

The National Nanotechnology Initiative

Structure, Focus Areas, and Resources for Stakeholders

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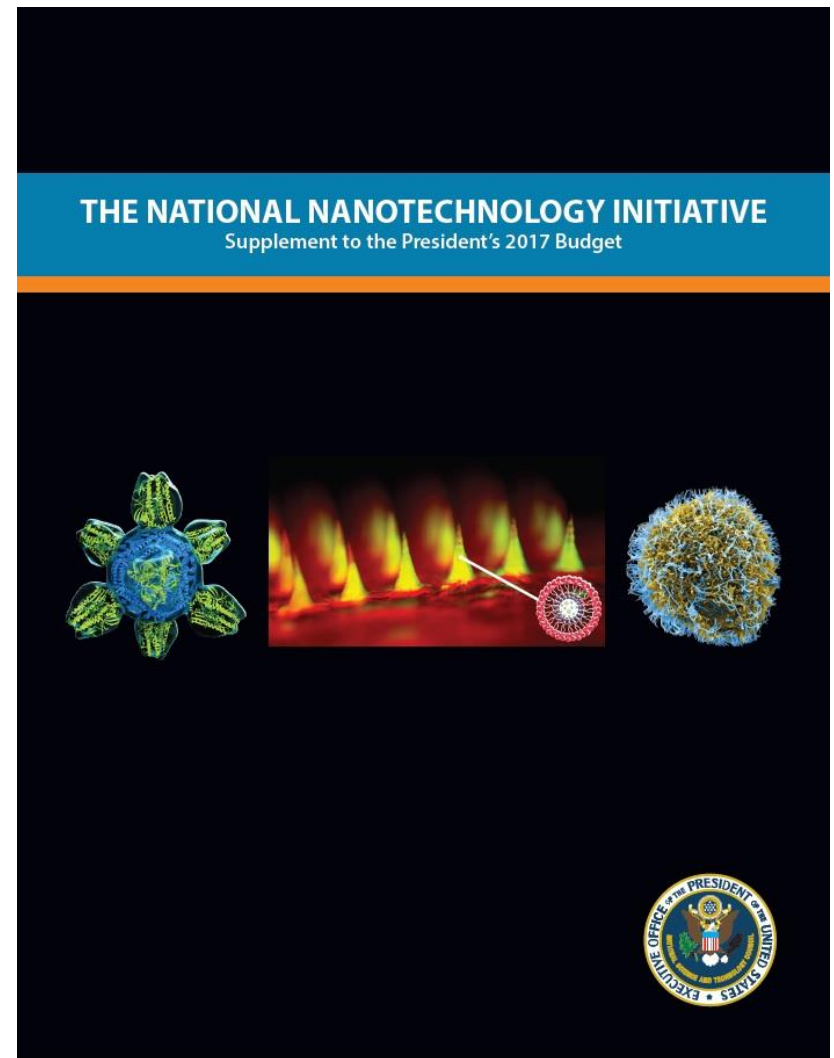
May 19, 2016

**NNI Strategic Planning Stakeholders Workshop
Washington, DC**

National Nanotechnology Initiative (NNI)

- Launched in 2000 to promote and coordinate US nanotech R&D
- Collaborative R&D to advance understanding and control of matter at the nanoscale for:
 - National economic benefit
 - National security
 - Improved quality of life
- 20 Federal Departments and Independent Agencies
 - 11 have specific nanotech budgets
- 2017 budget: \$1.4 billion
 - Cumulative ~\$24 billion investment since 2001

A coordinated initiative, NOT a distinct funding program.



National Nanotechnology Initiative

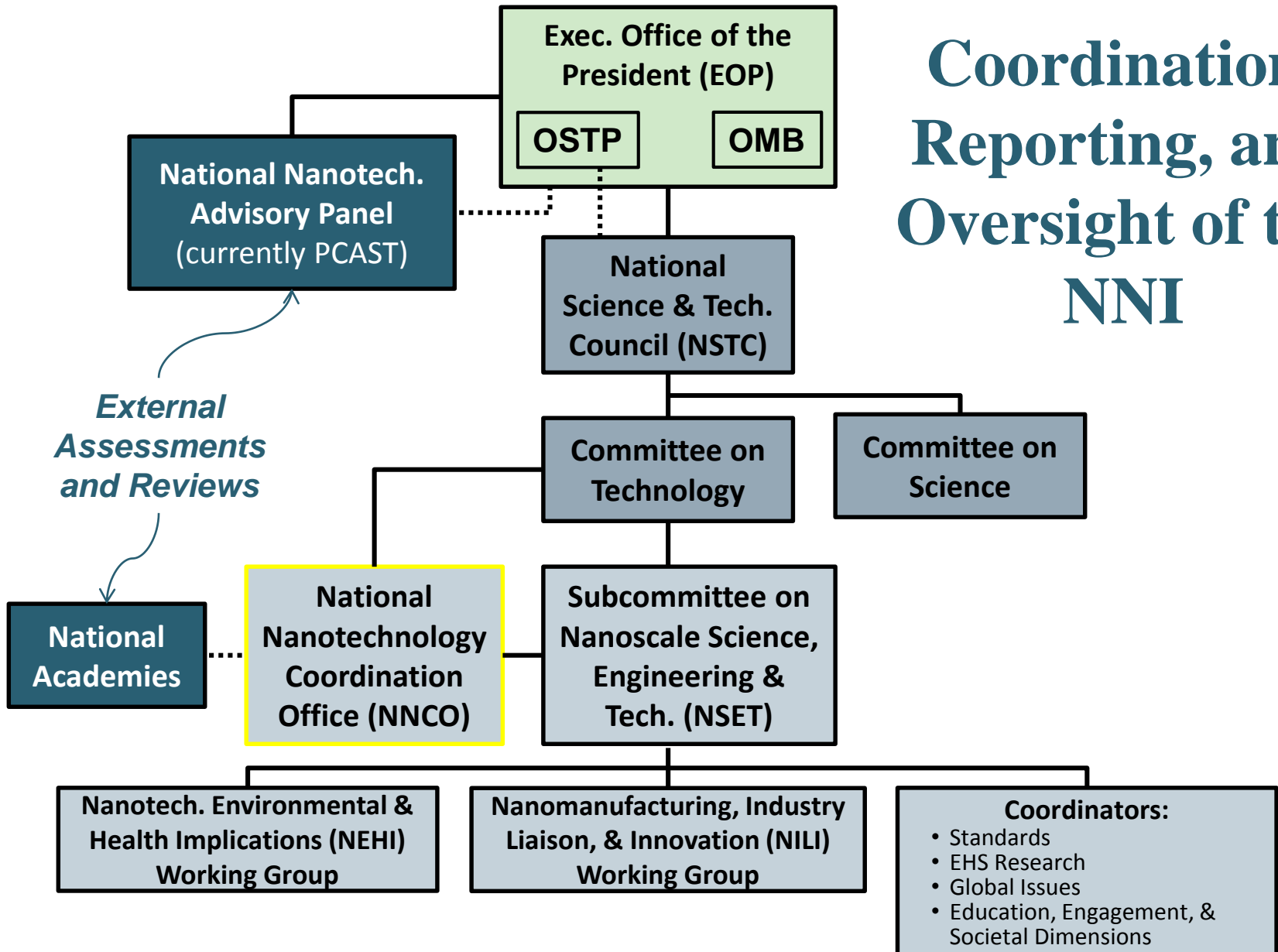
Vision: A future in which the ability to understand and control matter on the nanoscale leads to a revolution in technology and industry that benefits society.

Goals:

- Advance a world-class nanotechnology research and development program.
- Foster the transfer of new technologies into products for commercial and public benefit.
- Develop and sustain educational resources, a skilled workforce, and a dynamic infrastructure and toolset to advance nanotechnology.
- Support responsible development of nanotechnology.



Coordination, Reporting, and Oversight of the NNI



Key NNI Documents

- **Strategic Plans**

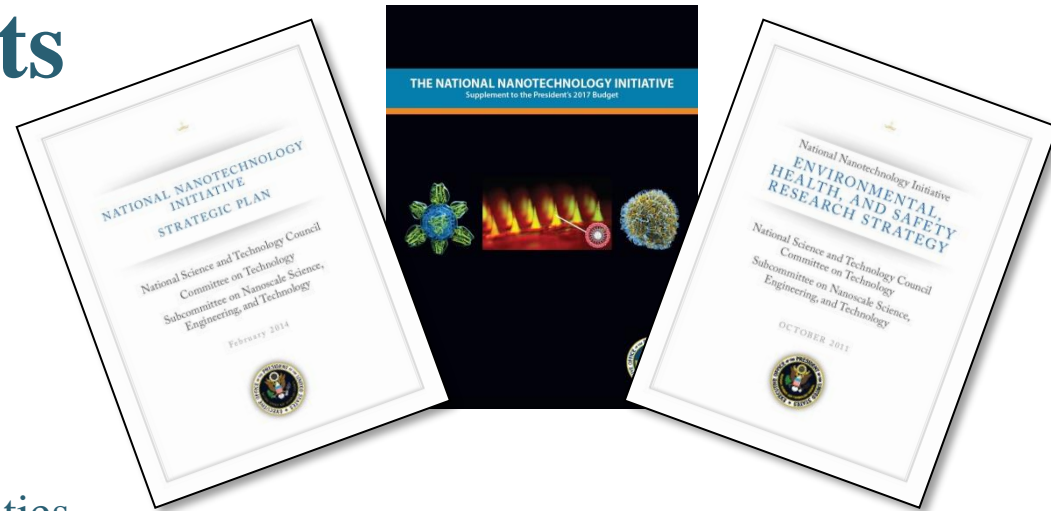
- Lay out a series of objectives under each NNI goal
- Describe Program Component Areas (PCAs)
- Define agency interests and priorities, coordination and assessment structures and mechanisms, collaborative agency activities and plans, and stakeholder input

- **Annual Budget Supplements**

- Report Federal nanotechnology investments and activities
- Serve as the annual reports of the NNI

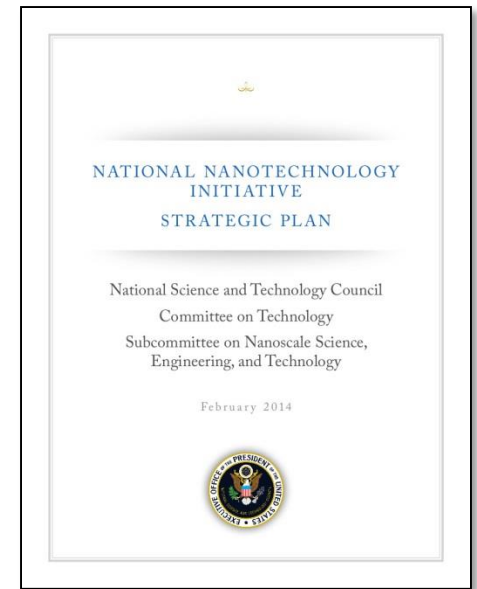
- **2011 NNI EHS Research Strategy**

- Federal agency nanoEHS research activities, priorities, and program plans



2014 NNI Strategic Plan

- Describes vision and goals, strategies to achieve the goals, and investment strategy
- Describes new PCAs, and importance of Nanotechnology Signature Initiatives (NSIs)
- Identifies specific objectives toward collectively achieving the vision
- **Example (Goal 2):** Foster the transfer of new technologies into products for commercial and public benefit.
 - Goal 2 Objective 2.1: Assist the nanotechnology-based business community in understanding the Federal Government’s R&D funding and regulatory environment
 - 2.1.1. Disseminate information on supporting sponsors and programs to assist transfer of nanotechnology-based technologies into Federal Government acquisition programs
 - 2.1.2. Improve public access to informational materials about resources available that support nanotechnology commercialization
 - 2.1.3. Provide informational materials, including points of contact, to explain issues pertinent to nanotechnology-enabled products and businesses



NNI Signature Initiatives

The Nanotechnology Signature Initiatives (NSIs) spotlight areas of national significance that can be more rapidly advanced through focused and closely-coordinated inter-agency collaboration.

The NSIs

- ***Address R&D gaps*** within areas of critical national need
 - Identify research ***thrust areas***
 - Select ***key research targets*** associated with near-and long-term expected outcomes
- ***Leverage*** skills, resources, and capabilities among multiple NNI agencies to maximize scientific and technological progress
- Provide a forum for communication and ***ongoing assessment*** of direction and progress
- ***Catalyze*** communities of practice and public private partnerships to accelerate commercialization

The NNI's Nanotechnology Signature Initiatives

- Intended to be dynamic; topical areas will likely be added and rotate/evolve over time.
- Five current signature initiatives:
 - Sustainable Nanomanufacturing
 - Nanoelectronics for 2020 and Beyond
 - Nanotechnology Knowledge Infrastructure
 - Nanotechnology for Sensors and Sensors for Nanotechnology
 - Water Sustainability through Nanotechnology

The collage displays five overlapping document covers from the NNI Signature Initiative series. Each cover is issued by the NSTC Committee on Technology, Subcommittee on Nanoscale Science, Engineering, and Technology. The documents are:

- Nanoelectronics for 2020 and Beyond** (top right)
- Sustainable Nanomanufacturing - Creating the Industries of the Future** (middle right)
- Nanotechnology Knowledge Infrastructure: Enabling National Leadership in Sustainable Design** (middle left)
- Nanotechnology Signature Initiative: Improving and Protecting Health, Safety, and the Environment** (bottom middle)
- Water Sustainability through Nanotechnology: Nanoscale Solutions for a Global-Scale Challenge** (bottom left)

The 'Water Sustainability through Nanotechnology' document cover includes the following text:

Nanoscale Solutions for a Global-Scale Challenge
 Collaborating Agencies: DOC/NIST, DOE, EPA, NASA, NSF, USDA/NIFA
 March 22, 2016

National Need Addressed

Water is essential to all life, and its significance bridges many critical needs for society: food, energy, security, and the environment. Projected population growth in the coming decades and associated increases in demand for water exacerbate the mounting pressure to address water sustainability. Yet, only 2.5% of the world's water is fresh water, and some of the most severe impacts of climate change are on our country's water resources. For example, in 2012, drought affected about two-thirds of the continental United States, impacting water supplies, tourism, transportation, energy, and fisheries – costing the agricultural sector alone \$30 billion. In addition, the ground water in many of the Nation's aquifers is being depleted at unsustainable rates, which exacerbates drilling ever deeper to tap groundwater resources. Finally, water infrastructure is a critically important but sometimes overlooked aspect of water treatment and distribution. Both technological and sociopolitical solutions are required to address these problems.

The small size and unique properties of engineered nanomaterials (ENMs) are particularly promising for addressing the pressing technical challenges related to water quality and quantity. For example, the increased surface area and reactivity of ENMs can be exploited to create precision sized-flow catalysts for water purification, and the enhanced strength-to-weight properties of nanocomposites can be used to make stronger, lighter, and more durable piping systems and components. The goal of the *Water Sustainability through Nanotechnology Signature Initiative* (the "Water NNI") is to take advantage of the unique properties of engineered nanomaterials to generate significant breakthroughs in addressing our Nation's water challenges. This initiative is designed to aid in the development of technological solutions that can alleviate current stresses on the water supply and provide methods to sustainably utilize water resources in the future. The three specific thrusts of the Water NNI are as follows:

1. Increase water availability using nanotechnology.
2. Improve the efficiency of water delivery and use with nanotechnology.
3. Enable zero-growth water consuming systems with nanotechnology.

This white paper highlights key technical challenges for each thrust, identifies key objectives to overcome those challenges, and notes promising areas of research and development where nanotechnology promises to provide the needed solutions. By shining a spotlight on these areas, this NNI will increase Federal coordination and collaboration, including with public and private stakeholders, which is vital to making progress in these areas. The additional focus and associated collective efforts will advance stewardship of water resources to support the essential food, energy, security, and environment needs of all stakeholders.

* Please note that "collaborating agencies" is used in the header space and does not necessarily imply that agencies provide additional funds or have obligations to do so. Agencies are listed in alphabetical order.

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NNI Grand Challenge

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

- Announced on 10-20-15 by the WH Office of Science and Technology Policy
- Moving beyond conventional (von Neumann) computing architectures to make computers that can solve problems faster than conventional computers and require much less energy

NNI 2.0 Depends on You

The promise of nanotechnology can only be achieved through community involvement. We want to hear from you.

How to engage?

- Webinars
- Workshops
- Respond to RFIs
- Contact NNCO



NNI 2016 Strategic Plan

- Are there any obvious gaps in the goals and objectives? Are there any objectives that are no longer among the top priorities that need to be addressed?
- What will be the new/hot areas of research or challenges in the next 5-10 years?
- Outside of additional funding, what can the Federal Government do to support activities or address challenges in the areas above?
- How will we know when the nanotechnology enterprise is successful in this area? How do we measure this?

Thank you.

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