

Enabling Science, Technology & Innovation For National Security

Thomas Kalil

Deputy Director for Policy

White House Office of Science and Technology Policy

13th Annual Science & Engineering Technology Conference / Defense Tech Exposition
17 April 2012



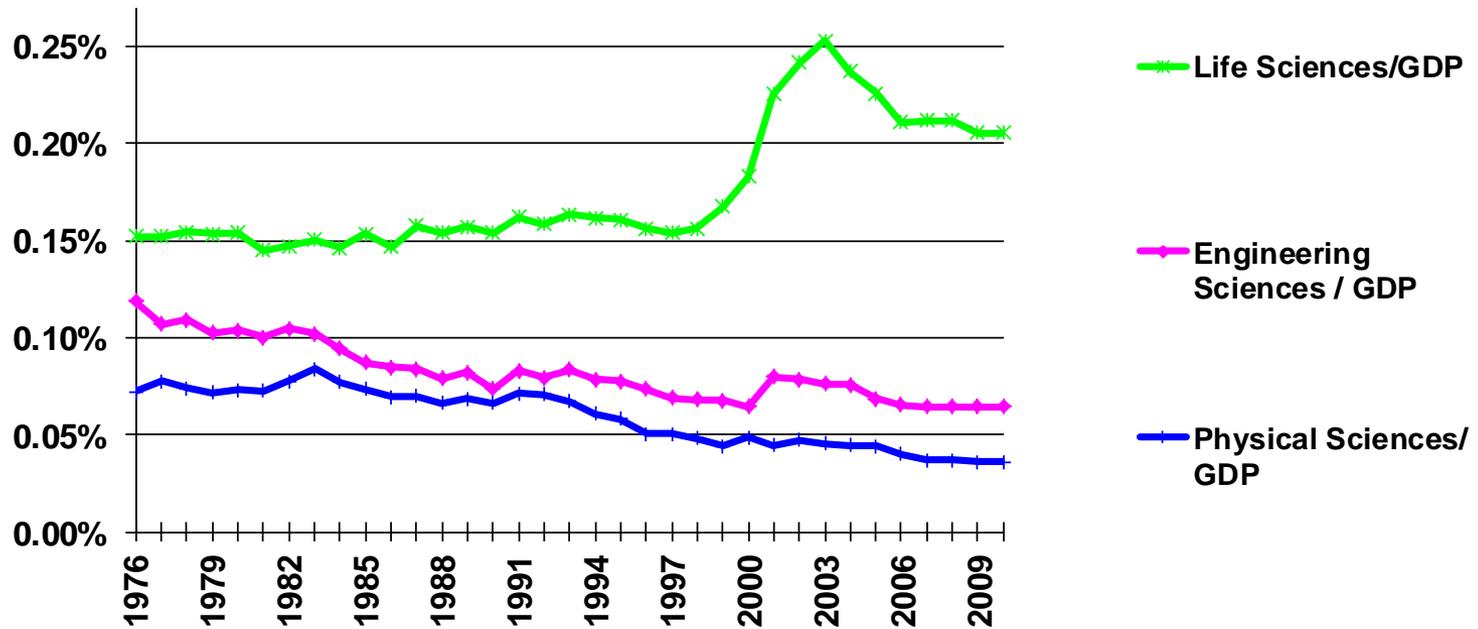
OSTP involvement in Defense S&T

- Overall “topline” for 6.1 – 6.3
- Funding in particular technical areas of national importance
- Health of defense S&T enterprise
 - Personnel
 - DOD labs
 - Access to non-traditional contractors



Trends in Federal Research by Discipline, FY 1976-2010

obligations for research / Gross Domestic Product



From “Sustaining US Global Leadership – Priorities for Sustaining 21st Century Defense”



- “In adjusting our strategy and attendant force size, the Department will make every effort to maintain an adequate industrial base and our investment in science and technology.”
- “To that end, the Department will both encourage a culture of change and be prudent with its “seed corn,” balancing reductions necessitated by resource pressures with the imperative to sustain key streams of innovation that may provide significant long-term payoffs.”

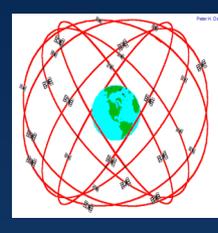
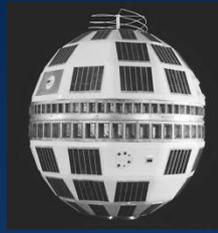


January 5, 2012



Investing in the Future: DOD S&T

A Track Record of Success....



40s

50s

60s

70s

80s

90s

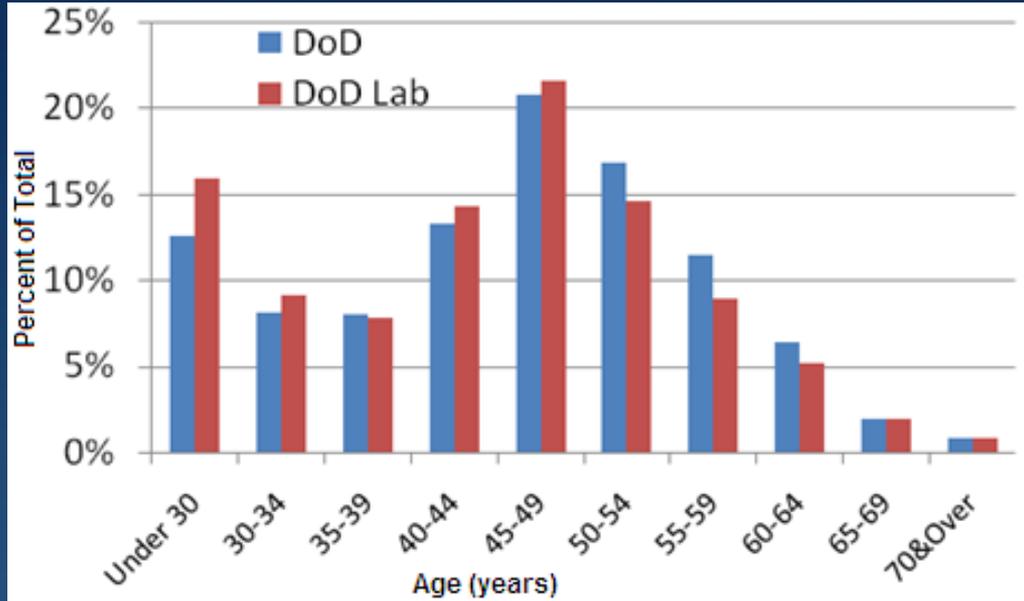
00s

New Challenges and Threats for the Future....



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”

Initiatives

- **Streamlining Lab Personnel Hiring**
- **Citizenship for Service**
- **Industry IPAs**
- **Entrepreneurial Leave**



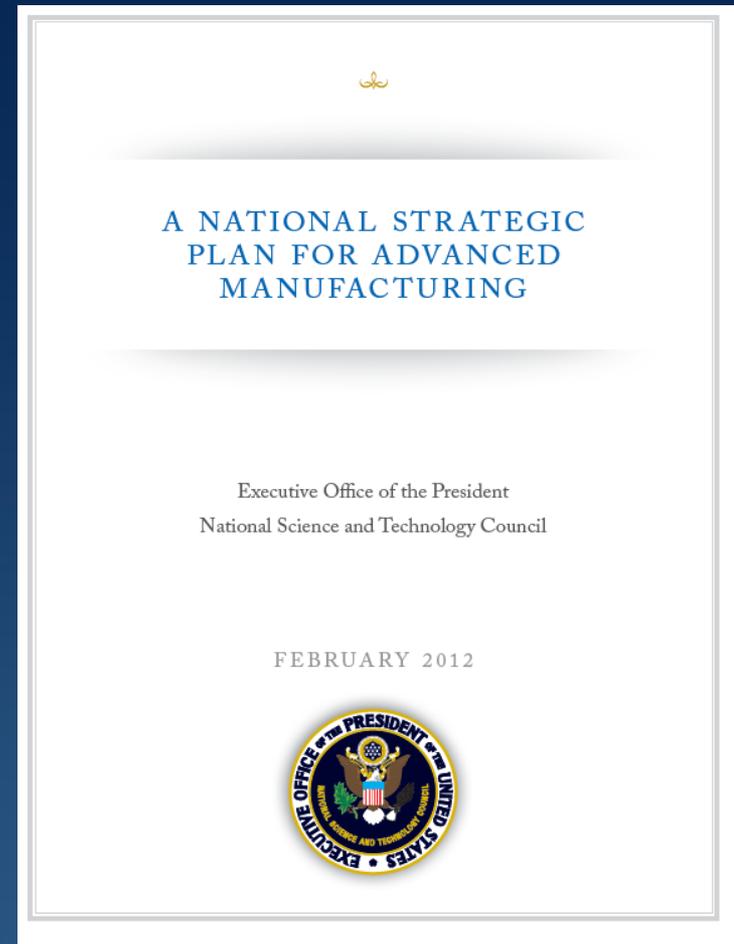
OSTP R&D Initiatives

- Advanced Manufacturing
- Energy
- Robotics
- Materials Genome
- BioEconomy
- Big Data
- STEM Education
- Grand Challenges
- Prizes
- Innovative Contracting



Strategic Plan for Advanced Manufacturing (AM)

- Accelerate investment in AM technology, especially by small and medium-sized enterprises
- Create and support national and regional public-private, government-industry-academic partnership
- Expand the number of workers with skills in demand and make the education and training system more responsive
- Optimize the federal government's AM investment by taking a portfolio perspective
- Increase total U.S. public and private investments in AM R&D.



National Network for Manufacturing Innovation

\$1 billion FY13 proposal:

“institutes of manufacturing excellence where some of our most advanced engineering schools and our most innovative manufacturers collaborate on new ideas, new technology, new methods, new processes.”

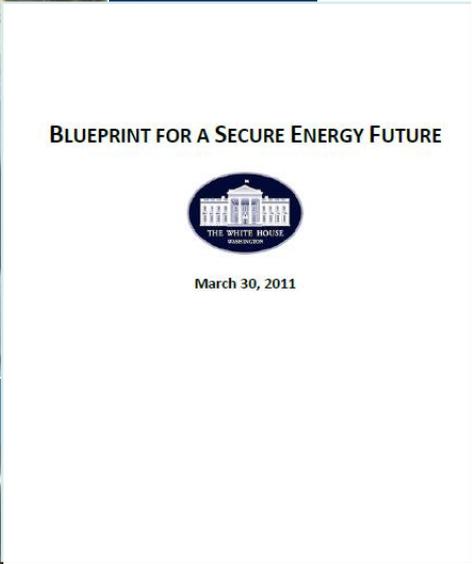
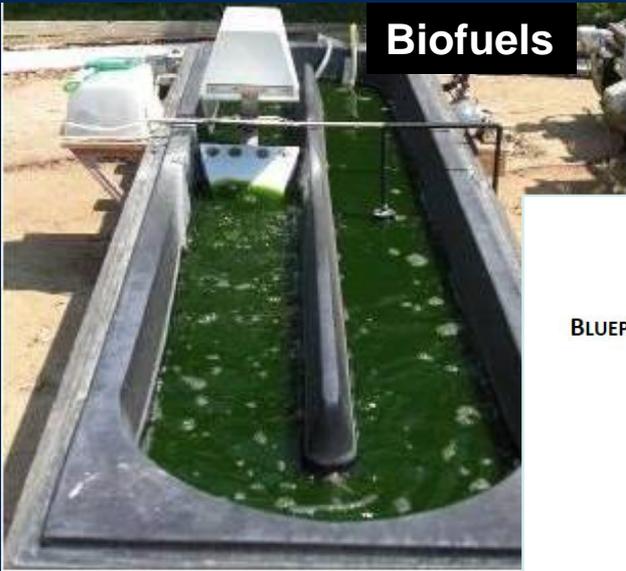
\$45 million FY12 pilot - DoD pilot on ManTech - focused on additive metal, composites, & direct write electronics



President Obama at Rolls-Royce Crosspointe, Petersburg, VA, March 9, 2012



Energy - Early Adoption Opportunities



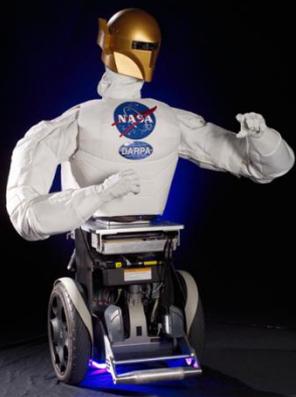
“Unleash us from the tether of fuel.”

Gen. James Mattis, USMC



National Robotics Initiative (NRI)

The realization of co-robots acting in direct support of individuals and groups... manufacturing, exploration, discovery, agriculture, security,



NRL



NIH

THEMES

- Fundamental research
- Controls and dynamical systems
- Computational models of human cognition
- Application-inspired topics
- Micro- and nano-robotics, neuro-robotics, humanoid robotics, & networked multi-robot team
- Understanding of the long term social, behavioral and economic implications of co-robots across all areas of human activity
- Use of co-robots for STEM learning



Materials Genome Initiative

Goal: Decrease the time-to-market by 50 %

To help businesses discover, develop, and deploy new materials twice as fast, we're launching what we call the Materials Genome Initiative. The invention of silicon circuits and lithium ion batteries made computers and iPods and iPads possible, but it took years to get those technologies from the drawing board to the market place. We can do it faster.

-President Obama, Carnegie Mellon University, June 2011



INITIATIVES

- Develop a Materials Innovation Infrastructure
- Achieve National goals in energy, security, and human welfare with advanced materials
- Equipping the next generation materials workforce

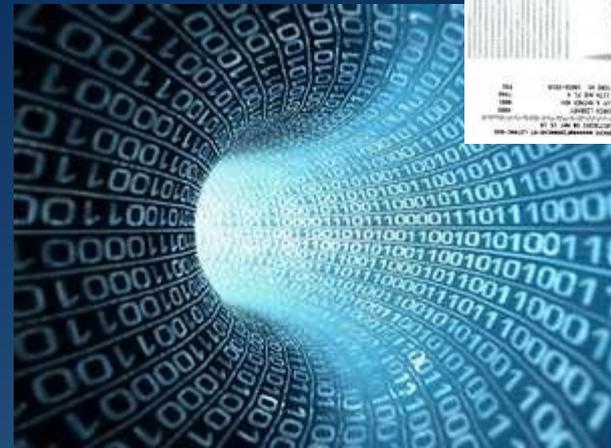
THEMES

- Incentivizing open paradigms of sharing & access of tools
- Facilitating the development of innovation ecosystems & access to all stakeholders
- Driving innovative techniques across computation, informatics & experimentation
- Catalyzing shift in culture across the entire materials continuum & scaling the movement

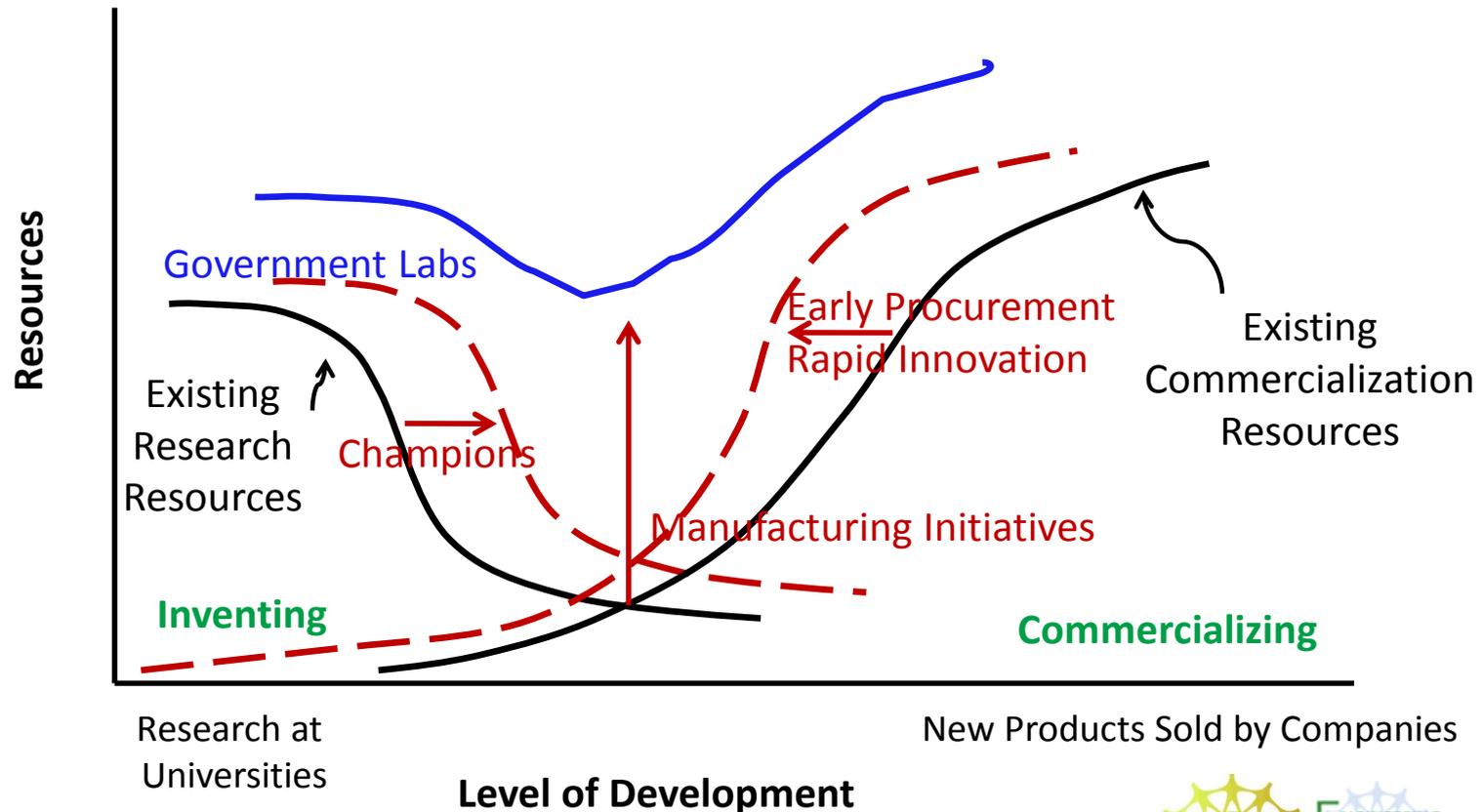


BIG DATA

- ***“The future of computing is not just big iron. It’s big data.”***
- March 29th – agencies announce \$200 million in additional investments in R&D related to Big Data
 - NSF and NIH joint solicitation
 - DARPA XDATA program
 - DOD “Data to Decision” initiative
 - Accelerate “data to knowledge to action.”



Shrinking the Missing Middle through Innovation



Adapted from Dr. Deborah Jackson, 2011



Strategy for American Innovation

“The Federal government should ... use high-risk, high-reward policy tools such as prizes and challenges to solve tough problems.”

*-President Barack Obama
August 5, 2009*



Grand Challenges

Department of Energy: Clean Energy Grand Challenges

- **SunShot:** To make solar energy cost competitive with other forms of energy by 2020
- **EV Everywhere:** To make electric vehicles as affordable and convenient to own as gas-powered vehicles by 2020

Private Sector Grand Challenges

- **IBM – Watson**
- **Google – self-driving car**
- **Qualcomm – Tricorder X Prize**

BENEFITS

- Help solve important economic and societal problems
- Serve as a “North Star” for high-impact, multi-disciplinary collaborations and public-private partnerships
- Create the foundation for the industries and jobs of the future
- Capture public imagination and increase support for public policies that foster science, technology and innovation
- Inspire the next generation of scientists, engineers, and entrepreneurs



Incentive Prizes

1. Exemplar
(recognition)
2. Point-solution
3. Exposition
4. Participation
5. Network
6. Market
stimulation

BENEFITS

- Shine a spotlight on a problem or opportunity
- Pay only for results
- Target an ambitious goal without predicting which team or approach is most likely to succeed
- Reach beyond usual suspects to tap top talent
- Stimulate private sector investment many times greater than the prize purse
- Bring out-of-discipline perspectives to bear
- Inspire risk-taking by offering a level playing field
- Establish clear target metrics and validation protocols



AFRL Vehicle Stopper Challenge

- Requirements

- \$25,000 for design for a system that could safely stop uncooperative fleeing vehicles without harm
- Solution in 60 days

- Winner

- Retired 66-year-old mechanical engineer from Lima, Peru

- Solution

- ✓ Remote electric-powered vehicle that accelerates up to 130 mph within 3 sec. to position itself under a fleeing car – automatically triggers a restrained airbag to lift the car and slide it to a stop



Innovative Contracting Mechanisms

*“Military advantage in the future will be conferred upon defense establishments that are able to mine the globalized, commercialized technology base the fastest, keeping ahead of competitors who will be able to draw from much of the same base. It is crucial to U.S. military advantage that it be a faster adopter and adapter of technology, since it can no longer hope to be technology’s exclusive owner ... **The single most powerful mechanism to make defense a smart buyer of technology is to reduce the artificial barriers that separate defense businesses from commercial businesses.**”*

- Hon. Ash Carter noted in Keeping the Edge: Managing Defense for the Future



“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



Many Challenges Remain

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
First automatic location ellipse of the 2006
and 2009 events

