

NISE Network Forum: “Risks, Benefits, and Who Decides?” Formative Evaluation

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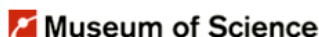
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THIS IS A FORMATIVE EVALUATION REPORT

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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Table of Contents

| | |
|---|-----------|
| Executive Summary | 4 |
| I. Introduction | 5 |
| About the Forum | 5 |
| About the Evaluation | 6 |
| II. Methods..... | 8 |
| Selection of Study Forums..... | 8 |
| Data Collection Methods..... | 9 |
| Data Analysis | 10 |
| III. Results and Discussion..... | 11 |
| 1. Why participants came to the forum and what they knew before attending. | 11 |
| 2. Questions participants asked during the forum | 14 |
| 3. Issues participants discussed during the forum..... | 16 |
| 4. Outcomes reported by participants after the forum. | 18 |
| 5. Advice for conducting the forum based on learning from the educators. | 25 |
| IV. Conclusion..... | 29 |
| References..... | 31 |
| Appendix A: Other Information About the Forums..... | 32 |

Executive Summary

This study was conducted as a part of the formative evaluation of the NISE Network forum “Nanotechnology: Risks, Benefits, and Who Decides?” The purpose of the forum was to bring members of the public together to discuss whether experts, watchdogs, and/or the public should be the primary decision makers about nanotechnology policy. During the course of the forum, participants learned about nanotechnology and its societal and ethical implications from experts, had a chance to ask questions of the experts, participated in a small group discussion where they talked about the pros and cons of the three potential policy makers, and reported out to the larger group about their discussion.

During 2006, all five NISE Network Forums Team institutions (Exploratorium, Museum of Science, Museum of Life and Science, Science Museum of Minnesota, and Oregon Museum of Science and Industry) presented this forum at least once. As a part of the presentation of the forum, formative evaluation information was collected including exit surveys, participant documentation, observations, educator debriefs, and video/audio tapes. This information along with data collected through other sources was used to help the team modify and optimize the forum for participants and program educators. In addition, it was felt that the data collected could be used to help future forum educators and expert presenters understand the needs of potential forum audiences and gain advice from past forum educators.

Based on the results of the formative evaluation, advice to those presenting future “Who Decides?” Forums includes the following:

- Balance the time allowed for expert presentations and small group discussion because participants find both of these segments important.
- If at all possible, make sure the presentations cover the full range of content relevant to the discussion scenario, including information about nanoscale science and technology, nanotechnology applications, regulation of technologies, and societal and ethical impacts of technology.
- Make sure that the speaker feels comfortable talking to the general public and can adjust his/her content to a level appropriate for the audience.
- Use trained facilitators whenever possible to ensure that the pros and cons of each of the scenario options are discussed and to make sure that everyone gets a chance to speak.
- Encourage participants to discuss the pros and cons of each of the three scenario options (experts, watchdogs, and the public), but do not force them to conclude the discussion by settling on just one of the options as the primary policy decision maker.
- Make sure the participants clearly understand what they are expected to produce for the report-out.

I. Introduction

About the Forum

The “Nanotechnology: Risks, Benefits, and Who Decides?” Forum was created in 2006 by the NISE Network Forums Team institutions. The institutions who are a part of the NISE Network Forums Team include:

- Exploratorium,
- Museum of Life and Science (MLS),
- Museum of Science (MoS),
- Science Museum of Minnesota (SMM), and
- Oregon Museum of Science and Industry (OMSI).

As a part of the creation of the forum, it was presented at all five of the forum institutions at least once between May and September 2006 (see Table A1 in Appendix A). The purpose of the forum was to generate discussion among members of the public about who should be involved in policy decision making surrounding nanotechnology: experts, watchdogs, and/or the public. These forums generally lasted two hours. During this time, participants learned about nanotechnology and its societal and ethical implications from experts, were able to ask the experts questions about their presentations, discussed the pros and cons of involving each of the three stakeholder groups in policy decision making in a small group with the help of a moderator, and reported out to the larger group about their discussions. The educational and programmatic goals for all NISE Network forums including “Who Decides?” are the following:

Overarching Goal: To provide experiences where adults and teenagers from a broad range of backgrounds can engage in discussion, dialogue, and deliberation by:

- Enhancing the participants’ understanding of nanoscale science, technology and engineering and its potential impact on the participants’ lives, society, and the environment.
- Strengthening the public’s and scientists’ acceptance of, and familiarity with, diverse points of view related to nanoscale science, technology, and engineering.
- Engaging participants in discussions and dialogues where they consider the positive and negative impacts of existing or potential nanotechnologies.
- Increasing the participants’ confidence in participating in public discourse about nanotechnologies and/or the value they find in engaging in such activities.
- Attracting and engaging adult audiences in in-depth learning experiences.
- Increasing informal science educators’ knowledge, skill, and interest in developing and conducting programs that engage the public in discussion, dialogue, and deliberation about societal and environmental issues raised by nanotechnology and other new and emerging technologies.

The materials needed to conduct this forum can be found at <http://www.nisenet.org/>. In addition, information about other NISE Network forums can be found on the website, in the *NISE Network Public Forums Manual* (NISE Network, 2007), and in the article “Fostering civic dialogue: A new role for science museums?” (Reich, Bell, Kollmann, & Chin, 2007).

About the Evaluation

As a part of the creation of the “Nanotechnology: Risks, Benefits, and Who Decides?” Forum, evaluators from the NISE Network Forums Team institutions (Museum of Science, Exploratorium, Science Museum of Minnesota, Museum of Life and Science, and Oregon Museum of Science and Industry) conducted a formative evaluation of the program under the direction of Research and Evaluation Department at the Museum of Science. The purpose of the formative evaluation was to collect data from participants and forum educators in order to understand what changes should be made to optimize the forum experience. Based on these findings, changes have been made which are reflected in the “Who Decides?” materials available on <http://www.nisenet.org>. Those changes included the following:

- The overarching question of the forum was modified so that it focuses on the roles of experts, watchdogs, and public in nanotechnology decision making instead of focusing only on the public’s role.
- The small group scenarios were shortened and converted into bullet point lists.
- Definitions and examples of groups that belonged in each of the scenario options (experts, watchdogs, and the public) were provided.
- Participants were instructed that they can think beyond the small group scenario suggestions when deciding who should make policy decisions.
- Instructions were added so that participants understood from the small group scenarios what they are expected to report out about to the larger group after the small group discussion.

The other purpose of the evaluation was to create a program that could be easily disseminated to and used by museum professionals who had never conducted a forum program. The findings reported in this paper reflect this second purpose of the formative evaluation.

The following analysis is a summary of the NISE Network Forum Team’s findings about the “Who Decides?” Forum. The analysis was conducted to help people who had never presented their own forum before to present the forum at their own institutions by presenting them with a description of experiences of the participants who came to the forums and the educators who presented the forums. This report provides information about why participants are likely to attend the forum, what reactions participants will likely have to the event, and what participants are likely to value and learn through their participation. The findings presented will also be useful to forum speakers who may want to understand the nanotechnology topics that are likely to interest participants as well as the level of information the participants need. Also included in this report is advice collected from the NISE Network Forums Team about how to run the “Who Decides?” Forum. This information is presented to help program presenters understand what implementation techniques worked well for the forum educators as well as the challenges they encountered.

Based on the results of the formative evaluation, advice to those presenting future “Who Decides?” Forums includes the following:

- Balance the time allowed for expert presentations and small group discussion because participants find both of these segments important.
- If at all possible, make sure the presentations cover the full range of content relevant to the discussion scenario, including information about nanoscale science and technology,

nanotechnology applications, regulation of technologies, and societal and ethical impacts of technology.

- Make sure that the speaker feels comfortable talking to the general public and can adjust his/her content to a level appropriate for the audience.
- Use trained facilitators whenever possible to ensure that the pros and cons of each of the scenario options are discussed and to make sure that everyone gets a chance to speak.
- Encourage participants to discuss the pros and cons of each of the three scenario options (experts, watchdogs, and the public), but do not force them to conclude the discussion by settling on just one of the options as the primary policy decision maker.
- Make sure the participants clearly understand what they are expected to produce for the report-out.

These findings and recommendations are based on the formative evaluation of the “Who Decides?” Forum as conducted at the five institutions cited above. One should keep in mind that these findings may not be applicable to all institutions that choose to host this Forum in the future. These Forums were marketed predominantly to people who are museum members or on a museum email list so the audiences present at these forums were generally similar. However, we found that much of the data were consistent across institutions making it likely that similar results will also be found at other science centers and museums, particularly if the program attracts museum members or frequent visitors.

II. Methods

Data were collected in 2006 during the “Nanotechnology: Risks, Benefits, and Who Decides?” Forums conducted by the NISE Network Forums Team. The purpose of the formative evaluation was to generate data that could be used to make informed changes to the forums and provide advice to future forum presenters. Multiple methods of data collection were employed including educator debriefs, exit surveys, observations, videotaping, attendance tracking, and follow-up interviews. By using multiple data collection methods, the evaluators were able to develop a more complete picture of the forum experience for visitors and educators (Table 1). Data collection instruments which other museums can use to conduct their own forum formative evaluations can be found in the *NISE Network Public Forums Manual* (NISE Network, 2007).

TABLE 1. Methodology Matrix.

| Evaluation Questions | Data Collection Instruments | | | | | | |
|--|-----------------------------|-------------|--------------|-------------|---------------------|----------------------|-------------------|
| | Participant Documentation | Exit survey | Observations | Videotaping | Attendance tracking | Follow-up interviews | Educator debriefs |
| What marketing methods are effective, and not so effective, at attracting audiences to the NISE forum events? | | X | | | X | | X |
| Who comes to the forum events, and what possibilities exist for expanding the reach of the program? | | X | | | X | | |
| What elements or aspects of these programs create satisfying, compelling experiences for the participants? | | X | X | X | | X | X |
| How can the programmatic design be improved so it achieves the public impact goals for the forum program as specified in the baseline documents? | X | X | | X | | X | X |

Selection of Study Forums

Over the course of 2006, each NISE Network Forums Team institution presented at least three forums and committed to presenting the “Who Decides?” Forum at least once. This report contains the data collected from nine of the 2006 “Who Decides?” Forums that were chosen for inclusion because they retained the original forum purpose of giving participants a chance to discuss whether experts, watchdogs, or the public should play the greatest role in nanotechnology policy decision making. In addition, these nine forums were selected because they represent all of the NISE Network Forums Team institutions (Exploratorium, Museum of Science, Museum of Life and Science, Oregon Museum of Science and Industry, and Science Museum of Minnesota). The forums that the data were collected at can be found in Appendix A (Table A1).

Data Collection Methods

Forms of data collection used for the “Nanotechnology: Risks, Benefits, and Who Decides?” Forum included attendance tracking (collecting information gathered through registration), participant documentation (collecting materials generated by the participants during the program), exit surveys, observations, video/audio taping, educator debriefs, and follow-up interviews of select program participants. Given that each NISE Network Forums Team institution operated under a different set of constraints, the institutions often did not collect data using all these methods. At a minimum, all the institutions were asked to collect data through participant documentation and exit surveys, but they did not always collect data through other sources. The information sources considered in this report include the participant documentation, exit surveys, observations, video/audio taping, and educator debriefs. The forums at which each data collection method was used can be found in Appendix A (Table A2).

Participant documentation: Materials generated by the participants during the event served as a source of visitor-generated data that was analyzed by the Museum of Science Research and Evaluation staff to determine the topics and questions the visitors were most interested in addressing during the event. These materials were collected from 35 small group discussion tables at eight of the nine study forums. Materials that were gathered from the participants included notes generated through the small group discussion and questions for the speakers recorded on cards.

Exit survey: This method focused on capturing information about who attended the forum and the participants’ perspective of the value of the experience. The exit surveys were collected at all nine of the evaluation forums. In total, 282 surveys were collected from approximately 358 participants (79% return rate). Survey questions addressed participants’ interests and backgrounds, recommendations for improving the program, and the aspects of the program the participants found the most satisfying or compelling. Participants were given the survey at the beginning of the forum. The first side of the survey contained questions that participants were expected to answer before the forum, and the back side of the survey contained post-forum questions.

Observations: Observational data provided insights on the topics and concerns the participants were most interested in discussing during the event. These notes were collected at six of the nine study forums. Data recorded included questions asked and comments made by the participants during the large group discussions, how the group voted on each of the different policy options, and what the groups said were the major summary points from their small group discussion.

Video/Audio taping: Video/audio tape data revealed insights on the quality of the small group discussions and detailed the types of topics the visitors discussed during the small group activities. The discussion at one table was videotaped during four of the nine study forums. Participants were asked to give consent to be videotaped during registration. Those who agreed signed a consent form. Those who did not agree were told that they could still participate fully in the forum, but that they should avoid sitting at the table with the camera. The video/audio tape was used by the NISE Network Forums Team after the forum to discuss the positive and negative aspects of the small group discussion and how it could be improved.

Educator debrief: In the days following the forum, program staff were asked to gather together to discuss their forum experience. Debriefs were conducted following eight of the nine study forums. Staff, including the program educators and facilitators, were asked to talk about their thoughts on the success of the forum, how they felt about their preparation for the event, their thoughts on the structure and format of the forum, and what changes they would recommend for future implementations of the program.

Data Analysis

By collecting data in a variety of ways, the evaluator was able to triangulate the data. The logic behind triangulation is that “no single method ever adequately solves the problem of rival causal factors” (Patton, 2002, p.247). Therefore, if data is collected through many sources, evaluators can avoid the problems of a one-method study, which is “vulnerable to errors linked to that particular method (e.g., loaded interview questions, biased or untrue responses)” (Patton, 2002, p.248). Studies that utilize multiple methods allow “cross-data validity tests” (Patton, 2002, p.248), and thus reduce the likelihood that the evaluator will draw a false conclusion based on the limits of any one instrument. In this case, data from participant documentation, exit surveys, observations, video/audio taping, and educator debriefs were compared whenever possible to ensure that findings are not susceptible to error, and to allow for an exploration of differences among data.

Data collected through the instruments were both qualitative and quantitative in nature. Quantitative data were analyzed through descriptive statistics such as percentages, counts, and means. Qualitative data were analyzed using inductive coding. Inductive coding analysis involves “immersion in the details and specifics of data to discover important patterns, themes, and interrelationships” and allowing the coding scheme to emerge from the data (Patton, 2002, p.41).

III. Results and Discussion

In order to describe the visitors’ experiences, the evaluation data are split into the following sections:

1. Why participants came to the forum and what they knew before attending,
2. Questions participants asked during the forum,
3. Issues participants discussed during the forum,
4. Outcomes reported by participants after the forum, and
5. Advice for conducting the forum based on learning from the educators.

1. Why participants came to the forum and what they knew before attending.

The data collected on visitors before their participation in the forum indicate the following:

1. Participants came to the forum because the topic was nanotechnology.
2. Participants did not know very much about nanotechnology before the forum, but they still felt comfortable expressing their opinions about science and technology.

1.1 Participants came to the forum because the topic was nanotechnology.

The evaluation sought to figure out why participant were coming to the forum by asking them on the exit survey what their relationship to the forum topic was. Participants were given six options to choose from. Over half of the surveyed participants (59%) said their main relationship to the forum topic is personal interest. This means that, for most participants, their relationship to the topic is not that they are research scientists (10% of surveyed participants), employees of nanotechnology industry (10% of surveyed participants), teachers (22% of surveyed participants), or community advocacy group members (8% of surveyed participants), but they are members of a public interested in nanotechnology (Table 2).

TABLE 2. Participant Responses to the Exit Survey Question: “Describe Your Relationship to the Nanotechnology Forum Topic” (N=282).¹

| | Number of Survey Respondents | % |
|---|------------------------------|-----|
| Personally Interested | 166 | 59% |
| Educator/Teacher | 61 | 22% |
| Other | 32 | 11% |
| Nanotechnology Industry/ Business Interest | 28 | 10% |
| Researcher studying nano or a related topic | 27 | 10% |
| Community/Advocacy Interest Group Member | 22 | 8% |
| No Answer | 6 | 2% |

¹ Percentages add up to more than 100% because participants were allowed to choose as many of the question options as they wanted.

Another way we learned why participants were attending the forums was to ask them to rank the importance of different factors on their decision to attend. The surveyed participants (90%) were most likely to say that the topic of nanotechnology was an “important” or “very important” factor in their decision to attend. They also agreed that two other factors important to their decision to attend were the focus on societal impacts (82% surveyed participants) and the trustworthiness of the museums (80% of surveyed participants). Other factors such as those relating to the expert presenters (speakers’ expertise: 71%; chance to ask experts questions: 59%) or the opportunity to talk to peers (53% of surveyed participants) were less important to the participants in making their decision to attend (Table 3).

TABLE 3. Participant Responses to the Exit Survey Question: “How Important Were Each of the Following to Your Decision to Attend the Event?”²

| | % of Survey Respondents Choosing: “Important” or “Very Important” | % of Survey Respondents Choosing: “Not At All Important” or “Somewhat Important” |
|---|---|--|
| The topic of nanotechnology (N=274) | 90% | 10% |
| The focus on societal impacts (N=211) | 82% | 18% |
| The trustworthiness of the museum (N=268) | 80% | 20% |
| The speakers’ expertise (N=259) | 71% | 29% |
| The chance to ask experts questions (N=263) | 59% | 41% |
| The opportunity to talk to peers (N=237) | 53% | 47% |
| The time of the event (N=257) | 53% | 47% |
| The event was free (N=240) | 46% | 54% |
| The location (N=256) | 41% | 59% |
| Being served a meal (N=225) | 23% | 77% |

1.2 Participants did not know very much about nanotechnology before the forum, but they still felt comfortable expressing their opinions about science and technology.

Before participating in the “Who Decides?” Forum, participants reported that they did not know very much about nanotechnology. When asked to rank their agreement with the statement “I have a strong understanding of nanotechnology” on the exit survey, just over a quarter of the surveyed respondents (29%) agreed (Table 4). This is partially explained through an open-ended question found on the exit survey. When the asked what they expected from the event, the most common response given by surveyed participants (52%) was that they will learn (Table 5). One participant said, “[I expect the forum] to expand my viewpoints” (SMM).

² Participants were asked to rank each statement as “not at all important,” “somewhat important,” “important,” or “very important.” The data reflect only the surveys on which the question was answered.

TABLE 4. Participant Responses to the Exit Survey Question: "Please Rate Your Agreement with the Following Questions."³

| | % of Survey Respondents Choosing: "Agree" or "Strongly Agree" | % of Survey Respondents Choosing: "Disagree" or "Strongly Disagree" |
|---|--|--|
| I feel comfortable expressing my opinions on science and technology. (N=239) | 87% | 13% |
| I have a strong opinion about the role of the public in science decision-making. (N=237) ⁴ | 76% | 24% |
| I have a strong understanding of the relationship between technology and society. (N=206) | 73% | 27% |
| I have a strong understanding of nanotechnology. (N=241) | 29% | 71% |

TABLE 5. Participant Responses to the Exit Survey Question: "What Do You Expect This Event Will Be Like?" (N=110)⁵

| | Number of Survey Respondents | % | Quotes |
|------------------------------|-------------------------------------|----------|--|
| Learning/ Information | 57 | 52% | "Informational/Educational" (Exploratorium) |
| No answer | 33 | 30% | -- |
| Fun/interesting | 16 | 15% | "Fun..." (MoS) |
| No idea | 11 | 10% | "No clue" (Exploratorium) |
| Discussion | 9 | 8% | "...discuss the current (& foreseeable future) of nanotech." (MoS) |
| Science content | 9 | 8% | "...How nanotechnology impacts my life & how I can be involved." (SMM) |
| Presentation | 3 | 3% | "Expect to hear pros and cons of nanotech..." (SMM) |
| Meet people | 2 | 2% | "...opportunities for networking, meeting people from the industry." (MoS) |
| Other | 2 | 2% | "... create optimistic vision of future." (MoS) |
| Challenging | 2 | 2% | "...Challenging (thought provoking)" (SMM) |
| Focus will not be on science | 2 | 2% | "More about policy and politics and not too much about the science of nanotech." (MoS) |
| Interaction | 1 | 1% | "... ineractive." (Exploratorium) |

³ Participants were asked to rank each statement as "strongly disagree," "disagree," "agree," or "strongly agree." The data reflect only the surveys on which the question was answered.

⁴ On the SMM Year 1, Forum 2 survey, the strongly agree box was one line down which may have caused the people who picked this box to be artificially low.

⁵ Percentages add up to more than 100% because the answers participants gave sometimes fit into more than one coding category.

Participants were also asked to rank their agreement with another series of statements about their understandings of and their comfort expressing opinions about science and technology. Despite their lack of understanding about nanotechnology, many surveyed participants (73%) agreed that they had a strong understanding of the relationship between technology and society. The surveyed participants (87%) also agreed that they feel comfortable expressing their opinions about science and technology (Table 4). This indicates that though participants may not know a lot about nanotechnology, they are still comfortable sharing their opinions about science and technology in general.

2. Questions participants asked during the forum

The question and answer session gave participants a chance to ask the speakers clarifying questions about nanotechnology and about some of the issues raised during the small group discussion. The following analysis examines the questions that participants posed to the experts at two Exploratorium forums, two Museum of Science forums, and two Science Museum of Minnesota forums about the regulation of nanotechnology. Questions posed by participants about general nanotechnology topics can be found in the *NISE Network Public Forums Manual* (NISE Net, 2007). Sometimes similar questions were asked across venues. Other times different kinds of questions were asked. Differences in the questions asked may be attributable to the content presented by the experts or the individual interests of the participants. The types of questions that were asked during the “Who Decides?” Forum included the following:

1. Participants asked the experts about past policy decisions.
2. Participants asked the experts what nanotechnology policies are already in place.
3. Participants asked the experts what they think future nanotechnology policies will be.

2.1 Participants asked the experts about past technology policy decisions.

During the question and answer session, participants from the Exploratorium and Museum of Science expressed an interest in learning about the policy decisions that were made for other technologies and how these decisions would relate to the regulation of nanotechnology.

How is nanotechnology different from other technologies (chemistry for example) that already have regulations in place? (MoS)

[The] human genome project and the ability to gain patents over genetic information, I see the same potential with the nanotechnology area... Who's going to own the ideas? How do we level the playing field with this kind of technology? (Exploratorium)

They also asked if past technology policies have ever limited the kinds of research that scientists can perform because they were curious if any limits would or could be made on nanotechnology research.

Parallel... [the] emerging speed of nanotechnology with the biotech revolutions... Can you give an example or two where nanotechnology is going somewhere it shouldn't go and how people addressed this concern? (Exploratorium)

What would provoke a restriction on research? (MoS)

2.2 Participants asked the experts what nanotechnology policies are already in place.

Some participants at the Museum of Science forums were curious to learn how nanotechnology is currently being regulated in the United States.

Are there currently FDA regulations in place in regards to products using nanoparticles? (MoS)

Do we have any US government agencies in charge of these products based on nanotechnology? (MoS)

Other participants at the Museum of Science and the Science Museum of Minnesota wanted to know about how nanotechnology regulation policies are being created in other countries.

What are the world wide policies and their influence on nanotechnology? (MoS)

What are Europe and Asia doing with nanotechnology and the role of the public? (SMM)

2.3 Participants asked the experts what they think future nanotechnology policies will be.

Some participants at the Exploratorium and the Museum of Science asked the experts to explain the process that they think will generate new nanotechnology policies.

Are nanotechnology materials being tested under biohazard standards? Should they be? (Exploratorium)

[Can you address] efforts by the EPA to create a framework that standardizes testing specific to nanotechnology? (MoS)

Other participants at the Museum of Science and the Science Museum of Minnesota were interested in learning whether the legislature will be in charge of making policy decisions, and whether they are prepared to take on this responsibility.

Do you agree that it is premature for legislation in nanotechnology, as no products exist and we don't know yet what the products are going to be? (MoS)

Do our elected representatives have staff educated enough to properly advise them on (nanotechnology issues)? (SMM)

3. Issues participants discussed during the forum

During the “Who Decides?” discussion, participants were asked to consider the pros and cons of allowing experts, watchdogs, or the public guide nanotechnology policy decision-making. After looking at the notes created at each small group discussion table and transcripts created from the video/audio taped small group discussions, it appears that there were similarities in the discussions and arguments made across the forums despite differences in the locations of the events and the people present at the tables. The arguments most typically seen in a small group discussion were the following:

1. Participants felt that there are reasons to trust and distrust all three groups if they are making the decisions about nanotechnology policy.
2. Participants felt that there is a need for the public to be more informed about nanotechnology so that they can be a part of the decision making process.
3. Participants felt that we need to be aware of the influence of money in technology decision making.
4. Participants felt that there is a need for multiple voices in nanotechnology decision making to provide checks and balances.

3.1 Participants felt that there are reasons to trust and distrust all three groups if they are making the decisions about nanotechnology policy.

One issue that participants repeated across the “Who Decides?” Forums was that they felt that each of the three scenario options had reasons to be trusted and distrusted when making policy decisions about nanotechnology. Many of the small groups said they felt that the experts have the knowledge about nanotechnology that is needed to make these decisions.

People working in the field have the best information/knowledge to make decisions. (MLS)

The experts are more knowledgeable—the scientists in particular. (MoS)

However, they may be untrustworthy to make the decisions because they are too influenced by their own interests.

At best scientists have the knowledge, at worst, they offer self-interest. (Exploratorium)

The experts might not have the same values as the public. (OMSI)

Watchdogs could be an important part of the decision-making process because their main function is to alert and inform people.

Advocacy groups are good at raising issues, debating, but they're not decision makers.

(MLS)

I think they play an important role but they shouldn't play a leadership role. The good things [watchdogs] do [are getting you]... information on what is good and what is bad. (SMM)

However, they are biased because they have a particular agenda that they are trying to promote.

... If you only went to green watchdog groups, then you get a one-sided approach to the whole thing. (MoS)

A watchdog may not be an expert, and they may have an agenda. (Exploratorium)

Finally, the public could be an important part of nanotechnology policy decision making because they have the interest and ability to judge risks and benefits.

We have to recognize that the public is composed of different segments that may play different roles. They can't be just listened to but have to be involved somehow. (SMM)

Public should have say in flow of commerce, what products are released. (Exploratorium)

However, the problem with allowing the public to make policy decisions is that they lack knowledge and are easily swayed.

People in general are ignorant. (Exploratorium)

The public doesn't have expertise. (MoS)

Public is subject to propaganda/misinformation. (MLS)

3.2 Participants felt that there is a need for the public to be more informed about nanotechnology so that they can be a part of the decision making process.

Many participants discussed the importance of educating the public about nanotechnology in order to make them better decision makers and allow them to be a part of the policy making process.

We need massive education efforts for [the] public. You would think with the Internet [there would be no] excuse but people aren't knowledgeable enough and if we aren't we just leave it to the experts. We need to figure out a way to get smarter. Something has to happen to get people thinking about these things. (SMM)

In order to rectify this situation, some participants expressed that it is the job of the experts to create an educated public.

... Experts should educate the public about nanotechnologies, and the possible risks associated with them, so that the public can make informed decisions about their use of nano consumer products, or of new medical nanotechnologies. (MoS)

[I say leave it to the experts if they] acknowledge that efforts to educate the public are made. (Exploratorium)

3.3 Participants felt that we need to be aware of the influence of money in technology decision making.

Many of the participants also discussed their concern about the power of money to influence decisions about nanotechnology. The participants see that this outside influence can affect any of options given in the scenarios—the experts, the watchdogs, or the public, and they were worried that money might take precedence over societal and ethical concerns.

Experts are employed by organizations with interests that may be at odds with the public’s interests... Experts have their own interests which may not align with the larger good. (SMM)

Basic research is being sacrificed in favor of Nano because all the money is there. (Exploratorium)

3.4 Participants felt that there is a need for multiple voices in nanotechnology decision making to provide checks and balances.

Because of the positive and negative aspects of each of the scenario options, many of the participants decided that one scenario option should not be in charge of making all the policy decisions about nanotechnology. Instead, the experts, the watchdogs, and the public all need to be involved in the process to ensure proper checks and balances.

[The solution should be] experts monitored by watchdogs and influenced by the public. (MoS)

The existing system, involving parts of all three options, succeeds in many ways. (SMM)

Experts, watchdogs, and the public all have a role. [They are] checks on each other. (MoS)

4. Outcomes reported by participants after the forum.

The data collected from participants about their forum experience indicated the following:

1. Participants enjoyed their forum experience, especially the small group discussion and the expert presentations.
2. Participants learned about nanotechnology and some of its societal and ethical implications from the forum.
3. Participants often suggested changing the timing or content of the various programmatic segments of the forum.

4.1 Participants enjoyed their forum experience, especially the small group discussion and the expert presentations.

After the completion of the forum, participants were asked on the exit survey a series of open-ended and ranking questions about their experiences. Some of the ranking questions asked participants about their enjoyment and comfort during the forum. Almost all of the surveyed participants agreed that they enjoyed their experience (99%) and felt comfortable voicing their opinions (99%) at the forum (Table 6).

TABLE 6. Participant Responses to the Exit Survey Question: “Please Rate Your Agreement with the Following Sentences About This Event.”⁶

| | % of Survey Respondents Choosing: “Agree” or “Strongly Agree” | % of Survey Respondents Choosing: “Disagree” or “Strongly Disagree” |
|---|--|--|
| I enjoyed the experience. (N=270) | 99% | 1% |
| I felt comfortable voicing my opinions. (N=241) | 99% | 1% |

Later, participants were asked to rank how important different factors were to their satisfaction with the forum program. The responses revealed that the factors relating to the expert presentations and small group discussion were ranked higher than other factors by the participants. Many of the factors related to the expert presentations were ranked most highly. Almost all the surveyed participants agreed that the topic of nanotechnology (93%) and the speakers’ presentations (88%) were important to their satisfaction with the event. Many surveyed participants (78%) also agreed that the question and answer period was important to their satisfaction with the event. Factors relating to the small group discussion were also highly rated. Most surveyed participants (84%) agreed that the focus on societal impacts, which was part of both the expert presentations and the small group discussion, was important to their satisfaction with the event. In addition, over three-quarters of the surveyed participants agreed that the small group discussion itself (82%) and the presence of a facilitator (80%) were important to their satisfaction with the program. The factors that did not relate to the small group discussion or the expert presentations were generally ranked lower by participants. Only the trustworthiness of the museum (79% of surveyed participants) was important to more than half the participants while fewer participants found the forum location (50% of surveyed participants) and the opportunity to have a meal (26% of surveyed participants) important to their satisfaction with the event (Table 7).

⁶ Participants were asked to rank each statement as “strongly disagree,” “disagree,” “agree,” or “strongly agree.” The data reflect only the surveys on which the question was answered.

TABLE 7. Participant Responses to the Exit Survey Question: “How Important Were the Following in Contributing to Your Satisfaction with This Program?”⁷

| | % of Survey Respondents Choosing: “Important” or “Very Important” | % of Survey Respondents Choosing: “Not At All Important” or “Somewhat Important” |
|---|--|---|
| The topic of nanotechnology (N=271) | 93% | 7% |
| The speakers’ presentation (N=272) | 88% | 12% |
| The focus on societal impacts (N=206) | 84% | 16% |
| The small group discussion with peers (N=232) | 82% | 18% |
| The presence of a facilitator (N=235) | 80% | 20% |
| The trustworthiness of the museum (N=266) | 79% | 21% |
| The question/answer period (N=265) | 78% | 22% |
| The location (N=258) | 50% | 50% |
| The meal (N=224) | 26% | 74% |

The importance of these two event segments was also evident on an open-ended question that was asked on the exit survey. This question showed that the small group discussion and the expert presentations were what participants valued most about their experiences. The most common response that the surveyed participants gave was that they valued the small group discussion (31%). One participant said, “[I valued the] opportunities to discuss and listen to ideas” (SMM). The next two most common responses had to do with the expert presentations. Some surveyed participants (17%) said they most valued the opportunity to learn, and others (17%) said they most valued hearing and learning from the experts (Table 8). One participant said, “[I valued] gaining an understanding of [the] potential of nanotechnology” (MLS). Another participant said, “[I valued] hearing the speakers’ perceptions of societal issues” (MoS).

⁷ Participants were asked to rank each statement as “not at all important,” “somewhat important,” “important,” or “very important.” The data reflect only the surveys on which the question was answered.

TABLE 8. Participant Responses to the Exit Survey Question: “What Did You Value Most about This Experience?” (N=247)⁸

| | Number of Survey Respondents | % | Quotes |
|--|------------------------------|-----|---|
| The opportunity to discuss & hear others' opinions | 77 | 31% | "Interesting intellectual conversation" (SMM) |
| Opportunity to learn | 43 | 17% | "Learning about the subject and its application" (Exploratorium) |
| Hear/Learn from experts | 41 | 17% | "Hearing from experts" (OMSI) |
| No Answer | 28 | 11% | -- |
| Both learning from experts & the discussion | 25 | 10% | "Forum presenters and group discussion." (OMSI) |
| Diverse range of viewpoints brought to the table | 21 | 9% | "Diversity of backgrounds and opinions of people at table." (MLS) |
| The topic of nanotechnology | 18 | 7% | "Exposure to nanotechnology" (MoS) |
| Social/ ethical issues discussed | 16 | 6% | "...its social ramifications." (Exploratorium) |
| Meeting other participants/ the participants | 14 | 6% | "Chance to meet others interested in nanotech..." (MLS) |
| Other | 13 | 5% | "OMSI reaching out to adults -- to me." (OMSI) |
| The Format | 10 | 4% | "The relaxed informal setting instead of lecture hall." (MoS) |
| The food | 1 | 0% | "...even the food." (SMM) |

4.2 Participants learned about nanotechnology and some of its societal and ethical implications from the forum.

The two learning goals that the NISE Network Forums Team had for the “Who Decides?” Forum were the following: 1) participants would have an increased understanding of nanotechnology and 2) participants would gain an understanding some of the potential societal impacts of nanotechnology. Participant reports of their learning indicated that these two topics were the most likely to be learned by the participants during the forums.

Across the events, participants reported that they learned about nanotechnology from the forum. Participants were asked to rank their agreement with the statement “I feel more informed about nanotechnology.” Most surveyed participants (88%) agreed that their participation in the forum made them feel more informed (Table 9). In addition, when participants were asked in an open-ended question what they learned from the forum that they did not know before, the most common response that surveyed respondents (19%) gave was that they learned about the science and technology at the nanoscale. One participant said, “[I learned] the importance of the changes in properties of atoms at the nanoscale. [I learned] estimates of nano-size...” (OMSI). Other surveyed participants (10%) said they learned the applications of nanotechnology (Table 10). One participant said, “[I learned about] the amount of nanotech products” (MoS).

⁸ Percentages add up to more than 100% because the answers participants gave sometimes fit into more than one coding category.

Participants also said that they learned about the societal and ethical implications of nanotechnology from the forum. When asked to rank their agreement with the statement “I feel more informed about the relationship between nanotechnology and society,” most survey respondents (86%) agreed that they felt more informed. Additionally, the open-ended question about participant learning at the forum showed that many surveyed participants (12%) learned about the societal aspects of nanotechnology from the forum. One participant said, “[I learned] that there are serious societal concerns around the technology of nanoscience” (MoS). Another aspect of the societal and ethical implications that many participants reported learning about was how other participants feel about nanotechnology. Almost all the surveyed participants (96%) agreed with the statement “I learned about other people’s values on the forum topic” (Table 9). This learning also appeared in responses to the open-ended learning question. On this question, some surveyed participants (8%) reported they learned about others’ perspectives (Table 10). One participant said, “[I learned] a wide range of others’ viewpoints that I don’t usually get in discussing with my researching colleagues” (MLS).

TABLE 9. Participant Responses to the Exit Survey Question: “Please Rate Your Agreement with the Following Sentences about This Event.”⁹

| | % of Survey Respondents Choosing: “Agree” or “Strongly Agree” | % of Survey Respondents Choosing: “Disagree” or “Strongly Disagree” |
|---|--|--|
| I learned about other people’s values on the forum topic. (N=241) | 96% | 4% |
| I feel more informed about nanotechnology. (N=260) | 88% | 12% |
| I feel more informed about the relationship between nanotechnology and society. (N=207) | 86% | 14% |

⁹ Participants were asked to rank each statement as “strongly disagree,” “disagree,” “agree,” or “strongly agree.” The data reflect only the surveys on which the question was answered.

TABLE 10. Participant Responses to the Exit Survey Question: "What, If Anything, Did You Learn from This Forum That You Didn't Know Before?" (N=282)¹⁰

| | Number of Survey Respondents | % | Quotes |
|-------------------------------------|------------------------------|-----|--|
| No Answer | 82 | 29% | -- |
| About science/tech of nano | 53 | 19% | "Almost everything about nano (i.e. its beginnings, some of its principles)" (Exploratorium) |
| Societal aspects of technology/nano | 35 | 12% | "...the role we have as global consumers." (SMM) |
| Uses of nanotechnology | 28 | 10% | "The technology impact of this type of research." (MLS) |
| What others are thinking | 22 | 8% | "The way that the experts see the nano" (Exploratorium) |
| Other | 20 | 7% | "To attempt to steer our sons into the study of this fascinating field." (OMSI) |
| Regulations/policy | 16 | 6% | "Insite into the semantics of regulating technology" (MoS) |
| Significance of nanotechnology | 15 | 5% | "Both understanding of scope, unintent state, promise and risks of nanotech/science." (MLS) |
| Complexity of the issue | 13 | 5% | "Complexity of decision-making process" (SMM) |
| Lots of information | 10 | 4% | "Didn't know much so all was new." (OMSI) |
| Risk | 6 | 2% | "The possible benefits and problems that it can cause." (SMM) |
| Advancements in science/technology | 5 | 2% | "Complexity of nanotech on our future" (MoS) |
| Civic discourse/ public involvement | 5 | 2% | "Informing and educating public is important. Public backlash may result if they are not properly informed." (MLS) |
| Nothing | 5 | 2% | "a very little about nanotech" (MoS) |
| About government funding of nano | 3 | 1% | "That the government is spending money to inform the public about nanotech." (MoS) |
| About the researchers who presented | 1 | 0% | "That MIT's institute for researching military nanotech is named the Institute for Social Nanotechnology." (SMM) |

4.3 Participants often suggested changing the timing or content of the various programmatic segments of the forum.

Even though participants liked and learned from the expert presentations and small group discussion, these were the parts of the program that they were most likely to suggest changes for. Participants were asked an open-ended question on the exit survey about how the

¹⁰ Percentages add up to more than 100% because the answers participants gave sometimes fit into more than one coding category.

program could be improved. The most common response was to suggest changing the timing of the programmatic segments. Many participants suggested changing the timing of the question and answer period or the expert discussions. One participant said, “[I would suggest] maybe [adding] more Q&A time” (OMSI). Another participant said, “[I suggest] more time for ‘experts’ in their fields (in this case, the folks from Northeastern University) to present their ideas. Ten minutes was too limited” (MoS). Other surveyed participants (9%) suggested that the content, especially of the expert presentations, should be changed. One participant said, “[I suggest adding] more specific examples of nanotechnology” (SMM). Another participant said, “[I suggest adding] more [if] possible on current societal and political issues and conversations” (Exploratorium). Other common responses had to do with the small group discussion. Some surveyed participants (11%) felt that the discussion scenarios or question needed to be modified (Table 11). One participant said, “[I suggest] better defined questions with less limiting options” (MLS).

TABLE 11. Participant Responses to the Exit Survey Question: “How Could We Improve the Next Forum?” (N=282)¹¹

| | Number of Survey Respondents | % | Quotes |
|---|------------------------------|-----|---|
| No Answer | 77 | 27% | -- |
| Changing timing of programmatic segments, experts | 33 | 12% | "Maybe more Q&A time." (OMSI) |
| Change small group discussion question/scenario | 30 | 11% | "Better defined question" (MLS) |
| Change content; give real world examples | 26 | 9% | "Don't know - maybe a discussion focused on current controls and regulations." (SMM) |
| Don't change anything | 23 | 8% | "Can't think of anything - well done!" (MoS) |
| Provide information to participants | 13 | 5% | "Provide information prior to meeting. (i.e. white paper)..." (MoS) |
| Other | 13 | 5% | "Continued to have it at neutral ground (places that don't have political, religious etc. agendas)." (OMSI) |
| Improve AV issues | 11 | 4% | "Better breakout space too noisy in room." (SMM) |
| Bring in broader range of experts | 10 | 4% | "Outreach to journalists, lawyers, public interest NGO's & GO's." (Exploratorium) |
| Gives us some way to follow-up | 9 | 3% | "...Perhaps a follow-up forum - same topic, same participants." (MoS) |
| I'm not sure what to change | 8 | 3% | "?" (MLS) |
| Change the format | 8 | 3% | "More for a question and answer session, or allow questions throughout the presentations." (MLS) |
| Make the program longer | 8 | 3% | "More time to discuss..." (SMM) |

¹¹ Percentages add up to more than 100% because the answers participants gave sometimes fit into more than one coding category.

| | | | |
|--|---|----|--|
| Provide more organizing structure throughout forum | 7 | 2% | "A bit more structure on small group output" (SMM) |
| Balance makeup of the small group | 7 | 2% | "When divide the groups, divide them more diverse, because in my group the most are teachers." (Exploratorium) |
| Change the food service | 7 | 2% | "Cheaper food..." (OMSI) |
| Make the program shorter | 6 | 2% | "Shorten the time: too long" (MoS) |
| Provide other programming on nanotechnology and other topics | 4 | 1% | "Have these events more frequently on a variety of science-related topics." (SMM) |
| Bring examples/demos | 4 | 1% | "Show some research (ie. an Exhibit)" (MoS) |
| Make sure cellphones are turned off | 4 | 1% | "Remind audience to silence cellphones..." (OMSI) |
| Start on time | 3 | 1% | "Start on time!" (Exploratorium) |
| Increase number of participants | 3 | 1% | "Get the meeting/Forum advertised on a wider scale. Not so small." (MLS) |
| Improve sign up system | 2 | 1% | "Reservation system." (MoS) |
| Change the start or end time | 2 | 1% | "Move start time to 6:30. Traffic is really bad to make it by 6:00 PM." (MoS) |
| Include speakers in small groups | 2 | 1% | "Include speakers in the groups." (Exploratorium) |
| Have more tables | 2 | 1% | "...more tables" (OMSI) |
| Improve the moderated discussion | 1 | 0% | "Better facilitation" (SMM) |

5. Advice for conducting the forum based on learning from the educators.

In the course of the evaluation, members of the NISE Network Forums Team were asked to discuss their experiences presenting the forums and advice for how to best present the "Who Decides?" Forum. Included in this summary are the thoughts expressed by the Forums Team members, in-house evaluators at the host institutions, and some of the small group facilitators. Other information and advice from forum educators can be found in the *NISE Network Forum Manual* (NISE Net, 2007) and on <http://www.nisnet.org>.

The data collected from programmatic staff about the forum indicated the following:

1. Forums attracted a good audience, but attrition rates and marketing of the events were problematic.
2. It was important to have charismatic speakers who could cover a diversity of issues at a level appropriate for the participants.
3. The make-up of the small group was important to the quality of the discussion, but it was difficult to control.
4. The small group discussion worked best when the agenda and instructions for the scenarios and report-out were clear.
5. The facilitation of the small group helped the discussion, but the facilitators needed training.
6. It was important to conduct the small group discussion in rooms where the sound level could be controlled.

5.1 Forums attracted a good audience, but attrition rates and marketing of the events could be problematic.

Most institutions reported positively on their forum audience, saying that participants were committed, knowledgeable, and diverse.

We had the best of all possible audiences. People who came were committed. Some people knew quite a bit about nanotechnology. (Exploratorium)

Participants were a diverse group (MoS)

Still, some programmatic staff were worried about questions of low attendance and how the advertising of the event impacted the audience.

Attendance was low (48% no show). (Exploratorium)

We did not say in the email what a science café was, if we had remembered to do that, would we have attracted a different audience? (MLS)

5.2 It was important to have charismatic speakers who could cover a diversity of issues at a level appropriate for the participants.

Several institutions reported positively on their speakers, saying that they were approachable and had accessible presentations.

Speaker presentations seemed accessible. (MoS)

The scientist was very helpful and approachable. My table of kids had some specific questions for the scientists and the interaction between the scientist and the teens was very directed and helpful. (SMM)

Others thought the variety of speakers at their event was good, including having a speaker representing the “watchdog” voice.

[The participants] liked the idea of having the watchdog voice in the event, [we] hope that speaker continues to be a part of the program. (MLS)

Good variety of speakers. (OMSI)

However, some programmatic staff reported that they had issues with the content provided by their speakers because it was too general, too technical, too positive, or not applicable enough.

The speeches (from the experts) at the end were much more general than they should have been. (SMM)

[Speaker A’s] talk was very technical and over the heads of some visitors. (Exploratorium)

[Speaker B] focused on the positive implications of Nano, not any potential downsides or risks. (Exploratorium)

5.3 The make-up of the small group was important to the quality of the discussion, but it was difficult to control.

Educators reported that the makeup of the discussion groups was occasionally problematic, with unevenly distributed participants and undesirable groupings.

Random seating resulted in some strange groups (one table was one family; videotaped table only three adults plus one teen). (MoS)

The small group discussions had very uneven numbers. (Exploratorium)

However, when staff tried to divide the participants into groups, they found that this also caused issues.

We tried to divide the visitors into small groups using color coded dots: that didn't work. (Exploratorium)

5.4 The small group discussion worked best when the agenda and instructions for the scenarios and report-out were clear.

Educators felt that the scenarios were not as engaging for participants as they had hoped.

The three questions we posed (to replace the scenario sheet) were not as interesting to visitors as we expected them to be. (Exploratorium)

One guy didn't agree with question so [it was] hard to get answer. (SMM)

However, they felt that it could be improved by adding more structure to the discussion by providing participants with an agenda for discussion and instructions for the report-out.

Whole group could have used more closure. Voting was good, but some sort of reporting out seemed to be missing. (SMM)

Structuring the discussion a bit, [have an] agenda for discussion. (OMSI)

5.5 The facilitation of the small group helped the discussion, but facilitators needed training.

Feedback on the facilitation of the small group discussions was mixed. Some events had facilitation that engaged the small groups, kept discussion running smoothly, and encouraged input from all participants.

Facilitators ensured that the few quiet people were encouraged to talk occasionally. The facilitators were strong, but not overpowering. (Exploratorium)

Facilitators kept it all running smoothly. The staff facilitators were excellent, and the discussions were often lively. (MoS)

Other educators felt that more training for the facilitation would be beneficial, including focusing on how to keep one individual from dominating the discussion as well as clarification on a facilitator’s role in reaching consensus in the group.

Have the facilitators play a more active role. More facilitation training. (OMSI)

[Facilitators] thought that there seemed to be one person who dominated the conversation in each group, and wondered “What are some techniques for facilitators to keep the conversations on track?” More specifically, they are looking for techniques they can be “imported (cheaply) to other museums.” (MLS)

5.6 It was important to conduct the small group discussion in rooms where the sound level could be controlled.

For one of their forums, educators at the Exploratorium reacted positively to being in separate rooms for the small group discussion.

Being separated into separate rooms for the small group discussion [went well].

Being visually and sonically contained seemed to help focus the groups (Exploratorium)

Educators at a Science Museum of Minnesota forum felt that the noise of the room had a negative impact on the small group discussion and that splitting into different rooms for that portion of the event would be beneficial.

We only had five participants in our group and one of the women was unable to participate. Her hearing was so bad, it was too loud. (SMM)

If we do this again we should spread out into different rooms. (SMM)

IV. Conclusion

The data presented in this report describes the experiences of the participants and programmatic staff who participated in the “Nanotechnology: Risks, Benefits, and Who Decides?” Forums. The original purpose of this formative evaluation was to provide the Forum team with data that could be used to make informed changes to the forum. Between forum runs, the forum team made many modifications to “Nanotechnology: Risks, Benefits, and Who Decides?” based on the evaluation findings in order to optimize the forum for educators and participants including the following:

- They changed the overarching question of the forum so that it focuses on the roles of experts, watchdogs, and public in nanotechnology decision making instead of focusing only on the public’s role.
- They shortened the small group discussion scenarios and converted them into bullet point lists.
- They gave definitions and examples of groups that belonged in each of the small group discussion scenario options (experts, watchdogs, and the public).
- They made sure to let participants know they can think beyond the small group scenario suggestions when deciding who should make policy decisions.
- They made sure participants understand from the scenarios what they are expected to report out about to the larger group after the small group discussion.

The NISE Networks Forums Team realized that much of the data generated could also be helpful to other programmatic staff who have not yet produced a forum at their own institution. The purpose of this report was to report the data results in a way that is helpful to these new forum presenters. Therefore, the data discusses the forum participants: what they know before the forum, why they decide to attend, what questions they ask the speakers, what they discuss in their small groups, what they learn from the forum, and what they value about the experience. The data also discusses the experiences of programmatic staff: how they felt about the forum audience, the expert presenters, the small group discussion, and the report-out and their advice for the presentation of future forums. Based on the data presented here, there are a number of things that programmatic staff, who have never presented a forum program before, should consider before presenting their own forum.

- Expect that most participants will come to the forum because they want to learn about nanotechnology.
 - Give the expert presentations and question and answer session just under half the forum time so that participants can optimize their learning.
 - Make sure to leave enough time for the small group discussion because this forum segment is also important to the achievement of forum goals and valued by participants.
- Whenever possible, cover content during the forum that is not just about nanotechnology.
 - Participants are interested in learning about nanoscale science and technology, some of the current and future applications of nano as well as the regulation of technologies.
 - Participants are also interested in learning about the societal and ethical implications of nanotechnology.

- During the discussion, participants tend to argue that there are pros and cons to each of the discussion options and that all of them should be a part of the decision making process.
 - It is important to include a facilitator for each small group so that each group discusses the pros and cons of each of the small group scenario options and prepares for the report-out.
 - Do not force participants to choose only one of the small group scenario options during the discussion, but do allow participants to create their own model for how they think the nanotechnology decision making process should proceed.
- Most of the participants leave the forum having learned from and valued their time hearing from the experts and participating in the small group discussion.
 - Though participants suggest adding time for the experts, this time needs to be balanced with time provided for the small group discussion.
 - It is important to screen presenters to make sure that they are comfortable talking to a public audience and can address them on an appropriate level.

References

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Appendix A: Other Information About the Forums

TABLE A1. Dates and Locations of the Forums Included in this Evaluation.

| Forum | Institution | Date |
|-------------------------|---------------------------------------|-----------|
| Explo 1.1 ¹² | Exploratorium | 8/2/2006 |
| Explo 1.2 | Exploratorium | 9/14/2006 |
| MLS 1.1 | Museum of Life and Science | 5/23/2006 |
| MoS 1.1 | Museum of Science | 5/23/2006 |
| MoS 1.2 | Museum of Science | 7/18/2006 |
| OMSI 1.1 | Oregon Museum of Science and Industry | 6/6/2006 |
| OMSI 1.2 | Oregon Museum of Science and Industry | 8/28/2006 |
| SMM 1.1 | Science Museum of Minnesota | 5/18/2006 |
| SMM 1.2 | Science Museum of Minnesota | 8/30/2006 |

TABLE A2. Data Collection Instruments Used at Each of the Study Forums.

| | Attendance Tracking | Participant Documentation | Exit Surveys | Observations | Video / Audio Taping | Educator Debriefs | Follow-up Interviews |
|------------------|---------------------|---------------------------|--------------|--------------|----------------------|-------------------|----------------------|
| Explo 1.1 | X | X | X | | | X | |
| Explo 1.2 | X | X | X | | X | X | |
| MLS 1.1 | X | X | X | | | | X |
| MoS 1.1 | X | X | X | X | X | X | X |
| MoS 1.2 | X | X | X | X | X | X | X |
| OMSI 1.1 | | X | X | X | | X | |
| OMSI 1.2 | | | X | X | | X | |
| SMM 1.1 | X | X | X | X | | X | |
| SMM 1.2 | X | X | X | X | X | X | |

¹² "Explo" is an abbreviation of Exploratorium.