Nanotechnology: Anniversary of PCAST Report, and A Grand Challenge is Born

Lloyd Whitman

Assistant Director for Nanotechnology and Advanced Materials

White House Office of Science and Technology Policy

PCAST Public Meeting, Washington, DC, November 20, 2015

15 Years of Presidential Nanotechnology

*President Clinton at CalTech
January 21, 2000*
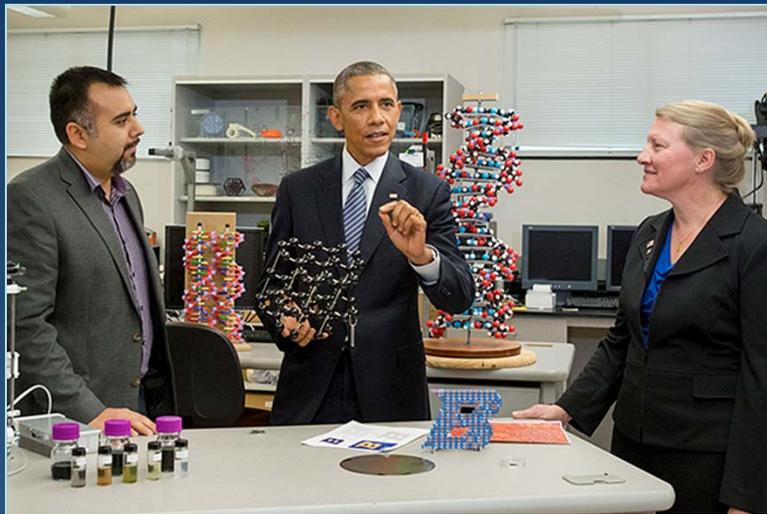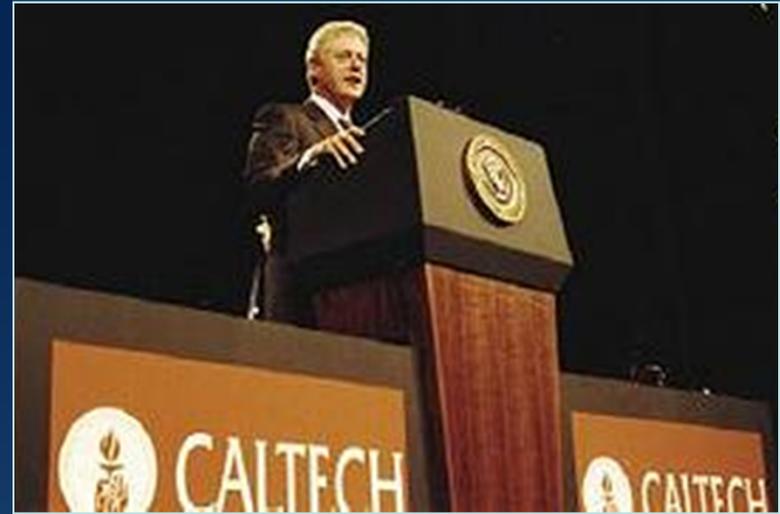
*President Obama at Boise State
January 21, 2015*

news.boisestate.edu

National Nanotechnology Initiative (NNI)

20 Federal Departments and Independent Agencies
   11 with nanotech budgets

2015 budget: $1.5 billion
   $22 billion since 2001

www.nano.gov

THE NATIONAL NANOTECHNOLOGY INITIATIVE
Supplement to the President's 2016 Budget
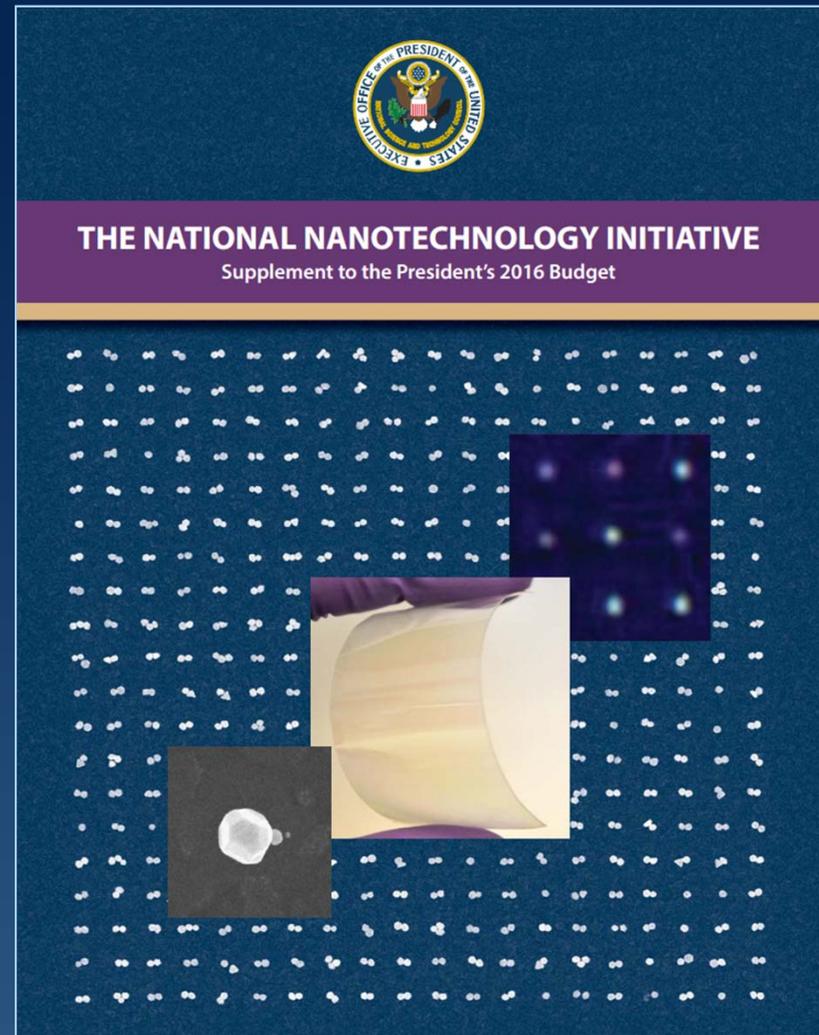
2016 Budget Supplement

NNI Funding by Agency: 2011-2016
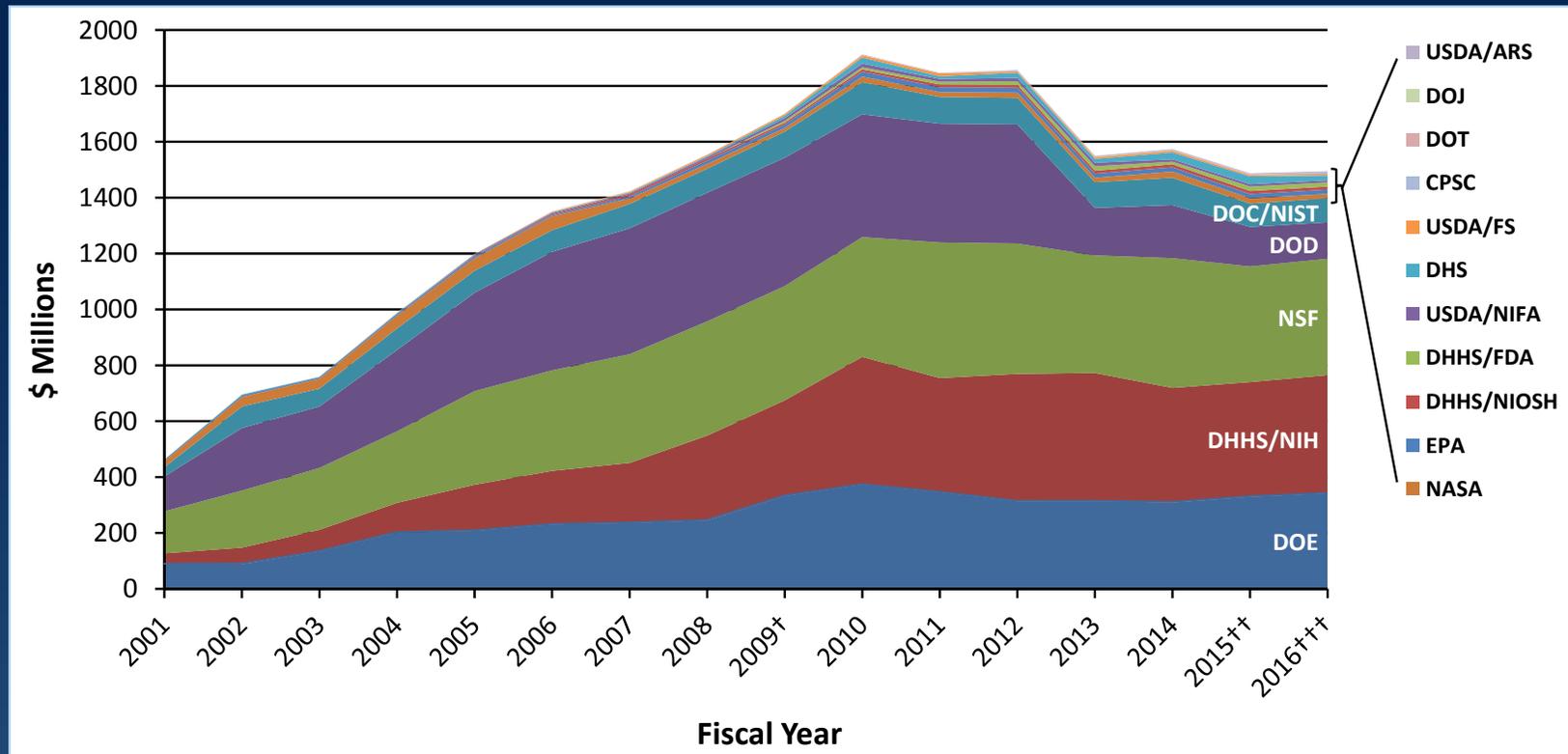
† 2009 does not include ARRA funds for DOE ($293 M), NIH ($73 M), NSF ($101 M), and NIST ($43 M)

†† 2015 estimate based on 2015 enacted levels; may change as operating plans are finalized

††† 2016 request

# 2016 NNI Funding by Program Area

Nanotechnology Signature Initiatives

Solar energy

Nanomanufacturing

Nanoelectronics

Knowledge infrastructure

Sensors
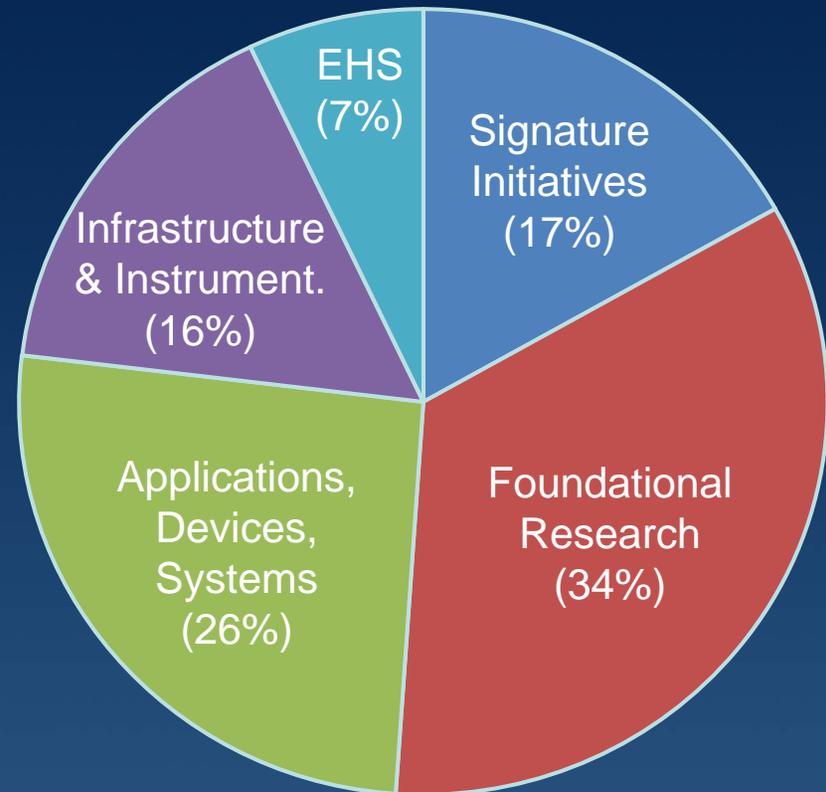
Economic Impact is Growing

Lux Research

Global product revenue grew from $339 B in 2010 to $731 B in 2012

Forecast to grow to $4.4 trillion by 2018

Most current products involve nanoparticle additives or coatings
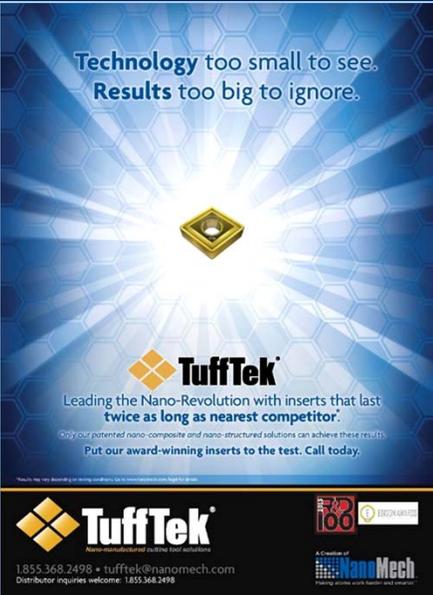
Technology too small to see.
Results too big to ignore.

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Titan Spine nanoLOCK™ Surface Tech.
(spinewards.com)

Fulfilling the Promise: NNI 2.0

How do we re-energize the NNI ecosystem while promoting commercialization?

Broaden awareness, participation, and cohesion of the entire NNI ecosystem?

> *Education*
> *R&D*
> *Environmental, health, and safety*
> *Ethical, legal, and societal issues*
> *Commercialization*

NNCO Highlights from the Past Year

Technical workshops and reports

Carbon nanotubes, sensors, exposure science, U.S.-EU coordination

Webinars (8) on commercialization, sensors, informatics, nano.gov resources

Expanded outreach

Student image and video contests, AwesomeCon, professional society interactions, NSF nanotech videos, new nano.gov resources

Work on metrics through OECD, USPTO

February 2015 Industry Roundtable

Is something holding back the high-value, higher-complexity products?

OSTP-Industry Roundtable to Identify Barriers to Manufacturing Nanomaterial-Enabled Products

What are the barriers to creating a national-scale manufacturing ecosystem?

What types of programs would best help overcome these barriers?

May 2015 White House Forum

White House Forum on Small Business Challenges to Commercializing Nanotechnology

Co-hosted by the National Economic Council

Explored opportunities to accelerate commercialization

Emphasis on the development of private-sector led collaborations and partnerships

Innovating Through Grand Challenges

Ambitious but achievable goals that harness science, technology, and innovation to solve important national or global problems and have the potential to capture the public's imagination.

DOE SunShot Grand Challenge

Make solar energy cost competitive with coal by 2020

DOE EV Everywhere Grand Challenge

Make electric vehicles that are as affordable as today's gasoline-powered vehicles by 2022

NASA's Asteroid Grand Challenge

Find all asteroid threats to human populations and know what to do about them

Nanotechnology-Inspired Grand Challenges

Ambitious but achievable goals that harness nanoscience, nanotechnology, and innovation…

RFI posted on 6/17/2015, responses due 7/16/2015

Six examples developed by agencies, NNCO, & OSTP

OSTP followed up with a number of respondents and wide range of technical experts

First challenge—for future computing—announced October 20, 2015

Still working to develop other challenges, e.g. for future manufacturing

Nanotechnology-Inspired Grand Challenge for Future Computing

Addresses the NNI, the National Strategic Computing Initiative (NSCI), and the BRAIN initiative:

Create a new type of computer that can proactively interpret and learn from data, solve unfamiliar problems using what it has learned, and operate with the energy efficiency of the human brain.

Breakthroughs needed in both nanoscale systems and computer architectures.

www.nano.gov/grandchallenges

A Grand Challenge to Transform Computing

Which is more efficient at image recognition?

The IBM Blue Gene/Q Sequoia supercomputer at Lawrence Livermore National Laboratory

A Grand Challenge to Transform Computing

Low power image recognition

animalia-life.com

Thank you for your attention!