



*Creating Solutions. Inspiring Action.®*

## **Winter Member Meeting**

February 3 – 4, 2011

The Ritz-Carlton  
Fort Lauderdale, FL

# AGENDA:

## THURSDAY, FEBRUARY 3, 2011

▶ 3:30 - 4:15 P.M.

### **Keynote Speaker**

*Ballroom 2*

- **Jeb Bush**, Former Governor of Florida

▶ 5:30 - 6:00 P.M.

### **Opening Reception**

*Ocean View Foyer 2*

▶ 6:00 - 7:00 P.M.

### **Opening Program**

*Ballroom 2*

Welcome

- **William H. Swanson**, BHEF Chair and Chairman & CEO, Raytheon Company

Program Introduction

- **Lewis Hay, III**, Chairman & CEO, NextEra Energy, Inc.

Presentation: The opportunity of renewable energy and implications for the energy industry workforce

- **Ahmad Ababneh**, General Manager, Technology, Florida Power & Light Company
- **Mark Ahlstrom**, CEO, WindLogics, Inc.
- **Stacy Fleenor**, Associate Resource Modeling Analyst, WindLogics, Inc.
- **Richard L. Shaheen**, Senior Director, Distribution Engineering & Technical Services, Florida Power & Light Company

▶ 7:00 - 8:30 P.M.

### **Opening Dinner**

*Ballroom 3*

Opening/Closing Remarks

- **William H. Swanson**, BHEF Chair and Chairman & CEO, Raytheon Company

# AGENDA:

## FRIDAY, FEBRUARY 4, 2011

- ▶ 7:00 - 8:00 A.M.      **Breakfast**  
*Ballroom 3*
  
- ▶ 8:00 - 8:05 A.M.      **Opening Remarks**  
*Ballroom 3*
  - **William H. Swanson**, BHEF Chair and Chairman & CEO, Raytheon Company
  
- ▶ 8:05 - 9:20 A.M.      **Opening Panel Discussion**  
*Ballroom 3*

Moderator:

  - **Eduardo Padrón**, President, Miami Dade College

Panelists:

  - **Adrian Fenty**, Former Mayor of Washington, DC
  - **Renu Khator**, President, University of Houston and Chancellor, University of Houston System
  - **Dennis Nally**, Chairman, PricewaterhouseCoopers International Ltd.
  - **John Veihmeyer**, Chairman & CEO, KPMG LLP
  
- ▶ 9:20 - 9:40 A.M.      **Break**
  
- ▶ 9:40 - 12:00 P.M.      **Plenary Session I**  
*Ballrooms 1 & 2*

Equipping Networks of Leaders: Creating Sustained Education Improvement

Moderator:

  - **Eduardo Padrón**, President, Miami Dade College

Facilitator:

  - **James P. Honan**, Senior Lecturer on Education, Harvard Graduate School of Education
  
- ▶ 12:00 - 1:30 P.M.      **Lunch**  
*Ballroom 3*

Introduction

  - **William H. Swanson**, BHEF Chair and Chairman & CEO, Raytheon Company

Report on Executive Committee Meeting

  - **William E. Kirwan, II**, BHEF Vice Chair and Chancellor, University System of Maryland

# AGENDA:

## FRIDAY, FEBRUARY 4, 2011 (CONT.)

- ▶ 12:00 - 1:30 P.M.      **Lunch (cont.)**  
*Ballroom 3*  
A Scientific Approach to Learning and Teaching Science  
Keynote Speaker:
  - **Carl Wieman**, Nobel Laureate & Associate Director for Science, Office of Science and Technology Policy, Executive Office of the President
  
- ▶ 1:30 - 1:35 P.M.      **Afternoon Opening Remarks**  
*Ballrooms 1 & 2*
  - **Mark S. Wrighton**, Chancellor, Washington University in St. Louis
  
- ▶ 1:35 - 3:00 P.M.      **Plenary Session II**  
*Ballrooms 1 & 2*  
Preparing the Next Generation of STEM Workers:  
Transforming STEM Undergraduate Education  
Moderator:
  - **Richard Stephens**, Senior Vice President, Human Resources and Administration, The Boeing Company
  
- ▶ 3:00 - 3:15 P.M.      **Break**
  
- ▶ 3:15 - 4:15 P.M.      **Plenary Session III**  
*Ballrooms 1 & 2*  
Collaborating to Meet Industry's Demands for STEM Skills:  
Professional Science and Engineering Masters Programs  
Moderator:
  - **William E. Kirwan, II**, BHEF Vice Chair and Chancellor, University System of Maryland
  
- ▶ 4:15 - 4:30 P.M.      **Closing Remarks**  
*Ballrooms 1 & 2*
  - **William H. Swanson**, BHEF Chair and Chairman & CEO, Raytheon Company
  - **William E. Kirwan, II**, BHEF Vice Chair and Chancellor, University System of Maryland
  
- ▶ 6:00 - 7:00 P.M.      **Closing Reception**  
*Outdoor Pool Deck*
  
- ▶ 7:00 - 8:30 P.M.      **Closing Dinner**  
*Outdoor Pool Deck*

# AGENDA:

## SATURDAY, FEBRUARY 5, 2011

- ▶ 8:30 A.M.      **Tour of Florida Power & Light's System Control Center**  
*Bus departs hotel*
- ▶ 11:45 A.M.      *Bus arrives hotel*

# OVERVIEW



# W

Welcome to the Business-Higher Education Forum's (BHEF) Winter 2011 Member Meeting, which will focus on two important topics: how business and higher education leaders can execute systemic strategies for improving college readiness and degree attainment in order to achieve their communities' unique workforce needs; and how business and higher education can collaborate to strengthen STEM undergraduate and graduate education in order to address critical and emerging STEM workforce needs.

The meeting will kick off Thursday afternoon with a discussion of strategies for sustained, systemic education improvement by former Florida Governor Jeb Bush. In the evening, meeting host Lew Hay, III, chairman and CEO of NextEra Energy, Inc., and members of his staff will give a presentation on "The Opportunity of Renewable Energy and Implications for the Energy Industry Workforce."

Friday morning will focus on improving college and work readiness and degree attainment and will open with a panel discussion with former Washington, DC Mayor Adrian Fenty speaking about the challenges of reforming public schools. The first plenary session will focus on the College Readiness, Access, and Success Initiative (CRI) and highlight the progress of our member-led CRI projects, as well as insights from the *Cities for Success Leadership Summit*. The afternoon will feature two sessions focused on preparing the STEM innovation workforce of the future and how business and higher education can collaborate to strengthen STEM higher education. One session will focus on business-higher education collaborations to restructure undergraduate education in the STEM disciplines to encourage student persistence and increase graduation rates, and the second will explore joint efforts by business and higher education to support new programs in STEM graduate education that are designed to better respond to industry's STEM workforce needs. Both of these efforts are vital if the United States is to address the STEM skills shortage/mismatch that is plaguing so many of our corporations and government entities.

**PLENARY SESSION I****Equipping Networks of Leaders: Creating Sustained Education Improvement**

Our country's leaders, including President Obama, increasingly view education as the driver of economic prosperity. This session's facilitated conversation will expand upon several themes that underpin BHEF's College Readiness, Access, and Success Initiative (CRI), including the lack of alignment between workforce needs and student interest, and the strong business and education leadership necessary to address systemic and sustained change. Plenary Session I will highlight the work of BHEF member CEOs and college and university presidents who are leading their communities in efforts to increase college readiness and degree attainment to meet their workforce and economic development needs. BHEF members and guests will examine the strategies that BHEF members are employing, how these strategies inform work in other communities, and discuss the results of the *Cities for Success Leadership Summit* recently held in Louisville, KY.

**PLENARY SESSION II****Preparing the Next Generation of STEM Workers: Transforming STEM Undergraduate Education**

Talent-driven innovation has long fueled America's economic vitality and growth, but other countries are catching up with accelerated investments in primary, secondary, and higher education. At the same time, America is producing fewer STEM graduates, despite looming baby-boomer retirements and growing demand for STEM workers. Insights from the STEM modeling process, particularly the high returns that accrue from improving STEM undergraduate education, coupled with the recent reauthorization of the America COMPETES Act and the creation of a new PCAST working group on STEM higher education, suggest that BHEF and its members should play a leadership role in developing new collaborations among business, higher education and government that improve STEM undergraduate education outcomes and meet the rapidly emerging demands for STEM workers. Plenary Session II will focus on business-higher education collaborations to restructure undergraduate education in the STEM disciplines to encourage student persistence and increase graduation rate.

**PLENARY SESSION III****Collaborating to Meet Industry's Demands for STEM Skills: Professional Science and Engineering Masters Programs**

Increasingly, scientific and technology companies are meeting their workforce needs for highly trained workers and managers by collaborating with universities to develop programs that provide graduates with the necessary skill-set to work in these industries. These programs include Professional Science Master's (PSM) degrees and other similar programs, representing a model for collaboration between business and universities to maintain a competitive innovation workforce. Plenary Session III will explore how business and higher education can work together to expand and sustain PSM and similar programs. It will also highlight successful collaborations involving BHEF members' universities and businesses, as well as others, as a means of ensuring the technical, managerial and leadership skills needed in the STEM workforce.

## Equipping Networks of Leaders: Creating Sustained Education Improvement

### Overview

In states and regions across the country, systemic education and workforce challenges have been exacerbated by the recession, leading to high unemployment, persistent education achievement gaps, and a workforce not educated for high-demand jobs. With stimulus funds that had staved off budget cuts and layoffs now exhausted, states face current-year deficits that will reduce funding for P-12 and higher education in many states, creating greater challenges for education improvement efforts. Nevertheless, networks of committed leaders are working with local stakeholders to improve educational outcomes and create a well educated workforce that communities and regions need for economic development.

This session's facilitated conversation will explore several issues that underpin BHEF's College Readiness, Access, and Success Initiative (CRI), including the misalignment between workforce needs and student preparation and interest, the federal and state efforts underway to address this misalignment, and the need for strong business and education leadership to guide systemic and sustained change.

The session will be facilitated by Dr. Jim Honan, faculty member and educational co-chair of the Institute for Educational Management at Harvard University. Dr. Honan also facilitated the Mayor's Education Roundtable retreat in Louisville, KY, held in July 2009.

This plenary session will explore:

- The strategies BHEF members employ in their own communities to meet their workforce and economic development needs.
- How these strategies can inform work underway in other communities.
- Insights from the *Cities for Success Leadership Summit* recently held in Louisville, KY.
- How this work can inform BHEF's advocacy agenda.



## The Context for Education and Workforce Improvement

During BHEF's winter 2010 meeting, members and guests discussed how stagnant baccalaureate degree attainment rates appear to be on a collision course with workforce demands. BHEF members were particularly sobered by the conclusion that, on its current trajectory, higher education will not produce enough college graduates to replace the 40 million baby boomers aging out of the workforce in the coming years.

Since then, two issues have compounded the challenges of education and workforce improvement. First, with stimulus funds exhausted, declining state revenue requires many states to significantly cut education budgets. At the K-12 level, this means broad program cuts, school district consolidations, and changes to class size and the academic calendar.<sup>1</sup> While efficiency efforts are laudable, some school districts are experiencing library closures, elimination of transportation, shortened school years, and staff reductions by as much as 30 percent.<sup>2</sup>

Similarly, public colleges and universities, many having absorbed millions of dollars in cuts in prior years, are being told to expect further reductions—often to the tune of billions of dollars. In California, for example, Governor Brown's proposed budget would reduce state support for higher education to levels that, for the first time in history, would see revenue from tuition exceed state support.<sup>3</sup>

The second issue facing education and workforce improvement is the severe structural misalignments among P-12, postsecondary education, and the workforce. These misalignments represent systemic inefficiencies that compound an already challenging economic environment—a shortage of well-educated and trained workers to fill the highest demand jobs.

The Race to the Top Fund, the \$4.35 billion federal competitive grant program, jumpstarted radical reform in a small number of states with comprehensive education reform plans. Grants were awarded based on comprehensive plans that include building data systems that measure student growth and reward teachers accordingly and adopting college and career-ready standards. In addition, several other federal initiatives present opportunities to address this education/workforce underperformance in all states. The Common Core State Standards Initiative, which seeks to align state K-12 academic standards by college-readiness requirements, offers an important strategy for addressing these challenges (see sidebar). Another lies in the reauthorization of the Elementary and Secondary Education Act, currently known as

### The Common Core State Standards Initiative

The Common Core State Standards Initiative is a state-led effort coordinated by the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO), designed to ensure that all students leave high school college and career ready. Though the effort is only six months old, as of January 2011, 44 states have adopted the new standards. However, several roadblocks to implementation exist:

- Assessments for the Common Core State Standards still are being developed and will not be in place until the 2014-2015 school year at the earliest.
- The K-12 and higher education disconnect remains pervasive even with these new standards. Findings from a new Center on Education Policy survey confirm that many state K-12 leaders are unsure whether colleges will even align their admissions or curriculum to the new Common Core.<sup>8</sup>
- Recent elections mean that more than half of all states have new governors whose support of the Common Core is relatively unknown.

### Reauthorization of the Elementary and Secondary Education Act (ESEA)

The Elementary and Secondary Education Act (ESEA) is a federal accountability framework for our nation's education system. The 2002 reauthorization (known as No Child Left Behind) required all students to be "proficient" in reading and math by 2014. Reauthorization is imperative this year as the "proficiency" deadline quickly approaches and the number of schools failing to meet accountability standards increases. U.S. Secretary of Education Arne Duncan has called for a bipartisan effort to address common criticisms of the legislation and to change the existing law to better achieve the Obama administration's goal of leading the world in college completion by 2020.

Despite pressure from the Obama administration, recent changes in congressional leadership make it unlikely that Congress will pass a comprehensive ESEA package. While bipartisan support seems to indicate that the timing is right for an overhaul of the law, Rep. Kline (R-MN), the new chairman of the House Education and the Workforce Committee, has indicated that he favors a piecemeal approach to reauthorization. This may lead Congress to pass several targeted standalone bills rather than a comprehensive ESEA reauthorization.

For now, the best case scenario for reauthorization in 2011 has the Senate passing a version and pressuring the House this spring to advance the bill, before the forthcoming presidential elections begin to ramp up. BHEF will continue to monitor developments and provide updates to members.

No Child Left Behind (see sidebar). The U.S. Department of Labor's forthcoming Community College and Career Training Program offers a third option, which will provide grants to community colleges seeking to expand capacity for adult workers whose jobs have been displaced as a result of international trade.

While these national efforts are essential, bringing about systemic change in such tough economic times will require significant action at the state and local levels as well. In most states, leaders are choosing to launch modest policy changes that will increase flexibility rather than implement the sweeping reforms encouraged by Race to the Top.<sup>4</sup> Consequently, improving the education-workforce pipeline will require a comprehensive and collaborative effort among regional stakeholders, who can customize their efforts to local needs.

### The Imperative to Address Education and Workforce Misalignments

The recession and the structural misalignments present in the education-workforce pipeline signify daunting challenges. In the face of the severe misalignments, however, the cost of waiting for federal and state-level reforms to "take effect" is simply too high. While 44 states have adopted the Common Core State Standards, assessments will not be in place until the 2014-2015 school year. Further, one analysis found that across all of the Common Core domains, only one-third to one-half of 11<sup>th</sup> graders reached or exceeded the performance level expected for college-ready students within that topic. For example, 38 percent of those tested met reading benchmarks and 35 percent met algebra benchmarks.<sup>5</sup>

Similar achievement patterns are playing out at the postsecondary level. Between 2003 and 2008, the six-year graduation rate dropped at one-third of all four-year institutions, while the graduation gains at the other institutions increased by only two percent.<sup>6</sup> While this decline could possibly be explained by an increase in time-to-degree completion, an analysis of eight-year graduation rates showed very modest improvements in the baccalaureate attainment rate, two to four percent, depending on the type of institution.<sup>7</sup>

In addition to these baccalaureate degree attainment issues, workforce demands also will be stymied by a series of structural misalignments. These misalignments across P-12 education, higher education, and the workforce threaten our ability to meet this country's 21st century education and workforce needs, especially in

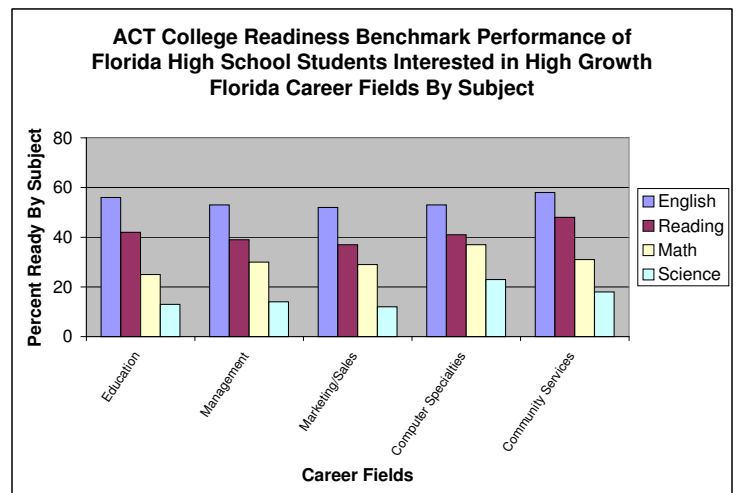
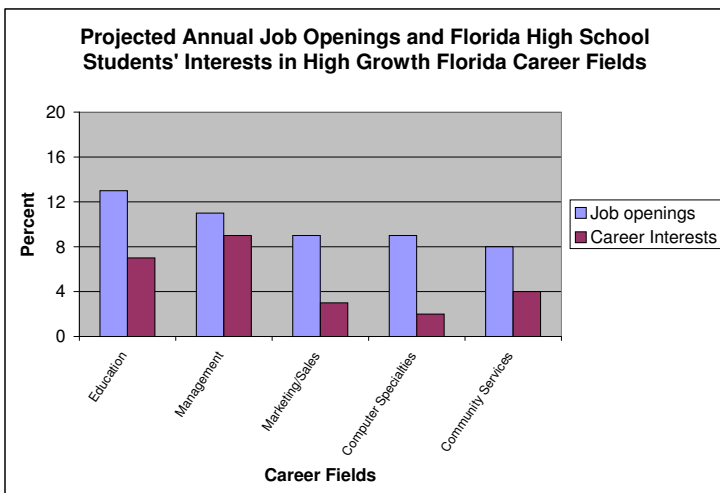
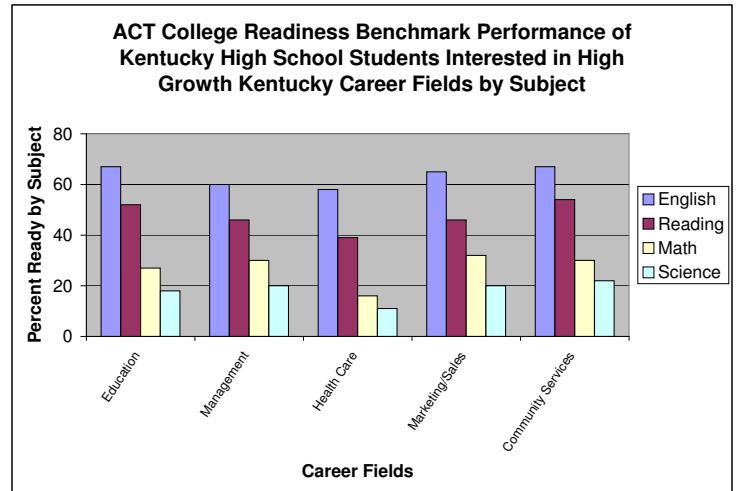
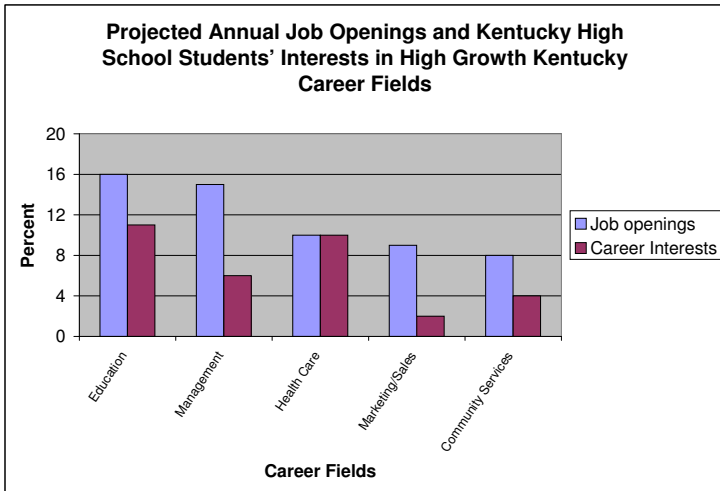
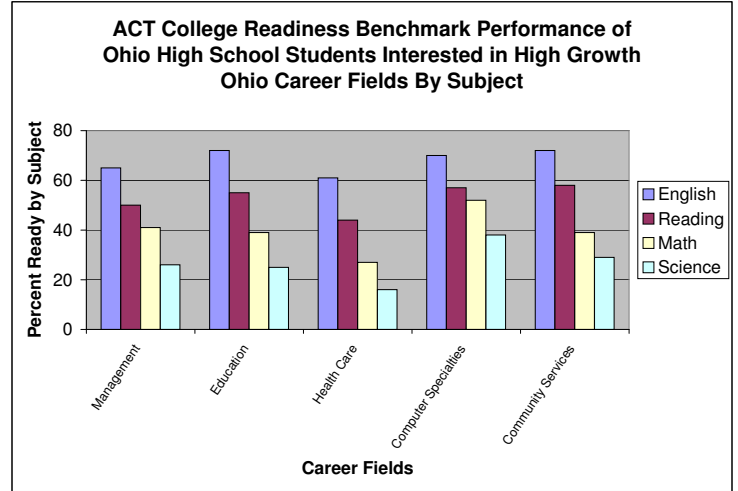
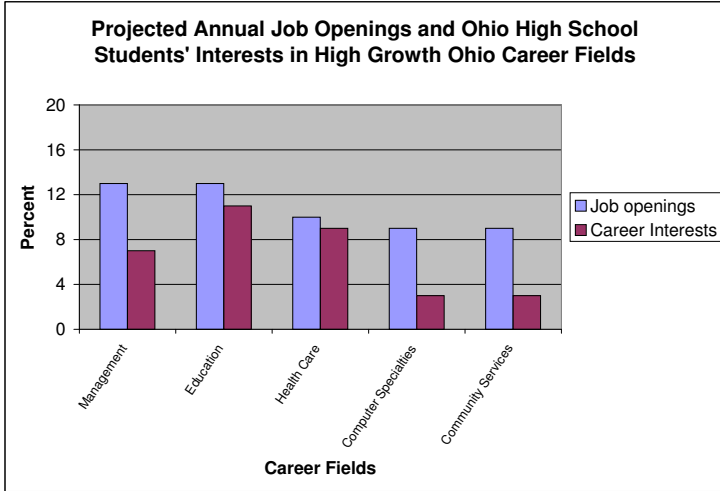
the highest-demand careers. State-level data indicate the magnitude of the challenge:

1. In many states, student interest in high-growth jobs does not meet anticipated demand. For example, in Kentucky's five highest growth jobs, interest only matches demand in the health care field. For the other fields, demand exceeds student interest, often by more than half. This pattern is consistent in Oklahoma and is even more pronounced in Iowa, where marketing/sales and computer specialties in particular see dramatic mismatches between interest and demand. Other states with available data have similar mismatches in interest and demand, including Florida, Ohio, and Texas.
2. These student career interest data, while important, do not tell the full story. Among those students interested in high-growth jobs, many are not prepared for the demands of these jobs, as indicated by ACT college readiness benchmarks. As a result, even those fields that exhibit equilibrium between student interest and workforce demand will be confronted by under-prepared students. For example, in Kentucky and Texas, student interest and workforce demand in the health care fields were aligned. In Kentucky, however, only 16 percent of those students met the college readiness benchmark in math and only 11 percent met the benchmark in science. These trends are similar in Texas, where only 23 percent of students interested in health care careers met the college ready benchmark in math and only 10 percent met the science benchmark. These trends among students interested in health care professions are consistent across the country: In Colorado, 22 percent and 13 percent met the math and science benchmarks, respectively, while in Nevada 22 percent and five percent met the math and science benchmarks.

This misalignment creates significant inefficiencies in the education-workforce linkages, which can result in students and adults being trained for jobs, but not finding them, while other high-demand jobs go unfilled. Addressing this is not simply a matter of improving the path from community colleges to four-year colleges or universities, although this clearly also is important. More must be done to connect high school students and adults with these high-growth careers and ensure that they are prepared adequately in high school and in postsecondary education to join the 21st century workforce.

### **BHEF's Action Framework**

BHEF's work in the CRI has demonstrated that education improvement efforts rooted in a community's larger economic vision are more likely to be sustained through natural periods of transition and challenge. Engagement from business and higher education leaders is essential to develop an aspirational vision for the community and to serve as catalysts for a community-wide commitment that frames shared accountability with differentiated responsibility, and translates it into workforce and education goals.



BHEF's CRI has equipped business and higher education leaders with the networks and tools necessary to achieve the community's desired outcomes around high school graduation, college enrollment and success, workforce preparedness, and economic competitiveness. Within regions, we support leaders in developing the comprehensive strategy necessary to achieve the community's big vision around the economy, the workforce, and education (see sidebars).

## Louisville and the Cities for Success Leadership Summit

BHEF's *Cities for Success Leadership Summit* was held to spotlight the powerful and effective education improvement and degree attainment efforts in Louisville and across the country. High-level delegations from Des Moines, IA, and Oklahoma City, OK, including the cities' mayors; superintendents; business, higher education, and philanthropy leaders; and dozens of other national leaders engaged in education improvement, attended *Cities for Success* to gather information about launching projects similar to the one in Louisville in their respective cities.

Why Louisville? Because Louisville is home to one of BHEF's most successful member-led regional efforts, led by David Jones, Jr. Through his leadership, combined with leadership from the mayor and key stakeholders in the region, Louisville leaders signed the Greater Louisville Education Commitment, an agreement among K-12 and postsecondary education, business, and community organizations to work together to improve education attainment in the region by 55,000 degrees over the next decade. Louisville's strategy can be a model for the nation on how to create lasting leadership networks to improve education attainment, and participants at the *Cities for Success Leadership Summit* were eager to learn from Louisville's experience.

BHEF believes that systemic improvement across the P-20 pipeline is achieved most effectively when business and higher education leaders are equipped with the high leverage strategies and tools they need to provide sustained leadership in this arena. BHEF works with its members and their peers to do just that in Louisville and in other communities across the country.

For more on the *Cities for Success Leadership Summit*, see [the key insights](#) from the event.

## StrategicEdSolutions.org®

BHEF's online resource center, [www.StrategicEdSolutions.org](http://www.StrategicEdSolutions.org), is geared toward leaders looking to make a positive impact on—and invest wisely in—P-12 and postsecondary education. It includes, among other things, numerous programs that work to improve college readiness, access, and success; tools that offer new ways to understand the nature of the problem as well as solutions; an expert blog for sharing thoughts and ideas among users; and access to the Pathways to College Network library, which provides thousands of articles and policy reports on issues related to college access and success.

The screenshot shows the StrategicEdSolutions.org website. At the top, it says "A BHEF RESOURCE CENTER" and "STRATEGIC ED SOLUTIONS® MAXIMIZING INVESTMENT IN EDUCATION". There is a search bar with a "Search" button and a link to "Advanced Search". Below the search bar are navigation tabs: "OVERVIEW", "CREATE CHANGE", "SHARE CHANGE", and "MODEL CHANGE". A banner image shows a group of students looking at a microscope. Below the banner is a "HOME > SEARCH FOR IDEAS" link. The main content area is titled "SEARCH FOR CHANGE" and includes a "Keywords" search box. On the left, there are filters for "Strategies", "Tactics", and "Topics". The "Topics" filter is expanded, showing a list of checkboxes for "Select All", "Co and Extra Curricular", "Curriculum", "Leaders", "Philanthropy", "Standards", "STEM", "Teachers", and "Underserved Students". Below this is a "Level of Education" filter and a "Filter by Type" section. At the bottom of the filter section are "Search" and "Clear All" buttons. The main content area is titled "Search for Ideas" and contains text explaining the search feature and its purpose.

USA Funds, among others, has provided invaluable support contributing to the development and enhancement of this site.



# PLENARY I END NOTES



- 1 NGA Center for Best Practices. (2010). *State government redesign efforts 2009 and 2010*. Retrieved from <http://www.nga.org/Files/pdf/1010STATEGOVTRDESIGN.PDF>.
- 2 Dwyer, L. (2011, January 8). California declares education budget “financial emergency”. *Redu*. Retrieved from <http://www.letsredu.com/2011/01/california-declares-education-budget-financial-emergency>.
- 3 Yudof, M. (2011). *UC president’s open letter to California*. Retrieved from <http://www.universityofcalifornia.edu/news/article/24763>.
- 4 Education Week. (2011). *Quality Counts 2011: Uncertain forecast: Education adjusts to a new economic reality*. Retrieved from <http://www.edweek.org/ew/articles/2011/01/13/16execsum.h30.html>.
- 5 ACT. (2010). *A first look at the Common Core and college and career readiness*. Retrieved from <http://www.act.org/commoncore/pdf/FirstLook.pdf>.
- 6 The Chronicle of Higher Education. (2010, December 5). *Trends in college graduation rates*. Retrieved from <http://chronicle.com/article/Trends-in-College-Graduation/125626>.
- 7 Horn, L. (2010). *Tracking students to 200 percent of normal time: Effect on institutional graduation rates*. Washington, DC: Institute of Education Sciences, National Center for Education Statistics.
- 8 Kober, N., & Rentner, D.S. (2011). *States’ progress and challenges in implementing common core state standards*. Washington, DC: Center on Education Policy.

## Preparing the Next Generation of STEM Workers: Transforming STEM Undergraduate Education

### Overview

Talent-driven innovation has long fueled our country's economic vitality and growth. However, the United States' historic global leadership in developing talent in science, technology, engineering and mathematics (STEM) fields that drives innovation is quickly narrowing, as other countries have accelerated their investments in primary, secondary, and, more recently, higher education. During the same time, the production of U.S. STEM graduates has stagnated, despite looming baby-boomer retirements and growing demand for STEM workers, signaling a fundamental mismatch between student interest and workforce demand.

Insights from the STEM modeling process, particularly the high returns that accrue from improving STEM undergraduate education, coupled with the recent reauthorization of the America COMPETES Act and the creation of a new PCAST working group on STEM higher education (see sidebars), suggest that BHEF and its members should play a leadership role in developing new collaborations among business, higher education and government that improve STEM undergraduate education outcomes, meet the rapidly emerging demands for STEM workers, and leverage scarce resources.

This plenary session will explore:

- Those strategies that can be implemented in the era of budget austerity to increase the retention and graduation rates of students in STEM majors, particularly among women and minorities.
- The strategies that can provide students with the essential skills needed to be successful in the STEM workforce and encourage more graduates to pursue careers in high-demand STEM fields.
- The strategies that can be implemented to encourage more students to aspire to teaching careers in STEM fields and provide them with the necessary training to become highly effective teachers.
- How business, higher education and government can more effectively work together to advance these strategies.

## Despite Strong Demand for STEM Graduates, Student Interest and Success is Low

Even in the face of a continued sluggish economy, the demand for STEM graduates remains strong, with low relative unemployment levels in STEM fields and strong job prospects for new bachelor's degree holders in computer science, engineering, and mathematics.<sup>1</sup> Meanwhile, STEM-related jobs are expected to grow by 17 percent over the next decade, with the majority of those jobs requiring a college degree or higher.<sup>2</sup> In addition, impending retirements among baby boomers with STEM skills threaten to exacerbate the shortage of workers in many technology-based sectors. Indeed, recent data reveal that 20 percent of the current aerospace industry technical workforce is retirement-eligible or will be shortly.

The production of STEM graduates is stagnating, however. In 2007, less than 16 percent of bachelor's degrees earned by U.S. students were in STEM fields, and the overall share of STEM degrees awarded actually shrank during the past five years.<sup>3</sup> Even smaller percentages of the fastest growing student populations, including women, Hispanics, and African Americans, earn a STEM degree. Compared to the rest of the world, the United States has a significantly lower rate of degrees awarded in STEM-related disciplines. In 2009, the United States ranked 27th among 29 developed countries in the percentage of students who earned a bachelor's degree in science, mathematics and engineering. Meanwhile, China awarded nearly half of its first university degrees in these fields (47 percent), South Korea awarded 38 percent, and Germany awarded 28 percent.<sup>4</sup>

Persistence in STEM majors is a major impediment, as less than half of those U.S. undergraduates who begin their studies in a STEM major will graduate with a STEM degree. More than a third of students intending to major in a STEM field switch out of a STEM major between their freshman and sophomore year.<sup>5</sup>

Low transfer rates of students from the rapidly growing community colleges sector also hamper efforts to increase the number of STEM majors and workforce—only seven percent of students who start undergraduate education in STEM at a community college earned a STEM baccalaureate degree within six years.<sup>6</sup> Looking more broadly at specialized training in STEM, the overall share of certificates awarded in STEM declined from eight percent to less than six percent.<sup>7</sup>

## President Obama Signs Reauthorization of America COMPETES Act

The recently signed reauthorization of the America COMPETES Act authorizes the planned expansion of research funding for the Department of Energy's (DOE) Office of Science, the National Science Foundation (NSF), and the National Institute of Standards & Technology (NIST). It also contains several new features that could help bolster the number of students who earn STEM degrees and choose STEM careers, consistent with recommendations by BHEF and several of its members who testified in support of the bill.

For example, COMPETES will encourage stronger collaborations between industry and higher education to promote innovation and catalyze the impact of research; authorize STEM industry internships and research experiences for undergraduates and high school students; and broaden participation among underrepresented groups in STEM education. Another new measure in the bill will ensure better coordination of STEM education activities across federal agencies.

The reauthorization also continues the Robert Noyce Teacher Scholarship Program, and authorizes a new STEM-Training Grant Program to replicate and implement programs such as UTeach that provide integrated courses of study in STEM and teacher education, and that lead to concurrent teacher certification.

In addition, the reauthorized bill includes provisions for graduate education programs, such as the Professional Science Masters degree, which seek to train students for careers in high-demand STEM fields in industry and government.



### IEEE Real World Engineering Projects

The IEEE Real-World Engineering Projects (RWEP) program provides hands-on team-based projects for first-year students. These projects have been shown to increase the recruitment, persistence to degree, and satisfaction of students, and particularly women, in baccalaureate engineering programs. The curriculum focuses on the mathematical components of engineering where the vehicle for change is the IEEE-approved hands-on projects that faculty can use in the first-year classroom in order to “adhere” their students to these disciplines.

### The Freshman Research Initiative

The Freshman Research Initiative (FRI), which was initiated at University of Texas-Austin’s College of Natural Sciences, aims to reinvent the undergraduate research paradigm. The program is faculty initiated, involves more than 500 undergraduates, and is fully integrated with the curriculum. It aims to attract and retain students in science, improve academic success, bridge the gap between education and research, and foster collaborations that promote enhanced learning. Students are recruited to FRI during their freshman year. This program provides a research-based, small-class alternative to required freshman courses and offers close interaction with research faculty and postdoctoral students. The program has resulted in greater interactions between corporations, industry researchers and graduate programs.

There are further troubling signs, as relatively few students intend to major in STEM. According to ACT, among college-bound students that took their test, only 17 percent were both proficient in mathematics—the key gateway course—and interested in STEM careers.<sup>8</sup>

These troubling trends signal significant challenges in meeting current and future domestic workforce needs and call for new strategies and collaborations among business, higher education and government to increase both the number and quality of students obtaining postsecondary degrees in STEM.

### Strategies to Strengthen STEM Undergraduate Outcomes

Insights from the BHEF U.S. STEM Education Model and other research demonstrate that we need a comprehensive, national strategy to staunch attrition, improve learning, and connect undergraduates to STEM careers during the first two years of undergraduate education, when all too many students who are interested and proficient in STEM switch to other majors. It will require a broad and cohesive coalition of colleges and universities, government, and business to support and implement this strategy.

This approach should ensure that students are prepared for the 21<sup>st</sup> century workplace by implementing interdisciplinary and learner-center approaches that incorporate hands-on research and learning experiences, tie classroom teaching to real-world challenges, and use technology to augment learning (see sidebar on IEEE Real World Engineering Projects). In addition, a number of colleges and disciplinary societies have devoted significant resources to restructuring introductory courses in order to improve pathways to STEM majors and careers. For example, Virginia Tech’s Math Emporium has served as a national model that addresses a key barrier to STEM success by helping students increase learning while decreasing costs for the university. And the chemistry and physics communities have been making advances in reforming introductory curriculum and pedagogy. But more needs to be done.

Recent evidence indicates that real-world experiential learning opportunities—which can take place on- or off-campus—can increase student persistence and success in STEM majors and lead to greater interest in pursuing careers in these fields. A number of programs have been initiated that provide these types of opportunities for

STEM students during their freshman year of college. The Freshman Research Initiative at The University of Texas at Austin is one program that has achieved impressive student outcomes and provides a replicable and scalable model (see sidebar on previous page for more information).

Cooperative education programs and internships are another vehicle for bridging the gap between classroom learning and the real-world work environment, and provide students a first-hand understanding of what they can expect and what skills they will need in the STEM workforce. In addition, they may be an important source of financial support for the increasing number of students who must work while they attend school. Likewise, cohort and bridge programs provide supportive environments where students can bond and connect with faculty and mentors and become part of a learning community.

We also need to encourage those students who may be interested in science and mathematics to consider teaching and provide accessible pathways to make this possible. One highly successful model is the UTeach program, which was founded at University of Texas at Austin. UTeach trains secondary science and mathematics teachers and is a collaborative effort between the Colleges of Natural Sciences and the School of Education. Now it is being replicated at 22 universities around the country.

### **Leveraging Business and Government Support for STEM Undergraduate Education**

Business and government agencies can and should play a vital role in partnering with higher education to help transform STEM undergraduate education, including helping faculty understand emerging workforce needs, providing guidance in curriculum development, and providing experiential opportunities for students during the freshman and sophomore years of college, when they are making crucial decisions about whether to remain enrolled in a STEM major or take an introductory class that may help them decide whether a STEM major or career is right for them.

#### **PCAST Forms Working Group on STEM Higher Education**

Recently, the President's Council of Advisors on Science and Technology (PCAST) announced the formation of a working group to develop recommendations for President Obama on strengthening STEM higher education. BHEF's Brian Fitzgerald participated in an organizing meeting of the working group, and with other experts, helped to identify the following recommendations for PCAST consideration:

- Identify and respond to STEM workforce needs.
- Strengthen STEM introductory courses and pathways.
- Take successful programs to scale.
- Strengthen cross-sector partnerships.
- Change faculty culture and attitudes, particularly towards the first two years of students' undergraduate STEM experience.
- Develop new metrics to better measure student learning and skills.
- Leverage informal learning in order to prepare students to apply scientific knowledge to the world's problems.
- Increase STEM awareness and perception among the public, including educating students and their parents on the availability of STEM opportunities.

# PLENARY II END NOTES



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## Collaborating to Meet Industry's Demand for STEM Skills: Professional Science and Engineering Masters Programs

### Overview

The U.S. graduate education system, considered the world's pre-eminent, provides students with the advanced knowledge, training and skills to succeed in an increasingly global and complex world. It also prepares some of the world's most highly skilled scientists, engineers, and technology workers to be the next generation of innovators.<sup>1</sup>

Nevertheless, as we heard from Debra Stewart of the Council of Graduate Schools at our winter 2010 meeting, graduate education in the United States faces a number of challenges, including high student attrition rates, long training periods, lack of funding, and increased foreign competition for elite students. Some also have criticized graduate education for offering curricula that is too narrow and training that often is not useful for non-academic careers in business, industry and the government.<sup>2</sup>

In particular, graduate education in the sciences historically has focused on training students for a doctorate degree, with the master's degree viewed as a consolation prize for those who are unable, or unwilling, to earn a Ph.D. With an increase in demand for T-shaped employees—professionals that combine deep problem-solving skills (e.g., depth) with complex communication skills (e.g., breadth)<sup>3</sup>—and the growing number of fields that require inter-disciplinary training, there have been new efforts to launch programs and degrees that combine in-depth disciplinary training with breadth of managerial training and skills, particularly at the master's degree level.

This plenary session will explore:

- How businesses and universities are addressing the needs for highly skilled talent in STEM fields.
- What roles universities, industry, and government can play to support and expand strategies and programs designed to increase the number and quality of STEM professionals.

### Emerging Responses to Meet STEM Workforce Demands

A recent article in *The Economist* entitled “The disposable academic” explored the apparent mismatch in training at the graduate education level, with more than 100,000 doctoral degrees produced in the United States between 2005 and 2009, but only 16,000 new professorships available during the same period. A number of programs have been created in the past few years to redress this training and workforce needs mismatch. Below, we explore two promising programs that emphasize the education of T-shaped professionals who have depth in science or engineering and also breadth in terms of business, team-work and management skills.

**The Professional Science Masters (PSM) Degree Program**, developed in 1997 with initial support from the Sloan Foundation, includes intensive graduate-level training in science, engineering, technology or a mathematics-related field, combined with courses providing business and managerial skills. These “plus” courses, as they are called, may be in financial and project management, communication, statistics, ethics, intellectual property or regulatory affairs.<sup>4</sup> They may also include a capstone project that provides additional opportunities for students to understand the practical aspects of emerging problems. Graduates of these programs bring advanced, interdisciplinary and project-oriented technical and managerial expertise to their employers. PSM programs require the active participation of business in developing the curriculum, offering internships, and providing advisory oversight for the program.<sup>5</sup> They may also include a capstone project that provides additional opportunities for students to understand the practical aspects of emerging problems. Graduates of these programs bring advanced, interdisciplinary and project-oriented technical and managerial expertise to their employers.<sup>6</sup> Indeed, data on students who have earned PSM degrees suggest positive outcomes, including high initial employment and average annual salaries.

Fueled by their popularity among students as well as from funding by the American Recovery and Reinvestment Act (ARRA), these programs have grown dramatically, with 230 PSM programs now recognized by the Council of Graduate Schools, which oversees the program. As shown in the chart on the following page, a number of BHEF member universities have successfully introduced PSM programs. Similarly, BHEF corporate members’ organizations have hired PSM graduates and provided support for PSM programs. Some of these include Raytheon, Battelle, Boeing, IBM, Northrop Grumman, PricewaterhouseCoopers, U.S. Office of Naval Research, and the Department of Homeland Security. PSM programs at more than 100 universities enroll more than 2,500 students annually, and have produced about 2,700 graduates to date. The programs cover a diverse range of disciplines including: mathematics, physics, biology, computational sciences, forensics, chemistry, and geographical information systems. Approximately half of the students have graduated in life sciences.

Nevertheless, the PSM market share remains small and its continued growth faces challenges. One component of this challenge is the lack of PSM brand recognition among employers, both in terms of hiring candidates who possess the degree, but also as it relates to encouraging employees to enroll in such programs. In addition to supporting their employees’ participation in PSM programs through tuition assistance or reimbursements, it is imperative that employers work closely and continuously with institutions to grow the PSM brand. For example, involvement of corporate representatives on

PSM advisory boards is vital to ensure that these programs are sustainable. One such collaboration has been the development of a corporate advisory board for the California State University system's PSM programs. This board, along with the development of a system-wide PSM network, has helped increase the placement of PSM graduates and interns and publicize these programs more broadly.

**Master of Engineering Management (MEM) Programs.** As noted by James J. Duderstadt, president emeritus and university professor of science and engineering, University of Michigan, and director, the Millennium Project, "America does not need just engineers; it needs a new kind of engineer."<sup>7</sup> There is a need for scientists and engineers to augment their advanced technical skills with managerial skills to meet the changing workforce demands. The Master of Engineering Management (MEM) degree and the Master of Science in Engineering & Management degree are designed to bridge the gap between the field of engineering and management. These programs offer a practical business perspective needed by technical managers to work in technology based-organizations. Although the structure of these programs varies, the degrees combine advanced level engineering courses with the general business classes that include coursework in marketing, finance, intellectual property, business law, and management. The interdisciplinary coursework trains a well-rounded engineering graduate who has advanced technical skills as well as an understanding of basic managerial concepts.<sup>8</sup>

The recently signed reauthorization of the **America COMPETES Act** authorizes a number of programs that support the training of a STEM workforce. For example, National Science Foundation's (NSF) Division of Graduate Education funds the Science Masters Degree program and the Integrative Graduate Education and Research Traineeship (IGERT) program that provides interdisciplinary training to Ph.D scientists and engineers.

Although the graduates from these programs have good job market prospects, these programs are quite young and the academic field is still in the process of growing. Some schools offering these programs have established the Master of Engineering Management Programs Consortium<sup>9</sup> to raise awareness about these programs and promote their benefits to business and industry. A number of programs include corporate advisory groups that provide an industry perspective to structure the curriculum of these programs with essential coursework necessary to train a well-rounded graduate. BHEF member universities, including Cornell, Columbia, Pennsylvania State, and University of Texas, have introduced these programs, and a number of BHEF member organizations, including Northrop Grumman, IBM, Accenture, and Parsons, have representatives who serve on corporate advisory boards for these programs.



### **Master's in Professional Studies: Cybersecurity**

The Obama administration has declared that investment in training the next generation of workforce with expertise in the areas of cybersecurity is essential for securing the nation's security challenges. In order to respond to the increased workforce demand in cybersecurity and cyber-defense, a Master's in Professional Studies program in Cybersecurity has been initiated at the University of Maryland, Baltimore Campus. This interdisciplinary degree program provides students with the range of knowledge and skills needed to be successful managers in the emerging field of cybersecurity. The coursework includes a blend of core courses in management, legal and policy analysis and technically focused coursework that allows students to customize the degree to fit specific professional needs. The program, launched this spring was developed in conjunction with Northrop Grumman, Battelle, and SAIC, and is open to employees in these corporations.

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### **Master of Engineering Program at Cornell University**

The MEng in Engineering Management program at Cornell University is offered through the school of Civil and Environmental Engineering. It was initiated in 1988 and has graduated more than 600 students since its inception. The program attracts students from various engineering disciplines and provides them with the necessary training to become effective engineering managers. The curriculum includes coursework in project management, information sciences, finance and accounting as well as real world group design project. Graduates of this program work in industries ranging from computers to manufacturing in both the public and private sector.

# PLENARY III

# END NOTES



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## SPECIAL GUEST BIOGRAPHY



# MARK AHLSTROM

CEO  
WINDLOGICS, INC.

**Mark Ahlstrom** is CEO for WindLogics and provides strategic direction to the company and expertise to the greater wind industry community. Ahlstrom enabled the company to build on years of research effort and apply itself to new renewable energy challenges. Under his leadership, the company has become an authority in the assessment, forecasting, operations and integration of renewable energy. Ahlstrom continues to focus his time on pushing new research and innovation for renewable energy and power systems.

Ahlstrom enjoys bridging the gap between advanced scientific and technical methods and the needs of the business world. He is frequently invited to speak at events sponsored by the American Wind Energy Association, Utility Wind Integration Group, IEEE, NERC and other industry and government groups. As a testament to these efforts, he served as a technical program chair for AWEA's WINDPOWER 2009 conference.

Ahlstrom joined WindLogics in 2000 and has more than 25 years of entrepreneurial and management leadership experience in software and technology businesses. He holds degrees in Biochemistry and Biomedical Engineering from the University of Wisconsin-Madison.

## SPECIAL GUEST BIOGRAPHY



# AHMAD ABABNEH

GENERAL MANAGER  
DISTRIBUTION QUALITY AND TECHNOLOGY

**Ahmad Ababneh** is General Manager, Distribution Quality and Technology, for Florida Power & Light Company, one of the largest investor-owned electric utilities in the nation. In his position, Ababneh is responsible for the development and management of the technology vision and strategy in FPL's Distribution business unit. In addition, Ababneh is leading the development of Smart Grid Advanced Applications for the Transmission and Distribution business units, including the creation of new predictive and remote diagnostics strategies and tools. He previously served as Business Solutions Manager, where he was responsible for all application management core services.

Ababneh joined FPL in 2004 and has more than 18 years of experience in multiple industries with a focus in the energy and utility sectors. He has worked in various engineering, IT, consulting and leadership positions for Fortune 500 companies, and possesses a proven track record in managing large-scale IT projects and teams developing technology solutions to optimize operational effectiveness and maximize productivity.

Ababneh holds a bachelor's degree in Electrical Engineering from Jordan University of Science and Technology, a Master's Degree in Electrical Engineering from the University of New Orleans and an MBA from Palm Beach Atlantic University. Additionally, he is a certified Six Sigma Black Belt.



## JEB BUSH

FORMER GOVERNOR OF FLORIDA

**Jeb Bush** was the 43rd governor of the state of Florida, serving from 1999 through 2006. He was the third Republican elected to the state’s highest office and the only Republican in the state’s history to be reelected.

During his two terms, Bush championed major reform of government programs in education and Medicaid. The state also launched and accelerated restoration of America’s Everglades, the largest project of its kind in the world, to save the habitat of 60 threatened and endangered species and provide a long-term supply of drinking water for eight million people in South Florida.

Bush served as Florida’s secretary of commerce under Bob Martinez, Florida’s 40th governor. He also co-authored “Profiles in Character,” a book profiling 14 of Florida’s civic heroes — people making a difference without claiming a single news headline.

Bush earned a bachelor’s degree in Latin American studies from the University of Texas at Austin. He moved to Florida in 1981, where he started a real estate development company with partner Armando Codina.

Currently, Bush is the president of the consulting firm Jeb Bush and Associates and is on the boards of CNL Bancshares and Tenet Healthcare Corporation. In civic and charitable affairs, Bush serves on the boards of the Foundation for Excellence in Education, the Foundation of Florida’s Future, CASEnergy, Volunteer USA and Our Pledge. He and his wife, Columba, live in Miami and have three grown children. Bush is the son of President George H.W. Bush and Barbara Bush.



## ADRIAN M. FENTY

FORMER MAYOR OF WASHINGTON, DC

**Adrian Fenty** has become a national leader in the area of urban education reform after changing the city's public schools structure in his first months in office.

One of the youngest mayors of a major metropolitan U.S. city, rising political figure Fenty captured the nation's attention during his term as mayor of the District of Columbia. Celebrated for his leadership in urban education reform, the public school system in Washington, DC had been troubled for years with poor student test performance scores and graduation rates among the lowest in the nation.

During his first months in office, he shocked the city—and the nation—by bringing the public school system under his administration's control. That bold move and the addition of Michelle Rhee as chancellor of schools have credited Fenty with putting the school system on the path to long-awaited improvements inside and outside the classroom. The results speak for themselves: student achievement at the secondary level rose 14 points in reading and 17 points in math since 2007, gains that are unprecedented in DC history and unparalleled nationwide.

While focusing on improving schools, the Fenty administration also is recognized for overhauling District agencies, ensuring more efficient and effective service delivery throughout city government. Government efficiency and accountability are among the key hallmarks of Fenty's work as mayor. He added more police officers to patrol the streets and expanded community policing; added thousands of affordable housing units; created the Housing First program, which provides permanent supportive housing for homeless individuals and families; and improved the delivery of emergency medical services. As a result, homicides dropped to their lowest level since the 1960's and both violent crimes and property crimes experienced a double-digit decline.

Fenty also championed development efforts across the city. Several schools, libraries, parks and recreation centers were renovated to offer state-of-the-art facilities for residents, youth and families. Fenty again made history by signing the Religious Freedom and Civil Marriage Equality Act of 2009, to legalize same-sex marriage in the District of Columbia.

Prior to his sweeping victory in the 2006 election, Fenty had been re-elected for a second District Council term in 2004, and was elected to the Ward Four council seat in 2000 after defeating a four-term incumbent. Before his election to the council, he was the lead attorney and counsel for the DC Council Committee on Education, Libraries and Recreation.

## SPECIAL GUEST BIOGRAPHY

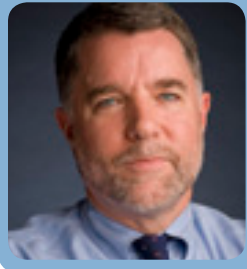


### STACY FLEENOR

ASSOCIATE RESOURCE MODELING ANALYST  
WINDLOGICS, INC.

**Stacy Fleenor** has been a resource modeling analyst for WindLogics since 2008, and has experience in wind and solar resource assessments. She is currently the lead analyst for solar assessments and has helped develop the solar resource assessment process at WindLogics. She holds a B.S. in Meteorology from Valparaiso University, and a M.S. degree in Atmospheric Science from the University of Arizona.

## SPECIAL GUEST BIOGRAPHY



# JAMES P. HONAN

SENIOR LECTURER ON EDUCATION  
HARVARD GRADUATE SCHOOL OF EDUCATION

**James Honan's** teaching and research interests include financial management of nonprofit organizations, organizational performance measurement and management, and higher-education administration.

At Harvard, he is educational co-chair of the Institute for Educational Management (IEM) and is a faculty member in a number of executive education programs for educational leaders and non-profit administrators. Honan has served as a consultant on strategic planning, resource allocation, and performance measurement and management to numerous colleges, universities, schools, and nonprofit organizations, both nationally and internationally.

Previously, he served as institutional research coordinator in the Office of Budgets at Harvard and as a project analyst in the Harvard University Financial Aid Office. He also has been a research assistant at the Educational Resources Information Center (ERIC) Clearinghouse on Higher Education in Washington, DC, and has served as executive assistant to the president of Lesley University in Cambridge, Massachusetts.

## SPECIAL GUEST BIOGRAPHY



# MARY ANN RANKIN

DEAN, COLLEGE OF NATURAL SCIENCES  
UNIVERSITY OF TEXAS SYSTEM

**Dr. Mary Ann Rankin** has been leading the college since 1994. Rankin first joined the faculty at The University of Texas at Austin as an assistant professor of zoology in January 1975. She received her bachelor's degree in biology and chemistry from Louisiana State University, served as a National Science Foundation pre-doctoral fellow at the University of Iowa and Imperial College Field Station, Ascot, England, and was awarded a doctorate in physiology and behavior from the University of Iowa in 1972. She was a National Institutes of Health postdoctoral fellow at Harvard University until joining The University of Texas at Austin. In 1986, she was promoted to professor. Rankin was chairman of the Division of Biological Sciences from 1989 until her appointment as dean of the College of Natural Sciences in 1994.

Rankin's research focuses on studies of the physiologic relationships governing the evolution of insect life history strategies. She is a member of the American Entomological Society, the Royal Entomological Society and the American Association for the Advancement of Science. She currently serves as vice-chairman of the board of directors of Southwest Research Institute in San Antonio, Texas.

## SPECIAL GUEST BIOGRAPHY



# RICHARD L. SHAHEEN

SR. DIRECTOR, DISTRIBUTION ENGINEERING & TECHNICAL SERVICES  
FLORIDA POWER & LIGHT COMPANY

**Richard Shaheen** is senior director, distribution engineering and technical services for Florida Power & Light Company, one of the largest investor-owned electric utilities in the nation. In his position, Shaheen is responsible for delivery assurance, design and engineering, project management, and environmental for the distribution business unit. Previously, he served as transmission & substation operations director and distribution operations director.

Shaheen has been with FPL for 25 years. He joined the company as a field engineer in the Power Delivery arena and during his career worked in various field, staff, engineering and leadership positions throughout Power Systems and the Integrated Supply Chain.

Shaheen has a bachelor's degree in Electrical Engineering from the University of Florida and an master's degree in business from Florida Atlantic University. Additionally, he is a registered Professional Engineer in the state of Florida, has a Florida Real Estate license and is a certified Six Sigma Black Belt.





## STEPHEN L. WEBER

PRESIDENT  
SAN DIEGO STATE UNIVERSITY

**Stephen L. Weber**, the seventh president of San Diego State University, provides dynamic leadership to an institution that ranks among the largest in the nation.

Under President Weber's guidance, students, faculty, staff, alumni and community leaders have participated in shaping "Shared Vision" — a road map for the university's future with goals such as reinforcing academic excellence, nurturing students, honoring diversity and social justice, carefully stewarding resources and further developing global programs.

In the process, SDSU has become an increasingly popular and selective choice among college-bound students. The overall academic quality of SDSU's incoming students is rising, and alumni involvement and private financial support of the university have never been stronger.

Weber is the past chair of the American Association of State Colleges and Universities Board of Directors, and co-chairs Partners for K-12 School Reform. He also serves on the boards of governors of The Peres Center for Peace, and on the boards of directors of the San Diego Regional Economic Development Corporation, the San Diego Science and Technology Council, and the California Healthcare Institute. He also is a member of the international advisory board for the Foundation for Children of the Californias.

Born in Boston, President Weber is a graduate of Bowling Green University with a bachelor's degree in philosophy. He received his doctoral degree in philosophy from the University of Notre Dame in 1969 and is the author of numerous articles on philosophy and higher education.



## CARL WIEMAN

ASSOCIATE DIRECTOR FOR SCIENCE  
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

**Dr. Carl Wieman** was born in Corvallis, Oregon, and graduated from Corvallis High School. Wieman earned his bachelor's degree in 1973 from MIT and his doctoral degree from Stanford University in 1977; he was also awarded a Doctor of Science, honoris causa from the University of Chicago in 1997. He was awarded the Lorentz Medal in 1998. In 2001, he won the Nobel Prize in Physics, along with Eric Allin Cornell and Wolfgang Ketterle. In 2004, he was named United States Professor of the Year among all doctoral and research universities.

Wieman joined the University of British Columbia on January 1, 2007, and is heading a well-endowed science education initiative there; he retains a twenty percent appointment at the University of Colorado at Boulder to head the science education project he founded in Colorado.

In the past several years, Wieman has been particularly involved with efforts at improving science education and has conducted educational research on science instruction. Wieman currently serves as Chair of the Board on Science Education of the National Academy of Sciences. He has used and promotes Eric Mazur's "peer instruction," a pedagogical system, where teachers repeatedly ask multiple-choice concept questions during class, and students reply on the spot with little wireless "clicker" devices. If a large proportion of the class chooses a wrong answer, students discuss among themselves and reply again. In 2007, Wieman was awarded the Oersted Medal, which recognizes notable contributions to the teaching of physics, by the American Association of Physics Teachers (AAPT).

Wieman is the founder and chairman of PhET, a web-based directive of University of Colorado which provides an extensive suite of simulations to improve the way that physics, chemistry, biology, earth science and math are taught and learned.

Wieman is a member of the USA Science and Engineering Festival's Advisory Board. Wieman was nominated to be The White House's Office of Science and Technology Policy Associate Director for Science on March 24, 2010. His hearing in front of the Commerce committee occurred on May 20, 2010, and he was passed by unanimous consent. On September 16, 2010, Dr. Wieman was confirmed by the U.S. Senate.



## CHRISTOPHER VALENTINO

CYBERSECURITY DIRECTOR  
NORTHROP GRUMMAN

**Christopher Valentino**, director, cyber, Cyber & SIGINT Systems, Northrop Grumman Information Systems, is a cyber security expert and business leader who provides innovative technology solutions to a diverse set of U.S. Government customers. As both a technology and business leader, he identifies emerging opportunities. Currently, he is responsible for the strategic technology planning operations in the Cybersecurity market area for Northrop Grumman's Intelligence Systems Division.

Prior to his current assignment, Valentino led the Cyber Operations business area, where he managed a team of over 200 Cybersecurity professionals providing research, development, testing and operations support to a variety of Defense and Intelligence customers. As a founding member of the former company Windermere, Valentino helped to develop and build a successful technology company that was acquired first by Essex Corporation and then Northrop Grumman.

## NEW MEMBER BIOGRAPHY



# CHARLES L. HARRINGTON

CHAIRMAN & CEO  
PARSONS CORPORATION

**Charles Harrington** is the Chairman and Chief Executive Officer of Parsons Corporation, an international engineering, construction, and technical and management services firm headquartered in Pasadena, California, with more than 12,000 employees and revenues of \$2.9 billion in 2009.

Harrington joined Parsons in 1982, working on a variety of diverse programs in locations ranging from Saudi Arabia to the North Slope of Alaska, and a broad range of markets from oil and gas to nuclear fuel reprocessing. In early 1991, he relocated from Pasadena, California, to Charlotte, North Carolina, and took over sales to federal government organizations in the southeastern United States. He later became Vice President and Program Manager of a multibillion-dollar engineering and construction project with the U.S. Department of Energy's Savannah River Site. Prior to his appointment in 2006 to the position of Executive Vice President, Chief Financial Officer, and Treasurer, he was the founding President of Parsons Commercial Technology Group, one of Parsons' four global business units.

A native Californian, Harrington graduated Magna Cum Laude from California Polytechnic State University, San Luis Obispo, with a bachelor's in engineering, and he graduated with honors from the Anderson School of Management at the University of California, Los Angeles, with a master's in business administration with concentrations in finance and marketing. Harrington also attended the Advanced Management Program at the Fuqua School of Business at Duke University. Harrington is a registered professional mechanical engineer and a graduate of the Parsons Rotating Management Program.

In addition to his responsibilities at Parsons, Harrington serves on the boards of the Los Angeles Chamber of Commerce, Los Angeles Sports Council, the California Polytechnic State University President's Cabinet, the Cal Poly Foundation Board of Directors, the Anderson School of Management at UCLA, the California Science Center Foundation, the Blumenthal Performing Arts Center and several volunteer organizations.

## NEW MEMBER BIOGRAPHY



# LINDA P. HUDSON

PRESIDENT & CHIEF EXECUTIVE OFFICER  
BAE SYSTEMS, INC.

**Linda Hudson** is the president & CEO of BAE Systems, Inc. She leads approximately 50,000 people across more than 130 sites in the United States, United Kingdom, Sweden, Israel, Germany, Mexico, Switzerland and South Africa. BAE Systems, Inc. had 2009 revenues of \$19.4 billion and is a U.S.-based, wholly owned subsidiary of BAE Systems plc, headquartered in London.

Concurrently, Hudson is an executive director of the BAE Systems plc Board and a member of the Executive Committee. She also is an executive director on the BAE Systems, Inc. board.

Previously, Hudson was president of BAE Systems' Land & Armaments operating group, a role she began in January 2007. Land & Armaments is the world's largest military vehicle and equipment business, with operations around the world.

Prior to joining BAE Systems, she served for seven years as an officer and vice president of the General Dynamics Corporation, and she was president of General Dynamics Armament and Technical Products in Charlotte, North Carolina.

From 1985 until 1999, Hudson held a variety of senior management positions in production operations, program management and business development during a period of significant consolidation in the defense industry. Beginning with Martin Marietta, she led organizations through the Lockheed Martin merger and a subsequent divestiture to General Dynamics.

Hudson began her career in 1972 at the Harris Corporation in Melbourne, Florida, as a research and development engineer. In 1976, she joined Ford Aerospace and Communications Corporation in Newport Beach, California. During her tenure at Ford Aerospace, she led reliability engineering and quality assurance organizations and was program manager on a multi-billion dollar production program.

A graduate of the University of Florida, Hudson received her bachelor's degree with honors in Systems Engineering. She remains active in the alumni and athletic associations and serves on advisory boards for the College of Engineering. Recently honored as a Distinguished Alumnus, she is a member of the Industrial and Systems Engineering Hall of Fame.

Hudson has received numerous awards and recognitions for her professional accomplishments and her philanthropic activities. She currently serves on the USO Worldwide Board of Governors, the Association of the United States Army Council of Trustees, Blue Star Families Board of Directors, University of Florida Foundation Board, and the advisory board for the Women in Engineering Program at the University of Maryland. She is a member of the North Carolina and Washington, DC chapters of the International Women's Forum and C200, the premier global organization of women business leaders. In 2009 and 2010, Hudson was named one of *Fortune Magazine's* 50 Most Powerful Women in Business.

## NEW MEMBER BIOGRAPHY



# LINDA P.B. KATEHI

CHANCELLOR  
UNIVERSITY OF CALIFORNIA, DAVIS

**Linda P.B. Katehi** became the sixth chancellor of the University of California, Davis, on August 17, 2009. As chief executive officer, she oversees all aspects of the university's teaching, research and public service mission.

Katehi also holds UC Davis faculty appointments in electrical and computer engineering and in women and gender studies. A member of the National Academy of Engineering, she chaired until 2010 the President's Committee for the National Medal of Science and the Secretary of Commerce's committee for the National Medal of Technology and Innovation. She is a fellow and board member of the American Association for the Advancement of Science and a member of many other national boards and committees.

Previously, Katehi served as provost and vice chancellor for academic affairs at the University of Illinois at Urbana-Champaign; the John A. Edwardson Dean of Engineering and professor of electrical and computer engineering at Purdue University; and associate dean for academic affairs and graduate education in the College of Engineering and professor of electrical engineering and computer science at the University of Michigan.

Since her early years as a faculty member, Katehi has focused on expanding research opportunities for undergraduates and improving the education and professional experience of graduate students, with an emphasis on underrepresented groups. She has mentored more than 70 postdoctoral fellows, doctoral and master's students in electrical and computer engineering. Of the 45 doctoral students who graduated under her supervision, 22 have become faculty members in research universities in the United States and abroad.

Her work in electronic circuit design has led to numerous national and international awards both as a technical leader and educator, 17 U.S. patents, and an additional 5 U.S. patent applications. She is the author or co-author of 10 book chapters and about 650 refereed publications in journals and symposia proceedings.

Katehi earned her bachelor's degree in electrical engineering from the National Technical University of Athens, Greece, in 1977, and her master's and doctoral degrees in electrical engineering from UCLA in 1981 and 1984, respectively.

## NEW MEMBER BIOGRAPHY



# JON WHITMORE

CHIEF EXECUTIVE OFFICER  
ACT

**Jon Whitmore** knows the value of education. A first-generation college graduate, Whitmore has made helping others achieve educational success his life's work. He continues that mission at ACT.

Raised with strong midwestern values and an equally strong work ethic, Whitmore earned both his bachelor's (1967) and master's (1968) degrees in speech from Washington State University. In 1974, he completed his doctoral degree in theater history at the University of California–Santa Barbara. He has authored two books, directed more than 60 plays, and written more than 160 scholarly articles.

Throughout his career, six universities have benefited from Whitmore's leadership and vision: West Virginia University, State University of New York at Buffalo, University of Texas at Austin, University of Iowa, Texas Tech University, and San Jose State University.

Whitmore has been an active member on dozens of community, civic and educational boards and organizations. He believes in offering opportunities for staff development, personal learning and advancement.



# BHEF MEMBERSHIP



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Association of American Universities

**Lee C. Bollinger**  
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Columbia University

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**Rear Admiral Nevin Carr, Jr.**  
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