

**Our industry** is in the middle of a complicated price journey. As stewards of assets that represent one of the largest investments made by any unit of government we inherit a long conversation about how we combine business acumen with social impact while overcoming internal concerns from faculty that a purely commercial operation will distract the education industry from its core mission or compromise its values. With an economic footprint of \$300 billion in the US economy alone, assertive engagement in global standards development processes is particularly important in heavily regulated industries like our own and where our campuses are essentially "cities within cities". We have everything to gain from linking the ideals of the academy with practical business sense at the highest level possible.

## 2002 2007 2010 2013 2014

Assertive advocacy on behalf of the US education facilities industry began in 1997 when the University of Michigan sponsored the first vote on the National Electrical Code (NEC) on behalf of APPA - The Association of Physical Plant Administrators (as it was then called) -- one of about twenty-five non-profit trade associations for educational facility professionals in the US. Assertive advocacy is distinguished by the characteristic of presenting original and data-informed safety and sustainability concepts to standards development committees. Professional time and travel must then persist -- frequently for 3 to 12 years -- to negotiate resolution with competitor interests with an opposing economic agenda. In the balanced market of materially affected stakeholders contemplated in the American national standard process, no single interest dominates the market. Therefore it is necessary to compromise with incumbent, competitor interests (typically manufacturers, insurance, labor and special experts within academia) to secure the majority vote usually necessary to change a standard that moves billions.

Up until 1997 only a very few individuals directly employed by the education industry were serving on ANSI accredited technical committees. They were discipline experts or technical school instructors but they were not the final fiduciary. Transcripts of the standards development processes of these technical committees revealed:

- Many committee members from academia were on retainer by private industry; applying their credentials and expertise as consultants for the competitive advantage of their sponsoring organizations -- typically incumbent interests.

- Most technical committee members were not advancing any new safety or sustainability proposals of their own; they were only voting Yes or No on the proposals of others.

- Many names on the rosters of these technical committees were technical school instructors who were either on the code panels for insight into the process that they would then convey to their students

For an industry with a market footprint on the order of hundreds of billions of dollars of annual spend at the time, the opportunity to manage its value chain through global standards development processes was too large to ignore. This drove the University of Michigan Plant Operations to begin seeking a merger of its business interests with the existing non-profit trade associations servicing the education industry; the Association of Physical Plant Administrators (APPA) being the first and natural choice since the University of Michigan was one of the original founding members of APPA in 1914. The National Electrical Code was a natural place to begin because it is the most widely adopted technical standard in the world and affected approximately 20 percent of the education facilities industry's power and telecommunications value chain.

The timing was fortuitous because the The National Technology Transfer and Advancement Act (NTTAA) had just been signed into law March 7, 1996. The Act amended several existing acts and mandated new directions for federal agencies for the purpose of:

- Bringing technology and industrial innovation to market more quickly
- Encouraging cooperative research and development between business and the federal agencies by providing access to federal laboratories; many of whom operated within colleges and universities
- Making it easier for businesses to obtain exclusive licenses to technology and inventions that resulted from cooperative research with the federal government

At least as important: the Act made a direct impact on the development of new industrial and technology standards by requiring that all Federal agencies use privately developed standards, particularly those developed by standards developing organizations (such as NFPA, IEEE, ASME, ASTM, UL, NSF International to name a few) whose business model included the financing and management of open, balanced and transparent market of materially-affected stakeholders to discover leading practice through American national standard processes.

Jim Christenson, Executive Director of Plant Operations at the University of Michigan, approached Ron Flinn (Michigan State University), who was APPA President at the time. A recommendation was made to the APPA Executive Board to nominate Mike Anthony to two National Electrical Code technical committees. Mike had been an employee at the University of Michigan (hired by Jack Janveja in 1982) and was Plant Operations first full-time electrical engineer. He was leading the development of UM's 100 MW power grid and had just published the first of three textbooks on power system engineering with McGraw-Hill. The nomination was the first APPA had ever made to any American national standards developer in its nearly 100-year history as a trade association.

The first NEC committee set standards for backup power systems and the second committee set the basis of the NEC as a regulatory document. The backup power committee rejected the application immediately because the user-interest was sufficiently represented. Mike's application for the regulatory committee was put on "Hold" and Mike continued to follow the development, adoption and enforcement of the NEC. During the following 1999 NEC revision cycle the University of Michigan received notice that the position to represent the "user-interest" on the regulatory committee had been granted. With the consent and support of Rich Robben, the Executive Director of Plant Operations who succeeded Jim Christenson, that position on the regulatory landscape continues to this day and is one of the few votes cast on behalf of the education facilities industry (See below).

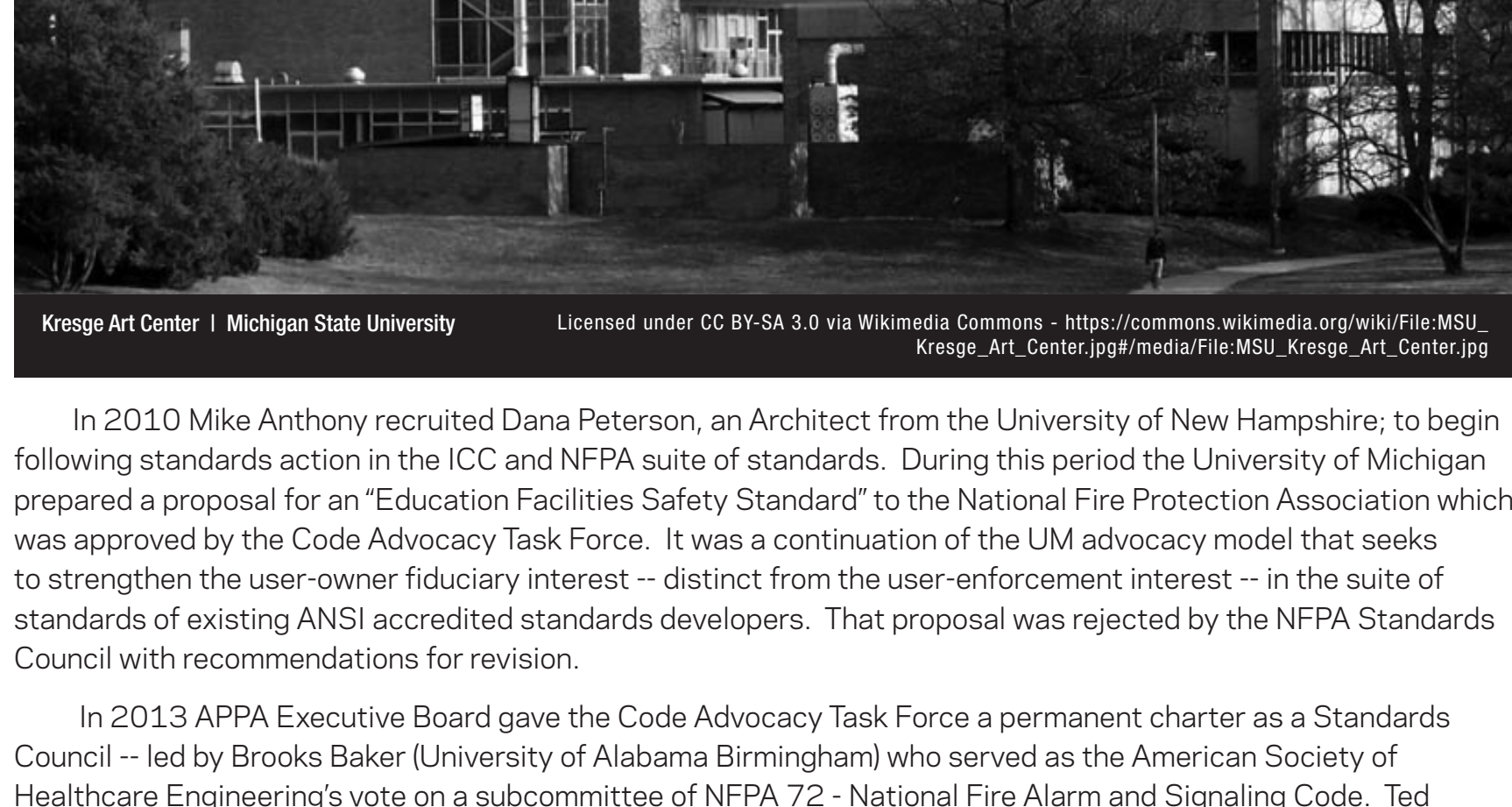
## 2002



The appointment was timely because IEEE-driven research into flash hazard safety risk was just beginning to track in the 2002 National Electrical Code. An understanding about the safety risks associated with just approaching -- apart from touching -- energized electrical equipment was accelerating but this understanding required extensive knowledge of the as-built power system before engineers could perform the incident energy calculations. Proposals to require incident energy calculations for any item of electrical equipment over 50 volts received fierce debate -- with manufacturers, insurance, labor and enforcement interests opposing utilities and user interests. The University of Michigan-sponsored vote was the deciding vote (in a 7-5-1 ballot) in limiting the scope of incident energy calculations and labeling requirements for all energized electrical equipment over 50 volts as a condition of occupancy. In retrospect, it was the appropriate vote for the education industry but, in prospect, the vote that was cast was not popular with the incumbents and the professional engineers who were qualified to perform the incident energy calculations. Nevertheless, that directed vote avoided what APPA electrical professionals determined to be unnecessary engineering costs on the order of \$1 - \$10 billion per year, and set the first mark for the value-add possibilities associated with managing regulatory risk.

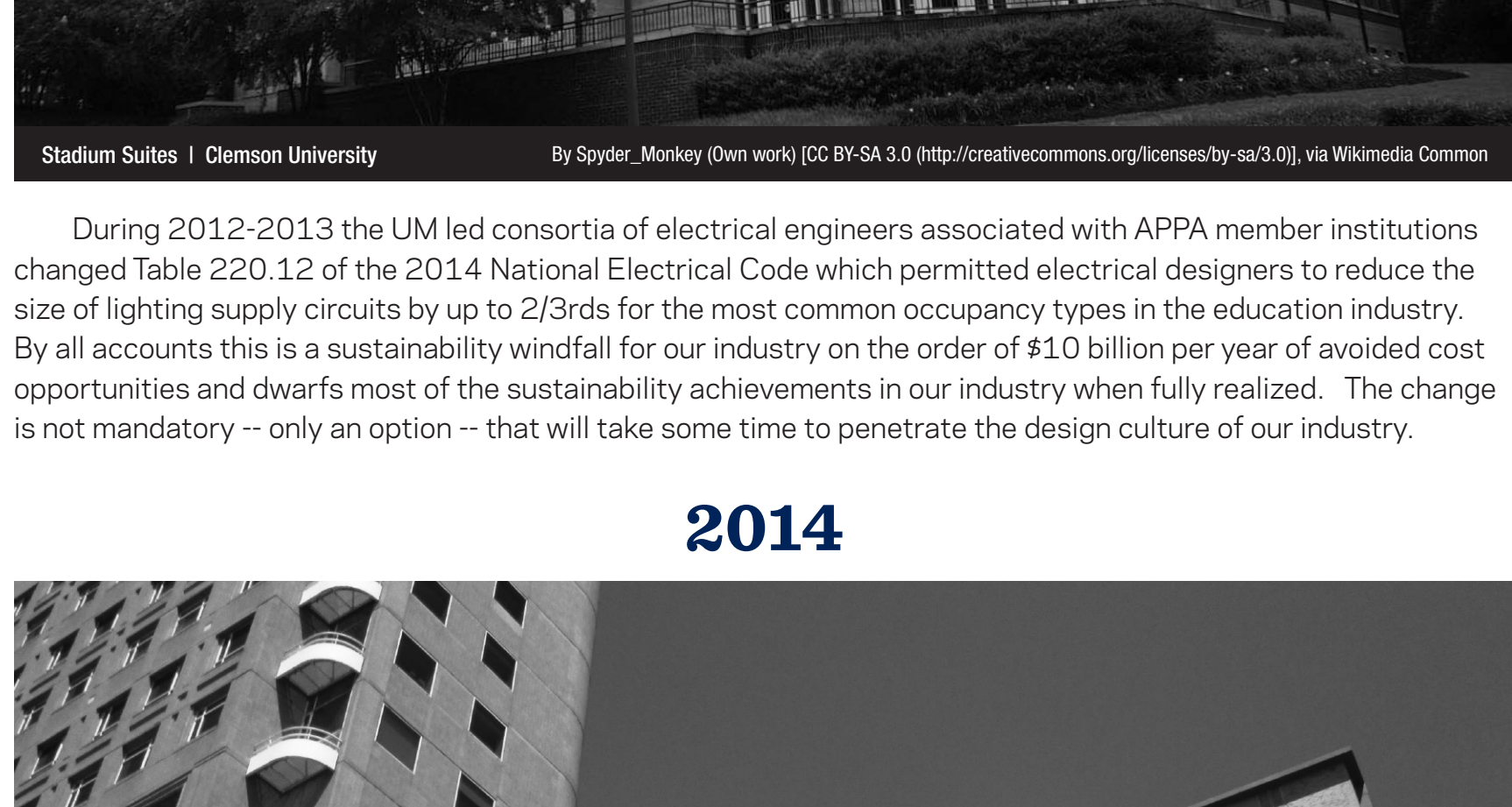
No increased risks to public safety since the 2002 NEC as a consequence of the lack of incident energy labeling are known, though the incident energy calculation requirements were then conveyed into a related document -- NFPA 70E - Recommended Practice for Electrical Safety in the Workplace -- that did not require incident energy labeling for all equipment operating above 50V as a requirement for occupancy.

## 2007



APPA rebranded itself from the Association of Physical Plant Administrators to APPA -- Leadership in Education Facilities. The success with advocating the education facilities industry's interest in the National Electrical Code was one of the factors that inspired APPA's Executive Board to create a pilot workgroup -- Code Advocacy Task Force -- led by Kevin Folsom (Trinity Christian Academy) in 2007. It was at the May 2007 meeting at APPA offices that Mike Anthony recommended that APPA become a member of the American National Standards Institute and to seek accreditation as a standards developer. This recommendation was to be forwarded to APPA's Professional Affairs Committee, chaired by David A. Cain. During this period several significant advocacy achievements were driven into operations and maintenance budgets -- among them the relaxation of the fixed testing intervals of fire pump no-flow tests from weekly to monthly. This reduced annual electric fire pump testing costs about 70 percent and was accomplished by a UM-led consortia of Stanford University (John Saidi), Evergreen State College (Richard Davis), the US General Services and the Veterans Administration. The University of Michigan supported the position of David Handwork (Arkansas State University, a voting member of the ASHRAE 90.1 mechanical subcommittee) who successfully argued that timers on power outlets on 50% of all outlets in classrooms and student residence halls would not be a practical solution to safety and sustainability concerns because, a) timed outlets would increase the use of extension cords in sleeping quarters, and b) classroom occupancy runs less than 20 percent and would never reduce energy waste to any degree that would make the additional expense of timers economically practical.

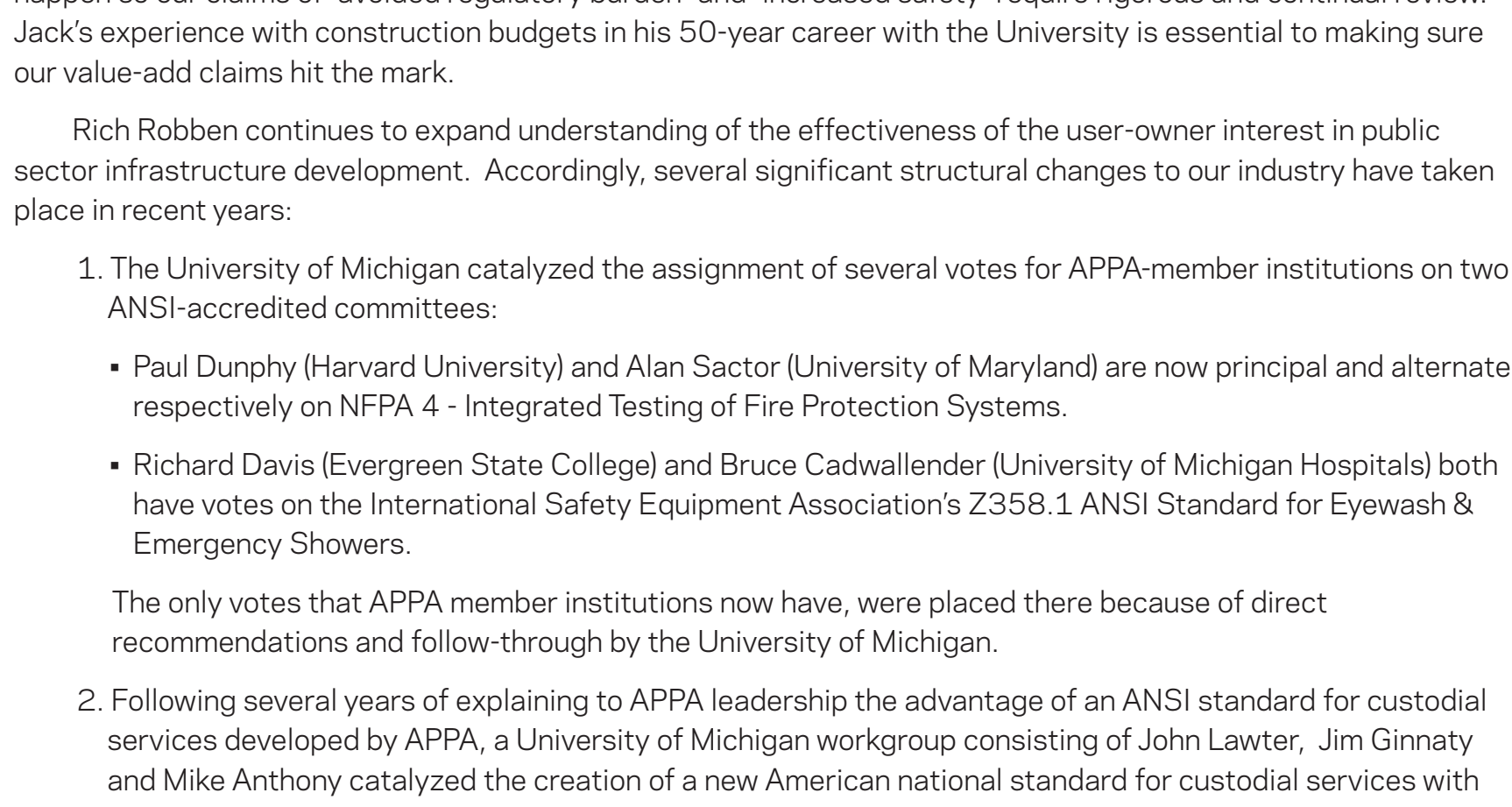
## 2010



In 2010 Mike Anthony recruited Dana Peterson, an Architect from the University of New Hampshire, to begin following standards action in the ICC and NFPA suite of standards. During this period the University of Michigan prepared a proposal for an "Education Facilities Safety Standard" to the National Fire Protection Association which was approved by the Code Advocacy Task Force. It was a continuation of the UM advocacy model that seeks to strengthen the user-owner fiduciary interest -- distinct from the user-enforcement interest -- in the suite of standards of existing ANSI accredited standards developers. That proposal was rejected by the NFPA Standards Council with recommendations for revision.

In 2013 APPA Executive Board gave the Code Advocacy Task Force a permanent charter as a Standards Council -- led by Brooks Baker (University of Alabama Birmingham) who served as the American Society of Healthcare Engineering's vote on a subcommittee of NFPA 72 - National Fire Alarm and Signaling Code. Ted Weidner (Purdue University), Clint Lord (Arizona State University) were added to the Standards Council from the original Code Advocacy Task Force.

## 2013



During 2012-2013 the UM led consortia of electrical engineers associated with APPA member institutions changed Table 220.12 of the 2014 National Electrical Code which permitted electrical designers to reduce the size of lighting supply circuits by up to 2/3rds for the most common occupancy types in the education industry. By all accounts this is a sustainability windfall for our industry on the order of \$10 billion per year of avoided cost opportunities and dwarfs most of the sustainability achievements in our industry when fully realized. The change is not mandatory -- only an option -- that will take some time to penetrate the design culture of our industry.

## 2014



Mike Anthony retains his vote on the National Electrical Code and is now assisted by Ryan Giorio (Oakland University), Dan Brimmer (Western Michigan University), and about 100 other engineering, management and academic colleagues throughout the education industry in the US, Canada and Europe. The University of Michigan-led consortia of colleges and universities has expanded its engagement on behalf of the US education facilities industry with a seat on the National Fire Protection Association Research Foundation and several other ANSI, International Electrotechnical Commission and International Standards Organization standard development committees.

Jack Janveja continues his engagement by helping us discover the highest quality at the lowest cost point through continual review of direct and indirect cost estimates. It is very difficult to count something that does not happen so our claims of "avoided regulatory burden" and "increased safety" require rigorous and continual review. Jack's experience with construction budgets in his 50-year career with the University is essential to making sure our value-add claims hit the mark.

Rich Robben continues to expand understanding of the effectiveness of the user-owner interest in public sector infrastructure development. Accordingly, several significant structural changes to our industry have taken place in recent years:

- The University of Michigan catalyzed the assignment of several votes for APPA-member institutions on two ANSI-accredited committees:
  - Paul Dunphy (Harvard University) and Alan Sactor (University of Maryland) are now principal and alternate respectively on NFPA 4 - Integrated Testing of Fire Protection Systems.
  - Richard Davis (Evergreen State College) and Bruce Cadwallender (University of Michigan Hospitals) both have votes on the International Safety Equipment Association's Z358.1 ANSI Standard for Eyewash & Emergency Showers.

The only votes that APPA member institutions now have, were placed there because of direct recommendations and follow-through by the University of Michigan.

- Following several years of explaining to APPA leadership the advantage of an ANSI standard for custodial services developed by APPA, a University of Michigan workgroup consisting of John Lawter, Jim Ginnaty and Mike Anthony catalyzed the creation of a new American national standard for custodial services with its engagement with the Simon Institute, another trade association in the education facilities space that specialized in public hygiene and worker safety. With the formation of an ANSI-accredited custodial standard led by the Simon Institute, leading practice can be discovered in an open platform of materially-affected stakeholders. With approximately \$200 billion spent on custodial and cleaning services annually across all US industries, the ANSI/Simon Institute custodial standard may present value-add opportunities on the order of \$10 billion annually to the US education facilities industry alone. The custodial industry is now the largest labor market in the US with an accredited ANSI standard.

- Mike Anthony catalyzed the creation of the American Society of Health Care Engineer's Academic Medical Center Committee

- Mike Anthony and Jim Harvey (University of Michigan Hospitals) catalyzed the creation of the IEEE Education & Health Care Facilities Electrotechnology Committee that will provide a global platform for leading practice discovery for energy, telecommunication and information technology professionals directly employed by schools, colleges, universities and their affiliated health care campuses.

- The foregoing structural changes in the standards development landscape for our industry was topped off by a visit by the President and CEO of the American National Standards Institute at Ross School of Business in October

These are deep changes. With the establishment of the ANSI accredited standards committees described above, and the user-owner fiduciary interest driven deep into existing ANSI accredited committees, about 40% of our industry's \$300 billion annual spend can be governed by a process that encourages an open and balanced group of materially affected stakeholders to discover leading practice and to reconcile the competing requirements of safety and economy. View the 2014 Annual Report

## FORWARD



In 1997 we could never have imagined the ferocious pace of innovation and regulation that we see today. Neither could we have imagined that stewardship would require more things working together than ever before. We could not have visualized the economy we have today -- one that permits us access staggering opportunities for collaboration which also comes with it a new competitive landscape and sea-changes in the way our industry interacts with other industries and with government.

To continue to be effective in moving money at the present scale of \$1 to \$10 billion annually the education facilities industry needs to be tooled up to enter a technical, policy and economic "theater" with incumbent interests. No one trade association is up to the task because they are too vulnerable to economic cycles; we need all of them to maintain a diversified portfolio of opportunity. Mid-to-late career facility professionals are necessary because they possess the political "gravitas", multi-dimensional experience, and technical capability to negotiate with competitor interest groups. We need to find, cultivate, and sponsor "strong votes". By examining the transcripts of consensus document development we will know them when we see them.

Validation of the UM Plant Operations business model for results-oriented advocacy for the education facilities industry can be found in the recent announcement by APPA's Standards Council that it will undertake creation of an ANSI accredited total cost of owning standard--seven years after the University of Michigan made this recommendation to the original Code Advocacy Task Force. This conforms to the University of Michigan strategy for getting as many of our 25-odd trade associations onto the collaborative, leading practice discovery platforms contemplated in the NTTAA. At the same July 2014 conference, Rich Robben was awarded APPA's "Award for Excellence in Facility Management" -- APPA's highest award -- and is the only APPA member to have received this award twice; among the reasons -- visionary leadership in regulatory advocacy for the US education facilities industry.

The University of Michigan-led consortia of education facility executives who view global standards advocacy as a priority look for the highest developed stage of technical capability regarding products, processes, and services, based on the relevant consolidated findings of science, technology and experience. As such, much work necessarily challenges guarded orthodoxies but looks for practical compromises. Without question, however, its approach for strengthening the voice of the user-owner interest in the education and health care facilities industry with a fast-moving pipeline of safety and sustainability concepts continues to drive value-add opportunities at a rate of \$3 to \$6 billion annually to the education facilities industry as a whole. Not all institutions choose to use these results but they are there for the taking. The University of Michigan Plant Operations intends to expand and accelerate the advocacy model that drives tangible results onto our industry's balance sheets.

Current information about University of Michigan leadership in infrastructure standards development can be found at <http://standards.plantops.umich.edu/>.

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