



EPA's Program Activities Relating to Nanotechnology and Nanomaterials

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What is Nanotechnology?

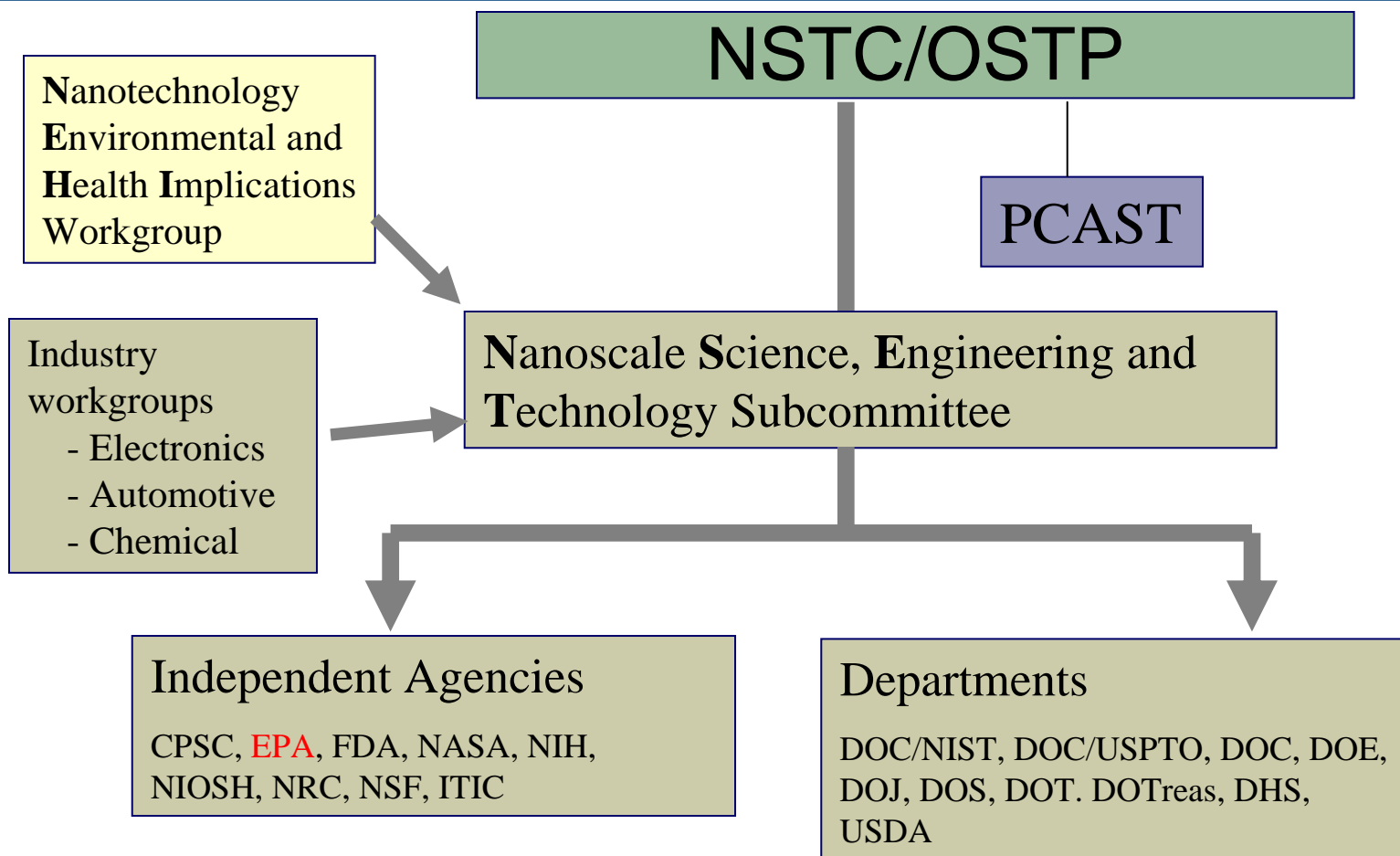
National Nanotechnology Initiative uses a 3-part definition:

- **Size:** Macromolecular level (**between individual atoms/molecules and bulk matter**) in the length scale of approximately ***1 – 100 nm*** in any one dimension
- **Properties:** The intermediate size generates ***unique phenomena and novel properties***
- **Control:** Ability to ***understand, control, and/or manipulate matter*** at this scale.

www.nano.gov



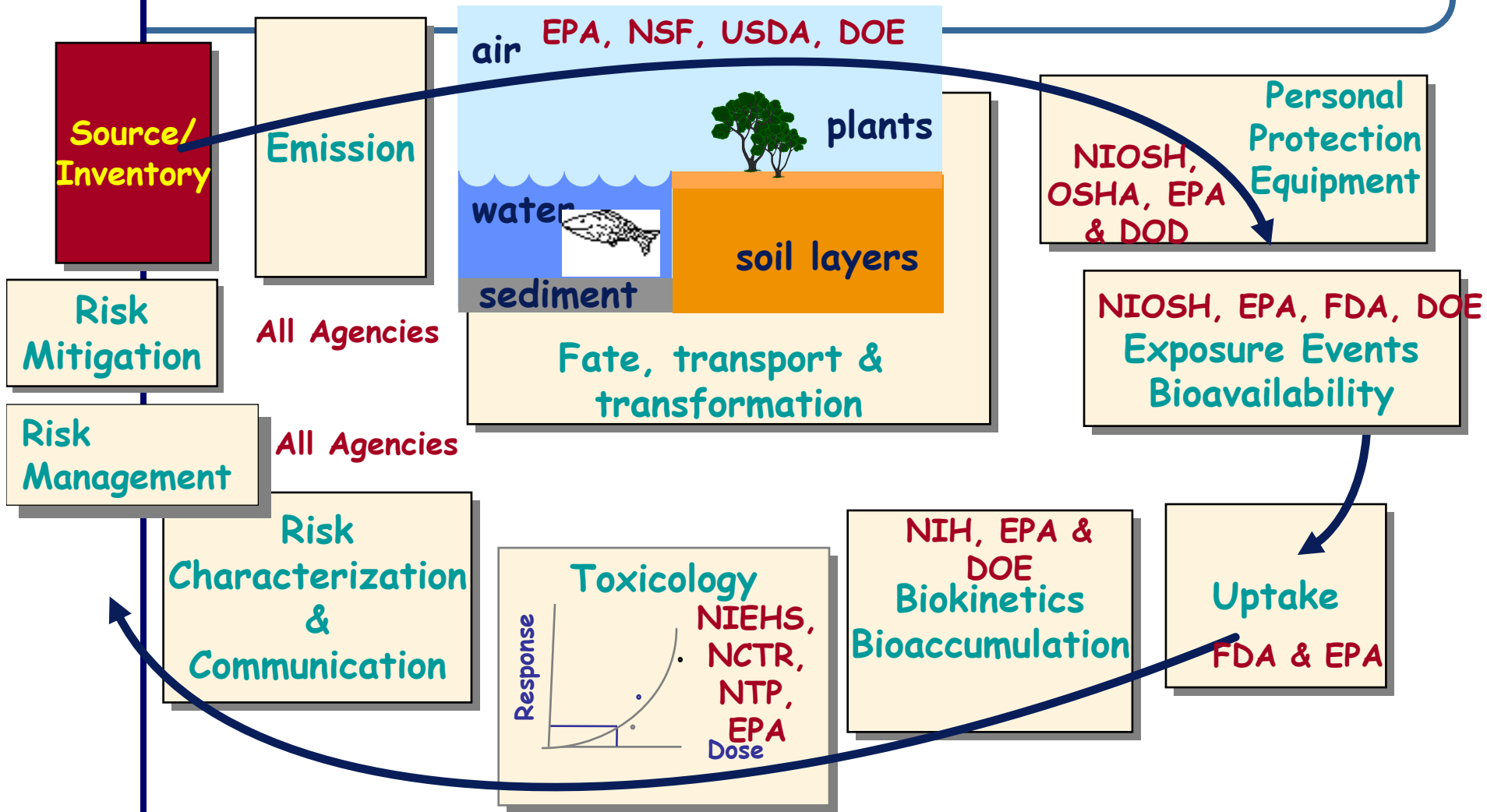
Federal Coordinating Structure for National Nanotech Initiative



Federal Nanotechnology R&D in the U.S. is coordinated by the NNI



Regulatory & Research Topics for EHS



Source: DOE Molecular Foundry—Lawrence Berkeley National Laboratory
Office of Pollution Prevention and Toxics, U.S. EPA



Nanotechnology: EPA's Role

- **Provide leadership** to the U.S. and global community in environmental applications and implications of nanotechnology
- **Support research** directly and in collaboration with other agencies through the inter-agency work groups established under the NNI
- Help to **build a research community** with knowledge in nanotechnology
- Address nanotechnology as appropriate under EPA's statutes to **protect human health and the environment**
- Proactively work with industry and NGOs to **ensure responsible development and realize potential benefits** of nanotechnology



EPA Offices

- OPP – nano-pesticides (e.g. nano silver)
- OAR – fuel additives
- OSWER – site remediation, life-cycle issues
- OW – discharges, water treatment
- ORD – research into applications and implications
- OPPT – industrial nanomaterials



SPC: White Paper

- Science Policy Council (SPC): EPA's venue for discussion and management of cross-agency science issues
- Intra-agency Nanotechnology Workgroup convened by SPC (December 2004)
- Group charge: develop a white paper to examine the applications and implications of nanotechnology for the consideration of Agency managers
- Submission for SPC consideration (November 2005)
- External peer-review/Public Comment (19-20 April 2006)
- Publication (Mid 2006)



White Paper Draft Recommendation Areas

- Pollution Prevention and Stewardship
- Research
 - Chemical identification and characterization
 - Environmental fate
 - Environmental detection and analysis
 - Potential releases and human exposures
 - Human health effects assessment
 - Ecological effects assessment
- Risk Assessment
- Cross-Agency Workgroup
- Collaboration
- Training



Nanotechnology: ORD

- Science to Achieve Results (STAR) Grants on Nano >\$24 million to date
- Co-Chair (with OPPTS) of Agency White Paper workgroup
- \$8.6 research budget request for 07
- ORD Research Strategy - initial ORD focus on eco effects, environmental releases and exposures, environmental fate and transport, risk assessment (inc. case study), life-cycle and detection/monitoring.
- Cooperation with OPPT on: new chemical reviews, consideration of data elements for stewardship program, nanotech P2/DfE issues



EPA Nanotechnology STAR Grants

- 2001 Environmental Applications of Nanotechnology
 - 16 awards, \$5.6 million
- 2002 Environmental Applications of Nanotechnology
 - 16 awards, \$5 million
- 2003 Health and Environmental Effects of Manufactured Nanomaterials
 - 12 awards, \$4 million
- 2001 Environmental Applications of Nanomaterials
 - 7 awards, \$2 million
- 2004/5 Health and environmental effects of Nanoparticles
 - 19 awards, \$7 million (joint with NSF, NIOSH)
- 2005/6 Health and Environmental effects of Nanomaterials
 - Release Nov 05, joint with NSF, NIOSH, NIEHS
- 2007 President's Budget Request \$8.9 million



OPPT Activities

- Reviewing nanomaterials that are new chemicals
- Developing policy guidance on new/existing:
 - “*TSCA Inventory Status of Nanoscale Substances: General Approach*”
- Developing possible Stewardship Program
- Promoting Pollution Prevention benefits (conference anticipated in Washington later this year)
- Authorities under TSCA appear to be adequate but there is a fundamental need for a better understanding of potential risks



Stewardship Program

- EPA Public Meeting (June 2005)
- NPPTAC “Overview Document” forwarded to EPA (Nov. 22, 2005)
- Agency-wide Workgroup formed by OPPT
- Public scientific peer consultations (spring 2006):
 - materials characterization
 - management practices
- Submission of ICR for approval (mid-2006)
- Approval of ICR; publication of FRN (fall 2006)
- Agency decision on initiation/implementation (fall 2006)
- Public scientific peer consultations (spring 2007):
 - risk assessment
 - risk management
- Possible information gathering rule for evaluation (outyears)



NPPTAC Overview Document: Schematic of Program

	Information Reporting	Information Gathering	Management Practices
Basic Program	<u>All available:</u> Materials Characterization Hazard data	Gap filling for characterization	Training MSDS Engineering controls PPE
In-Depth Program	Usage data Management practices	Also: New data generation (hazard, PPE, etc.)	Also: Extend practices along value chain Monitoring



External Activities: OECD

- Organization for Economic Co-operation and Development (**OECD**): Workshop on the Safety of Manufactured Nanomaterials (hosted by U.S., Dec. 7-9, 2005, Washington, DC)
- Works in following areas:
 - **Definitions, nomenclature and characterization** (properties, uses, fate)
 - **Environmental effects** (hazard identification; hazard and exposure assessment methods)
 - **Human health effects** (hazard identification; hazard and exposure assessment methods)
 - **Regulatory frameworks** (in the industrial chemicals sector)
- US has taken on a leadership role internationally
- 39th meeting of the Chemicals Committee (Feb. 15-17, 2006, Paris) decided to establish a Working Party on the Health and Environmental Safety Implications of Manufactured Nanomaterials
- First Working Party meeting planned for London, 26-27 October 2006
- Will help share the burden and make approaches more consistent, which should reduce burden on industry and facilitate global markets



Summary

- Need for a consistent message on what is needed for NMs
 - Reassure public
 - Enable industry to invest wisely
- Need to review new chemical NMs informed by sound science
- Need to understand whether, and to what extent, there are issues with existing chemical NMs
- TSCA authorities appear to be adequate, however health and environmental safety data and assessment techniques are limited
- Gaps in our understanding can be addressed through
 - EPA White Paper
 - Research under NNI
 - Testing conducted by NTP, ORD and other sources
 - Cooperation through the OECD
 - Stewardship program