Protecting National Security Innovation

Arun Seraphin

Assistant Director for Defense Programs

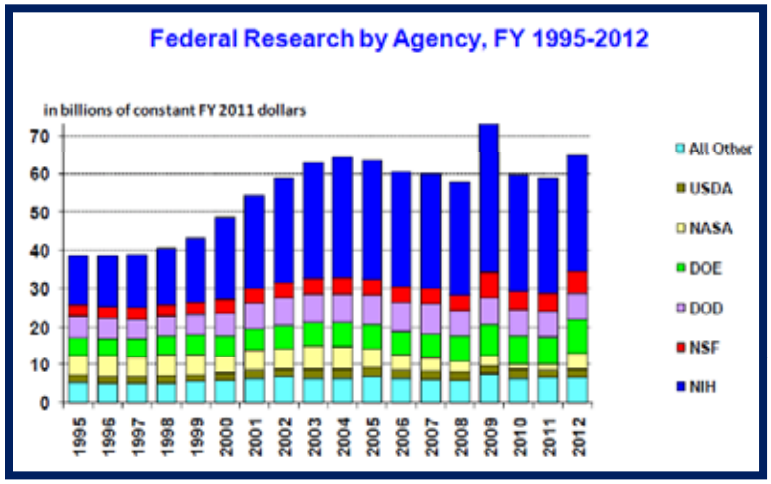
White House Office of Science and Technology Policy

November 1, 2011

Outline

- OSTP: Who are we?
- Why Invest in S&T
- OSTP Initiatives to Support the Labs
- Questions

OSTP: two major responsibilities



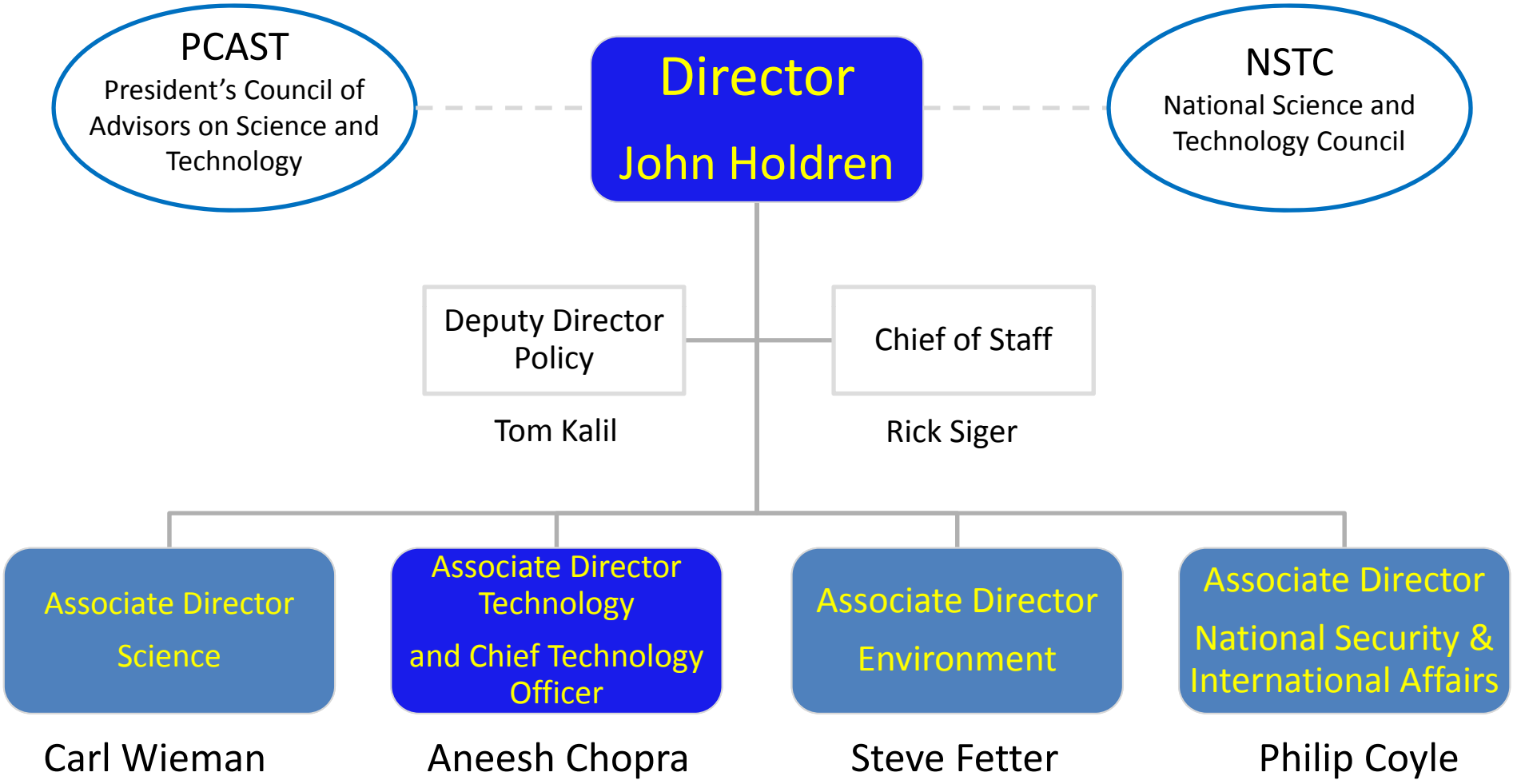
1. Policy for Science and Technology

Analysis, recommendations, and coordination with other White House offices on R&D budgets & related policies, S&T education and workforce issues, interagency S&T initiatives, broadband, open government, scientific integrity ...

2. Science and Technology for Policy

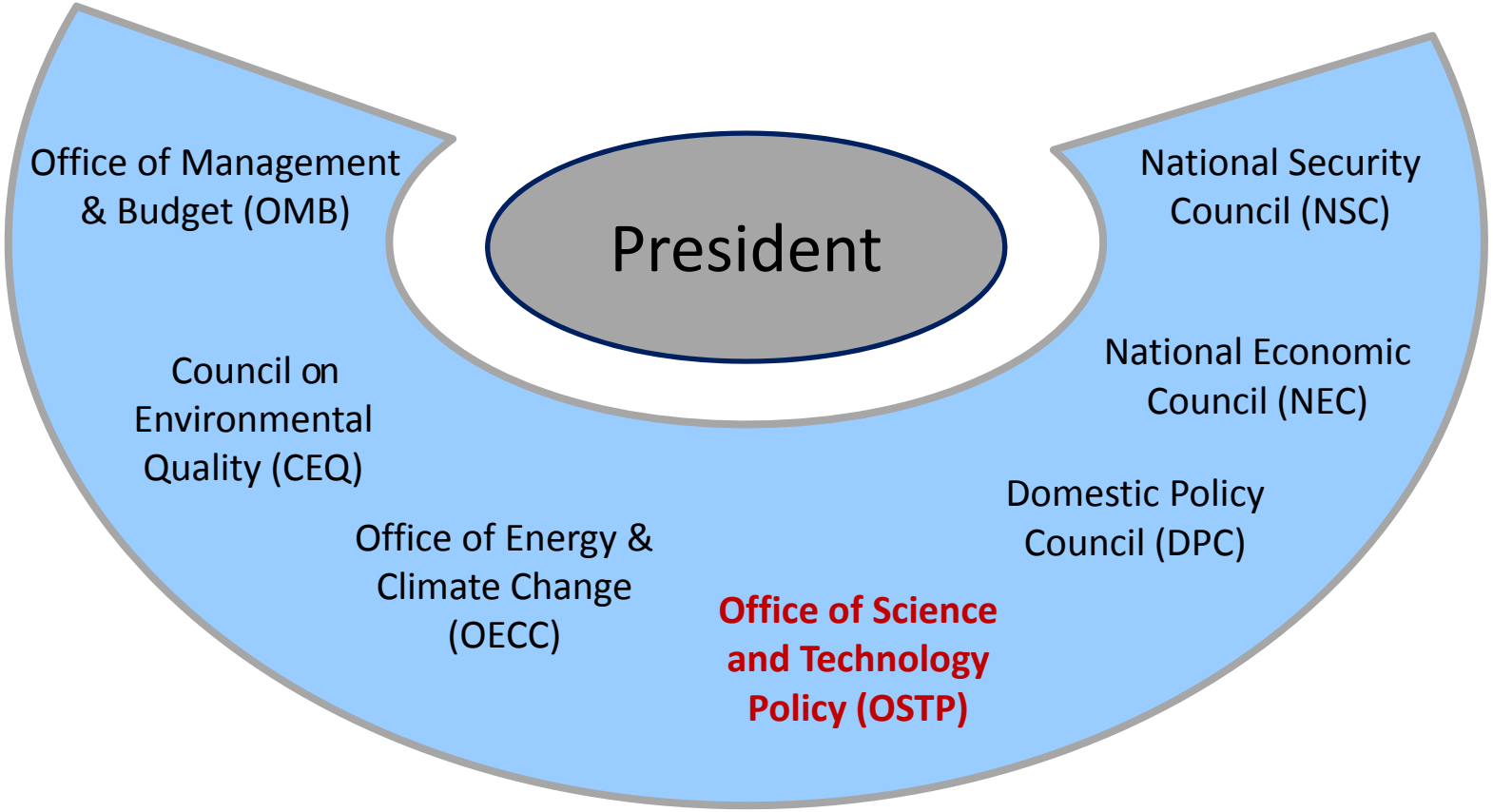
Independent advice for the President about S&T germane to all policy issues with which he is concerned

OSTP Organization

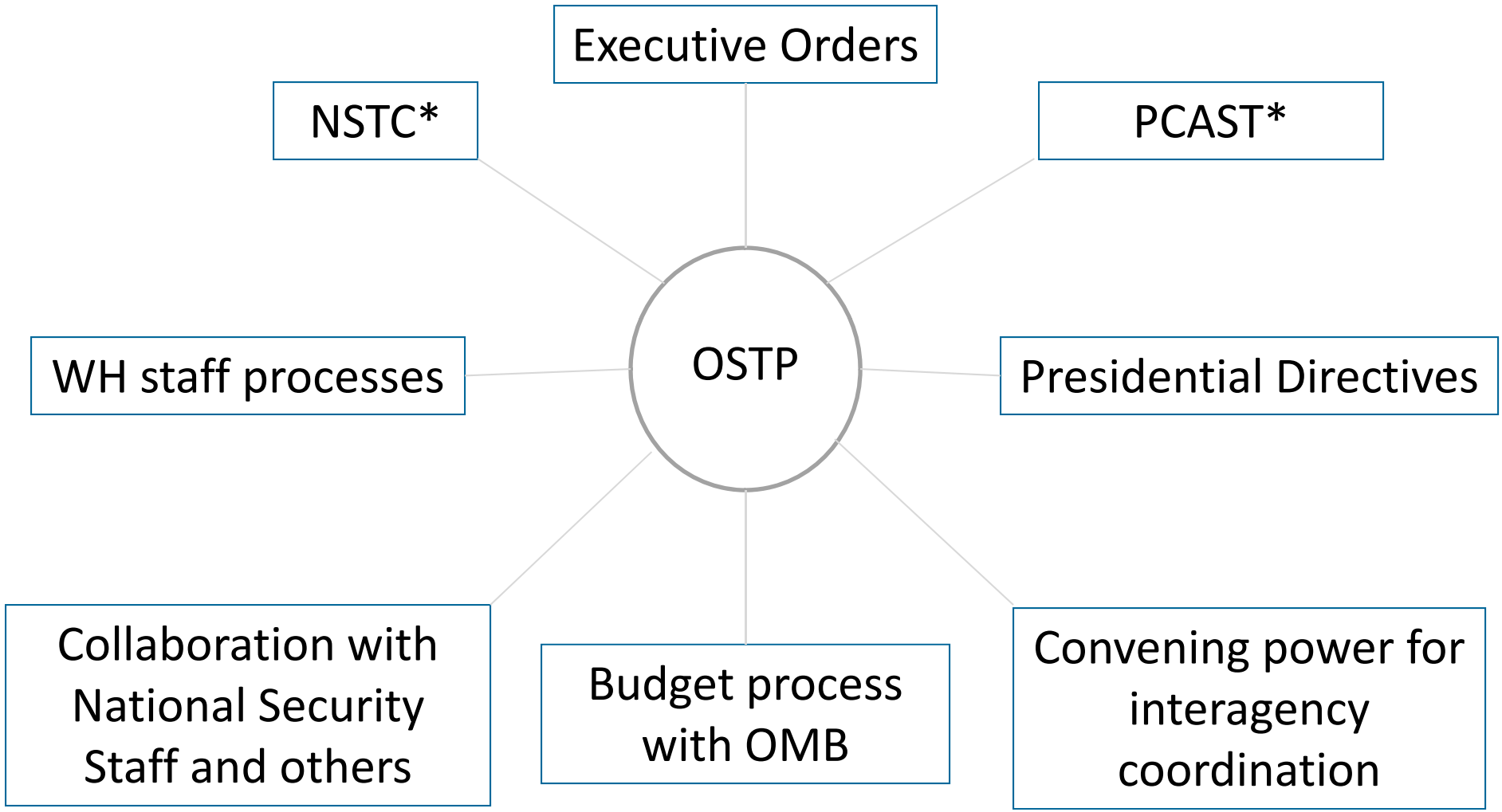


More than 90 staff, many on loan from agencies, labs, universities, and NGOs.

OSTP is a part of the Executive Office of the President (EOP)



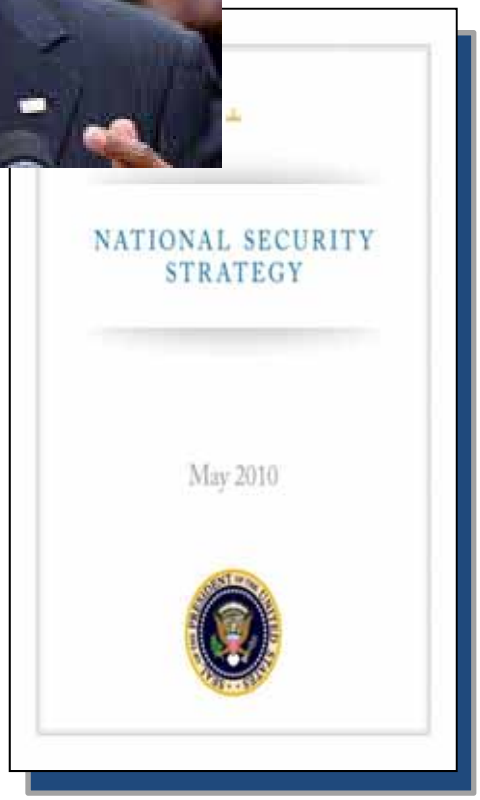
OSTP Mechanisms for Action



*National Science and Technology Council

*President's Council of Advisors on Science and Technology

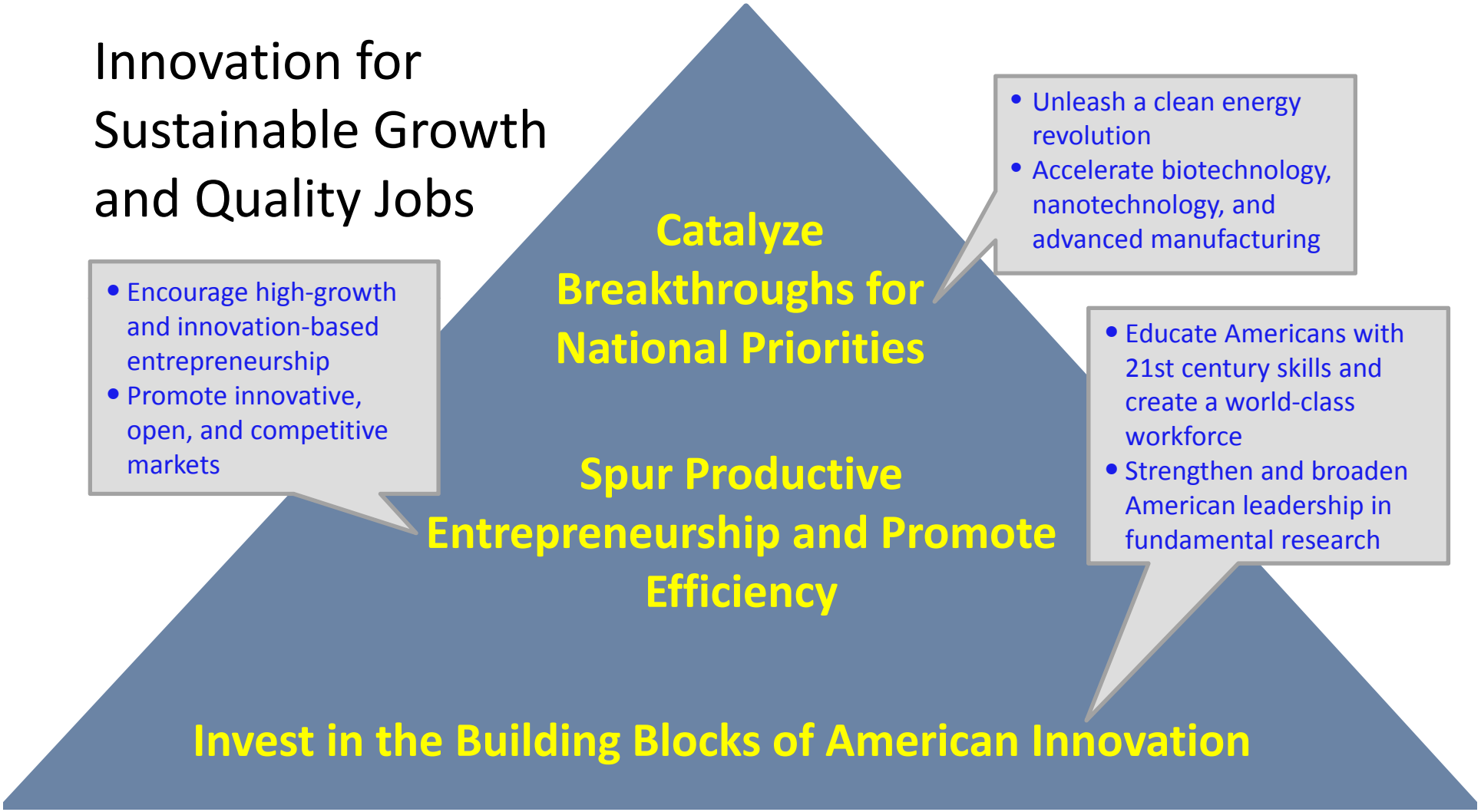
Innovation for National Security is a Presidential Priority



"Reaffirming America's role as the global engine of scientific discovery and technological innovation has never been more critical … Our renewed commitment to science and technology … will help us protect our citizens and advance U.S. national security priorities."

National Security Strategy, May 2010

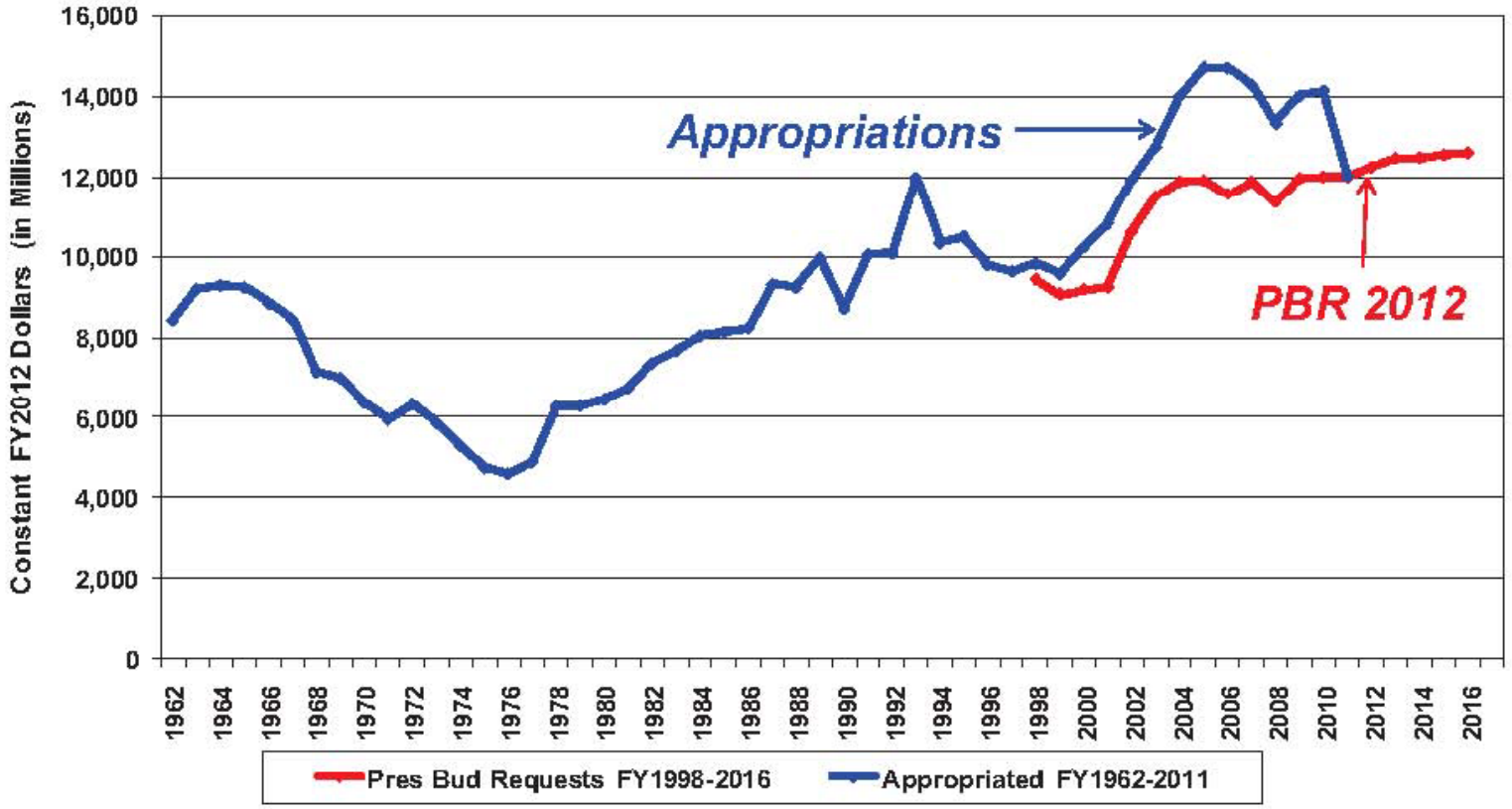
President's Strategy for American Innovation



http://www.whitehouse.gov/innovation/strategy

DoD S&T FUNDING: FY1962-2016

(Constant FY12 Dollars)



http://www.dtic.mil/ndia/2011SET/BAKER_NDIA_FY12_Final.pdf

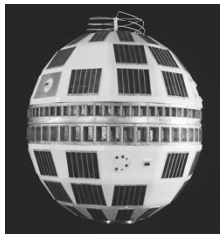
Why Invest in S&T?

- Track record of past success
- Global competition
- Today's technological opportunities
- Current threats require it
- Train the next generation
- Keep the engine running

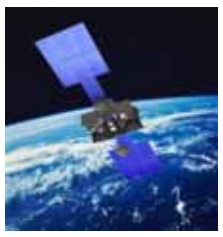
Even in the face of shrinking or flat resources, there are compelling reasons to maintain or strengthen our investments in future capabilities through S&T

Track Record of Past Success





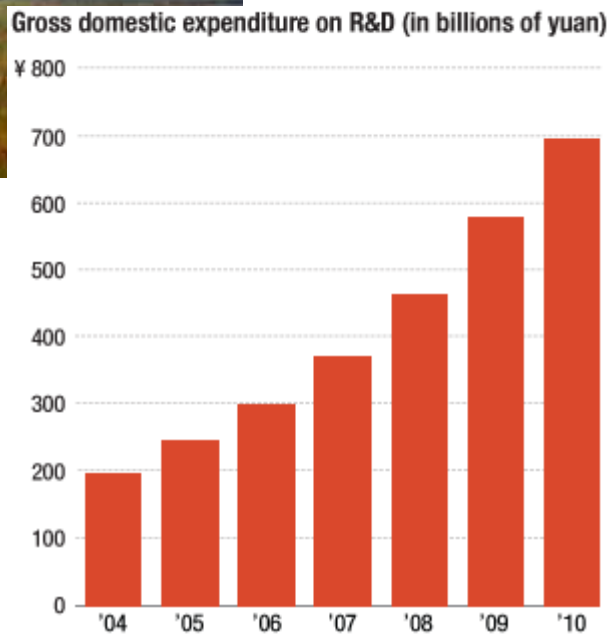




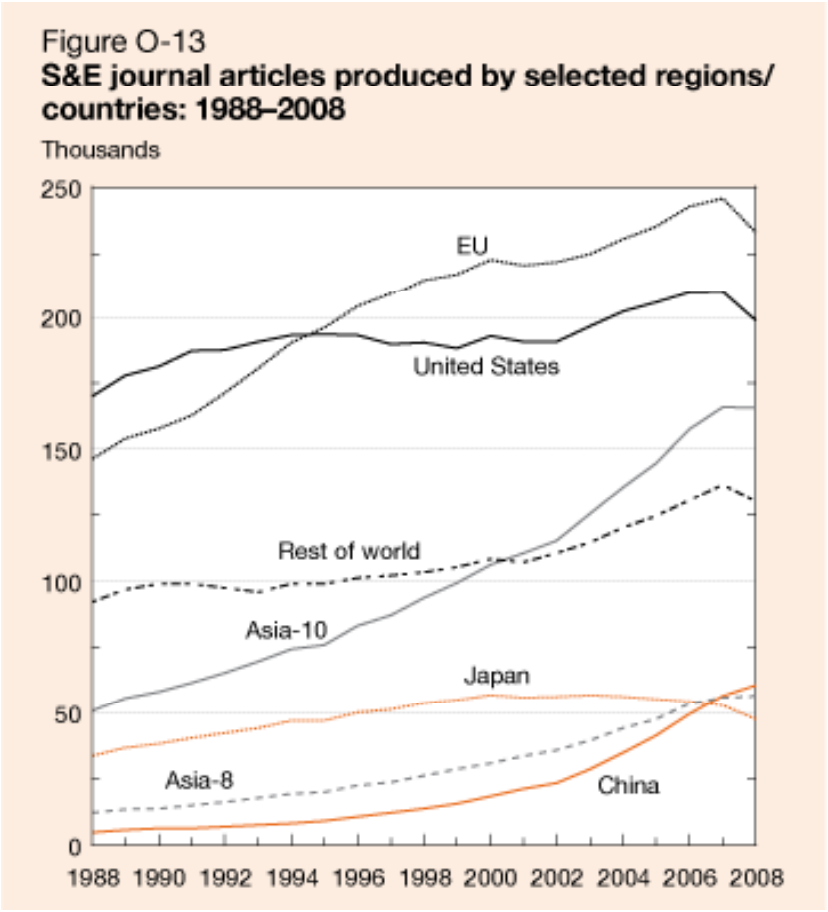
40s	50s	60s	70s	80s	90s	00s
• Nuclear weapons • Radar • Proximity fuse • Sonar • Jet engine • LORAN	• Digital computer • ICBM • Transistor • Laser technology • Nuclear propulsion • Digital comm.	• Satellite comm. • Integrated circuits • Phased-array radar • Defense networks • Airborne surv. • MIRV	• Airborne GMTI/SAR • Stealth • Strategic CMs • IR search and track • Space track network • C2 networks	• GPS • UAVs • Night vision • Personal computing • Counter-stealth • BMD hit-to-kill	• Wideband networks • Web protocols • Precision munitions • Solid state radar • Advanced robotics • Speech recognition	• GIG • Armed UAVs • Optical SATCOM • Data mining • Advanced seekers • Decision support

Our competitors are investing

- Globalization of R&D and emerging centers-of-excellence around the world



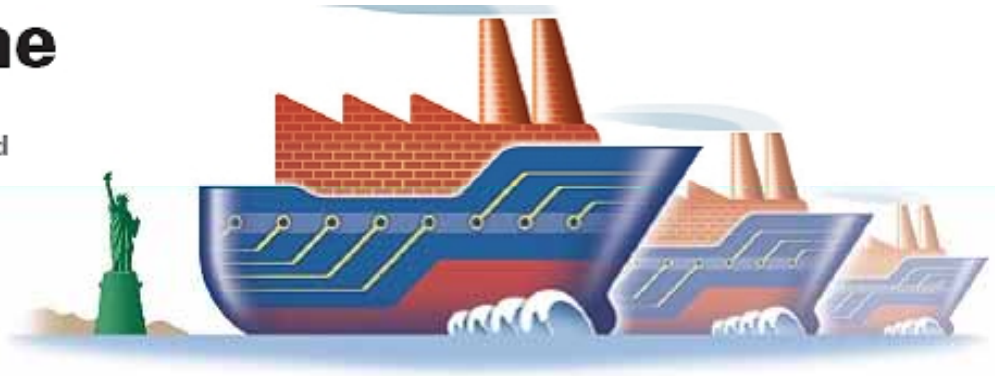
698 billion yuan equals $108 billion U.S..
Source: China Science & Technology Statistics Data Book
Credit: Christina Baird/NPR



From NSF, Science and Engineering Indicators, 2010

Going…Going…Gone

Many high-tech products can no longer be manufactured in the United States because critical knowledge, skills, and suppliers of advanced materials, tools, production equipment, and components have been lost through outsourcing. Many other products are on the verge of the same fate.



Semiconductors

ALREADY LOST

"Fabless" chips

AT RISK

DRAMs

Flash memory chips

Lighting

ALREADY LOST

Compact fluorescent lighting

AT RISK

LEDs for solid-state lighting, signs, indicators, and backlights

Electronic displays

ALREADY LOST

LCDs for monitors, TVs, and handheld devices like mobile phones

Electrophoretic displays for Amazon's Kindle e-reader and electronic signs

AT RISK

Next-generation "electronic paper" displays for portable devices like e-readers, retail signs, and advertising displays

Energy storage and green energy production

ALREADY LOST

Lithium-ion, lithium polymer, and NiMH batteries for cell phones, portable consumer electronics, laptops, and power tools

Advanced rechargeable batteries (NiMH, Li-ion) for hybrid vehicles

Crystalline and polycrystalline silicon solar cells, inverters, and power semiconductors for solar panels

AT RISK

Thin-film solar cells (the newest solar-power technology)

Computing and communications

ALREADY LOST

Desktop, notebook, and netbook PCs

Low-end servers

Hard disk drives

Consumer-networking gear such as routers, access points, and home set-top boxes

AT RISK

Blade servers, midrange servers

Mobile handsets

Optical-communication components

Core network equipment

Advanced materials

ALREADY LOST

Advanced composites used in sporting goods and other consumer gear

Advanced ceramics

Integrated circuit packaging

AT RISK

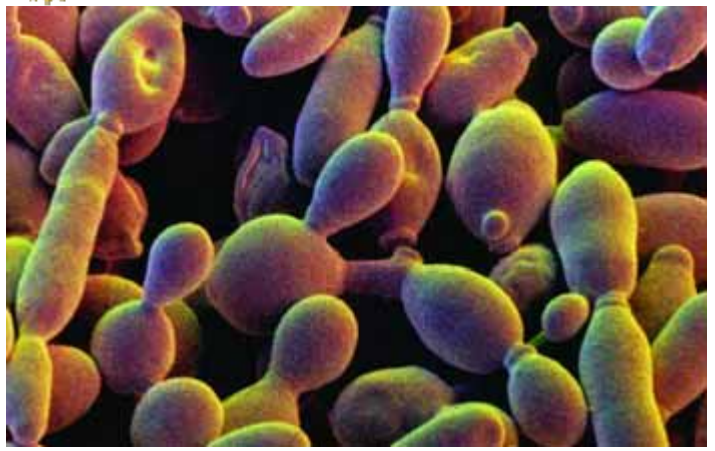
Carbon composite components for aerospace and wind energy applications

Taken from Gary Pisano and Willy Shih, "Restoring American Competitiveness", Harvard Business Review, July-August 2009

Emerging Technological Opportunities

- Nanotechnology
- Synthetic Biology
- Crowdsourcing
- Rapid prototyping
- Quantum Computing
- Robotics
- Artificial Intelligence
- Hypersonics
- Computational Materials Science

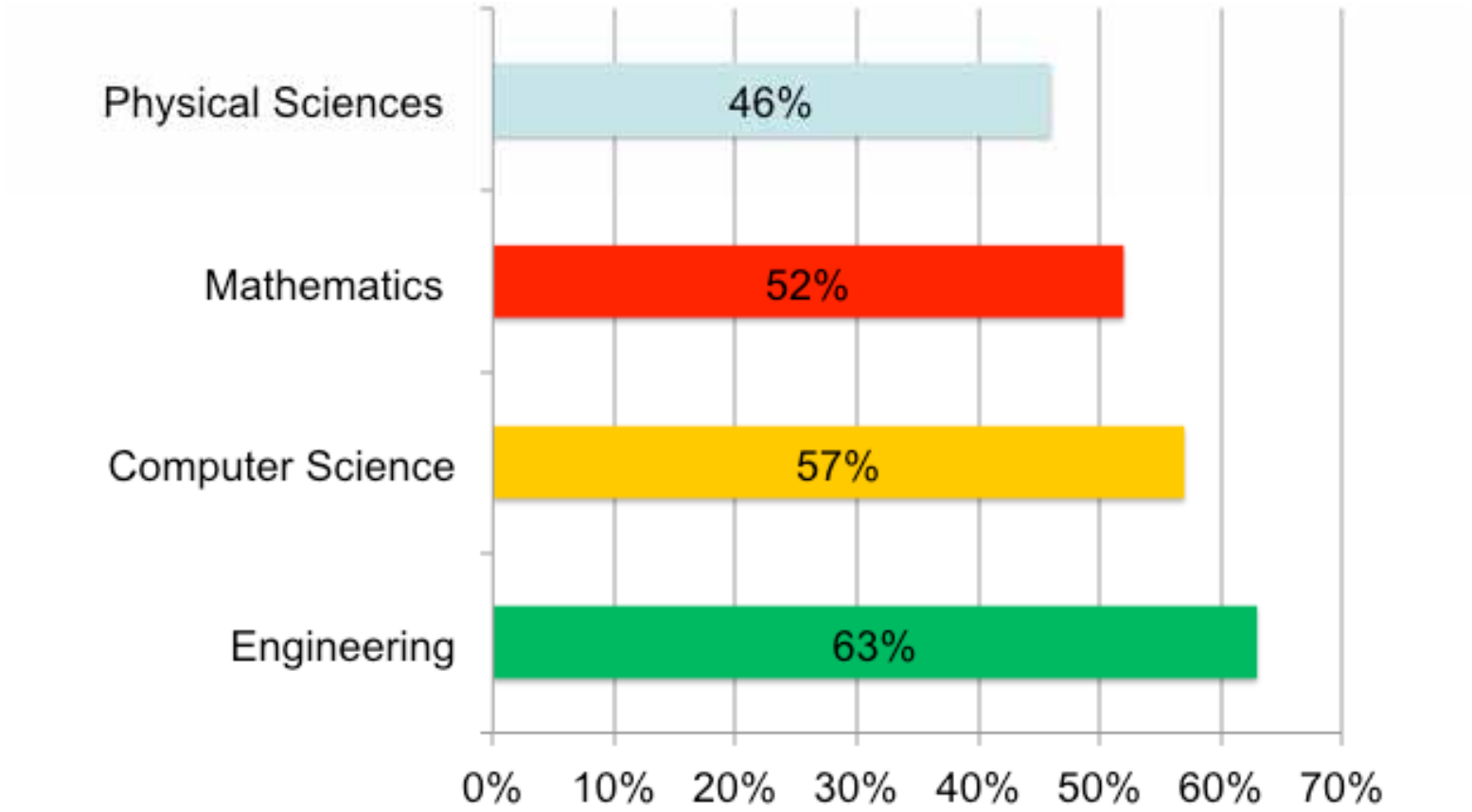
Yeast cells with computer-designed, synthetically produced DNA.



Today's Threats Require S&T Solutions

- Cyber
- Anti Access/Area Denial
- Advanced missile technologies
- IEDs/RPGs
- Traumatic Brain Injury/PTSD
- CBRNE
- …

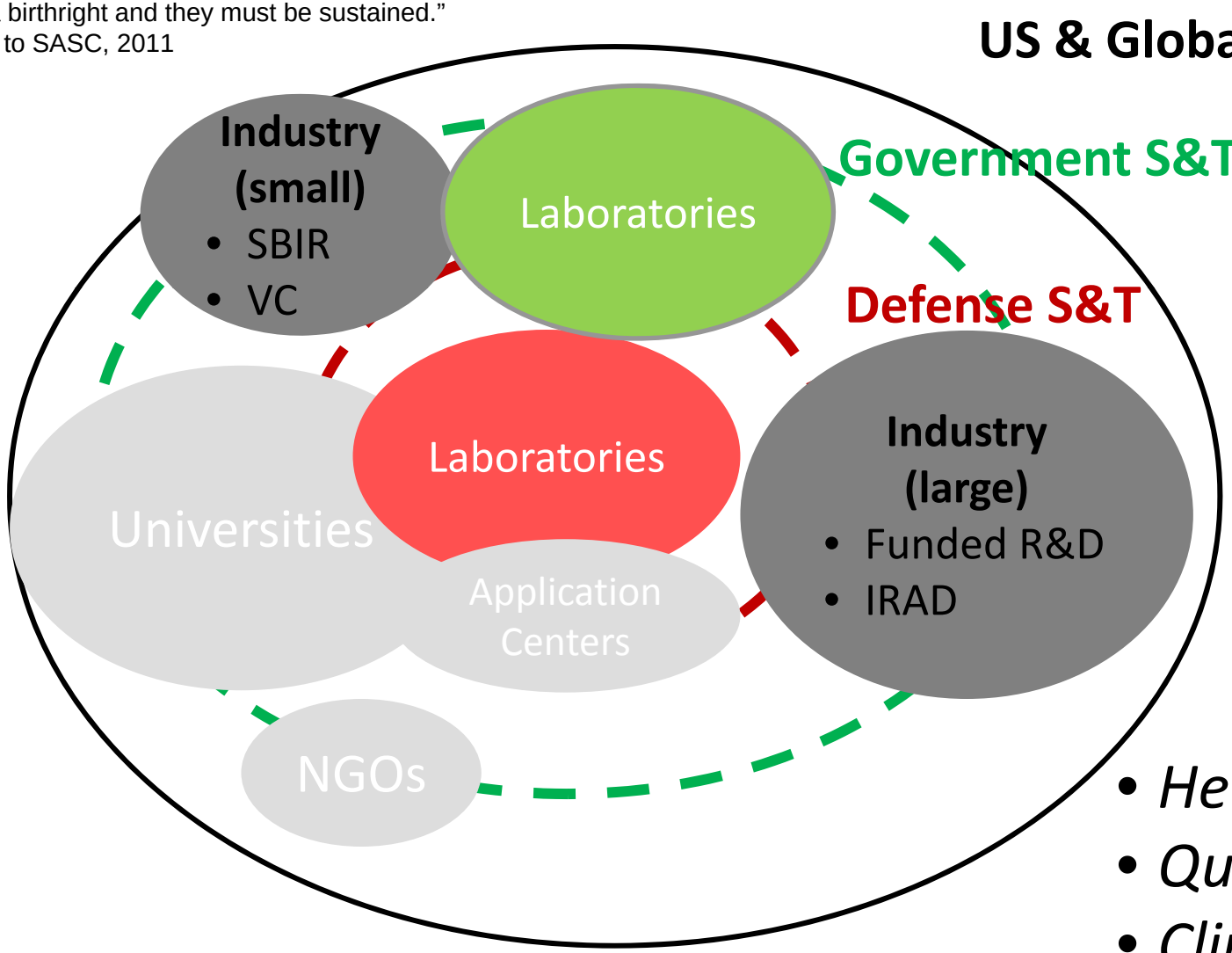
STEM Doctoral Degrees Awarded to Foreign Students (2007)



Office of Naval Research

S&T Ecosystem of Performers

"For decades the U.S. has commanded a decisive lead in the quality of defense-related research and engineering conducted globally and in the military capabilities of the products that flow from this work. However, the advantages, which have enabled American pre-eminence in defense technology, are not a birthright and they must be sustained."
- Hon. Frank Kendall to SASC, 2011



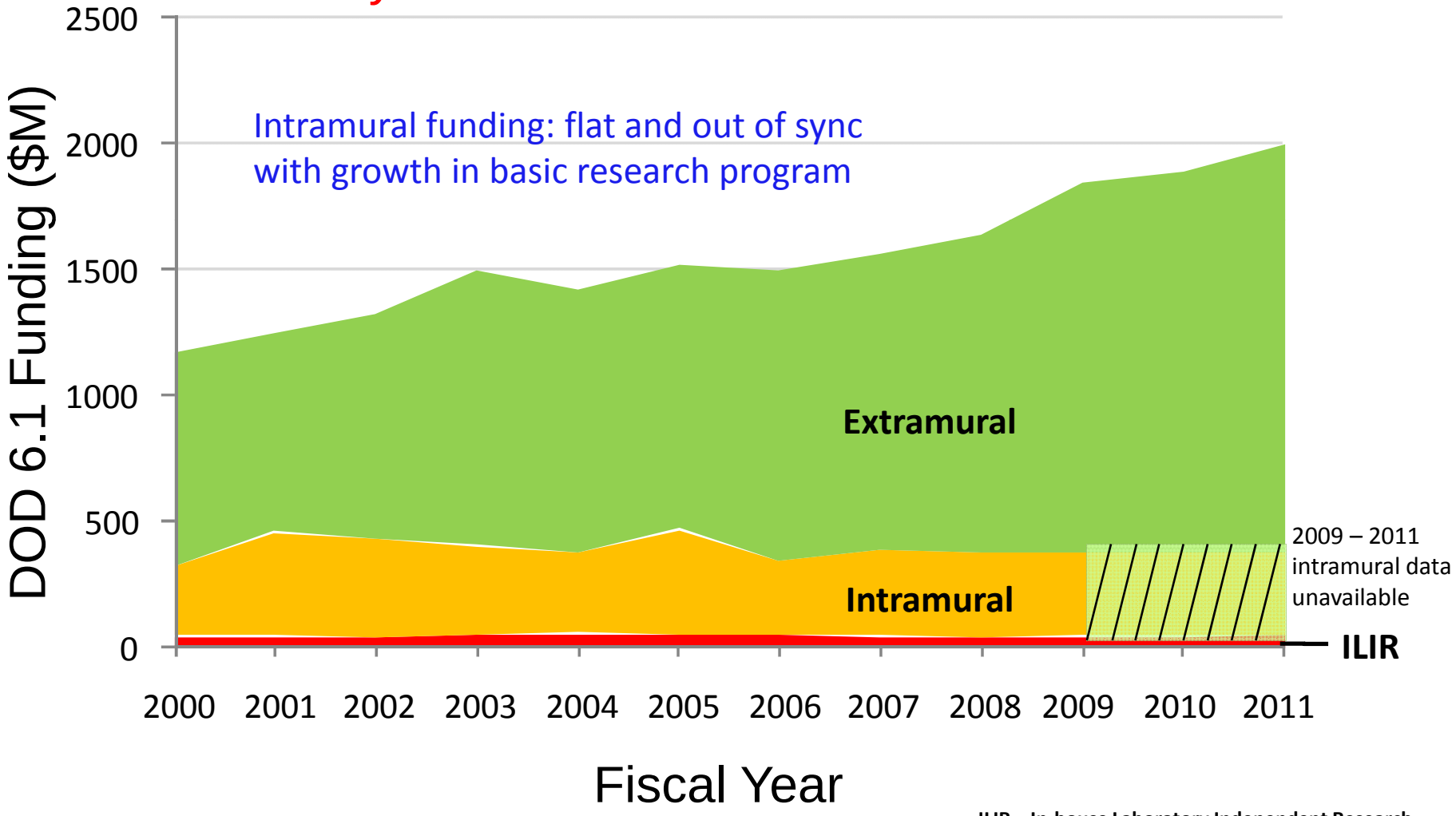
- *Health ?*
- *Quality ?*
- *Climate ?*

OSTP Lab Initiatives

- Advocacy for world-class S&T in the Labs
  - Support for Current Operations/Warfighters
  - Smart Buyer Role
  - Sources of American Innovation
- Support for S&T in the Labs
  - In-House Funding (Section 219, basic research)
  - Infrastructure and Lab MILCON
  - Personnel
  - Customer Base

In-House Basic Research

Can the Services greatly increase capacity for in-house DOD laboratory basic research activities?



ILIR = In-house Laboratory Independent Research

Infrastructure Issues

RDT&E Only	TOTAL ft^2	AVG ft^2	AGE	AVG "Q" RATING	TOTAL PROPERTY REPLACEMENT VALUE (PRV)	FUNDING REQUIRED TO Q=100
Army	11,305,696	13,254	46	82	$3,791,002,023	$ 423,975,255
Navy	8,755,704	11,013	47	62	$3,071,485,923	$1,075,310,942
Air Force	15,392,265	22,243	40	92	$5,982,305,335	$ 472,479,755
Aggregate	**35,453,665**	**15,151**	**44**	**78**	**$12,844,793,281**	**$1,971,765,953**

Q = value grade (0-100) for the status of facility quality

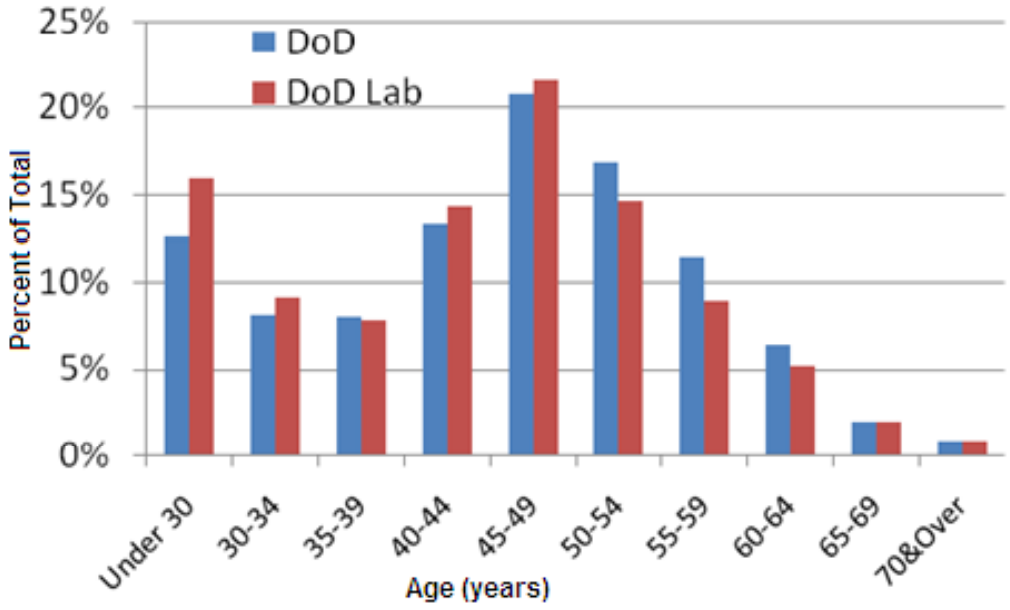
Assessment of DOD RDTE facilities from DOD Report to Congress, "DOD Laboratory Recapitalization and Sustainment Issues", June 2010

- Predominately BRAC and Congressional MILCON funding
- Minor MILCON authority (< $2 M)
- DOD LABCON account?
- Equipment Modernization and Upgrades?

What are the highest priority MILCON and equipment issues? How can they be addressed?

Workforce

"The DoD lab S&E workforce age profile is not flat, owing to the fact that the DoD lab workforce lacks workers between 35 and 45 following the hiring freeze in the 1990s and worker turnover."



DoD and DoD Lab Civilian S&E Workforce Age Profile in 2008

Institute for Defense Analyses, June 2009
"Assessment of the DoD Laboratory Civilian Science and Engineering Workforce"

<u>Ideas</u>

- Protect 6.2
- Industry IPAs
- Streamlining Lab Personnel Processes
- Citizenship for Service
- Entrepreneurial Leave

Customer Base and Outreach

Can we expand the customer base of the DOD labs to increase revenues and promote technology transfer?

- New Customers
  - Other Services
  - Other government agencies (NNSA, IC, DHS)
  - Industry
- New Partnerships
  - Lab to market
  - Public-private R&D

"Facilitate Commercialization through Local and Regional Partnerships. Agencies must take steps to enhance successful technology innovation networks by fostering increased Federal laboratory engagement with external partners, including universities, industry consortia, economic development entities, and State and local governments."

- Presidential memo on Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Businesses, October 28, 2011

Some Questions for the Future

- Does the Cold War national security R&D ecosystem need modifications?
- How do we ensure that the national security S&T enterprise is protected during times of budget pressure?
- How do we attract the best and brightest to work on national security problems?
- What is the role and future of DOD's in-house laboratories?

"We now live in a world where technology has made it possible for companies to take their business anywhere. If we want them to start here and stay here and hire here, we have to be able to out-build and out-educate and out-innovate every other country on Earth."

President Obama
September 8, 2011


EXECUTIVE OFFICE OF THE PRESIDENT OF THE UNITED STATES
OFFICE OF SCIENCE AND TECHNOLOGY POLICY