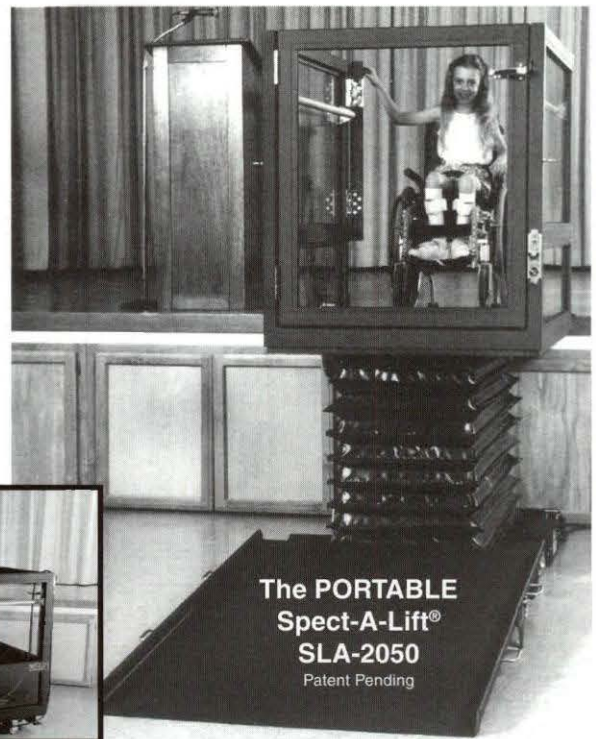
Administrators love it too, because it saves the cost of multiple ramps and stationary lifts, and the cost of their installation. One school district realized savings of more than \$100,000 by being able to use their Spect-A-Lift in 18 different locations.

The Spect-A-Lift meets or exceeds the safety requirements of the Americans with Disabilities Act (ADA) as well as ASME and ANSI performance, dimensional and safety requirements.

For additional information and a free demonstration video contact:

ASCENSION®
A DIVISION OF AGM

PO Box 40020 • Tucson AZ 85717-0020
Tel: (800) 459-0400 • Fax: (520) 881-4983



The PORTABLE
Spect-A-Lift®
SLA-2050
Patent Pending

COMMUNICATING Space Management Needs

With

Credibility and Integrity

by Brenda Norman Albright

Higher education leaders are skilled in recognizing and identifying problems and opportunities. But particularly in this era of accountability, we must be able to organize and persuade ourselves to do something about them. In *The Age of Unreason*, Charles Handy describes a learning organization as an organization that learns and encourages learning in its people. It has a formal way of asking questions, seeking out theories, testing them, and reflecting on them. The learning organization is "properly selfish"—it is clear about its role, its future, it has goals, and is determined to reach them. A learning organization is a caring organization—it wants everyone to learn always, and bends over backwards to make that obvious. APPA is clearly the quintessential learning organization. Each member has experienced what Alan Mumford calls "Incidental Learning"—lessons learned from incidents in our lives and careers.

Lesson 1: Know that Credibility Counts

Tell the truth (the whole truth) even if it hurts

Credibility is the most powerful persuader. Leaders earn credibility when they are consistently honest, admit mistakes, make decisions reflecting the best interest of the people they serve, take responsibility rather than pointing fingers, and abide by the spirit, not only the letter, of policies or law.

Incidental Learning Experience: a legislature appropriated funds for a university library. The president, however, chose to spend the funds on building a gymnasium. While the president's actions were within the limits of the law, the action was inconsistent with legisla-

tive intent. Needless to say, the entire higher education system lost credibility, the legislature amended the statute on capital to close this loophole, and the much-needed library was not built until ten years later, after a new president was selected. Now, twenty years later, many legislators have not yet forgotten the library that became a field house.

Credibility is also earned in being prepared, presenting all the facts whether they support your viewpoint or not, and recognizing that other programs or institutions may have greater needs. While it usually takes months or years to build credibility, it only takes one unwise action by an institution or an individual to destroy credibility of many institutions for a long period of time. Who has forgotten higher education's loss of credibility in use of indirect cost recovery?

In environments soaked with skepticism and hostility, sometimes it is difficult simply to tell the truth. No one likes to face embarrassment, particularly very public displays. Perhaps many of us have or have been tempted to tell half-truths, leave out a few details, or fail to acknowledge mistakes. Denial of the truth means loss of credibility. While no one likes to hear bad news, lying and concealment is neither forgiven nor forgotten. Perhaps Edward R. Murrow said it best: "To be persuasive, we must be believable. To be believable, we must be credible. To be credible, we must be truthful."

Lesson 2: Recognize the Holistic Nature of Communication and Decision-Making

As one component of a much larger system, it is essential to be informed and aware of other parts of the whole since they ultimately affect us. While Stanford University received the most publicity concerning indirect cost expenses, all higher education institutions were affected. Elementary and secondary schools are part of the system too; current national publicity about deplorable physical conditions will affect our operations. Understanding the decision-making process, its

Brenda Albright is a consultant to higher education based in Franklin, Tennessee. She most recently worked as vice chancellor for administration and finance for the University of Maryland System, and she served from 1986 to 1994 as deputy executive director of the Tennessee Higher Education Commission. Albright is a past member of the APPA Board of Directors and is an honorary member of APPA.

timing, and its leaders is essential to effective communication. Charles Handy notes that the learning organization is constantly reframing the world and its part in it, and that reframing needs outside stimulus. "Reframers need to walk in other people's worlds."

Lesson 3: Believe in Your Cause

A successful political fundraiser once said that the key to success in believing in your cause. Decisions are sometimes made on logic, frequently on emotion. Observe a president, dean, or department head; attend a legislative budget hearing. Those who add a bit of passion to a logically built presentation are usually the most effective communicators. Leaders who believe in their cause are successful in persuading others to support deferred maintenance or to build new libraries. Believing in your cause means going beyond the technical and substantive.

Lesson 4: Take Action—Ask

Many people find it difficult to ask; asking is a risk. But not asking is also a risk. If you see a need yet are unwilling to act, the risk is loss of sense of personal responsibility. Analysis may be excellent, thinking may be sound, conceptual framework may be strong, yet it's impossible to think your way into financial support for a needed renovation project. You have to ask your way. Perhaps many of us are afraid of failure. "If you want the rainbow, you have to put up with the rain," as Dolly Parton wrote in a song. Successful communication and results requires frequent action, asking, and some failures.

Lesson 5: Be Teachable

The times when we are not successful in communicating space management or facilities needs are opportunities to learn. Charles Handy says that the Learning Organization must *cultivate its negative capability*—disappointment and mistakes are part of change and essential to learning. The teachers are those who say no, ask questions, or disagree. Sometimes the message is to ask again. Other times the message is to repackage our programs and needs into another form. Being teachable means making the effort to understand the budgetary process.

In Tennessee there is a legislative subcommittee known as the Black Hole Committee; it is composed of three legislators who determine which bills are moved out of committee for vote of the entire legislative body. To be effective in the legislature, one must be willing to learn and be teachable about the Black Hole Committee.

Lesson 6: Understand the Budget Process, Identify Champions and Allies, Be a Player

A recent article in the *Washington Post* was subtitled "Reality Check, the Politics of Mistrust" and titled "Who's in Control? Many Don't Know or Care—Knowledge Gap Affects Attitudes and Participation." The article concluded that the majority of Americans do not know the names of their U.S. senators, or whether or not more of the federal budget is now spent on Medicare or foreign aid. The *Post* noted that "knowing basic facts about politics does matter. . . information is one of democracy's golden keys. Without basic facts about the players and the rules of the game, Americans tune out politics and turn off voting." In a similar way, the budget is central to the management and future of institutions. Understanding the process and knowing the facts matter;

budget information is a key to budgetary solutions.

Facilities managers have an easier task in communicating management and financial issues than others because seeing is believing. Scheduling tours for budgetary allies is a strong strategy for building support.

Lesson 7: Move from Pulp Fiction to Virtual Reality

Remember that each presentation counts

Given the ease of communicating using presentation software and technology, polishing skills and moving from a detailed paper world to use of technology can be a major aid in communication. *Incidental Learning Experience: in a luncheon meeting, a board member was impressed with the use of technology in demonstrating the need for technology. The board member later mentioned the conversation to a client who years later became governor and funded the technology program. Each presentation counts.*

Lesson 8: Embrace Accountability

Goal-based funding can change the language and the budget discussion from reviewing institutional expenditures to reviewing teaching and learning and evaluating success in meeting state and student needs and educational achievement. Ruth Holmberg, Chair of the Board of the *Chattanooga Times* and member of the Tennessee Higher Education Commission, noted that "If the higher education community does not state its purposes, aims and vision itself, someone else will eventually step in and do it for you. . . it is best done from within. . . you have your dreams and you know your constituencies. Articulate your vision with clarity and imagination and the press is your best ally. We will promote, publicize, and editorialize in support of effective higher education. We will endeavor to build both the public support and the financial commitment that such a vision deserves."

Lesson 9: Communicate Quality and Success

Quality is infectious. Students and faculty want to be associated with institutions and programs that are known for high quality. While acknowledging failures, communicate the positive aspects, not the negative of our enterprise. Aim toward the achievement of high quality, not average. In a conversation about salaries, a governor asked, "Why does higher education aspire to be average? Do you want an average salary?" When you're below average, average appears to be a desirable goal, but do we truly want an average educational system? When quality and performance are evident, basic support of programs is easier to achieve. Assessment and accountability programs are ways of demonstrating quality and building credibility and support.

Lesson 10: Success is Never Final

Although your space management needs may be met, and the world may look rosy, success is never final. We don't win today's games based on yesterday's press releases. Only through continuous learning of new lessons can we achieve a better future through serving students, faculty, citizens. This list is not yet complete! ■

Sources

1. Charles Handy, *The Age of Unreason*. Boston: Harvard University Press, 1990.
2. *The Washington Post*, January 29, 1996.

Regulatory Action

Confined Spaces: Defined and Simplified

J. Brent Kynoch

What is a confined space? What are the requirements for working in or around confined spaces?

Most people are not sure what a confined space is or how to comply with the OSHA regulations relating to confined spaces if such a space exists on their campus. As with most OSHA regulations, the confined space regulation can be difficult to understand. With the right analysis, however, this confined space standard can be made simple and straightforward.

A confined space is one that is large enough and is shaped in a way that allows for employee entry to perform some assigned task, but has a limited or restricted means of entry and exit. A confined space is also one that is not intended for continuous occupancy (for those of you who think that your office might qualify as a confined space!). Many workplaces contain spaces that are considered to be "confined" because their configurations hinder the activities of any employees who must enter into, work in, and exit from them. Examples of confined spaces include underground vaults, tanks, storage bins, pits and diked areas, vessels, and silos.

Any potential workplace hazard can be even more of a hazard in a confined

space because of the difficulty of quick exit or the difficulty of moving around within the space. In many instances, employees who work in confined spaces face increased risk of exposure to serious physical injury from hazards such as entrapment, engulfment, and hazardous atmospheric conditions. Confinement itself may pose entrapment hazards, and work in confined spaces may keep employees closer to hazards, such as an asphyxiating atmosphere, than they would be in a non-confined space. For example, confinement, limited access, and restricted airflow can result in hazardous conditions that would not arise in an open work space. For these reasons, confined space work is regulated by OSHA, and requires special training and precautions.

OSHA estimates that about 2.1 million workers enter confined spaces annually. Over 17,000 workers are injured each year in confined spaces, with some 6,500 of these accidents being serious in nature. Worse yet, about 60 persons die each year from work in confined spaces.

Permit Required Confined Spaces

"Permit required confined spaces," or permit spaces, refer to confined spaces that also pose some health or safety hazard, and thus, require a permit for entry according to the OSHA regulations. In fact, the OSHA standard essentially regulates *only* these permit spaces. Simply defined, a permit space is a confined space that has, or has the potential for, one or more of the following conditions:

1. Hazardous Atmosphere

- levels of flammable gases above 10 percent of the substance's lower flammability limit.
- levels of combustible dust that are above the substances lower flammability limit.
- oxygen concentrations above 23.5 percent or below 19.5 percent.

Example: Underground or above ground fuel storage tank.

2. Engulfment Potential

- contains a material that could "flow" and engulf the occupant.

Example: Sand bin storage building for foundry operations.

3. Entrapment Potential

- has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly con-

verging walls or by a floor that slopes downward and tapers to a smaller cross-section.

Example: A grain hopper with a funnel shaped bottom.

4. Contains any other recognized serious safety or health hazard.

A confined space only becomes a permit space if one or more of these conditions exist, and the majority of the OSHA standard only applies to permit spaces. So it pays to identify those spaces that are considered confined, and attempt to eliminate those hazards that might make the space a permit space.

OSHA Standard

The OSHA Standard governing work in confined spaces is 29 CFR 1910.146. This standard became effective on April 15, 1993. In general, the standard requires that employers evaluate the workplace to determine if spaces are permit spaces. If there are permit spaces in the workplace, the employer must inform exposed employees of the existence, location, and danger posed by the spaces. This can be accomplished by posting danger signs or by another equally effective means.

If the employer does not intend for workers to enter and work in any permit spaces, then effective means of preventing access to these spaces must be implemented, and the requirements of the standard have then been met.

If the employer does intend for workers to enter permit spaces, there are a number of requirements that must be met in order to be in compliance with the OSHA standard. These requirements are as follows:

1. Develop a written permit space entry program.
2. Perform appropriate testing for atmospheric hazards.
3. Develop the actual entry permit.
4. Provide proper training for all workers who are required to work in permit spaces.
5. Assign an attendant outside the permit space for the duration of the entry operation.
6. Assign a supervisor to be responsible for verification of appropriate testing and issuance of permit.
7. Provide all necessary personal protective equipment required for entry at no cost to the employee.

Brent Kynoch is president of AAS Environmental, Inc., an environmental engineering consulting firm with offices in Washington, D.C. and New York City. He is a frequent speaker and writer on indoor environmental and industrial hygiene issues. In January 1996, he served as an instructor at the APPA Institute in Los Angeles, where he provided information on confined spaces, asbestos, lead paint, and indoor air quality.

Atmospheric Testing

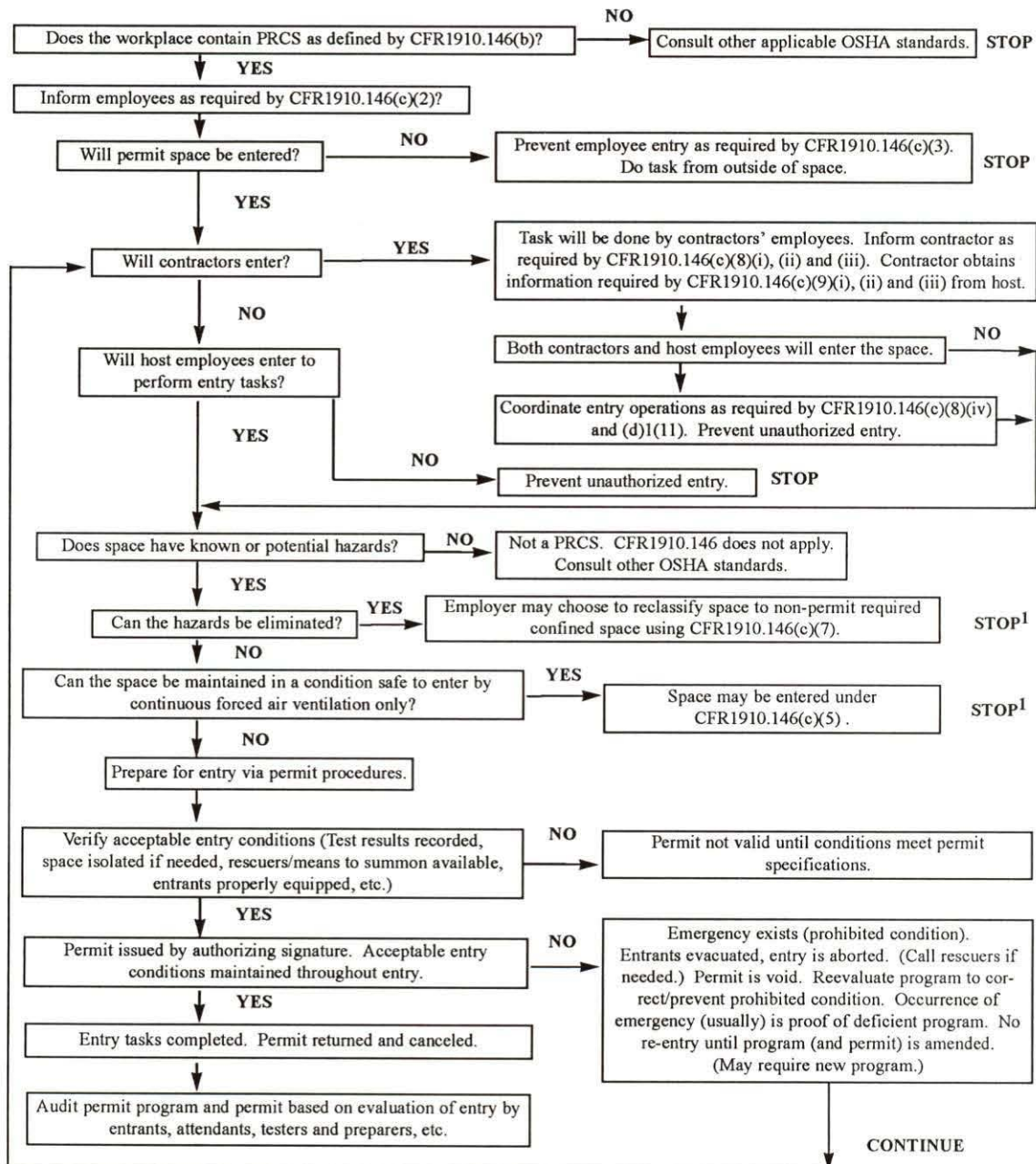
Most permit spaces are defined as such because of an actual or possible hazardous atmosphere. For this reason, testing of confined spaces is required before entry, and is a relatively common practice today. The OSHA standard requires that atmospheric testing be conducted for oxygen, combustible gases, and other toxic gases and vapors.

In fact, the testing must be conducted in this order because of the relative importance of each of these hazards and because of the multiple atmospheric hazards that can be created in confined spaces.

For instance, methane is an odorless substance that is nontoxic and harmless at some concentrations. Methane, however, can displace all or part of the atmosphere in a confined space, and

the hazards presented by this displacement can vary greatly, depending on the degree of the displacement. With only 10 percent displacement, methane produces an atmosphere which is adequate for respiration (i.e., oxygen content above 19.5 percent), but can explode violently. At displacement levels of 90 percent, methane will not burn or explode, but the resulting lack of oxygen will asphyxiate an unpro-

Permit - Required Confined Space Decision Flow Chart



¹Spaces may have to be evacuated and re-evaluated if hazards arise during entry.

tected worker in less than five minutes.

Monitoring equipment for confined space testing is commercially available and very common in the workplace. The OSHA standard requires direct reading equipment, and most on the market meets this standard. Monitors are available that will test for oxygen, explosives, and toxic gases, in that order, and can be worn on the waist of the worker in the confined

space. These monitors can be set to alarm if the atmospheric conditions change during the course of the work. Better yet, some of the monitors contain data logging capability, allowing for data collected on atmospheric conditions during the confined space entry to be downloaded onto a computer after work is complete. This information can be used to provide a valuable historic record of work in confined spaces for future reference.

Avoiding the OSHA Standards

The OSHA requirements for permit spaces may seem onerous; however, they exist to ensure the health and safety of those who must work in confined spaces. Obviously, it would be in the best interest of the employer and the employee to attempt to reclassify permit spaces to non-permit required spaces. This can be done by eliminating the hazards that cause a confined space to be classified as a permit space. OSHA allows opportunities for permit spaces to be reclassified as non-permit spaces as a part of the standard.

For example, if the only hazard posed by a permit space is an actual or potential hazardous atmosphere, and it can be demonstrated that forced air ventilation alone is sufficient to maintain the space safe for entry, then the employer can be exempted from the requirements for permits and attendants. The telecommunications and electric utilities industries have been very successful in using forced air ventilation to eliminate hazards in street level manholes prior to entering for maintenance and repair work. Workers that will enter the space still need appropriate training but all of the other paperwork can be avoided. In other cases, if the engulfment or entrapment hazards can be eliminated or abated for the duration of the entry operation, the requirements of the OSHA standard do not apply.

If an employer can eliminate hazards in confined spaces that classify them as permit spaces, the entry operation can be made safer, and OSHA, workers, and administrators are happier. The OSHA requirements for permit spaces can be boiled down to a written program, a permit, training, testing, and assignment of attendants and supervisors. Or, more simply, one can avoid the OSHA requirements and the dangers inherent in working in permit spaces by eliminating hazardous atmospheres, engulfment hazards, and entrapment hazards.

If confined spaces exist on your campus, follow these rules for simplicity and safety:

1. Identify confined spaces and determine if these are permit spaces.
2. Lock out these spaces and do not enter, if possible.
3. If entry is required, eliminate or remove the hazard to reclassify the space as non-permit required before entering.
4. If reclassification is not possible, follow the requirements of the OSHA standard 29 CFR 1910.146.

*"Run
With the
Authority..."*

- Work Order Management
- Equipment Management
- Preventive Maintenance
- Project Management
- Building Management
- Scheduling
- Failure Analysis
- Inventory Control
- Contract Management
- Chargeback and Cost Accounting
- Personnel and Training Management
- Reporting, Charting and Graphing
- E-Mail Interface
- CAD Interface
- Paperless PM Management
- Network Ready/Multi-User



Easy to Use Facility Management Software

TMA Systems, Inc.
5220 East 69th Place • Tulsa, OK • 74136
Call Today For A Demo Disk • 918.494.2890

Multi-Platform Ready

Mac™ OS,
Windows™,
Windows NT™,
Windows 95™

Quality • Lightweight

Folding Tables & Chairs

High Strength
ABS Tabletop
18" and 30" Wide
60" Round

Sturdy
Polypropylene
Chairs
7 lbs.

8' x 30" Table
Only 45 lbs.!

1-800-333-2687

 **McCourt**
Manufacturing

1001 North 3rd Street
Fort Smith, AR 72901
FAX 501-783-7608

Call for Samples & Information

Software & Solutions

Howard Millman

2 Plus 1 Equals 21

For years I believed that only two universal elements existed, Hydrogen and Confusion. I have just discovered a third, Algorithms. And this new element minimizes Confusion at least when it comes to optimizing and scheduling campus space and events.

According to Universal Algorithms (UI), their family of space planning

applications will help justify construction or renovation projects, analyze space utilization, and minimize the maddening mental calisthenics involved in verifying space availability and access.

UI offers three products. The first, Schedule25, provides a variety of space management features. Using it, campus planners can readily generate virtual forecasts to, for example, test the feasibility of converting a classroom to a science lab. Or predict the effect that adding new courses and rooms will have on schedules and maintenance demands. Planners can also use the system to plan classroom consolidations or floor closings during periods of low use or seasonal maintenance.

The product offers a variety of reports including open rooms by day of week and time, a placement analysis conveying all classes assigned, not assigned, or impossible to assign.

According to UI, Schedule25 will reduce space scheduling time from weeks down to minutes and achieve at least a 5 percent utilization improvement over existing methods. If your existing scheduling system is paper-based, you can expect a much higher return.

Schedule25's suggested list price ranges from \$15,000 to \$30,000 and includes unlimited phone support. The software runs on numerous mini and mainframe hardware platforms including DG/UX, RS/6000/AIX, IBM's mainframes, Sun/SunOS, Sequent, DEC's VAX/VMS, DEC/OSF/ULTRIX, HP/MPE/XL and HP/UX.

The second in the UI lineup, Model25, graphically models the campus' space to help with strategic planning tasks. In addition, the Windows-like application enables users to graphically view the effect of changes in facilities management policies and to plan accordingly. Analytic graphs and tables and drill-downs provide increasingly detailed data. Depending on the authorization level granted by the system administrator, users can add, delete, or modify scheduled usage. A wide variety of preformatted reports summarizes space utilization.

Model25's suggested list price ranges from \$15,000 to \$30,000; it requires Schedule25, and it runs on IBM's RS/6000/AIX and DEC's Alpha.

The third member of the UI product line, 25E, enables users to view and schedule all courses and events held in

classrooms, fields, offices, and other campus meeting spaces.

With a couple of keystrokes, 25E will answer such typical questions as: When is room 1025 in Hartley Hall not used? What hours and days are the conference rooms in Terrace in use? What spaces are available for our June 18th meeting? Menu driven, the program displays its commands prominently.

25E works with actual and abstract "What if" data to project campus facility requirements. Facilities managers and campus planners can then use the resulting data models to analyze the suitability of proposed renovations or construction projects, or to assess the impact of projected changes in enrollment.

The software provides users with the ability to invoke all commands by pressing clearly labeled function keys. Its Select Entry interface allows users to create event descriptions by moving the cursor to each field (rooms, departments, room features) and pressing Select to make a choice rather than by typing.

25E includes a security system setup that lets system administrators establish the users' access rights and privileges. Relevant data stored in other databases can be exported in ASCII format and imported into 25E.

The software generates a record for capture and delivery to user's student information system for each assignment or change. Users can plan for enrollment changes, compare how spaces are utilized, determine which spaces are best suited for converting to other uses and track how departments spread their meeting times across the clock.

Costs of 25E start at \$10,000 for a five-user configuration. It runs on DG/UX, RS/6000/AIX, IBM's mainframes, Sun/SunOS, Sequent, DEC's VAX/VMS, DEC/OSF/ULTRIX, HP/MPE/XL and HP/UX.

For more information contact Universal Algorithms at 503-973-5200 (voice), 503-973-5252 (fax), or visit their World Wide Web site at <http://www.unival.com>. And help stop the proliferation of Confusion. ■

Howard Millman is a systems integrator who helps universities and hospitals implement facility automation systems. His firm, Data System Services, is based in Croton, New York. Millman can be reached at 914-271-6883 or hmillman@mcimail.com.



ATEK IS YOUR ONE SOURCE FOR ALL YOUR EMERGENCY LIGHTING NEEDS

ATEK inc.

CALL OR FAX US TODAY FOR YOUR FREE COPY OF OUR COMPLETE PRODUCT LINE CATALOG

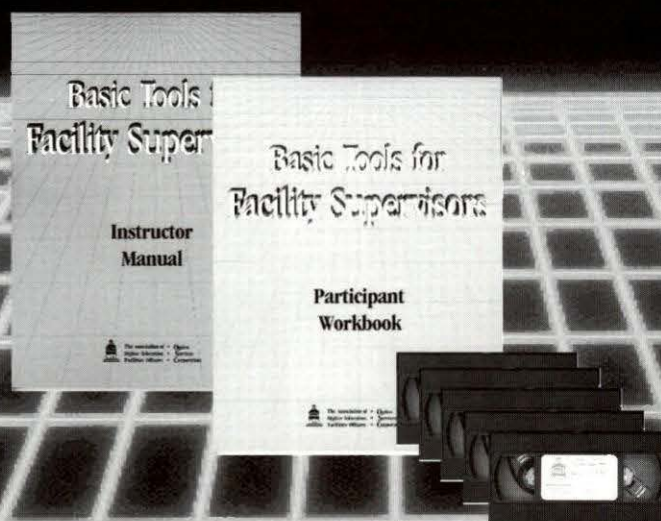
ATEK INC. 133 ROUTE 9 SOUTH, FORKED RIVER, N.J. 08731

CALL TOLL FREE 1-800-611-4509

FAX: 1-609-693-3118

CUSTOM LED SIGNS

Training Tools for Facility Supervisors



Now, more than ever, highly trained, skillful supervisors are needed to meet the challenges of budget cuts, shrinking human resources, and growing demands from education administrators.

WHAT CAN YOU DO?

APPA, in partnership with Ogden Services Corporation, has created a comprehensive 32-hour training and development package. It has been specifically tailored for educational facilities administrators, featuring proven management principles within the context of facilities operations. It is presented in seven modules—each practical and clearly structured.

- Module I: The Changing Job of Supervision
- Module II: Building Effective Internal and External Relationships
- Module III: Getting to Know Your Employees
- Module IV: Basic Labor Relations
- Module V: Goal Setting
- Module VI: Communications
- Module VII: Leadership

HOW *BASIC TOOLS FOR FACILITY SUPERVISORS* CAN HELP.

If budget cuts have eliminated your travel budget or curtailed training resources, and your facility supervisors are unable to attend valuable training seminars—training that can save your institution money in the long run—then this step-by-step guide and multimedia approach will make this information easily accessible to supervisors and staff.

UPGRADE SUPERVISORY SKILLS.

Most front-line supervisors have come up from the ranks with little formal training to help them make the transition from worker to manager. With this program, you can give them a whole new set of skills to become good supervisors.

ORDER *BASIC TOOLS FOR FACILITY SUPERVISORS* FROM APPA TODAY.
703-684-1446 ext. 235

See the difference in your supervisors, staff, and most importantly—your budget's bottom line.

**Receive : 1 instructor's manual
5 participant workbooks
(extra workbooks available at \$30 each)
5 videotapes**

\$995 after
\$1,200 for nonmembers

Major credit cards accepted.

Please send orders to:
APPA Publications
Dept. STAD
P.O. Box 1201
Alexandria, VA 22313-1201



The Association of
Higher Education
Facilities Officers

The Bookshelf

Book Review Editor: John M. Casey, P.E., University of Georgia

The Literature on Space

Planning for Higher Education, quarterly journal published by the Society for College and University Planning, Ann Arbor, Michigan. \$50/year for journal only, free with \$110/year membership, softcover.

The theme for this issue of *Facilities Manager* is space management. This term is often used in higher education, but just as often carries different meanings for different people in the academy. To a campus planning office, it involves siting, and programming new spaces for, future buildings. To the academic planning office, it means selecting the

appropriate classroom or laboratory at the correct times for each course lecture or laboratory period. To the campus librarian, it involves allocating space at the most convenient location for circulation, reference, stacks, and binding operations. To deans and department heads, it includes the acquisition and allocation of space to support faculty and student needs.

A narrow view of space management from a facilities perspective might limit it to the ordinary housekeeping and maintenance tasks necessary to keep spaces neat and comfortable. Planning, allocating, and managing space, however, are activities that are so interdependent that any involvement in these processes can, and usually does, make a facilities manager guilty by association in campus turf battles. As Australians Ted Dews of James Cook University and Sam Ragusa of Griffith University point out in their "Space Planning and Management" chapter in APPA's *Planning, Design, and Construction* book, "Space allocation approaches parking as one of the most inflammatory issues that confronts the facilities manager." As a result, each facilities manager must assume his or her role in the total space management process, perhaps not making turf decisions per se, but certainly acting as an important decision maker in the complicated process of establishing and maintaining space equilibrium.

For the purposes of this review, space

management is considered to involve the utilization of all campus space effectively and efficiently to accommodate present needs, with the flexibility to modify spaces and/or programs to suit changing needs. Several distinct steps appear necessary for each institution in its effort to implement space management. These include the preparation of a current facilities inventory, a periodical reevaluation of the data from the inventory, reallocating of space as necessary to accommodate changing requirements, and/or construction of additional space to handle revised, expanded, or new programs.

To fulfill the requirements of this definition, both academic and facilities managers must develop, and then maintain, a current database that allows the institution to know exactly how much space each separate activity occupies, how much each requires, and then to implement the necessary changes to establish and maintain space equilibrium. In APPA's *Planning, Design, and Construction*, Wendell Brase has stressed this important, and seemingly intuitive, need to integrate facilities planning with academic planning; unfortunately, such coordination is often neglected in the planning processes, and space management can become an exercise of square academic pegs not fitting into round facilities holes.

In reviewing higher education literature concerning this topic, there seems to be no recent monograph covering space management as defined. One publication, *Guide For Planning Educational Facilities* by the Council of Educational Facility Planners International, seemed promising, but on closer inspection this book covered different territory than our definition of the topic. The guide does provide excellent information concerning certain aspects of the entire process, but seems more closely related to basic campus planning than total space management.

Similarly, this topic is only partially covered in book chapters or journal articles, which are usually written from the perspective, and in the context, of the various disciplines or interest groups involved. For instance, APPA has, in addition to the Dews/Ragusa and Brase articles, published information that refers to aspects of space management as defined above. These works include the complete Winter 1992 (*Adapting Old Buildings for New Use*) and Summer 1995 (*Planning, Design, and Construction*) issues of *Facilities Manager*, and the book *Planning for Master Planning* by John Reeve and Marion Smith. The excellent chapter in APPA's *Facilities Management* manual by Clinton Hewitt on "Facilities Planning and Space Management" is probably the most concise and valuable discussion of the topic from the physical plant perspective.

Another representative of the University of Minnesota, William Middlebrook, wrote the oldest book, published in 1958, listed in the ERIC database on space utilization. In the 1970s, APPA published *Campus Planning and Construction*, in which Sam Brewster

ENGINEERS ARE ALWAYS SO SERIOUS

At Stanley Consultants,
we're serious about providing
excellent professional services.

Engineering, architecture,
planning, and management -
We take them all seriously.



STANLEY CONSULTANTS

TELEPHONE: 319/264-6600 • FAX: 319/264-6658

Phoenix, AZ • Denver, CO • West Palm Beach, FL • Chicago, IL • Des Moines, IA
Muscatine, IA • Minneapolis, MN • Las Vegas, NV • Cleveland, OH • Madison, WI

WE'RE SERIOUS ABOUT SERVICE

indicated how the basic elements of space management were applied at the University of Utah. Other related publications include Dr. Harvey Kaiser's *Planning and Managing Higher Educational Facilities*, still another contribution to facilities literature by the retired Syracuse University administrator, and Jon Regnier's "Improving the Utilization of Capital Facilities" in *Improving Academic Management* by Paul Jedamus and Marvin Peterson. Finally, no review of space management literature would be complete without mentioning the seminal work done at the University of Illinois in the late 1960s by Harlan Bareither and Jerry Schillinger; their book *University Space Planning* is the standard to which all other such publications are compared.

After unsuccessfully searching for a monograph on space management, it appears that the Society for College and University Planning (SCUP) journal, *Planning for Higher Education*, is the most consistent source for information about most aspects of this topic in the literature of higher education in the United States. SCUP describes itself as an "association of professionals devoted to planning at academic institutions" and indicates that its journal "seeks to transmit the knowledge, ideas, research, and experience most likely to advance the practice of higher education planning and policy making." In addition to a half-dozen or so feature articles, *PHE*, edited by George Keller, devotes about a third of its pages to reviews of scholarly publications. It also lists a brief description of "noteworthy articles" on academic, administrative, facilities, and financial topics from about forty primarily higher education journals; however, this list does not include *Facilities Manager*, an egregious lapse of good sense on the part of an otherwise prescient publication staff at *PHE*.

SCUP was founded in 1965, and is younger than APPA by over fifty years. Its headquarters are near the University of Michigan, and while not resident at Washington's One Dupont Circle or its environs, it is at least eligible for inclusion in higher education's inner circle; SCUP, like APPA, is a member of CHEMA, the Council of Higher Education Management Associations, along with National Association of College and University Business Officers (NACUBO), College and University Personnel Association (CUPA), and Association of College and University Housing Officers-International (ACUHO-I). SCUP has joined APPA and NACUBO in sponsoring publications of interest to facilities managers, including *Financial Planning Guidelines for Facility Renewal and Adaptation* by John Dunn.

Since 1990, SCUP has presented several articles in *Planning for Higher Education* that help to define and clarify space management. For example, "Creating Space Standards: The California Solution" by William Storey in the Fall 1991 edition describes how one state attempted to answer

the age-old question: "How Much Space Do Universities Need, Really?" This problem has plagued higher education since Plato set up a library and residential building adjacent to Akademos' olive grove in 387 B.C. Other attempts at belling the space requirement cat have been undertaken in Texas, New York, Ontario, the United Kingdom, and South Africa, according to Dews and Ragusa. The Storey article stress the fact that good space planning "is about conflict," a reminder that effective space management is not necessarily a positive-sum game.

Michael Owu's article "Classrooms for the 21st Century" in the Spring 1992 issue of *PHE* contains valuable information for classroom renovations, a subject that is high on each facilities manager's priority list. In the Fall 1992 issue, Alan Freeman et al. discuss elements of space management from the perspective of a land-locked urban institution in "New Town-Gown Planning." Roger Schluntz reports in the Spring 1993 issue that "institutions have suddenly started to create panels of experts to ensure good campus design," including effective use of existing structures, in "The Emergence of Design Review Boards." The Spring 1994 article by Anthony Blackett and Brenda Stanfield "A Planner's Guide to Tomorrow's Classrooms" discusses the impact of electronic teaching methods on classroom space allocation and its resultant effect on a building's infrastructure. "Planning for Renovations on

Campus" by James McKinney et al. informed readers of the Summer 1994 edition that effective space management of older campus buildings requires careful programming, including life-cycle cost analyses and feasibility studies for proposed renovations. The renovation theme is further defined in the following Winter issue by Stanton Eckstut and Ezra Ehrenkrantz in "Dos and Don'ts of Historic Preservation on Campus." Finally, John Jarvis suggests that planners can help architects by providing better guidelines for design, clearly an important element of efficient space management, in "Writing the Building Program for Architects" in the Spring 1995 issue.

The Society for College and University Planning provides a valuable service to all higher education institutions by publishing *Planning for Higher Education*. Its pages are filled with current information on topics that affect all facilities managers in the academy. Beneath the scholarly patina of the articles presented in this journal is a wealth of information for all institutions regardless of size or location. All APPA members should become regular readers of *Planning for Higher Education*.

—Dr. John M. Casey P.E.
Manager, Engineering Department
Physical Plant Division
University of Georgia
Athens, Georgia

FACILITY AUTOMATION

Success Insurance

Purchasing or upgrading maintenance management software? Ready to introduce your staff to the future of maintenance management? But with 300 programs to choose from, where do you get **objective recommendations** to help you choose the programs that will meet today's tracking and planning needs as well as tomorrow's?

Call us. Benefit from our 50 years of combined experience in facility management. You receive affordable, candid & focused recommendations geared to *your* needs. Why? **Because we sell no software or hardware**, a solution to your needs is our sole interest.

Howard Millman, Dan Millman, P.E.
Data System Services..... 914-271-6883

Readying for Change

Transforming Higher Education: A Vision for Learning in the 21st Century, by Michael G. Dolence & Donald M. Norris. Ann Arbor, Michigan: Society for College and University Planning, 1995. 100 pp. \$25 members, \$40 nonmembers, softcover.

In precisely 100 pages, Don Norris and Michael Dolence identify what college and university faculty and administrators sensed, even feared, was happening to higher education during the last several years. Someone finally has put a finger on the pulse of the institution, diagnosed its symptoms, and prescribed a general course of treatment. Still, the book resembles psychological therapy as much as a new prescription for higher education.

Transforming Higher Education: A Vision for Learning in the 21st Century captures the essence of angst in higher education today. Through their analysis, the authors assume roles similar to psychoanalysts treating a patient for multiple personalities disorder.

Dolence and Norris describe the recent massive transformation of society from the Industrial Age to the Information Age and the shift of focus from mass production mentality to targeting the individual needs of the customer, client, or stakeholder. This fundamental change is one result of the

explosion of information technology. However, the authors reason that despite widespread change resulting from significant investment in information technology, American higher education has not transformed itself because it has not clearly defined "a compelling vision for learning required to succeed in the Information Age." They see colleges and universities as bogged down with concerns about ownership of the "teaching franchise," and pro-

The book resembles psychological therapy as much as a new prescription for higher education.

pose that higher education instead expand the "learning vision" to the broader perspectives of the Information Age.

According to the authors, the transformation of American society from the Industrial Age to the Information Age has profoundly affected how we learn and work. Technology paves the way to producing information and generating new knowledge faster than ever before. As a result, we

expect students and workers to learn more and apply their knowledge quicker. Once used, information and knowledge endure a short life cycle before newer, more meaningful information supplants it.

Dolence and Norris point out that experts estimate that by the turn of the century, individual workers must learn an equivalent of thirty credit hours of instruction every seven years to keep pace with the dynamic nature of their workplace. This demand for learning and knowledge can place higher education in a "pivotal role in society." However, the authors believe colleges and universities will not be ready for such an important mission until higher education reexamines its fundamental approaches to learning. Colleges and universities must move away from the factory model based on a rigid structure of curriculum requirements, class size and credit hour generation toward the learner-focused model based on individualized information exploration through network learning and organizational collaboration.

In defining what transformation really means, Dolence and Norris describe a series of vignettes that portray types of learner-driven needs. They emphasize that higher education in the 21st century will combine a wide range of learning experiences, from traditional classroom lecture classes to completely on-line courses that will be available when the student is ready to study.

Beyond this linear definition, the authors describe transformation as a set of four interlocking operations that realign higher education with Information Age, redesign higher education to achieve this realigned vision, redefine roles and responsibilities, and reengineer the organization for higher quality and productivity. These operations are interconnected, perpetual, and mutually reinforcing.

To realign higher education of the Information Age, Dolence and Norris prescribe three steps. First, college instruction must incorporate traditional classroom experiences with active learning activities such as network scholarship, information synthesis, and knowledge navigation. Second, remove the time and place boundaries of the learning process, provide learners access to knowledge through electronic media, and make instruction learner-centered, self-paced, personally assessed, and experientially targeted. Third, understand the changing notion of a "job," as work moves from the industrial model of specific, limited tasks and responsibilities to the "knowledge worker," who possesses a variety of skills and talents and who can perform various roles for an organization.

To redesign itself to meet the needs of Information Age learners, higher education must understand and use the capabilities of the global electronic network. To do so will entail reorienting the role and purpose to create a ubiquitous information infrastructure, reconstituting the organization around

continued on page 52



DIRECT, EXCLUDE & CONTAIN FOOT TRAFFIC TO DESIGNATED AREAS WITH ROPOST PORTABLE CROWD CONTROL POSTS

- Form orderly lines during peak attendance times
- Placement of Posts can conform to any shape area
- Quickly installed & removed

**800-376-7678
FAX (214)222-6687**

MAILBOXES AND MAILROOM EQUIPMENT

*Attention
School Officials!*

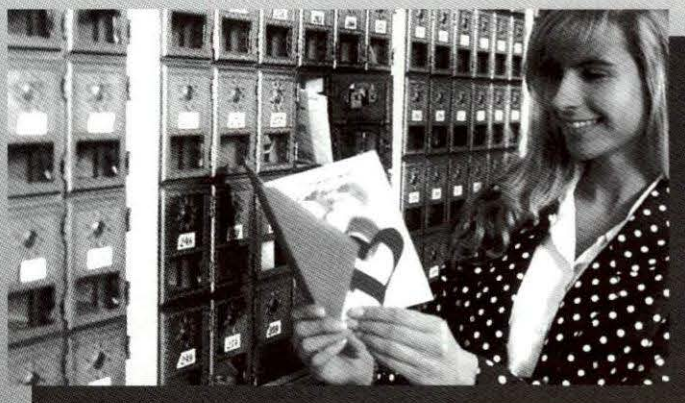
**FREE
CATALOG**

Products Include:

Brass Mailboxes
Aluminum Mailboxes
Free-Standing Mail Centers
Pedestal Boxes
Apartment Mailboxes
Free-Standing Drop Boxes
Wall Mounting Mail Drops
Mail Carts
Stamp Machines
Name Directories
Key Cabinets
Specialty Boxes
Spare Parts
Custom Systems



**Salsbury is the #1 Supplier of Mailboxes
to Colleges & Universities**



**SALSBURY
INDUSTRIES**

People Committed to Quality Since 1936

To order literature, please contact us 24hrs. by phone, fax, or mail.

Salsbury Industries (800) 323-3003
1010 East 62nd Street (213) 232-6181
Los Angeles, CA 90001 Fax (213) 232-7021

continued from page 50

essential outcomes, and reconfiguring notions of "seat time-based education" to "achievement-based learning" in the Information Age.

To redefine roles, responsibilities, and productivity, faculty must adapt to a multiple purpose role of research, mentor, synthesizer, evaluator, navigator, and architect. Learners must assume different roles based on personal choice and stage of learning. They must redefine productivity based on learning outcomes and demonstrated capabilities. Faculty will establish standards of performance and accomplishment for credentialing purposes, but learners will control conditions and timing for the attainment of these skills and talents.

To reengineer organizational processes, a critical examination of all basic assumptions about what is done, why, and how it is done must occur. What little reengineering has occurred on campuses has been predominately in administrative processes, but the authors believe the next wave will involve a transition of the organizational culture from "provider-driven" to "learner-driven" enterprises. Higher education must establish the idea of intellectual currency earned through a variety of accomplishments during a lifetime of learning. When successful reengineering occurs, it will "alter the very outcomes of the enterprise" besides improving productivity and performance.

Finally, Dolence and Norris argue that traditional planning processes cannot transform higher education. We must think strategically more than plan. Strategic thinking generates "a learning vision of compelling power" that will enable the strategic planning process on campuses. Strategic thinking leads to strategic planning that envisions the future through a participative approach that is based on reality and focused on the future.

The text is a wake-up call to higher education to respond to the Information Age, or remain stuck in the Industrial Age. As the authors acknowledge, their primary purpose is to provoke, or enlighten, not to prescribe definitive strategies. On occasion, however, the reader wants more details than the authors deliver.

The authors paint a compelling scenario of higher education's options at this point in the Information Age, and it is much like a train about to leave the station. Colleges and universities must decide whether to board now or risk getting left at the station.

Transforming Higher Education is available from APPA Publications, P.O. Box 1201, Alexandria, VA 22313-1201; add \$8 for shipping and handling.

—Dr. J. Thomas Bowen
Assistant to the Vice President
for Academic Affairs
University of Georgia
Athens, Georgia

Coming Events

APPA Events

For more information on APPA classes, contact the APPA Education Department at 703-684-1446, extension 230.

April 21-26—*The Executive Institute*. University of Notre Dame.

April 29-30—*Planning for Master Planning Seminar*. Atlanta, GA.

July 19-24—*1996 Educational Conference and 83rd Annual Meeting*. Salt Lake City, Utah.

Other Events

May 11-15—*Association for Facilities Engineering (formerly AIPE) Spring Maintenance Conference*, Baltimore, MD. Contact AFE at 513-489-2473.

May 13-15—*Total Quality Management Course*, New York. Contact American Management Association, 800-262-9699.

May 17—*National Fire Sprinkler Association Pumps for Fire Protection Seminar*, Boston, MA. Contact NFSA, 914-878-4200.

June 3-5—*Advance Topics in Industrial Hygiene Chemistry*, Salt Lake City, Utah. Contact Rocky Mountain Center for Occupational and Environmental Health, Registration Coordinator, 801-581-5710.

June 9-14—*CACUBO Management Institute*, University of Wisconsin, Milwaukee. Contact Chip Goldsberry, Purdue University, 317-494-7401.

June 17-20—*Construction Technology '96*, Anaheim Convention Center, Anaheim, CA. Contact 800-451-1196 or 610-458-7070.

June 18-20—*Instructional Techniques for New Instructors: Becoming a Dynamic Trainer*, Toronto. Langevin Learning Services. Contact 613-692-6382.

July 21-26—*Administrative Management Institute*, Cornell University, Ithaca NY. Contact School of Continuing Education and Summer Sessions, 607-255-7259; fax: 607-255-8942; e-mail: sp@sce.cornell.edu.

July 23-26—*Turbo Power Asia '96*

International Conference on Power Generation and Turbomachinery, World Trade Center, Singapore. Contact HQ Link Pte, Ltd., 150 South Bridge Road, #13-01 Fook Hai Building, Singapore 058727; phone: 65 5343588; fax: 65 5342330.

July 31-Aug 1—*5th Annual MAPPA/PGMS Grounds Conference*, Harper College, Palatine, IL. Contact Bob Getz, Physical Plant, Harper College, 1200 West Algonquin Road, Palatine, IL 60067; e-mail: rgetz@harper.cc.il.us.

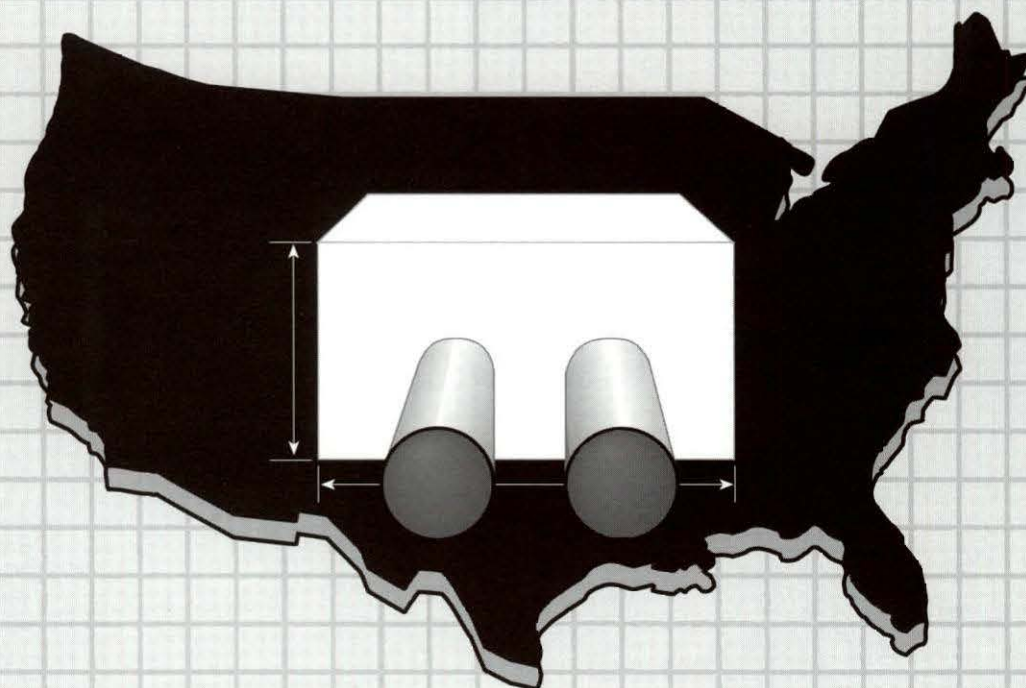
Index of Advertisers

ABM.....	10
American Thermal Products, Inc.	cover 4
Ascension.....	39
APPA Annual Meeting Insert	7
APPA Publications	47
ATEK.....	46
CES/Way.....	18
Contracting Alternatives	15
Copper Development.....	4
Data System Services.....	49
DriTherm	cover 3
Hudson Technologies, Inc.	6
Informed	13
Innerface	31
ISES Corporation.....	2
Johnson Controls	22, 26, 27
Locknetics Security Engineering.....	23
Maintenance Automation Corp.	cover 2
McCourt Manufacturing	45
Neptune Benson.....	21
O'Brien-Kreitzberg	14
The Parking Block Store.....	5
Ropost Rope Barricades.....	50
Salsbury Mailboxes.....	51
SFT	11
Stanley Consultants, Inc.	48
SVBK Consulting Group	12
TMA Systems, Inc.	44
Vulcan Signs.....	19
World Dryer Corp.	20



Dritherm®

Underground Pipe Insulation / Corrosion Protection



PROTECTING AMERICA'S PIPES

YESTERDAY

TODAY

TOMORROW

- Continuously Manufactured Using Same Formula Since 1967
- Closed Cell - 100% Hydrophobic Design
- Temperature Range: -273°F (Cryogenic) to +480°F (250°C)
- Ideal for New Piping Systems / Repairs / Tanks
- Approved by Department of Defense for New Construction

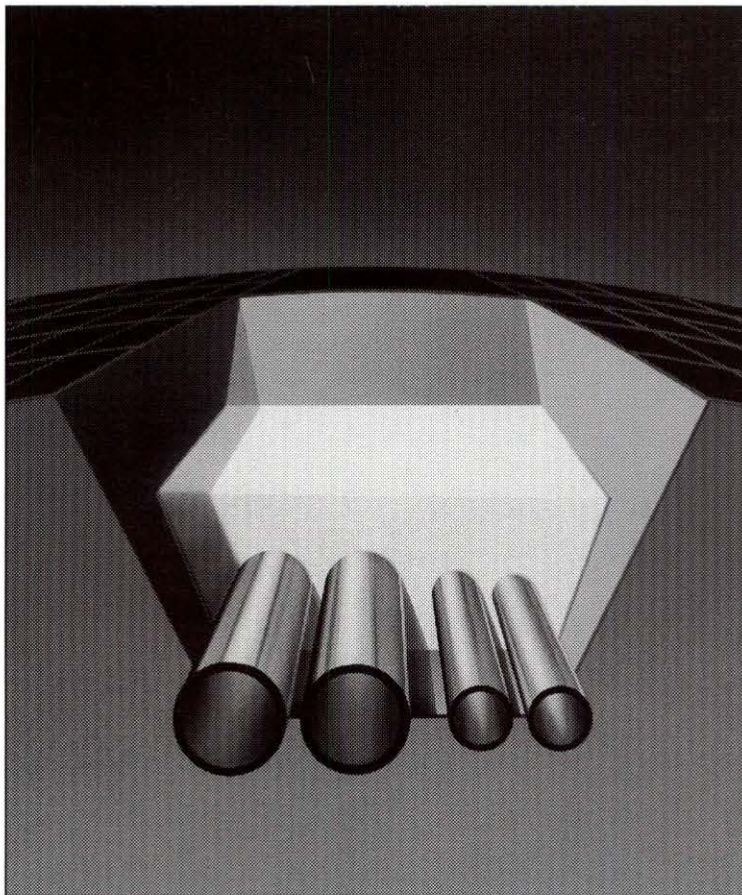
DRITHERM INCORPORATED

P.O. Box 5296

Parsippany, New Jersey 07054

(800)343-4188

FAX (201)428-3391



"HEFT Contributor"

Gilsulate® 500^{XR}

***Thermal Insulation and
Protection System for
Underground Pipes Operating
at 35° F to 800° F***

- *District Heating & Cooling*
- *Cogeneration*
- *Retrofit*
- *Hydrophobic*
- *Load Bearing*
- *Computerized Heat Transfer
Calculations and Design Reviews*
- *Engineered Drawings*

*For complete material and design
assistance contact:*

American Thermal Products, Inc.
*9220 Bonita Beach Rd. #111
 Bonita Springs, FL 33923
 800-833-3881*

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

Facilities Manager

1643 Prince Street
 Alexandria, Virginia 22314-2818

Nonprofit Organization
 U.S. POSTAGE
 PAID
 Bridgewater, VA
 Permit No. 5