

# Next-Generation Governance Challenges for Engineered Nanomaterials

Benjamin Trump, Igor Linkov  
US Army Engineer Research and Development  
Center  
QEEN-II

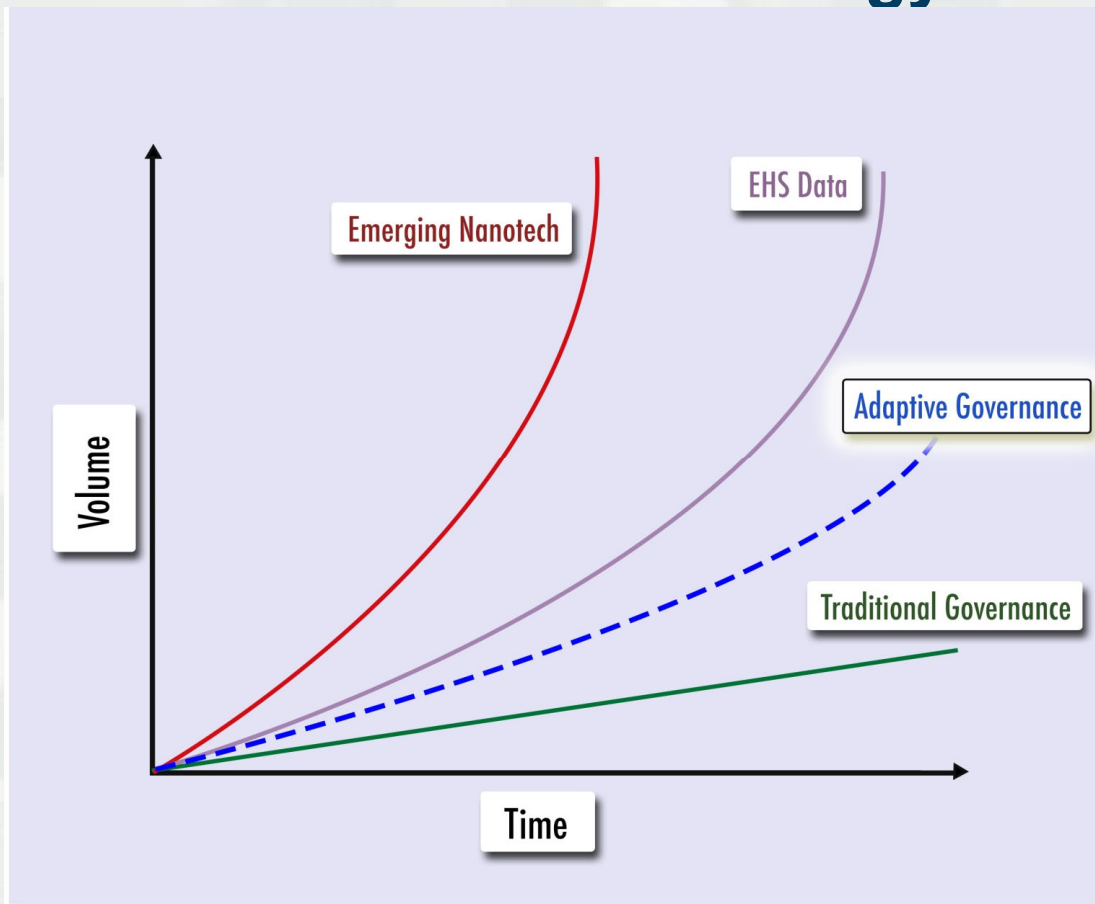


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# “The Pacing Problem” of Technology Governance



No matter how sophisticated risk assessment becomes, a gap will always exist between new material introduction and risk characterization & management.

*Adaptive Governance:*

Iterative improvements to governance of materials or activities as more information becomes available

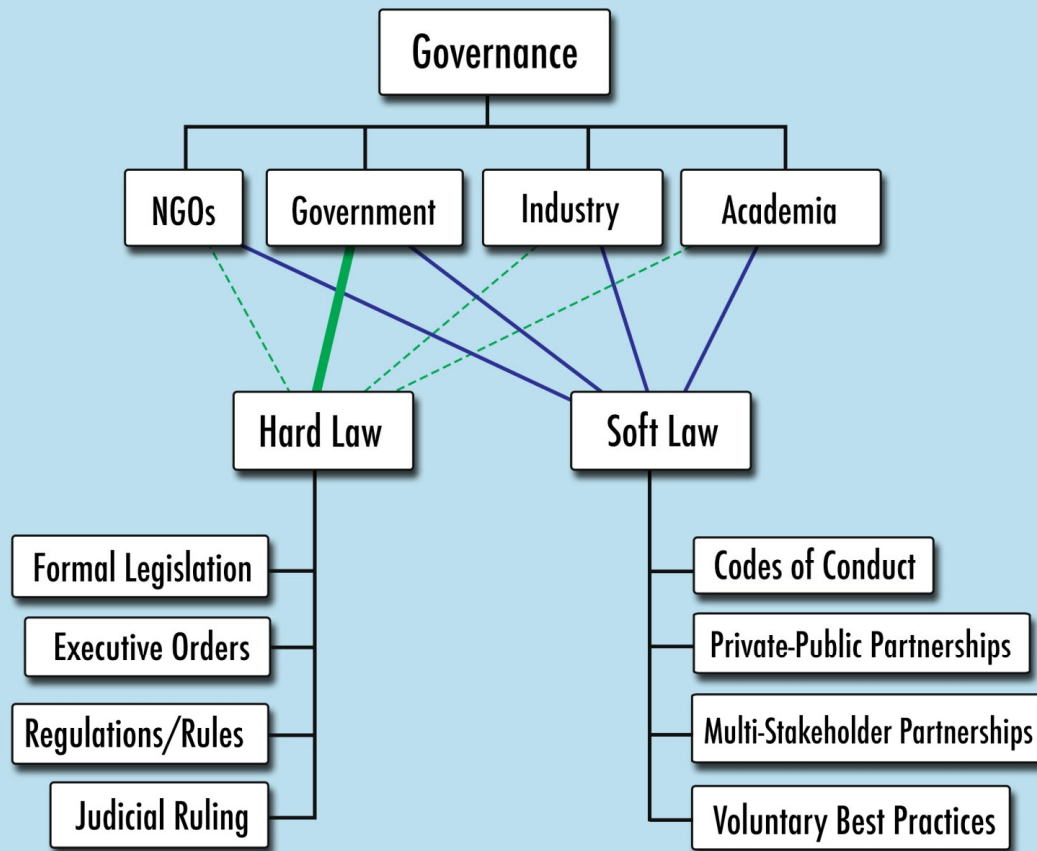


# Further Complications – Decision Making & Regulation Under Uncertainty?

- We've learned quite a bit about engineered nanomaterials and their exposure pathways over the past 20 years, but challenges remain:
  - i. *Filling knowledge gaps for nanomaterial exposure scenarios*
  - ii. *Prioritizing and utilizing available data to inform risk – especially when that information is incomplete*
- What can we do about these challenges?
  - ▶ *Bottom-up approaches*: Lab experimentation to evaluate specific material
  - ▶ *Top-down approaches*: Decision support tools to fit stakeholder needs



# Drivers of Governance

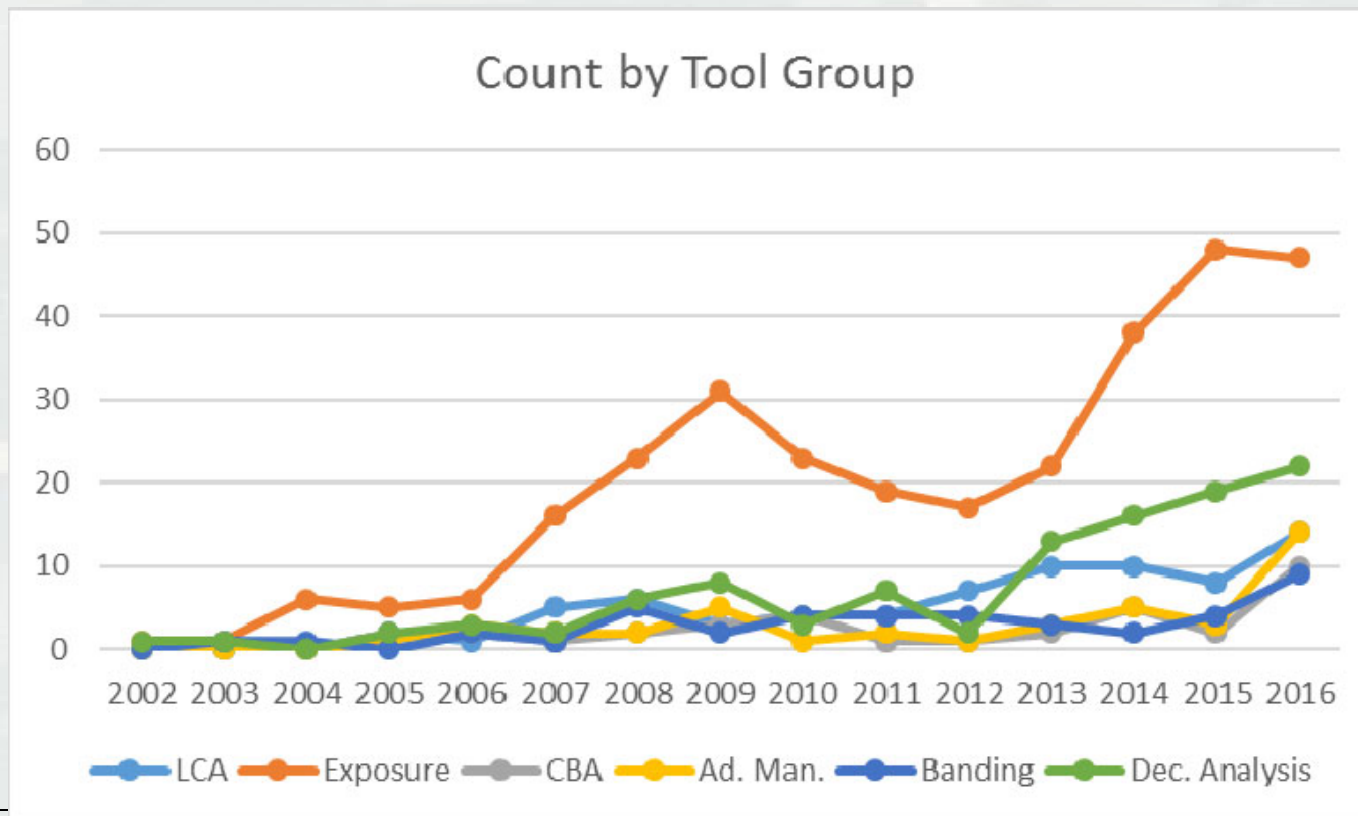


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# A Survey of Nano Tools: 2002-2016



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# Tools are helpful, but not necessarily “Good” Governance

- Quantitative methods and tools help drive risk assessment
- However, data on hazard, exposure, and effects is not always readily available for the exact material in question
- Also need to consider non-risk considerations of cost, societal benefit, ethics, implications, etc.
  - Challenging via Frank Lautenberg amendments to TSCA in 2016
  - Consider all elements of risk governance to drive “good” governance

