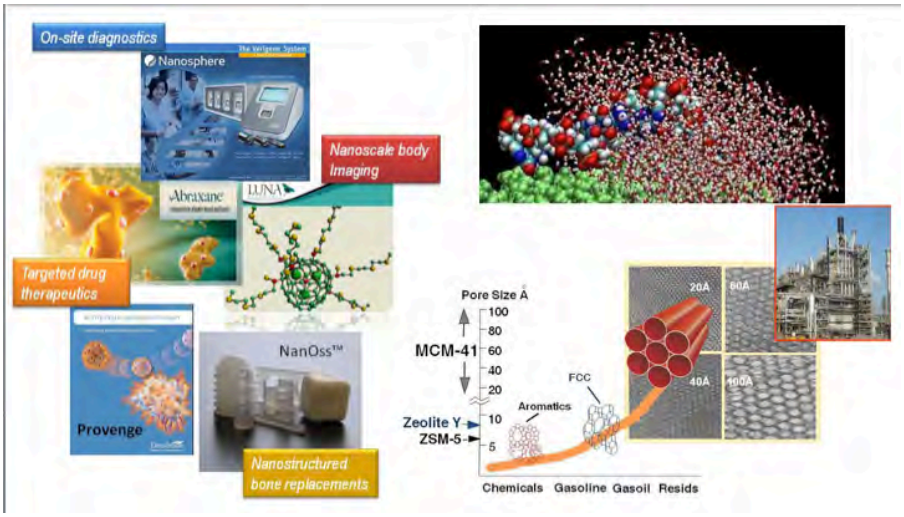
Adding Unfamiliar Current Research to Science Museums



ASTC 2012 Case Study: NISE network NANOSCALE INFORMAL SCIENCE EDUCATION

Nanoscale Science and Engineering

Program Solicitation
NSF 05-543
Replaces Document NSF 03-044

National Science Foundation
Directorate for Education and Human Reso
Directorate for Biological Sciences
Directorate for Computer and Information S
Directorate for Engineering
Directorate for Geosciences
Office of International Science and Enginee
Directorate for Mathematical and Physical S
Directorate for Social, Behavioral, and Econ

Letter of Intent Due Date(s) ***(required)***:

February 06, 2005

Nanoscale Informal Science Education (N
Letter of Intent

Full Proposal Deadline(s) (due by 5 p.m. proposer's local

April 06, 2005

In Jan 2005 NSF issued a solicitation

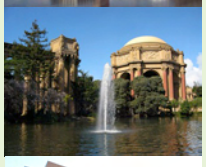
This effort is intended to foster public awareness, engagement, and understanding of nanoscale science, engineering, and technology through establishment of a Network, a national infrastructure that links science museums and other informal science education organizations with nanoscale science and engineering research organizations.

Goals from NSF

- Build capacity in the field to educate the public about nanoscale science, engineering, and technology.
- Develop and disseminate educational deliverables of all kinds that foster engagement and understanding of nano
- Stimulate educational research and evaluation that informs improvement of both products and processes.

Core Partners

Collaborated to win the award:



- Museum of Science, Boston
- Exploratorium, San Francisco
- Science Museum of Minnesota, St. Paul
- and this group recruited 10 others

Negotiations

- We said that we would have nano in 100 institutions
- Products had to benefit/be available to the entire field
- NSF wanted synergistic activities -- impact beyond the parts
- NSF wanted sustainable impact
- NSF wanted quality informed by evaluation

INVERNESS RESEARCH

Inverness Research Associates identified four major challenges at the outset

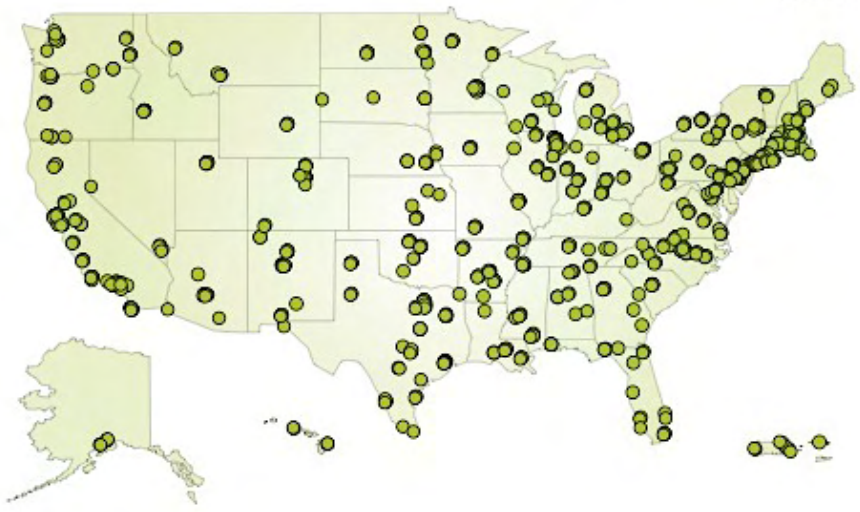
- The content and pedagogy of nano science education is just now emerging.
- The field is just now learning how to design resources that will effectively communicate nano science to public audiences in informal science education settings.
- At the ISE institutional level, there is little expertise, experience, or incentive to do nano education for the public.
- At the field level, there is limited experience in developing and working with a national supportive network.

NISE network

Inverness Research Associates identified four major challenges at the outset

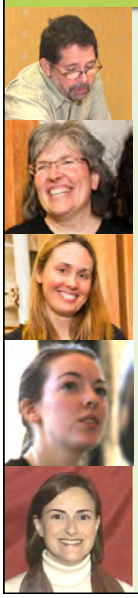
- Nobody knows what it is.
- Nobody knows how to do it.
- Nobody wants to do it.
- Nobody knows how to get it to happen.

Seven years later . . .



Nano ISE at over 200 sites

What made it work?



- Paul Martin, Science Museum of Minnesota
- Catherine McCarthy, Science Museum of Minnesota
- Rae Ostman, Sciencenter
- Vrylena Olney, Museum of Science
- Christine Reich, Museum of Science

Open-source Catalog of Educational Products

Paul Martin
Senior Vice President of Science Learning
Science Museum of Minnesota

NISE Network: Goals

Build a Network:

- Form partnerships among Informal Science Education institutions (ISEs) and research centers

Engage the Public:

- Support partners in engaging the public in nanoscale science, engineering, and technology
- Develop and distribute educational products
- Raise public awareness and understanding of nano

Why open source?

- Help build a creative community
- Increase access to our work, promote widespread use
- Allow others to adapt, and build on our work

Image source: *Something for Nothing*
www.redmagma.com

Website for professionals

NISE network

Online Catalog

Online Catalog of 200+ products

- Programs
- Exhibits
- Media
- Tools and guides, training
- Evaluation reports

Online Catalog

Wonders and Worries of Nanotechnology
Video

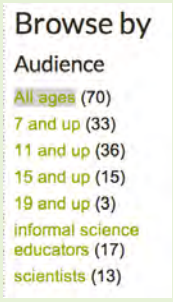
Societal and Ethical Implications
Posters

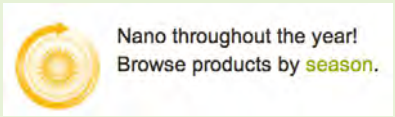
NanoVenture
Board game

Summer camp and afterschool Group programs

More info: nisenet.org/catalog

Online Catalog – Search and Browse





More info: nisenet.org/catalog

Challenges and Our Solutions

NISE NET PRODUCT

Products created with NISE Network Funding

- Development process (scientist review, peer review, evaluation)
- Standards and templates
- Encourage free sharing and adaption

LINKED RESOURCE ▸

Linked products

- Created outside of NISE Net
- Vetting process
- Different rights ownership/attribution

Clarity about rights

Creative Commons license

Creative Commons

CC

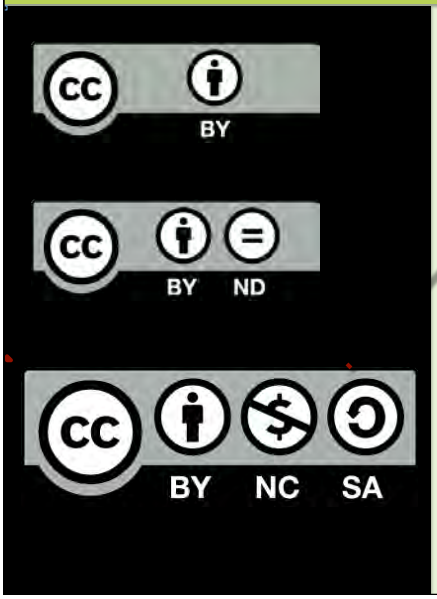
- Allows a creator to state how they feel about copying and re-use
- Licensing is simple and straightforward process
- Geared towards electronic content

Creator's rights

- Creator still owns the copyright
- Creator allows others to use
- Legal jargon is taken care of

Image source: *Something for Nothing*
www.redmagma.com

Examples of Licenses



- Choose from a variety of licences
- Example license used by the NISE Network:
  - Attribution
  - Non-commercial
  - Share Alike

More information

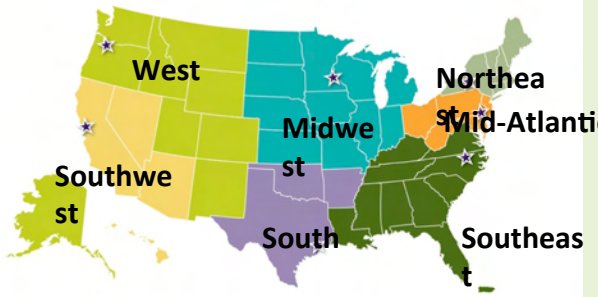
www.creativecommons.org

Image source: *Something for Nothing*
www.redmagma.com

Regional Hub Network Structure

Catherine McCarthy
Project Leader, Science Museum of Minnesota

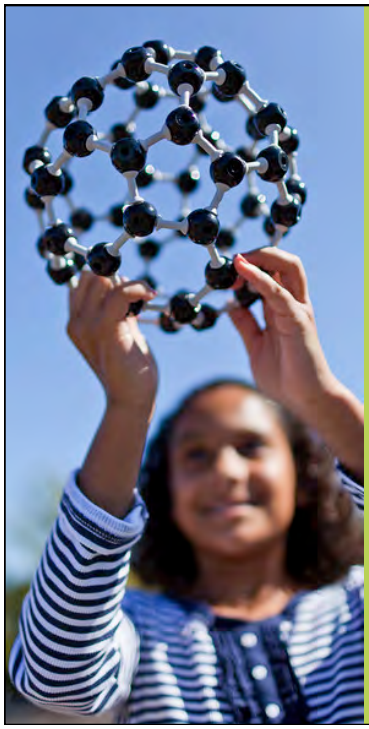
Regional Hub Structure
for the NISE Network Community



Catherine McCarthy
Project Leader
Science Museum of Minnesota
cmccarthy@smm.org
www.nisenet.org

NISE network
NANOSCALE INFORMAL SCIENCE EDUCATION

October 2012
www.nisenet.org



Problem:

How do we get nano in 100 museums?

Solution has evolved over time

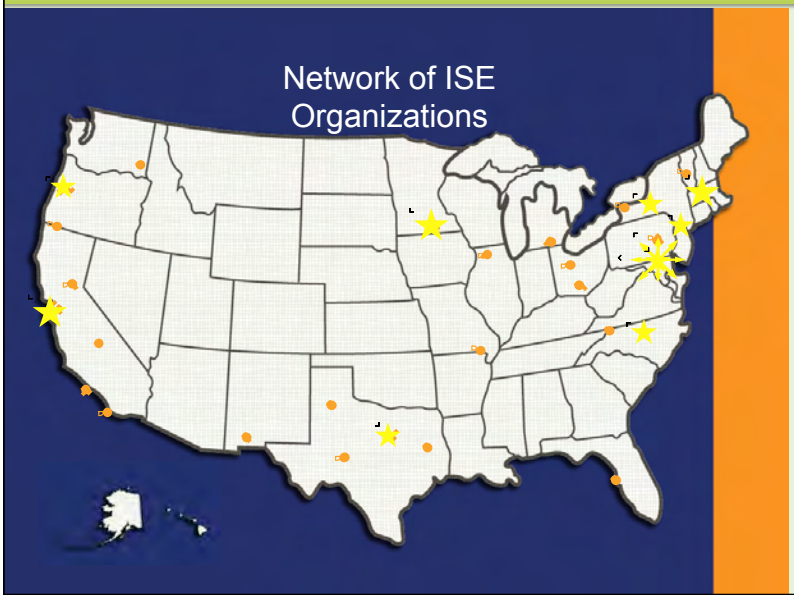
Early Years:

- Recruiting partners
- Building the network
- Soliciting input from partners

Current focus:

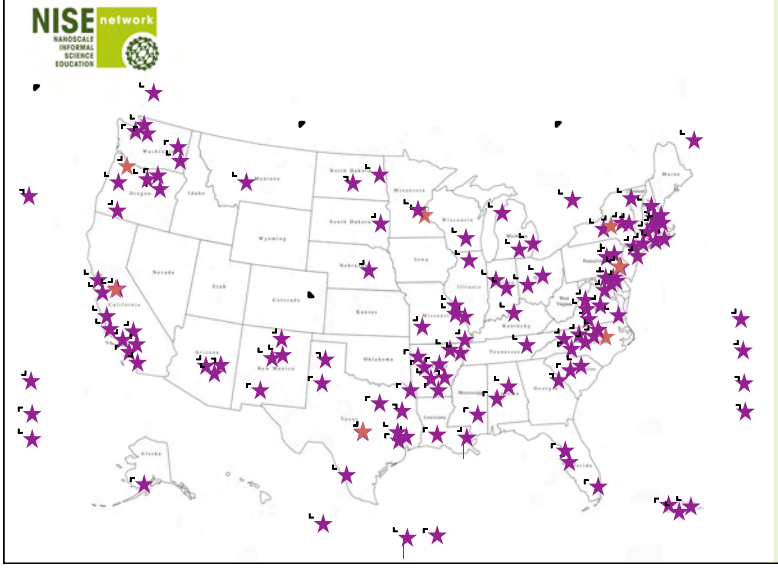
- Increasing partners' capacity to engage the public in nano
  - Deeper relationships
  - Dissemination of products
  - Offering professional resources and opportunities

Evolution: "Ten Friends" approach



2005

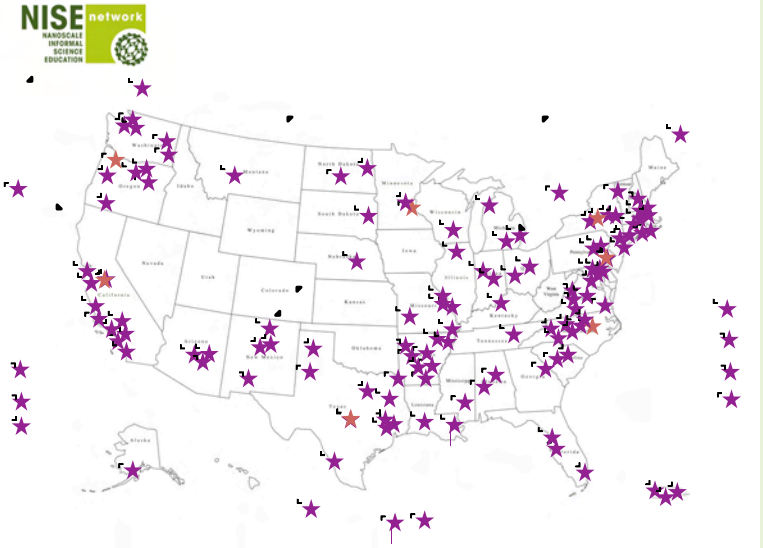
Evolution: Network Expansion



2007

4 regional hubs

Evolution: Network Expansion

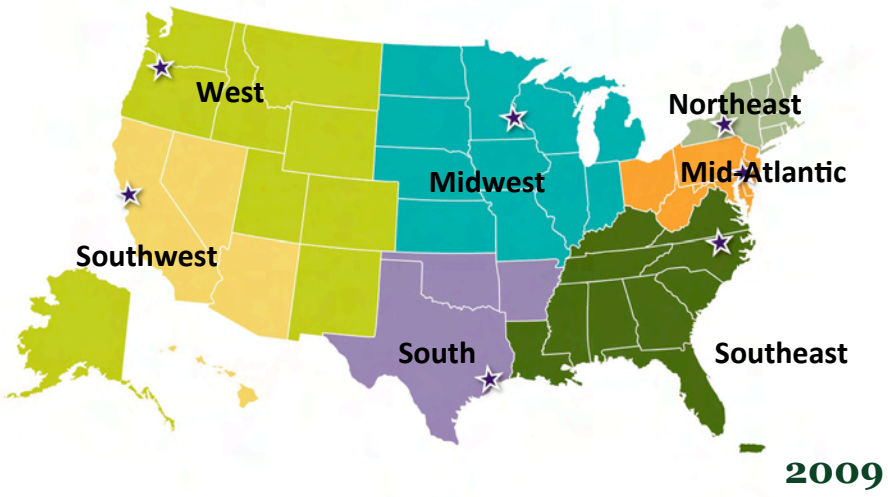


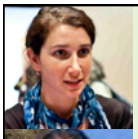
2008

9 regional hubs:

- 7 regions
- Washington DC
- international

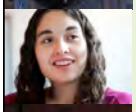
NISE Net Community Regional Hubs





Northeast:
Ali Jackson
Sciencenter

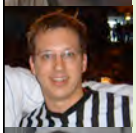
Mid Atlantic:
Jayatri Das
The Franklin Institute



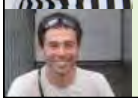
Midwest:
Christina Akers
Science Museum of Minnesota

Southeast:
Brad Herring
Museum of Life + Science

South:
Aaron Guerrero
Children's Museum of Houston



Southwest:
Frank Kusiak
Lawrence Hall of Science

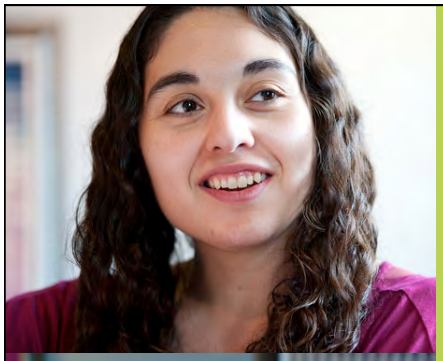


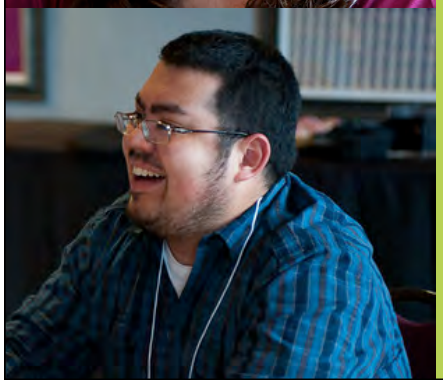
West:
Tim Hecox
OMSI

Role of Regional Hub Leaders

To build the network and raise the capacities of its members:

- Share NISE Network resources with partners
- Support the infusion of nano content into partner museum institutions—increasing public impact
- Encourage further involvement in the network
- Connect museums and scientists on a local level

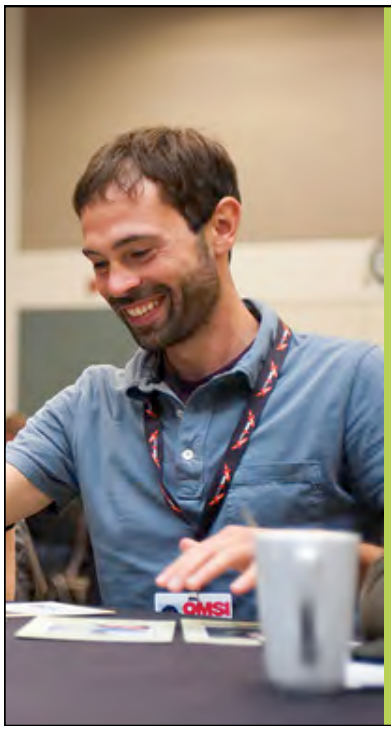




Sustainability Strategy

Geographic proximity offers fewer barriers to collaboration

. . . it is more likely partners will maintain relationships and collaborations with organizations and individuals located nearby



Lessons Learned

- Requires a unique blend of skills
  - Networkers, communicators
  - Knowledgeable of our resources
  - Desire to share, learn and listen
- Coordination among the hub leaders is key
- Need concrete opportunities and resources for partners

Concrete Opportunities and Resources

that partners value goes hand-in-hand with the regional hub system

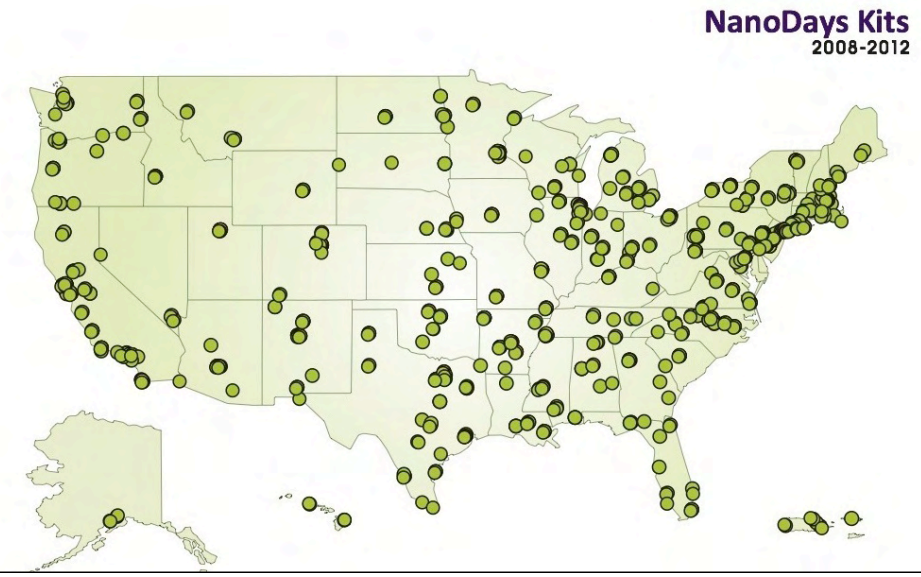
1. NanoDays
2. Professional Development and Networking
3. Mini-grants
4. Nano mini-exhibition
5. Open source educational products in the online catalog

NanoDays

NanoDays
The Biggest Event for the Smallest Science!

first NanoDays physical kit - 2008

NanoDays Participants

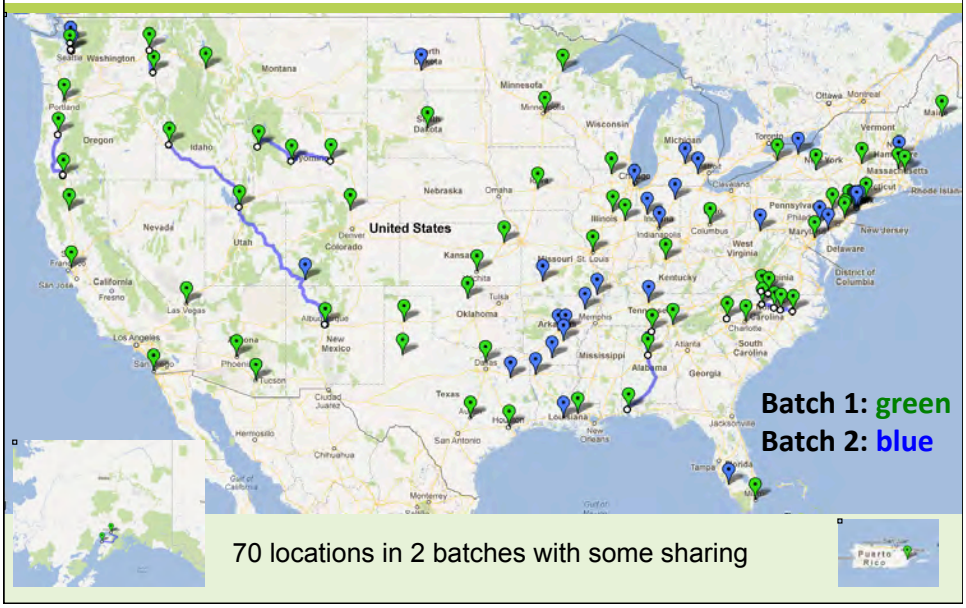


Professional Development and Networking

Mini-Grant Awards Map

Nano Mini-Exhibition

Mini-Exhibition Map



70 locations in 2 batches with some sharing

Nisenet.org website

NISE network

whatisnano.org

Benefits of geographic hub approach

- Provides a clear contact person and a human face
- Allows for more personal, deeper connections with partners
- A way to manage relationships, recruit for opportunities, and provide input for awarding limited resources
- Provides a mechanism to solicit feedback and provide input to network leadership about partner needs, constraints, and interests

NanoDays

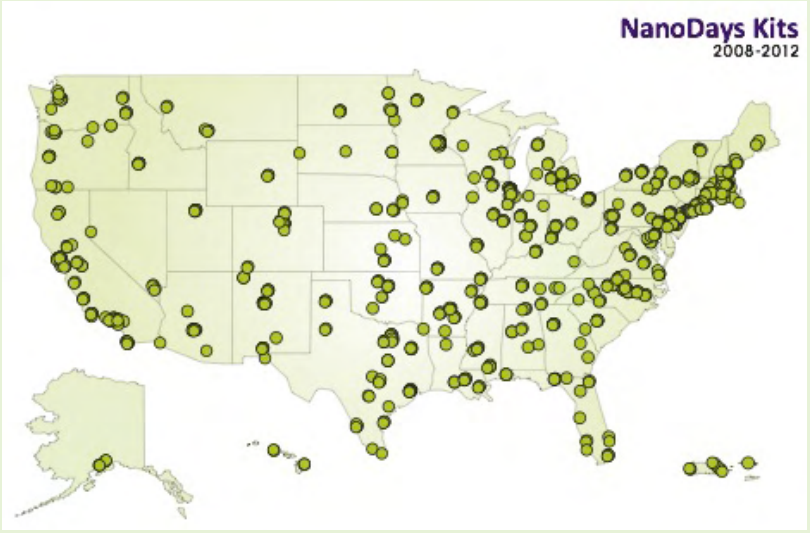
Rae Ostman
Director of National Collaborations, Sciencenter, Ithaca

NanoDays

Network community
•Cultivate a national network through common participation in an event
•Foster local partnerships between museums and the scientific community
•Increase capacity in the field to engage the public in nano
•Create, share, and implement a coherent suite of educational products

Public engagement
•Deliver informal learning experiences about nano
•Engage public audiences in content learning related to nano

Network Community



Network Community

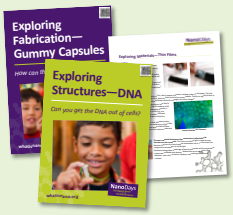
"NanoDays was a wonderful platform for the museum to develop a partnership with the science department at the university."

"This was the first year that we have really collaborated with other groups for NanoDays—and it was wonderful! We're looking forward to continuing to work with these groups on nano-related projects—including next year's NanoDays celebration!"

Network Community

"It is a joy to teach the general public about nanoscience. The public finds it fascinating and enjoys the hands-on aspects of the event. We hope to keep participating for years to come!!!! We love it."

"Everything is fun, clearly explained and interesting. The teens in our Explorers program look forward to it every year."



Network Community

"Not only did visitors have a great time using the kits and exploring the materials, but our staff and volunteers as well."

Lessons Learned

Public Engagement

"I love that this event gives us something both appealing for the parents and accessible to the children…We always see a real engagement and sense of fascination from attendees, staff and volunteers at NanoDays."

"It was a huge success. The children could not get enough. We finally had to tell them time was up. Every day they ask when we are going to do our Nano experiments. I have walked by groups of children as they are talking with each other and heard them discussing something as being a nano. It was one of the best programs I have ever taught."



Lessons Learned

"We use the materials on a regular basis for our discovery activities, which we try to do at least 5 days/ week. We also use them sometimes for funder visits…The Discovery Team use some of the materials so much that I tell them, put that away for awhile."

"We actually use the activities every day have already incorporated a few of the activities into existing programs…The activities really fit well into our various galleries and so staff pull out the activities a lot outside of NanoDays."



Lessons Learned

"Every year, the language of the signage and the activities seem to become more inclusive of our audience of families with young children."

"The kits are fantastic! The information is presented in a way that makes it easy for the staff to communicate the scientific principals to our young patrons."

"The kits continue to become more tactile and sensory, which is great for our audience. Likewise, the signage has become easier to understand."

Lessons Learned

"We like that the kit is ready-to-use, and takes relatively little preparation and training to pull off an event."

"Really appreciate how turn key the materials are-very little prep needed to establish a great event!"

"You made this very easy to organize, to advertise, and to implement, thank you!"

"The kits were very well put together. Everything that was needed was available. I was able to bring the volunteers who were staffing the tables up to speed very quickly using the background information you provided."

Mini-grants

Vrylena Olney
NISE Net Manager, Museum of Science Boston

Mini-grants: Context

Year 5 of NISE Net

- Regional hubs well-established
- Partners had experience hosting NanoDays events
- Catalog
- Prof. Development opportunities

The Problem

→Sustainable impact

→Significant public reach

How do we get nano content incorporated into partner educational activities beyond NanoDays?

Our Solution: Mini-Grants

Purpose: Support initiatives by NISE Net partners to engage their local public audiences in nano topics.

Port Discovery Children's Museum created carts showcasing nano activities and trained volunteers to implement activities.

Mini-Grants: Eligible Projects

Increase or **expansion** in nano programming

1. New efforts to integrate nano into existing programming
2. New efforts to reach new audiences with nano programming
3. New partnerships between museums and nano researchers.

Iridescent created and ran nano workshops for underserved students and their families

Mini-Grants: Features of Program

- $3000
- One-time award
- No on-going costs
- Application and review process (in Fall)
- Expectations for reporting/sharing work accomplished with others (the following Fall/Winter)

Mini-Grants: What Worked

The mini-grant projects!

Administration of project relatively smooth (with Network already in place)

- Clear project goals, expectations
- Application process/informed reviewers
- Expectations for sharing

Science Factory Children's Museum summer camp developed with the University of Oregon dept. of Chemistry

Mini-Grants: How Program Evolved

- It exists
- Increased # of mini-grants
- Thinking of ways to encourage more sharing of projects

Year 6 and 7 Mini-Grants

Year 6 mini-grant awards: green
Year 7 mini-grant awards: blue

Other questions? Vrylena Olney, volney@mos.org

Team-based Inquiry

Christine Reich
Director of Research and Evaluation, Museum of Science

Team-based Inquiry

Solution to an evaluation problem we didn't know we had

Team-based Inquiry

- In the first five years…
  - Evaluation conducted in the traditional stages
  - Innovative approaches developed for those stages
- Result:
  - Over 230 evaluation reports
  - All programs and exhibits formatively evaluated

Team-based Inquiry

- Evaluation in stages didn't make sense for a network
  - No program was ever "finished"
  - Evaluation team could not keep up with demand

Team-based Inquiry

- Needed a solution that was…
  - Team-led
  - On-going and iterative
  - Integrated into the work

Team-based Inquiry

Thank You

This presentation is based on work supported by the National Science Foundation under Grant No. 0940143.

Any opinions, findings, and conclusions or recommendations expressed in this presentation are those of the author(s) and do not necessarily reflect the views of the Foundation.

Questions and Discussion