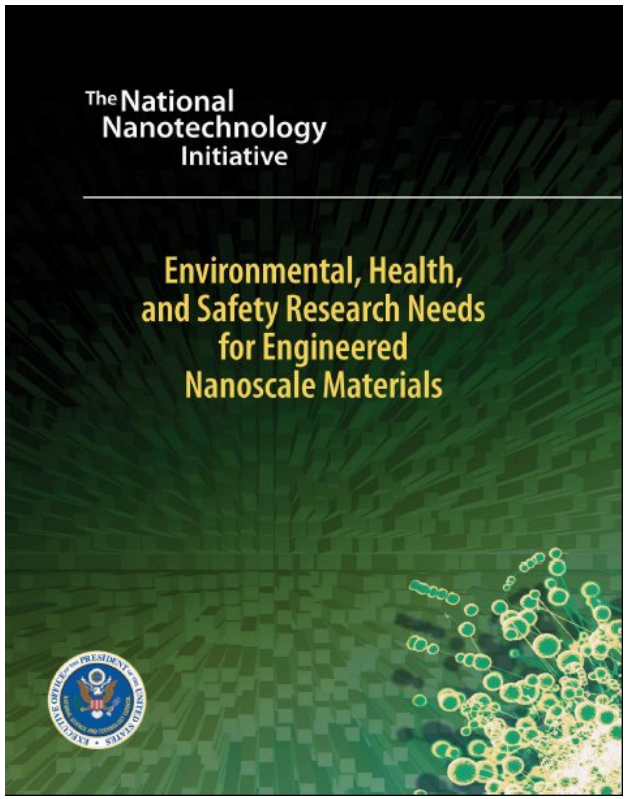
NATIONAL NANOTECHNOLOGY INITIATIVE

Health & Environmental Surveillance: Priority Research Needs



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Scope of Research

5. Health and Environmental Surveillance

This area addresses research on the systematic collection, analysis, and interpretation of data obtained over time on human exposure to nanomaterials in the workplace and other indoor and outdoor environments; research to determine the presence of these materials or their byproducts in the environment; research on the determinants of exposures to support interpretation of limited or surrogate workplace and environmental data; monitoring of the health experience of individuals exposed to nanomaterials; and monitoring outcomes in habitats impacted by nanomaterials.

Research Needs focus on

- **Incidence of specific adverse human or environmental health outcome to identify risk factors**

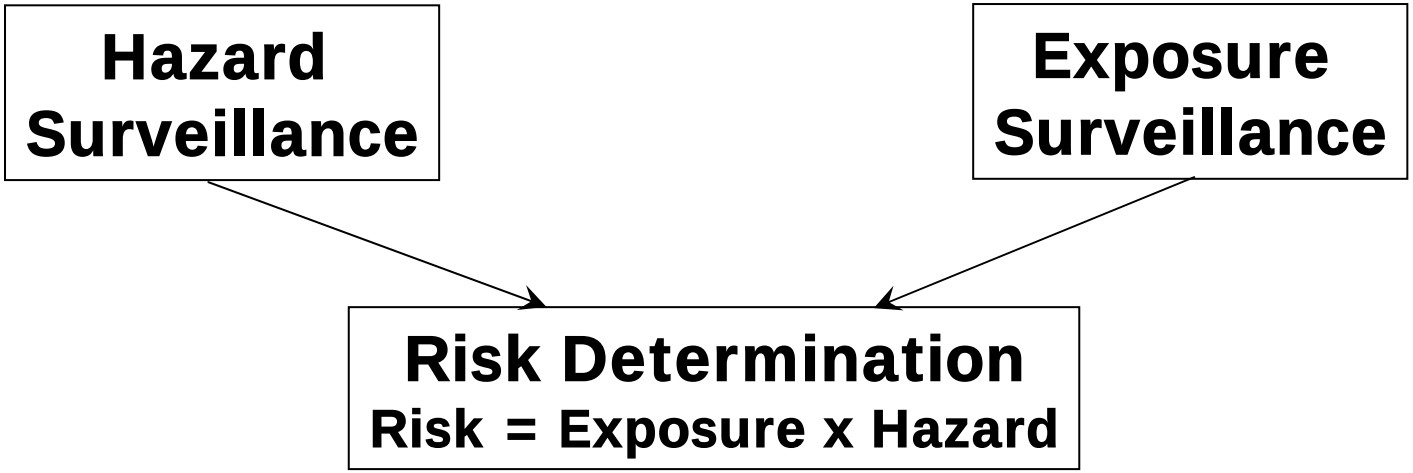
- **Specific risk factor to identify adverse human or environmental health outcomes**

General Background

- **Fourteen research needs are identified**

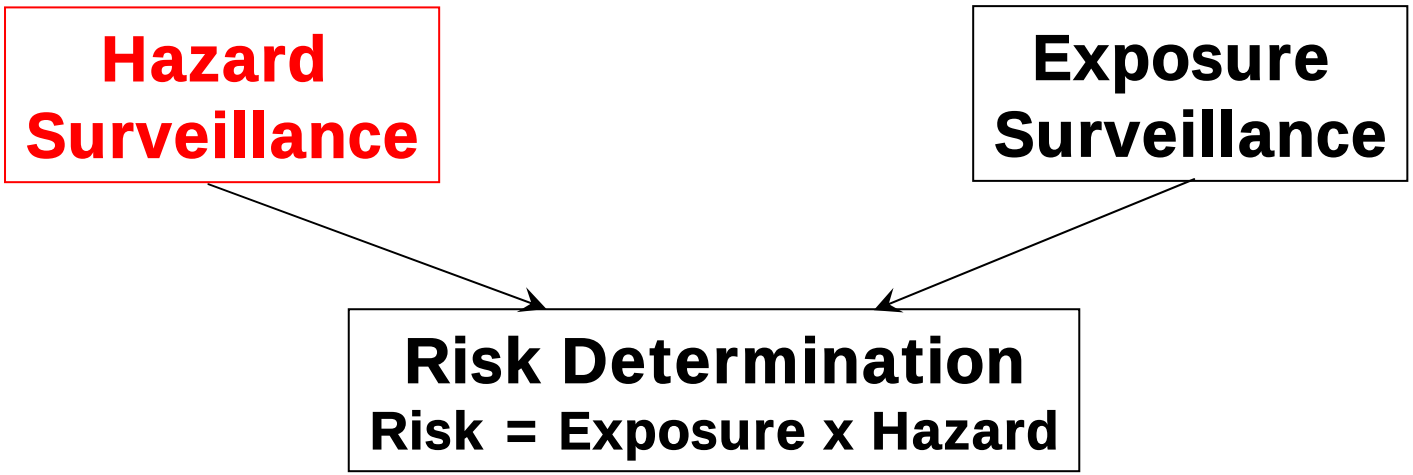
- **Overlaps with other Research Areas**
  - **"Develop methods for measuring nanomaterial exposures in environmental matrices" falls under "Develop methods for detecting nanomaterials in biological matrices, the environment, and the workplace" of the "Instrumentation, Metrology, and Analytical Methods" Research Area**
  - **"Determine environmental fate and effects following known or suspected releases" overlaps with "Understand the transformation of nanomaterials under different environmental conditions" and "Evaluate effects beyond those in individuals of a species" of the "Nanomaterials & the Environment" Research Area**

Risk Assessment Framework



- Occupational Health and Exposure Surveillance
- Public Health and Exposure Surveillance
- Environmental Health Surveillance

Hazard Surveillance



Research Needs

Collect health information

Scope

- Passive: reviewing diagnoses for exposed individuals seeking medical care
- Active: targeted medical evaluations for a specific outcome
- Hypotheses formation: unanticipated health events trigger investigations and research
- Hypotheses testing: compare prevalence of a specific outcome in exposed and unexposed populations

Rationale

- Reduce Uncertainty About Risks
  - Quantify the human health risks associated with exposures
  - Feedback on whether health protection programs provide the desired level of protection
  - Provide a basis for planning and prioritizing research and protective actions
- Provide new information about properties
  - Identify unexpected adverse events or trends as early as possible

Research Needs

Analyze injury and illness reporting

Scope

- Evaluation of existing occupational and consumer injury and illness reporting programs

Rationale

- Aid in identifying adverse outcomes associated with nanomaterials
- Can be simpler and less costly to obtain

Research Needs

Gain early knowledge of unanticipated effects to biota

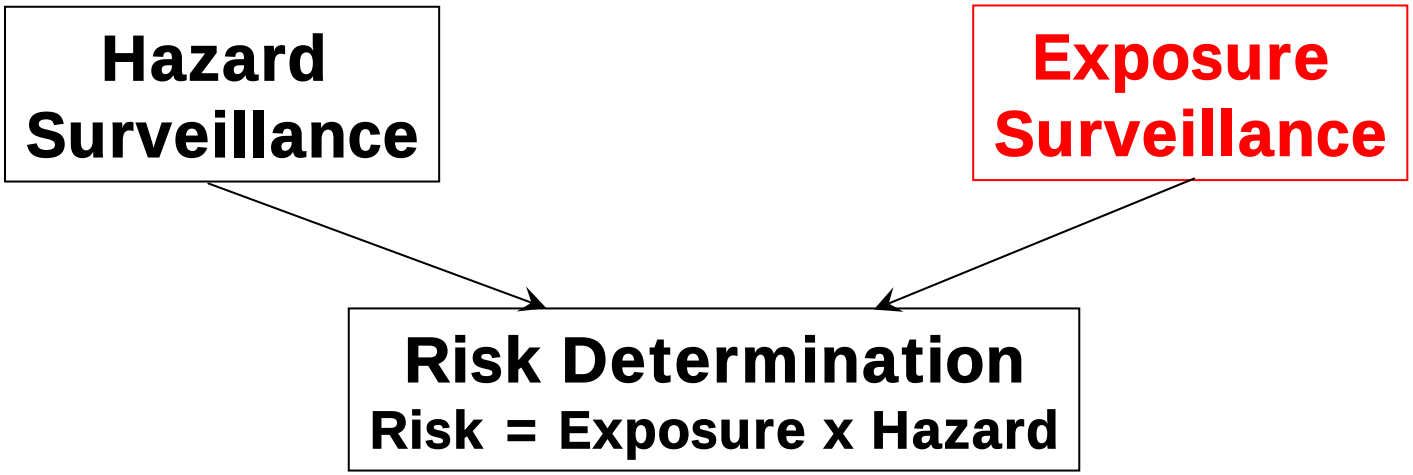
Scope

- **Collection, counting, and evaluation of specimens in habitats affected by nanomaterials to identify abnormalities, population changes or other effects**

Rationale

- **Provides early information about unanticipated behavior of nanomaterials in the environment**

Exposure Surveillance



Research Needs

Collect exposure information

Scope

- Collect exposure data on nanomaterials in the workplace and other indoor and outdoor environments
- Qualitative and quantitative data

Rationale

- Data supports interpretation of workplace and environmental information
- Important for risk analysis, research prioritization related to biological effects, and planning
- Help to establish whether exposures have occurred as a result of nanomaterial release
- Use existing monitoring programs where possible for data collection

Research Needs

Establish environmental monitoring activities

Scope

- Surveillance of air, water, soil, and sediments to establish environmental exposures resulting from nanomaterial use/release

Rationale

- Help with prioritizing research on environmental effects of exposures and underlying mechanisms
- Promote early prevention activities

Research Needs

Understand workplace processes and factors that determine exposure to nanomaterials

Scope

- Understanding nanomaterials behavior in processes and workplace factors (e.g., task and location variable) that determine releases and resultant exposures
- Reinterpreting existing monitoring data, and identifying exposures that have not been monitored

Rationale

- Result in reduction in uncertainty about potential risks
- Provide information on exposure potential for workers, general population, and environmental species to the nanomaterials
- Aid in planning protective actions to prevent releases and exposures, and development of protection strategy in the absence of known health impact

Research Needs

Quantify nanomaterial exposure to the general population from consumer products, industrial processes, and products containing nanomaterials

Scope

- Intentional and unintentional exposures to nanomaterials may occur in the general population from the production and use of consumer products

Rationale

- Assess product use resulting in nanomaterial releases
  - Quantify human exposure
- Provide data on industrial releases and subsequent contamination of environmental media, medical and consumer oriented exposures
  - Quantify human exposure through a number of potential pathways

Research Needs

Identify population groups exposed to engineered nanoscale materials

Scope

- Population groups potentially exposed to nanomaterials: workers, patients, consumers, neighbors of production or utilization plants

Rationale

- Identification of exposed groups is integral to
  - Collection of exposure information, including quantifying intentional and unintentional exposures to nanomaterials
  - Collection of health information among persons potentially exposed to nanomaterials
  - Epidemiologic study including possible exposure registries
  - Focused intervention
- Information concerning exposure and health of exposed groups may ultimately contribute to
  - Improved manufacturing and waste handling processes
  - Most appropriate commercial and personal use of nanomaterials

Research Needs

Evaluate release scenarios most likely to create environmental exposures

Scope

- **Analogous to identifying susceptible sub-populations for human exposure**

Rationale

- **Necessary for targeted environmental surveillance activities**

Comments

- Is the breadth of this research category captured by the research needs identified?
- What criteria should be considered in setting research priorities?
- Which research need(s) should be prioritized within this category?
- Additional comments?