Science and Engineering Workforce

Leads: George Reynolds and Kelly Sullivan

Retreat Participants: Sam Armstrong, Mel Bernstein, Janice Bordeaux, Candis Claiborn, Gladys Escalona de Motta, Merrilea Mayo, Dan Mote, Laura Petonito, Will Rees, Jim Rosser, Wally Schaffer, Hratch Semerjian, Ginny Wiggins, Lilian Wu

Vision: Our Picture of the Ideal Future

- In a global economy, the U.S. is the undisputed world leader in science and engineering
- The American public recognizes the value of science and engineering to the quality of their personal lives and to the overall economic well-being of the Nation
- We have well-informed, highly skilled and technically literate citizens and decision-makers at all levels
- U.S. science and engineering education is multi-disciplinary, accessible and responsive to the current and future workforce needs of the Nation
- A larger and more diverse group of top U.S. students are recruited and retained in science and engineering programs
- Top students from around the world are competing to get into U.S. science and engineering programs
- The quality and agility of the U.S. science and engineering workforce strengthens U.S. businesses and attracts international investments
- The U.S. has a long-term commitment to research and development investment at both the Federal and state levels across the country
- The U.S. has a robust and integrated research, development and innovation infrastructure

Logic: Working Backwards from Desired Impact

Impact: Increase in quality of life for U.S. citizens

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Increase in U.S. global competitiveness

⇑

Increase in U.S. innovation, discovery, and production

⇑

Goal: Increase in quality, agility and diversity of U.S. science and engineering workforce

Defining “S&E workforce”

- People who are trained and educated in science and engineering
- People who are working in science and engineering careers
- People who have science and engineering knowledge and skills

GUIRR Roles

Our Contribution to the Vision

- Provide neutral setting for government, universities, and industry perspectives
- Engage key stakeholders and partners to leverage support for national priorities
- Define a national strategy and provide leadership for targeted initiatives

Discrete Goals: Our Focus for the Next 3-5 Years

1. Create a right-sized, agile, adaptive, diverse and high-quality workforce to meet society's needs
2. Sustain strong demand for science and engineering talent through increased investment in U.S. research and development
3. Stimulate and capture the interest of Americans in science and engineering careers

Context

Goal #1: **Create a right-sized, agile, adaptive, diverse, and high-quality workforce to meet society's needs**

We desire a "just-in-time" workforce; the right number of people with the right skills at the right time. However, our current system of credentialing does not allow us to easily identify those people.

Credential	**Possible Interpretation**
Ph.D.	"research geek"
Environmental Engineering	What does that mean?
"High-Falutin' University"	Smart, rich, or both
3.7 GPA	Good test taker

21st Century credentialing should be based on knowledge, skills, and abilities (KSAs)

- Would allow employers to find the "85% match" to their job opening and to find S&E workers who don't have formal degree titles.
- New degree titles are no longer indecipherable to employers – they can be expressed as novel combinations of *standard* KSA's.
- 21st Century skills like teamwork & communication can be quantified and put into this metric.
- National, standardized assessment engenders "credential trust" and higher mobility for students – no more need for articulation agreements between institutions.
- Credentials change and grow as student expands knowledge and abilities – encourages lifelong learning.

Possible Work Plan

Goal #1: **Create a right-sized, agile, adaptive, diverse, and high-quality workforce to meet society's needs**

- Identify subset of GUIRR volunteers (companies + universities) willing to experiment with a new credential in a common field.
- Engage commercial evaluation company to assess knowledge, skills, and abilities (KSA's) germane to employment needs and develop corresponding assessment tool for universities.
- Allow students to "opt-in" to assessment pilot.
- Train HR personnel to read and understand new credential.
- Let experiment run for 1 year and assess value.
- If credentialing successful, then expand.

Also begin to look at educational interventions (e.g., summer internships) in terms of the impacts they have on student's needed KSA's for a given corporate sector.

Context

Goal #2: **Sustain strong demand for science and engineering talent through increased investment in U.S. research and development**

- We envision government policy that encourages US industrial investment in research and development both inside companies and in support of university-based research while sustaining and growing federal research programs. Such policy would result in:
  - Broad acceptance by key stakeholders, especially the public, of the high rate of return on investment in science and engineering
  - Tax incentives for investment in research and development
  - Increased U.S. industry research and development
  - Increased Federal, state and local investment in research and infrastructure at our national laboratories, research intensive universities, and relevant industries
  - Increased number and value of government, university, and industry partnerships
  - Increased and predictable demand for domestic science and engineering talent

Possible Work Plan

Goal #2: **Sustain strong demand for science and engineering talent through increased investment in U.S. research and development**

Identify a group of partners to develop an action plan to:

- Engage stakeholders in issuing a national challenge to drive increased investment in research and development
- Develop strategies to support legislation that favors the use of R&D credits
- Develop strategies to support increased investments in longer term research by industry and educational initiatives to attract and prepare the needed workforce.
- Clearly define the link between increased domestic R&D and the workforce.
- Catalogue and distribute best practices for leveraging investment in R&D:
  - Identify policies that encourage research and development investment.
  - Define optimal opportunities for leveraging research and development $s.
  - Define optimal venues for leveraged research and development.
  - Demonstrate the benefits of an agile, robust workforce for maximizing economic competitiveness and national health and security issues.
  - Use the case study of energy independence and environmental quality to illustrate the importance of domestically based R&D and by extension the availability of a trained workforce.

Context
Goal #3: **Stimulate and capture the interest of Americans in science and engineering careers**

- We all wish that everyone valued the impact of the science and engineering enterprise on the quality of life. If that were true, then:
  - Policymakers would wisely invest in science and engineering as a national priority
  - Multi-media outlets would celebrate science and engineering careers
  - A larger more diverse set of students would identify science and engineering as intended career paths
- There are many single-sector efforts aimed at getting this message across:
  - essential$_2$ campaign of the American Chemistry Council
  - The Human Element campaign of Dow Chemical
  - National Chemistry Week of the American Chemical Society
- Is there a way to coordinate such efforts and expand upon them?

Possible Work Plan
Goal #3: **Stimulate and capture the interest of Americans in science and engineering careers**

- Identify list of potential partners (include professional societies, industry, government agencies, trade associations, etc)
- Invite participation in Partnership Conference
- Convene conference
  - Identify existing program and their strengths
  - Include marketing experts to aid in creating a compelling and sustainable message
  - Gain agreement to cooperatively “spread the word”
  - Develop modular but complementary message units for each sector and for multiple audiences
- Develop and implement dissemination plan with aid of market experts

Potential Projects Summary

1. Develop a new credentialing system

2. Develop action plan for encouraging R&D investment policies using case studies and best practices

3. Develop a cross-sector public message platform