

Welcome NISE Network Partners !



NISE Network Regional Meeting

Fall 2013



Regional Meeting Goals



1. Nurture and deepen **relationships** with existing partners in the NISE Network.
2. Provide valuable **networking opportunities** among workshop attendees, focusing on museum educators and outreach coordinators.
3. Create **opportunities for sharing** experiences with using NISE Net products.
4. Discuss ways to **sustain the benefits** of the NISE Network **after Year 10**.
5. Present an **update of NISE Net's resources**, including new programs, tools and guides, mini-exhibition, and mini-grants.

Regional Meeting Agenda – Day 1



- 9:00 Welcome and introductions
- 9:15 Improv Activity 1: *I Say Hi*
- 9:45 NISE Network update
- 10:30 Break
- 10:45 Mini-Grants: New Ideas for Doing Nano

- 12:00 Lunch and museum visit time

- 2:00 Improv Activity 2: *Nano Around the World*
- 2:15 Nano & Society Conversations
- 3:15 Break
- 3:30 Making the Most of Your NanoDays Kit
- 4:30 Inclusive Audiences Bilingual and Universal Design
- 5:30 Break
- 6:30 Group Dinner

Regional Meeting Agenda – Day 2

- 9:00 Improv Activity #3: *Red Ball*
- 9:15 Getting Nano into your building
(exhibitions, signage, partnerships)
- 10:15 Beyond Year 10 Discussion Part 1
- 11:00 Break/List completion
- 11:15 Beyond Year 10 Discussion Part 2
- 11:45 Meeting wrap-up

Regional Meeting Welcome



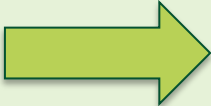
Introductions

Logistics

- restrooms
- handouts
- getting a copy of slides
- reimbursement forms
- luggage
- airport rides
- dinner tonight

Swap Board

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Improv Exercise – *I Say Hi!*



More info: nisenet.org/catalog/tools_guides/improv_exercises

Why implement improv exercises ?

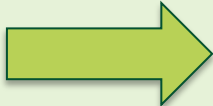


Incorporating improv exercises into staff and volunteer training helps create a supportive and upbeat environment for educators to practice and strengthen essential skills.

- **Warm up skills** required for interacting with visitors
- **Encourage conversations:** with visitors (rather than reciting scripts)
- **Be better listeners:** think on your feet and respond in the moment
- **Be responsive:** better tailor content to visitors responses and integrate visitor feedback
- **Be positioned as equals** with visitors not “the expert”
- **Foster teamwork & creativity:** create a fun, supportive, positive work environment to practice skills

More info: nisenet.org/catalog/tools_guides/improv_exercises

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Where can you

find nano?



NISE Network Overview

- Introduction
- Network Community
- Educational Products
- Professional Tools and Guides
- Upcoming Opportunities



NISE Network

Nanoscale Informal Science Education Network

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



What is Nano?



1. Nano is small and different

Nanometer-sized things are very small, and often behave differently than larger things do.

2. Nano is studying and making tiny things

Scientists and engineers have formed the interdisciplinary field of nanotechnology by investigating properties and manipulating matter at the nanoscale.

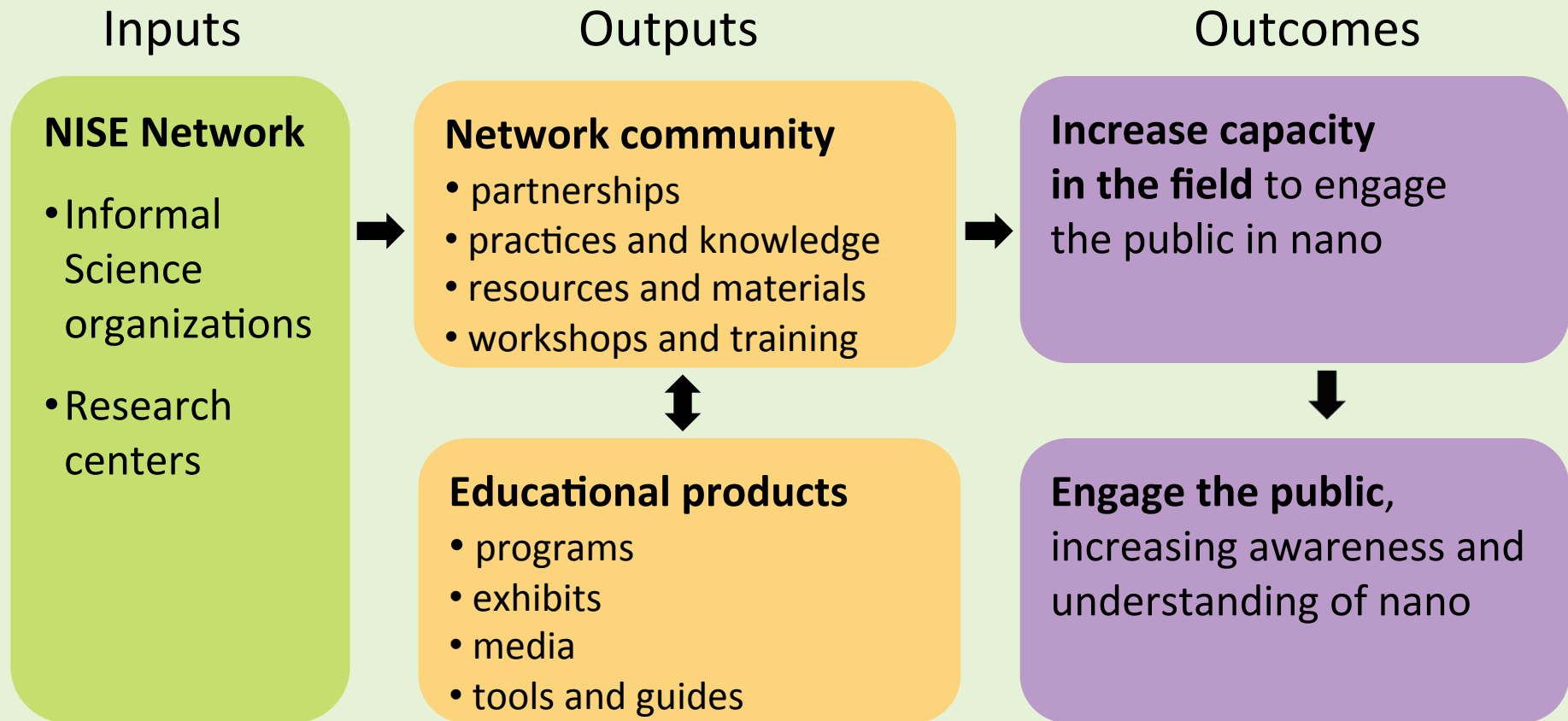
3. Nano is new technologies

Nanoscience, nanotechnology, and nanoengineering lead to new knowledge and innovations that weren't possible before.

4. Nano is part of our society and our future

Nanotechnologies—and their costs, utility, risks, and benefits—are closely interconnected with society and with our values.

NISE Network: Strategy



Year 6-10 Focus



Years 1-5: (2005-2010)

- Building the network

Years 6-10: (2010-2015)

- Engaging the public through the network



NISE Network: Goals



Network community: increase capacity in the field

- Support partners in engaging the public in nanoscale science, engineering, and technology
- Form partnerships among Informal Science Education institutions and research centers

Educational products: engage the public

- Develop and distribute educational products
- Raise public awareness and understanding of nano

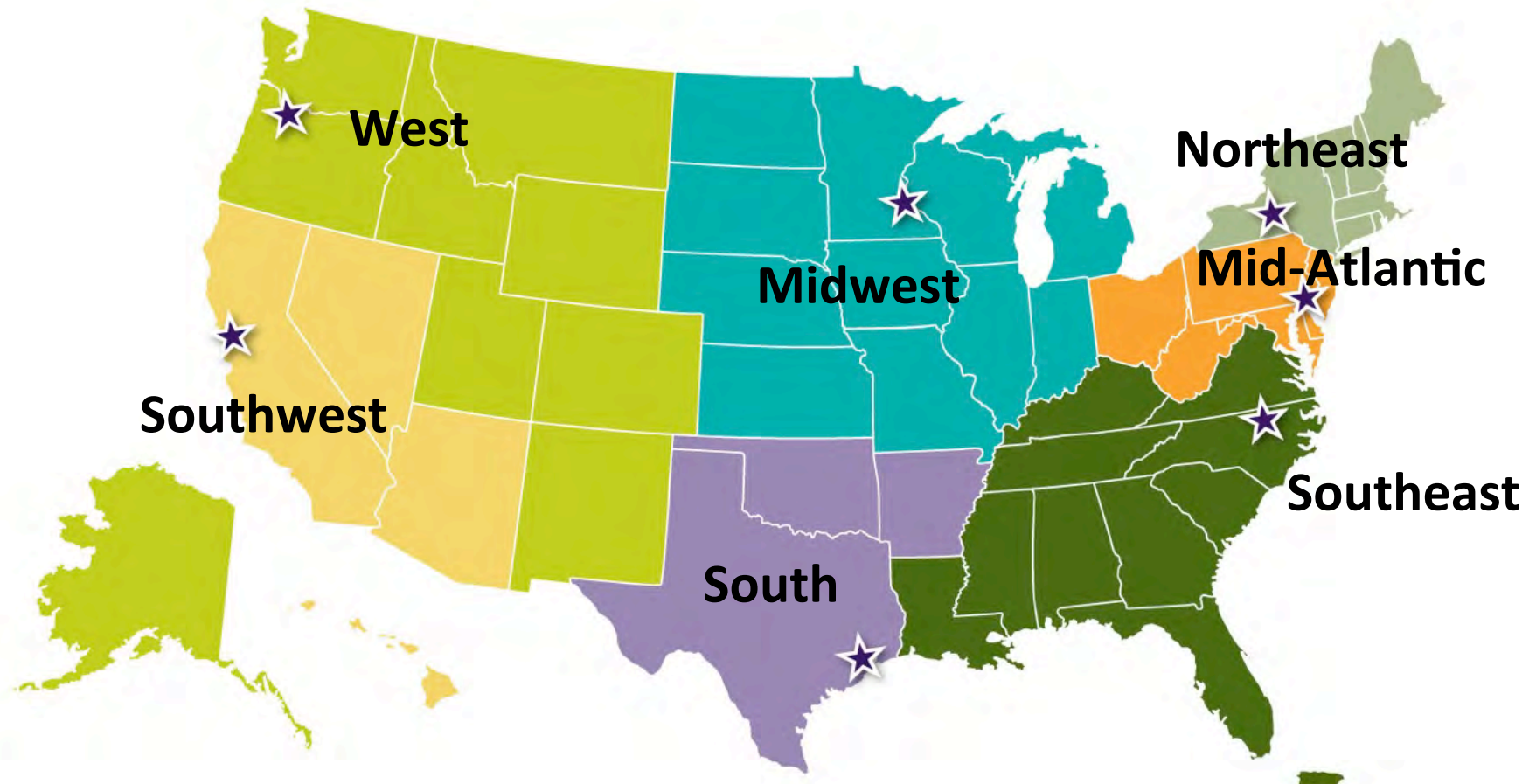
Knowledge: inform the field and future projects

- Generate and document learning through evaluation and research
- Communicate broadly in ISE and research fields

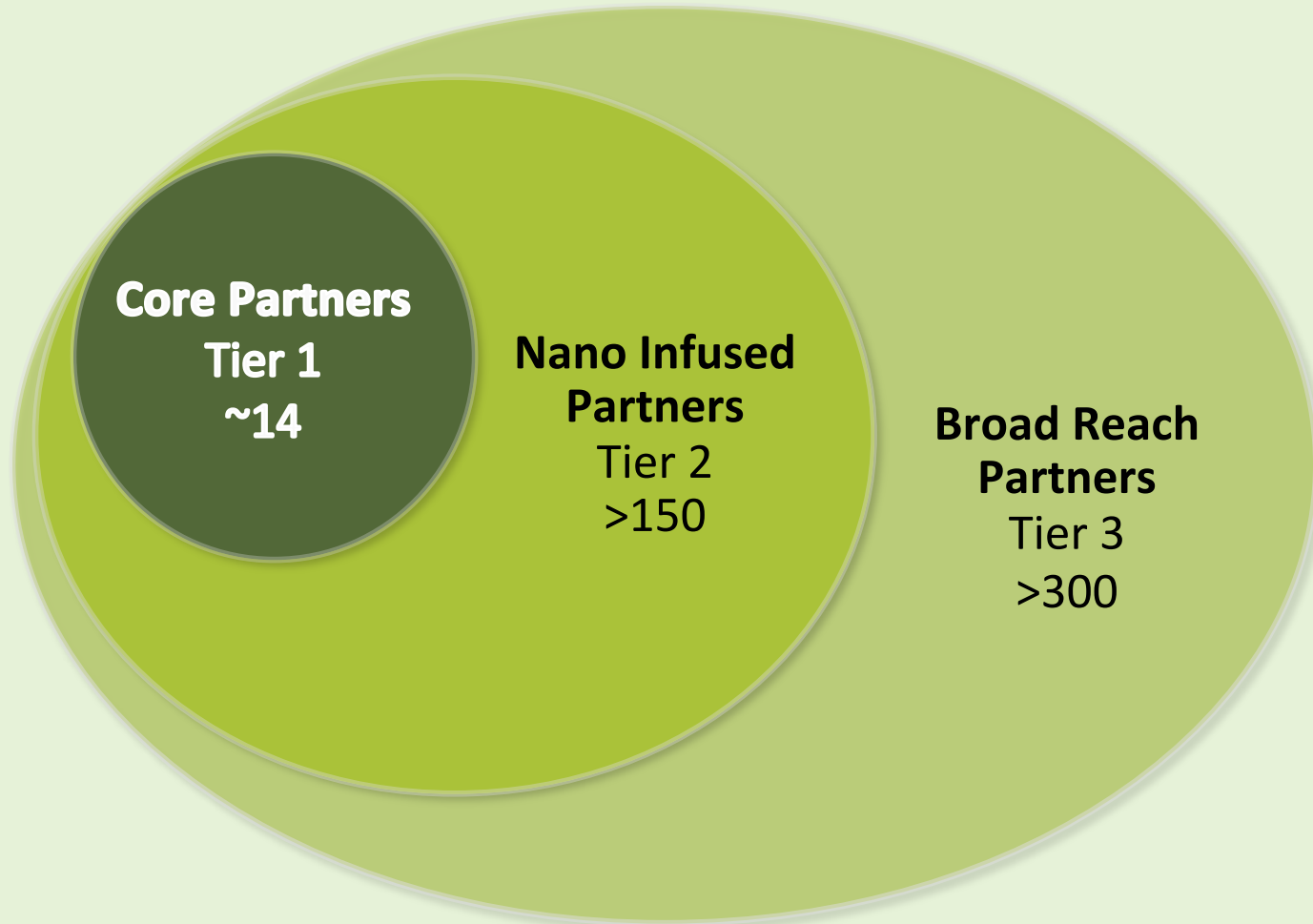


Network Community

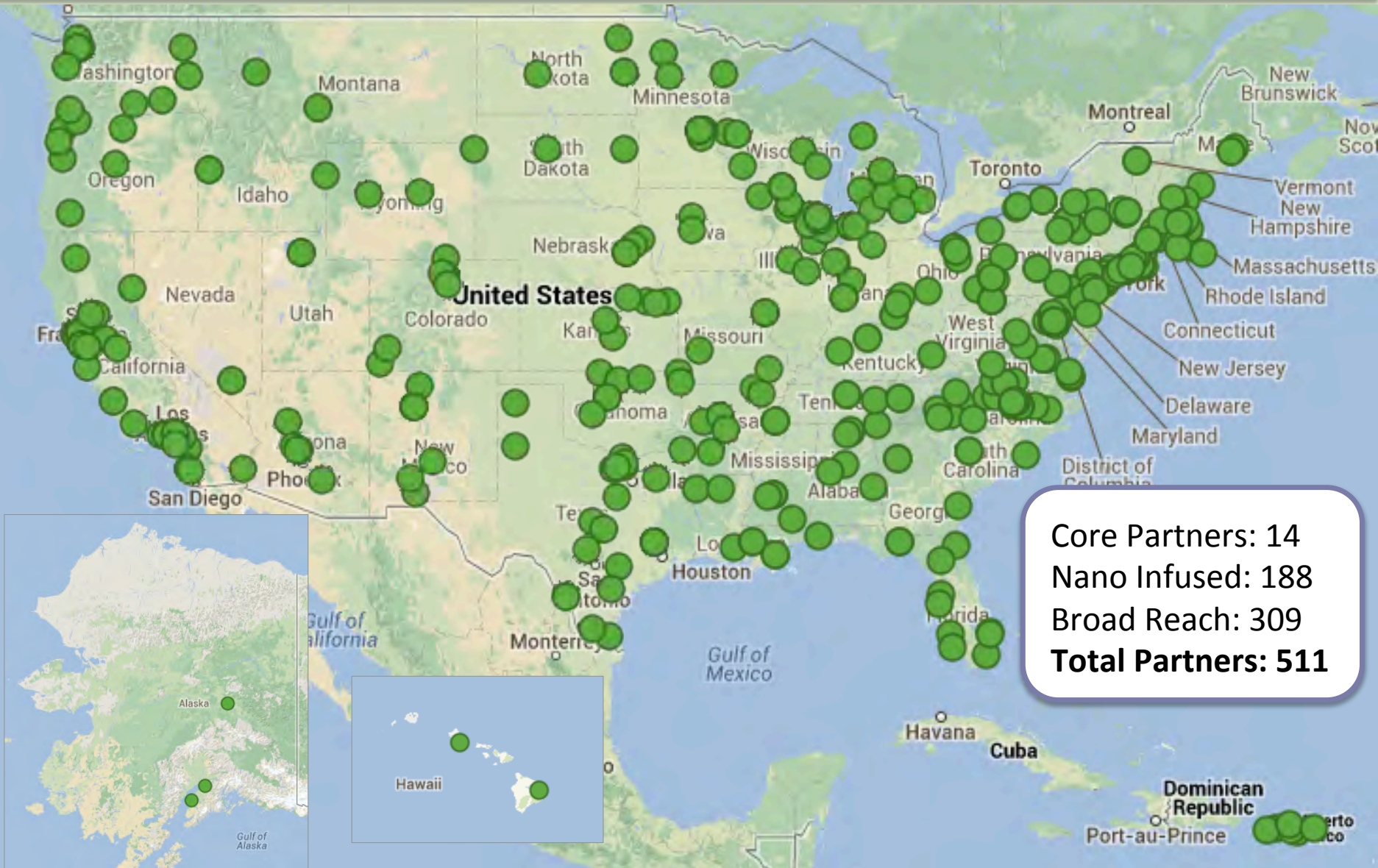
NISE Net Regional Hub Structure



Network Community Strategy



Partner Reach





Educational Products

- Product Development Process
- Website
- DIY Nano App
- *Nano* mini-exhibition
- New in catalog

Product Development Process



Iterative, collaborative development process:

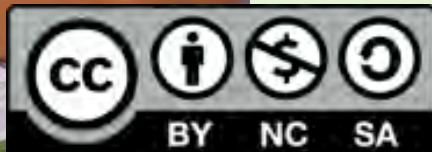
- ✓ Scientist review
- ✓ Peer review
- ✓ Visitor evaluation

Audiences and Content

- Content Map as a guide
- Inclusive audience approach

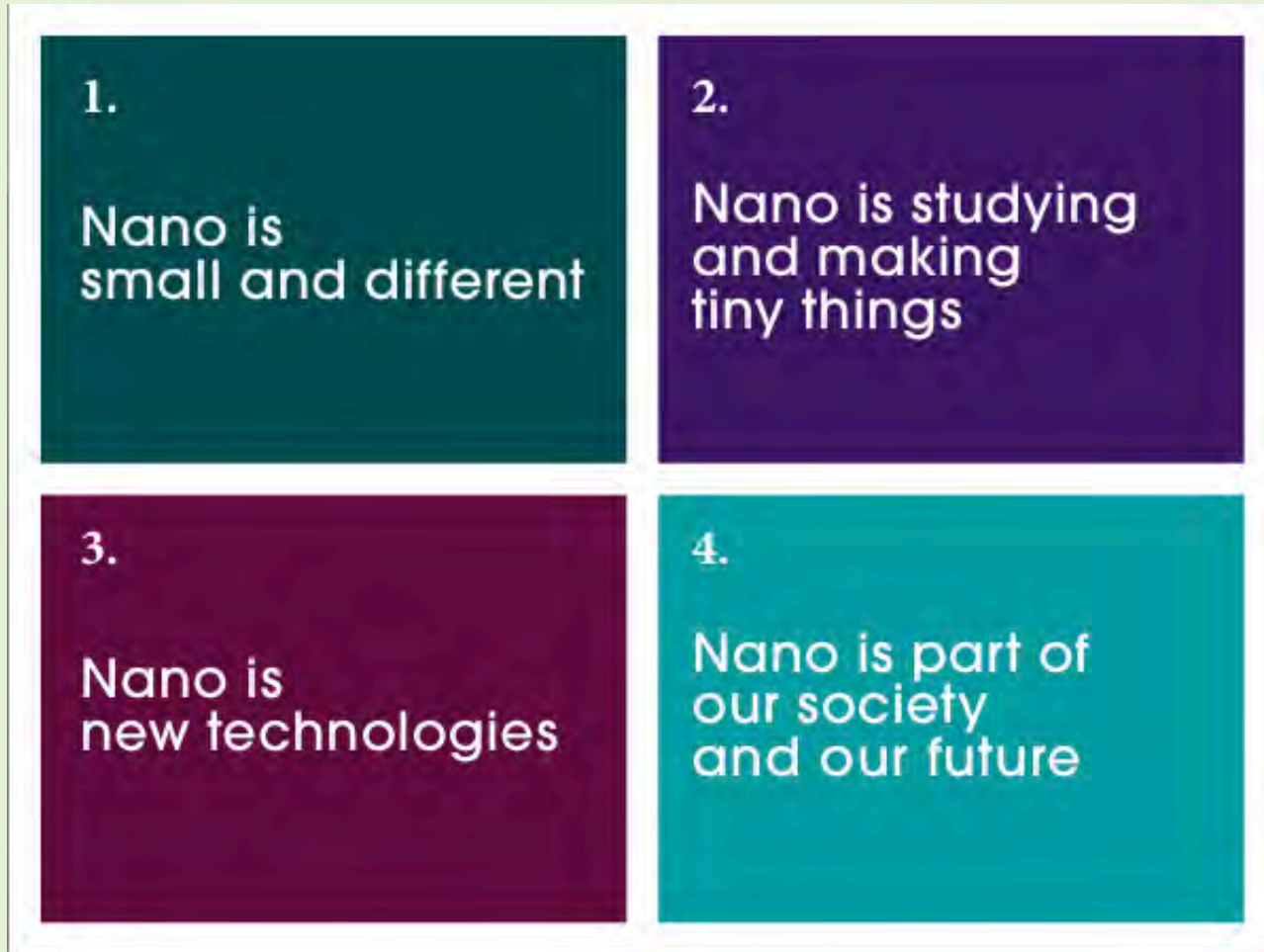
Designed for sharing

- Easily edited and adapted
- Creative Commons license



More info: [/nisenet.org/programs](https://nisenet.org/programs)

Content Map



Inclusive Audiences Approach



Spanish Bilingual materials:

- NanoDays materials and exhibits are available in both English and Spanish

Tools and Guides:

- Universal Design guidelines for programs and exhibits
- Bilingual graphic design
- Translation process guide

More info: [/nisenet.org/inclusive_audiences](https://nisenet.org/inclusive_audiences)

Website for educators - nisenet.org



 Site People Catalog

HOME COMMUNITY CATALOG ABOUT WHAT IS NANO

Support | Log in | Sign up

Nanoscale Informal Science Education Network

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

Become a partner of the NISE Network. Learn how to get involved or sign up now.

NanoDays

MARCH 30 - APRIL 7, 2013

Be sure to fill out your NanoDays 2013 online report by May 1st and be entered in our drawing!



Image Collection



Human Red Blood Cells (SEM)

Red blood cells carry a protein called hemoglobin which has a molecular structure adapted to transport oxygen to body tissues. This scanning electron micrograph shows the cells' characteristic donut-like shapes.

NISE Net News

NanoDays 2012 report - winners chosen

By Catherine McCarthy on May 22, 2012 | 0 comments

Two winners!
We have two randomly drawn winners who submitted their online NanoDays reports by the May 1st deadline. Both will be receiving additional educational materials to use with their visitors.

[Read more »](#)

DIY Nano App now available

By Catherine McCarthy on May 11, 2012 | 0 comments

Over 20,000 people have downloaded the new DIY Nano App!



[Read more »](#)

MRS Call for Papers- Deadline Approaching!

By KIC on May 24, 2012 | 0 comments



The 2012 MRS Fall meeting in Boston takes place November 25-30, but the deadline for abstract submission is just around the corner! All abstracts must be submitted by June 19th. Click here for more information on abstract submission guidelines and details about the meeting.

New in the Catalog



Select NISE Network educational products are now available in Spanish!

Media

DIY Nano App

The DIY Nano app allows families to experience and learn about nanoscale science, engineering, and technology at home! The app provides free hands-on activities. Each activity includes material lists, step-by-step instructions, and detailed explanations. The activity materials are easy to find, inexpensive to purchase, and you probably have many of them in your own home! Our app includes an extensive list of family-friendly video links and helps you browse the [whatnanano.org](#) public website for more information, activities, and videos. The DIY Nano app was created by the Nanoscale Informal Science Education Network (NISE Net), funded by the National Science Foundation. NISE Net is dedicated to engaging all audiences with fun, educational activities about nano-..... Requirements: Compatible with iPhone 3GS, iPhone 4, iPhone 4S, iPod touch (3rd generation), iPod touch (4th generation) and iPad. Requires iOS 5.0 or later. [Read more »](#)

Programs

DIY Nano

These "Do It Yourself" Nano activities



nisenet.org

- Catalog of educational products
- News and events
- Member directory
- Social networking links



Website for educators - nisenet.org

Nanoscale Informal Science Education Network

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Become a partner of the NISE Network. Learn how to **get involved** or **sign up now**.

Catalog

- Programs
- Exhibits
- Tools and guides
- Media
- Image Gallery
- Evaluation & Research

NanoDays
The Biggest Event for the Smallest Science!

MARCH 30 - APRIL 7, 2013
The NanoDays 2013 physical kit application is now available - [Apply today!](#)



Image Collection



Human Red Blood Cells (SEM)

Red blood cells carry a protein called hemoglobin which has a molecular structure adapted to transport oxygen to body tissues. This scanning electron micrograph shows the cells' characteristic donut-like shapes.

NISE Net News

NanoDays 2013 kit applications - due December 1, 2012

By [Catharine McCarthy](#) on September 24, 2012 | 0 comments

[Apply now for a NanoDays 2013 physical kit!](#)
[Read more](#)

NanoDays
The Biggest Event for the Smallest Science!

Annual Partner Survey to launch in late October 2012

By [Catharine McCarthy](#) on September 24, 2012 | 0 comments

We are excited to announce that the NISE Net Annual Partner Survey will be launched in late October.

[Read more](#)



New in the Catalog

Select NISE Network educational products are now available in Spanish!



Programs

Nano Future Tellers

Nano Future Tellers are origami-folded, interactive pocket game to educate visitors ages 7-12 about future nano products! Everyone's favorite fortune telling game brings potential future nano products to life! [Read more](#)

Programs

Scientist Speed Dating

Scientist Speed Dating is a facilitated, yet informal and high-energy, social activity to encourage a large group of people to speak with one another, ask questions, and learn about specific areas of research and practice within the field of nanoscale science and engineering, as well as the related societal and ethical implications of work in this field. [Read more](#)

Tools and Guides

Search the Catalog

Search the catalog by audience, topic, or season

The screenshot shows the NISE Network Catalog website. The header includes the NISE network logo and a search bar. The main navigation menu has links for HOME, COMMUNITY, CATALOG, ABOUT, and WHAT IS NANO. The left sidebar lists various resources like Programs & Activities, Exhibits, Forums, Tools & Guides, Media, Research & Evaluation, and Table of Contents. The main content area is titled 'Catalog' and features a search bar, a 'Browse by' section, and an 'Activity' section. The 'Browse by' section is highlighted with a purple arrow pointing to a callout box on the right.

Browse by

Audience

All ages (109)
7 and up (39)
11 and up (38)
15 and up (17)
19 and up (3)
Informal science educators (25)
scientists (14)

Nano topics

Art and nature (71)
Bio and medicine (73)
Energy and environment (50)
Fundamentals (132)
Information Technology (47)
Materials, tools, and applications (148)
Society, policy, and economics (64)

Programs

Cart demonstration (25)
Classroom activity (25)
Display (2)
Facilitated activity (46)
Game (4)
Museum theater (4)
Stage presentation (16)

Available translations

Spanish (61)



Nano throughout the year!
Browse products by **season**.



Select NISE Network educational products are **now available** in Spanish!

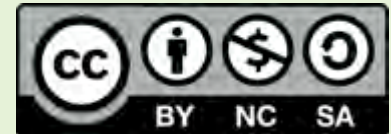
Find answers to your questions about the catalog on our [FAQ page](#).

Products in Catalog

NISE NET PRODUCT 

NISE Net Products

- Created with NISE Network funding
- Development process:
 - scientist review, peer review, & visitor evaluation
 - content map as a guide
 - inclusive audiences approach
- Designed to be easily edited and adapted under a Creative Commons license



LINKED RESOURCE ►

Linked resources

- Created with other funding
- Different vetting process
- Different rights ownership/attribution

Website for the Public

whatisnano.org

English Español

Home | NanoDays | Nano Exhibition

**Nano is all around us—
in nature and in technology.**

NanoDays
NanoDays is a nationwide festival of educational programs about nanoscale science and engineering and its potential impact on the future.
> Learn more

NanoBuzz
Current nano news:
join the conversation!

- Bio Flash Mob**
Posted May 11, 2012
- Itty-bitty Art**
Posted May 9, 2012
- The Iceman bleedeth**
Posted May 3,

K-12 Teachers
Curriculum and activity resources for K-12 teachers to use in their classrooms.
> Learn more

Resources

- Introductions**
- Video**
- Audio**
- Games**
- Products & Society**
- Diff Nano**

DIY nano
Downloadable from the iTunes store. Free.

Invisible Sunblock
What's in your sunblock? In this activity, kids find out why some mineral sunblock rubs in clear. Suitable for kids ages 5 and up. edit

Rainbow Film
How can you make rainbow colors out of clear nail polish? In this activity, kids use clear nail polish to create a beautiful iridescent pattern on black paper. Suitable for edit

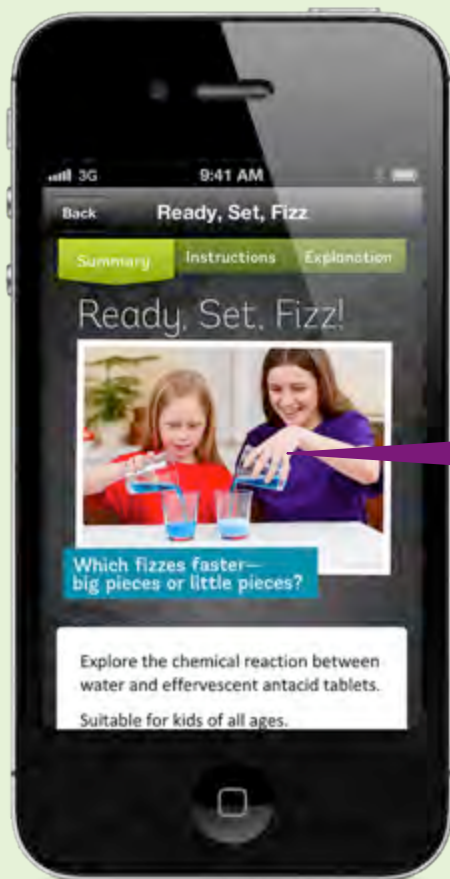
Mystery Sand
Can sand keep itself dry? In this activity, kids play with surprising sand that doesn't get wet! Suitable for kids ages 3 and up. edit

Mitten Challenge
What's the right tool for the job? In this activity, kids try to put together toy bricks—wearing oven mitts on their hands! Suitable for kids ages 3 and up.

- Videos, podcasts, activities, links
- NanoDays locations
- List of mini-exhibition locations
- Audio Description in English and Spanish

whatisnano.org

DIY Nano App for iPhone and iPad



Activities to try at home



More info: whatisnano.org/diy-nano-app
nisenet.org/catalog/media/diy_nano

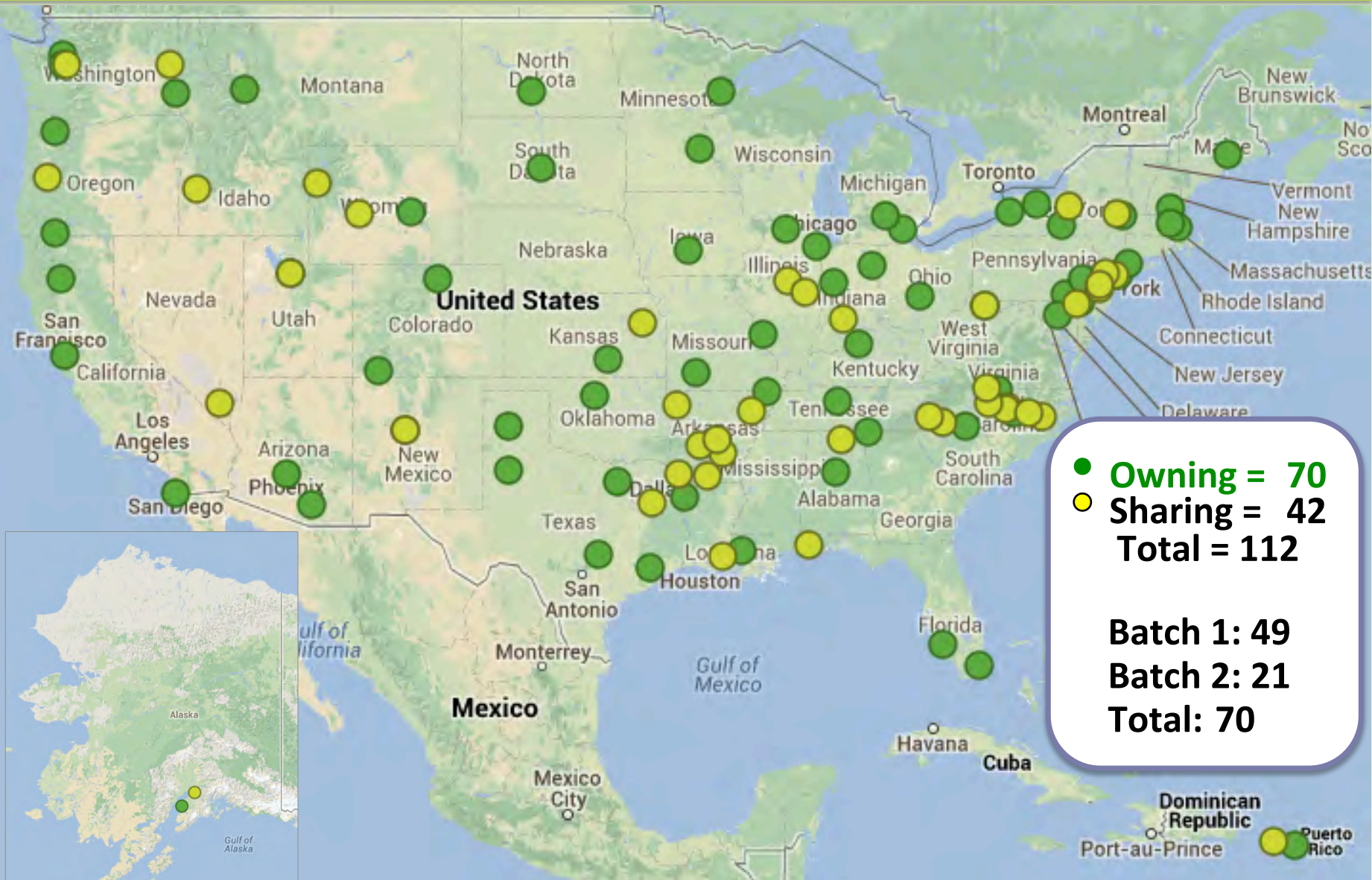
Nano Mini-exhibition



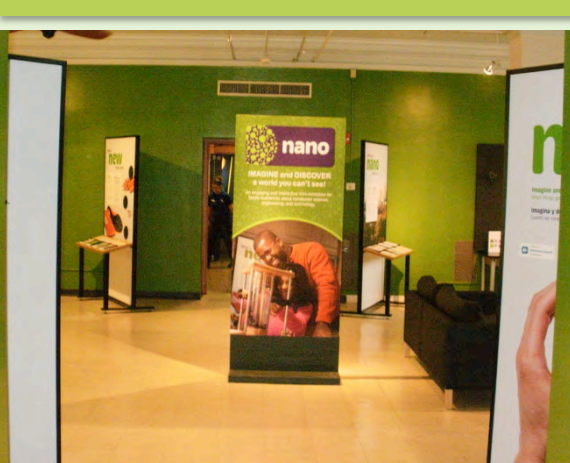
- Comprehensive content
- Small footprint: 400 square feet
- Flexible configurations, modular
- Bilingual – English & Spanish, accessible
- Making > 90 copies
 - Batch 1 = 49 copies (shipped in 2012-2013)
 - Batch 2 = 21 copies (will ship April – August 2014)
 - Batch 3 = 23 copies invitation process (ship 2015)

Waiting list for used copies
and possible sharing

Nano Mini-Exhibition Reach



Mini-exhibition around the country



Buffalo Museum of Science
Buffalo, NY



National Museum of Nuclear Science
and History, Albuquerque, NM



Da Vinci Science Center
Allentown, PA



Miami Science Center
Miami, FL



Saint Louis Science Center
Saint Louis, MO



Children's Museum of Houston
Houston, TX

Nano Mini-exhibition Public Impact



Summative Study Findings:

1. Reach is sizable and broad
2. Successful in:
 - Engaging visitors
 - Promoting learning
3. Successful for:
 - Different types of institutions
 - Small sample of Spanish-speaking visitors
 - Small sample of visitors with disabilities
4. Catalyzing new and enhanced programming

Nano Mini-exhibition Partner Impact



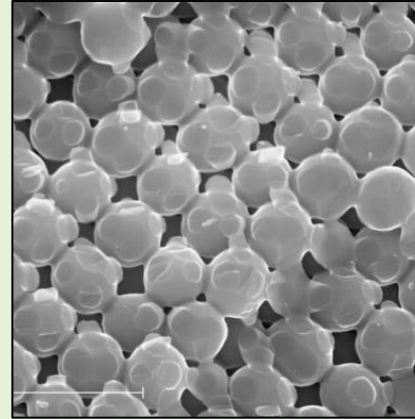
- 87% implementing new or expanded **public programming**
- 62% reported new and expanded **partnerships**
- Almost all partners have implemented new or expanded **staff and/or volunteer training**
- All plan to keep or share Nano **beyond the one-year commitment**, 52% said indefinitely
- Wide range of **impacts** described on visitors, staff, collaborations, and organizational

More info: nisenet.org/catalog/exhibits/nano_mini-exhibition

Programs - New in the Catalog



**Liquid Body
Armor**
Cart demo



**Colors at the
NanoScale:
Butterflies,
Beetles, and
Opals**
program



**Making
Molecular Movies
with QSTORM**
Public
presentation



**More
coming soon –
watch the
Nano Bite**

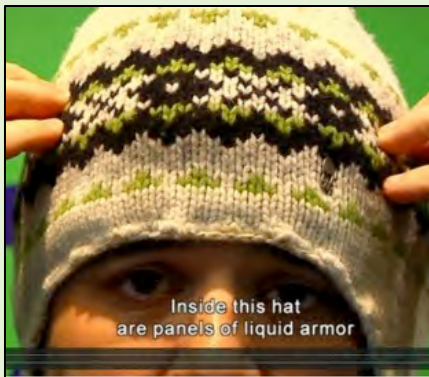
Media – for the public in the Catalog



**Mr. O video –
A Little bit of
Sunshine**



**Invisibility
Cloak**



**Mr. O video –
Liquid Armor**



**What's Nano
about that
series
(coming soon)**

Media – tools for educators



**NanoDays
Training Videos
2013**



**America's Next
Top Presenter**
(coming soon)



**NanoDays
Training Videos
2014**
(coming soon)



Speed-Ucate
Visitor
Conversations
Video
(coming soon)



Professional Tools and Guides

- Museum-Scientist Collaborations
- Team Based Inquiry

Later on agenda:

- Inclusive Audiences
 - Bilingual Audiences
 - Universal Design
- Nano and Society

Museum-Scientist Collaboration Tools



RISE: Research Center – Informal Science Education Partnerships

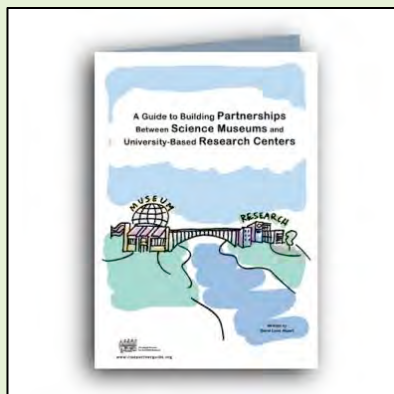
Encouragement, knowledge, and tools to support collaborations

Why Collaborate?

- Bring current science to museum audiences
- Connect scientists and students with the public
- Share resources and tools
- Mutual learning between scientists, museum educators, and the public

More info: nisenet.org/rise

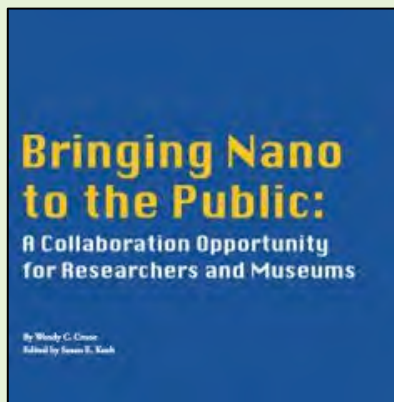
Museum-Scientist Collaboration Tools



Guide to Building Partnerships between Science Museums and University-Based Research Centers



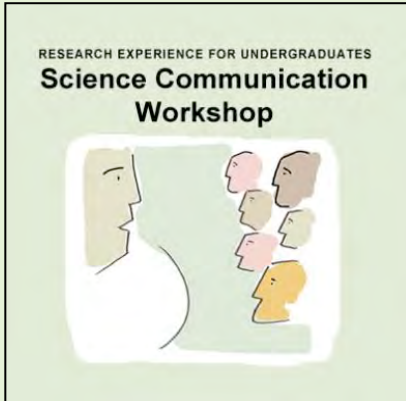
National Chemistry Week collaborations
Oct 20-26, 2013



Bringing Nano to the Public
collaboration introduction

More info: nisenet.org/rise

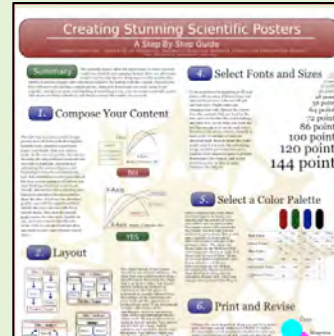
Science Communication Tools for scientists



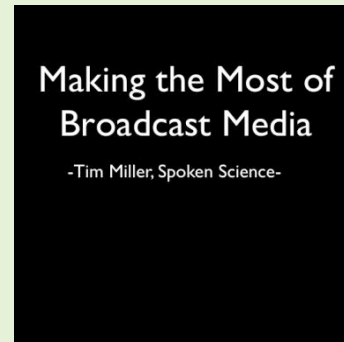
Science Communication Workshop
designed for Research Experiences for Undergraduates (REU) programs



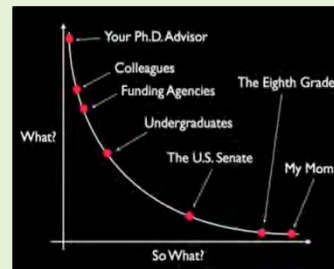
Sharing Science Workshop and Practicum
designed for scientists and students



Creating Stunning Scientific Posters Seminar



Making the Most of Broadcast Media Workshop



Mastering Science and Public Presentations Video



Upcoming Opportunities

- NanoDays
- Mini-grants
- Team-Based Inquiry Training
- Annual Partner Surveys
- And more!

NanoDays

NanoDays Applications
due **December 1, 2013**

- Annual event introducing the public to nanoscale science, engineering, and technology
- Involves hundreds of museums and universities over one week



NanoDays Reach and Impact



Reach:

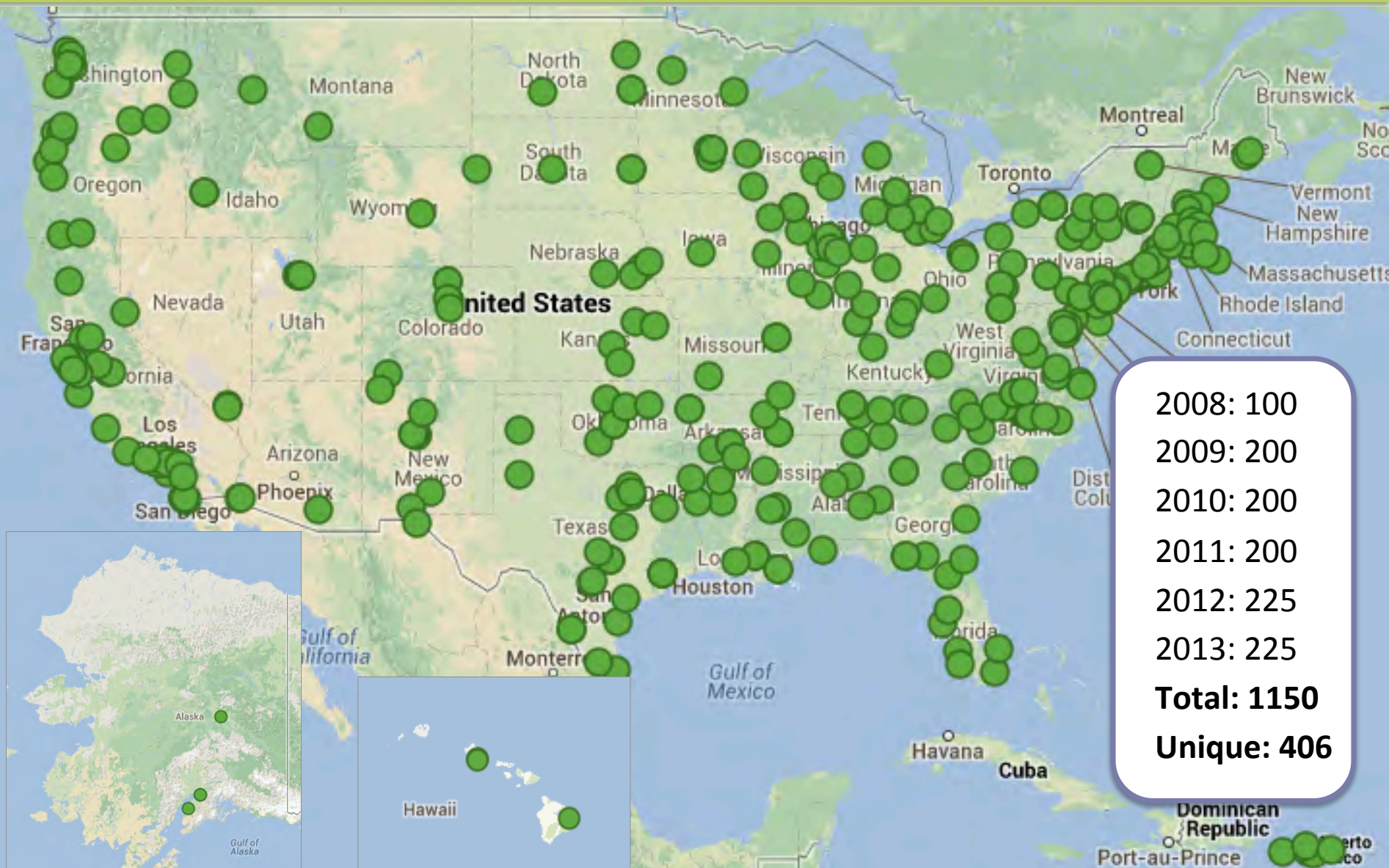
- 225 physical kits in 2013
- 250 kits in 2014 and 2015
- Digital kit and materials available free online

Impacts:

- Local collaborations: over 60%
- Year round use of kits: 100%
- Audience: nearly 100% family audiences



NanoDays Reach



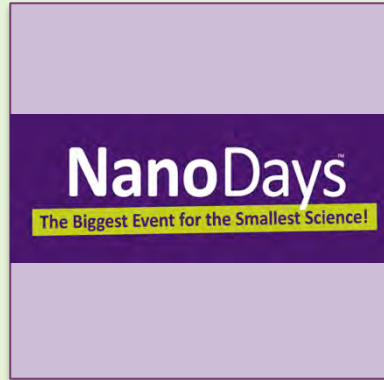
NanoDays 2014 kit

Applications are due
December 1, 2013



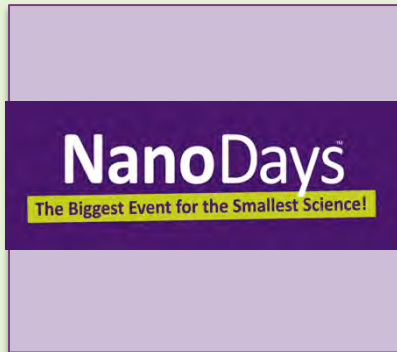
Training Videos for visitors & staff

- for each activity
- visitor conversations



Volunteer Survey

We'll be inviting all NanoDays volunteers across the nation to participate in a short online survey to learn about their volunteer experience



New activities

- Capillary Action
- Oobleck
- Piezoelectricity
- Electroplating

New Videos

- Invisibility Cloak
- more!



Online Brown-Bags

- What's Coming in the NanoDays kit
- Hosting a Bilingual NanoDays
- Science Behind NanoDays

NanoDays after 2015



Sustainability Plans

- Planning to create and distribute a compendium of all NanoDays activities (hard copy and digital)
- Continue to make NanoDays materials available online

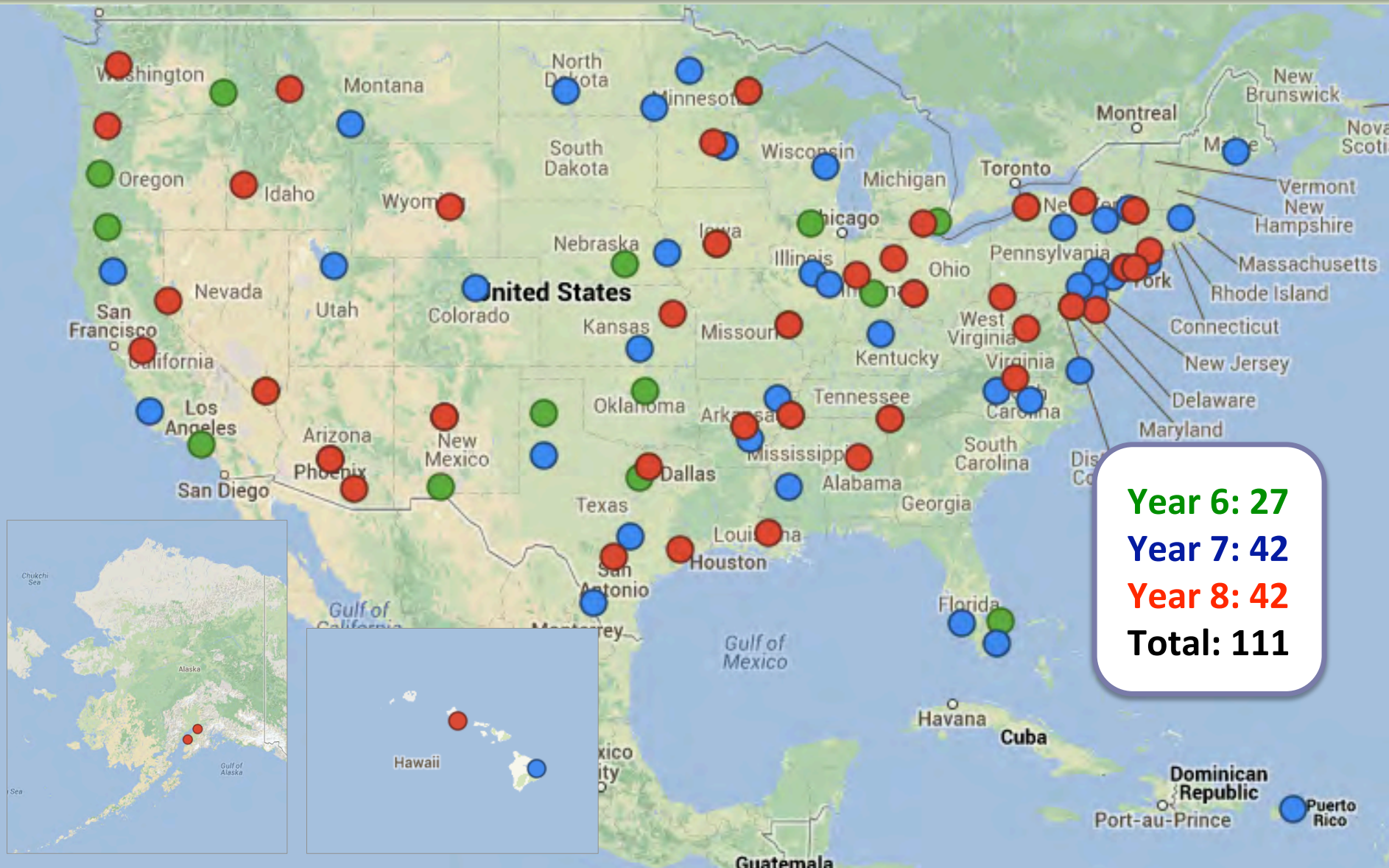
Mini-Grants

Applications are due
November 1, 2013



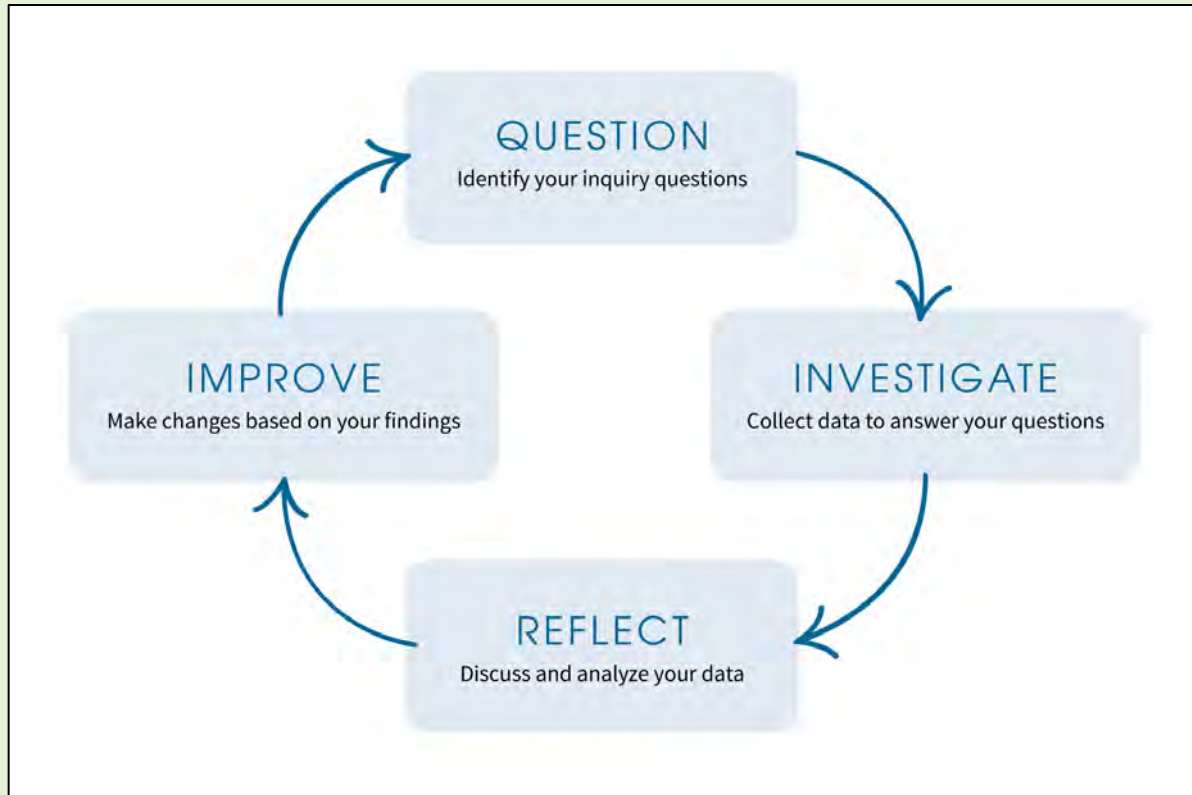
- 27 awards in 2011, 42 in 2012, 42 in 2013 anticipate 40 in 2014
- \$3,000 maximum
- Eligible activities:
 1. New efforts to integrate nano into existing programming
 2. New efforts to reach new audiences with nano programming (including traditionally under-served or under-represented audiences)
 3. New partnerships between museums and nano researchers, community--based organizations, or diversity serving organizations

Mini-Grants Reach



Team-Based Inquiry

TBI is an approach to empowering professionals to get the data they need, when they need it, in order to improve their products and practices and create successful educational experiences.



Team-Based Inquiry Tools



Team-Based Inquiry Guide includes:

- Templates
- Observation forms
- Interview forms
- Worksheets
- Concrete examples

The guide will be included in the NanoDays 2014 physical kit

Team-Based Inquiry Professional Development



New Professional Development Opportunity

What? NISE Network is inviting a small number of partner institutions to participate in an intensive, seven-month professional development experience focused on team-based inquiry (TBI).

Team-Based Inquiry Professional Development



New Professional Development Opportunity

Why? The professional development will help institutions use TBI to incorporate evaluation and data-based decision-making into their nano education work.

Team-Based Inquiry Professional Development

The experience is offered at no charge but will require significant time from two staff January-July 2014:

- 1.5 hour phone call every two weeks
- 2 to 4 hours per month on professional development
- One-day workshop in Portland, OR, April 2014 (travel, lodging, & food covered by the NISE Net)

Participating will also impact the timeline of your mini-grant project:

- January-March 2014, participants learn about TBI and prepare for shared inquiry experience during NanoDays 2014
- April-July 2014, participants work on TBI studies at their own institutions specific to their mini-grant projects

*Participation will **NOT** affect selection process for mini-grant applications!*



More info: nisenet.org/community/mini-grants

Team-Based Inquiry Professional Development

How do I apply?

- Participants will be recruited through the **mini-grant application**.
- Indicate your organization's interest at the end of the application.
- Invitation e-mails will be sent out in January.

This opportunity is described in more detail in the **2014 Mini-Grants Program Overview**. Before indicating below if your organization is interested in participating, please read more about the opportunity and consider the timeline and required staff time commitment.

12. Would your organization like to be considered for this team-based inquiry professional development opportunity? *Your response to this question will NOT affect the selection and review process of your mini-grant application. **

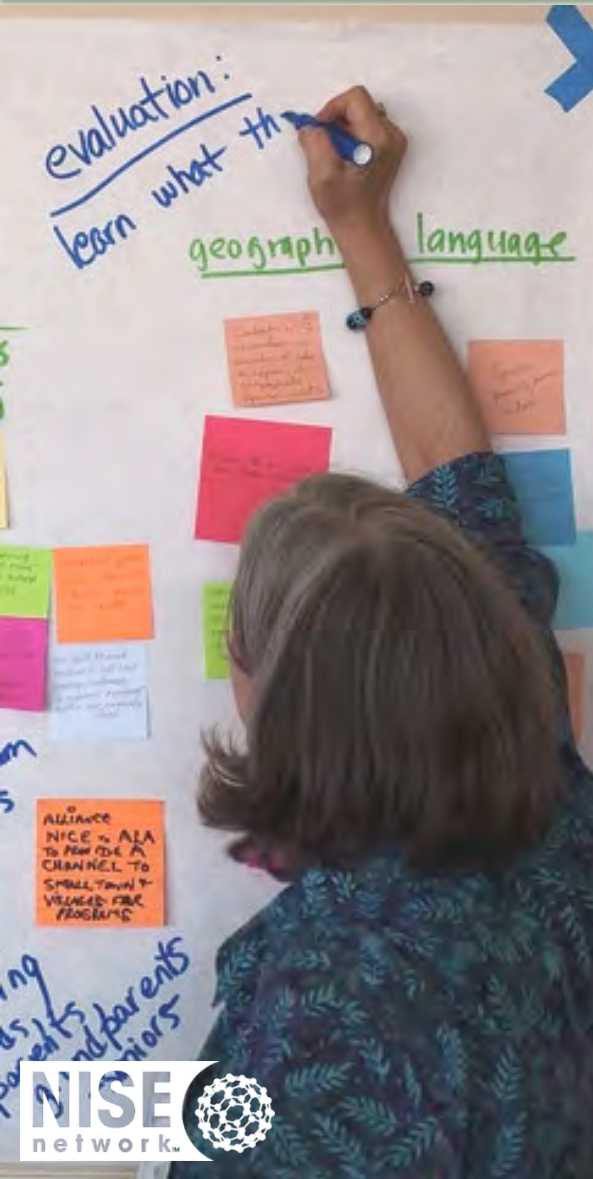
Yes

No

Participation will **NOT** affect selection process for mini-grant applications!

Mini-grant application
due **November 1, 2013**

Evaluation and Research



Evaluation measures professional learning and practice, public learning, and Network growth.

- Professional Impacts
- Public impacts

Research studies provide the field with new knowledge and understanding

- Public Decision Making and Learning
 - Organizational Change
 - Museum – Scientist Partnerships
 - Nano in Traditional and Social media
-
- Find out what we have learned so far by visiting nisenet.org

More info: nisenet.org/evaluation

More info: nisenet.org/research

Help Us Learn – Annual Partner Survey



Help us to advance NISE Network and the field by participating in the Annual Partner Survey

Please fill out the survey when you receive an invitation

- even if you filled it out last year
- even if more than one person at your institution is filling out the survey

Survey invitation
via email in
October 2013

Professional Development Opportunities



- **ASTC (Association of Science-Technology Centers)**
October 2013 in Albuquerque
Sessions, booth, breakfast
pre-conference workshop on Team-Based Inquiry
- **Association of Children's Museums (ACM)**
May 2013 in Phoenix - sessions, booth
- **Materials Research Society (MRS)**
November 2013 in Boston & April 2014 in San Francisco
- **Online Brown-Bag conversations**
All year round, averaging one a month
Recorded and available to view online

More info: nisenet.org/community/events

Online Brown-Bag Conversations



*All past
brown-bags
are recorded
and available
online.*

This Fall:

- Nano for School Groups – October 1
- Universal Design Program Workshop Follow-up – October 28
- Nano in Food – November 13

Coming Up Winter/Spring 2014:

- For NanoDays:
 - What's Coming in the NanoDays kit
 - Hosting a Bilingual NanoDays
 - Science Behind NanoDays
- Nano for Summer Camps
- Nano and Society

More info: nisenet.org/community/events

Stay in Touch

Website networking tools



- Update your profile on the website
nisenet.org/faq
- Sign up for the monthly
Nano Bite newsletter
nisenet.org/community/nanobite
- Join our social networking sites
nisenet.org/community



Thank you!

To all our partners - we could not do this work without 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 authors and do not necessarily reflect the views of the Foundation.

Questions & Discussion



Are there robots
the size of a freckle or hair?



.1mm

Regional Meeting Agenda – Day 1

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Mini-Grant Presenters

- Ana-Rita Mayol
Delaware State University
- Nora Moynihan and Sarah Zimmerman
Port Discovery Children's Museum
- Harold Clark and Ruben Rosario
Liberty Science Center
- Susan Pion and Dawn Kirchner
Boonshoft Museum
- Julie Bryan
Children's Discovery Museum of West Virginia

Applications are due
November 1, 2013

DSU-OSCAR Partnership: Bringing Nanoscale Optics Research Concepts to the schools on the mid- Atlantic region

Ana-Rita Mayol
Delaware State University

Rationale

- Increase the public awareness of optics and photonics through education and research

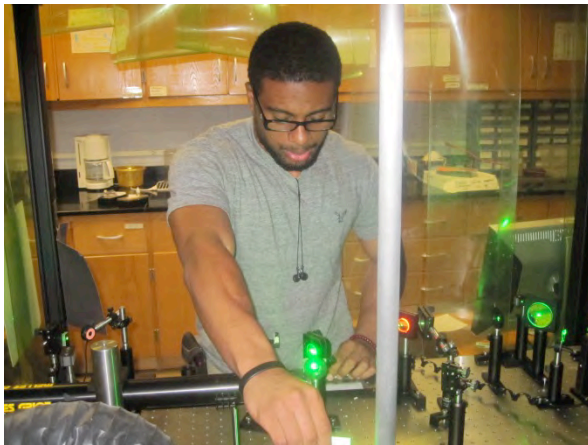
Expected outcomes

- Prepare educational that bring nanoscale optics to the K-12 level.
- Offer workshops and demonstrations on nanoscale optics in the mid-Atlantic region of the US with emphasis on the state of Delaware.
- Impact Boys and Girls Club of Dover Delaware, thus educating the next generation workforce.

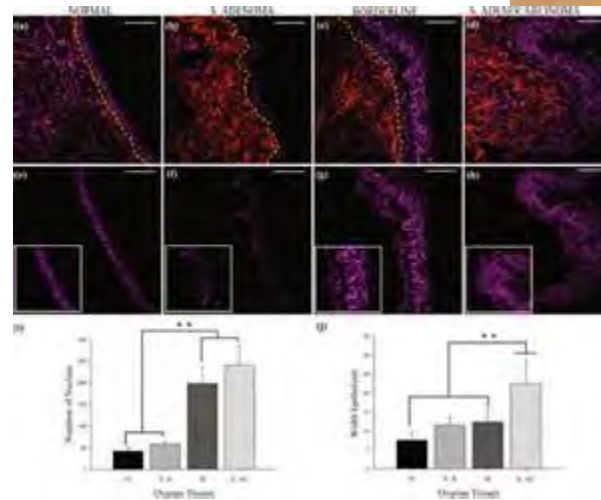


Optics

Branch of physics which involves the behavior and properties of light, including its interactions with matter and the construction of instruments that use or detect it. It usually describes the behavior of visible, ultraviolet, and infrared light.



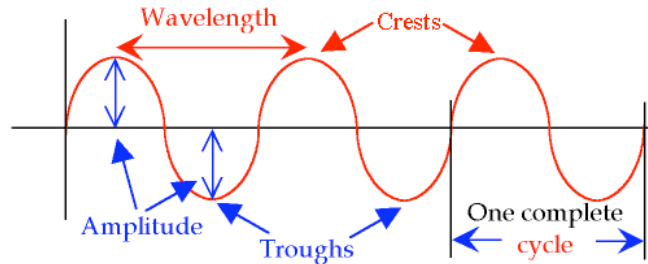
Basic research



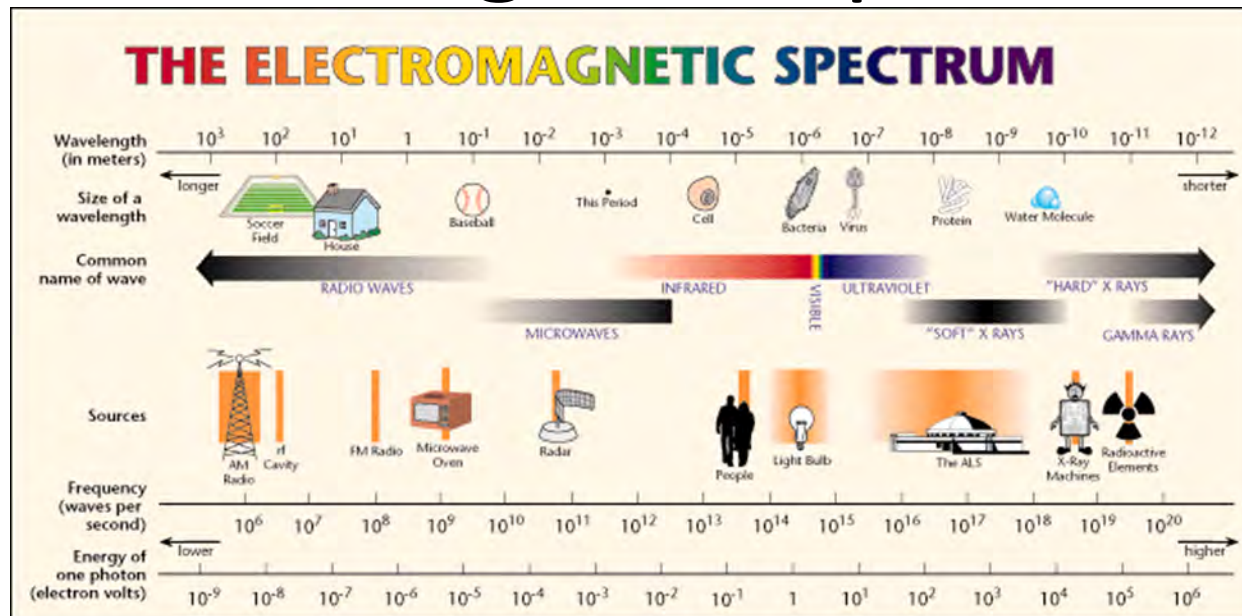
Applications

Properties of waves

This wave is moving
in this direction

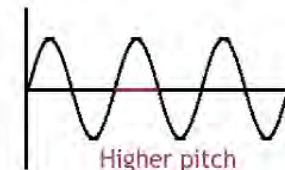
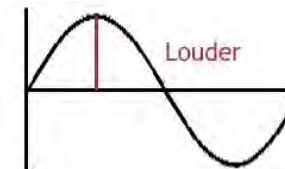
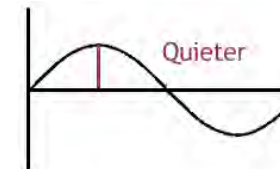
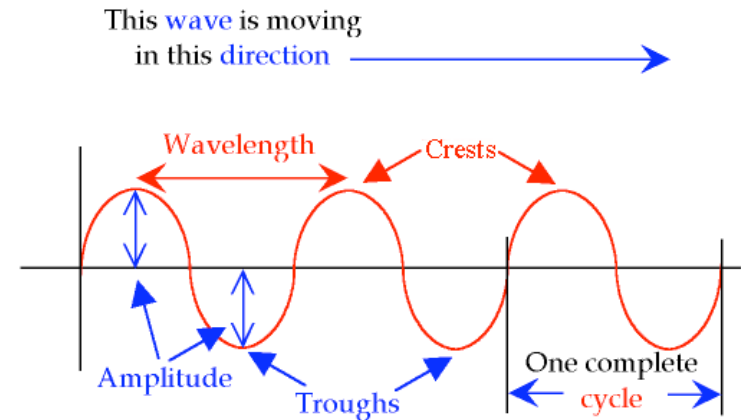


Electromagnetic Spectrum



Properties of waves

<u>Building</u>	<u>1000m</u>
<u>Football field</u>	<u>100m</u>
<u>House</u>	<u>10m</u>
<u>Human</u>	<u>1m</u>
<u>baseball</u>	<u>0.1m</u>
<u>Honey Bee</u>	<u>0.01m</u>
<u>(thickness of) Paper Clip</u>	<u>0.001m</u>
<u>Thickness of) Sheet of paper</u>	<u>0.0001m</u>
<u>Cell</u>	<u>0.00001m</u>
<u>Bacteria</u>	<u>0.000001m</u>
<u>Virus</u>	<u>0.0000001m</u>
<u>Molecules</u>	<u>0.00000001m</u>
<u>Proteins</u>	<u>0.000000001m</u>
<u>Atom</u>	<u>0.0000000001m</u>
<u>Water molecule</u>	<u>0.00000000001m</u>
<u>Nucleus</u>	<u>0.000000000001m</u>



© www.science aid.net

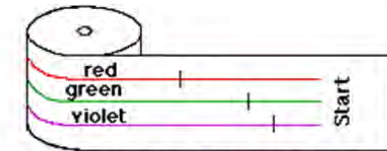
The Electromagnetic Spectrum

Making the Band

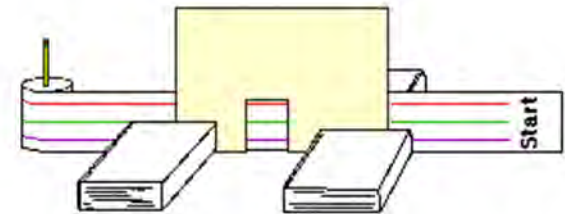
Electromagnetic Spectrum

Visible Light Region

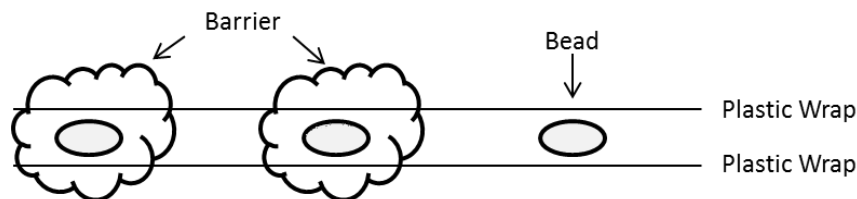
Light Source	Observations	
	Colors:	Continuous or dark lines?
Sunlight		
Incandescent Light		
Fluorescent Light		
White LED Flashlight		
LED Light: Color		
LED Light: Color		



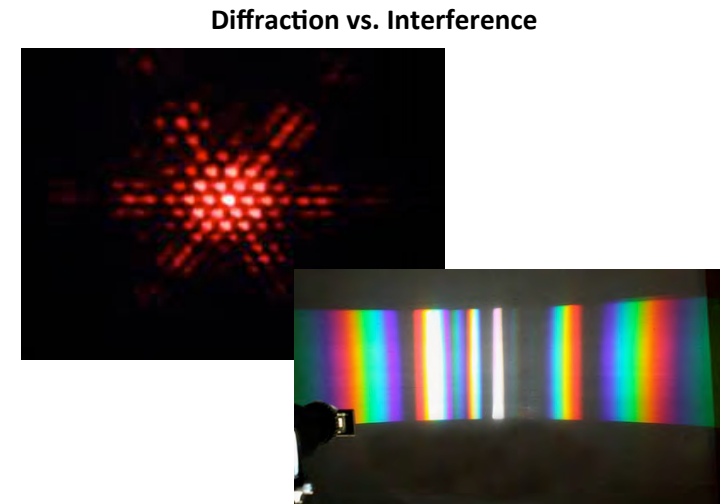
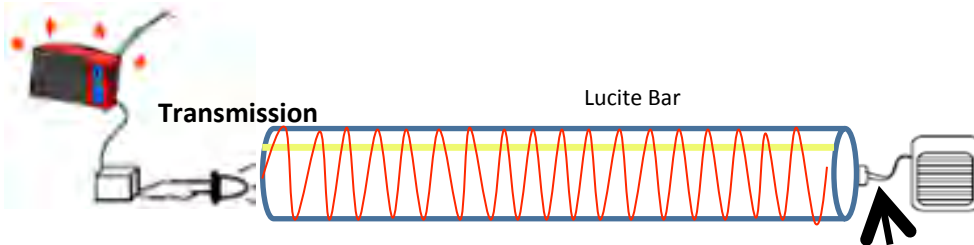
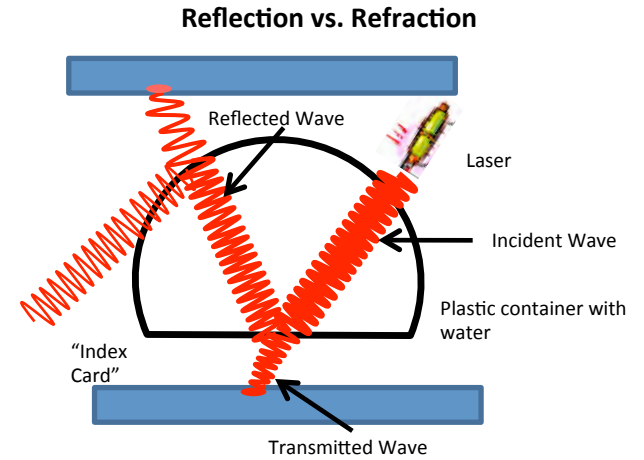
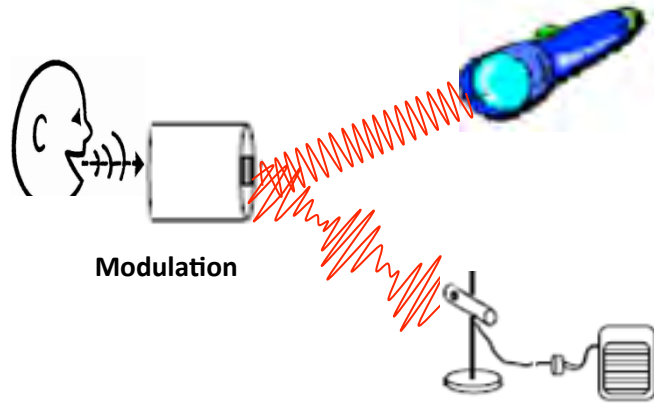
Note: This is how to get started, keep labeling the colors until you reach 100 cm.



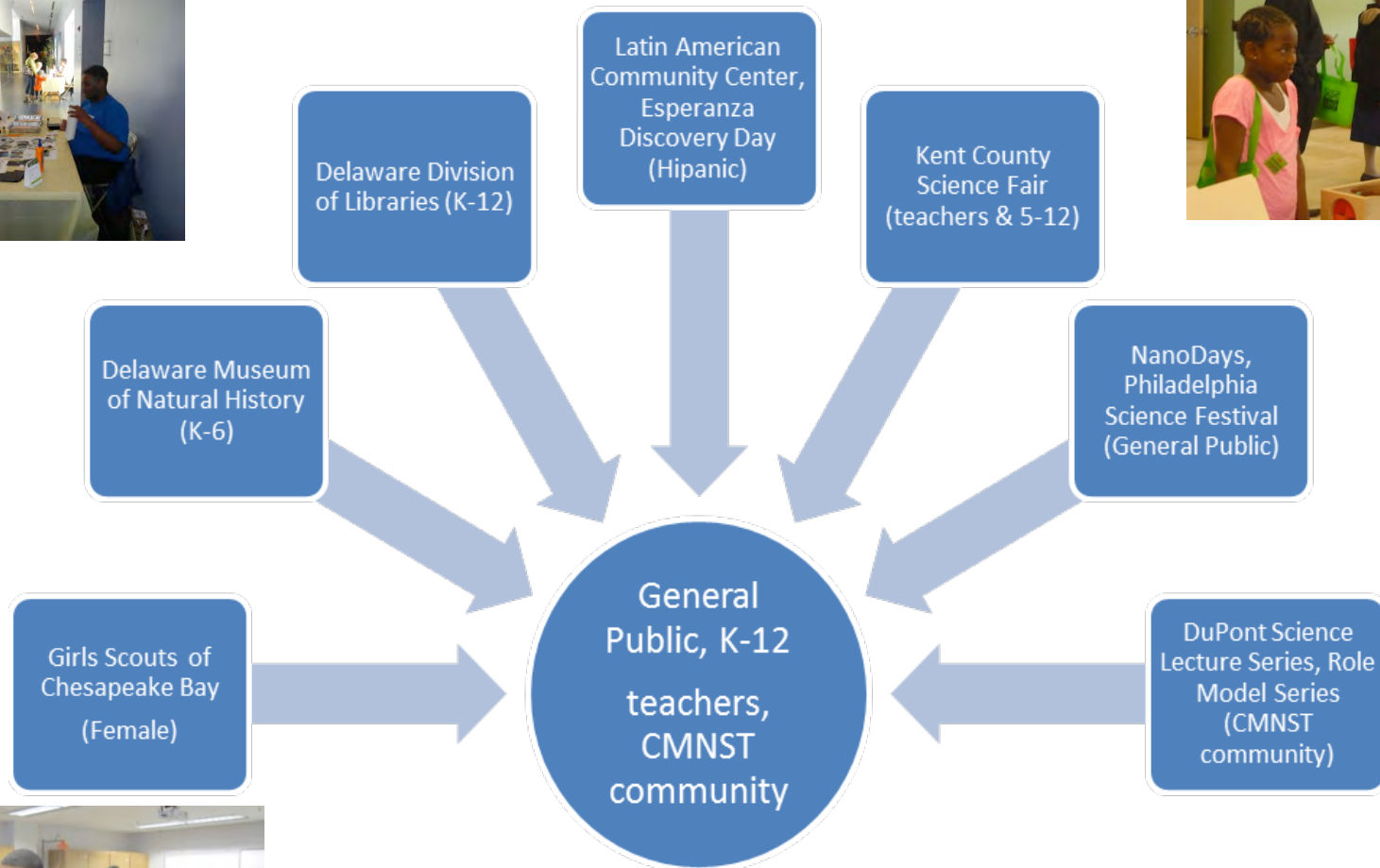
UV Region



Communicating with Light



Partnerships



Outcomes

Level	No. Participants	Demographics
Undergraduate	7	2 F, all Af.-Am
4-9	24	15 F, 7 Af.-Am
4-8	36	20 F, 35 Af.-Am, 1 Hisp.
General Public	350	Information not collected

- Six modules have been developed; four have been tested and implemented
- Four new partnerships have been fostered



Acknowledgement

NISE Net Mini grant

NSF-CREST-CREOSA

HRD1242067

American Honda Foundation – Explorer's Club



MINI GRANT

2013



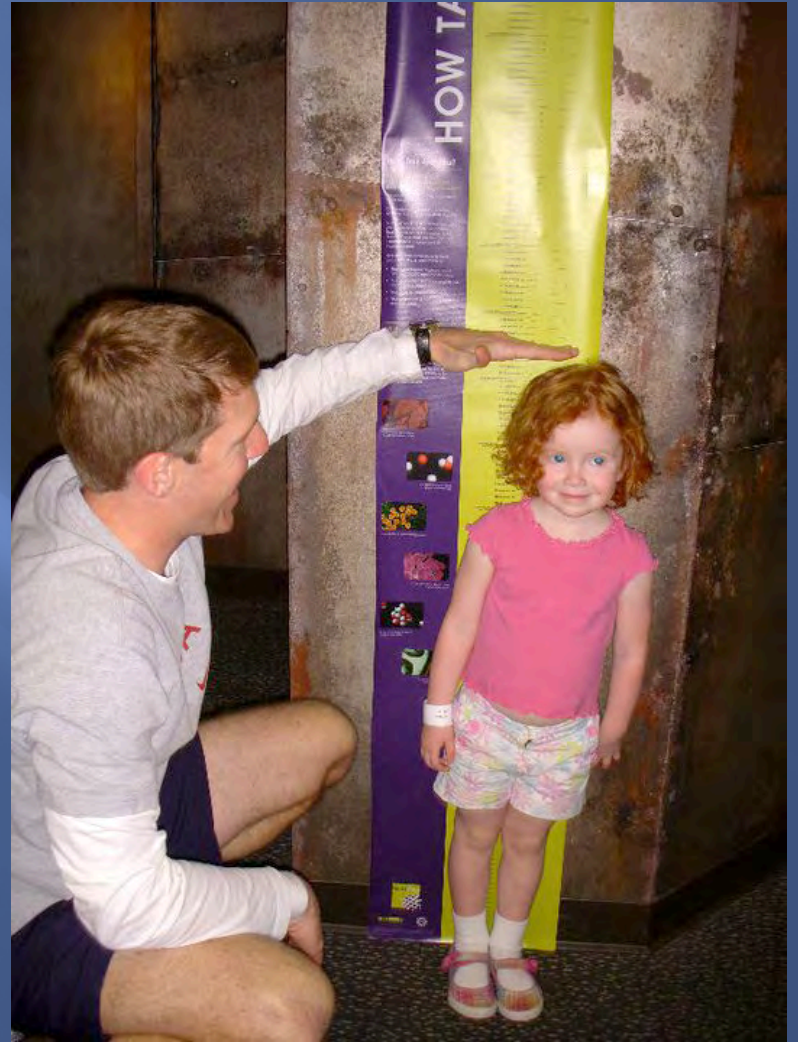
How Do You?
Nan-Know ?

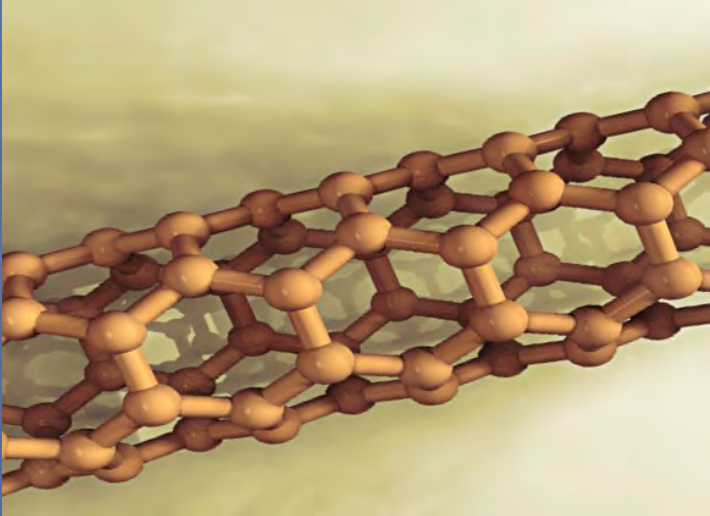




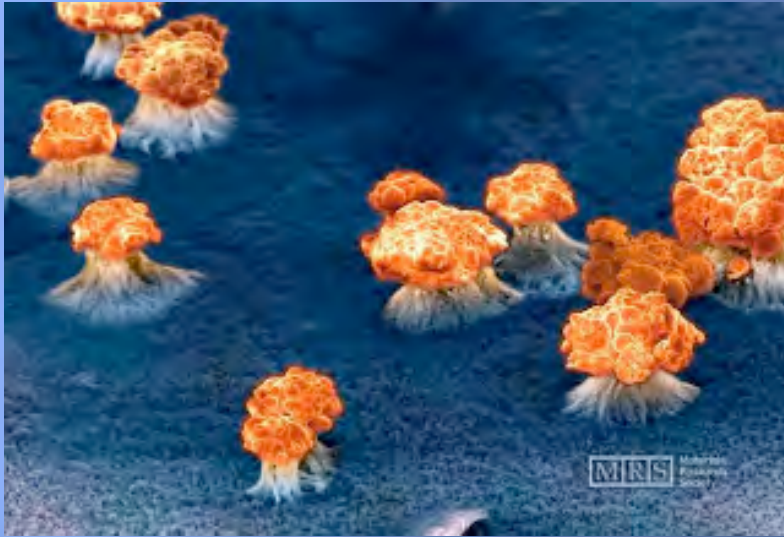
What
we
Nan-Know...

It's SMALL!



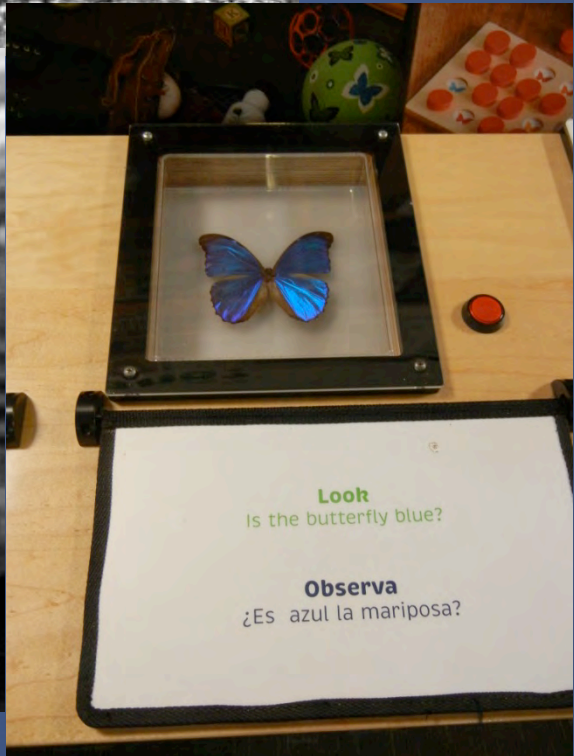
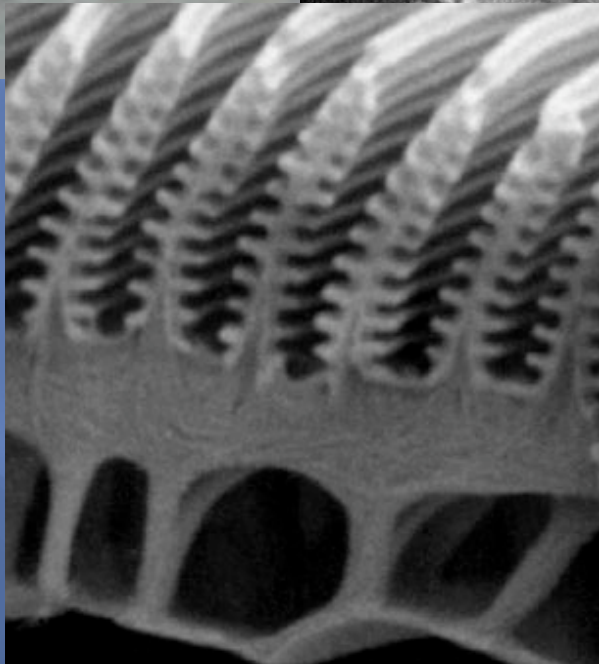
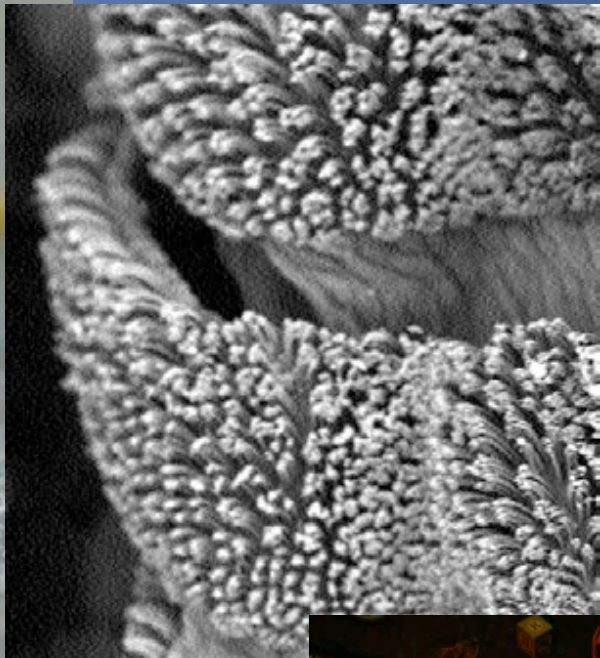


UNEXPECTED
things
can
happen!

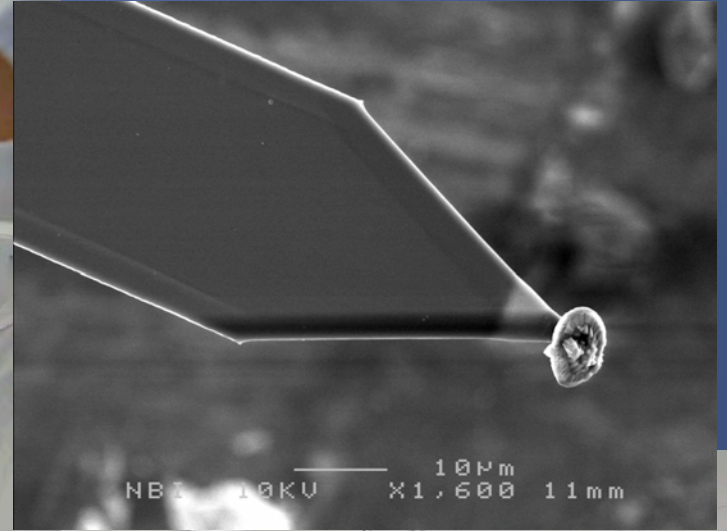




Nano
is found in
nature!

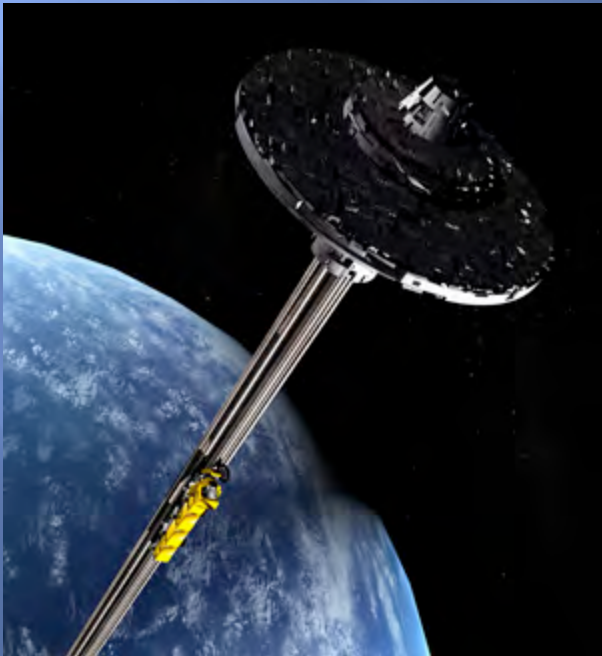
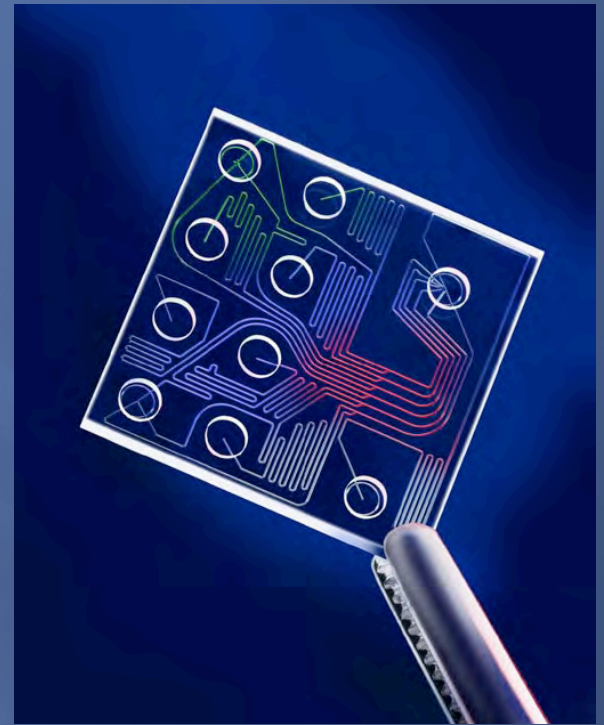
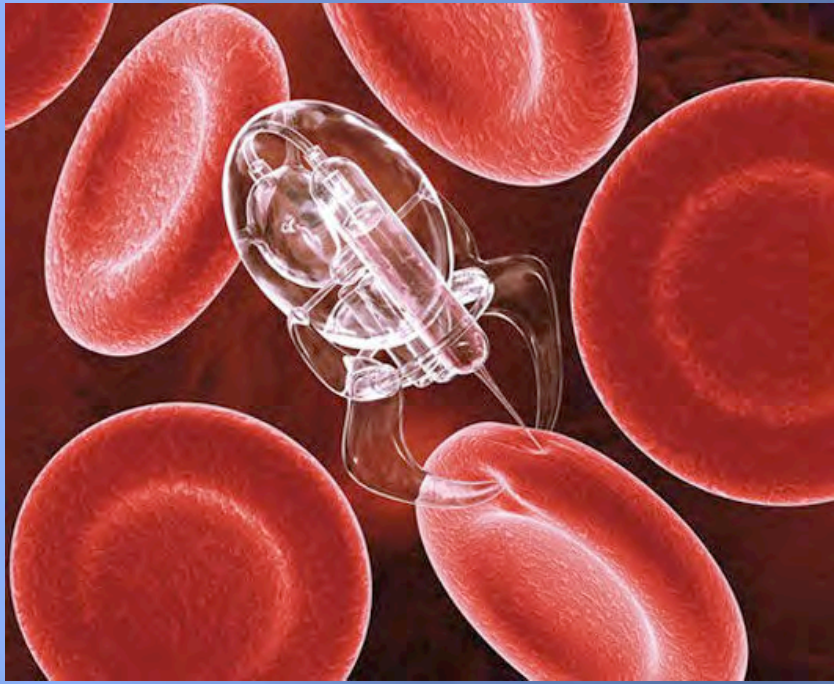


Scientists
study nano
with special
tools!





Nano
inspires
new
technologies!



Nano
is all
around
us!

The NEW exhibit

Where Can You Find Nano in Your Neighborhood?



Can you find Nano Boy on the picture of Baltimore?
Match the number on his shirt to the number below to
learn more about nano in your own neighborhood!

PORT DISCOVERY
Children's Museum

1. Port Discovery Children's Museum
35 Market Place, Baltimore, Maryland

Here at Port Discovery, our Nano and NanoFabulous exhibits are engaging families in the mysterious world of nanoscience. Children learn that nano is very, very small and that when things become nano-sized they can have unexpected properties. "Pop Up" science experiments, after school programs, our annual NanoDay, family workshops and more provide hands-on/minds-on experiences.

2. University of Maryland, MRSEC
1117 John S. Toll Building, College Park, Maryland



Where Can You Find Nano in Your Neighborhood?
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SPINALLIGENT

WATER HEATING

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SPINALLIGENT

WATER HEATING

But...

How do we
Nano-Know...

if we want
to use products
that
nanotechnology
has been used
to create?



Think about...

Your values

How much
does it cost?



Is it useful?





Is it “COOL!”
or popular?

How Do You?
Nan-Know ?

How Do You Nan-Know?

Every day people make choices about what to buy in the store. Each person places different values on the products that are available. How do you decide what to buy?

- Do you think about how it will help you?
- Do you think about how much it will cost?
- Do you think about how cool it is?

Now Decide for Yourself:

On the tables, there are pairs of products. In each pair, one of the products uses nanotechnology and the other does not. Read the description of each of the products. Flip the blocks to show what you decide about cost, usefulness, and coolness.

Like Dislike

Created by **UNIVERSITY OF MARYLAND**

Food Storage
 Cost: \$8.99
 Purpose: Food storage containers help you store and transport food. They also help keep food fresh longer.

Nano Food Storage
 Cost: \$10.99
 Purpose: Food storage containers help you store and transport food. They also help keep food fresh longer. Nano silver particles in the plastic make it resistant to mold or bacteria.

Cost Usefulness Coolness

Paint
 Cost: \$12.58
 Purpose: Paint covers walls and other surfaces to make them look nicer.

Nano Paint
 Cost: \$15.28
 Purpose: Paint covers walls and other surfaces to make them look nicer. Nanocoatings in the paint prevent dirt from sticking to it. This means that the paint does not get dirty as easily.

Cost Usefulness Coolness

Shorts
 Cost: \$19.50
 Purpose: Shorts cover your legs while letting you stay cool.

Nano Shorts
 Cost: \$19.98
 Purpose: Shorts cover your legs while letting you stay cool. Nano particles coat the fibers in shorts and repel liquids and stains to help keep the shorts clean.

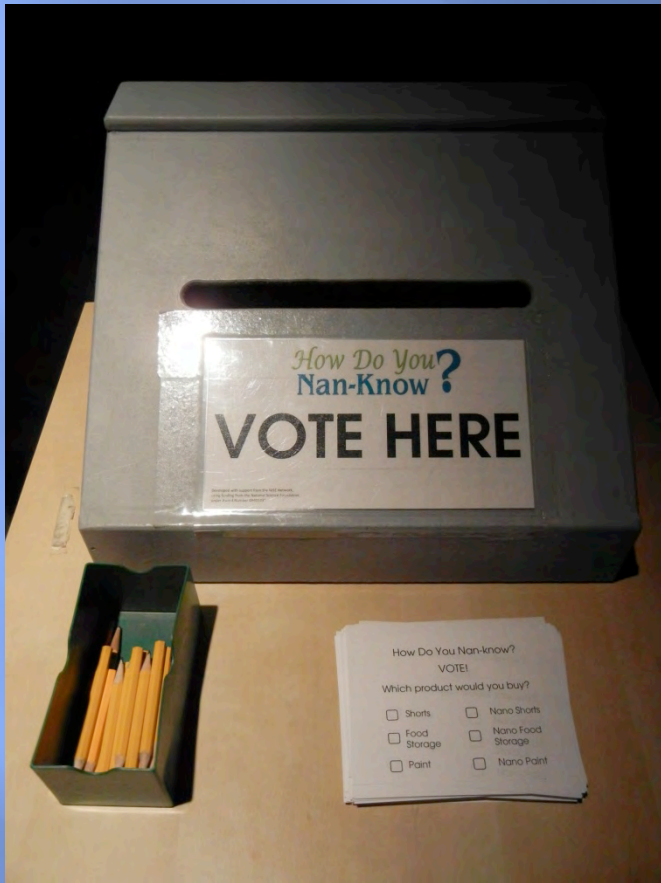
Cost Usefulness Coolness



Created by **UNIVERSITY OF MARYLAND**

University of Maryland- MRSEC





VOTE NOW!

Special Day
to support
the exhibit focus:

NanoVention Convention!



Cultural Partners:
National Electronics
Museum

University Partners: University of Maryland MRSEC



Industry Partners: Vorbeck Materials

Nano is here!



Nano is there!



Nano

is

EVERYWHERE



How do you
Nan-Know?





Family Science Center

AZA Accredited Zoo

Planetarium

Nano Science 101

- Assembly style program
- Rural communities
- Grades 4 to 6
- Introduction to size and scale
 - What is nano?
 - Why is it important?
 - Does it really matter?

Audience Reached

- **Greenview Middle School, grade 7**
 - 100 students, 5 programs
 - Median family income of \$35,555
 - Student poverty rate of 28%
 - 35 miles East of Dayton, Ohio
- **Wapakoneta Middle School, grade 5**
 - 64 students, 4 programs
 - Median family income of \$ 31,317
 - Student poverty rate of 41%
 - 58 miles North of Dayton, Ohio

Teacher Requests

- Individual class programs
 - Assembly format modified
 - More student attention
 - Emphasis on current class topics
- More hands-on vs. demonstration
 - Demonstration as introduction
 - Meaningful exposure to scientific process and tools not readily available

Activities

- Team challenge
- Introduction to surface area



- Chemical reactions – effervescent tablets
- Nano silver – modified wood blocks and Velcro
- Sodium polyacrylate – particle size



Children's Discovery Museum of West Virginia

Julie Bryan

NISE Network Mid-Atlantic Hub

Regional Meeting

September 18, 2013

Background on CDMWV

- Opened February 2011
- Exhibits for ages 6 months to 8 years old
 - Reach older children with Special Events and new Hands-On Science Area
- Two 20 hours (total) per week paid staff
- Operating budget of \$30,000
- Growing attendance
 - 2011: **4050**
 - 2012: **7535**
 - 2013: **5050** (Jan-June 30)



Goals of Mini-Grant

Create nanoscience-based programs for:

- *Science Saturday* program
- Outreach to Boys and Girls Club



Science Saturday

- Offered every (non-event) Saturday at 11:30
- Available to all visitors at no additional charge
- Staff-led, interactive science program



Boys and Girls Club

- Two evenings a month
- 2nd-4th grade
- One or two big ideas
- Demo and hands-on



Programs

- 11 programs created
- Programs were created through:
 - NanoDays Kits
 - Combination of programs in NISE catalog
 - Added take-home component/craft to catalog programs
 - Mixing nano and non-nano science



NanoDays Kits

- UV Beads



Combination of programs from catalog

- What is nano?
 - Measuring your hand worksheet from Measure Yourself
 - Nano gold
 - Alka seltzer from Surface Area
 - Nano sand



Added craft/take home component

- Gummy capsules
 - Made paper polymer chains
- Nano Sand
 - Oil and water bottles



Nano and non-nano

- Magnets and ferrofluid
 - Hands-on activities with magnets, what they are, how they work, etc.
 - Show ferrofluid



Additional Audiences

Knowledge and materials gained used for:

- Field Trips
 - First time offering nano-related field trips
 - K- 2nd grade
- Kids Day
 - Taught outreach to University students



Attendance= 586 children & adults

- Science Saturday
 - 21 children participated (nano programs)
- Outreach to Boys and Girls Club
 - 85 children
- Field Trips
 - 200 children
- Kids Day
 - 280 adults and children



To be continued...

- Field trips
- Science Saturday
- Outreach with other groups
- Opening of nano mini-exhibit

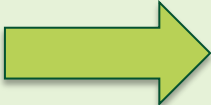


Arrr, Thank You Me Hearties!




Happy (early) Talk Like A Pirate Day!

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Game – *Nano Around the World*



More info:

nisenet.org/catalog/programs/nano_around_world

Why implement improv exercises ?



Incorporating improv exercises into staff and volunteer training helps create a supportive and upbeat environment for educators to practice and strengthen essential skills.

- **Warm up skills** required for interacting with visitors
- **Encourage conversations:** with visitors (rather than reciting scripts)
- **Be better listeners:** think on your feet and respond in the moment
- **Be responsive:** better tailor content to visitors responses and integrate visitor feedback
- **Be positioned as equals** with visitors not “the expert”
- **Foster teamwork & creativity:** create a fun, supportive, positive work environment to practice skills

More info: nisenet.org/catalog/tools_guides/improv_exercises

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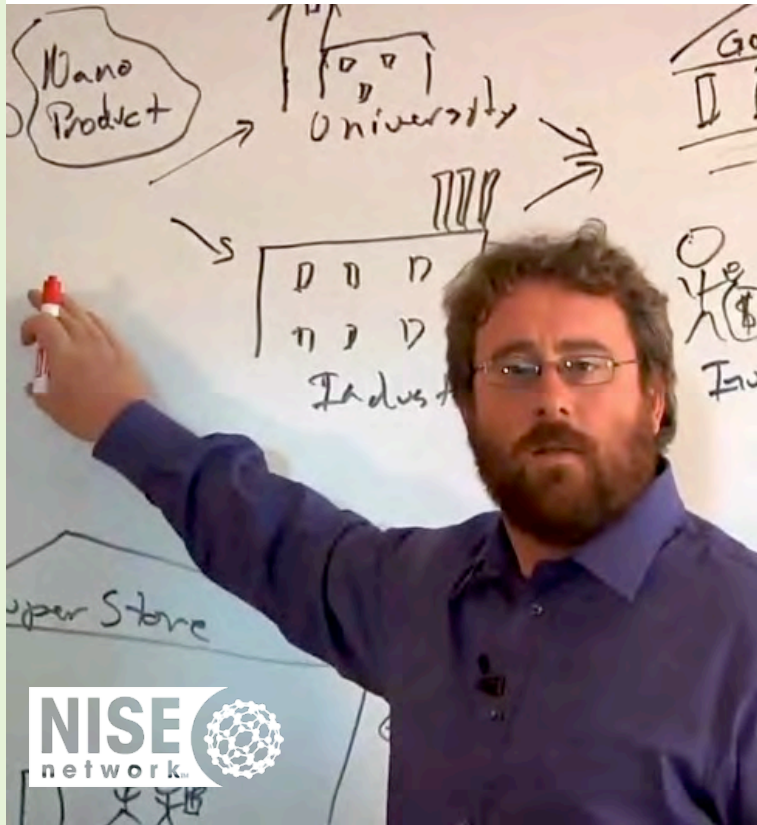
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Nano & Society Workshops

Set of four workshops in Fall 2012 focused on preparing museum educators to engage the public in conversations about the relationship between nanotechnology and society.



Nano & Society Three Big Ideas:

- Values shape technologies
- Technologies affect social relationships.
- Technologies work because they are part of larger systems.

Methods and practices for engaging The public:

- Conversational techniques for facilitating interactions with visitors.
- Team-based inquiry approaches to improving and learning from professional practice.

More info: www.nisenet.org/catalog/tools_guides/nano_society_training_materials

Nano & Society Activities



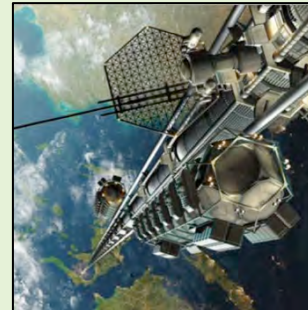
Nano Around the World card game



Exploring Nano & Society – Invisibility Cloak



Exploring Nano & Society – Flying Cars



Exploring Nano & Society – Space Elevator



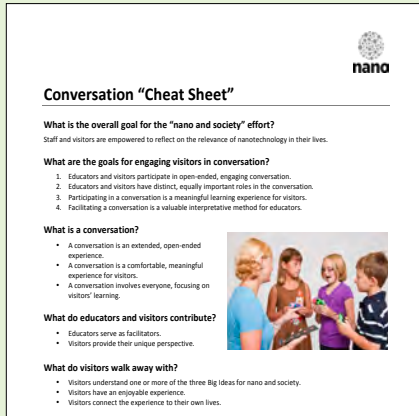
Exploring Nano & Society – Tippy Table



Exploring Nano & Society – You Decide!

More info: www.nisenet.org/catalog/tools_guides/nano_society_training_materials

Nano & Society Tools

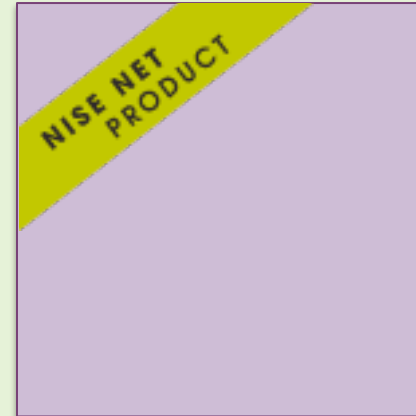


Nano & Society training materials

- slideshows
- videos
- tip sheets
- team-based inquiry sheets



Improv Exercises for staff and volunteers



Technology & Society Guide
(coming in NanoDays 2014 kit)

More info: www.nisenet.org/catalog/tools_guides/nano_society_training_materials

More Nano & Society Programs & Activities



Would you buy that?
Public program



Societal and Ethical Implications Posters



Wonders and Worries of Nanotechnology
Video episodes



Forums:

- Nanomedicine
- Energy
- Privacy
- Who Decides?
- Cognitive Enhancement

Nano & Society Workshops - Share-outs

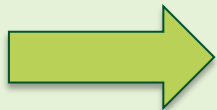
- Dan Steinberg
Princeton University
- Susan Petroulas and Chidi Agostinelli
Newark Museum
- Julie Bryan
Children's Discovery Museum of West Virginia
- Donna Hammer and Julie Callis
University of Maryland

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- 3:30 Making the Most of Your NanoDays Kit
- 4:30 Inclusive Audiences Bilingual and Universal Design
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- 6:30 Group Dinner



Making the most of your NanoDays Kit - Share-outs

- Chris Weyant
Drexel University
- Geri Baker and Zach Weber
Carnegie Science Center
- Mariah Romaninsky
Delaware Museum of Natural History
- Katrina Gorga and Abby Goodlaxson
Maryland Science Center
- Mark Thorne and Andrea Ramey
National Children's Museum
- Jill Showalter and Nora Joyce
North Museum

NanoDays Applications
due **December 1, 2013**

NISENet NanoDays Kits in Action

*Large One Day Public Events
(with Penn & Franklin Institute)*

- Philly Materials Day
- Philadelphia Science Carnival

Activities at Drexel

- STEM Outreach



DREXEL UNIVERSITY

Materials Science
and Engineering

College of Engineering

Philly Materials Day with Penn & FI



Philly Materials Day with Penn & FI



Philly Materials Day with Penn & FI

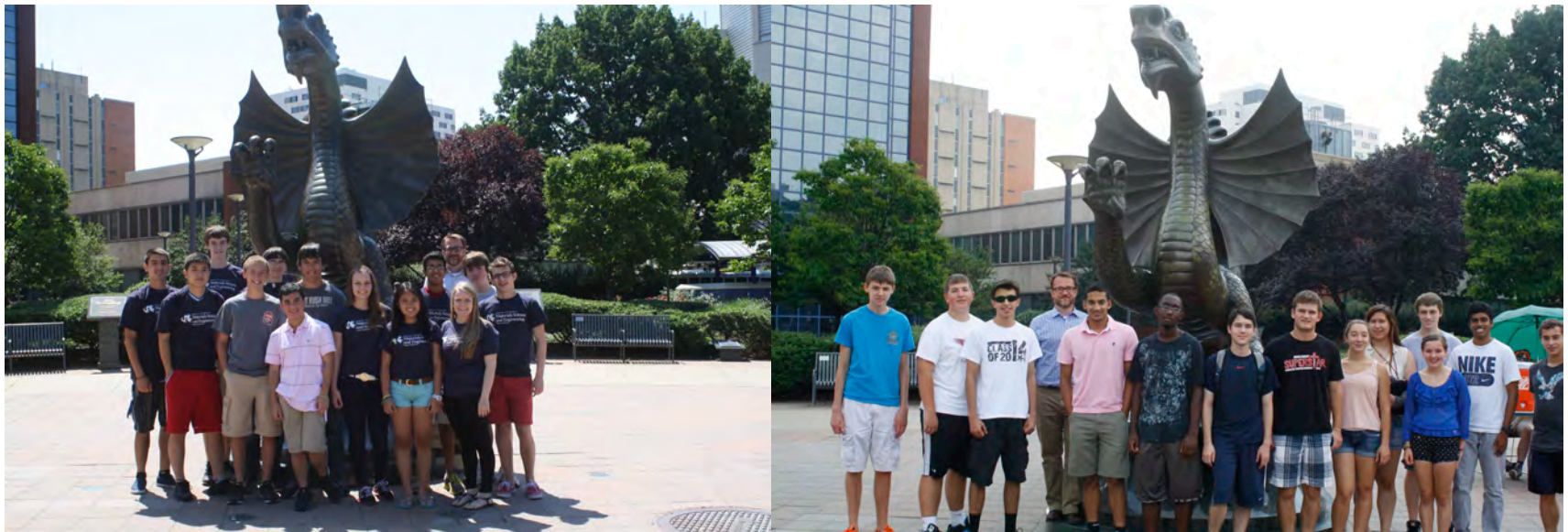


Science Carnival with Penn & FI



STEM Outreach at Drexel

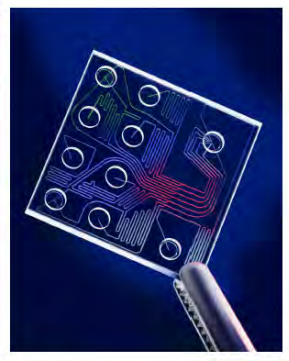
- High school campus visits
- Engineering Open Houses
- Drexel University Materials Science & Engineering Summer Institute



Technology & Society

NanoDays

Lab on a chip

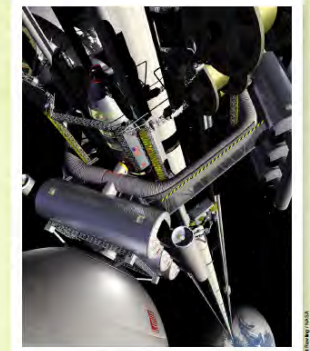


Tiny chips might quickly screen for diseases.

© Science Photo Library

NanoDays

Space elevator

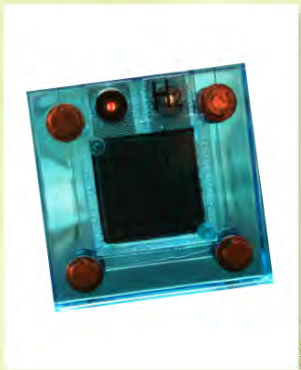


An elevator could bring people and materials to outer space.

© Science Photo Library

NanoDays

Nanoparticle fuel cells



Nanoparticle catalysts could generate clean energy for cars.

© Science Photo Library

NanoDays

Invisibility cloak



Nano-sized structures could make objects invisible.

© Science Photo Library

NanoDays

Tea bag water filter

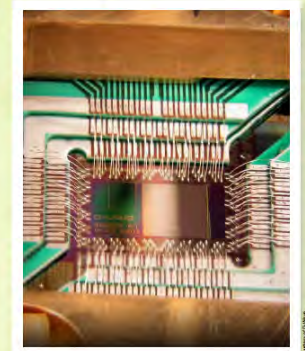


Portable nanofiber filters will purify water.

© Science Photo Library

NanoDays

Quantum computer



Quantum bits could process information a million times faster.

© Science Photo Library

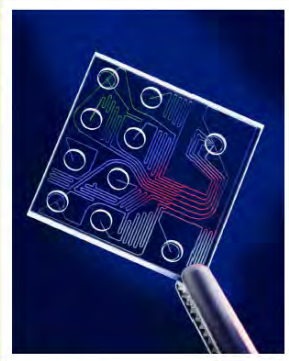


DREXEL UNIVERSITY

Materials Science
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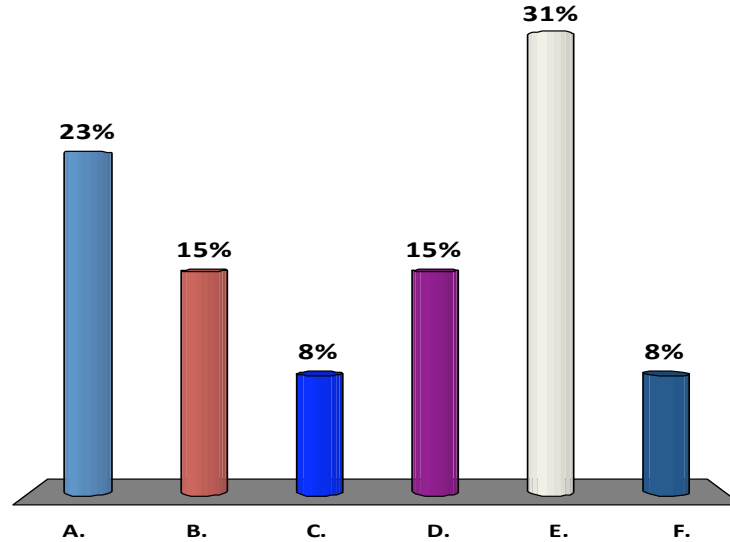
College of Engineering

Lab on a chip

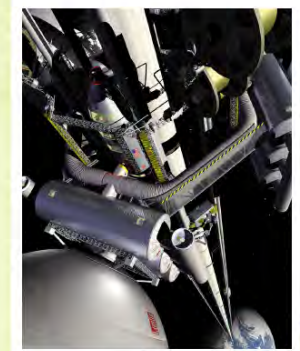


Tiny chips might quickly screen for diseases. **A**

Which technology should be developed first?

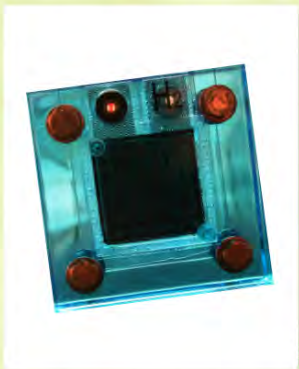


Space elevator



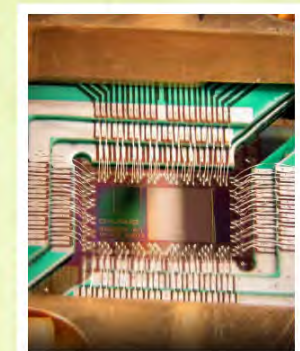
An elevator could bring people and materials to outer space. **F**

Nanoparticle fuel cells



Nanoparticle catalysts could generate clean energy for cars. **B**

Quantum computer



Quantum bits could process information a million times faster. **E**

Invisibility cloak



Nano-sized structures could make objects invisible. **C**

Tea bag water filter



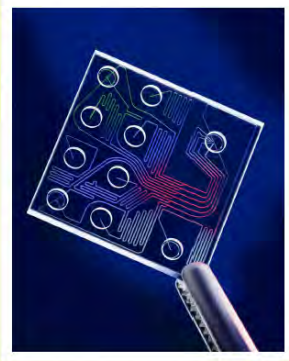
Portable nanofiber filters will purify water. **D**



What if you were an...

NanoDays

Lab on a chip

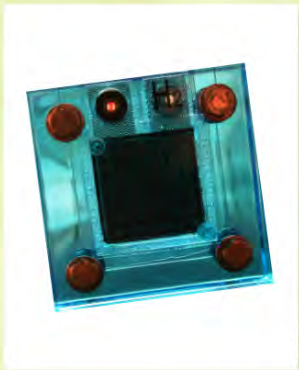


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A

NanoDays

Nanoparticle fuel cells



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B

NanoDays

Invisibility cloak



Nano-sized structures could make objects invisible.

C

NanoDays

Iraqi soldier



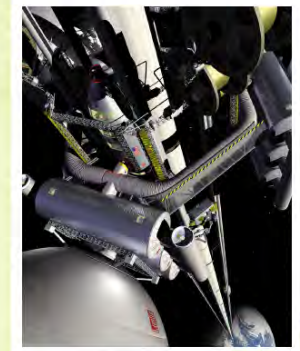
Jassim works as a soldier in the Iraqi military. He patrols the area around his village. Food and drinkable water are in short supply, but local people help him find what he needs. Much of his equipment was originally made for American soldiers and imported to Iraq.

NAME: Jassim
AGE: 22
JOB: Soldier
SALARY: \$5,500/year



NanoDays

Space elevator

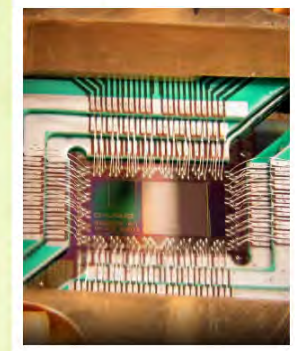


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Quantum computer



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NanoDays

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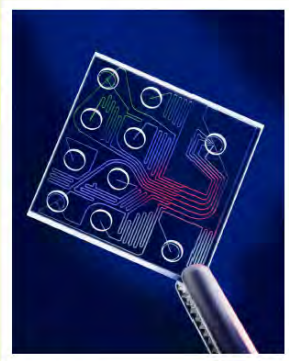


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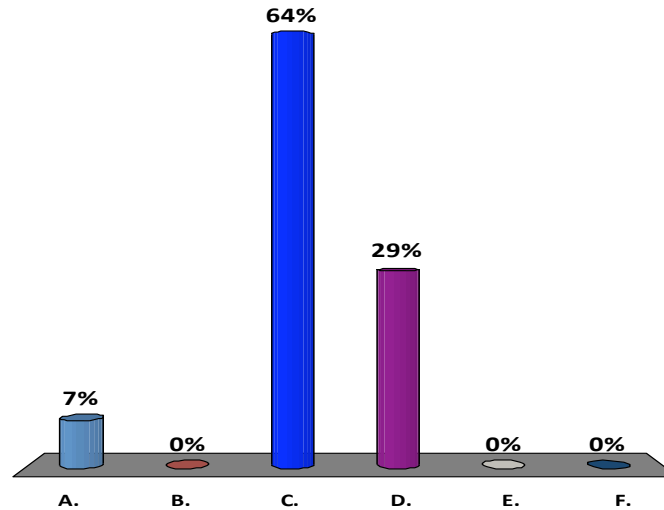


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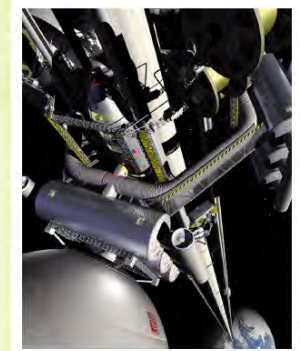


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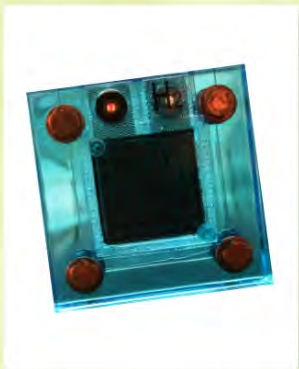


Space elevator



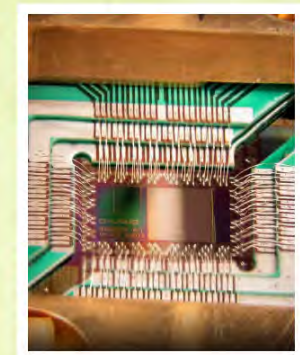
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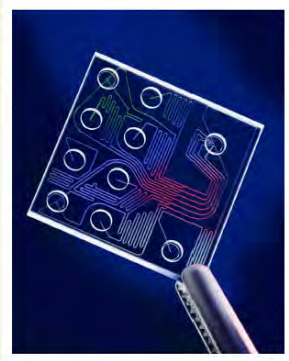
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What if you were a...

NanoDays

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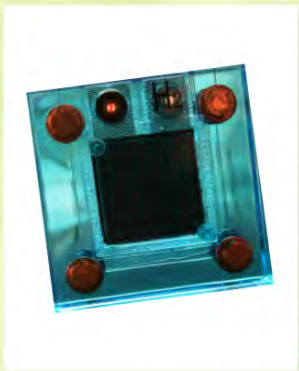


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NanoDays

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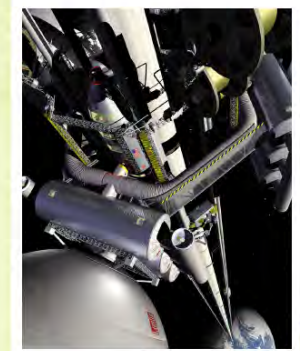


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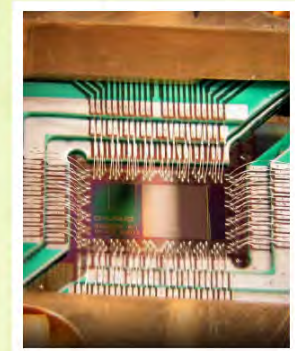


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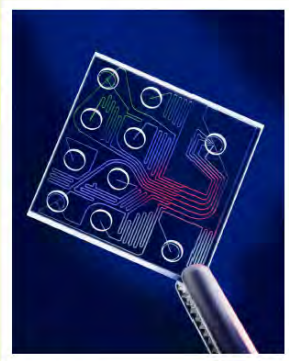


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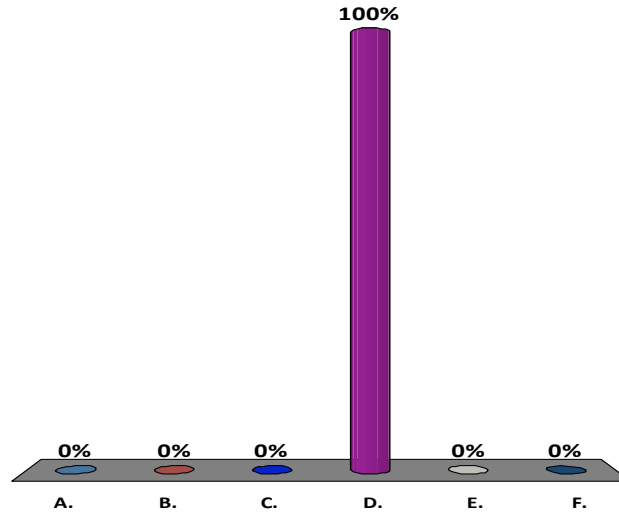


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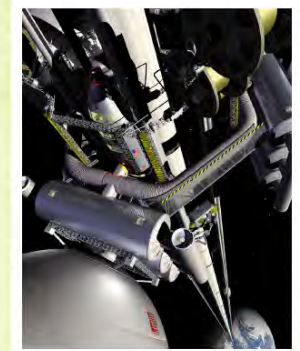


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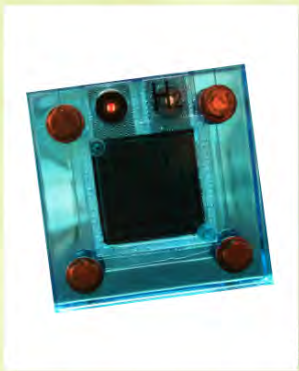


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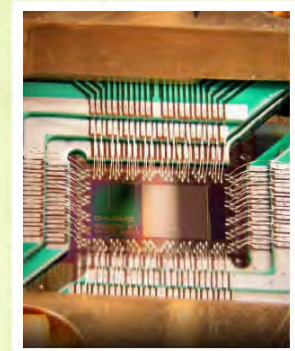
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Reaching Diverse Audiences



Inclusive Audiences

Raising our capacity to effectively engage underserved and underrepresented audiences

Why use an Inclusive Audiences approach?

- Museums are uniquely situated to educate the public, inspire youth, and provide access to learning experiences.
- Inclusive approaches help reach all audiences more effectively.
- It allows us to go beyond education and inspiration to empowerment and social justice.

Inclusive Audiences - Bilingual Audience Workshop



Workshop held in June 2013 in Houston

- Explored importance of engaging bilingual audiences in nanoscale science, engineering and technology
- Strategies to better engage Spanish speakers by building capacity, using techniques like:
 - sheltered instruction
 - team-based inquiry
 - marketing strategies

More info:

nisenet.org/catalog/spanish

nisenet.org/catalog/tools_guides/bilingual_audience_workshop_resources

Inclusive Audiences - Bilingual Audience Workshop



Workshop held in June 2013 in Houston

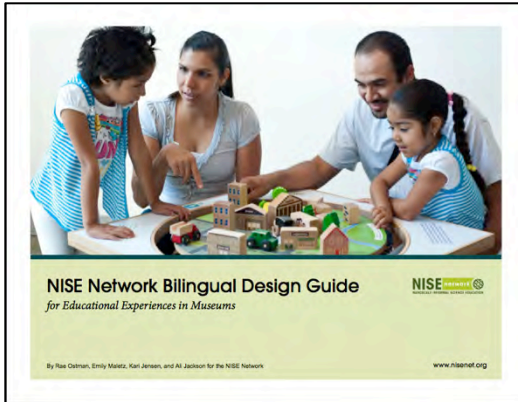
- Zip, Zap, Zop - icebreaker
- Scavenger Hunt – training tool
- Sheltered Instruction
- Evaluation – Team based inquiry
- Action Plan

More info:

nisenet.org/catalog/spanish

nisenet.org/catalog/tools_guides/bilingual_audience_workshop_resources

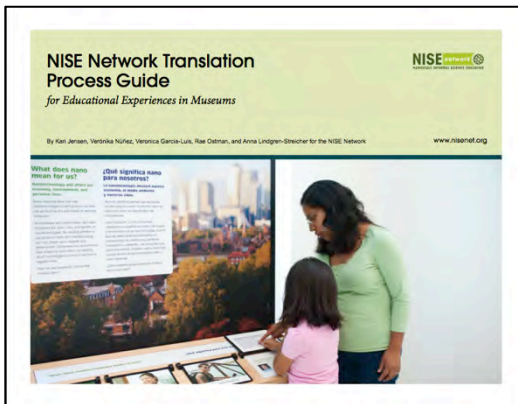
Inclusive Audiences - Bilingual Audience Tools



Bilingual Design Guide



Spanish Language Translations for many educational materials



Translation Process Guide



Bilingual Audience Workshop Resources

More info: nisenet.org/catalog/spanish

nisenet.org/catalog/tools_guides/bilingual_audience_workshop_resources

Inclusive Audiences - Bilingual Audience Tools

Spanish Language Translations

Email Print

Select NISE Network educational products are now available in Spanish!



Based on input from NISE Network partners, we have adapted our most popular programs for Spanish-speaking audiences! Follow the links below to explore Spanish versions of several NISE Network public programs, as well as other selected resources. We have placed the highest priority on translating products that directly serve public audiences. Professional resources, such as instructional materials and educator's guides are only available in English at this time.

Below are a set of products with Spanish translations of public materials

- Click on the **RESOURCE** tab
- Scroll down to the **SPANISH** files

Tools

- [Translation Process Guide](#)
- [Bilingual Design Guide](#)
- [NISE Net Bilingual Audiences Workshop](#)

Website

- Public website [WhatIsNano.org](#)

Videos

- [Intro to Nano Video: "Nanotechnology: What's the Big Deal?"](#)
- [NanoLab Video: "How Small is Nano?"](#)
- [NanoLab Video: "What Happens in a NanoLab?"](#)
- ["Nano and Me" videos: Aluminum, Gold, Gravity, Latex, Pants, and Silver](#)

Programs and Activities

- [Intro to Nano Cart Demo](#)
- [Sizing Things Down](#)

Browse by

Audience

All ages (109)
7 and up (39)
11 and up (38)
15 and up (17)
19 and up (3)
Informal science educators (25)
scientists (14)

Nano topics

Art and nature (71)
Bio and medicine (73)
Energy and environment (50)
Fundamentals (132)
Information Technology (47)
Materials, tools, and applications (148)
Society, policy, and economics (64)

Programs

Classroom activity (2)
Display (2)
Facilitated activity (46)
Game (4)
Museum theater (4)
Stage presentation (16)

Available translations

Spanish (61)



Nano throughout the year!
Browse products by **season**.



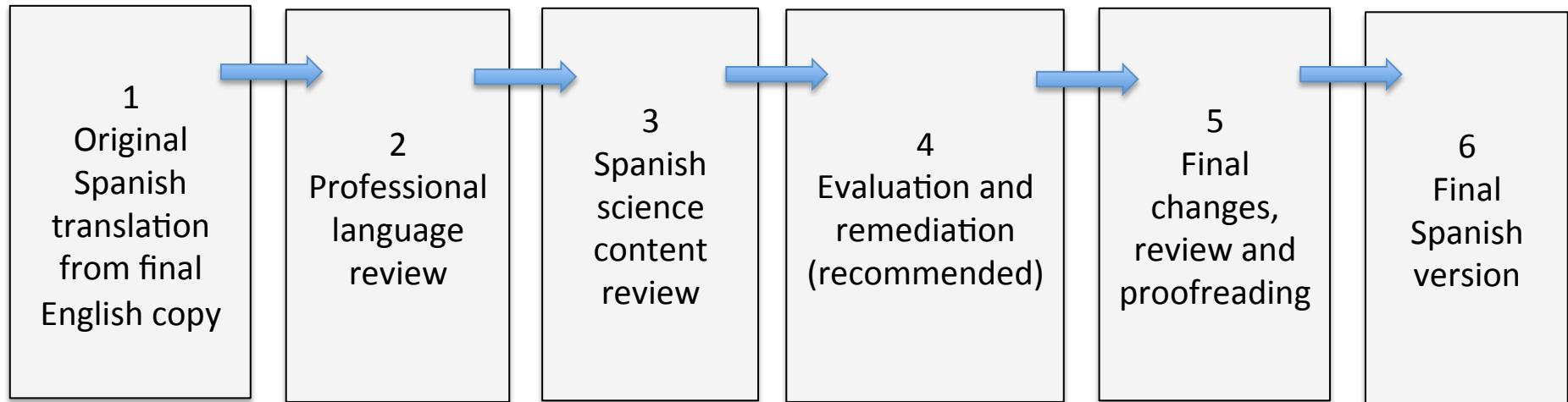
Select NISE Network educational products are now available in Spanish!

Find answers to your questions about the catalog on our [FAQ page](#).

More info: nisenet.org/catalog/spanish

Inclusive Audiences - Bilingual Audience Tools

Translation Process Guide



More info: nisenet.org/catalog/spanish

nisenet.org/catalog/tools_guides/bilingual_audience_workshop_resources

Inclusive Audiences - Bilingual Audience Workshop



Scavenger Hunt

- Image showing multi-ethnic population
- A Spanish only program
- Signage that is language neutral
- Something encouraging visitors to speak English to staff

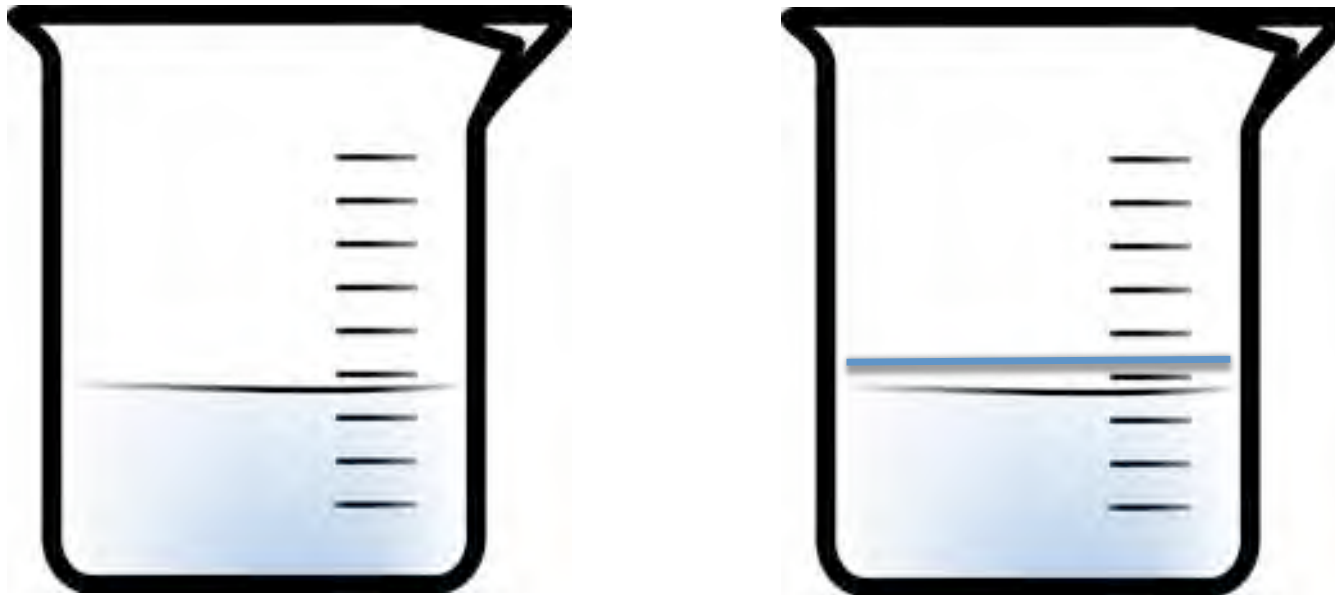
VIETNAMESE MID-AUTUMN FEST

Lion dancers will highlight a full day of colorful activities complete with lanterns, moon cakes, pageants and storytelling on Sept. 21.

[Celebrate Tet Trung Thu](#)

Inclusive Audiences - Bilingual Audience Workshop

Sheltered instruction

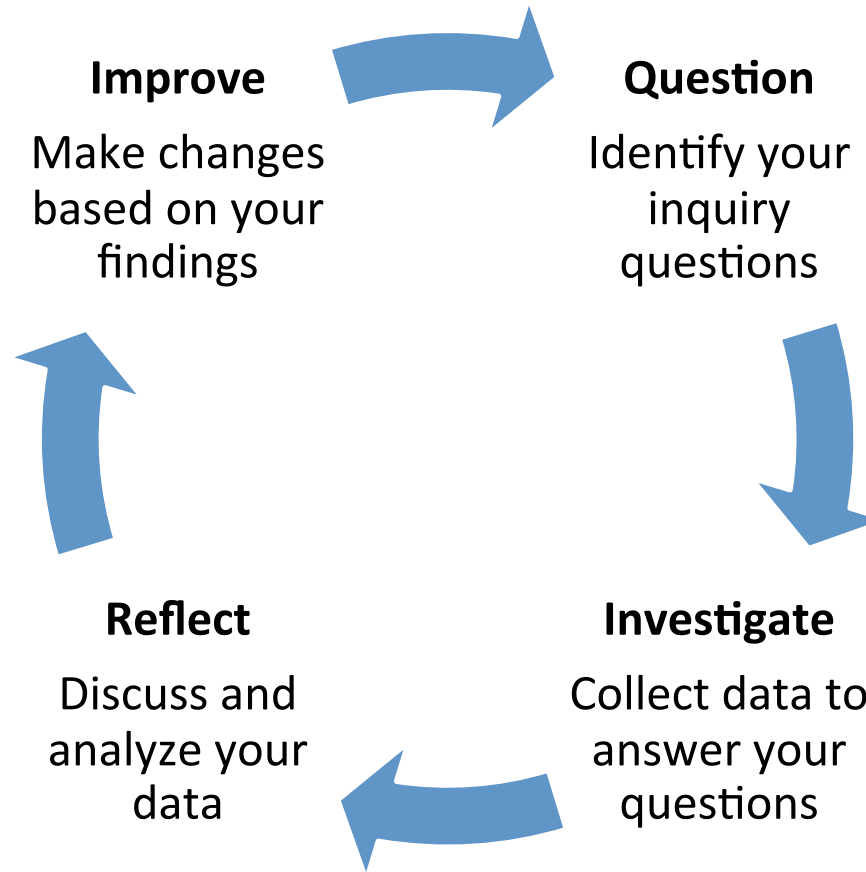


Measure 100 mL of water vs. fill to line

Mide 100 mL de agua vs. completa hasta la linea

Inclusive Audiences - Bilingual Audience Workshop

Team-Based Inquiry



More info: Eval log
nisenet.org/catalog/tools_guides/bilingual_audience_workshop_resources

Inclusive Audiences - Bilingual Audience Workshop

Bilingual Audiences—Activity Facilitation Log

Date: _____ Facilitator initials: _____ Observer initials: _____

Activity:

Facilitation Goal:

- Encourage visitors to engage in activity using Sheltered Instruction strategies.
- Continuously engage both English language and ELL learners in activity at the same time.
- Other:

Strategies to try: *(this might include speaking slowly, simplifying language, using visuals, modeling)*

Group Characteristics

No. of adults: ___ 18-29 ___ 30-50 ___ 51+

No. of children/youth: ___ under 2 ___ 2-5 ___ 6-8 ___ 9-12 ___ 13-17

Group seems to be (circle one): ___ School or tour group ___ Family or friend group

English language: ___ Primary English ___ Secondary English ___ Non-English speakers

1. What happened during the activity? *(description of talk and behaviors that happened, not opinion)*

2. What strategies worked well to accomplish your goals?

3. What strategies didn't work as well to accomplish your goals?

4. List any other reflections *(e.g., additional strategies to try, interesting visitor comments, group specific issues, drawn examples of visual aids) on the back.*

More info: Eval log

nisenet.org/catalog/tools_guides/bilingual_audience_workshop_resources

Inclusive Audiences - Bilingual Audience Workshop

Action Plan

Action	Target Audience (Spanish speaking, bilingual, multilingual, families, school-groups)	Resources	Partnerships	Time frame	Challenges	Feedback
NanoDays	multilingual	NanoDays kits	Esperanza College, Latino Living Center, Library	March 2014	Recruiting volunteers	Community

Inclusive Audiences: Universal Design Workshop



What is Universal Design?

The design of products and environments to be usable **by all people**, to the greatest extent possible, **without the need for adaptation** or specialized design.

More info: nisenet.org/inclusive_audiences

Inclusive Audiences: Universal Design Workshop



July 2013 at Museum of Science, Boston

Audience: Museum Educators

Hands-on opportunity to apply Universal Design guidelines:

- Gathered feedback on NanoDays activities from experts with disabilities
- Used Team-Based Inquiry (TBI) approach
- Identified barriers & modified activities

Inclusive Audiences: Universal Design Tools



Universal Design Guidelines
for programs



Universal Design Workshop Resources



Universal Design Guidelines
for exhibits

More info: nisenet.org/inclusive_audiences

Universal Design Workshop– Share-outs

- Adrienne Kimball
The Franklin Institute
- Julie Bryan
Children's Discovery Museum of West Virginia
- Nora Moynihan and Sarah Zimmerman
Port Discovery
- Regina Hall and Karen Venetian
Cincinnati Museum

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