

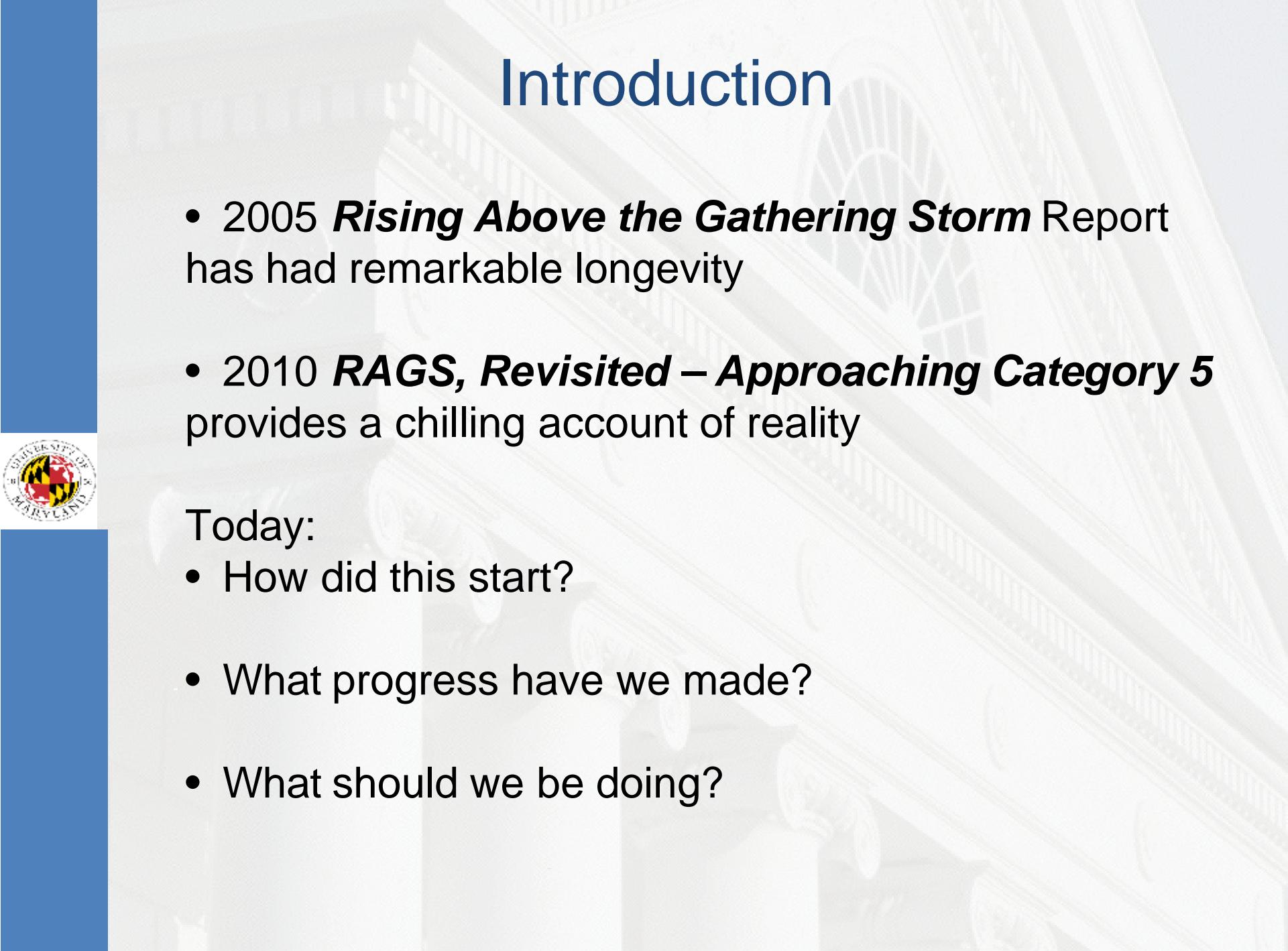
# Five Years After Rising Above the Gathering Storm

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Rising Above the Gather Storm: Development of Regional Innovation  
Environments

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# Introduction

- 2005 ***Rising Above the Gathering Storm*** Report has had remarkable longevity
- 2010 ***RAGS, Revisited – Approaching Category 5*** provides a chilling account of reality



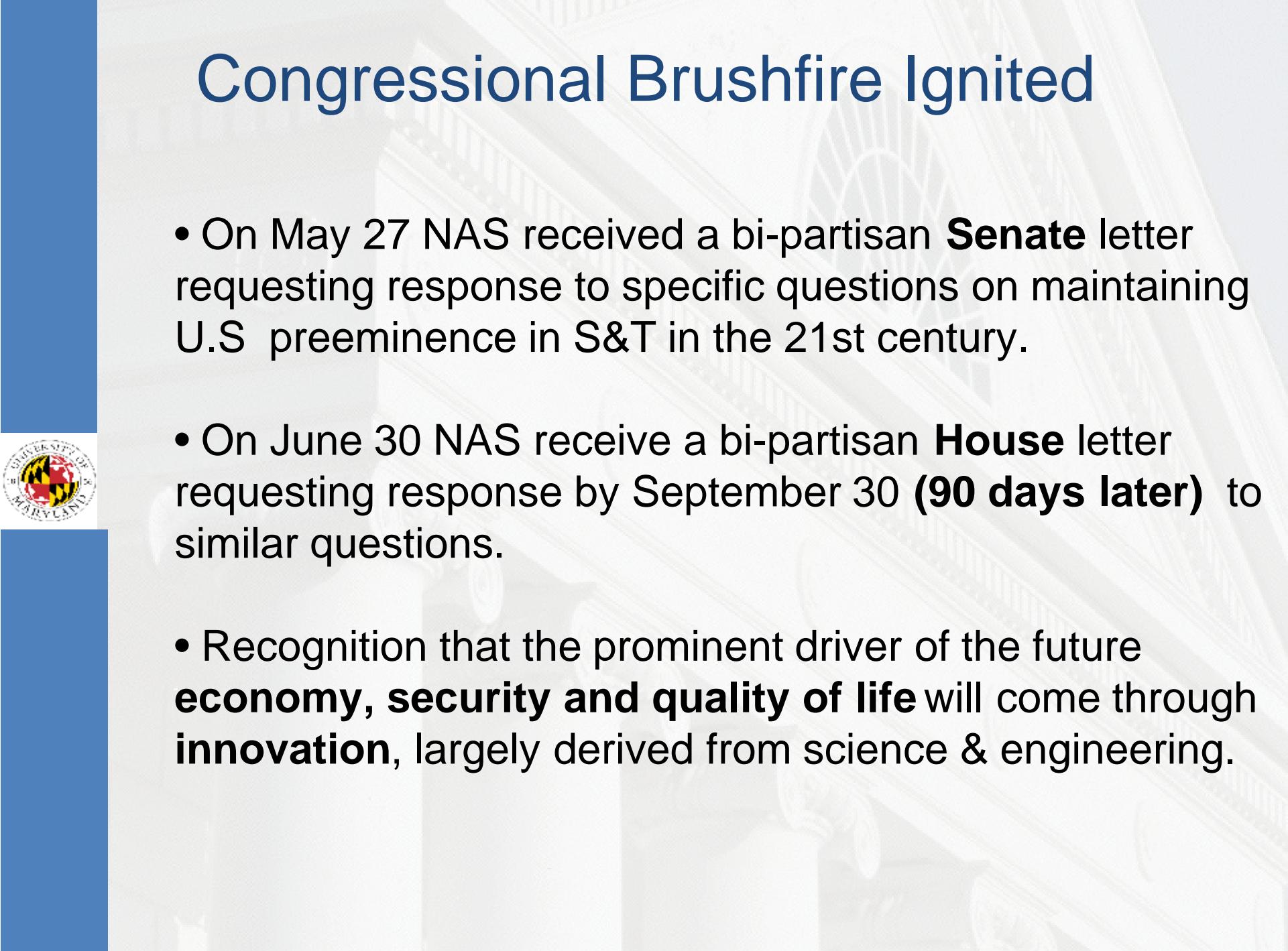
Today:

- How did this start?
- What progress have we made?
- What should we be doing?

# Sen. Lamar Alexander, May 11, 2005

- Closing Comments 2005 NAS Meeting
  - Titled remarks **“The Next Big Surprise”** -----
    - “in 10 or 20 years other countries may close the economic gap between themselves and the U.S.”
  - “The world will no longer allow 5% of the people to control 30% of the wealth.”
  - “We need to work together to ensure that our current prosperity is passed on to the next generation”





# Congressional Brushfire Ignited

- On May 27 NAS received a bi-partisan **Senate** letter requesting response to specific questions on maintaining U.S. preeminence in S&T in the 21st century.
- On June 30 NAS receive a bi-partisan **House** letter requesting response by September 30 (**90 days later**) to similar questions.
- Recognition that the prominent driver of the future **economy, security and quality of life** will come through **innovation**, largely derived from science & engineering.



# Response: NRC Committee

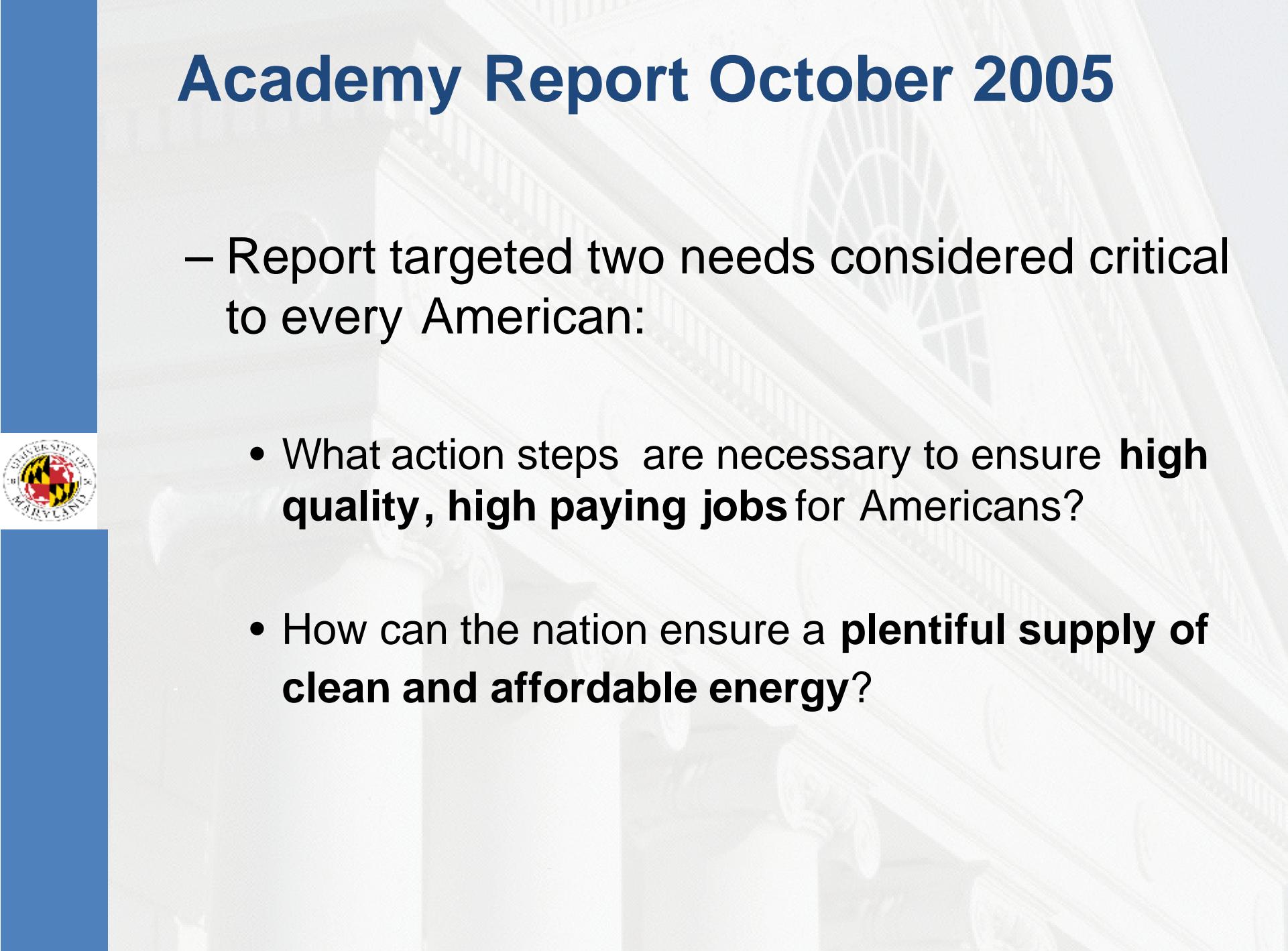
- RAGS Committee: 20 members:
  - Nobel laureates, national lab directors, university presidents, CEOs, former presidential appointees
- Norm Augustine, Chair
- SOT: What top ten actions of federal policy would **enhance the U.S. science and technology enterprise** so that the **United States can successfully compete, prosper, and be secure** in the global community of the 21st century?



# Targeted call-to-action by Federal Government

- Straight-forward set of prioritized recommendations with price tags and time lines
- Sen Alexander touted the report in the Senate, putting his credibility behind a report that didn't exist and a committee that had yet to meet, setting the stage for a media blitz following its presentation in October 2005
- **Problem: SOT extended beyond several different federal responsibilities reaching into State and local issues, like k-12 education and regional innovation, and even to the private sector.**





# Academy Report October 2005

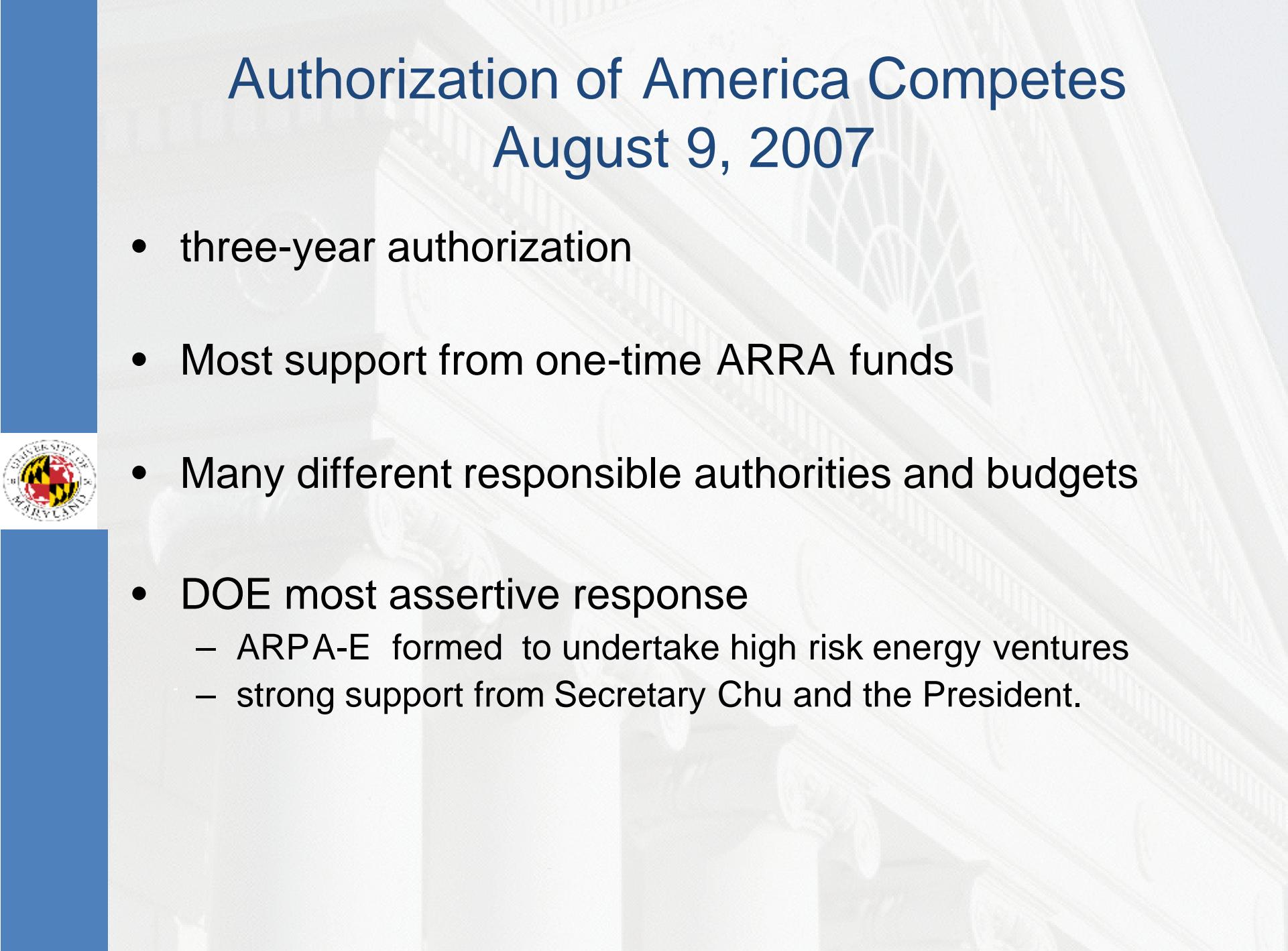
- Report targeted two needs considered critical to every American:
  - What action steps are necessary to ensure **high quality, high paying jobs** for Americans?
  - How can the nation ensure a **plentiful supply of clean and affordable energy**?



# 4 recommendations & 20 steps

- **K-12 Science and Mathematics Education: Highest Priority Recommendation**
  - Teachers and talent pool
- **Science and Engineering Research**
  - Basic research and transformational ideas
- **Best and Brightest**
  - Talent: American and Global
- **Incentives for Innovation**
  - THE Premier place in the world to Innovate, Invest and Create high-paying jobs





# Authorization of America Competes

## August 9, 2007

- three-year authorization
- Most support from one-time ARRA funds
- Many different responsible authorities and budgets
- DOE most assertive response
  - ARPA-E formed to undertake high risk energy ventures
  - strong support from Secretary Chu and the President.





# America Competes reauthorized on January 4, 2011

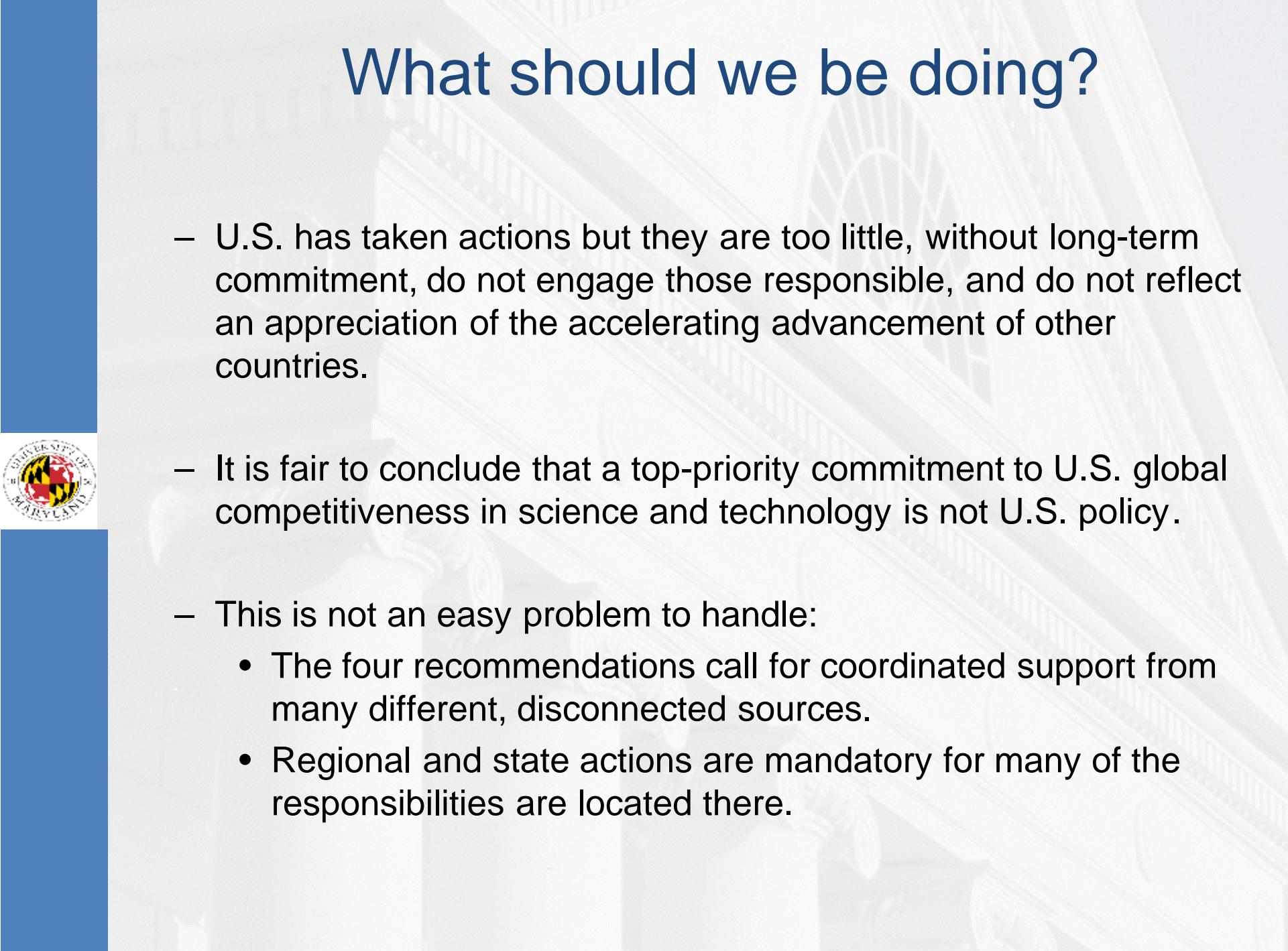
- Miraculously (House 228-130)
- Increasing science and research investments
- Strengthening STEM education
- Developing a national infrastructure for innovation
- Double the budgets at NSF, DOE-Science and NIST over 10-years (if funds are appropriated)





# What progress have we made? Across the board: less competitive.

- Rising Above the Gathering Storm committee unanimously concluded that the U.S. is less globally competitive today than it was in 2005.
- Slipped relatively backwards in all four recommendations.
- Earlier predictions underestimated the global rates of change.
  - China became the second largest economy in **2010**.
    - **2016 was predicted** in the RAGS volume (published 2006)
    - **2025 was predicted** in by *Global Trends 2025*: (published 2008)
  - International students are returning home because of more attractive working opportunities
    - a quality the U.S. always cherished and considered its greatest attractor.
  - Progress has been achieved in k-12 education, but our schools are less competitive



# What should we be doing?

- U.S. has taken actions but they are too little, without long-term commitment, do not engage those responsible, and do not reflect an appreciation of the accelerating advancement of other countries.
- It is fair to conclude that a top-priority commitment to U.S. global competitiveness in science and technology is not U.S. policy.
- This is not an easy problem to handle:
  - The four recommendations call for coordinated support from many different, disconnected sources.
  - Regional and state actions are mandatory for many of the responsibilities are located there.





# What should we be doing?

- An “Approaching Category 5” storm is here because our nation does not yet comprehend the seriousness of its problem – we look inward and do not see:
  - accelerating global change
  - increasing global competitiveness
  - competition for global talent
- Our nation does not recognize its declining global positions in:
  - human capital
  - knowledge capital and
  - premier location capital









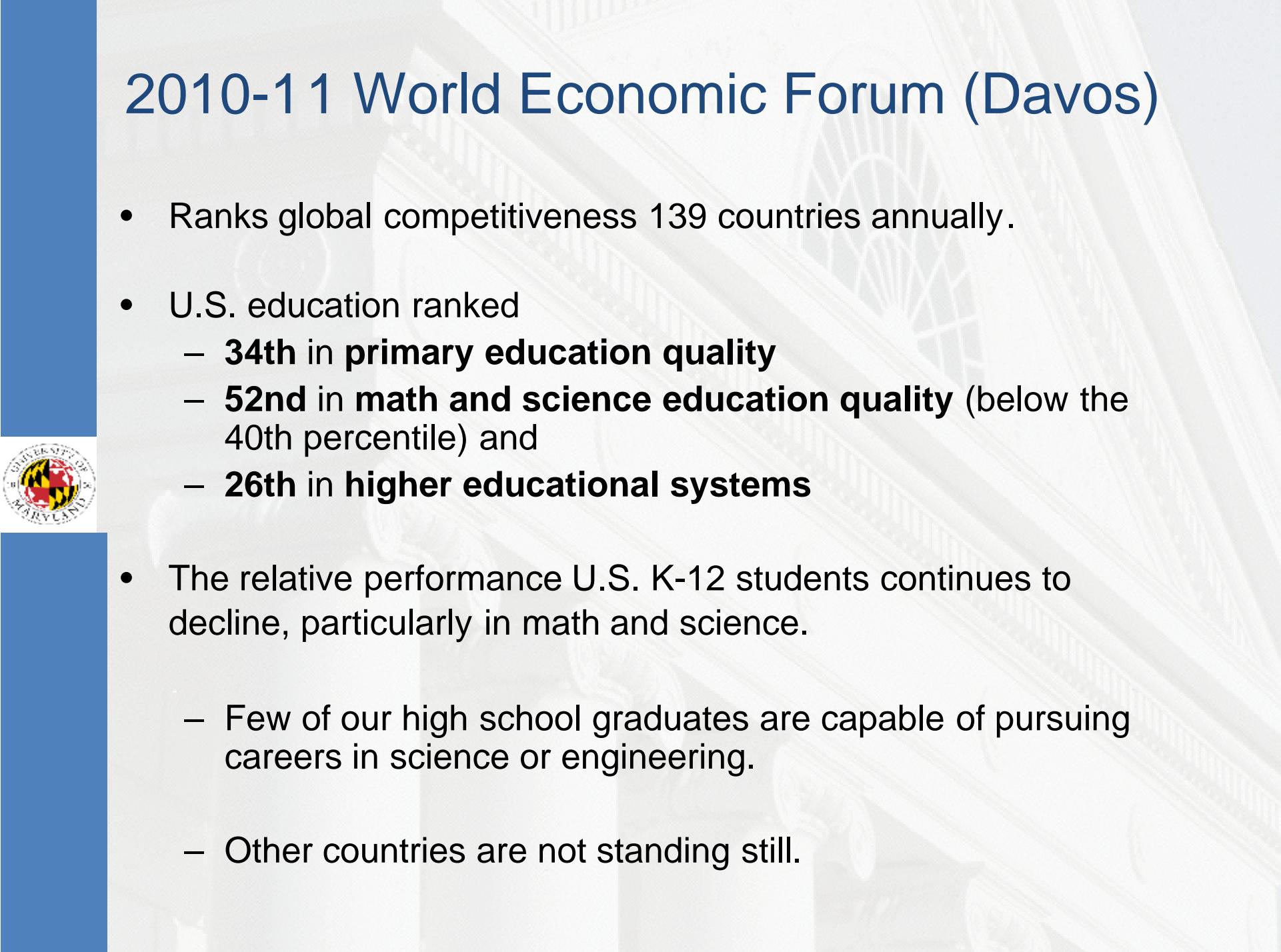
# How about Global Competitiveness?

- **U.S. global competitiveness** ranked **4th** in **2010-11 World Economic Forum, Davos**
  - **4<sup>th</sup>** of 139 countries overall
  - **2<sup>nd</sup>** in 2009-10 (until passed by Sweden and Korea)
  - **1<sup>st</sup>** in 2008-09 and earlier (until passed by Switzerland)
- **Global Innovation and competitiveness** ranked by the ITIF in Feb 2009 (Information technology and Innovation foundation)
  - U.S. rank **6<sup>th</sup>** of 39 behind Singapore, Sweden, Luxembourg, Denmark, and Korea
  - U.S. ranked **1<sup>st</sup>** in 1999.
    - U.S. score increased between 1999 and 2009 but not competitively with increases in other countries.

# 4 recommendations & 20 steps

- **K-12 Science and Mathematics Education: Highest Priority Recommendation**
  - Human Capital
- **Science and Engineering Research**
  - Knowledge Capital
- **Best and Brightest**
  - Human Capital
- **Incentives for Innovation**
  - Location, location, location

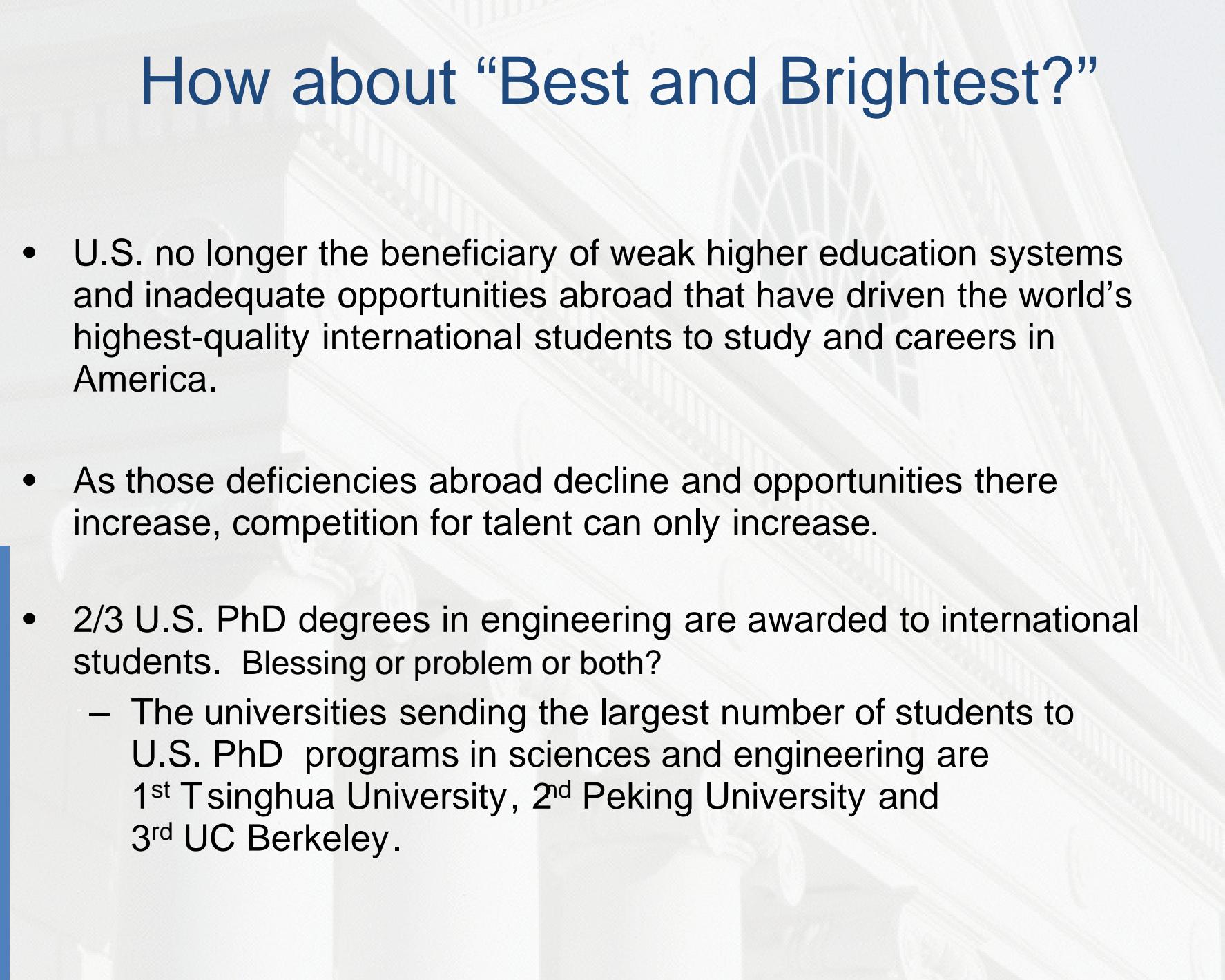




# 2010-11 World Economic Forum (Davos)

- Ranks global competitiveness 139 countries annually.
- U.S. education ranked
  - **34th in primary education quality**
  - **52nd in math and science education quality** (below the 40th percentile) and
  - **26th in higher educational systems**
- The relative performance U.S. K-12 students continues to decline, particularly in math and science.
  - Few of our high school graduates are capable of pursuing careers in science or engineering.
  - Other countries are not standing still.





# How about “Best and Brightest?”

- U.S. no longer the beneficiary of weak higher education systems and inadequate opportunities abroad that have driven the world’s highest-quality international students to study and careers in America.
- As those deficiencies abroad decline and opportunities there increase, competition for talent can only increase.
- 2/3 U.S. PhD degrees in engineering are awarded to international students. Blessing or problem or both?
  - The universities sending the largest number of students to U.S. PhD programs in sciences and engineering are 1<sup>st</sup> Tsinghua University, 2<sup>nd</sup> Peking University and 3<sup>rd</sup> UC Berkeley.





# How about “Incentives for Innovation”

- Desire to immigrate to the U.S. by skilled U.S. resident Chinese and Indian S&E workers was surveyed in April 2011 by the Kauffman Foundation
  - In 2009 the number of Chinese who returned to China increased 56% over 2008 (**64,600**)
  - in 2010 the number increased another 33% over 2009 to a total of **134,000**
  - Over 90% Chinese and 60% Indian returnees stated that economic opportunities at home were very important to their decision
  - Over 80% Chinese and 70% Indian returnees said opportunity to start a business was more favorable at home

# What progress have we made? Is the U.S. more competitive than 5 years ago?

- K-12 Science and Math: 2009 PISA
  - Performance Reading, Mathematics and Science evaluated student literacy
    - 34 OECD countries plus 41 others
  - U.S. ranked **34<sup>th</sup>** math (below OECD avg); **22<sup>nd</sup>** science and **17<sup>th</sup>** reading (at OECD avg)
  - Shanghai: scored **1<sup>st</sup>** in each subject and **1<sup>st</sup>** overall.
  - South Korea: **1<sup>st</sup>** OECD country, below avg per capita income
  - U.S.: avg OECD country; **1<sup>st</sup>** per capita income





# What progress have we made?

## Is the U.S. more competitive than 5 years ago?

- **Science and Engineering Research**
  - Federal support of research declined 60% over forty years - **1.92% GDP** in 1964 and **0.76% GDP** in 2004
- Federal support university research declining compared to other countries (ITIF, Atkinson and Stewart, May 2011)
  - 2008 **0.24% GDP** ranked the U.S. **22<sup>nd</sup> of 30** countries, below the **0.34% GDP** country avg
  - Sweden ranked highest **0.61% GDP**, 2.5 times the U.S. level
- Industrial support university research ranked the U.S. **21<sup>st</sup> of 30** at **0.020% GDP**.
  - Industry support declined 7% since 2000



# What progress have we made?

## Is the U.S. more competitive than 5 years ago?

- **Best and Brightest**
- Higher education globally is under great stress
- Everywhere higher education is in expansion mode
- New and reformed Universities are leaping out of the ground
- Some are associated with foreign universities, but many have significant resources, bold visions and excellent facilities.
- Talent is in great demand –The competition is fierce and can only get more intense.

