BHEF has positioned itself a national leader in brokering strategic business engagements with higher education to develop innovative workforce solutions. BHEF scales these innovations across networks of member projects and sectors through industry associations for national impact.
BHEF Overview

Founded in 1978, BHEF leaders work together to advance solutions to our nation’s most significant educational challenges to enhance U.S. competitiveness

• Diverse Membership
  ▪ Fortune 500 CEOs and senior executives
  ▪ University presidents
  ▪ Select government and foundation leaders

• Long History of Member-Led Initiatives
  ▪ Business-university research collaboration
  ▪ Diversity
  ▪ College readiness, access and success
  ▪ STEM
  ▪ Workforce
National Perspective: Degree Production by STEM Fields

• Bachelors degrees awarded in most STEM fields have remained relatively flat over the past 15-20 years.

• Drop-out rates for students in the physical or biological sciences is 50%, and 60% in mathematics, compared to 30% in humanities and social sciences.

• STEM drop-out rates are sharply higher for women and underrepresented minority students.

• Steepest drop-out rates occur in the first two years of college.
STEM Retention: Napoleon in Russia

This map drawn by Charles Joseph Minard portrays the losses suffered by Napoleon’s army in the Russian campaign of 1812. Beginning at the left on the Polish-Russian border near the Niemen, the thick band shows the size of the army (422,000 men) as it invaded Russia. The width of the band indicates the size of the army at each position. In September, the army reached Moscow with 100,000 men. The path of Napoleon’s retreat from Moscow in the bitterly cold winter is depicted by the dark lower band, which is tied to temperature and time scales. The remains of the Grande Armée struggled out of Russia with 10,000 men. Minard’s graphic tells a rich, coherent story with its multivariate data, far more enlightening than just a single number bouncing along over time. Six variables are plotted: the size of the army, its location on a two-dimensional surface, direction of the army’s movement, and temperature on various dates during the retreat from Moscow. It may well be the best statistical graphic ever drawn. Napoleon’s March poster $14 postpaid; English/French version $18 postpaid.
Why do students leave STEM?

According to the President’s Council of Advisors on Science and Technology, principal reasons for students dropping out of STEM include:

– Lack of adequate K-12 STEM preparation
– Dull introductory courses
– Few opportunities to “do” science or engineering (e.g., research)
– Emphasis on rote memorization, not discovery
– STEM as a filter, not a pump, for talent
– Few role models for women and URMs
BHEF’s Overarching Initiative

- Integrates its two long-standing initiatives into the National Higher Education and Workforce Initiative
- Serves as a platform for business-higher education collaboration to create new higher education pathways to high-demand careers in data science and analytics, cybersecurity, water, energy, and materials science and engineering
- Provides opportunities to integrate new insights from BHEF’s modeling and project work to drive Strategic Business Engagement and promote disruptive innovations in higher education
- Deploys unique scaling strategy to maximize impact
The National Higher Education & Workforce Initiative

• **Building a Strong Evidence Base**: Research-based interventions; systems dynamics modeling to show the impact of STEM “interventions” at scale; STEM student migration analysis; industry demand signaling;

• **Regional Strategy**: Engage BHEF business and higher education partners in innovative regional projects that deploy best practices in different fields (e.g., engineering, cybersecurity, chemistry) and respond to workforce needs

• **National Strategy**: Creation and deployment of a national STEM higher education collaboration with industry associations (BISEC, AIA, SIA) and higher education associations (AAU, APLU, ASEE) to align goals, share learning, and partner on regional projects
BHEF Regional Strategy

• Focus on the First Two Years of College
• Create Unique, Sector-Focused Regional Pilots
  – Directly align with local workforce needs
  – Move evidence-based best practices into real-world, on-the-ground settings
• Forge Deep Business-Universities Partnerships
  – Identify emerging regional workforce needs
  – Develop new innovative STEM educational models (cyber teaching hospital, 2+2’s, entrepreneurship in STEM, PSM’s)
  – Deploy proven practices (Earlier Internships; Course Re-design; Mentoring and Career Pathways; Cooperative Programs; Living/Learning Communities)
• Establish Pilots as National Proof Points
  – Serve as inputs to the U.S. STEM Education Model 2.0
  – Create a network for scaling and exporting learning
BHEF Regional Project: University of Maryland
Advanced Cybersecurity Experience for Students

- **Northrop Grumman and the University of Maryland**
  - Innovative model of aerospace industry-higher education partnership

- **Undergraduate Cyber “Teaching Hospital”**
  - Alignment with local cyber workforce needs
  - Focus on the first two years of college

- **New Interdisciplinary Honors Program in Cybersecurity**
  - Includes: Early internships; redesigned courses; new teaching methods focused on active student learning; undergraduate mentoring and career guidance by STEM professionals

- **Maryland Cyber Network**
  engages industry on all levels to coordinate strategy and tactics, with possible role for government (e.g., ONR, NSA)
Cohort I BHEF Regional STEM Projects

**Wisconsin:**
University of Wisconsin System; Milwaukee Water Council

**California (2):**
San Jose State; Bay Area Council; Cal Poly; Parsons; Raytheon; Northrop Grumman

**Missouri (2):**
Washington University in St. Louis; Boeing; Novus Pharmaceuticals

**Ohio (2):**
Battelle Memorial Institute; The Ohio State University; Case Western Reserve University; Sherwin Williams/Eaton

**Florida:**
Miami Dade College; Next Era Energy

**Massachusetts:**
University of Massachusetts System; Raytheon; MA Competitive Partnership;

**New York:**
City University of New York; IBM;

**Maryland (2):**
University of Maryland College Park and Baltimore County; Northrop Grumman; Battelle Memorial Institute; Raytheon
June 12, 2012

The Honorable Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, D.C. 20500

Dear President Obama,

We, the undersigned organizational leaders, recognize the vital importance of undergraduate science, technology, engineering, and mathematics (STEM) education to maintaining a vibrant, diverse workforce and ensuring a secure and prosperous nation. Of particular concern to us are the first two years of college, when students, especially women and underrepresented minorities, are most likely to leave STEM fields into other majors or not complete a degree at all.

Further, we recognize the need for broader alignment and deeper engagement among business, higher education, and government to increase overall STEM literacy and to improve undergraduate success in STEM fields; demonstrate the value of STEM academic study to many rewarding career pathways; and convey to students the skills and competencies required for the 21st century STEM workforce. Over the next five years, we will collaborate among our organizations to address the needs stated above through the following Themes, Operating Principles, and Action Plan:

Themes:
- Expand the number and diversity of undergraduates in STEM disciplines and the role at which they graduate and enter the STEM workforce or enroll in graduate programs
- Better align undergraduate education (including community college education) with STEM industry workforce needs in key strategic areas
- Identify roles and responsibilities for academic, industry, and government organizations in advancing, enhancing, and evaluating comprehensive and systematic reform to undergraduate STEM education and workforce development, recruitment, placement, and retention

Operating Principles:
- Partners will be open to collaboration, taking the lead, as appropriate, on group activities and sharing information about workforce needs, strategies for workforce recruitment, and other approaches to undergraduates STEM education, and data on effective practices

Action Plan:
- Work jointly to understand the workforce and training needs of industry in STEM-related fields and to develop new and innovative ways, based on research, theory, or expert judgment, to ensure that colleges and universities are meeting those needs
- Work jointly to find or integrate new approaches to recruit, develop, train, and retain the domestic STEM talent necessary to ensure future U.S. global competitiveness

Sincerely,

[Signatures of the undersigned organizational leaders]

Nancy C. Bildner
President & Chief Executive Officer
Aerospace Industries Association

Molly Corbett Broad
President
American Council on Education

Brian E. Rawlings III
President
Association of Public and Land-grant Universities

American Chemical Society

Dana P. Siddon
President
American Society for Engineering Education

Peter McPherson
President
Association of Public and Land-grant Universities

Lt Gen Lawrence D. Farrell, Jr., USAF (Ret)
President
National Defense Industrial Association

Ray Konarski
President & Chief Executive Officer
TechNet
A Comprehensive Strategy

1. Core Project Design Principles

2. Strategic Business-Higher Education Engagement

3. Comprehensive Scaling Strategy

4. Strategic Outputs
For Additional Information


- BHEF’s Online Resource Center: [www.StrategicEdSolutions.org](http://www.StrategicEdSolutions.org)