

UCCS



JILA





# Past Science Advisors



Early Science Advisors



Ed David  
Nixon



Frank Press  
Carter



Jay Keyworth  
Reagan



Allan Bromley  
GHW Bush



Jack Gibbons  
Clinton



Neal  
Clinton

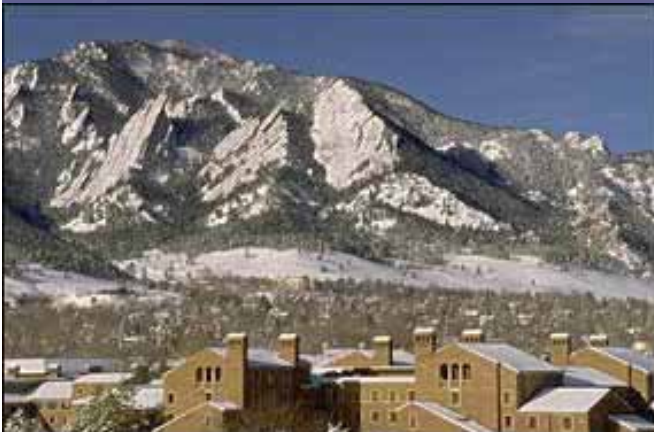


Jack Marburger  
GW Bush

# Threats to the future of U.S. Science and Technology

The University of Colorado  
Boulder, CO  
October 5, 2005

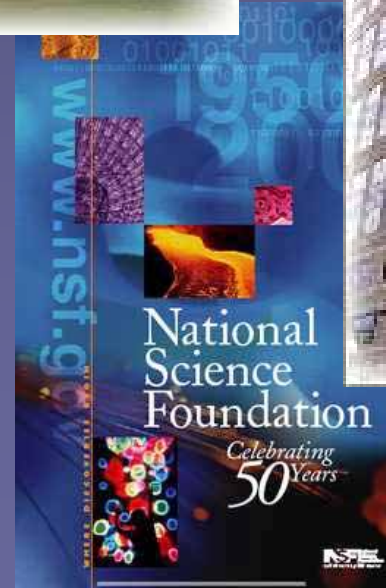
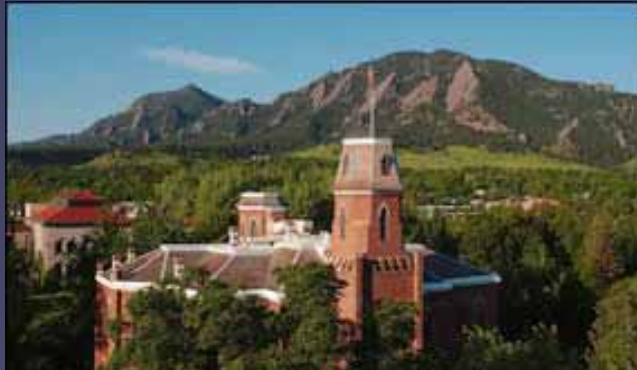
Neal Lane  
James A. Baker III Institute for Public Policy  
Department of Physics and Astronomy  
Rice University



## OUTLINE

- A personal journey
- How the White House works
- Four “threats” to science and technology and what a Science Advisor can do!

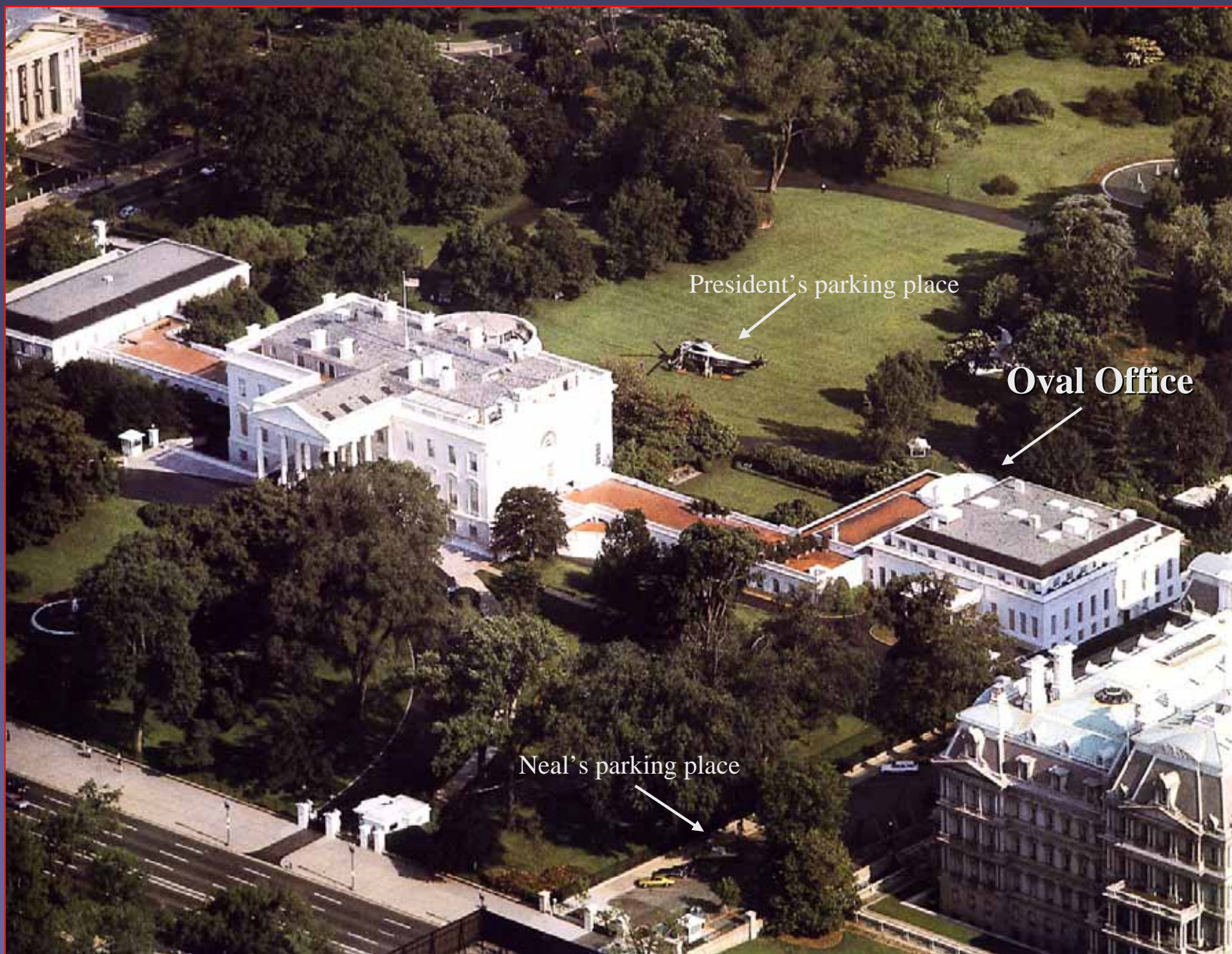




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“Neal, how much did you say we need to spend on nanotechnology?”



It's a team effort !



# Science and Technology in the U.S. Government

## The Executive Branch

with R&D agencies



U.S. President

Office of  
Management  
and Budget

**Science Advisor**  
Office of Science and  
Technology Policy

Other boards,  
councils, etc.

NSTC

## *Major Departments*

Homeland Security

Agriculture

Health and  
Human Services

NIH

Interior

USGS

Transportation

Defense

DARPA, ONR,  
AFOSR

Energy

NNSA

Commerce

NOAA  
NIST

## *Independent Agencies*



National  
Aeronautic  
and Space  
Administration

Environmental  
Protection  
Agency

Smithsonian  
Institution

Nuclear  
Regulatory  
Commission

Other  
agencies

# The Executive Branch

with R&D agencies



U.S. President

Science and Technology  
are important to most Federal  
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## Examples of Public Policy Issues that Relate to Science and Technology

- Advances in science, engineering, and technology (R&D budget)
- Emerging technologies - National Nanotechnology Initiative
- Energy production and consumption
- National and Homeland security and counter-terrorism
- Environment – air/water, climate change, clean-up
- Storage of spent nuclear fuel and high level radioactive waste
- Information technology, computing, internet
- Health – Human genome, proteomics, cloning, stem cells, AIDS
- International cooperation in S&T (e.g, Carnegie G-8 meetings)
- Education and the technical workforce
- Space program
- Food safety, plant biotechnology (GMO's)
- Policy on research misconduct
- Surprises !

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with R&D agencies



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One job of the Science Advisor  
is to coordinate S&T activities  
across federal government

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Other  
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with R&D agencies



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Including the White House

Domestic Policy Council  
National Economic Council  
National Security Council  
Council on Environmental Quality  
Office of Management and Budget  
Office of Vice President





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## FOUR THREATS TO U.S. SCIENCE AND TECHNOLOGY

- MONEY TO FUND SCIENCE
- PEOPLE TO DO SCIENCE
- PUBLIC UNDERSTANDING OF SCIENCE
- RESPECT FOR THE INTEGRITY OF SCIENCE

## FOUR THREATS TO U.S. SCIENCE AND TECHNOLOGY

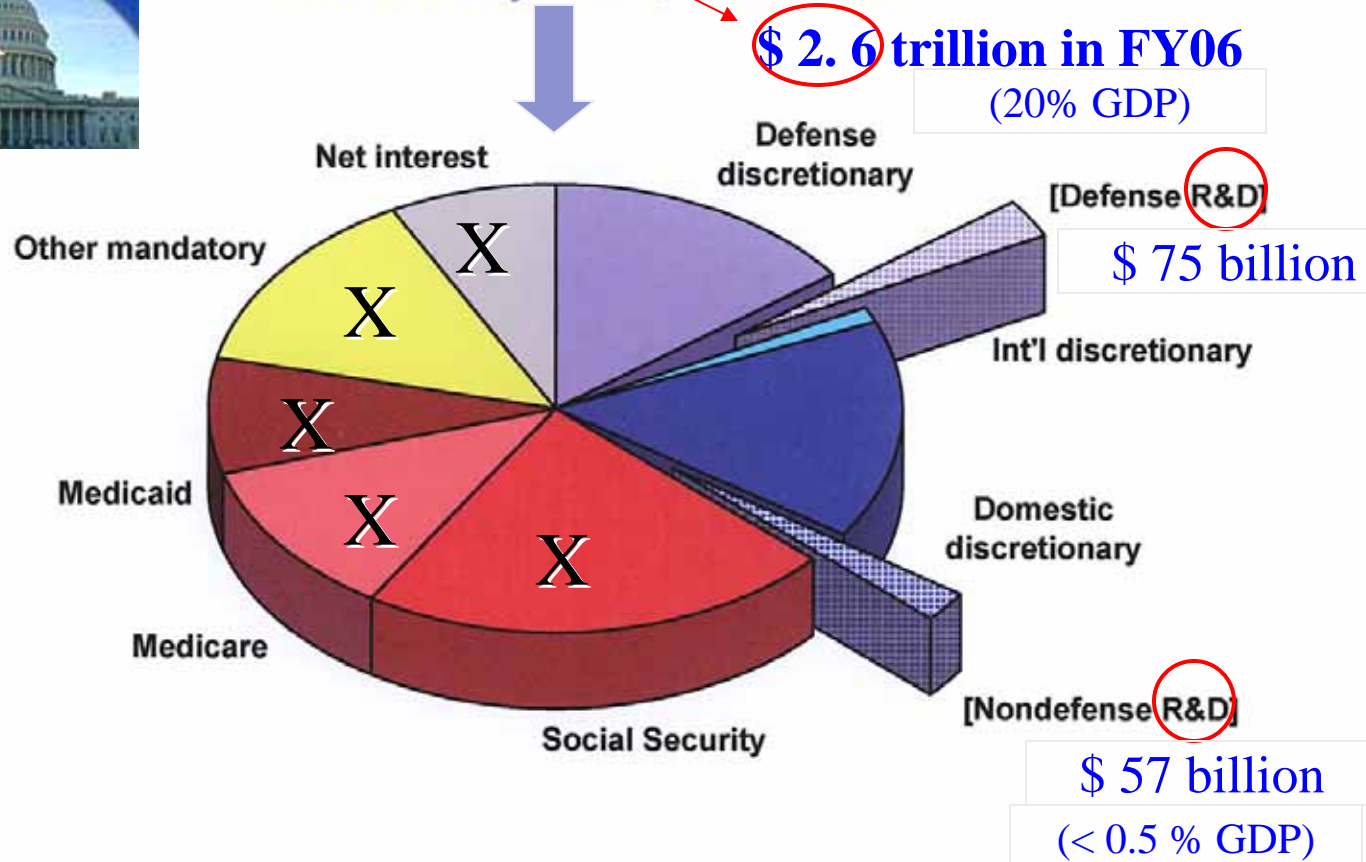
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# Research will get Squeezed in Future Budgets

Composition of the Proposed FY 2004 Budget  
Total Outlays = \$2,229 billion



Note: Projected Unified deficit is \$307 billion.

Source: AAAS, based on *Budget of the United States Government FY 2004*.  
FEB. '03 © 2003 AAAS

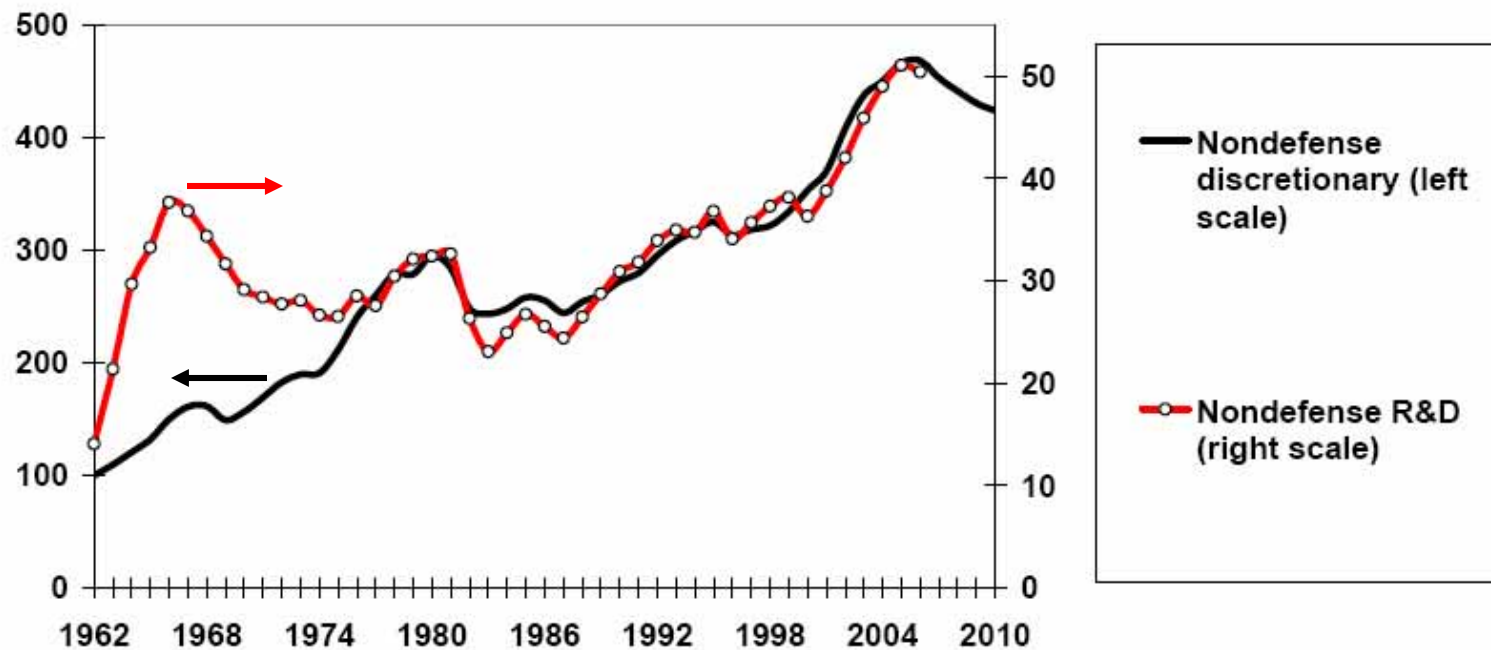


AMERICAN ASSOCIATION FOR THE  
ADVANCEMENT OF SCIENCE

# Outyear budget projections look grim!

## R&D and Discretionary Outlays (Nondefense), 1962-2010

in billions of constant FY 2005 dollars



## FOUR THREATS TO U.S. SCIENCE AND TECHNOLOGY

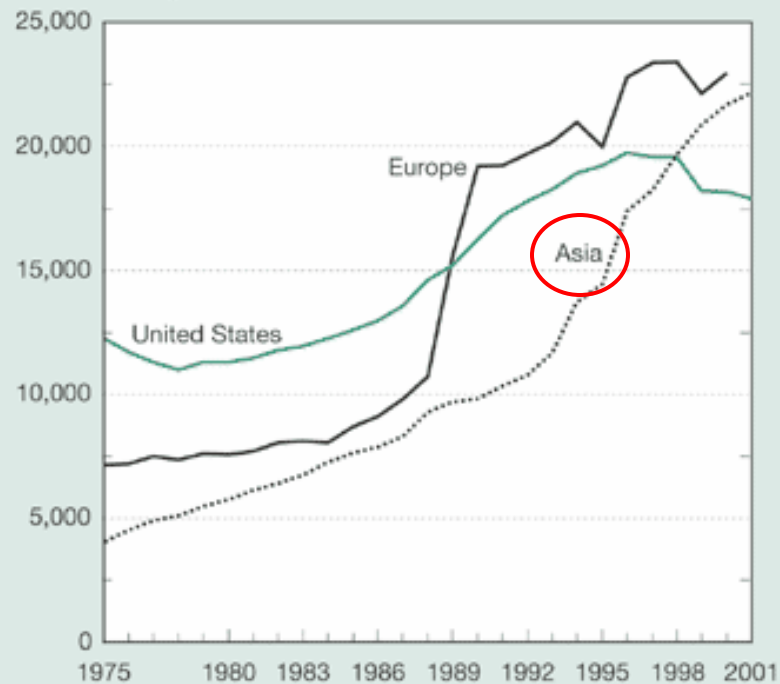
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Talented students have been coming from abroad to study science and engineering- but that trend may not continue !

Figure 2-38  
NS&E doctoral **degrees** in United States, Europe, and Asia: 1975–2001

Number of degrees



NS&E natural sciences and engineering

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

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# What Do the American People Know?

(from survey done for NSF's "SE Indicators" \*)

- Plants produce oxygen
  - Continents have been moving for millions of years
  - Light travels faster than sound
  - Earth goes around the sun
  - Not all radioactivity is manmade
- >70%
- Earliest humans did not live with the dinosaurs
  - Earth takes one year to go around the sun
  - Electrons are smaller than atoms
  - Antibiotics do not kill viruses
  - Lasers do not work by focusing sound waves
- 50%

\* From NSF (National Science Board) Science and Engineering Indicators 2002, chapt. 7



# What Do the American People Believe?

(from various polls reported in NSF's "SE Indicators" \*)

- Psychic or spiritual healing - mind over body ( > 50%)
  - ESP (50%)
  - Haunted houses (>40%)
  - Ghosts (40%)
  - ET visits ( >30%)
  - Astrology is scientific or "sort of" (40%)
  - Evolution in schools
    - teach only evolution (20%)
    - teach with creationism (> 45%)
    - do not teach evolution at all (16%)
- } > 60%

\* From NSF (National Science Board) Science and Engineering Indicators 2002, chapt. 7

## FOUR THREATS TO U.S. SCIENCE AND TECHNOLOGY

- MONEY TO FUND SCIENCE
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# RESPECT FOR THE INTEGRITY OF SCIENCE

- The integrity of U.S. science has always been non-partisan



*"Science, like any field of endeavor, relies on freedom of inquiry; and one of the hallmarks of that freedom is objectivity. Now, more than ever, on issues ranging from climate change to AIDS research to genetic engineering to food additives, government relies on the impartial perspective of science for guidance."*

President George H.W. Bush, April 23, 1990



- But something has changed:



**A Statement** – “Restoring Scientific Integrity in Policymaking”, calling attention to misrepresentation and misuse of science by some in the current Administration, was signed by 62 scientists, including many Nobel Laureates.



Union of Concerned Scientists  
Citizens and Scientists for Environmental Solutions



## FOUR THREATS TO U.S. SCIENCE AND TECHNOLOGY

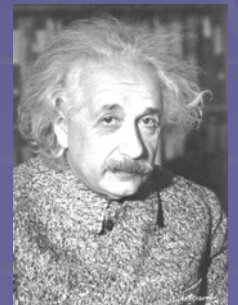
- MONEY TO FUND SCIENCE
- PEOPLE TO DO SCIENCE
- PUBLIC UNDERSTANDING OF SCIENCE ?
- RESPECT FOR THE INTEGRITY OF SCIENCE

→ Especially challenging in a post-9/11 world ←

## Einstein had advice for scientists:

"Concern for man and his fate must always form the chief interest of all technical endeavors...in order that the creations of our mind shall be a blessing and not a curse to mankind. Never forget this in the midst of your diagrams and equations."

(Albert Einstein, speech at Cal Tech, February 1931)



## Einstein had advice for all of us:

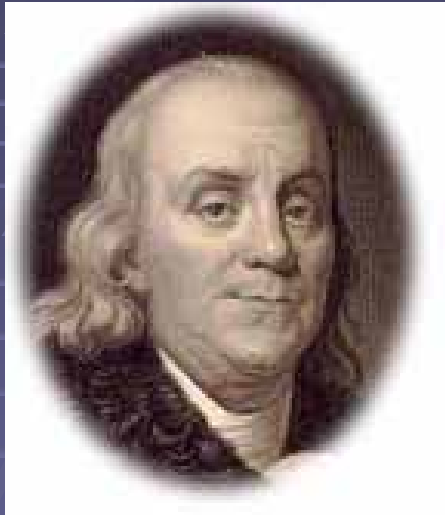
"Everything that is really great and inspiring is created by the individual who can labor in freedom."

(Albert Einstein , commencement Address to the graduates of Swarthmore, 1938 and quoted in *Out of My Later Years* , 1950)

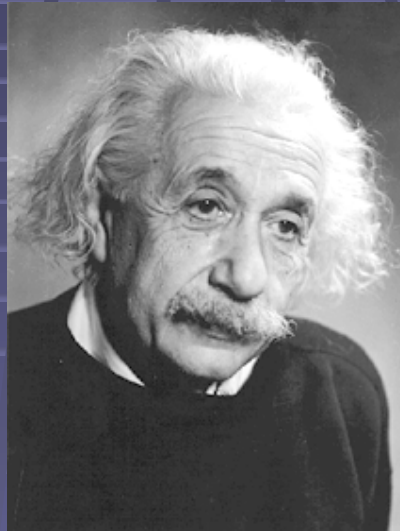
Becomes a citizen  
of the United States -  
a true "Patriot Act"



# Three American "Civic Scientists"



Benjamin Franklin  
1706-1790



Albert Einstein  
1879-1955



Allan Bromley  
1926-2005





Thank you !

