National Nanotechnology Initiative: A Strategic Vision for Responsible Development

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Strategic Themes

• NNI Guidance Documents
• Integration of EHS across the NNI
• Nanotechnology Policy Directions
Collaborative Research & Development that will advance understanding & control of matter at nanoscale for:

- National Economic Benefit
- National Security
- Improved Quality of Life
NNI: Guided by Strategic Documents

NATIONAL NANOTECHNOLOGY INITIATIVE
STRATEGIC PLAN

National Science and Technology Council
Committee on Technology
Subcommittee on Nanoscale Science, Engineering, and Technology

February 2011

ENVIRONMENTAL, HEALTH, AND SAFETY RESEARCH STRATEGY

National Nanotechnology Initiative

National Science and Technology Council
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October 2011
NNI Vision and Goals: Strategic Plan to Organize the Innovation Pipeline

Vision of the NNI .... a revolution in technology and industry that benefits society.

Goals

• Advance world-class nanotechnology research and development

• Foster the transfer of new technologies into products for commercial and public benefit

• Develop and sustain educational resources, a skilled workforce, and the supporting infrastructure and tools to advance nanotechnology

• Support responsible development of nanotechnology
EHS Challenge: Translate Goal 4 into a Strategy to Decrease Risk and Support Product Development

EHS Mission:

• Protect public health and the environment through science-based risk analysis and risk management and
• Foster technological advancements that benefit society
Risk Management Research Framework

Product Life Cycle Stages

Nanomaterials Synthesis and Use Potential Release & Disposal

Research to Understand and Manage Risk
- Measurement
- Human Exposure
- Human Health
- Environment

Risk Assessment

Predictive Modeling

Risk Management
- Product life cycle
- Regulatory decision-making
- Public outreach
- Research planning

ELSI Considerations
Targeting and Accelerating Research

Critical Elements:
• Prioritize nanomaterials for research
• Establish standard measurements, terminology, nomenclature, and assay methods
• Develop informatics and predictive modeling tools
• Stratify knowledge for risk assessment
• Partner to achieve the NNI EHS research goals, including globally
Partnering Globally to Achieve the NNI EHS Research Goals

Communities of Research for Nanotechnology EHS

NNI Booth at Japan Nanotech 2012

NNI-OECD International Metrics Symposium

Russian scientists met with Deputy Director Sally Tinkle at the National Nanotechnology Coordination Office as part of the Open World Program.
NNI Signature Initiatives: Focusing the Scientific and Technological Spotlight

- Address R&D gaps within **critical national challenges**
- Leverage skills, resources, and capabilities among multiple NNI agencies to **maximize scientific and technological progress**
- Prepare a field for **industrial commercialization**
Sustainable Nanomanufacturing

Collaborating Agencies: NIST, NSF, DOE, DOD, EPA, IC/DNI, NIH, NIOSH/OSHA, USDA/FS

Goal: Use nanotechnology to improve design of scalable and sustainable nanomaterials, components, devices, and processes and to develop nanomanufacturing measurement technologies

DeVolder et al., Advanced Materials
Nanotechnology for Sensors & Sensors for Nanotechnology

Improving and Protecting Health, Safety, and the Environment

**Collaborating Agencies:** CPSC, DOD/DTRA, EPA, FDA, NASA, NIH, NIOSH, NIST, NSF, USDA/NIFA

**Goal:** To coordinate and stimulate creation of the knowledge, tools, and methods to develop nanotechnology-enabled sensors and sensors to track the fate of engineered nanomaterials in the body and the environment.

Image from NNI Nanotechnology-enabled Sensing Report, 2009
Nanotechnology Knowledge Infrastructure
Enabling National Leadership in Sustainable Nanomaterial Design

Collaborating Agencies: CPSC, DOD, DOE, EPA, FDA, NASA, NIH, NIOSH, NIST, NSF, OSHA

Goal: To develop the infrastructure to support the transformation of data to knowledge in support of nanotechnology and build the tools and communities of scientists and technologists who will use the tools
Identifying Synergies and Opportunities

Potential areas for collaboration

- Understanding physical and chemical properties along the length and time scale
- Data and databases of mutual interest
- Procedural and technical issues in developing open innovation communities
  - e.g., IP and standards, data curation and federation, minimum information requirements
- Shared protocols and best practices
Advanced Manufacturing Partnership: Creating High-Quality Manufacturing Jobs of the Future in the US

- Developed by industry & university leaders
- **Goal:** invest $1 billion to catalyze a national network of up to 15 manufacturing innovation institutes around the country that would serve as regional hubs of manufacturing excellence

First Award Announced August 16, 2012
**National Additive Manufacturing Innovation Institute**, Youngstown, Ohio

- Initial $30 million in federal funding, matched by $40 million from the winning consortium, which includes 40 companies, 9 universities, 5 community colleges, and 11 non-profit organizations from the Ohio-Pennsylvania-West Virginia ‘Tech Belt.’
- Additive manufacturing (3D printing) is a new way of making products and components from a digital model
Emerging Technologies Interagency Policy Coordination Committee (ETIPC)

- **Broad principles:** guide development and implementation of policies for oversight across the US government.

Science and Technology Priorities Memo for FY14 Budget recognizes the importance of nanotechnology, nanoEHS, and NSIs

- Based, and commensurate with risk; nanomaterials should not as a class be presumed either benign or harmful.
Thank You!

SENN Oct 31: U.S. NNI EHS Contributions to Nanotechnology Risk Assessment: A Progress Report

NNI Dashboard @ http://nanodashboard.nano.gov