Who Decides Forum

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General Description

Summary:

This forum asks participants to discuss the strengths and weaknesses of three options. They will also have the opportunity to raise questions about the societal and environmental implications of nanotechnology to a panel of experts.

Participants will work in small groups to form a group recommendation drawing from the options presented—perhaps adding or combining elements, or creating a totally new option representing your group's view on the issue. They are not limited to the three options presented for discussion. If the group cannot reach agreement on a recommendation, have them identify the items they agree upon and those on which they differ.

Finally, each group will make a brief report to everyone on the group's recommendations.

Big idea:

Given the potential benefits as well as the unknown risks associated with nanotechnology, who should play the major role in shaping its future development and developing regulations concerning its use?

NISE Network Main Messages:

[ ] 1. Nanoscale effects occur in many places. Some are natural, everyday occurrences; others are the result of cutting-edge research.
[ ] 2. Many materials exhibit startling properties at the nanoscale.
[X] 3. Nanotechnology means working at small size scales, manipulating materials to exhibit new properties and create new devices.
[X] 4. Nanoscale research is a people story.
[X] 5. No one knows what nanoscale research may discover, or how it may be applied.
[X] 6. How will nano affect you?

Forums Overview

Introduction: The NISE Network:

The Nanoscale Informal Science Education Network (NISE Net) is a national infrastructure comprised of science museums and university based research centers collaborating to foster public awareness, engagement, and understanding of nanoscale science, engineering, and technology through establishment of a network that links science

museums and other informal science education organizations with nanoscale science and engineering research organizations. It is funded by a five-year cooperative agreement between the National Science Foundation and the Museum of Science – Boston and its core partners: the Exploratorium and the Science Museum of Minnesota.

Other subawardees have included: Oregon Museum of Science and Industry, Museum of Life and Science – Durham, New York Hall of Science, Sciencenter in Ithaca, Fort Worth Museum of Science and History, Cornell University, University of Wisconsin – Madison, the Materials Research Society, the Association of Science-Technology Centers, Inverness Research Associates, and Multimedia Research.

The goals for the NISE Net are to:

1. Engage the public with nanoscale science, engineering and technology through exhibits, programs, media, forums and other kinds of informal educational products;

2. Build a professional network of relationships, alliances, and professional development opportunities between museums and the research community; and

3. Generate essential new knowledge for learning about nanoscale science and engineering.

One of the primary goals is to engage the museum going public and other partner stakeholder groups by helping to bring nanoscale exhibits, programs, and media to as many informal science education venues as possible, with a specific target of 100 venues over the course of the grant. The NISE Net plans to reach this goal by building a network of relationships between informal science education organizations, nanoscience researchers, and professional associations that can work together to accomplish more than any single institution could do on their own.

Nano Public Forums Overview:

One focus of NISE Net's activity is the creation of nanoscale science, engineering and technology public forums that offer participants the opportunity to engage in thoughtful conversations about important issues regarding the potential societal, environmental and ethical implications of nanotechnology. They provide a vehicle for people of diverse views and backgrounds to deliberate on difficult issues and to seek a more comprehensive understanding of the topic.

The overall charge to the NISE Net Forums Team is to develop, test, and disseminate program models aimed at engaging adults and teenagers with informal educational experiences that incorporate discussion, dialogue, and deliberation around societal implications of nanoscale science, engineering and technology. The purpose of this manual is to provide information on how to engage members of the public in thoughtful conversations about important issues in nanotechnology.

The Forums Team (Figure 1) collectively has presented more than 30 forum programs and developed two program models (with different formats and topics) that have been tested at all five institutions, as well as a number of other forum program models implemented at only one or two sites. Going forward, the Forums Team plans to develop one more program model and to create dissemination packages for all three developed and tested programs. These program packages will be made available on nisenet.org along with information about other program models.

In addition to creating additional program models and distilling and posting the relevant knowledge about producing forum programs, work will be done in the remaining three years of the grant to expand the number of institutions with experience in presenting such programs.

Figure 1. Museum Collaborators in NISE Net's Forums Team

Museum	**Contact**
Exploratorium	Veronica Garcia-Luis
Museum of Science	David Sittenfeld
Museum of Life + Science	Brad Herring
Science Museum of Minnesota	Dave Chittenden
Oregon Museum of Science and Industry	Amanda Thomas
Evaluation Coordinator	
Museum of Science	Christine Reich

NOTICE: You're welcome to alter this program to suit your needs. In fact, we encourage it! Change it around, and if you find something that works let us know. Post your revisions on www.nisenet.org. You may also find it helpful to refer to the Forums Manual for more detailed information on hosting a forum.

Program Delivery

Agenda:

1. Welcome/Introduction – 5 minutes
    a. Have the moderator of the forum give an introduction to your museum/institution and to the format of the forum.
    b. Introduction to the NISE Net and your role with the network if applicable.
    c. Introduce speaker(s) – obtain presenter biographies beforehand to use for introducing each presenter
2. Professional Speaker(s) Present Topic(s) – 30 to 40 minutes
    a. The first speaker should give an introduction to nanoscale science, engineering and technology and provide examples of applications either currently available or in the research and design phase (20 minute max).
    b. The second speaker should discuss the societal, ethical and environmental implications aspect (20 minute max).
3. Q&A for any clarifying questions – 5 to 10 minutes
4. Group Deliberation – 30-45 minutes
    a. Groups sit around a table and discuss the overarching question and forum scenarios that have been placed on each table before the forum starts.
5. Individual or Group Reflection/Report Out – 10 to 15 minutes
    a. Either have each group report to the whole group what they discussed during the group deliberation or ask volunteers to stand up and share with everyone what they discussed.

Program Length:

2:00 Hours

Cleanup:

Taking down the A/V equipment, bidding guests and speakers farewell, and cleaning up the space can take up to an hour. Satisfied speakers and participants tend to linger and continue to discuss the topic. This is to be expected with a forum. It is helpful to have someone cleaning up while at least one other person plays genial host.

Background Information for Speaker:

The following is a brief list of basic nanoscale science talking points intended to help presenters think about the kind of information they should include in their presentations. For information regarding societal and ethical implications of new and emerging nanotechnologies, please see the article Nanotechnology & Society: Ideas for Education and Public Engagement located in the appendix section of the Forums Manual.

- Nanoscale science is an emerging area of scientific research that encompasses many areas of study, including chemistry, biology, engineering, physics, and medicine.
- Nanotechnology will enable new advances in fields such as medicine, computing, and consumer products, and will likely have an effect on much of everyday life.
- Nanotechnology has to do with very small things, smaller than you can see with an ordinary microscope.
- A nanometer is very small, a billionth of a meter or 10^{-9} (for example, approximately 80,000 nanometers = width of human hair).
- Materials can have different characteristics at the nano scale (for example, gold particles change color the smaller they become).
- Along with the new benefits of nanotechnology may come risks that are currently unknown to our health, environment, and society.

Participant Materials

The following materials should be placed at each table before the forum gets underway. You may wish to highlight the overarching question by having it on its own sheet of paper and in the center of the table for everyone to refer to throughout the forum. Below you will find an introduction to the forum for the participants to read prior to the group deliberation, the overarching question, and the three scenarios.

Introduction:

Nanotechnology is an incredibly exciting and promising new field arising from the design and manipulation of matter at the molecular and atomic scale. New tools that enable building materials from the bottom up (and the top down) are leading scientists and engineers to imagine an amazing range of applications that include cheap and clean energy, reduced environmental pollution, greater

computing power, solutions to world hunger and national security, and cures for devastating diseases such as cancer. Nanotechnology is expected to have a significant impact on just about every sector of the economy, although it is not yet clear which of the imagined future applications will be most successful. Countries around the world are engaged in a race to develop processes and products to win the international economic advantage of being a leader in this cutting edge field. It is uncertain what the ultimate impact of nanotechnology will be, but many believe we are on the verge of a technological revolution. The worldwide nano-race has begun, and yet we still know very little about the risks associated with the new materials and technologies that are being created.

The rapid development of nanotechnology raises a number of concerns. Nanoscale particles often are familiar materials, but with new properties. The small size, unique structures, and novel behavior of such particles have experts concerned with possible health and environmental risks. But how do we go about setting policy or regulating materials for which there is very little information? Moreover, what ethical issues are raised by the new applications imagined for nanotechnology? And what are the economic, labor market, and political implications of winning or losing the worldwide race for leadership in this emerging field?

Scientists, engineers, policy makers, advocacy groups, and social scientists are involved in a range of discussions about the societal and environmental issues raised by the rapid advances in nanotechnology, and new government policies are likely to be developed soon.

We ask participants to discuss the strengths and weaknesses of three options.

You also will have the opportunity to raise questions about the societal and environmental implications of nanotechnology to a panel of experts.

Then you will work in small groups to form a group recommendation drawing from the options presented—perhaps adding or combining elements, or creating a totally new option representing your group's view on the issue. You are not limited to the three options presented for discussion. If your group cannot reach agreement on a recommendation, identify the items you agree upon and those on which you differ.

Finally, you will make a brief report to everyone on you group's recommendations.

Overarching Question:

Given the potential benefits as well as the unknown risks associated with nanotechnology, who should play the major role in shaping its future development and developing regulation concerning its use?

Scenarios:

Option 1: Leave it to the Experts

Proposal

- Since scientists have technical knowledge, and US government officials have the responsibility to set policy, these experts should be the decision makers about funding, research priorities, government regulation, and other policies regarding nanotechnology.
- The experts here might include the National Science Foundation, the National Institutes of Health, the Food and Drug Administration, the Environmental Protection Agency, other federal, state and local government agencies, and the broader scientific community.
- Consumers will chose what products they buy, and should be informed—for example, through a system of package labeling--about any potential risks so they can make informed choices. Beyond that, the general public does not have the interest nor the expertise to be involved in the complicated, technical issues associated with national policy, and so involving the public in any significant way would be detrimental to the decision-making process.

Drawbacks

Opponents of this approach claim that:

- Without adequate public input, the public interest will not be protected.
- The research and development agenda will not be oriented with the public good in mind.
- Nanotechnology development will not match what the public finds important or acceptable, resulting in rejection of nanotechnology after much money has been spent on development.

Option 2: Leave it to the Watchdogs

Proposal

- Non-governmental watchdog organizations, such as environmental groups, consumer advocacy groups, and worker protection organizations, should take the primary role in shaping national public policy on nanotechnology. These organizations already have the know-how and

resources to monitor the progress of new technological developments and the possible health and environmental risks. They also have the clout and lobbying skills to handle this complex issue and influence public policy to ensure that the public welfare is considered in public policy decisions and that corporate interests do not control the process.

- A few examples of the kinds of organizations that might play this role are Friends of the Earth, Greenpeace, Consumers Union, and the Center for Responsible Nanotechnology.
- Watchdog organizations can help the public make informed decisions about issues with potential impact within their own communities, such as deciding about the siting of a new research or commercial facility: will it create new jobs and economic benefits, or create an environmental and public health hazard?

Drawbacks

Opponents of this approach claim that:

- Watchdog agencies may have an agenda of their own and not represent a balanced consideration of the issues.
- Policy debates will be engaged in an atmosphere of conflict with groups staking out positions and with members of the public polarized around the issues.
- This is not a proper model for problem-solving and as a result, key problems will not be resolved until some kind of crisis occurs.

Option 3: The Public Decides

Proposal

- The wishes and interests of the general public should have the strongest influence on both research and governmental policy decisions. Scientists should pay attention to what ordinary people think, their priorities and values, and incorporate these views in technical decisions, funding choices, and research methods.
- The US government, scientists, educators and watchdog agencies should all keep the public informed and up to date on all issues involving nanotechnology, and develop widespread programs to engage the public in dialogue on issues concerning nanotechnology and its potential positive and negative implications, and to incorporate the results of those conversations into policy decisions.

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Drawbacks

Opponents to this option claim that:

- The public does not have the interest or understanding to participate in decisions about nanotechnology and their vision may limit future possibilities.
- Without adequate scientific background, the public is subject to propaganda and misinformation from many sources.
- To engage the public in this way, some funds will have to be shifted from scientific research to public involvement programs, resulting in slower technological advancements.
- Misinformed public views could slow or derail important scientific and economic development.

Universal Design

The following features of the program's design make it accessible:

1. Repeat and reinforce main ideas and concepts.
2. Provide multiple entry points and multiple ways of engagement
3. Provide physical and sensory access to all aspects of the program. Visitors can touch, see and hear different elements of the program.

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