The background is a dark blue-grey color with a faint, light-colored graphic. On the left side, there is a compass rose with a needle pointing towards the top-left. To the right of the compass rose is a gear or cogwheel. The text is centered and written in a light blue, sans-serif font.

# Building on BEST Principles: Designing Programs that Support the Success of All Students

AAC&U Annual Conference 2006  
Thursday, January 26

# Session Goals

- ▶ to examine the recommendations for enhancing access to and success in higher education
- ▶ to stimulate thinking about how to apply the design principles that have been identified

# Panelists

- ▶ Daryl E. Chubin - Director, Center for Advancing Science & Engineering Capacity, American Association for the Advancement of Science
- ▶ Jeanne L. Narum - Director, Project Kaleidoscope
- ▶ Wanda E. Ward - Deputy Assistant Director, Directorate for Social, Behavioral and Economic Sciences, National Science Foundation
- ▶ Irelene P. Ricks - Director of Minorities Affairs, The American Society for Cell Biology

## **Moderator**

- ▶ Jodi L. Wesemann - Assistant Director for Higher Education, American Chemical Society

# Session Overview

- ▶ Why do we (still) need to consider strategies for student success?
- ▶ What strategies should be considered?
- ▶ How can these strategies be implemented?

# Why do we (still) need to consider strategies for student success?

- ▶ Need for higher education
  - Jobs for college graduates are expected to grow nearly 28 percent between 1998 and 2008
  - 36% of job openings will be to replace those leaving the labor force

Chad Fleetwood, Kristina Shelley, "The Outlook for College Graduates, 1998-2008: A Balancing Act" Occupational Outlook Quarterly, Fall 2000.

# Why do we (still) need to consider strategies for student success?

## ► Need to facilitate access

Traditional students are no longer the tradition - Consider the enrollment patterns for traditional age students (18-26)

- 57% attend more than one institution as undergraduates
- 35% cross state lines to do so (23% of four-year students and 12% of community college students)
- 20% earn acceleration credits via examination or dual-enrollment
- 62% attend during the summer terms

Clifford Adelman, *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000*. U.S. Dept of Education: Washington, DC, 2004.

# Why do we (still) need to consider strategies for student success?

- ▶ Need to foster success
  - 37% of degree-seeking students get a bachelor's degree in four years
  - 63% get bachelor's degree in six years (54% of low-income students)
  - Barely a quarter of all four-year institutions graduate more than 50% of their students in four years or less.

A Matter of Degrees, Education Trust, May 2004

# Workforce Demographics

Sex, Race/Ethnicity and Disabilities	Percentage U.S. population 1999	Percentage total workforce 1999	Percentage S&E workforce 1999
White men	35.2	39.9	63.2
White women	36.7	34.8	18.6
Asian men	1.8	2.0	8.4
Asian women	2.0	1.8	2.6
Black men	5.7	4.9	2.1
Black women	6.4	5.9	1.3
Hispanic men	5.8	5.9	2.4
Hispanic women	5.7	4.2	1.0
American Indian men	0.4	NA	0.2
American Indian women	0.4	NA	0.1
Persons with disabilities	~20	NA	NA

"Standing Our Ground", AAAS: Washington DC, 2004, p 55.

# Meeting Scientific Workforce Needs

- ▶ Tapping America's Potential: The Education for Innovation Initiative (July 2005)
- ▶ Broadening Participation in America's Science and Engineering Workforce (December 2004)
- ▶ Standing our Ground: A Guidebook for STEM Educators in the Post-Michigan Era (October 2004)
- ▶ NSF InfoBrief "The role of community colleges in the education of recent science and engineering graduates" (May 2004)

# Meeting Scientific Workforce Needs

- ▶ A Bridge for All: Higher Education Design Principles to Broaden Participation in Science, Technology, Engineering and Mathematics (February 2004)
- ▶ Recommendations for Action in Support of Undergraduate Science, Technology, Engineering, and Mathematics (September 2002)
- ▶ Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology (September 2000)

# What strategies should be considered?

- ▶ Use of design principles provide framework for institutional change
  - Doing what works – principles from “A Bridge for All”
  - Doing what is legally permissible – principles from “Standing Our Ground”

# BEST: Building Engineering & Science Talent

## Design Principles to Expand Higher Education Capacity

<i>Principle</i>	<i>Evidence</i>
• Institutional leadership	Commitment to inclusiveness across the campus community
• Targeted recruitment	Investing in and executing a feeder system, K-12
• Engaged faculty	Developing student talent as a rewarded faculty outcome
• Personal attention	Addressing, through mentoring and tutoring, the learning needs of each student
• Peer support	Student interaction opportunities that build support across cohorts and allegiance to institution, discipline and profession
• Enriched research experience	Beyond-the-classroom hands-on opportunities and summer internships that connect to the world of work
• Bridging to the next level	Institutional relationships that help students and faculty to envision pathways to milestones and career development
• Continuous evaluation	Ongoing monitoring of process and outcomes that guide program adjustments to heighten impact

source: *A Bridge for All*, [www.bestworkforce.org](http://www.bestworkforce.org), 2004

Table 2  
**BEST Evaluation Criteria for Assessing  
 Higher Education Programs/Practices**

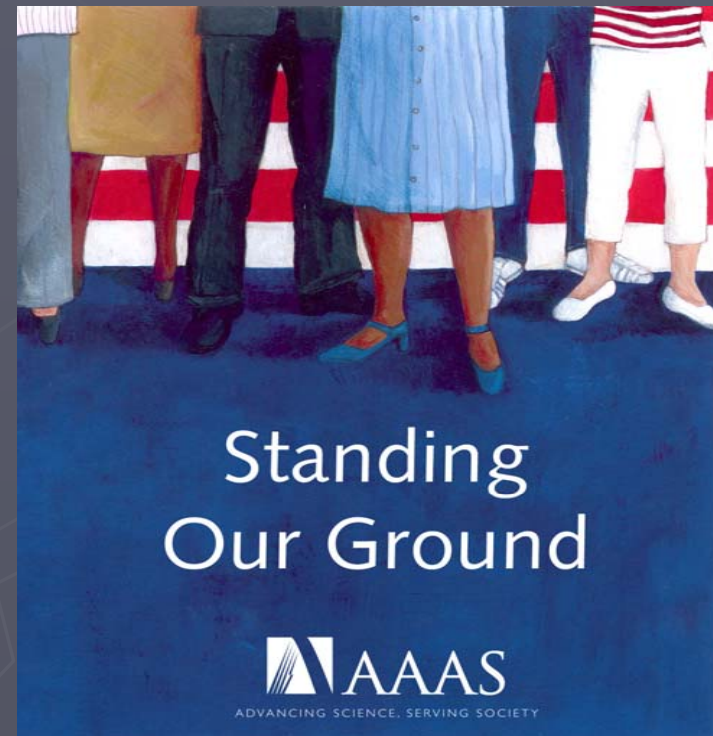
<b>Questions/Criteria</b>	<b>Exemplary – actionable now</b>	<b>Promising</b>	<b>Not ready to adapt/scale</b>
1. Were expected outcomes defined before program launch?	Yes	Soon after	Sort of/vague
2. Are outcome data attributable to the program intervention?	Far exceeded original expectations	Exceeded original expectations	Failed to meet expectations
3. Does it demonstrate excellence, which requires equity? – i.e., did it increase the diversity of the target population?	Chief outcome achieved and documented (positive trend)	Chief outcome implied (no monotonic trend)	Equity at core of program design, not an add-on
4. What was the value-add of the experience to the target population?	Related outcomes that move treatment group to next competitive level	Majority (but not most) of individuals in treatment population enhanced	Gains for some individuals that can be attributed to treatment
5. Is there evidence of adaptation/ institutionalization, i.e., multiple sites?	Explicit scale-up strategy w/evidence	Attempt to implement strategy and evaluate	Confined to a single site
6. Is there evidence of effectiveness with a population different from that originally targeted?	Planned and executed	Planned	Serendipitous
7. How long has it been in place?	Self-sustaining (10+ years)	Majority soft money (3-10 years)	New (<3 years)
8. Were there unexpected consequences?	Positive in intensity or extent (and measured)	Identification of possible/probable consequences	Evidence for systematic rather than random effect

*Source: BEST Blue Ribbon Panel on Higher Education, 2002*

# Assets in Making U.S. S&E More Inclusive

- Legal Primer: Remove barriers
- Design Principles: Affirm opportunities
- Conference Report: Document trends
- AAAS Capacity Center (2004→): Embodies resources in *Standing Our Ground* (legal, cultural, research) for changing policies, programs, and practices re student success and faculty progress

[www.aaas.org/standingourground](http://www.aaas.org/standingourground)



# Design Principles for Effective Programs

1. ***Mission:*** How do diversity efforts fit into the larger institutional mission?
2. ***Intent of the program:*** How does the program address overall university or organizational goals? What need does the program meet? What evidence led to the creation of the program?
3. ***Target population:*** What is the population to be served? How is this population linked to the intent of the program?
4. ***Character of the program:*** What does the program do? Where is it located?

## Design Principles (cont.)

5. ***Program Context:*** What is the institutional context? Does it matter?
6. ***Evaluation and Research:*** What is effective? How much is necessary?
7. ***Faculty Recruitment and Retention:*** Is diversity-based recruiting permitted? What about retention?
8. ***Leadership:*** At what level? What do they need to know?

# Institutional Coping: Responses to . . .

- ***Admissions quandaries***: undergrad— holistic review; grad—decentralized
- ***Legal constraints*** re: financial aid, outreach/bridge programs, targeted recruitment, faculty diversity
- ***Threats*** by anti-affirmative action groups
- ***Failure of Administration*** to provide guidance except “race-neutral alternatives”

# Current Challenges: What to Fix?

## ▶ *Students:*

- Demographic composition
- Pre-college academic preparation

## ▶ *Pathways:*

- Intervention programs—add-on to formal education
- Access to higher education—cost reduces diversity

## ▶ *College Environment:*

- Cultural competence of faculty
- Structural support—climate, career information, mentoring

# New Sources

- ▶ The College Board, *Federal Law and Recruitment, Outreach, and Retention: A Framework for Evaluating Diversity-Related Programs*, 2005 ([www.collegeboard.com](http://www.collegeboard.com))
- ▶ Project Kaleidoscope, *Report on Reports II*, forthcoming 2006 ([www.pkal.org](http://www.pkal.org))

# How can these strategies be implemented?

- ▶ Institutional change requires coordinated collaborative actions
  - Activities of federal agencies and scientific/higher education organizations
  - Activities of disciplinary societies
  - Activities of institutions

# Activities of federal agencies and scientific/higher education organizations

- ▶ National Science Foundation (NSF)
  - ADVANCE
  - Alliance for Graduate Education and the Professoriate (AGEP)
- ▶ National Institutes of Health (NIH)
  - Bridges to the Future Programs
- ▶ National Aeronautics and Space Administration (NASA)
  - Project ACCESS (Achieving Competence in Computing, Engineering and Space Science)
- ▶ American Association for the Advancement of Science (AAAS)
  - Center for Advancing Science and Engineering Capacity
- ▶ Association of American Colleges and Universities (AAC&U)
  - Making Excellence Inclusive: Diversity, Inclusion, and Institutional Renewal

# Activities of disciplinary societies

- ▶ Institutional Leadership
- ▶ Targeted Recruitment
- ▶ Engaged Faculty
- ▶ Personal Attention
- ▶ Peer Support
- ▶ Enriched Research Experiences
- ▶ Bridging to the Next Level
- ▶ Continuous Evaluation

# Institutional Leadership

Foster collaborations within the GK-16 community, including the two-year college community, and between the GK-16 community and industry.

- ▶ *American Physical Society/IBM Research Internship for Undergraduate Women*: A 10-week, paid summer internship at one of three IBM research centers.
- ▶ *American Society for Cell Biology Visiting Professors Program*: 6-8 minority scientists spend the summer in research labs of other ASCB members

# Targeted Recruitment

- ▶ *American Geophysical Union*: Use the association's international connections to foster student and scholar exchanges to promote understanding and to help break down the barriers of gender and ethnicity.
- ▶ *American Chemical Society*: Encourages high school students to pursue careers in chemical sciences through summer research fellowships.

# Engaged Faculty

- ▶ *National Academy of Engineering*: NAE's Center for the Advancement of Scholarship on Engineering Education (CASEE), with funds from NSF, works with participating HBCU institutions to develop and enhance the capacity of faculty to engage in rigorous research and education in engineering, and to make connections outside the HBCU community.

# Personal Attention

*Model Institutions of Excellence:* Focus on student needs through strategies of

- ▶ *Early alert systems* that detect students showing difficulties in mastering course material early
- ▶ Intensive discussion sections that help students master introductory course material that may be difficult due to a lack of exposure in their K-12 experience
- ▶ Expanded opportunities to conduct undergraduate research throughout the calendar year
- ▶ Field trips to graduate-level science programs, to demonstrate the possibilities of pursuing a similar career track

# Peer Support

- ▶ *Annual Biomedical Research Conference for Minority Students*: An annual conference of 2,600 attendees, of which 1,800 are undergraduates. Includes scientific sessions, professional development workshops, posters, exhibits, and awards.
- ▶ *American Chemical Society's CISA Grant*: Grant funds are provided to active ACS Student Affiliates to support projects where undergraduates improve minority children's learning experiences in the sciences.

# Enriched Research Experiences

- ▶ *MAA's National Research Experiences for Undergraduates (NREUP)*: Attract more under-represented students through research experiences with summer stipends and housing, travel to annual meetings to present findings, and faculty stipends.
- ▶ Many other programs of similar scope are supported by most disciplinary societies.

# Bridging to the Next Level

- ▶ *American Psychological Association's Minority Undergraduate Students of Excellence (MUSE)*: Under-represented undergraduates with a high potential for success in psychology graduate studies are nominated by their faculty. The identified students are targeted for special recruitment by graduate programs.

# Continuous Evaluation

The success stories of producing science majors from under-represented groups are many and varied. There are many potential features, and they can be arranged in many different patterns which lead to success. The key is continuous examination and discussion of the impact of the different facets of your approach, and continuous mid-course corrections to ensure that student needs are being met.

# Activities of institutions

- ▶ What approaches can be used to implement all of the design principles simultaneously?
- ▶ Which of the design principles have been most difficult to implement?
- ▶ What resources are available to institutions implementing the design principles?
- ▶ How can institutional activities be coordinated to maximize their impact?

# Session Goals

- ▶ to examine the recommendations for enhancing access to and success in higher education
- ▶ to stimulate thinking about how to apply the design principles that have been identified

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