NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

NTRC | NANOTECHNOLOGY RESEARCH CENTER

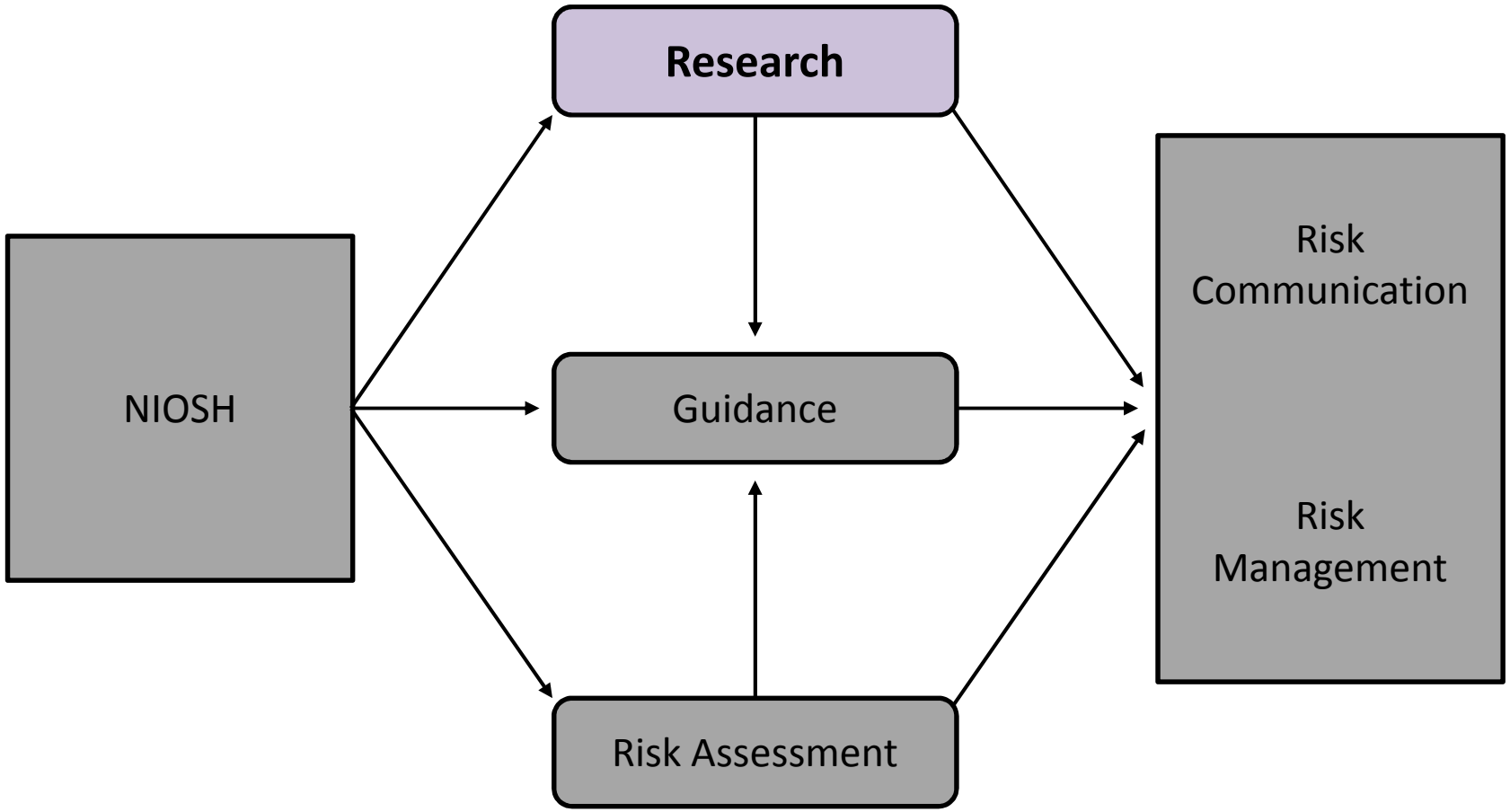
Occupational Risk Management System Used by NIOSH for NMNs

Paul A. Schulte, Laura Hodson, Charles L. Geraci, Ralph Zumwalde, Eileen D. Kuempel

National Institute for Occupational Safety and Health

CDC Workplace Safety and Health | NIOSH


Research
NIOSH
Guidance
Risk Communication
Risk Management
Risk Assessment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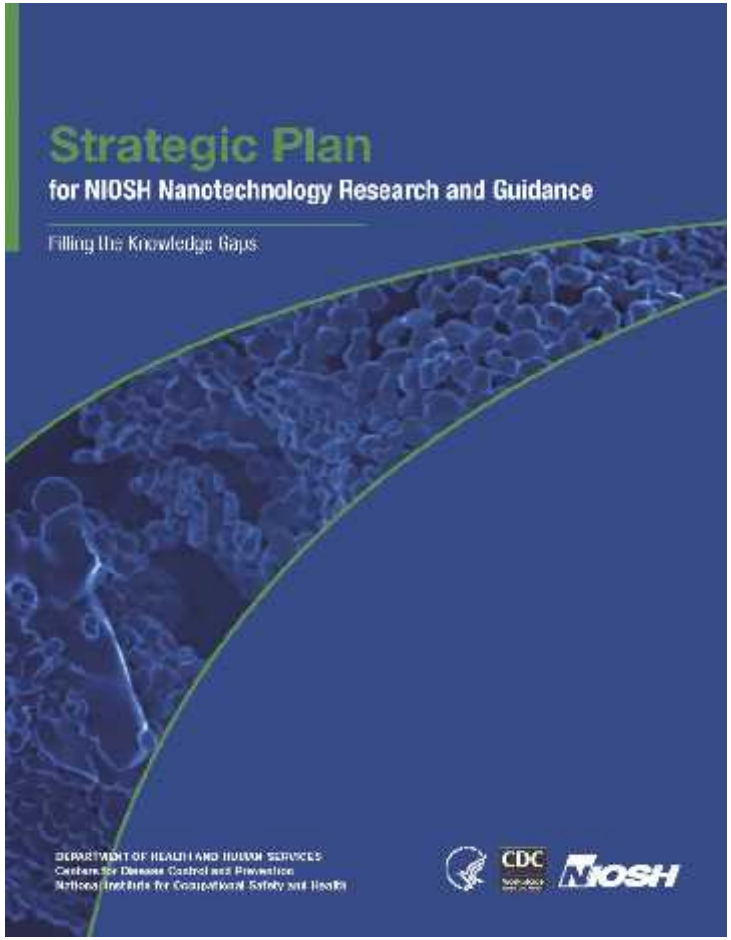
Strategic Plan
for NIOSH Nanotechnology Research and Guidance
Filling the Knowledge Gaps
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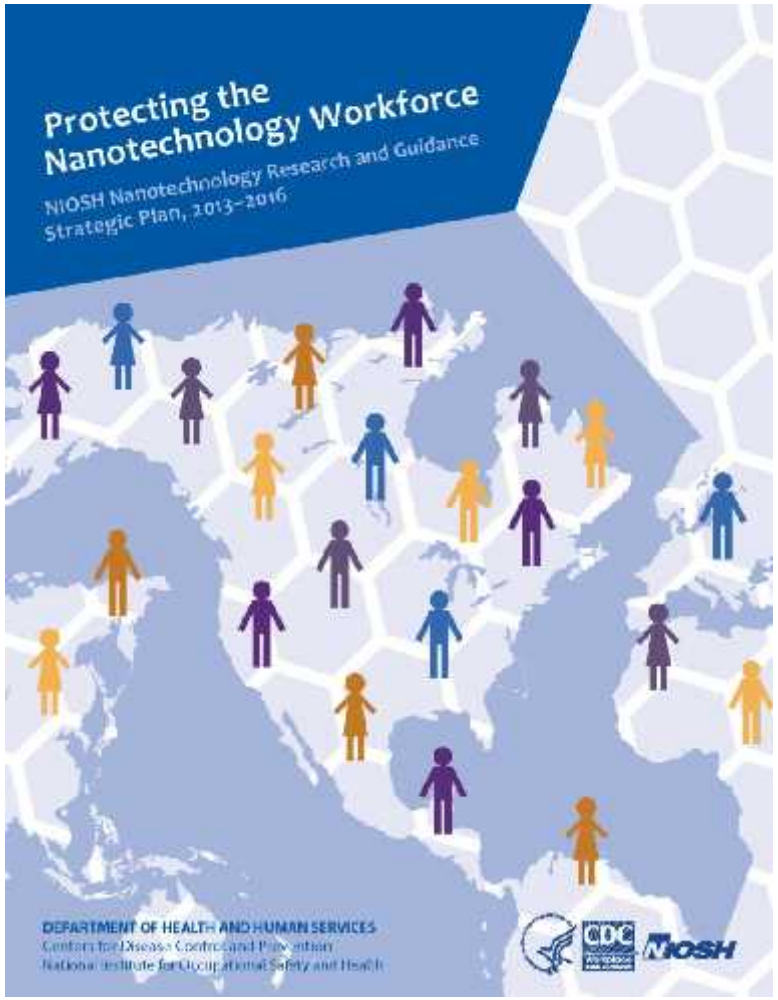
Protecting the Nanotechnology Workforce
NIOSH Nanotechnology Research and Guidance
Strategic Plan, 2013–2016
DEPARTMENT OF HEALTH AND HUMAN SERVICES
CDC
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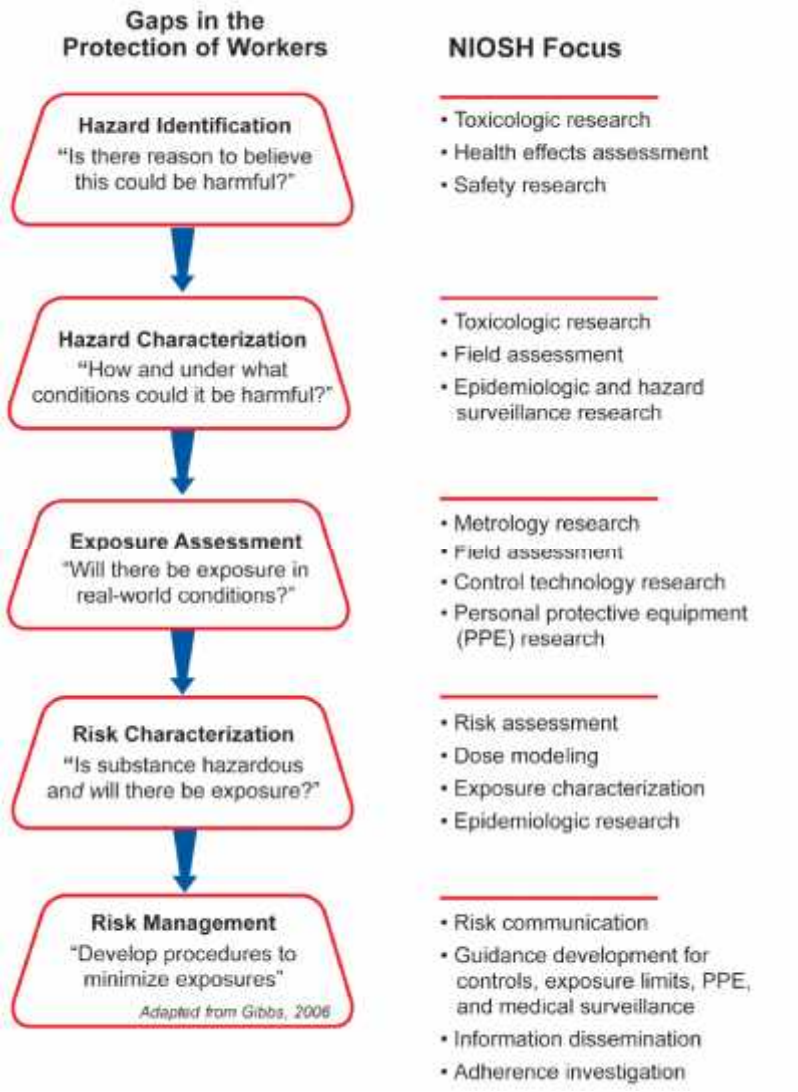
Strategic Plans

- 10 critical areas
- Peer reviewed
- Tightly focused – driven by toxicology

10 Critical Research Areas

1. Toxicity and internal dose
2. Measurement methods
3. Exposure assessment
4. Epidemiology and surveillance
5. Risk assessment
6. Engineering controls and PPE
7. Fire and explosion safety
8. Recommendations and guidance
9. Global collaborations
10. Applications


Gaps in the Protection of Workers
NIOSH Focus
Hazard Identification
"Is there reason to believe this could be harmful?"
• Toxicologic research
• Health effects assessment
• Safety research
Hazard Characterization
"How and under what conditions could it be harmful?"
• Toxicologic research
• Field assessment
• Epidemiologic and hazard surveillance research
Exposure Assessment
"Will there be exposure in real-world conditions?"
• Metrology research
• Field assessment
• Control technology research
• Personal protective equipment (PPE) research
Risk Characterization
"Is substance hazardous and will there be exposure?"
• Risk assessment
• Dose modeling
• Exposure characterization
• Epidemiologic research
Risk Management
"Develop procedures to minimize exposures"
Adapted from Gibbs, 2006
• Risk communication
• Guidance development for controls, exposure limits, PPE, and medical surveillance
• Information dissemination
• Adherence investigation

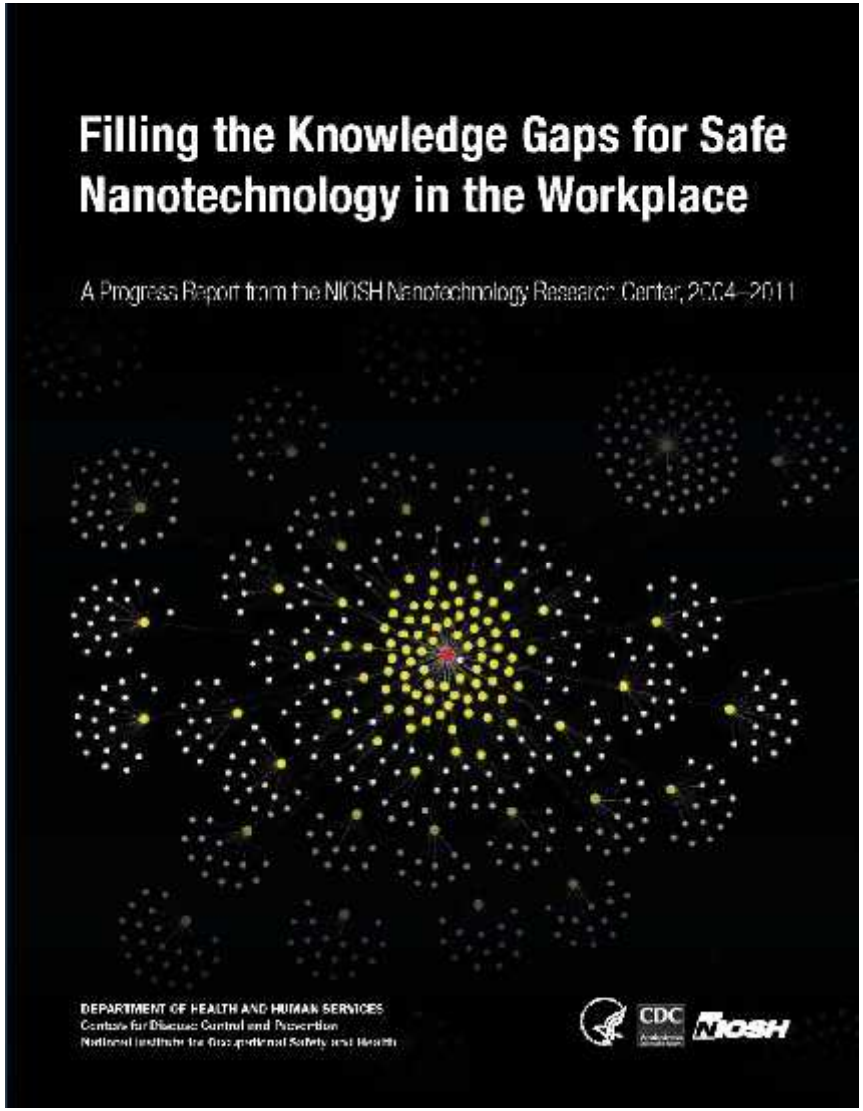
Nanotechnology Research Center (NTRC)

- Virtual Center
- ~ 50 scientists – range of disciplines
- 2004–present

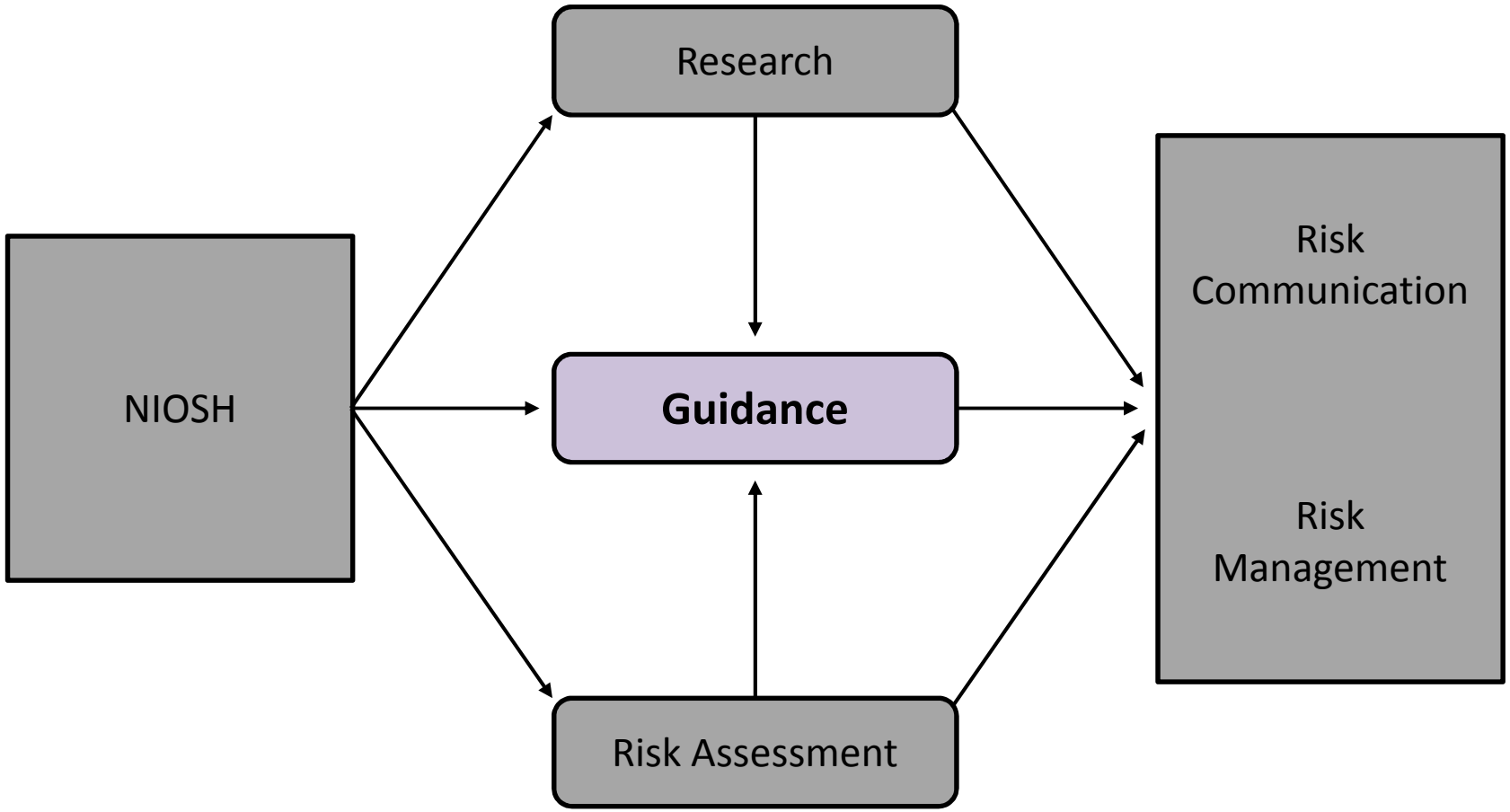
Produced more than 400 peer-reviewed scientific publications

- Resulting > 5,000 primary citations and 82,000 secondary citations
- 650 invited presentations

[NIOSH 2012]



http://www.cdc.gov/niosh/docs/2013-101/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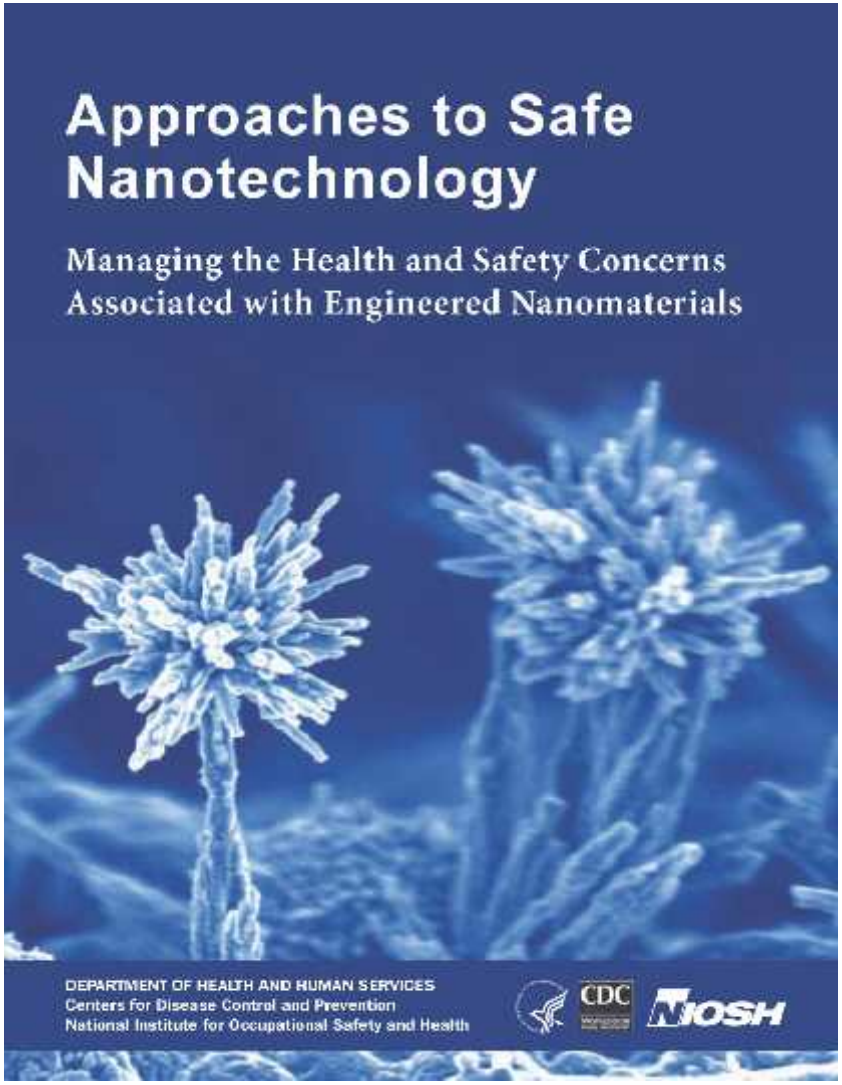
Approaches to Safe Nanotechnology
Managing the Health and Safety Concerns Associated with Engineered Nanomaterials
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Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
CDC
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Story of Approaches to Safe Nanotechnology:

An Information Exchange with NIOSH

Utilized realization that there was over 100 years of history of controlling fine dusts, powders and gases

- Nanoparticles followed laws of classical aerosol physics
- Quite controllable
- 2005 First posted on NIOSH website
- 2009 Update and publish

  Influenced various agencies and companies world-wide

Nanotechnology Emissions Assessment Technique (NEAT)

- NEAT was developed as an initial step to semi-quantitatively evaluate emissions in nanomaterial workplaces and consists of a combination of field portable, ***direct reading instrumentation (DRI)*** and ***filter-based air sampling*** with subsequent laboratory analysis

NEAT Steps

- Develop list of target areas, processes, or tasks
- Identify potential emission sources
- Collect basic particle count
- Collect filter samples
- Use sophisticated equipment

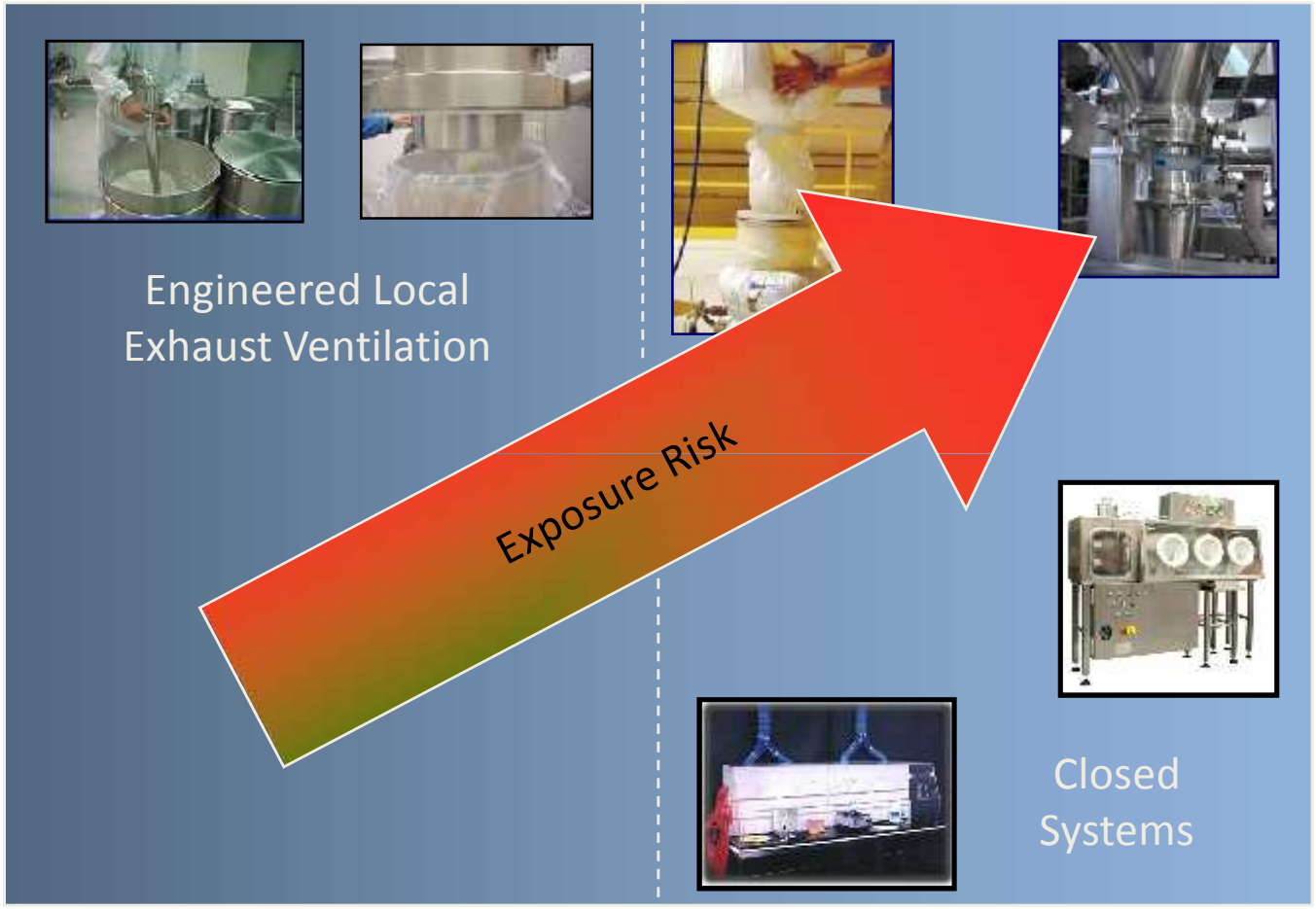
Risk Management and Prevention through Design (PtD)

Best

Last Resort

Factors Influencing Control Selection

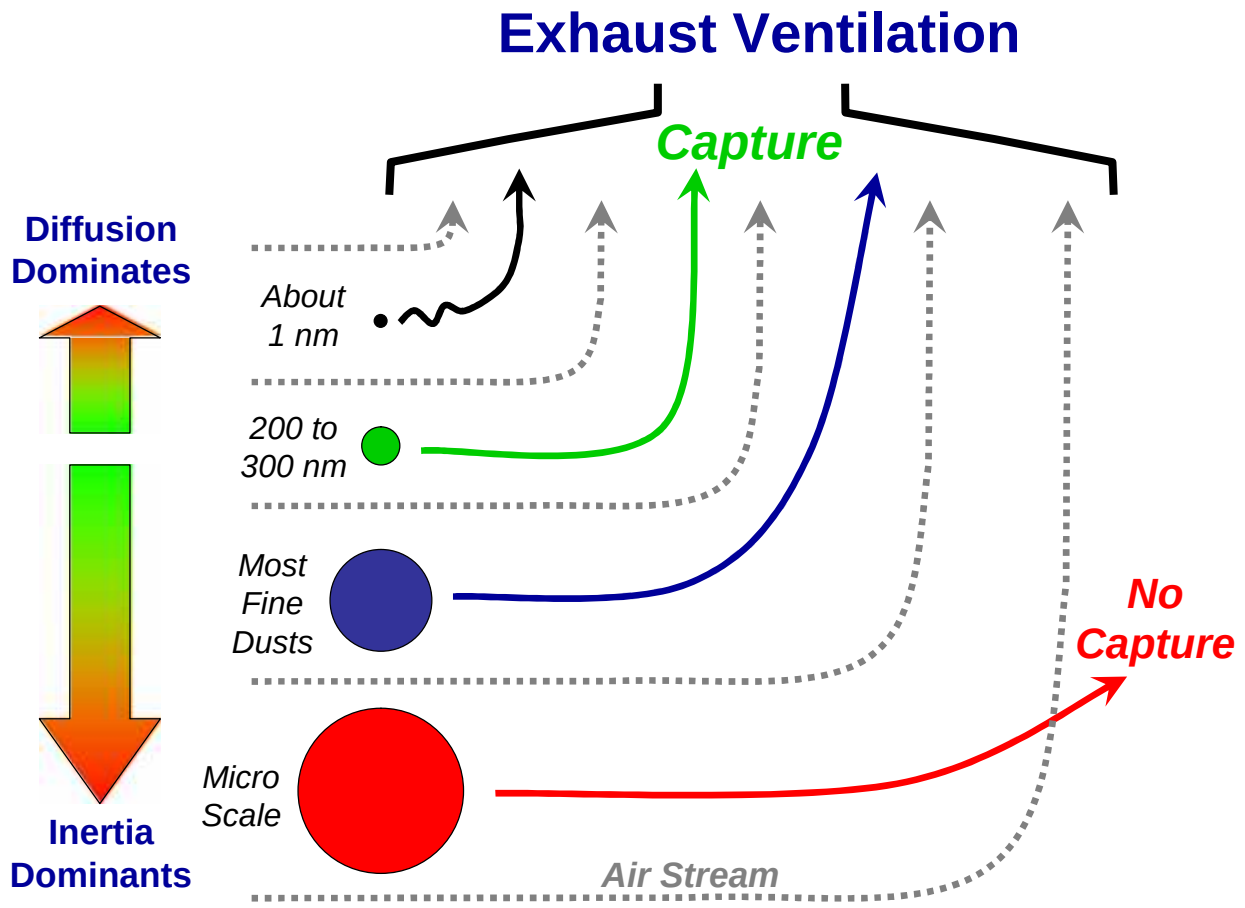
mild / reversible → **Occupational Health Hazard** → severe / irreversible



slurry/suspension → agglomerated → highly disperse

Physical Form

Conventional controls should work

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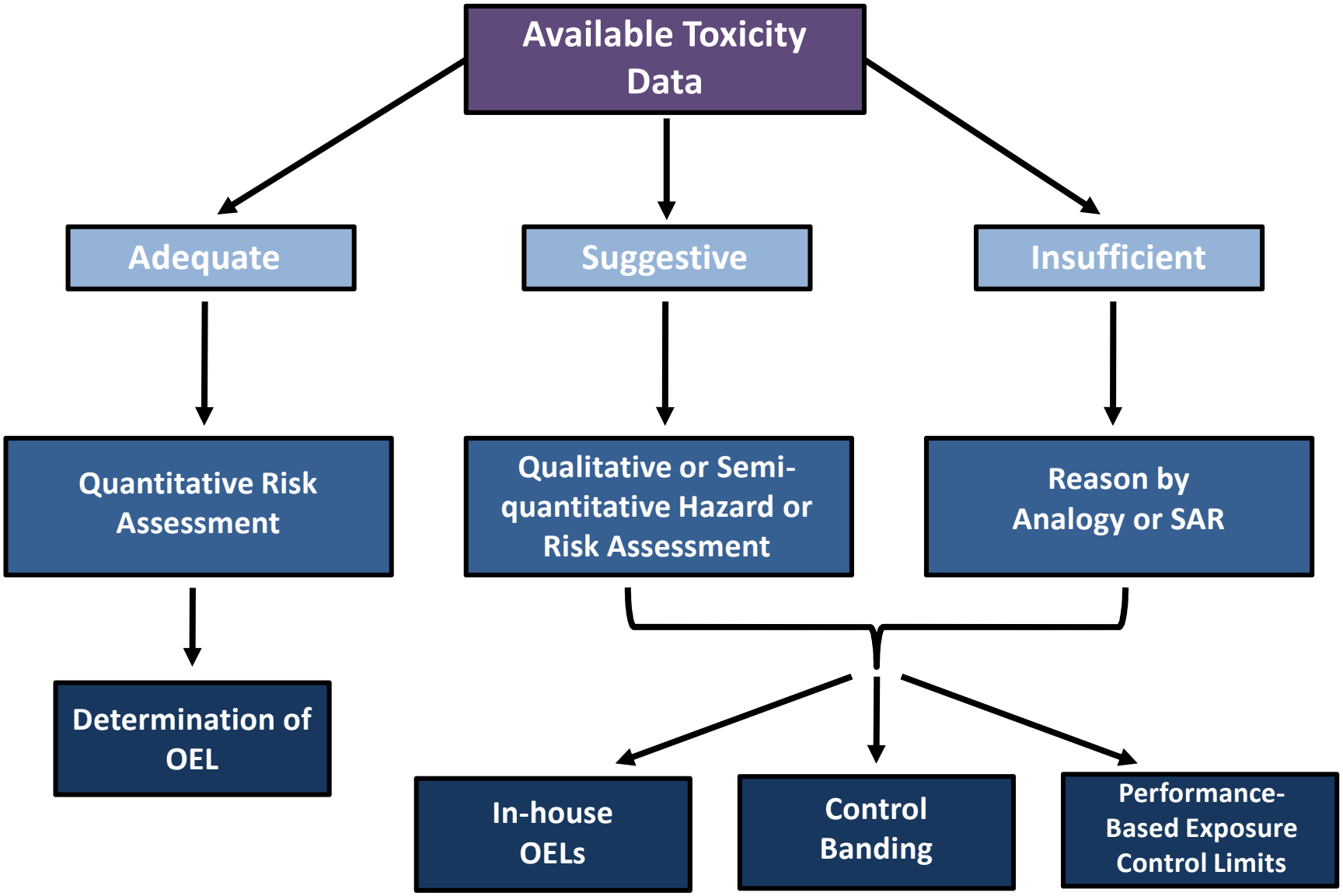
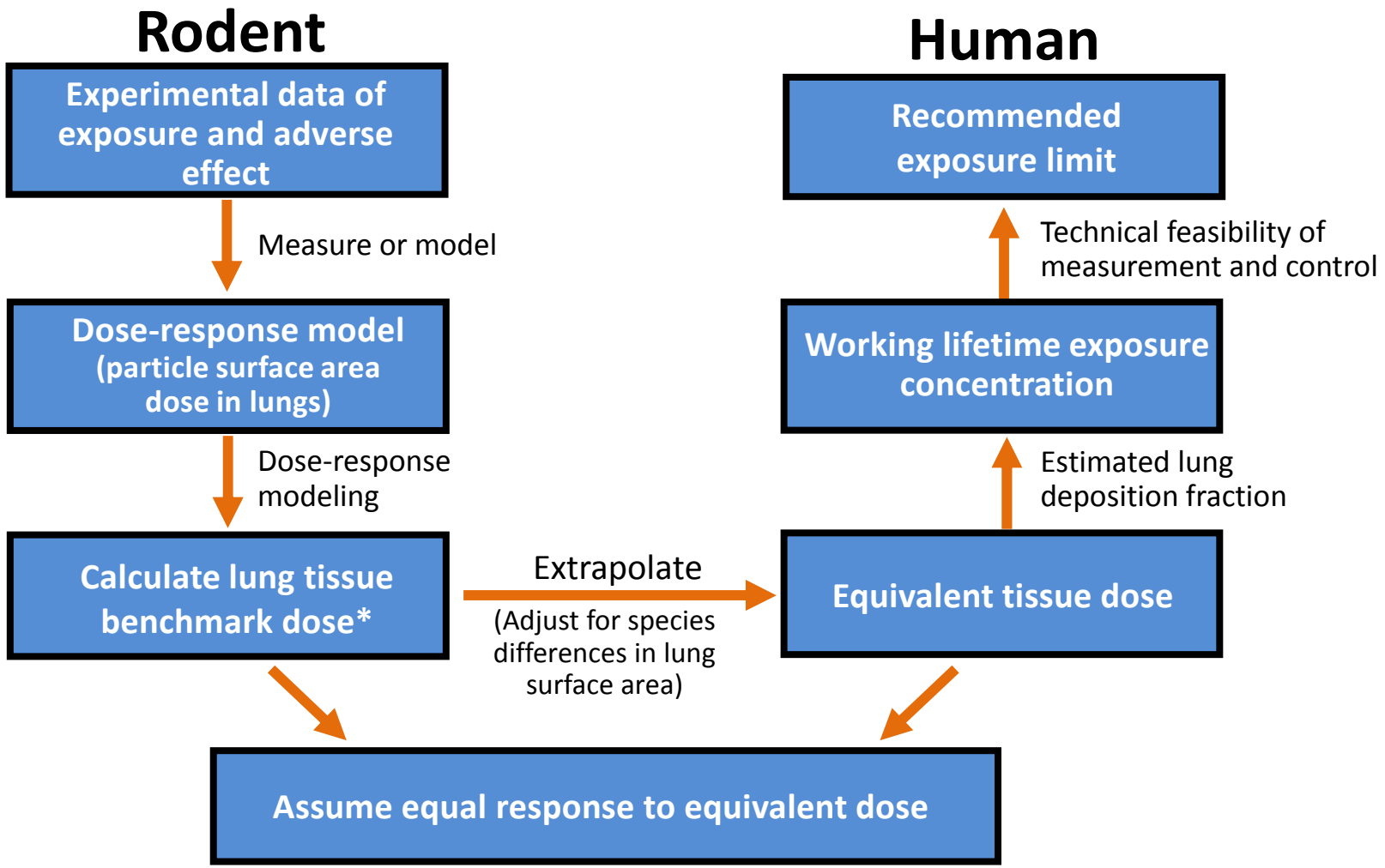


[Schulte et al. 2010; Kuempel et al. 2007, 2012]

Quantitative Risk Assessment in Developing Recommended Exposure Limits for Inhaled Particles

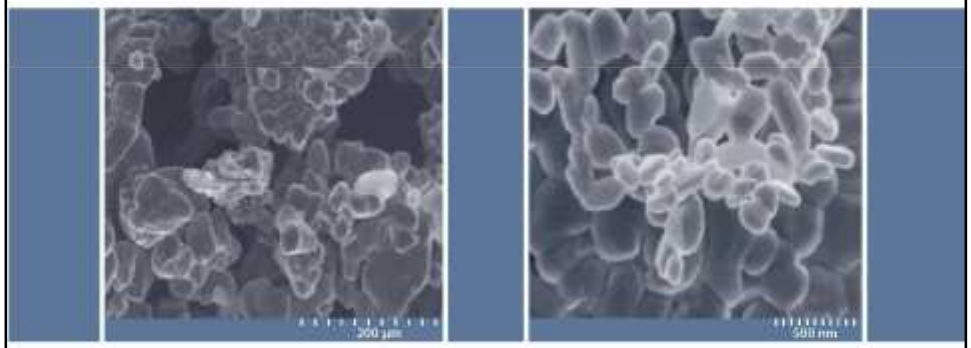


*Dose associated with specified level of risk.

[Oberdörster 1989; Kuempel 2011; NIOSH 2011]

CURRENT INTELLIGENCE BULLETIN 63

Occupational Exposure to Titanium Dioxide



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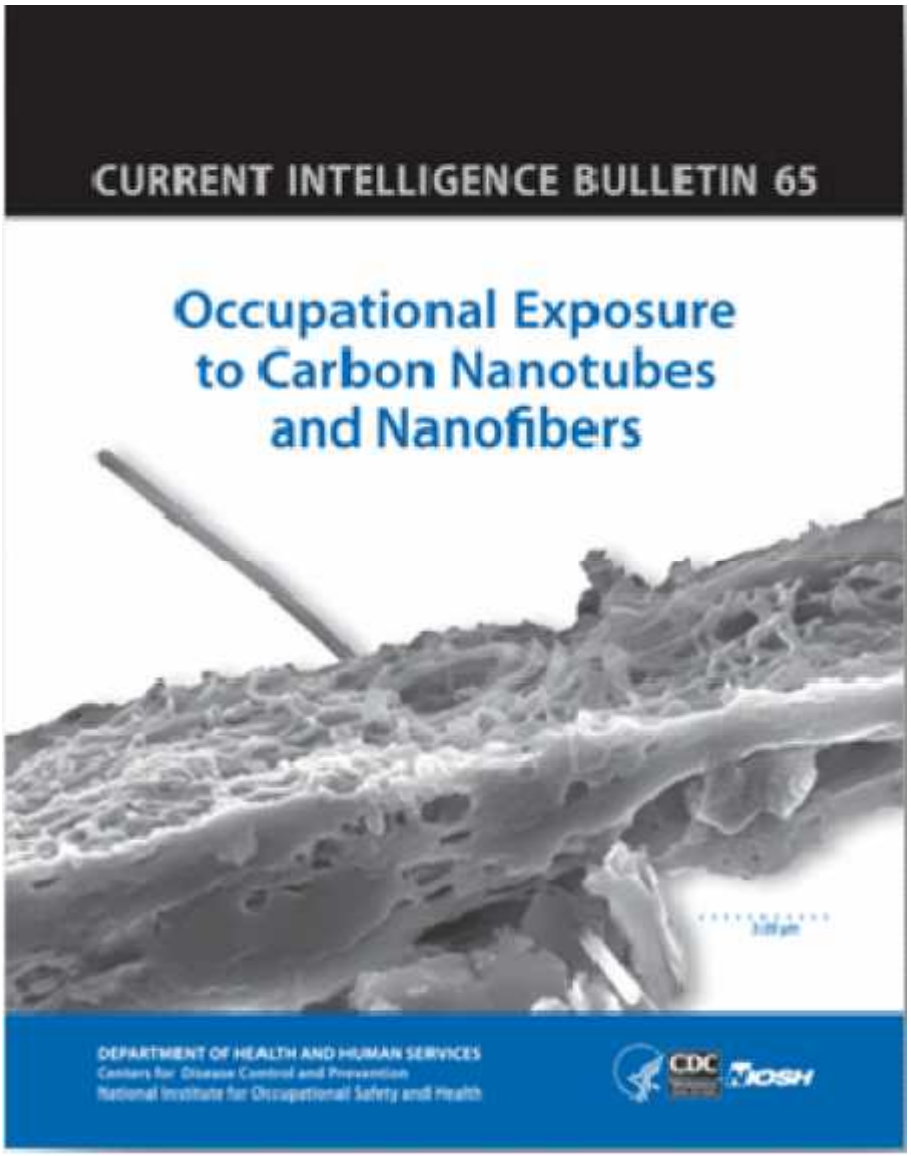
CURRENT INTELLIGENCE BULLETIN 65
Occupational Exposure to Carbon Nanotubes and Nanofibers
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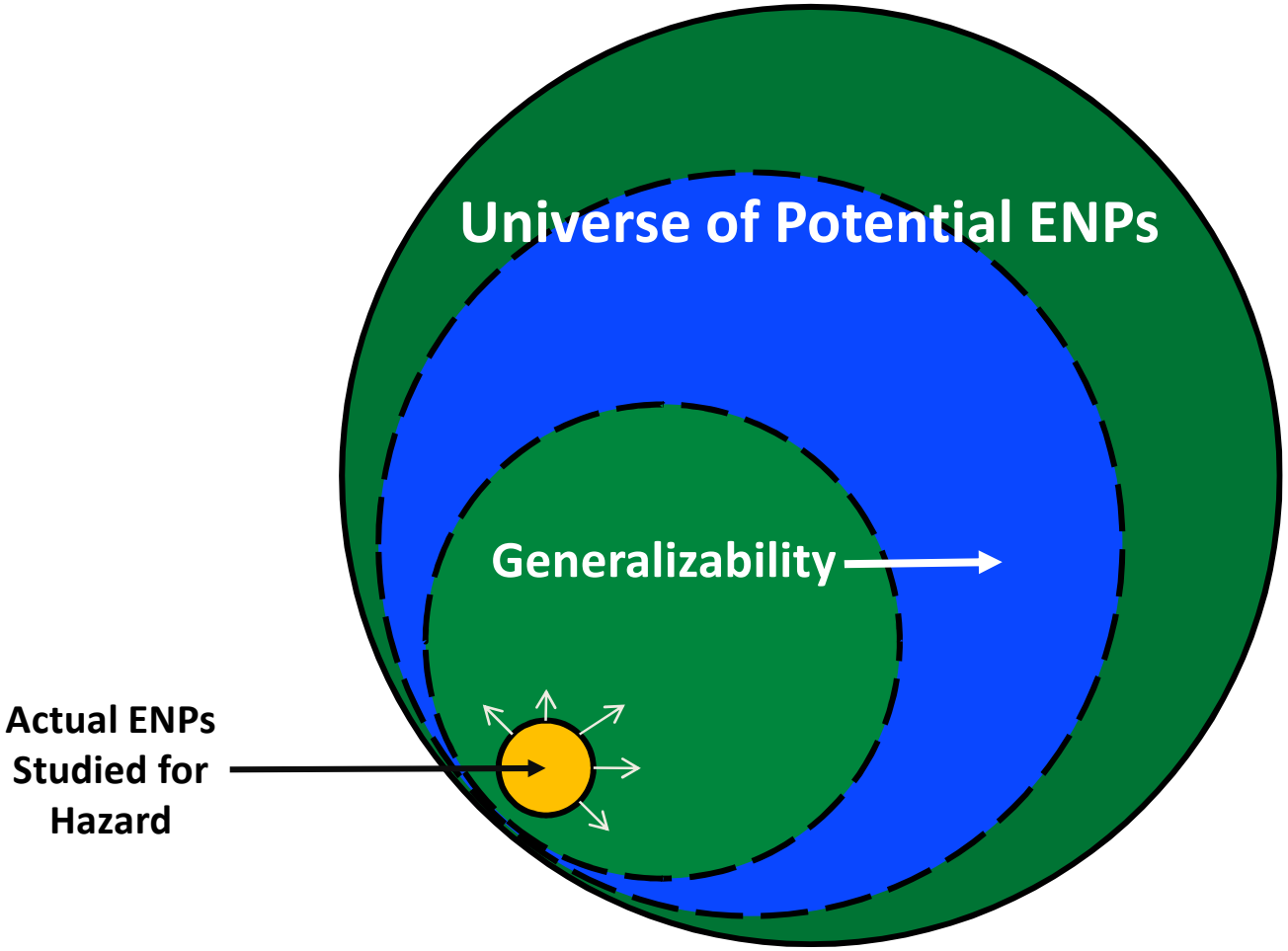
Distribution of Potential Nanomaterials



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Issues in Establishing Categorical Occupational Exposure Limits (OELs) for Engineered Nanomaterials (ENMs)

Paul Schulte, Eileen Kuempel, Ralph Zumwalde, Vladimir Murashov, Laura Hodson, Mark Hoover, Aleksandr Stefaniak, Charles Geraci

National Institute for Occupational Safety and Health

CDC NIOSH

Thank you!

pschulte@cdc.gov