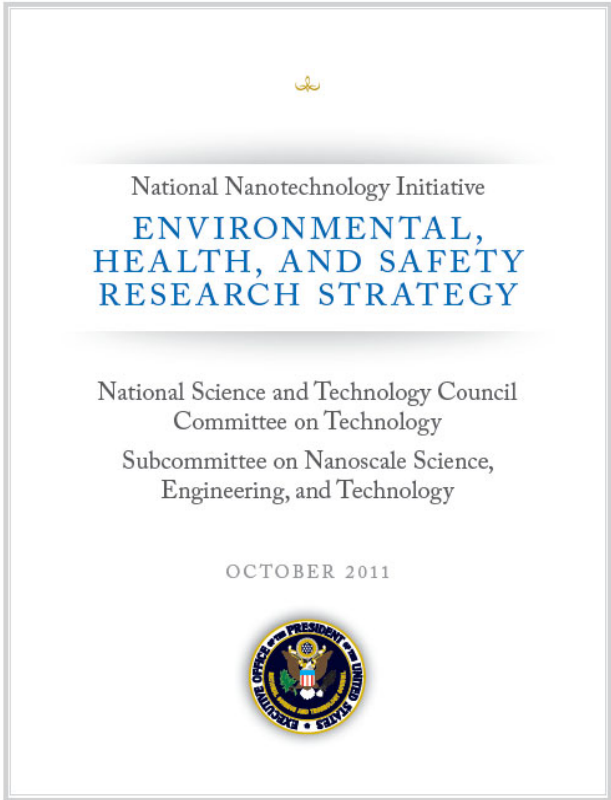
QUANTIFYING EXPOSURE TO ENGINEERED NANOMATERIALS FROM MANUFACTURED PRODUCTS
QEEN II

WORKSHOP SUMMARY

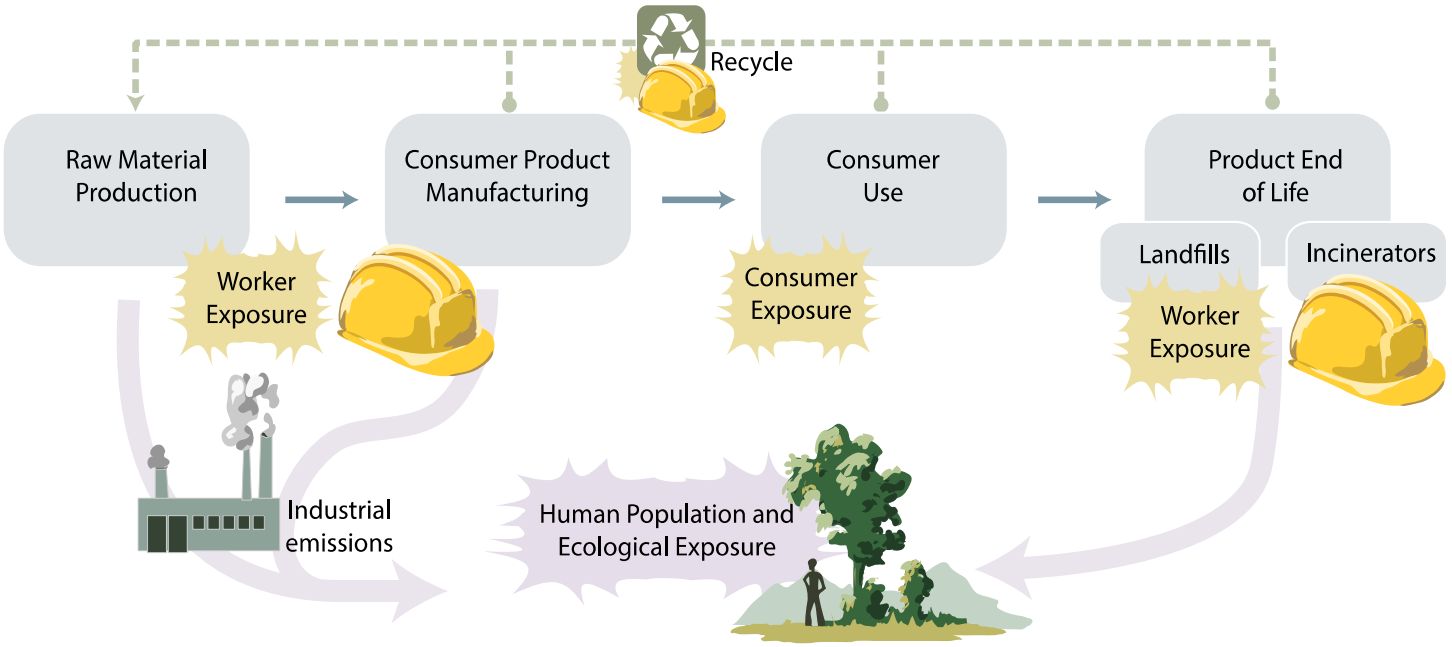
OCTOBER 11, 2018

RISK-BASED FRAMEWORK FOR ADDRESSING NANOTECHNOLOGY HEALTH AND SAFETY IMPLICATIONS

- 2011 National Nanotechnology Initiative (NNI) Environmental, Health, and Safety (EHS) Research Strategy
  - Employ science-based risk analysis and risk management
  - Research Needs
    - Understand processes and factors that determine exposures to nanomaterials
    - Identify population groups exposure to engineered nanomaterials
    - Characterize individual exposures to nanomaterials
    - Conduct health surveillance of exposed populations



The 2011 NNI EHS Strategy: A conceptual framework that incorporates risk-assessment, risk management, and life cycle analysis to inform specific research principles



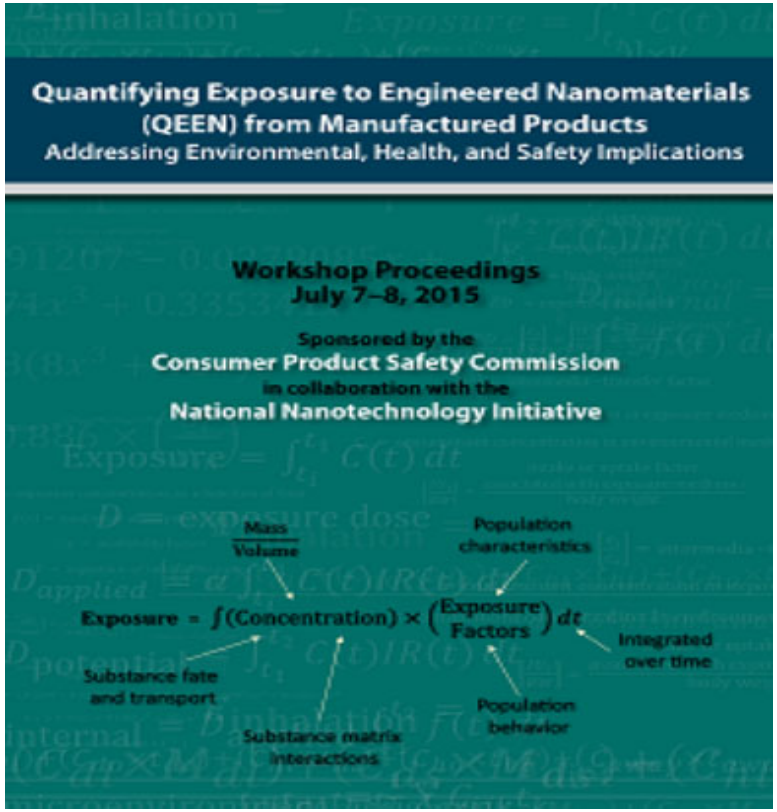
Source: EPA

Call to Action for Exposure Science and Nanotechnology Communities

Quantifying Exposures to Engineered Nanomaterials (QEEN) Workshop

July 7-8, 2015, Rosslyn, VA

- Co-sponsored by CPSC and NNI
- Bring together and engage stakeholders
- Focus on lifecycle exposures: from production, use and disposal
- Identify methods and approaches from various media
- Understand global efforts for exposure science
- Re-invigorate US – EU Communities of Research (COR)



QEEN report released March 28, 2016 nano.gov

QEEN II HIGHLIGHTS

- Informative sessions with experts in exposure assesment, metrology, toxicology, epidemiology and other disciplines
  - Dosimetry modeling and computational approaches to evidence integration
  - Exposure to nanomaterials in agroecosystems and agricultural production
  - Integrating exposure and toxicity assessments of nanomaterials at different states of the lifecycle
  - Emerging Technologies and Advanced Materials: Stakeholder Perspectives on Exposure, Hazard, and Risk Assessment
- More time for discussion and interaction
- New investigators and the “old guard”

WHAT HAVE WE LEARNED?

- Exposure plays a critical role in understanding health risks
- We have made significant progress in "Nano exposure science"
  - The tools are available to characterize and quantify exposures
    - Availability and costs (e.g., TEM)?
  - We can reduce occupational exposures even when there are unknowns
    - PPE and engineering controls are effective for nanoparticles
- Exposure assessment and toxicology
  - Need toxicology data relevant for real world exposures
  - Account for changes in nanoparticles across the lifecycle
    - Morphology, coatings, functional groups, protein coronas
    - Exposure does not equal dose
      - Factors influencing uptake, transformations and disposition
  - Increased interaction with toxicology, exposure, epidemiology and other communities

WHAT WERE THE KEY QUESTIONS

Unique size and structure – will the effects be unique?

- What is the appropriate metric for evaluating nanomaterials?
- Will we need new assays to evaluate the toxicity?
- Can we develop the appropriate tools to evaluate exposure?
- Do we need to develop an entirely new risk assessment paradigm to evaluate nanomaterials?
- Should we develop Nanoexposure science as a discipline as a complement to Nanotoxicology?

PATH FORWARD

- COMMUNICATION
  - "We" don't know it, or you don't know it exists???
  - How to improve data sharing?
  - More effectively utilize meetings, workshops and webinars
    - Outreach to new investigators
  - Support standards and other global activities
    - OECD WPMN SG8, ISO TC229, ASTM E56,