

# Science & Technology Policy in the Obama Administration: A Progress Report

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**“We will restore science to  
its rightful place...”**

Barack Obama, January 20, 2009



## The place of science on the agenda

S&T are central to meeting key challenges of

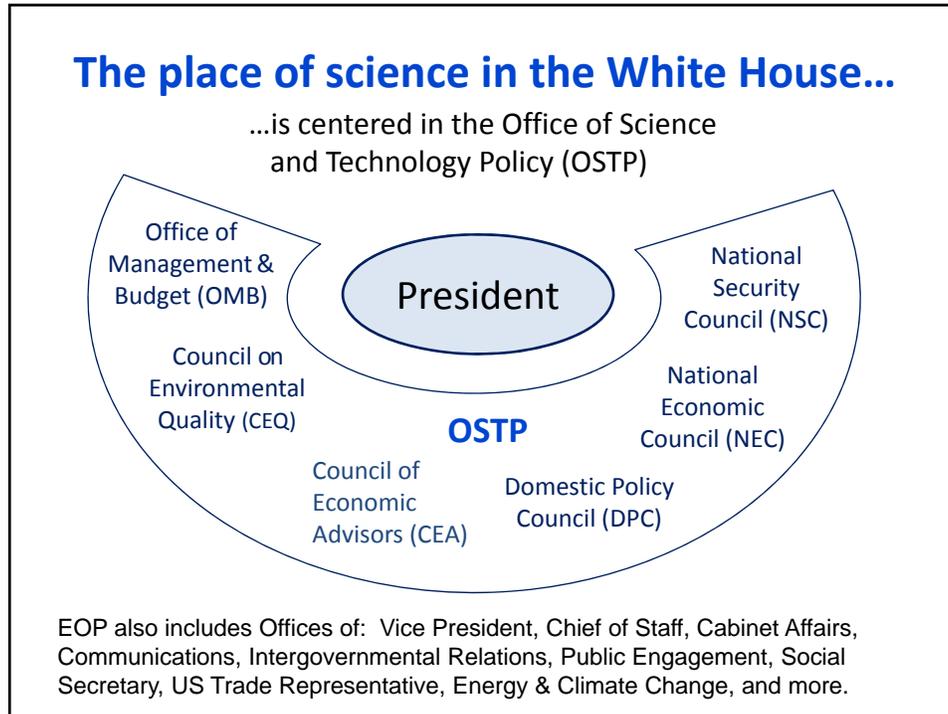
- economic development & sustainable growth
- biomedicine & health-care delivery
- clean, safe, reliable, & affordable energy
- climate-change mitigation & adaptation
- competing uses of land & water
- the health & productivity of the oceans
- national & homeland security

as well as lifting the human spirit through discovery, invention, & expanded understanding.



“Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before.”

- At the National Academy of Sciences, April 27, 2009



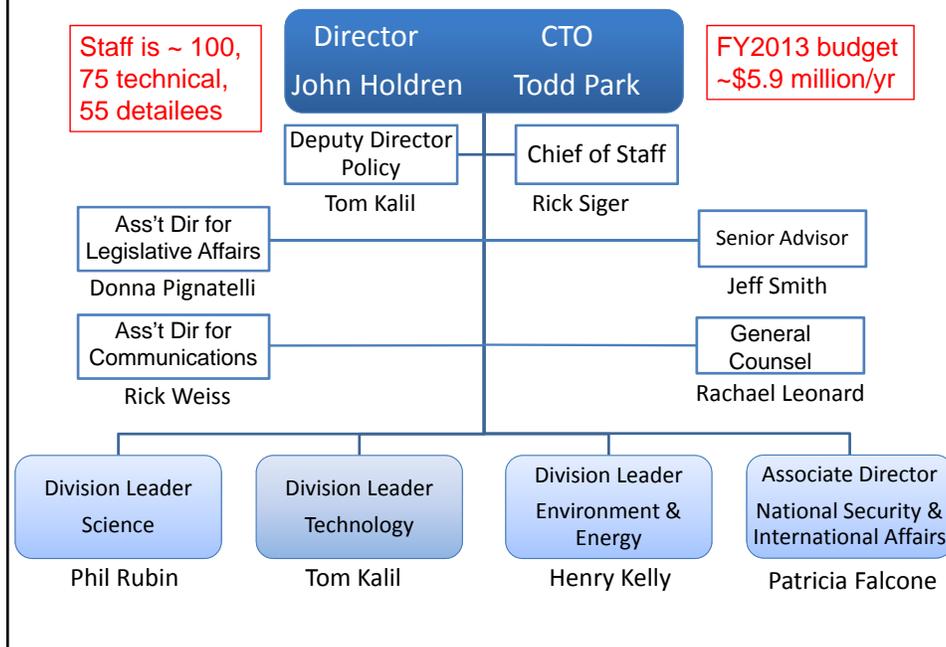
### Three dimensions of OSTP's responsibilities

- Science and technology for policy
  - Timely, independent, objective advice for the President about S&T dimensions of all policy issues with which he is concerned
- Policy for science and technology
  - Analysis, recommendations, & coordination with other White House offices and Executive Branch departments & agencies on R&D budgets, STEM education and workforce issues, interagency S&T initiatives, broadband, open government, scientific integrity...
- Strengthening S&T policy mechanisms

## OSTP's specific responsibilities also include...

- providing White House liaison and oversight for the NSF and NASA;
- carrying out a range of functions in support of National Security and Emergency Preparedness Communications
- coordinating & overseeing US cooperation in S&T with other countries

## OSTP structure



## Entities managed by OSTP

- National Science & Technology Council (NSTC)
  - Deputy secretaries & undersecretaries of cabinet departments with S&T missions, plus heads of NSF, NIH, NASA, NOAA, NIST, EPA, USGS, CDC
  - Nominally chaired by the President; chaired in practice by the OSTP Director / Science Advisor; administered by OSTP
  - Five standing committees: Science; Technology; Environment, Natural Resources, and Sustainability; National and Homeland Security; and STEM Education
  - Coordinates S&T activities that cross agency boundaries, including such major initiatives as the US Global Change Research Program, the National Climate Assessment, the National Nanotechnology Initiative, and the Networking and Information Technology R&D program

## OSTP-managed entities (continued)

- National Oceans Council (NOC, jointly with CEQ)
  - Responsible for implementing the National Policy on Oceans, Coasts, and the Great Lakes
- Emerging Technologies Interagency Policy Coordinating Committee (ETIPCC, jointly with OMB/OIRA & USTR)
  - Addresses the intersection of science & regulation around infotech, biotech, and nanotech
- Six ministerial-level Joint Commissions on S&T Cooperation
  - With Brazil, China, India, Japan, Republic of Korea, Russia
- S&T Working Group, US-Russia Presidential Commission
- US-China Dialogue on Innovation Policy

## OSTP-managed entities (continued)

- President's Council of Advisors on Science and Technology (PCAST)
  - A PCAST or its equivalent has existed under every U.S. President since Eisenhower.
  - The current PCAST has 21 members, of which 20, including one Co-Chair, are part-time, uncompensated Special Government Employees, appointed by the President.
  - The 21<sup>st</sup> member and other Co-Chair is the Assistant to the President for S&T / OSTP Director.
  - PCAST's function is to provide an additional high-caliber source of S&T advice for the President and to help link OSTP to the outside S&T community.
  - Administrative support for PCAST is provided by an Executive Director and two deputies housed in OSTP.

## The members of the 1<sup>st</sup>-Term Obama PCAST



## What has PCAST done under Obama?

- PCAST studies requested and completed in the 1<sup>st</sup> term:
  - The science and technology of 2009-H1N1 influenza
  - Reengineering the influenza vaccine production enterprise
  - Assessment of the National Nanotechnology Initiative (NNI)
  - K-12 STEM education
  - Accelerating the Pace of Change in Energy Technologies
  - Realizing the Full Potential of Health IT to Improve Healthcare
  - Networking and Information Technology R&D
  - Ensuring American leadership in advanced manufacturing
  - Biodiversity preservation and ecosystem sustainability
  - Strengthening STEM teaching in the first two college years
  - 2<sup>nd</sup> NNI assessment
  - The Advanced Manufacturing Partnership (AMP)
  - Managing government-owned spectrum for economic growth
  - Accelerating drug development and approval



President Obama has embraced a high proportion of PCAST's recommendations.

## **What he's done: PCAST studies implemented**

PCAST recommendations embodied in the 2010-2014 budgets:

- Prepare an additional 100,000 K-12 STEM teachers by the end of the decade; launch a STEM Master Teacher Corps
- Launch a new Advanced Research Projects Agency – Education (ARPA-ED)
- Initiate improvements to influenza-vaccine manufacturing to shorten production timeframe
- Conduct a DOE Quadrennial Technology Review to assess energy options; lay groundwork for interagency Quadrennial Energy Assessment
- Accelerate adoption of Electronic Health Records; develop standards for health-information exchange over the internet
- Expand research to foster the next revolution in IT, to help transform healthcare, energy efficiency, education, and transportation
- Launch a network of advanced-manufacturing centers

**What else has President Obama  
done to restore science  
to “its rightful place”?**

## What he's done

- Presidential appointments: 5 Nobel Laureates in science, another 25+ members of the National Academies, a CTO and CIO for the Administration for the first time.
- The Presidential pulpit: He's talked more about how and why science, technology, and innovation matter than any previous president.
- Presidential events: three White House Science Fairs; astronomy night for kids on the White House lawn; innumerable celebrations of US Nobel Laureates, other science & engineering achievers, outstanding STEM teachers and mentors, astronauts; numerous visits to government, university, and industry labs.



“So we will continue to pursue advances in science and engineering, in infrastructure and innovation, in education and environmental protection...”  
 – Back at the National Academy of Sciences, April 29, 2013

## What he's done: Presidential events



Astronomy Night for Kids on the South Lawn, October 2009

Visit to laboratories at the National Institutes of Health, September, 2009



## Presidential events (continued)

First White House Science Fair, October 2010



Dropping by NYC Science Fair, March 2011



**“Whenever I get a chance to go to a science fair, I go.”**

- President Obama at NYC Science and Engineering Fair, March 2011

## What he's done: The American Innovation Strategy

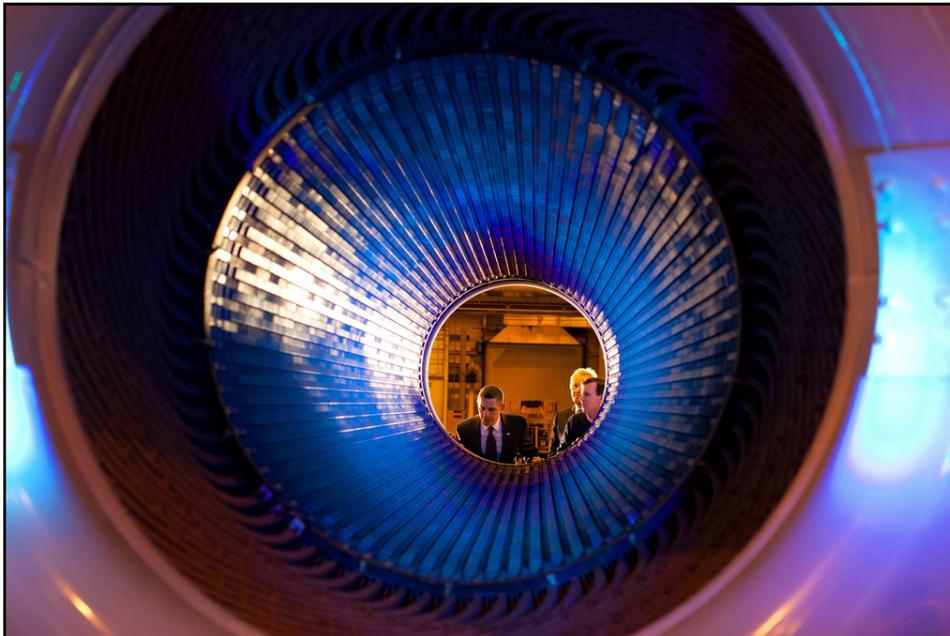
- Invest in the building blocks of innovation
  - educate Americans with 21<sup>st</sup> century skills
  - strengthen leadership in fundamental research
  - build a leading physical infrastructure
  - develop an advanced IT “ecosystem”
- Promote market-based innovation
  - accelerate business innovation w R&E tax credit
  - encourage innovation-based entrepreneurship
  - grow investments in ingenuity w effective IPR policy
  - promote innovative, open, competitive markets

## The American Innovation Strategy (continued)

- Catalyze breakthroughs for national priorities
  - unleash a clean-energy revolution
  - accelerate biotech, nanotech, & advanced mfg
  - develop breakthroughs in space applications
  - drive breakthroughs in health-care technology
  - create a leap forward in educational technologies
- These efforts include increased support for...
  - scientists & engineers early in their careers
  - more engagement of girls/women in STEM fields
  - commercializing university research
  - multidisciplinary & high-risk/high-return research

## What he's done: public-private partnerships

- Firms fund 67% of US R&D, perform 72%.
- Pres Obama has proposed to make the Research & Experimentation tax credit permanent.
- Recovery Act helped start & grow clean-energy businesses across the country.
- Small Business Innovation Research (SBIR) initiative provides funding from diverse agencies for many avenues of innovation.
- Small Business Lending bill (signed 9-27-10) increases loans & cuts taxes for entrepreneurs.
- DOE's energy-innovation hubs link national labs, universities, and industry.



President visiting GE Schenectady, 21 January 2011

### Partnerships w the private sector (continued)

- Launched Jan 2011, Startup America bolsters entrepreneurship by increasing success of high-growth startups that create economic growth and quality jobs
  - accelerates the transfer of new ideas from labs to the market
  - creates new opportunities for small business financing
  - improves regulatory environment for starting and growing new businesses
  - spawned the nonprofit Startup America Partnership, whose private-sector CEOs have raised \$1B to help startups
- Jumpstart Our Business Startups (JOBS) Act — signed Spring 2012 — allows crowdfunding, expands mini-public offerings, creates “IPO on-ramp”.

### Partnerships w the private sector (continued)

- The Wireless Innovation and Infrastructure Initiative (Wi3) is an ambitious blueprint to connect 98 percent of the US population with 4G wireless.
- The Advanced Manufacturing Partnership, linking research universities, high-tech companies, and the Federal government, is investing in emerging technologies to create high-quality manufacturing jobs. The President’s National Robotics Initiative and Materials Genome Initiative reinforce this goal.
- NSF’s new Innovation Corps is getting scientists out of the lab to start new companies.

## Harnessing private innovation: prizes and challenges

- Prizes & challenges harness the ingenuity that lurks in individuals, schools, firms all across the society.
- Sponsors/organizers set an ambitious goal without prescribing the best means to achieve it, pay only for results.
- The Administration's new [challenge.gov](http://challenge.gov) website provides 1-stop shopping for innovators looking for opportunities.

## Prizes and challenges (continued)

- The Progressive Insurance / DOE Automotive X-Prize illustrates the leverage in this approach.
  - \$10M in prizes for super-fuel-efficient passenger vehicles (over 100 miles per gallon of gasoline equivalent) called forth \$100M+ in investments in innovation by competitors.
  - Winning designs achieved up to 200 MPGe.

## Automotive X-Prize awards, September 16, 2010



## Initiatives: STEM-education

- Increased collaboration of White House (OSTP, DPC) with Dept of Education & NSF, HHS, DoD, DOE, NASA
- New national goals: moving American kids from middle to top of internat'l rankings on science & math tests, increasing American proportion of college graduates to 1st in the world by 2020.
- \$4.4 billion "Race to the Top" in the ARRA included preference to states whose proposals emphasize innovation in STEM education.
- "Educate to Innovate" program (11-09) for K-12 STEM education w \$700+ million in private-sector & philanthropic support; "Change the Equation" added Sept 2010 w 100+ high-tech CEOs
- Launched the STEM Master Teacher Corps (\$100M in FY2012, aiming for \$1B in FY2013) to reward & empower our best STEM teachers

## Honoring STEM teachers



President Obama honoring educators who have shown excellence in teaching and mentoring students in mathematics and science at an awards ceremony at the White House, January 6, 2010.

## More initiatives: energy & environment

- \$80 billion for clean & efficient energy in the Recovery Act
- funding for Advanced Research Projects Agency – Energy (ARPA-E) and six new Energy Innovation Hubs
- first-ever fuel-economy/ $\text{CO}_2$  tailpipe standards for light-duty vehicles, plus fuel-economy standards for trucks
- interagency task force led by OSTP, CEQ, NOAA to coordinate of govt's climate-adaptation activities
- re-invigoration of US Global Change Research Program
- new National Oceans Policy & National Oceans Council

## President Obama signing the National Oceans Policy Executive Order (19 July 2010)



### More initiatives: infotech & innovation

- Big Data: managing & manipulating large datasets for new insights and applications
- US Ignite: facilitation for high-speed broadband and new apps underpinning economic growth
- Presidential Innovation Fellows: 1<sup>st</sup> cohort of 18 selected from 700 applicants to come to DC to work in teams for 6 months on IT-linked innovation challenges
- Open Government : pathways on the web for public participation
- Data.gov: making gov't datasets available in support of innovation, entrepreneurship

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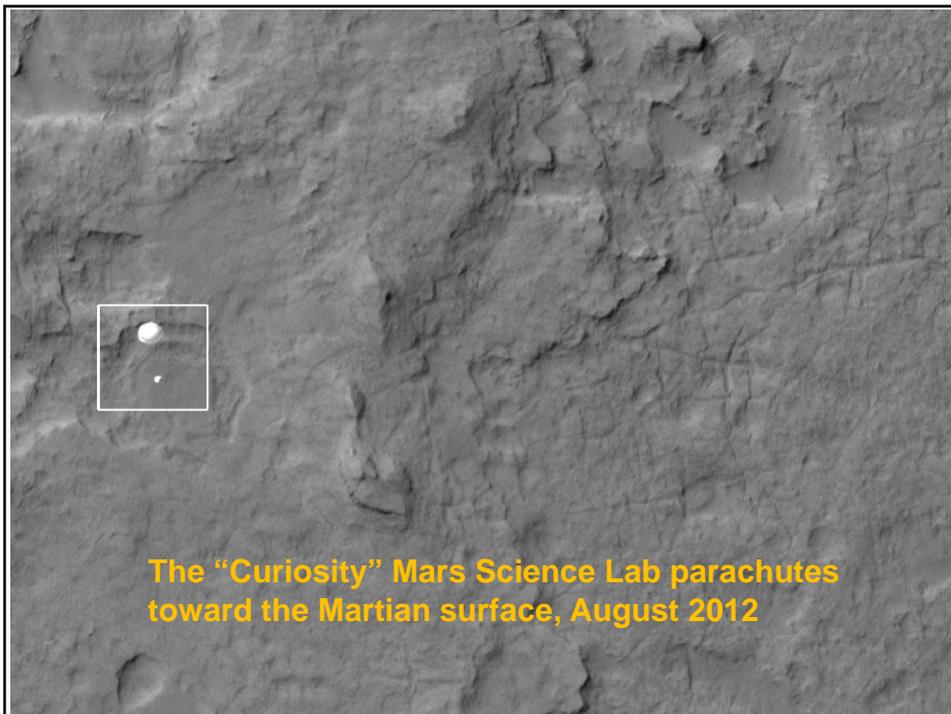
View our government at work and find opportunities to participate.

## More initiatives: a course correction for NASA

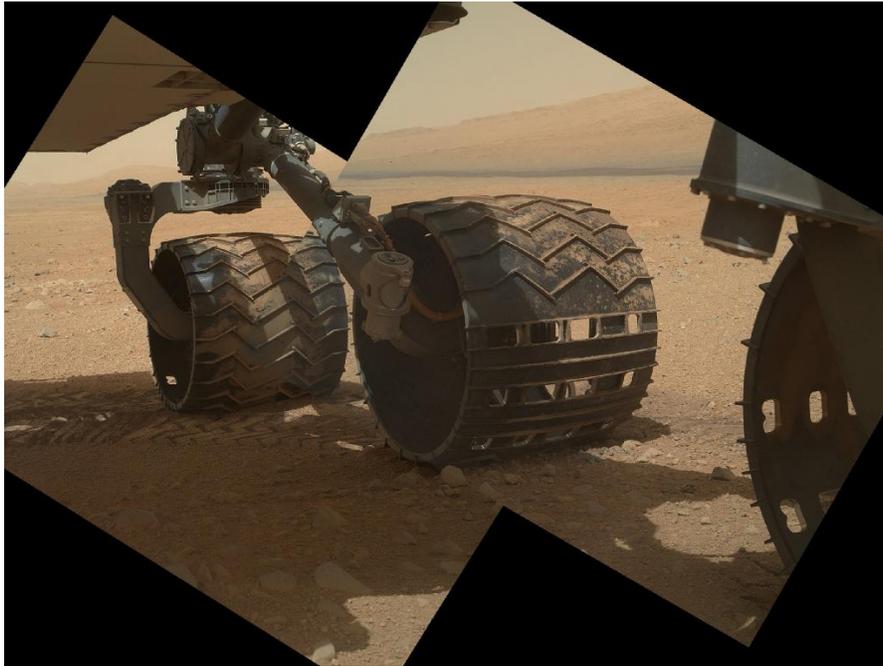
- The NASA we inherited
  - “Constellation” human-exploration program hopelessly behind schedule & over budget
  - NASA science, technology, robotic missions, telescopes, Earth observation, aeronautics, and the ISS all imperiled by Constellation’s overruns
- Obama’s re-balanced space policy
  - “Constellation” slimmed down & retargeted, emphasizing visits to a near-Earth asteroid and Mars
  - commercial crew/cargo encouraged for low Earth orbit
  - ISS operation extended to 2020 or beyond
  - support for neglected/imperiled programs restored



**SpaceX Corporation's Dragon capsule docks w the ISS, May 2012**



**The "Curiosity" Mars Science Lab parachutes toward the Martian surface, August 2012**



Curiosity on the Martian surface (self-portrait)

### Initiatives: International S&T cooperation

- Reviving & strengthening the high-level Joint Commission Meetings on S&T cooperation with China, India, Brazil, Japan, S Korea, Russia
- Nurturing the strong S&T cooperation that has long existed with the EU, Canada, Australia, NZ...
- Convening the Multilateral Economic Forum, US-China S&ED, & US-Russia Presidential Commission with a strong S&T focus
- Streamlining the visa procedures that apply to visiting scientists & technologists
- Making S&T the centerpiece of USAID development strategy



## What he's done: Federal S&T budgets

- Huge boost for S&T in the Recovery Act.
- S&T investment goals: double the budgets of 3 basic science agencies; make the Research & Experimentation Tax Credit permanent; lift public + private investment in R&D to  $\geq 3\%$  of GDP.
- The President's 2010, 2011, and 2012 Budgets would have put us on track to meet the goals.
- There were setbacks in 2011 & 2012 appropriations because of Budget Control Act spending caps.
- Despite setbacks, S&T fared better in 2011 and 2012 appropriations than most other sectors.

### R&D in the President's FY14 Budget

Budget authority in billions of current dollars	FY12 actual	FY14 proposed	percent change
Total R&D	140.9	142.8	+1.3%
<i>defense</i>	77.2	73.2	-5.2%
<i>nondefense</i>	63.7	69.6	+9.2%
Basic research	31.7	33.2	+4.5%
<i>defense</i>	2.1	2.2	+5.9%
<i>nondefense</i>	29.7	31.0	+4.4%
Applied research	31.6	35.0	+10.6%
<i>defense</i>	7.1	7.4	+4.1%
<i>nondefense</i>	24.6	27.6	+12.4%

### R&D in the President's FY14 Budget (continued)

Some highlights:

- \$1.4 billion at DHS (+186%)
- \$733 million at NOAA (+28%)
- \$754 million in the NIST labs (+21%)
- \$12.7 billion at DOE (+18%)
- \$1.2 billion at USGS (+9%)
- \$7.6 billion at NSF (+8.4%)
- \$2.7 billion in the USGCRP (+6.0%)

## S&T priorities for the President's 2<sup>nd</sup> term

- S&T for the economy: advancing economic recovery and job creation through S&T-based innovation to drive advanced manufacturing and new/improved products
- S&T for biomedicine and health: helping to implement the Affordable Care Act so as to get better healthcare outcomes for more Americans at lower costs
- S&T for energy and climate: advancing the coupled agendas of clean, efficient, reliable, affordable energy and climate-change mitigation/preparedness/resilience
- S&T for open government: using information science & technology to improve access to government data & services and increase public participation in government
- STEM education: strengthening the next generation of discoverers, innovators, workers, and citizens

## The challenges ahead

- Sustaining support for S&T under budget cuts
    - Particularly difficult will be sustaining support for...
    - NASA (JWST, advanced technology)
    - NOAA (polar-orbiting satellites, climate service),
    - DOE (CO<sub>2</sub> capture, fusion)
    - NSF (basic research, social science)
    - USDA (peer-reviewed agricultural science)
    - EPA & FDA (regulatory science)
    - USGCRP (climate science, sustainability science)
    - international cooperation in S&T
- NIH funding is less contentious but still hard to increase in percentage terms because it's already so large.

## The challenges ahead (continued)

- Accelerating translation of scientific & engineering advances into economic and social benefits through closer public-private-academic partnerships
- Advancing a coherent energy-climate policy with increased public & private investments in both mitigation and adaptation
- Addressing systemic weaknesses in STEM-ed weak teacher competence in K-12, inertia w respect to adopting more effective methods at college level
- Getting key messages across why science & engineering matter (to economy, health, environment, security), how science works



<http://www.ostp.gov>