Monday, September 28th - Today’s presenters are:

Liz Kollmann, Marta Beyer, and Leigh Ann Mesiti from the Museum of Science, Boston

As we wait to get started with today’s discussion, please:

**Introduce yourself!** Type your name and institution into the chat box.

**Call into the phone line (optional)** at (877) 898-0037 (if using the phone line please make sure to mute your phone when not talking and also your computer’s microphone).

**Questions?** Feel free to type your questions or comments into the chat box at any time.

**Today’s discussion will be recorded and shared on nisenet.org at:**

http://nisenet.org/events/online-workshop

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Findings from the NISE Net Professional Impacts Summative Evaluation
Nanoscale Informal Science Education Network

The NISE Net is a national community of researchers and informal science educators dedicated to fostering public awareness, engagement, and understanding of nanoscale science, engineering, and technology.
NISE Network Logic Model

**Inputs**
- NISE Network
  - ISE organizations
  - research centers

**Outputs**
- Network community
  - partnerships
  - practices and knowledge
  - resources and materials
  - workshops and training
- Educational products
  - programs
  - exhibits
  - media
  - tools and guides

**Outcomes**
- Increase capacity in the field to engage the public in nano
- Engage the public by increasing awareness and understanding of nano
Unique Characteristics of NISE Net

• Size
• Timeline
• Content
• Open-source philosophy
Unique Characteristics of NISE Net

• Size
• Timeline
• Content
• Open-source philosophy
NISE Net Timeline

Years 1-5: (2005-2010)
• Building the network

Years 6-10: (2010-2015)
• Engaging the public through the network
Unique Characteristics of NISE Net

- Size
- Timeline
- Content
- Open-source philosophy
NISE Net Content
Unique Characteristics of NISE Net

- Size
- Timeline
- Content
- Open-source philosophy
NISE Net Open-Source Philosophy
NISE Net Professional Impacts
Summative Evaluation
Presentation overview

• Context
  – Network
  – Study

• Findings
  – Related to professionals’ sense of community, learning of nano concepts, and use of NISE Net products and practices

• Discussion breaks

• Final Q&A
Before we get started,

• Poll #1: Who is the room?
Getting to know you

Before we get started,

• Poll #2: How many of you have heard of the NISE Network?
NISE Net Context
Organization types

Informal Science Education (ISE) partners

• Museums and science centers
• Include educators, directors, and outreach coordinators

University partners

• Large and small universities and colleges
• Include educators, scientists, researchers, and outreach coordinators
Description of NISE Net Tiers

- **Tier 1:**
  - 14 organizations
  - 100 people active at a time

- **Tier 2:**
  - 100 organizations
  - 300 people active at a time

- **Tier 3:**
  - many organizations
  - 5,000 people by year 10

**More Intense, Greater Impact**
- Funded partners

**Less Intense, Lesser Impact**
- NanoDays presenters, online workshop attendees, conference session attendees, nisenet.org users, NanoBite newsletter recipients
Study Context
About this 3-year study

Based on the Network’s goals for professionals

- Sense of community
- Learning about nano
- Use of NISE Net products and practices
Methods: Survey

Annual Partner Survey
• 2012 (Y8): 296 responses
• 2013 (Y9): 354 responses
• 2014 (Y10): 324 responses

Analysis
• Complex analytical approaches
• Findings for Year 10
• Findings across Years 8-10
Methods: Interviews

Interviews

• 21 professionals interviewed yearly

• Represent a range of Network experiences
  – Selected based on individual and institutional characteristics

Analysis

• Inductive and deductive coding
• Often used to support survey findings
• Case studies exemplifying findings
Study limitations

• Timing of this study

• Accuracy of the NISE Net database

• Limited view of effectiveness of individual components
Upcoming report

• Visual executive summary
• Overall findings
  – End of 3 years
  – Changes over time
• Illustrative vignettes
• Technical appendix
Community and Collaboration
Community and collaboration

Did you identify with a broader community of scientists and museum professionals...

Before getting involved with NISE Net?  Now that you are involved with NISE Net?

- Not at all/Very little: 38%  77%
- A little/Some what: 45%  21%
- A lot/A great deal:  21%

n=321

*statistically significant increase for all involvement levels and organization types Wilcoxon signed-ranks T test, p<.05
Community and collaboration

When describing how their community had shifted, professionals said NISE Net...

• Expanded the types of organizations with whom they connected
• Helped them focus collaboration with a nano-themed event
• Made them aware of national connections
“I always identified with a community of scientists. But never had any interactions with people associated with the museum side of things. Through NISE Net, I became involved with our local children’s museum. But also at the local conference, I was able to see what some other museums are doing. Became aware of other science museums and what they do. And that would not have happened without being exposed to NISE Net”

- University partner
Community and collaboration

Partners described the NISE Net community as welcoming, supportive, and thorough.

Partners felt they played diverse roles within the Network as

- **Sharers** of knowledge
- **Liaisons** between organizations
- **Users** of resources
Community and collaboration

“It’s a community of educators who all seem to be very passionate about education, hands-on learning, and wanting to bring new things to their institution, open to other ideas and willing to share their ideas.”

– ISE Partner

“I got invited to the conference this year. That was huge, so I met a lot of other people. I would say that was a very valuable experience for me to see the Network that way. And becoming more aware of all of the other resources out there, [and] different ways they’re using them. That was a very, very powerful experience.”

– ISE partner
The majority of professionals agree they feel confident initiating a partnership with an informal learning or research organization.
Community and collaboration: Partnerships

The majority of professionals are using NISE Net resources to initiate partnerships

- 56% Used NISE Net Resource
- 15% Not aware of NISE Net Resource
- 8% Aware of NISE Net Resource but did not use
- 22% Did not use NISE Net Resource

n=238
Overview of findings: Community and collaboration

Professionals
- Increased sense of community
- Identified with a broader community
- Valued opportunities provided by NISE Net
- Felt confident initiating partnerships and often used NISE Net resources

Example connections for other projects
- Even professionals who likely received less direct contact (Tier 3) felt a sense of community in NISE Net
- Partners were collaborating with institutions that might be unlike their own (ex: ISE-University partnerships)
Learning about Nano Concepts
Learning about nano concepts

a. The size of a nanometer
b. How nano-sized materials behave compared to macro-sized materials
c. How scientists work at the nanoscale
d. Examples of nano in nature
e. Innovations that are possible because of nanotechnology
f. Ways that nanotechnology improves existing products
g. Risks or potential risks of nanotechnology
h. How the future of nanotechnology may be influenced by political, economic, and personal values
Learning about nano concepts

All respondents felt confident about their understanding of nano, but some groups attributed more of this learning to NISE Net

- Tier 2 partners attributed more to NISE Net than Tier 3 partners
- ISE partners attributed more to NISE Net than University partners
Learning about nano concepts

“Pretty much everything I know about nano I know from NISE Net”
- ISE partner

“I learned a lot about how to communicate the idea of a nanometer to these students and not only just about the idea of a nanometer, but also how nano affects what we do in real life”
- University partner
Learning about nano concepts

Professionals reported that NISE Net resources were useful for their own learning of nano concepts. They also reported learning about nano through other methods.

For the nano concept(s) from the table above that you feel the most confident about, what has helped you reach this level of confidence? This could be a NISE Net resource or something outside of NISE Net.

- Respondent mentions only non-NISE Net resources: 26%
- Respondent mentions both NISE Net and other resources: 24%
- Respondent mentions NISE Net resource: 50%

N=145
Overview of findings: Learning nano concepts

In terms of learning:
• Network affected professionals’ understanding of nano
• NISE Net kits, meetings, and website were useful
• Outside resources also used by partners

Example connections for other projects
• When discussing what they had learned, many university partners talked about how NISE Net affected their ability to communicate science to the public
Using Public Engagement Products
Using public engagement products

Types of NISE Net products offered to professionals:

- Cart/Hands-on
- Media (print and video)
- Classroom
- Stage presentations
- Science cafes
- Museum theater
- Forums

Disseminated primarily through NanoDays kits and the NISE Net website
Using public engagement products

Did you personally engage any public audience in nano at any time of the year...

Before getting involved with NISE Net, did you personally engage any public audience in nano at any time of the year? 31%

In your current role at your organization, do you personally engage any public audience in nano at any time of the year? 82%

*n=322

*statistically significant increase for all involvement levels and organization types

McNemar’s test, p<.05
### Using public engagement products

<table>
<thead>
<tr>
<th>Used by 60% or more</th>
<th>Used by less than 60%</th>
<th>When choosing products, professionals considered...</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cart demonstrations and hands-on activities</td>
<td>• Stage presentations</td>
<td>• Connections to existing content</td>
</tr>
<tr>
<td>• Media (print, posters)</td>
<td>• Science cafes</td>
<td>• Age/audience appropriateness</td>
</tr>
<tr>
<td>• Media (videos, multimedia, images)</td>
<td>• Museum theater</td>
<td>• Delivery format</td>
</tr>
<tr>
<td>• Classroom activities</td>
<td>• Forums</td>
<td>• Ease of use</td>
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<td>• Quality of materials</td>
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<td>• Visitor enjoyment</td>
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</tbody>
</table>

- Connections to existing content
- Age/audience appropriateness
- Delivery format
- Ease of use
- Quality of materials
- Space availability
- Staff capacity
- Visitor enjoyment
- Staff preferences
Using public engagement products

The majority of respondents feel confident in their ability to modify and adapt products for their audiences

• This was similar across involvement levels and across organization types

The most frequent modification was “incorporating a NISE Net product into an existing program”
Overview of findings: Using public engagement products

• More professionals were engaging the public with nano after becoming involved
• NISE Net cart demonstrations, media, and classroom activities were used most frequently
• Professionals felt confident modifying NISE Net products

Example connections for other projects
• Professionals reported that the hands-on activities were the types of products that they used the most
• NISE Net products were easily adapted and modified by professionals
Public Engagement Practices
Public engagement practices

- Engage adult audiences
- Engage young children
- Engage audiences with nano and society content
- Communicate to a public audience findings from the field of nano research
- Use team-based inquiry to incorporate evaluation into my work
- Apply principles of universal design
- Engage Spanish-speaking audiences
Public engagement practices

Professionals are confident in their understanding of many practices
• Especially engaging adults, engaging children, conveying nano & society content, and communicating nano research findings to the public

Please rate the extent to which you agree with the following.
As part of my nano education efforts, I feel confident in my ability to...

- Young Children (n=255):
  - Completely/ Mostly Disagree: 7%
  - Slightly Disagree/ Agree: 8%
  - Mostly/ Completely Agree: 92%

- Adult Audiences (n=259):
  - Completely/ Mostly Disagree: 7%
  - Slightly Disagree/ Agree: 8%
  - Mostly/ Completely Agree: 92%

- Nano & Society Content (n=256):
  - Completely/ Mostly Disagree: 7%
  - Slightly Disagree/ Agree: 22%
  - Mostly/ Completely Agree: 77%

- Communicate Nano Findings (n=253):
  - Completely/ Mostly Disagree: 7%
  - Slightly Disagree/ Agree: 21%
  - Mostly/ Completely Agree: 76%

- TBI (n=244):
  - Completely/ Mostly Disagree: 9%
  - Slightly Disagree/ Agree: 40%
  - Mostly/ Completely Agree: 53%

- Universal Design (n=234):
  - Completely/ Mostly Disagree: 9%
  - Slightly Disagree/ Agree: 42%
  - Mostly/ Completely Agree: 49%

- Spanish-speaking Audiences (n=197):
  - Completely/ Mostly Disagree: 7%
  - Slightly Disagree/ Agree: 8%
  - Mostly/ Completely Agree: 92%

51
Public engagement practices

<table>
<thead>
<tr>
<th>Used by 60% or more</th>
<th>Used by less than 60%</th>
<th>Professionals reported barriers to implementing practices such as…</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Engaging young children</td>
<td>• Applying principles of universal design</td>
<td>• Lack of time/resources</td>
</tr>
<tr>
<td>• Engaging adult audiences</td>
<td>• Using team-based inquiry to incorporate evaluation into my work</td>
<td>• Lack of knowledge or misconception</td>
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<tr>
<td>• Engaging audiences with nano and society content</td>
<td>• Engaging Spanish-speaking audiences</td>
<td>• Not within their professional role</td>
</tr>
<tr>
<td>• Communicating to a public audience findings from the</td>
<td></td>
<td>• Not aligned with organizational goals</td>
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<tr>
<td>field of nano research</td>
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</tbody>
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Overview of findings: Public engagement practices

• Professionals were confident in their ability to engage the public in nano, especially
  – Young children
  – Adults
  – Audiences with nano and society content or nano research findings
• Professionals used NISE Net resources to implement public engagement practices
• Some practices were implemented less frequently than others

Example connections for other projects
• Professionals were engaging young children in a complex topic like nano
• Professionals were bringing in nano and society subject matter
• Some barriers still existed in regards to implementing practices
Expanding Beyond Nano Content
Expanding beyond nano: Partnerships

To what extent has NISE Net increased the amount of ANY partnerships or collaborations between your organization and another? (n=248)
Expanding beyond nano: Communicating STEM

To what extent has NISE Net helped you communicate any STEM with the public? (n=274)

- Not at all: 1%
- Very little: 3%
- A little: 6%
- Somewhat: 16%
- A lot: 41%
- A great deal: 34%
Expanding beyond nano: Using public engagement practices

Have you drawn on NISE Net information to do any of the following with content areas other than nano?

- Engage young children (n=234) 65%
- Engage adult audiences (n=240) 56%
- Engage audiences with content related to the societal implications of science (n=237) 50%
- Communicate to a public audience findings from the field of science research (n=239) 49%
- Use team-based inquiry to incorporate evaluation into my work (n=226) 38%
- Apply principles of universal design (n=222) 37%
- Engage Spanish-speaking audiences (n=188) 22%
Expanding beyond nano: NISE Net as a model

“I think that the NISE Net activities are so well put together. I think in general we have probably begun to emulate some of the ways the activities are put together. But I’m not sure it’s an actual thing I can articulate or measure in any particular way, but I think it has influenced us”  
- ISE partner

“I relied more heavily this year on some of the NISE Net materials on how to engage visitors. ...the students each got one of the nano kits, they got some time with [the kits], and then demonstrated to the class. Then they had to do something similar but for astrobiology, the kit was a model for teaching a concept“  
- University partner
Overview of findings: Expanding beyond nano content

- NISE Net helped organizations partner around non-nano areas
- Professionals reported that NISE Net helped them communicate STEM topics to the public
- Professionals, especially those in ISE, drew on NISE Net information to implement practices with content other than nano
- NISE Net provided a model to emulate

Example connections for other projects
- NISE Net helped professionals create collaborations beyond nano
- Professionals transferred many of the practices to other content areas
- Professionals looked to NISE Net products as examples for other work
Change Over Time
Overview of findings: Change over time

Greatest changes were seen in Tier 2 and ISE professionals

- Increased confidence in initiating partnerships
- Increased confidence in nano and society concepts and how much they attributed that confidence to NISE Net
- Increased confidence in engaging adult audiences and engaging Spanish-speaking audiences
- Increased audience engagement with nano and society content
Conclusion

NISE Net increased professionals’ sense of community, learning about nano, and use of NISE Net products and practices.

NISE Net supported professionals in some ways that extend beyond nano content.

See the full results in our report available in the upcoming year.
Questions?
This presentation is based on work supported by the National Science Foundation under Grant No. 0940143. Any opinions, findings, and conclusions or recommendations expressed in this presentation are those of the authors and do not necessarily reflect the views of the Foundation.
Thanks for joining us!

Upcoming Online Brown-Bag Conversations:

Planning a Museum and Community Partnerships Project
Wednesday, September 30, 2015
2:00 – 3:00PM Eastern

Findings from NISE Net’s Public Impact Studies
Monday, October 5, 2015
2:00 – 3:00PM Eastern

All brown-bags are archived online at http://www.nisenet.org/events/online-workshop