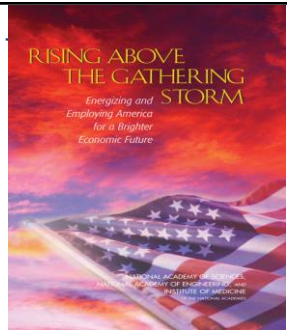


ASTR 4800: Space Science Practice & Policy

- Today's Topic: **Rising Above the Gathering Storm.**
- Next Class: *Overview of Authorization & Appropriations processes*; Homework: Chapter 4 in Beyond Sputnik.
- Interview proposals due Mar. 3; paper due Mar. 17.



Space in the News

George Booth

http://science.nasa.gov/science-news/science-at-nasa/2014/04feb_wobble/

Rising Above the Gathering Storm

"Where once nations measured their strength by the size of their armies and arsenals, in the world of the future knowledge will matter most."
— President Bill Clinton

Greg Eason
James Broder

Agenda

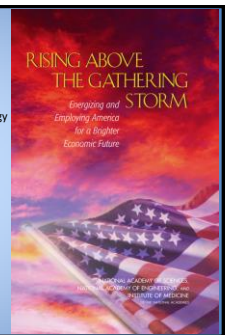
- Overview
- Charge to the Committee
- Recommendations
 - 10,000 Teachers, 10 Million Minds
 - Sowing the Seeds
 - Best and Brightest
 - Incentives for Innovation
- Vannevar Bush's "Science: The Endless Frontier"
- After the Report
- Political Impact
- Class Exercise

Overview 2006


- K-12 Education
 - 1999- 68% of US 8th grade students received instruction from a mathematics teacher who did not hold a degree or certification in mathematics.
 - American youth spend more time watching television than in school.
- Higher Education
 - % of graduates by country that receive their degrees in natural science or engineering
 - South Korea-38%
 - France- 47%, in
 - China- 50%
 - Singapore- 67%,
 - United States- 15%.
 - In the U.S. science and technology workforce in 2000, 38% of PhDs were foreign-born.
 - 1/3 of US students intending to major in engineering switch majors before graduating.
- Research
 - In 2005, only four American companies ranked among the top 10 corporate recipients of patents granted by the United States Patent and Trademark Office.
 - Beginning in 2007, the most capable high-energy particle accelerator on Earth will, for the first time, reside outside the United States.

Charge to the Committee

- What are the top 10 actions, in priority order, that federal policymakers could take to enhance the science and technology enterprise so that the United States can successfully compete, prosper, and be secure in the global community of the 21st century? What strategy, with several concrete steps, could be used to implement each of those actions?



Findings/Recommendations




Norm Augustine

- 4 Recommendations, 20 specific actions
- 10,000 Teachers, 10 Million Minds
- Sowing the Seeds
 - Provides the funding and infrastructure for research
- Best and Brightest
 - Calls for an increase in graduate and undergraduate degrees in Science, Technology, Engineering, and Mathematics (STEM), and International students
- Incentives for Innovation
 - Providing tax incentives for private investment and US-based innovation

10,000 Teachers, 10 Million Minds

- Actions
 - Annually recruit 10,000 science and mathematics teachers via 4-year scholarships.
 - Strengthen the skills of the 250,000 teachers through training and education programs.
 - Enlarge Pipeline of students who are prepared to enter college and graduate with a degree in science, engineering, or mathematics by increasing the passing rate of AP and IB science and mathematics courses.
- CU contribution: Center for STEM Learning



Center for STEM Learning
UNIVERSITY OF COLORADO BOULDER

Does anyone have any experience with STEM Learning here at CU?

Sowing the Seeds

- Actions
 - Increase federal investment in long-term basic research by 10% every year for the next 7 years (Calls for a doubling in funding for NIH, NSF, DOE, DOD, and NASA)
 - Create in the Department of Energy an organization like DARPA called the Advanced Research Project Agency-Energy (ARPA-E)
 - It's work will have important spin-off benefits




Best and Brightest

- Actions
 - Increase the number of students pursuing bachelor's and graduate degrees in STEM by increasing 25,000 undergraduate and 5,000 graduate scholarships each year.
 - To increase the incentives and ease of international students being sourced in order to help attain the goals of the Report.
 - Issues International Traffic in Arms Regulations (ITAR)

Challenges

- International Traffic in Arms Regulations (ITAR)
 - 9/11 pushed this to the extremes it's at today
 - ITAR regulations state that any information and material pertaining to defense and military related technologies may only be shared with U.S. Persons.
- Contradicts "Best and Brightest"
 - Call for more international help, but not in the major areas of STEM.

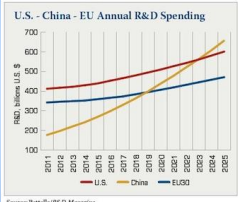


Incentives for Innovation

- Ensure that the United States is the premier place in the world to innovate

Actions

- Enhance IP (intellectual property) protection
- Enact stronger R&D tax credit to encourage private investment
- Provide tax incentives for US-based innovation



U.S. - China - EU Annual R&D Spending

Source: Battelle/BEIJING Magazine

Correlation to Vannevar Bush's "Science: The Endless Frontier"

Similarities

- Both documents following times of war
- Large emphasis on increasing the amount of funding to science research and science education
- Increase in international collaboration

Differences

- Bush's - Focus on military in terms of both science funding and education
- Augustine's - International collaboration focus on education more than research
- Change between the socioeconomic standards of the time periods

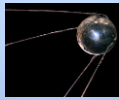


After the Report

- America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act of 2007-Issued by President George W. Bush
 - OSTP, NASA, NIST, NOAA, DOE, NSF
 - Direct response to Gathering Storm Report
- COMPETES Reauthorization Act of 2010- Issued by Barack H. Obama
- Currently going through another Reauthorization 2014

What's changed?

- COMPETES act struggling at being reauthorized
 - Recession of 2007-2009
- Political Impact
 - Bipartisan support
- Dick Truly touched on the fact that it is much more difficult to get funding these days
 - Things have become much more political



Question: With political support waning and a somewhat all-around lack of motivation do we need another "Sputnik" in order to maintain at the front of the game?

Class Exercise

- **10,000 Teachers, 10 Million Minds** - Increase America's talent pool by vastly improving K-12 science and mathematics education
- **Sowing the Seeds** - Sustain and strengthen the nation's traditional commitment to long-term basic research that has the potential to be transformational to maintain the flow of new ideas that fuel the economy, provide security, and enhance the quality of life.
- **Best and Brightest** - Make the United States the most attractive setting in which to study and perform research so that we can develop, recruit, and retain the best and brightest students, scientists, and engineers.
- **Incentives for Innovation** - Ensure that the United States is the premier place in the world to innovate; invest in downstream activities such as manufacturing and marketing; and create high-paying jobs based on innovation.

Break up in groups of 2-3, through personal experience/knowledge come up with one way we have been competitive in these areas and one way we have lagged.