Risk Management Methods Priority Research Needs

The National Nanotechnology Initiative

Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials
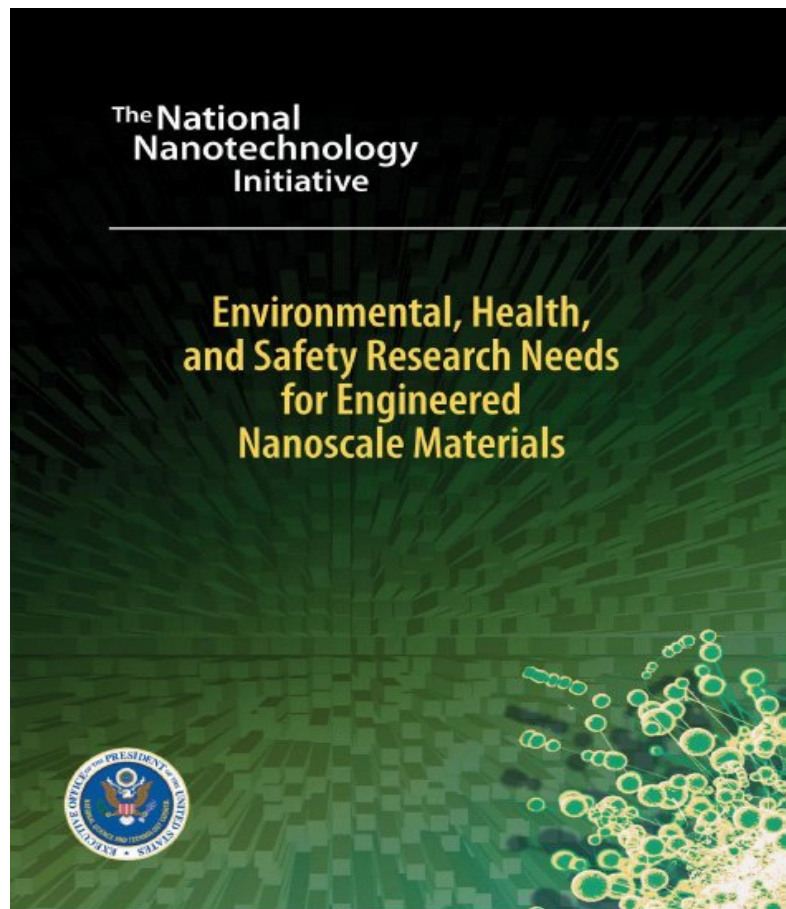
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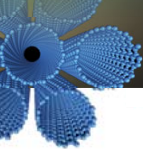
6. Risk Management Methods

This area comprises research on methods for risk management of nanomaterials, including research on methods to

- <u>reduce exposures</u> to potentially hazardous nanomaterials;

- improve procedures for <u>risk and accident avoidance</u>;

- improve <u>work practices, engineering controls, and protective equipment</u>; and

- develop procedures for <u>life cycle assessment</u> and improve understanding of potential impacts over the full life cycle, from raw material extraction through disposal and/or recycling.

Risk Management Methods for Nanomaterials

- 24 research needs are identified in Chapter 6

  Major themes help organize the areas

- Overarching concepts for risk management also expressed in Chapter 1 of the document

  - Good risk assessment is essential for good risk management

  - Research that is prioritized through value of information is an integral part of the risk management process

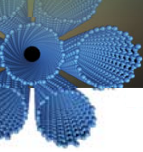 - Rapid advancement in nanomaterials development necessitates an "adaptive management" approach to risk management
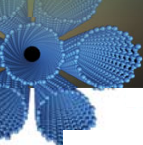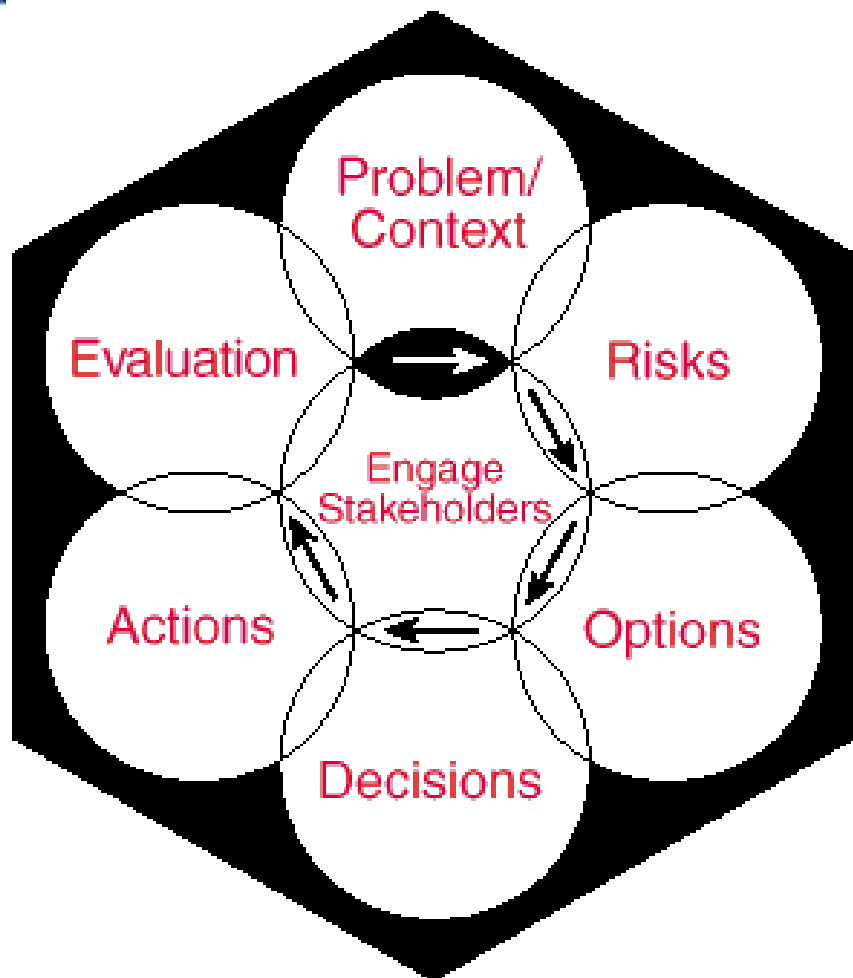
The Presidential/Congressional Commission on Risk Assessment and Risk Management

Final Report
Volume 1
1997

General theme

Evaluate the appropriateness and effectiveness of current and emerging risk management approaches for identifying those nanomaterials with the greatest potential risks

More specific themes

A. Understand and develop best workplace processes and environmental exposure controls

B. Examine product or material life cycle for risk reduction choices

C. Develop risk characterization information that allows classification for hazard properties

D. Develop trend information to help focus research efforts

E. Develop specific risk communication approaches and materials

Understand and develop best workplace processes and environmental exposure controls

- Evaluate accepted risk management approaches for nanomaterials

- Evaluate the opportunities for greatest potential risk reduction through minimizing hazard or exposure to nanomaterials

- Understand the efficacies of PPE against nanomaterials as exposure and hazard information evolve

- Improve understanding of the unique challenges for process design and engineering control systems applied to engineered nanoscale materials in air

Understand and develop best workplace processes and environmental exposure controls

- Understand the role and effectiveness of work practices and administrative controls in reducing exposures to nanomaterials as exposure and hazard information evolve

- Develop spill mitigation technologies and risk management procedures specific to nanomaterials

- Identify and evaluate the appropriate packaging requirements

- Develop filters and fabrics with improved capturing and regenerating/self-cleaning capabilities
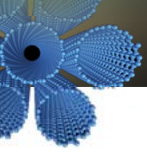
Research Theme B

Examine product or material life cycle for risk reduction choices

- Understand the efficacies of PPE against nanomaterials as exposure and hazard information evolve

- Improve understanding of the unique challenges for process design and engineering control systems applied to engineered nanoscale materials in air

- Understand how LCA may be suitable and adaptable to engineered nanomaterials

- Determine the stages in a product's life cycle that introduce the greatest potential for risk

Examine product or material life cycle for risk reduction choices

- Determine whether any residual manufacturing wastes of concern are being created and, if so, which processes are associated with such wastes

- Where wastes of concern are being produced, determine the best methods for waste disposal

- Develop environmentally benign manufacturing processes that can reduce the potential impact of nanomaterials

Develop risk characterization information that allows classification for hazard properties

- Understand factors influencing flammability and reactivity

- Fully characterize the nanomaterial to determine its properties and allow for an accurate determination and classification if it is a hazardous material
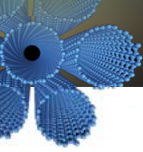
## Develop trend information to help focus research efforts

- Understand the flow of nanomaterials through the economy and ultimate disposition

- Understand the use of nanomaterials in products

- Discern trends in effects or causality in accidents or other incidents that may relate to the sizes or novel properties of engineered nanoscale materials

Develop specific risk communication approaches and materials

- Evaluate whether current risk communications are adequate for known risks and for risks that can be anticipated from currently available information

- Where necessary, develop effective methods to communicate risk or safety information to potentially affected populations

- Determine how best to communicate the hazard to the emergency response community under real-world accident scenarios
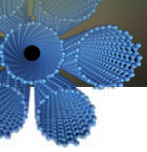
Conclusions

- 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?