

# NISE Network Regional Workshops: First Round of Workshops

Formative Evaluation

By Amy Grack Nelson and Claire Philippe

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## Acknowledgements

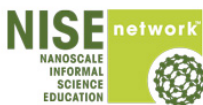
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### THIS IS A FORMATIVE EVALUATION REPORT

Formative evaluation studies like this one often:

- **are conducted quickly**, which may mean
  - small sample sizes
  - expedited analyses
  - brief reports
  
- **look at an earlier version** of the exhibit/program, which may mean
  - a focus on problems and solutions, rather than successes
  - a change in form or title of the final exhibit/program

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## Overview

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NISE Network Regional workshops were held during the summer of 2008 at the Science Museum of Minnesota (SMM), the North Carolina Museum of Life and Science (NCMLS), Sciencenter (SC), and the Oregon Museum of Science and Industry (OMSI). For a workshop agenda, see Appendix A.

The regional workshops were developed to address five goals. Formative evaluation was carried out to measure the success in meeting these goals.

1. Integrate new and existing partners into the NISE Network.
2. Provide valuable networking opportunities among workshop attendees: museum educators, outreach coordinators, research scientists, and industry representatives.
3. Create a foundation for strong and lasting regional partnerships within the NISE Network.
4. Present NISE Net's catalog of existing products, including programs, exhibits, and services.
5. Provide professional development resources—including knowledge, tools, and skills—to increase museum educators' capacity to engage a diverse public in nanoscale science, technology and engineering.

The evaluation was carried out using a mixed-methods design. Data collection methods included 1) partner pre-survey, 2) workshop observations, 3) partner post-workshop survey, 4) partner resource survey, 5) NISE Net staff post-workshop survey, 6) debrief with regional workshop team, and 7) content analysis of workshop correspondence, documents, and action plans. A total of 61 partners completed the pre-surveys, 65 completed the post-surveys, and 63 filled out a resource survey.

## Overall Workshop Experience

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Partners were asked what they valued most about their regional workshop experience. Responses were coded into themes (full responses are included in Appendix B). As illustrated in Table 1, close to two-thirds of partners valued the networking that took place at the workshop (Goal 2). A third of partners mentioned the Nano 101 presentation (Goal 5). A quarter of partners mentioned sharing ideas and learning programs (Goal 5).

**Table 1: What Partners Valued Most About Their Workshop Experience (n=61)**

	Percent of Partners
<b>Networking</b>	62%
<b>Nano 101 presentations</b>	33%
<b>Sharing ideas</b>	25%
<b>Learning nano programs</b>	25%
<b>NISE network staff</b>	16%
<b>Agenda</b>	8%
<b>Other</b>	11%

Partners were also asked what they would change to improve the workshop experience. A total of 39 partners provided suggestions. Responses were coded into themes (see Appendix C for all responses). A variety of changes were suggested as shown in Table 2. Partners had suggestions to improve the agenda as well as a desire for more hands-on activities. Some partners provided ideas of other individuals to invite to future workshops. One-fifth of the responses were about the desire to know more about what is included in the kits (NanoDays and Workshop Toolkit) either by seeing a kit at the workshop or obtaining a list of kit contents. A small percentage of partners mentioned the field trip to see a clean lab at Cornell University during the SC workshop.

**Table 2: What Partners Would Change About the Workshop (n=39)**

	Percent of Partners
<b>Agenda</b>	36%
<b>More hands-on activities</b>	29%
<b>Workshop participants</b>	18%
<b>More kit information</b>	10%
<b>Cornell field trip</b>	10%
<b>Nano 101 presentations</b>	8%
<b>Other</b>	13%

## Goal 1: Integrate New and Existing Partners Into the NISE Network

### Prior Participation in NISE Network Activities

Before coming to the workshop, partners were asked if they had personally participated in any NISE Network activities. Overall, three-quarters of partners (77%) had participated in at least one NISE Network activity. As illustrated in Table 3, more than two-thirds of the partners (69%) held NanoDays at their institution, which is not surprising since most of the regional workshops invitations were sent to institutions that participated in NanoDays. A much smaller percentage (23% or less) participated in the other NISE Net activities. One partner mentioned an activity that wasn't part of the list, "We are waiting for the documents to be translated into Spanish, that's our contribution."

**Table 3: How Partners Previously Participated in the NISE Network (n=61)**

	Yes	Not Sure
Held NanoDays at your institution	69%	3%
Pilot tested one of the NISE Net program kits (Wheel of the Future, Surface Area, or World of Carbon Nanotubes)	23%	7%
Attended a session led by NISE Net at a professional conference (such as ASTC, VSA, etc.)	21%	5%
Attended the NISE Net Annual Meeting in San Francisco	15%	0%
Attended a NISE Net workshop at OMSI or NC Museum of Life & Science	13%	0%
Presented a NISE Net program (other than the NanoDays programs or kit pilot testing)	13%	3%
Reviewed the NISE Net Universal Design Guidelines for Public Programs in Science Museums	12%	13%
Contributed to the nisenet.org website	12%	10%
Held a NISE Net forum	10%	0%
Contributed to the development of a NISE Net program	5%	3%
Contributed to the development of a NISE Net exhibit	3%	0%
Contributed to the development of a NISE Net forum	0%	3%
Participated in the NEO professional development program	0%	2%
Contributed to work of the NISE Net's Viz Lab	0%	0%

### Questions About the NISE Network

Before coming to the workshop, partners were also asked if they had any questions about the NISE Network, its resources, and/or its services. Fourteen partners posed questions. As illustrated in Table 4, partners' questions included topics such as the availability of exhibits and programs from NISE, a general overview of the NISE Network, and partnering with others to do work. See Appendix D for responses.

**Table 4: Pre-Workshop Questions About the NISE Network (n=14)**

	Percent of Partners
Nano exhibits and programs	43%
NISE overview	29%
Partnering	14%
Other	29%

At the end of the workshop, partners were asked if they had any remaining questions about the NISE Network, its resources, and/or its services. Fourteen partners posed questions. As shown in Table 5, partners still had questions about exhibits and programs, specifically related to what exhibits are available and how can acquire resources (exhibits, programs, and materials) from NISE. Partners no longer had general questions about the NISE Network; instead a few partners had questions about their involvement in the network. See Appendix D for responses.

**Table 5: Post-Workshop Questions About the NISE Network (n=14)**

	Percent of Partners
Nano exhibits and programs	71%
Involvement in the NISE Network	29%
Other	21%

An outcome of the workshops was that partners will become more involved in the NISE Network by sharing their resources (exhibits, programs, etc) on the NISE Network website. To help ensure this outcome was met, partners were asked if they had any questions about sharing resources through the NISE Network. Only 10 partners had questions. The most common question was how they actually share their resources.

**Questions About Sharing Resources Through the NISE Network (n=10)**

- Can we do that? How? What do you want? How do we share? We personally customized marketing materials, which might be helpful to others. I bet others have done that, too.
- When/how will we be able to upload our own programs?
- How do we?
- How do you add a new program - not comment on a program? We have great ideas, but you have the resources to make them a reality.
- How can we best share comments, ratings, pictures, etc. from programs?
- Are there other ways besides the web to do this?
- While I don't know exactly what to go to for this, I feel confident that I know enough contacts and resources to figure it out.
- My only concern is to not violate any copyrights and to post properly.
- How often do you want us to report? After each event or just when done?
- It's not a question of how, it's when!

**Partners' Relationship With NISE Network Staff**

As illustrated in Table 6, all partners felt the workshop strengthened their relationship with NISE Network staff.



**Table 6: Agreement with the statement “The Workshop Has Strengthened My Relationship with NISE Network Staff” (n=65)**

	Percent of Partners
Agree	95%
Somewhat agree	5%
Somewhat disagree	0%
Disagree	0%

## Action Plans

At the end of the workshop, partners developed an action plan for carrying out nano programming at their institution. The action plans included the NISE Network program kit they were going to use, what else they were planning to do related to nano at their institution, how they would collaborate with other informal science education institutions, and how they would involve scientists or industry representatives. Partners were asked how prepared they felt to carry out their action plan. Over half felt prepared to carry out their plan, while over one-third felt somewhat prepared.

**Table 7: Level of Preparedness for Carrying Out Action Plan (n= 63)**

	Percent of Partners
Prepared	59%
Somewhat Prepared	38%
Somewhat Unprepared	3%
Unprepared	0%

Partners gave suggestions for what NISE Network staff could do either during or after the regional workshop to support them in implementing their action plan. As illustrated in Table 8, almost half the responses were related to NISE Network staff following-up with partners after the workshop. Partners also wanted NISE Network staff to be available to answer questions they might have as they implement their plan. One-third of responses were related to obtaining resources from NISE to carry out their action plan. A small percentage of partners mentioned obtaining help to facilitate partnerships (relating to regional workshop Goal 3). Responses are listed in the Appendix E.

**Table 8. How NISE Network Staff Can Support Partners’ Action Plans (n=38)**

	Percent of Partners
Follow-up with partners	45%
Provide resources	34%
Be available to answer questions	24%
Help facilitate partnerships	13%
Other	8%

## Goal 2: Provide Valuable Networking Opportunities

The workshop had a variety of networking opportunities built into the agenda: evening dinners, breaks during the workshop, meals during the workshop, small group work. As illustrated in Table 9, almost all partners agreed that the workshop provided them with valuable networking opportunities with other museum educators. Some partners provided explanations for their rating: *“the workshop was the first time I had the opportunity to network with other museum personnel about nanotechnology. It was invaluable;”* *“I was very glad to meet everyone and share ideas for collaboration and obtaining useful materials to use at our center.”* Only one partner felt the workshop did not provide valuable networking opportunities.

**Table 9: Agreement with the statement, “The Workshop Provided Valuable Networking Opportunities With Other Museum Educators” (n=65)**

	Percent of Partners
Agree	92%
Somewhat agree	6%
Somewhat disagree	2%
Disagree	0%

As cited earlier in the report, partners most frequently mentioned valuing the networking opportunities during the workshop. One partner emailed her NISE Network node contact after returning home from the workshop, sharing an outcome of networking. *“The opportunity to network with other educators from other science centers about their nano programs was invaluable! In fact, when I got back to work this morning, there were approximately 20 emails in my box from various participants following up on discussions we had at the workshop!”*

## Goal 3: Create a Foundation for Regional Partnerships

### Partnering With Other Informal Education Institutions

Partners who had previously held nano programming or exhibits at their institution were asked if they had partnered with any informal education institutions. Only a little more than one-third (38%) had partnered with others to deliver programming or exhibits.

To help foster regional partnerships, the workshops had a regional focus and included opportunities for partners to network and work together. As shown in Table 10, over two-thirds (69%) agreed that the workshop provide a foundation for regional partnerships. *“I have established relationships with some museums that’ll help us/each other in the future.”* Some of the partners that somewhat agreed or disagreed with the statement provided reasons for their ratings. A few institutions said they were more isolated, making it difficult to create partnerships: *“there is no one else nearby with whom to collaborate. However, if there were, this workshop definitely would have helped.”* There were also a few partners who discussed the difficulties of creating successful partnerships. *“Regional partnerships are still challenging to implement beyond the theoretical.”*

**Table 10. Agreement with the statement “The Workshop Has Created the Foundation for Regional Partnerships With Other Institutions” (n=65)**

	Percent of Partners
<b>Agree</b>	69%
<b>Somewhat agree</b>	26%
<b>Somewhat disagree</b>	5%
<b>Disagree</b>	0%

Partners were encouraged to think of ways they could partner with other ISE institutions to carry out their action plan. Of the 52 institutions at the workshops, three-quarters (73%) planned to collaborate with another institution. Plans for collaborations included working with other institutions at the workshop, contacting institutions they had previously worked with, or establishing new connections with ISE institutions in their area.

### Working With Scientists and Industry Representatives

Over half of the partners (60%) had previously brought in research scientists or industry representatives to talk about nano with visitors. An outcome of the workshop was that partners would leave feeling more comfortable working with scientists and industry representatives. Part of the workshop was devoted to talking about connecting with these audiences to create and deliver nano programming. At all workshops, at least one representative from research or industry was there to talk about how they have worked with NISE and to answer partners’ questions. Partners were also directed to the MRS database for connecting with researchers. As illustrated in Table 11, partners felt more comfortable working with scientists and industry representatives after the workshop, with partners feeling more comfortable with scientists than industry representatives. However, by the end of the workshop there were still large percentages of partners that did not feel completely comfortable working with scientists (41%) and industry representatives (55%). This question was added after the SMM workshop, which is why their data is missing from Table 11.

**Table 11: Partner’s Comfort Working With Scientists and Industry Representatives**

	Working with Scientists		Working with Industry Representatives	
	Pre (n=46)	Post (n=49)	Pre (n=46)	Post (n=49)
<b>Comfortable</b>	44%	59%	37%	45%
<b>Somewhat comfortable</b>	41%	33%	44%	47%
<b>Somewhat uncomfortable</b>	15%	8%	17%	6%
<b>Uncomfortable</b>	0%	0%	2%	2%

Partners were encouraged to think of ways they could work with researchers or industry representatives to carry out their action plan. Of the 52 institutions at the workshops, 90% planned to contact a local researcher or industry representative to help with nano activities at their institution.

## Goal 4: Present NISE Net’s Catalog of Existing Products

During the workshop, partners learned about the range of the NISE Network’s programs, exhibits and services. At the end of the workshop, partners were asked if they would be interested in using any of NISE Net’s offerings. As illustrated in Table 12, almost all partners were interested in NanoDays materials and programs. Around half the partners were interested in exhibits and forums, with one-third or more being possibly interested.

**Table 12: Partners’ Interest in Using the NISE Network’s Offerings**

	Yes	Maybe	No
<b>NanoDays materials (n=64)</b>	97%	2%	1%
<b>Programs (n=64)</b>	92%	6%	2%
<b>Exhibits (n=64)</b>	58%	33%	9%
<b>Forums (n=63)</b>	51%	40%	9%

Even though partners were interested in NISE Network offerings, it was important that they were aware of how to acquire these products from NISE. As shown in Table 13, a majority of partners knew how to acquire the various NISE offerings. However, there were workshops where around one-quarter of partners left feeling unsure of how to acquire a particular resource. Overall, partners were least confident in how to acquire forums and exhibits.

**Table 13: Awareness of Acquiring NISE Network Resources**

	NanoDays Materials	Programs	Forums	Exhibits
<b>SMM workshop (n=14)</b>	100%	100%	100%	93%
<b>NCMLS workshop (n=15)</b>	93%	93%	87%	93%
<b>SC workshop (n=18)</b>	83%	78%	72%	72%
<b>OMSI workshop (n=16)</b>	88%	94%	81%	75%
<b>All workshops (n=63)</b>	91%	90%	84%	83%

### Barriers to Hosting Nano-Related Exhibits and Programming

Partners were asked about potential barriers to hosting nano-related exhibits and programs at their institution. A variety of barriers were mostly or definitely true for over half the partners (see Table 14). These barriers included financial constraints, nano topics not being a priority for school groups, lack of staff expertise in nano, and nano topics seeming difficult to convey to the public.

**Table 14: Barriers to Hosting Nano-Related Exhibits and Programming**

	Definitely not true	Mostly not true	Mostly true	Definitely true
Budget issues and resource constraints are a barrier. (n=61)	5%	28%	43%	25%
Nano topics are not a priority for our school audiences. (n=61)	7%	31%	46%	16%
We lack staff expertise to bring nano topics into our exhibits and/or programs. (n=61)	8%	36%	39%	16%
Nano topics seem difficult to convey to the general public. (n=61)	13%	39%	38%	10%
We would not expect nano topics to be of high interest to our audiences. (n=61)	25%	62%	13%	0%
Nano topics might be seen as controversial by our audiences. (n=60)	32%	58%	10%	0%
Nano topics are not consistent with our mission. (n=61)	72%	25%	3%	0%

## Goal 5: Provide Professional Development Resources

### Partners’ Nano-Related Questions

On the pre-survey, partners were asked what questions about nanoscale science, engineering and technology (SET) they wanted to see addressed at the workshop. Responses were coded into themes. (Responses are included in Appendix F.) Partners had a range of questions, as illustrated in Table 15. Questions most commonly were related to applications of nanotechnology and risks and benefits. Over one-third of partners did not ask about nano content, but instead asked about educational strategies for delivering nano-related content to visitors.

**Table 15. Pre-Workshop Questions About Nanoscale SET (n=50)**

	Percent of Partners
Applications of nanotechnology	37%
Risks and benefits of nanotechnology	22%
Basics of nanotechnology	14%
No questions, it’s all new	12%
Other nano-related questions	4%
Educational strategies (questions not related to nano content)	38%

On the post-survey, partners were asked what questions they still had about nanoscale SET. Only 24 partners had remaining questions. There were some partners who did not have questions at the end of the workshop but said they would probably have questions after they were able to process all the information and start doing work at their institution. Partners’ questions were coded into themes (full responses are included in Appendix F). As shown in Table 16, most questions were related to applications of nanotechnology.

**Table 16: Post-Workshop Questions About Nanoscale SET (n=24)**

	Percent of Partners
Applications of nanotechnology	83%
Risks and benefits of nanotechnology	21%
Nanotechnology manufacturing	17%
Other nano-related questions	13%

## Talking to Visitors About Nano

To help gauge partners’ comfort level with nano content, partners were asked how comfortable they were talking to visitors about nano and answering visitors’ nano questions. As illustrated in Table 17, partners came to the workshop with varying levels of comfort. By the end of the workshop, partners had significantly increased their comfort with nano and no one felt “uncomfortable.” Overall, partners left feeling much more comfortable talking about nano than answering visitors’ questions.

**Table 17: Partners’ Comfort Talking to Visitors About Nano and Answering Their Questions**

	Talking to Visitors About Nano		Answering Visitors’ Nano Questions	
	Pre (n=61)	Post (n=65)	Pre (n=61)	Post (n=65)
Comfortable	23%	72%	23%	35%
Somewhat comfortable	46%	25%	31%	54%
Somewhat uncomfortable	23%	3%	34%	11%
Uncomfortable	8%	0%	11%	0%

## Working With Diverse Audiences

During the workshop, a representative from the Diversity, Equity, and Access (DEA) team talked to partners about how they engage underserved and underrepresented audiences at their institution. The goal was that partners would gain new ideas on how to engage with these audiences. As illustrated in Table 18, over half of the partners agreed or somewhat agreed that they felt more prepared. However, when looking at ratings by workshop, OMSI workshop partners felt significantly less prepared. This could be attributed to the discussion question used during the OMSI workshop. At OMSI, the DEA representative asked, “Of the stuff you are doing or wish you were doing, how could the NISE Net help you?” At SMM, NCMLS, and SC, the DEA representative asked partners to share how their institution engaged underrepresented and underserved audiences. Some partners also provided reasons for their level of agreement, which can be found in Appendix G.

**Table 18: Agreement with the Statement “I Feel More Prepared to Engage Underserved and Underrepresented Audiences”**

	Disagree	Somewhat Disagree	Somewhat Agree	Agree
<b>SMM workshop (n=16)</b>	0%	13%	44%	44%
<b>NCMLS workshop (n=15)</b>	0%	13%	47%	40%
<b>SC workshop (n=18)</b>	6%	6%	39%	50%
<b>OMSI workshop (n=16)</b>	6%	25%	56%	13%
<b>All workshops (n=65)</b>	3%	14%	46%	37%

## Conclusions & Recommendations

### Goal 1: Integrate New and Existing Partners Into the NISE Network

Before coming to the workshop, three-quarters of partners had participated in at least one NISE Network activity. Most of these individuals had prior experience with NanoDays, which is not surprising considering most of the regional workshop invitations were sent to institutions that participated in NanoDays.

All partners felt the workshop strengthened their relationship with NISE Network staff. However, there were instances where NISE Network staff commented that they should do even more to connect with partners. A few things were noted:

- NISE Net staff need to make sure they spread out and mingle with partners during the workshop, instead of sitting together at the same table, which oftentimes happened at workshops.
- If NISE Net staff need to hold a meeting while people are together at the workshop, the meeting should not take place during the workshop. As noted by a NISE Net staff, *“If there is any time needed for on-site NISE Net staff discussion, they should not take place as a separate group in front to the attendees (e.g. not at lunch). We need to mingle and meet with them. If there is any ‘business’, it should be before breakfast or after hours and include all NISE Net staff.”*
- The regional host should continue to play a lead role in the workshop since they will be partners’ main contact. Some of the host’s roles include welcoming everyone to the workshops; introducing the core team and other NISE Network staff at the meeting; introducing each section of the workshop; talking about the action plans; and discussing how partners can continue to be involved in the network.

Partners were required to come up with an action plan they were going to carry out upon returning to their institution. Overall, partners felt prepared to implement their plan. They desired support from NISE Network staff while carrying out their plan, including follow-up communication and being available for their questions.

As members of the NISE Network, partners are encouraged to share their resources (exhibits, programs, etc) on the NISE Network website (nisenet.org). Some partners were unclear how

they could share their products with others. In future workshops, NISE Network staff should ensure all partners leave the workshop knowing how they currently can or will be able to share on nisenet.org.

## Goal 2: Provide Valuable Networking Opportunities

The social activities proved to be important components of the workshop, providing various networking opportunities. Partners most frequently cited networking as the most valuable aspect of the workshop and when asked if they felt the workshop provided valuable networking opportunities, almost all partners agreed.

Recognizing the impact of the social activities on networking, the NISE Net staff reflected after each workshop on how well various social events worked to facilitate discussion among partners. Several recommendations were generated for future workshops to optimize networking opportunities:

- The workshop room should be set up using round, rectangular, or square tables to encourage conversation. The first workshop had circular tables so people could easily converse. At NCMLS the room was set up in a U shape and partners could only easily talk to individuals on either side of them. This stifled conversations and thus limited opportunities for networking. The seating arrangement was changed to rectangular tables the second day of the workshop. One partner commented in their survey, “*Seating arrangement in afternoon on Tuesday was much better than day one.*”
- It is best to have a break between the workshop and dinner so people can rest and recharge before dinner. At NCMLS there was no break and partners went straight from the workshop to happy hour at the museum and then a buffet dinner. People were quiet at the tables while eating and after they finished some were ready to leave. There was not the level of conversation that happened at the other workshops where partners had time to talk while waiting for their meal. A restaurant atmosphere, where people order food, get appetizers, wait for their food and then possibly have dessert, provides an environment that better encourages conversation since people feel obligated to stay at dinner longer than a buffet setting like at NCMLS.
- A science pub should not be held on the first full night of the workshop, only the night before the workshop begins. A science pub was held Monday night at the OMSI workshop and it made it hard for participants to socialize after spending the day together. When people tried to talk during the presentation, it was distracting to bar patrons there for the science pub.

## Goal 3: Create a Foundation for Strong and Lasting Regional Partnerships

The workshop impacted partners’ desire to work with other institutions within and outside of the NISE Network to deliver nano programming. Before the workshop, only a little more than one-third of the partners reported working with other ISE institutions in the past to deliver nano programming or exhibits. A majority of partners felt the workshop created a foundation for regional partnerships with other institutions. This was evident when three-quarters of partner institutions stated that they hoped to collaborate with another ISE institution to carry out their action plan. When asked what support they needed from NISE Network staff to implement their action plan, 13% said they would like help facilitating partnerships.



The workshop also impacted partners' desires to work with researchers and industry representatives. Over half of the partners had previously brought in research scientists or industry representatives to talk about nano with visitors. After the workshop, partners felt more comfortable working with scientists and industry representatives than they did before the workshop, with partners feeling more comfortable with scientists than industry representatives. This was also evident by almost all partners (90%) stating that they were planning to contact a local researcher or industry representative as part of their action plan.

At the SC workshop, partners visited a clean lab at Cornell University. Although this was a novel experience for many, it was decided by the core team and SC hosts that a field trip may not be the best use of regional workshop time. This was echoed by some of the SC partners when asked what they would improve about the workshop. The regional workshop team had a purpose for the "working with scientists" discussion during the workshop and core topics they wanted to cover. Although this was the intention of the Cornell visit, it did not turn out this way and ended up not being very useful for some of the partners.

#### **Goal 4: Present NISE Net's Catalog of Existing Products**

Partners were interested in using the range of the NISE Network's offerings, although some partners still had questions about the exhibits after the workshop. In a few instances, partners were not aware there was a NISE exhibit set up in the host institution for them to see. It is important that partners are reminded throughout the workshop to visit the NISE exhibit and directed to where they can find it.

Although partners are interested in using the various resources, some partners were unsure how to acquire them. All partners should leave the workshop aware how to obtain programs, exhibits, forums, and NanoDays materials. Workshop leaders should be more explicit on how to acquire the resources and check in with partners during the workshop to ensure they all know how to obtain them. It may even be useful to provide partners with a handout that explains the range of NISE Network offerings and how to acquire them.

Partners face a variety of barriers to hosting nano-related exhibits and programs at their institution. These barriers included financial constraints, nano topics not a priority for school groups, lack of staff expertise in nano, and nano topics seeming difficult to convey to the public.

#### **Goal 5: Provide Professional Development Resources**

Partners came to the workshop with varying levels of comfort talking to visitors about nano and answering their nano-related questions. By the end of the workshop, partners had significantly increased their comfort with nano and no one felt "uncomfortable." Overall, partners left feeling much more comfortable talking about nano than answering visitors' questions. Partners who still had questions about nanoscale science, engineering, and technology after the workshop most frequently had questions related to applications of nanotechnology.

During the workshop, partners engaged in discussions about reaching underserved audiences. Partners felt more prepared to engage these audiences after the workshops. However, when looking at rating by workshop, OMSI workshop partners felt significantly less prepared. This could be accounted to the discussion question used during the OMSI workshop. At OMSI, the DEA representative asked, "*Of the stuff you are doing or wish you were doing, how could the*

*NISE Net help you?"* At SMM, NCMLS, and SC, the DEA representative asked partners to share how their institution engaged underrepresented and underserved audiences. It is recommended that the DEA conversation in future workshops continue to ask partners to share what they do as opposed to what the NISE Network can do for them.

It is highly recommended that the DEA representatives are involved with the planning of future regional workshops. The core team had developed the agenda and worked out the content and timing of the sections beforehand so they were similar across all workshops, except for the DEA discussion. At the first workshop, the discussion ended up taking up much more time than expected and went in a direction that the core team had not planned for, although the resulting discussion was valuable as evident from the evaluation results. In subsequent workshops, the DEA discussion was moved to a more appropriate place in the agenda to allow for the rich discussions to happen. Throughout the implementation of the regional workshop, changes to workshop content and layout between workshops were discussed as part of the core team and larger expansion group, but DEA discussions were not part of this so at the OMSI workshop the core team was not aware until right before the DEA discussion that the focus had changed. The difference in evaluation results for this workshop provides support for ensuring the DEA team is involved in the workshop planning and becomes part of the regional workshop planning team.

## Appendix A

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### Workshop Agenda

#### ***Sunday***

7:00 Dinner with the group (possible Science Pub event)

#### ***Monday***

9:00 Optional: Come over early and explore museum on your own.

10:30 Welcome and introductions

10:40 NISE Network overview and workshop goals

11:00 NanoDays 2008 presentations

12:00 Lunch

1:00 Nano 101 for museum educators

1:40 Discussion: questions you, your staff or visitors may have about nano

2:20 Break

2:45 Working with researchers and industry

3:30 Diversity, Equity & Access (includes Universal Design presentation)

4:30 Nano 101 for museum staff

5:00 Workshop ends for the day

6:30 Dinner

#### ***Tuesday***

8:30 Breakfast

9:00 Intro to Nano for the general public

9:15 Break into small groups to learn and modify NISE Net programs

11:00 Each small group presents their NISE Net program

12:00 Lunch

1:30 Nisenet.org Catalog

2:00 Discussion: Future of nano in your museum

2:30 Formulate action plans

3:15 Break

3:30 Report out action plans and Wrap Up

4:00 Workshop evaluation

4:15 Workshop ends

5:00 Workshop debrief (NISE Network staff)

7:00 Dinner

## Appendix B

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### What Partners Valued Most About Their Workshop Experience (n=61\*)

\*Some partners gave more than one response.

#### **62% (38) Networking**

- The new network of colleagues that I made.
- Networking.
- Networking opportunities.
- Contacts, networking.
- Connections with other museums.
- As always, networking with staff members from other institutions.
- Networking opportunities.
- Networking and dialogue with other museum junkies.
- Networking.
- Chance to chat and converse with fellow NISE Net'ers.
- Connecting with other educators.
- Contacts with other people.
- Connecting with science centers across the region.
- Connections to other institutions.
- The friends made.
- People.
- Fellowship with other Museums. Forming a network of support.
- Having time to network was important.
- Getting to meet other science center people!
- Getting to meet others in the same field. Also, loved networking.
- The networking.
- Meeting other people - very rich experience.
- I enjoyed the opportunity to meet with other museum professionals in my region. Sharing meals with them and collaborating with them on presentations helped me to form those connections I need so that I will be comfortable working with them in the future.
- I greatly enjoyed the networking opportunities, both about nano and other museum programs.
- Opportunities to talk with other participants.
- Opportunity to meet with folks in the same field.
- I valued the networking the most. Dinner on Monday was a great experience.
- Having an opportunity to talk to other museum professionals.
- Meeting new people at in the museum field and making connections.
- Meeting other educators.
- Meeting other nano educators.
- Networking.
- Networking.
- Network opportunities.
- Time with like-focused informal educators.
- We are not alone in the void!

- Nothing is better than face-to-face conversation!
- Working with fellow museum colleagues.

### **33% (20) Nano 101 Presentations**

- Presentations on Nano that can be repeated in the museum (all the nano 101's).
- Greta's outline/presentation on Nano 101.
- Nano is more about materials management than about tiny mechanical technology.
- Learning how nano applies to my work.
- Very helpful to see several different Nano 101 presentations.
- Basic nano information.
- Background information on nanotechnology.
- Background on nano.
- Well-organized and great nano info!
- Also, the knowledge about nanotech was wonderful.
- I liked having 3 presentations of the basic. I did wonder if I might have projected from having the general audience one first.
- Learning more about NISE and nano.
- Being exposed to seasoned presenters who knew their content - very helpful for a rather complex and largely undefined/unknown subject.
- I enjoyed the presentations (both on how to train our staff, as well as explain to our visitors).
- The information and how to continue educating myself with the use of the catalogue.
- Content knowledge.
- Information.
- Information/content given.
- The information gained.
- The information learned.

### **25% (15) Sharing Ideas**

- Loved exploring new and exciting opportunities.
- Discuss ideas and share past experiences with others in the same field.
- Brainstorming and hearing what they (other institutions) are doing.
- A lot of new ideas to apply in our museum!
- Sharing ideas.
- Hearing about what others have done.
- The open forum for discussion of what people are doing. What is working, what is not.
- Hearing others' ideas.
- Brainstorming.
- Hearing what others did to get ideas.
- Ability to discuss/dialogue and share out. Opportunity to meet with folks in the same field to discuss ideas and share past experiences.
- Energizing and got some ideas about things to take back.
- Learning tricks and tips and how to talk about nanotechnology and what people have found worked or didn't.
- Exposure to new methods.
- New ideas; the time to focus on applying nano ideas to museum life.

### **25% (15) Learning Nano Programs**

- Time to try out activities.
- And of course the activity presentation.
- Hands-on.
- Practicing the activities we were most interested in.
- Doing activities.
- Content/curriculum/training.
- Chance to work closely with programming.
- Programs and materials to teach nanotechnology.
- Having the opportunity to get new materials & programs provided to us.
- Love hands-on activities... learn and present portion of workshop was great. Going through the nano days activities and being able to do them would have been nice.
- Practicing the cart demo and building the giant balloon nanotube! It was a way to give us a chance to actually experience those things actively so we'll feel very comfortable doing them.
- Seeing and participating in the demos is great. All of these great tools enable us to do a variety of nano programming without a lot of stress.
- Working with the program materials and being able to work with a group to adjust, adapt, and discuss.
- Training in how to do the presentations.
- On what we could do!

### **16% (10) NISE Network Staff**

- Everyone very helpful and friendly.
- The workshops are always top quality! Tim and Anders are especially fantastic, fun, organized, and articulate.
- You guys were friendly and engaging. I didn't feel like a tick on the butt. :)
- Great staff!
- Staff.
- It was so wonderful to get to put names with faces from the emails and NanoDays report.
- Working with the NISE staff and putting faces with names (i.e. Vicki and Karen).
- Face to name in the network.
- The staff.
- Presenters were well prepared and gave good information. They also genuinely listened to the suggestions of participants.

### **8% (5) Agenda**

- Felt the break time was perfect. Having time to explore the museum was important.
- Plus it was awesome to play in OMSI.
- Thought it was a great pace: intense but not absolute overload. Loved walking to the restaurants and access to exhibit - THANKS!
- It was a good mix of presentations and participatory activities.
- Clean room tour was really interesting. J.Weil - not so useful presentation, too much about what they do versus what would be useful to a museum.

### **11% (7) Other**

- I really liked the comfortable discussion on things and the acceptability of those with less knowledge by those with more knowledge.
- Discussion.

- Discussion on serving underserved and forming partners.
- Paid for!! Thank you!
- Everything was paid for!
- Loved the OMSI location.
- Wonderful facilities!

## Appendix C

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### Ways to Improve the Regional Workshop (n=39\*)

\*Some partners gave more than one response.

#### **36% (14) Agenda**

- The day on Monday was a bit long. Would have been nice to have a bit of time between the conference and dinner or have gone straight to dinner. 9am to 9:30pm, I was a bit overloaded! (OMSI)
- Please provide breaks at reasonable time - I needed to use the restroom, but didn't want to miss information. Make sure we have time to visit nano exhibits -didn't know about them Monday morning. (SMM)
- It would have been nice to follow the agenda more. Sometimes discussions got very off topic or lasted too long. Every group is at a different level with Nano programs which is interesting but also makes for very deep conversations for those that don't have nano programs. (SMM)
- Also, it might help to give a little more pause to allow people chance to decide if they want to speak up. You might get more participation from some of the quieter participants.
- Maybe incorporate one more interactive part.
- Maybe some specific topical breakout sessions - nano for young learners, nano medicine, etc.
- I think the happy hour was good but would have been better if it were just workshop individuals. (SC)
- I thought it was well organized and well presented. My only suggestion is to either provide more comfortable chairs or more opportunity to be out of our seats. Sitting all day became painful after a while.
- More time out if the room to think about what we are learning. I felt overwhelmed at times from data overload.
- One or two small-group activities so we can network w/more people.
- We came a long way to Portland and have had little time to spend in Portland.
- Give the experts a specific job. The scientists present seemed more frustrated than helpful. I would like to have heard a more formal talk from the industry reps.
- I question the need for the Universal Design discussion. These are basic concerns that all museum professionals should work to address with all their programming and exhibits, not just NISE net related items. The info on the NISE program test runs was nice, but I was already aware of the guidelines in general. I guess someone just starting out as an educator would find this much more useful.
- I thought the ASTC presenter's content seemed somewhat out of place.

#### **23% (9) More Hands-On Activities**

- More time for the breakout session with new kits. I would have liked to have time with each. I wonder if we could buy the other two kits from you?
- Would have liked to have more hands-on opportunities.
- A time to develop new ideas from scratch and try them on the floor would be fun and useful; similar to how exhibit development workshops are after done.



- I would have loved to do more hands on activities that could be used in museums. "Science cart activities". It would also have been nice if we had time to modify one of the activities to fit the learning of really young children 3-5 years old. Most of the activities really only fit ages 7+. Which in most cases will not fit the audience of children's museums.
- Relied too much on PowerPoint. Good to have for modeling/tutorial purposes but maybe more models, audience participation, hands-on. Brainstorming on hands-on activities or models to expand what you have.
- It would be great to prototype new activities that need some fine-tuning - maybe activities that other organizations created.
- More on education; more activities.
- For the demonstrations, we need to focus less on using power point for public education.
- Maybe make it not so wordy – more hands-on.

**18% (7) Workshop Participants**

- This region is too large. No other participants were in easy driving range from me; closest is 4.5 hours. This compromises collaboration.
- Adding other groups - scientists/businesses/other.
- More children's museums!
- My only complaint was no participants in my area! But I guess that's a new task.
- I think it could be larger and still be effective but save some people their time.
- Wide variety of participants was both good for getting new ideas, but not always relevant.
- Maybe a grouping based on museum size or job function would also be useful.

**10% (4) Have Kits Available**

- For those that have not seen the NanoDays kits, possibly see those.
- It would be very helpful to leave the workshop with the materials (kits). I think it would eliminate a lot of questions.
- More hands on materials; prepared disks with information.
- List of tool kit contents. List of Nano Days kits. List of workshop outcomes/products.

**10% (4) Cornell Field Trip**

- While the Cornell piece was interesting -- I found the lecture long, PowerPoint poor quality and the lab experience rushed. Also unfortunately, I didn't get the point. The clean room explanation too long and lost on me. I would rather have had time with Houston "c" museum. Hearing an in depth account of nano at their facility.
- I didn't find the program at Cornell very informative. I have been to other nano workshops that included more time in the clean room where the participants actually got to use the equipment and AFM's.
- The visit to the clean lab provided info on a very abstract level. A more concrete experience would be helpful.
- I did not find the tour of Cornell's facilities useful. It was a bit rushed due to time constraints.

**8% (3) Nano 101 Presentations**

- There was a little too much Nano 101 stuff especially when combined with the pub trip. I would have preferred working together to solve NISE net problems, or more time to network, or more time to role-play or practice after knowing our action plans. (OMSI)
- More applications of nanotech. What is currently used - pro's and con's. I realize it may be that I haven't seen all you have on site. I think we have what we need to introduce nanoscale and what nanotech is -- but beyond that it's sketchy. And will most likely have regular updates. May an "in the news" category on site that gives urls for recent articles, newstories, etc. P.S. Lotus effect in this month's Scientific American. Thanks again!
- The "Nano 101" presentations were nice, but we didn't need so many. Also, start with Nano 101, not the end of the day. I would like a workshop on how to tie Nano into other programs. The e-mailed info was great, and I felt connected, but it was almost too much.

**13% (5) Other**

- It would be interesting to divide into groups based on some of the hows and whats of using programming. Looking at mission, outreach, size, etc. This could also be a feature of the website rather than workshop agenda.
- Would have liked more time to interact with Luke Falvo and Chris? - scientist view. A lab tour would have been cool. (NCMLS)
- It would be nice to have more information on how to fund programming for activities.
- Have them regularly.
- I think it might be good to be a little more sensitive of alienating participants be that religiously, ethnically, etc.

## Appendix D

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### **Pre-Workshop Questions About the NISE Network (n=14\*)**

\*Some partners had more than one question.

#### **43% (6) Nano Exhibits and Programs**

- I would like to know about all the resources available to our science center through the NISE Network.
- What programs and support information does NISE have available that I can use as a basis for hands-on activities for visitors to our Center? How can nanotechnology exhibits be made fun and interactive?
- I have been through the catalog and noticed some interesting programs or activities, as well as read through NanoDays reports from various institutions. There were a number of institutions who developed their own activities to demonstrate nanotechnology principles. Would it be possible to collect these activities to include on the catalog or as part of a lesson database?
- Can you make available ways in which to address the nano world to elementary school audiences? Can you give us examples of school programming involving nanotechnology?
- How can I best serve our school audiences?
- What resources are available for people working with elementary audiences and families.

#### **29% (4) NISE Overview**

- As this is brand new to me, I would like a general overview of what NISE is and what it is trying to accomplish.
- What is it all about? I am attending at our director's request and open to learning about nano and how it relates to our educational mission.
- How did it get started? Who is involved?
- Is the NISE Network affiliated with the National Nanotechnology Initiative? From my understanding, the network was formed in 2005 and is a five-year project. I am interested in learning the accomplishments of the last 3+ years, including evaluation of goal achievement and expectations. I know very little about it. I'd just like to learn more in general, and maybe get in contact with other colleagues who may be offering introductory Nano topics on the floor of their museums to find out if we can share strategies.

#### **14% (2) Partnering**

- Can the scientists, universities and experts from NISE Net be our partners? (Our museum is in Mexico City.)
- How can we expand partnerships between NISE Net institutions and public libraries nationwide? We have enjoyed some success in this area here in eastern Oregon thanks to LEO and OMSI. Perhaps a program at a national library conference such as ALA or PLA?

**29% (4) Other**

- To what degree does the NISE Network want to be directing/involved in these programs? Is it just an issue of seeing them happen or is there a specific approach being endorsed?
- Can you make the website more easily navigable?
- How can my institution acquire more exposure with nanoscale science?
- Other than direct contact with our primary (and wonderful) liaison in Durham, I am uncertain about ways to incorporate the network and the website into planning and dissemination of programs and activities.

**Post-Workshop Questions About the NISE Network  
(n=14\*)**

\*Some partners had more than one question.

**71% (10) Nano Exhibits and Programs**

- Are exhibits ready to purchase? How do I get a prototype?
- What is plan for exhibits -- how do we rent them?
- Need more info on exhibits to share with exhibits teams.
- The production of smaller exhibits for smaller museums.
- As for interest in exhibits, it seems basic pieces that could be easily incorporate in larger halls (themes) would be great.
- How do I purchase a lot (1000) of the carbon board Bucky balls with the NISE logo for our Nano Day Exhibit?
- How would I go about establishing a permanent nano presence at my museum?
- What can we get and how do we tap into it?
- What can we buy, borrow, have? How to get?
- Acquiring resources. Also, I had to leave before NanoDays Materials were discussed

**29% (4) Involvement in the NISE Network**

- How can I be a bigger part of NISE Net?
- What are the expectations of us? I have a general idea, a firm list of requirements would be appreciated.
- How are you planning to involve international participants? (Like Papalote in Mexico.)
- Whether resources can be shared with smaller institutions, especially if a second 5-year nano grant is applied for. Perhaps adding leadership from small institutions onto nano planning and evaluation meetings.

**21% (3) Other**

- Would like concrete information and ideas on increasing the diversity (ethnic, cultural and socioeconomic+ ability) of our audiences as well as diverse communication styles.
- What other workshops are planned? Future plans?
- I want to know how I can help trouble-shoot the website for you all! :)

## Appendix E

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### How NISE Net Can Support Partners Action Plans (n=38\*)

\*Some partners contributed more than one response.

#### **45% (17) Follow-Up With Partners**

- Check in -- see if they need assistance with contacting industry experts.
- Check in with them at various intervals.
- Follow-up on an individual or small-scale basis.
- Just keep us posted about opportunities to incorporate nanotechnology information into our plans.
- Keep in touch!
- Keep us up to date on important happenings/dates to remember 1 year in advance.
- Maintain communication flow back and forward; you know people who could be helpful, put us in touch with them.
- Send out messages alerting us to opportunities to see other plans in action!
- Stay in contact and remind them.
- Stay in touch; share new ideas; keep us all informed.
- It is always great to hear from Brad or others by email regarding what is going on, needs, etc.
- Occasional follow-up emails can serve as reminders to me of my commitment to the program. I have several special projects and events that sometimes distract me from distantly looming deadlines.
- Send emails out to remind us where to find NISE net's resources online.
- Touch base via email.
- Check in to answer questions and give support for later frustrations.
- Mail the postcards!
- Onsite visit.

#### **34% (13) Provide Resources**

- Props, exhibits.
- Providing kits is great!
- Providing tool kits;
- Provide the resources - Nano Days kits, tool kits, other modules. I'm still not clear on what everything is...
- I've already talked to a staff member about getting the first kit with the activities I need. She said I'd get it after the New Year.
- Send out materials and kits.
- Once I have the necessary materials, action plan will improve.
- Downloads.
- Deliver all the digital content promised soon. :)
- Continue to provide physical kits and ideas.
- Continue developing great hands-on program ideas.
- More access to activities - let's do more of them to see how they work.
- More PowerPoint materials available for our use.

**24% (9) Be Available For Questions**

- Answer questions as needed.
- As long as I am able to contact the people I need to, I should be fine (availability to answer questions throughout the year.)
- Be available for discussion and/or troubleshooting.
- Patience/ Available for questions.
- Provide support as questions come up.
- Point them in the direction of answers to questions that they might not know.
- Make sure you're available to answer any of our questions.
- The only thing I can think of at this time is to be open to questions and allowing us to use you as a resource - which you already do. Now I feel comfortable getting in touch with NISE network partners.
- Continue to provide communication channels.

**13% (5) Help Facilitate Partnerships**

- Perhaps an opportunity to meet with geographically linked museums in small groups to plan cooperative action plans.
- Provide examples of partnership; facilitate these interactions a little.
- Contact with subject area experts.
- Start the conversation in the new format e.g. linkserv so we can easily contact our regional partners.
- An online forum could be great.

**8% (3) Other**

- Give ideas for talking to and preparing visiting scientists to our museums.
- More information on how to fund some of the programs to carry out the goals.
- The website is a good idea.

## Appendix F

### Partners' Pre-Workshop Questions About Nanoscale SET (n=50\*)

\*Some participants had more than one question.

#### **34% (17) Applications of Nanotechnology**

- Practical applications to / effects on everyday living, exciting possibilities that will positively effect the Earth.
- How are research findings in nano translated into the development of actual products? To what extent is nano fulfilling its promise (or is it too soon to tell)? Compared to 3-5 years ago is the level of public interest in nano increasing, decreasing or about the same?
- How is nano already being used in our daily lives? What future applications for nano are envisioned by nano industry?
- I think it is important to be aware of the most current research in the field. I think one of the best ways to interest the public in nanotechnology is to show how it impacts their lives. I would like to know more about nanotechnology applications.
- I would like to learn about its connections to medical science and biotechnology. Specifically, what products are on the horizon that are going to affect these fields?
- Practical applications of nano technology that impact elementary age students in their context.
- What are the applications?
- Relate nano to the guest's everyday experience.
- What is the current nano science and technology that is applicable to the average visitor's life?
- What nano products do we use routinely--especially things kids would know about? What's the next Big Thing in nano?
- What specific examples of nanotechnology that are already in the consumer marketplace can we tell people about?
- How can the use of nanoscale science help to prolong life? How can nanoscale science be applied to the field of astronomy (NASA)?
- What are the latest developments in nanotechnology that are being used in medicine? industry? space science (NASA)?
- What are the most recent breakthroughs in this technology and how can we keep updated?
- What's the latest? Are memristors going to revolutionize electronics?
- I would like to be able to share with visitors "realistic" expectations of various nanotechnologies applications and timeline to production.
- I am also interested in new science emerging in this field or exciting things to bring to the attention of our visitors and presenters that will not go over their heads.
- Nanotechnology applications.

#### **22% (11) Risks and Benefits of Nanotechnology**

- How do we address the negative societal implications that nano poses?
- I would also like to learn more about the risks and concerns associated with nanotechnology.

- What precautions does the nano industry take to learn about and protect public from potential harms?
- How to address questions about people's fears and misconceptions about nano.
- What are the predominating concerns regarding safety or drawbacks to this science? What are the feasible next steps in developing this science to make accessible and safe on a larger scale?
- I'd like to know more about the efforts are being made to learn what nanoscale 'stuff' can do; both negative and positive.
- Explore the pros and cons of the nano industry.
- Safety and environmental impact.
- What are the benefits and potential problems?
- What ethical issues are involved in the study of nanotechnology/nanoscience?
- What does happen when I wash nanoparticles out of my socks and into my municipal sewage treatment plant and from there into my local waterway?

**14% (7) Basics of Nano**

- A layman's definition.
- I had difficulty explaining nano in the elevator speech for press releases, ads, etc., so some help there would be excellent. I am brand new to this network, so anything will be helpful!
- I need a foundational knowledge. I came to your workshop in Denver and found it interesting and thought it might be a nice match for PD.
- Review of vocabulary associated with nanotechnology. Understanding process working on a nano scale.
- I am comfortable talking about what I know to anyone, which I admit is not as much as I would like to know. I am hoping that this conference starts at the basics and heads right into current research and trends in the Nano industry and then further looking out into the future of what Nano technology can do.
- Some questions that visitors ask include: How did nanotechnology come about? Why did we just start using nanotechnology recently?

**12% (6) No Questions, It's All New**

- I have a lot to learn about nano! I'm sure you will answer questions I didn't even know I had.
- I have little or no base understanding about nano. I'm a clean slate!
- My current information is very limited. I expect questions will pose themselves as my knowledge increases. I would anticipate being comfortable talking about nano and answering questions after the workshop.
- Nano science is all new to me. This is something that we are looking into adding to our programming but I personally do not have any experience in this area. I am very excited to learn about nanos!
- Not sure I'm a Nano Novice.
- I am new to nanoscale so any information would be great.

**4% (2) Other Nano-related Questions**

- I basically just need to see more!! Would also be interested in an update of nano current events.
- Where should high school students look for experience in nano STEM?



**38% (19) Educational Strategies (Questions not related to nano-content)**

- How can nanoscale science best be explained to the general public in a fun way?
- How do you address this subject which is fantastically broad, covers so many fields of science, leaves so many hanging questions, and which is interesting to a wide spectrum of laypeople? How do we sift the facts from the propaganda and hyperbole?
- How to help people relate to things that are too small to see. How to do things in a relatively inexpensive way, yet attract older students.
- I am interested in learning about additional ways to approach visitors and relay information about this complex science curriculum.
- I would like a way to be able to teach nanoscale to the public through fun and interactive programs at our museum.
- I would like to be able to bring the science concept down to the everyday visitor's level.
- I'd like to hear how and if people are explaining more to visitors than simply what Nanotechnology and the nanoscale is. Our visitors do not seem ready to learn more than this yet, though our staff want to teach about it.
- Most of my questions have to do with program implementation in the museum setting -- how to effectively market such programs to school and public audiences and how to make a meaningful link to the real science through analogous activities while keeping it fun and approachable.
- My questions regard education strategies more than factual content. I would like to discuss approaches for teaching laymen about nanotechnology, especially children or a group with varied base knowledge.
- No true questions but we would like to gather nanoscale subjects/research topics and activities that we can bring/alter to a child's educational level.
- How to do simple but WOW experiments/demonstrations on the floor for guests to grasp nano. How can we present nano in a stand-alone inquiry format with our guests without a lot of front loading.
- More demos to introduce nanoscale science to the public...must be quick, easy & inexpensive.
- What hands-on activities are available to make nano concrete for children? What educational exhibits are available about nano?
- The presentation of nano-scale materials to elementary children.
- What are some fast and easy ways to teach nanoscale science to learners of various ages? What are some of the challenges that are faced when teaching about nanoscale?
- What are other institutions in our region working on, what would they say are their successes and challenges.
- What support is needed to get research scientists and industry representatives ready for informal science programs? Examples of successful programs, particularly for multi-age groups.
- We would like to get involve with scientists and industry, how can we do it?
- When working with industry representatives, how do you find a balance between providing information and advertisement?

## **Partners' Post-Workshop Questions About Nanoscale SET (n=24\*)**

\*Some partners had more than one question.

### **83% (20) Applications of Nanotechnology**

- More answers to real examples of nanoscience in everyday life.
- I still would like to know more examples of nanotechnology.
- How about how nanoscience is translated into real life applications; Overview of the current states of nanoscale industry - existing products and what's in the pipeline.
- It is always great to hear about the "new" nano products.
- How is this being applied to daily life... what would tie this to my visitors (very young children) lives?
- Applications currently in use -- examples. Applications likely to be in use in 5 years.
- How can nanoscale science be applied to space missions?
- I still have questions about what is possible/impossible with Nano.
- How nanotech contributes to pollution cleanup.
- It's always changing and growing so questions and applications are continuous.
- Further options of development/research.
- I think the correlation between nano and energy could be explained in more layman's terms.
- Applications.
- How do carbon tubes affect men and the visitors, etc.?
- What's next?

### **21% (5) Risks and Benefits of Nanotechnology**

- I still have questions about ethics and hazards.
- I'm very comfortable on the science end. Less so the social and ethical issues.
- What safety information is available about current nano products?
- positive and negative implications.
- Benefits/Risk.

### **17% (4) Nanotechnology Manufacturing**

- The technology aspect is somewhat difficult for me.
- Engineering details - how do they do it?
- Many of the "how-tos" and technical aspects.
- I'm still curious how they're applying manufacturing techniques in manufacturing nano products on large scale.

### **13% (3) Other**

- I would like to know more about the aspects that make materials at the Nano-scale behave weirdly (bonds, quantum mechanics, etc.). Where to learn more?
- What industries and businesses in our region are actually using nanotechnology or products made using nanotechnology?

## Appendix G

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### **Reasons For Level of Agreement With “I Feel More Prepared to Engage Underserved and Underrepresented Audiences” (n=14\*)**

\*Only some partners chose to comment on their rating.

#### ***Disagree***

- We didn't discuss this at all beyond foreign languages. We should do more work on this because ultimately, more than anyone, we want to inspire underserved populations toward the sciences. Why not toward nano? Let's work on this next time. (OMSI)

#### ***Somewhat Disagree***

- I don't feel programs made me specifically more or less comfortable engaging in underserved audiences because we didn't get into detail about ways to engage underserved audiences differently. (SC)
- As far as engaging underserved/underrepresented audiences, I feel we discussed or threw out ideas but usable ideas were not present for our situation & Nano activities have to be developed and relatable to those audiences. (OMSI)
- Already actively pursuing underrepresented audiences. (OMSI)
- Aware of this issue already -- no new info. (SMM)
- More specific tools to address this would be wonderful! (SMM)
- The underserved/represented populations are difficult to reach due to economic restrictions; outside the workshop's purview. (NCMLS)

#### ***Somewhat Agree***

- I do feel that in some ways, Nano is an "equalizer" in that most people have little/no knowledge of it. However, with it being such a complicated subject, I feel (and fear) as though it may further alienate members of our "under-represented" and/or "underserved" audience. (SMM)
- I thought that this was somewhat of a tangent. I'm a divesting advocate but felt like the ASTC rep's time could have been used by more research professionals. (NCMLS)
- We only spent a little time here (underserved audiences); I'm not sure it's placement/timing was most optimal. (NCMLS)
- Would like more strategies for engaging underserved; why should they care? (NCMLS)
- I felt presented material was more "we need to do this" than how, and shared ideas difficult to apply in my situation. (SC)

#### ***Agree***

- After attending this workshop, I now feel more competent in engaging others about nano. (NCMLS)
- I was already comfortable with this. (SMM)