

Opportunities to Harness Noinformatics for Impact in Environmental Remediation

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The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health. 1

Our Nano-4-Rem Premise

We can *identify and address the occupational and non-occupational hazards and opportunities of engineered nanomaterials in environmental remediation* through a **Knowledge Infrastructure**

<https://nanohub.org/groups/nano4rem>

Grass roots involvement in our community of practice is required!

Nanoinformatics

November 3 - 5 **2010**
Arlington, VA

- o Overview
- o Themes
- o Program
- o Call for Papers
- o Registration
- o Accommodation
- o Sponsor Opportunities
- o Organizers
- o Contact
- o Nanoinformatics Wiki

media partners

nanoBUSINESSalliance



InterNano



exhibitors



Nanoinformatics 2010

A Collaborative Roadmapping Workshop

- **Participants: Workshop Materials (login required)**

Nanoinformatics 2010 is a collaborative roadmapping and workshop project at which informatics experts, nanotechnology researchers, and other stakeholders and potential contributors will jointly develop a roadmap for the area of nanoinformatics.

Nanoinformatics 2010 is designed to survey the landscape, generate a roadmap, and stimulate collaborative activities in the area of nanoinformatics. By doing so, it will accelerate the responsible development and use of nanotechnology. Workshop themes include:

- *Data Collection and Curation*
- *Tools for Innovation, Analysis, and Simulation*
- *Data Accessibility and Information Sharing*

Nanoinformatics involves the development of effective mechanisms for collecting, sharing, visualizing, modeling and analyzing information relevant to the nanoscale science and engineering community. It also involves the utilization of information and communication technologies that help to launch and support efficient communities of practice. Nanoinformatics is necessary for comparative characterization of nanomaterials, for design and use of nanodevices and nanosystems, for instrumentation development and manufacturing processes. Nanoinformatics also fosters efficient scientific discovery and learning through data mining and machine learning techniques.

Nanoinformatics 2010 is open to all members of the nanoinformatics community and will be organized and governed by that community. [Contact](#) the program committee to get involved.

The Nanoinformatics Roadmap is currently under development and is expected for release in early 2011. Stay tuned!

Thank you to all of our speakers!

- George Adams, Network for Computational Nanotechnology
- Andrei Nel, UCLA
- Mihail C. Roco, NSF
- Sylvia Spengler, NSF
- Vincent Caprio, Nanobusiness Alliance
- Sharon Gaheen, SAIC
- Stacey Harper, Oregon State University
- Gretchen Bruce, Intertox
- Aaron Small, Luna Innovations
- Yoram Cohen, UCLA
- Nathan Baker, Pacific Northwest National Laboratory
- Raul Cachau, SAIC-Frederick
- Rong Liu, UCLA
- Kate Keahey, Argonne National Laboratory
- Daniel Crawl, UCSD
- Paul Schulte, NIOSH
- Carol Hamilton, RTI
- Jean-Claude Bradley, Drexel University
- Sumit Gangwal, EPA
- Victor Maojo, ACTION Grid
- Mills Davis, Project10x
- Michael McLennan, Purdue University
- Krishna Rajan, Iowa State University
- Vicki Colvin, Rice University
- Mark Hoover, NIOSH
- Chuck Geraci, NIOSH
- Jeff Morse, National Nanomanufacturing Network
- Martin Fritts, Nanotechnology Characterization Laboratory
- Michele Ostraat, RTI
- Guillermo Lopez-Campos, Institute of Health "Carlos III"
- Derek Stewart, Cornell University

A key community connection

You are invited to participate in the community-based Nanoinformatics 2020 Roadmap.

NSI: Nanotechnology Knowledge Infrastructure (NKI) -- Enabling National Leadership in Sustainable Design

[Home](#)

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[Cyber Toolbox](#)

[Data Readiness Levels](#)

[Related Communities & Resources](#)

Nanotechnology has the ability to solve global challenges by generating and applying new multidisciplinary knowledge of nanoscale phenomena and engineered nanoscale materials, structures, and products. Data underlying this new knowledge are vast, disconnected, and challenging to integrate into the broad scientific body of knowledge. The NKI NSI was initiated in 2012 to leverage and extend existing and emerging resources, programs, and technologies to support the broader goals of the NNI by creating an infrastructure to accelerate the vetting of new knowledge and to enable effective data utilization. The goal of this initiative is to coordinate the nanoscale science, engineering, and technology communities around the fundamental, interconnected elements of collaborative modeling, a cyber-toolbox, and data

Related Resources

- [NKI NSI White Paper](#)
- [Materials Genome Initiative White Paper](#)
- [Materials Science and Engineering Data Challenge](#)

Our Approach

Define *Nanoinformatics: Principles and Practices*

***Who* we are ... (Leaders, Cultures, Systems)**

***What* we are trying to accomplish ...**

***When* we are taking action ...**

***Where* we are involved ...**

***Why* we taking specific actions ...**

***How* we are defining and meeting our goals ...**

This is a work in progress ...

A Matrix View of “Who we are” and “What we need”

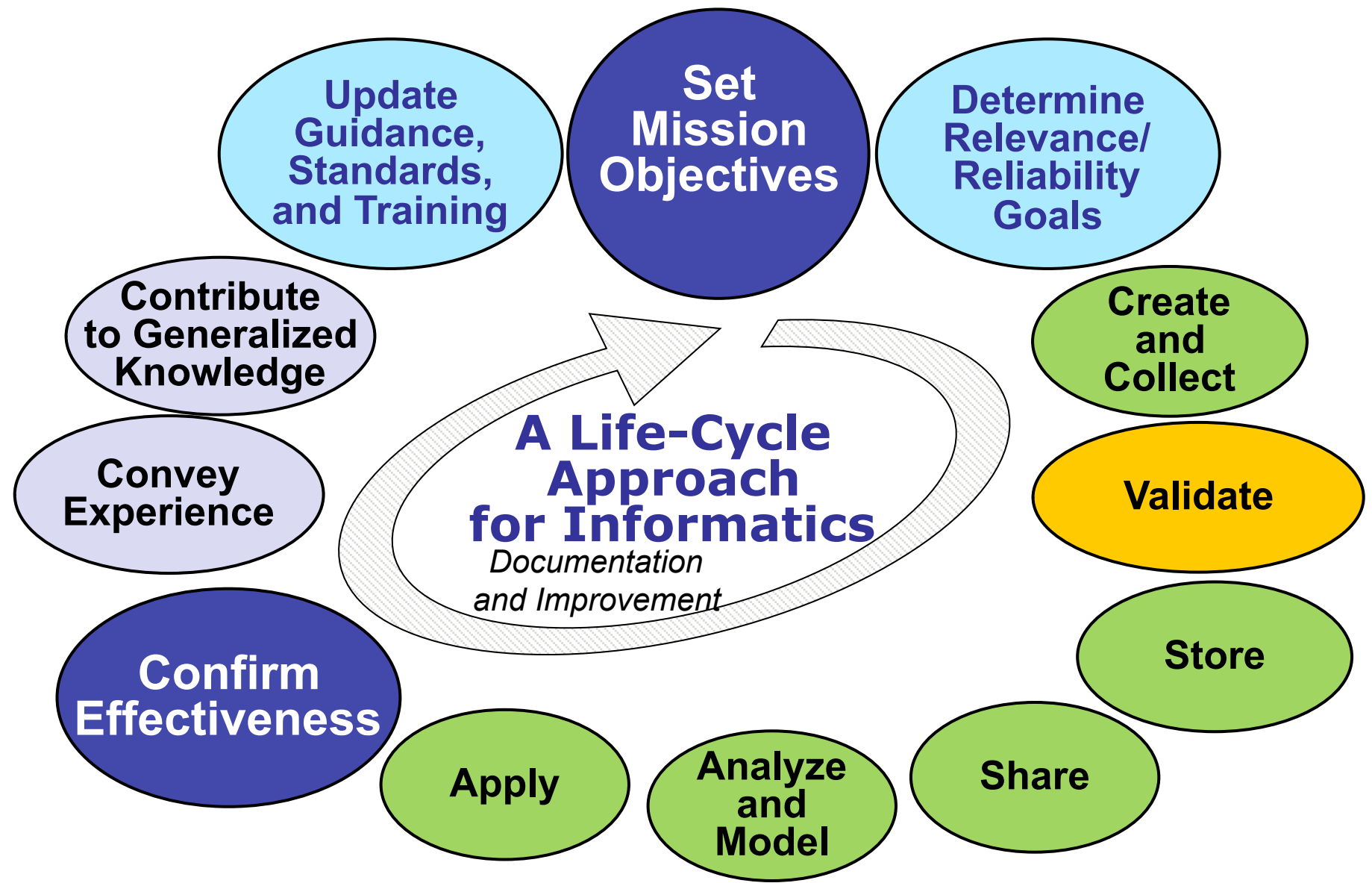
	Workers	Health and safety practitioners	Managers	Policy makers and regulators	Equipment and facility providers	Materials suppliers	Financiers	Insurers	Legal community	Researchers	Educators	Students	Emergency Responders	Media	Consumers	Society
Literacy and Critical Thinking Skills Real Life Examples Understanding (not rote application) Continuous Improvement Modeling and Sharing Assessment																

Specific messaging and actions in each element of the matrix must be based on (a) what knowledge and understanding each stakeholder needs and (b) what knowledge and understanding each stakeholder can provide.

A Working Definition of Nanoinformatics

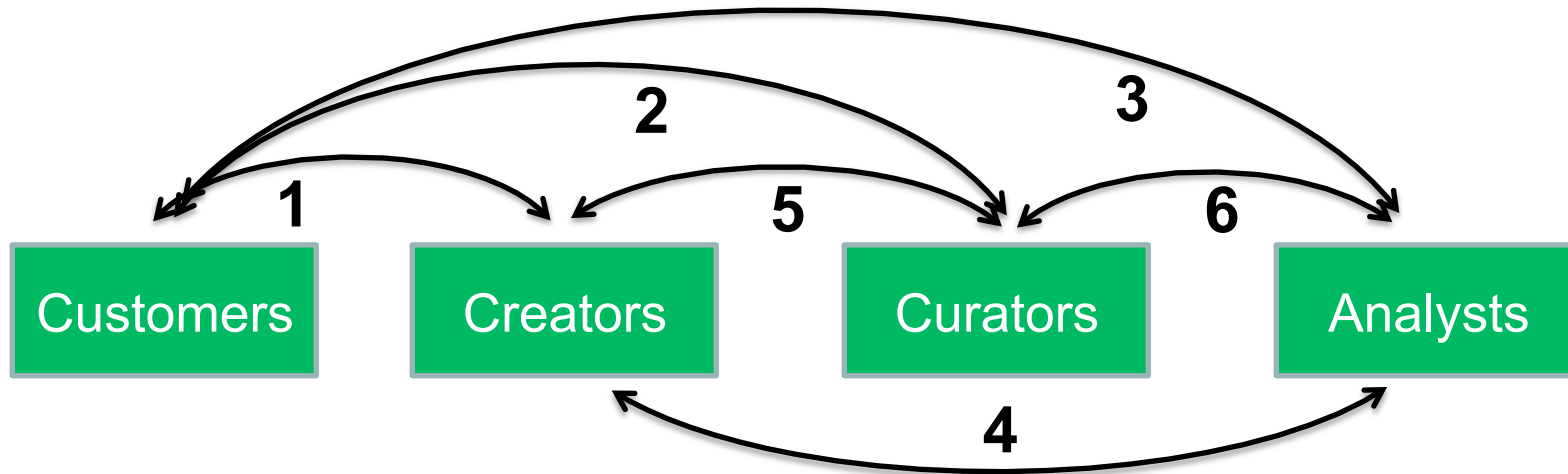
- The **science and practice** of determining **which information is relevant** to meeting objectives of the nanoscale science and engineering community,
- and then **developing and implementing effective mechanisms**
- to *collect, validate, store, share, analyze, model, and apply the information, and then to confirm achievement of the intended outcome* from use of that information,
- and then **conveying experience to the broader community, contributing to generalized knowledge, and updating standards and training.**

A Sensible, Sustainable Life Cycle



Each step must be tailored to our mission.

Informatics Roles and Responsibilities

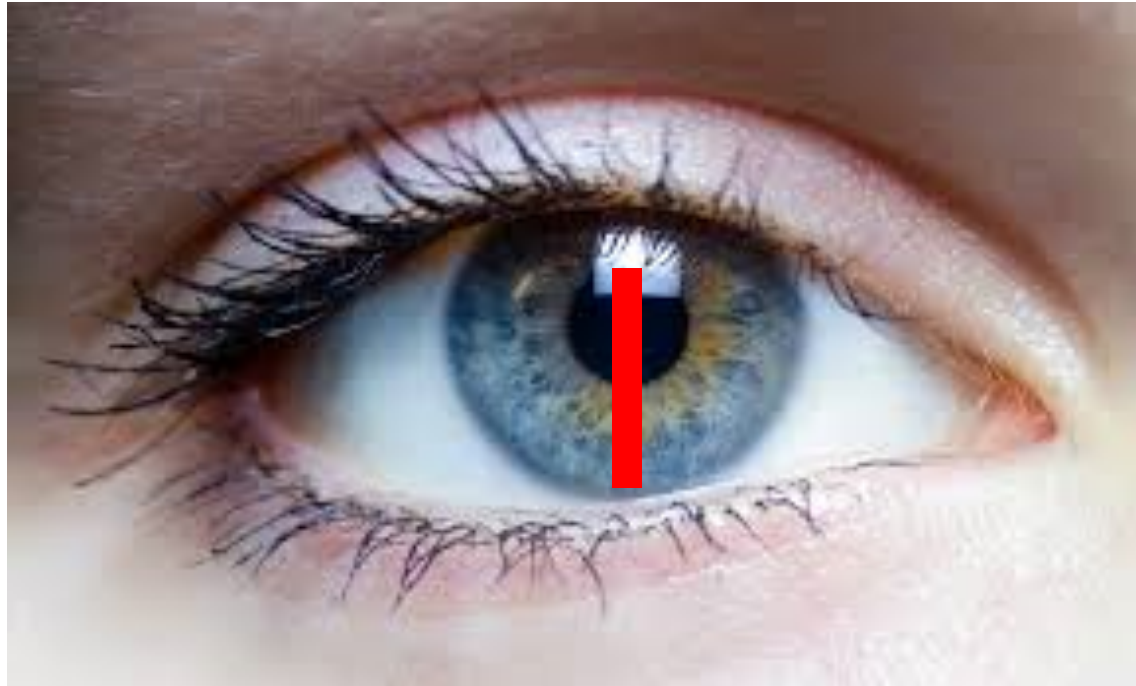


	Set Mission Objectives	Determine Relevance	Collect	Validate	Store	Share	Analyze and Model	Apply	Confirm Effectiveness	Convey Experience	Generalize	Update Guidance
Customers	X	X						X	X	X	X	X
Creators		X	X	X					X			X
Curators		X		X	X	X			X			X
Analysts		X		X			X		X		X	X

Communication and understanding are essential at all steps.

INFORMATICS 4 IMPACT

A critical point of view



*The “I”s are in the eye
of the beholder.*

One size does not fit all...

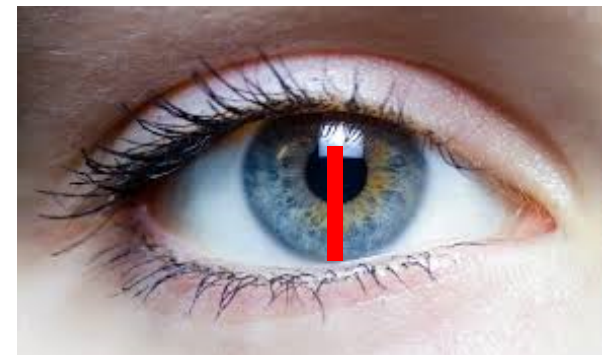
INFORMATICS 4 IMPACT

An implementation example

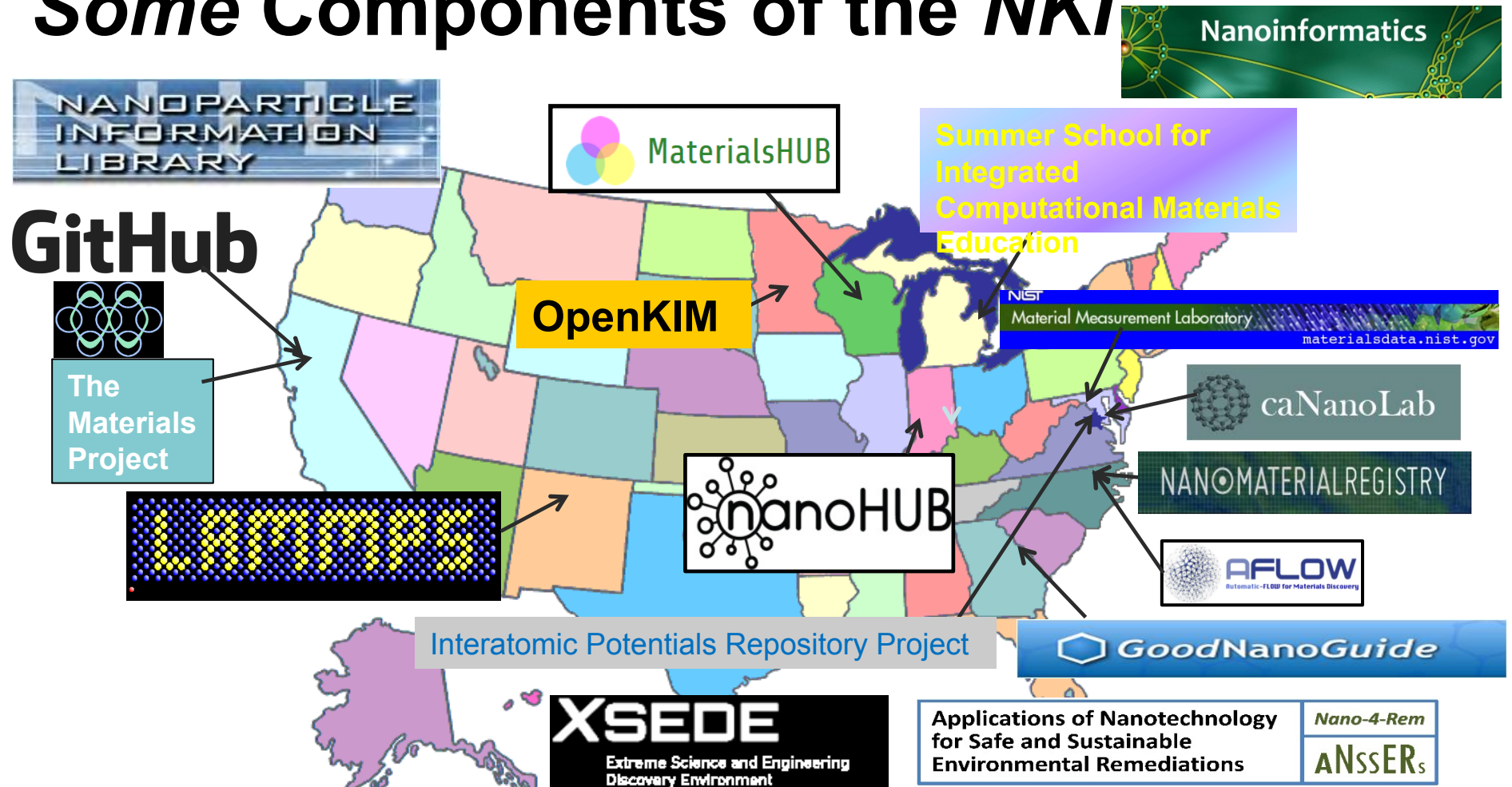
- **Identify** mission objectives and information needs
- **Initiate** a plan to gather, examine, and evaluate that information
- **Investigate** to detect, collect, and inspect the relevant information
- **Incorporate** findings and conclusions into everyday practices to beneficially impact workers, consumers, and communities
- **Improve** by confirming outcomes and making adjustments as needed

One size does not fit all...

*The “I”s are in the eye of the beholder.
We basically need to Plan, Do, Check, Adjust.*



Some Components of the NKI

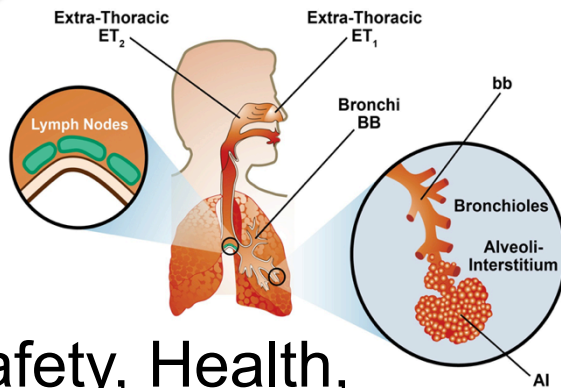


- Supported by NIH, NIOSH, NIST, NSF, ONR, DOE, EPA ...

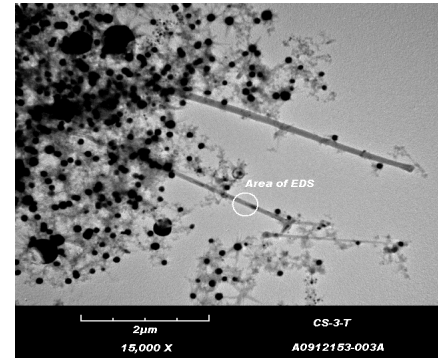


A wide array of nanoinformatics activities are already underway.

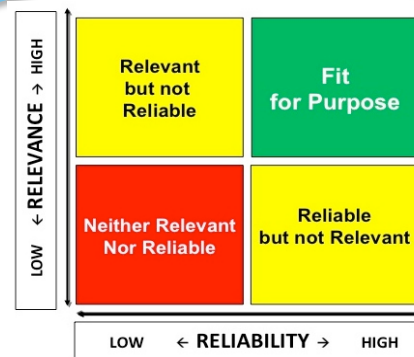
A Convergence for Information Sharing



Safety, Health,
Well-being, and
Productivity



Nanotechnologies



Risk Management

*Focus on the
Convergence =
Focus on Success.*

Four Steps for Community Action

to build and sustain **leaders, cultures, and systems**
for **safety, health, well-being, and productivity**



Thank you for partnering with Nano-4-Rem for impact.



Questions ?

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Example initiative for Data Readiness Levels

Concept for Expressing Data Maturity

DRL:	Data Readiness Level
0	Invalid data
1	Raw or unscaled data
2	Scaled data
3	Scaled data with defined precision or noise level
4	Scaled data with defined precision and noise levels, but not related to the larger body of scientific knowledge
5	DRL 4 data related to the larger body of scientific knowledge, but with measurement uncertainty too large for data standards
6(X)	Standards-quality data of X % measurement uncertainty

Readiness level is application-dependent.

Data Readiness Levels

Summary of DRLs Versus Data Attributes

Attribute	DRL 0	DRL 1	DRL 2	DRL 3	DRL 4	DRL 5	DRL 6
Units		maybe	yes	yes	yes	yes	yes
Precision and Noise				either	both	both	both
Independent Confirmation				possibly	yes	yes	yes
Related to Larger Body of Scientific Knowledge					no	yes	yes
Measurement Uncertainty					speculative	high	low
Example or use	little to none	unscaled sensor data	scaled sensor data	scaled data; noise levels defined	major scientific advances	coarse validation of theory	theory refinement and methods validation

Data attribute details are application-dependent.