The National Science Board: Activities Related to PCAST

Steven C. Beering
Chairman, National Science Board (NSB)

Louis J. Lancerotti
Chairman, S&E Indicators Committee, NSB

March 2010
• NSF is headed by the National Science Board (NSB) and the NSF Director (a member of the NSB)
• 25 Presidentially-appointed, Senate-confirmed members
• Staggered Terms of 6 Years (2 current vacancies; 8 more in May 2010)

• Major Responsibilities:
  ○ Set the policies of NSF
  ○ Approve NSF major facilities and awards
  ○ Deliver S&E policy reports to the President and Congress as the need is determined by the President, Congress or the NSB itself
    ➢ Science and Engineering Indicators (biennial statutory report)
    ➢ STEM Action Plan (requested by Congress)
    ➢ Recent: Sustainable Energy, International S&E and Cost Sharing
    ➢ Upcoming: STEM Innovators, NSF Merit Review, NSF Data Policies
NSB Recommendations from the August 2009 Report:

- The U.S. Government should:
  - Lead a coordinated RD3E* strategy in sustainable energy
  - Boost R&D investment
  - Construct essential policies
  - Support education and workforce development
  - Lead globally
  - Promote public awareness and action

- The National Science Foundation should:
  - Continue to increase emphasis on innovation in sustainable energy technologies and education as a top priority.
  - Coordinate sustainable energy activities
  - Strengthen systems approaches in research programs

*RD3E = research, development, demonstration, deployment and education
Public Attitudes Toward Scientific Research

Benefits vs. harms of scientific research: 1979-2008

Benefits of scientific research outweigh harmful results
Harmful results of scientific research outweigh benefits

www.nsf.gov/nsb/sei/
Public Attitudes Toward Government-Funded Basic Research

Government should fund basic research: 1985-2008

National Science Foundation, Division of Science Resources Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (years through 2001); University of Michigan, Survey of Consumer Attitudes (2004 in top panel); and University of Chicago, National Opinion Research Center, General Social Survey (2006, 2008 in top panel, 2002-08 in bottom panel)
Prestige of Scientists and Engineers

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firefighter</td>
<td>60</td>
</tr>
<tr>
<td>Scientist</td>
<td>55</td>
</tr>
<tr>
<td>Doctor</td>
<td>50</td>
</tr>
<tr>
<td>Nurse</td>
<td>45</td>
</tr>
<tr>
<td>Teacher</td>
<td>40</td>
</tr>
<tr>
<td>Farmer</td>
<td>35</td>
</tr>
<tr>
<td>Engineer</td>
<td>30</td>
</tr>
<tr>
<td>Lawyer</td>
<td>25</td>
</tr>
<tr>
<td>Athlete</td>
<td>20</td>
</tr>
<tr>
<td>Actor</td>
<td>15</td>
</tr>
</tbody>
</table>

Science and Engineering Indicators 2010
Globalization Trends in S&E

• Location of R&D Expenditures
• Number of Researchers
• High Tech Manufacturing:
  • Exports
  • Trade Balance
  • Value-Added Share
  • R&D Employment
R&D Expenditures

$ BILLIONS


United States
Asia–8
EU–27

www.nsf.gov/nsb/sei/
Annual Growth in the Number of Researchers

<table>
<thead>
<tr>
<th>Country</th>
<th>Growth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>(1.47 m)</td>
</tr>
<tr>
<td>EU-27</td>
<td>(1.36 m)</td>
</tr>
<tr>
<td>Russia</td>
<td>(0.47 m)</td>
</tr>
<tr>
<td>Japan</td>
<td>(0.71 m)</td>
</tr>
<tr>
<td>South Korea</td>
<td>(0.22 m)</td>
</tr>
<tr>
<td>Taiwan</td>
<td>(0.10 m)</td>
</tr>
<tr>
<td>China</td>
<td>(1.42 m)</td>
</tr>
<tr>
<td>Singapore</td>
<td>(0.03 m)</td>
</tr>
</tbody>
</table>

SEI 2010: Global S&E Labor Force, Chapter 3
Export of High-Tech Manufactured Goods

![Graph showing the export of high-tech manufactured goods by various regions from 1995 to 2008. The graph compares the percent global total of exports for Asia-8, United States, EU-27, China, Rest of world, and Japan.]

SEI 2010: Trade of High-Technology Goods, Chapter 6
High-Tech Manufacturing Value-Added Share
R&D Employment of U.S. and Foreign Multinational Corporations

Bureau of Economic Analysis, Survey of U.S. Direct Investment Abroad (various years).

www.nsf.gov/nsb/sei/
A National Action Plan for the STEM Education System

- Requested by Congress
- Board Used Statutory Authority to Appoint a Commission and Hold Hearings Around the Country

Recommendations
- Vertical Alignment from Pre-K through to Higher Education
- Horizontal Coordination with National STEM Content Guidelines
- Well-Qualified and Highly-Effective STEM Teachers

Congressman Honda, Senator Obama and Senator Lieberman each introduced legislation to implement the Board’s recommendations
National Council for STEM Education

Horizontal Coordination, Across Stakeholders

- National STEM Content Standards
- Student Assessments Aligned with National Content
- Share and Disseminate Best Practices
Vertical Alignment

- Strong linkage between high school and higher education and/or the workforce
- STEM education-focused P-16 councils in each state
Ensure students are taught by well-qualified and highly effective STEM teachers:

- Compensate STEM teachers at market rates
- Provide resources for the preparation of future STEM teachers
- Increase STEM teacher mobility between districts: national STEM teacher certification standards
- Provide strong STEM teacher preparation

Also see the NSB Letter to President-Elect Obama on Actions to Improve Science, Technology, Engineering, and Mathematics (STEM) Education for all American Students