NISE network™
NANOSCALE INFORMAL SCIENCE EDUCATION

Summative Study of the *Nano* Mini-exhibition

Summative Evaluation – Executive Summary and Appendices A & B

Gina Svarovsky, Juli Goss, Gayra Ostgaard, Nelda Reyes,
Clara Cahill, Ryan Auster, and Marjorie Bequette

May 20, 2013

Acknowledgements

This work would not have been possible without the effort and collaboration of several partners within the NISE Network. The authors wish to thank the staff and visitors from the eight institutions who participated in our study. In particular, we thank the contacts that helped us coordinate data collection at each of our study sites: Jennifer Rei Cameron at the Arizona Science Center, Michel Garcia and Rich Jaworski at Duluth Children's Museum, Nora Moynihan and Sarah Zimmerman at Port Discovery Children's Museum, Gayra Ostgaard at Science Museum of Minnesota, Jacie Hood at Science Spectrum, Ali Jackson at Sciencenter, Nelda Reyes at Oregon Museum of Science and Industry (OMSI), and Juli Goss at Museum of Science.

The authors would also like to thank the members of the NISE Network Evaluation team and the members of our home departments for their insight and support during this study. Specifically, we thank Ryan Auster, Clara Cahill, Juli Goss, Elizabeth Kunz Kollmann, Catherine Lussenhop, Sarah May, and Christine Reich in the Department of Research and Evaluation at the Museum of Science; Marcie Benne, Scott Pattison, Nelda Reyes, Liz Rosino, and Barry Walther in the Department of Evaluation and Visitor Studies at OMSI; and Arden Ashley-Wurtmann, Marjorie Bequette, Lura Harvey, Gretchen Haupt, Gayra Ostgaard, Gina Svarovsky, Zdanna Tranby, and Scott VanCleave from the Department of Evaluation and Research in Learning at the Science Museum of Minnesota.

In addition, the authors wish to thank the members of three other groups – the *Nano* mini-exhibition design team, including Christina Akers, Beth Cox, KC Miller, Ali Jackson, Emily Maletz, Catherine McCarthy and Paul Martin; the Network Leadership, and our Committee of Visitors, including Frances Lawrenz, Bruce Lewenstein, and Saul Rockman – for their input and feedback throughout this work.

This report was based on work supported by the National Science Foundation under Grant No. ESI-0940143. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the author(s) and do not necessarily reflect the views of the Foundation.

Gina Svarovsky
Science Museum of Minnesota
120 W. Kellogg Blvd
St. Paul, MN 55102
gsvarovsky@smm.org
651-265-5963

Table of Contents

Executive Summary

In the spring of 2012, the Nanoscale Informal Science Education Network (NISE Net) Public Impacts evaluation team conducted a summative study of the *Nano* mini-exhibition: a 400-square foot, modular exhibition that will be replicated and installed at over 70 partner institutions. The Network's goals for *Nano* led to the following summative evaluation questions:

1. What is the projected reach of the *Nano* mini-exhibition?
2. Is *Nano* successful in providing visitors with an engaging experience and promoting visitor learning of nano concepts?
3. Is *Nano* successful in these ways for different types of contexts and for different types of audiences, including Hispanic visitors and visitors with disabilities?
4. Does *Nano* catalyze new or expanded public programming around nano at the host institutions?

These questions were answered through a range of methods, including a counting study, visitor observations, surveys, interviews, and questions asked to Network partners who currently had the mini-exhibition on display in January, 2013.

Findings

1. The estimated reach of the Nano mini-exhibition is sizeable and broad.

Conservatively speaking, an estimated 7.1 million people will come into contact with the mini-exhibition annually, assuming that a) all available copies are out on the floor, and b) all copies are displayed for an entire year, as required by the contract that all recipients sign.

2. *Nano* is successful in providing visitors with an engaging experience and in promoting visitor learning of nano concepts.

Visitor data across all study sites demonstrates that the mini-exhibition was successful across all of the indicators defined by the *Nano* design team, including sustained use, interest and enjoyment, social interaction, broad age range, further exploration, and learning about nano content.

3. *Nano* is successful within different types of institutions.

Examining the data by institution type reveals that *Nano* was successful in engaging visitors and promoting learning of nano concepts both in the science center context as well as the children's museum context.

4. *Nano* shows promise for being successful for Hispanic visitors and visitors with disabilities.

Small exploratory studies conducted at four institutions provide insight into the experiences of visitors from these audience groups within their local contexts. While broad generalizations should not be made from this data, *Nano* did appear to be successful with the specific visitors who participated in these studies.

5. Network partners say *Nano* is catalyzing new and enhanced programming.

The vast majority of partners who responded reported implementing new or expanded programming as a result of the mini-exhibition.

Appendix A:
Description of Methods and Supplemental Findings

As described in the Summary of Findings, the Nanoscale Informal Science Education Network (NISE Net) Public Impacts Evaluation group embarked on a three-year study in March, 2012, to explore the public impacts of the most resource-intensive educational products developed by the Network. During the first year of the study, the Public Impacts Evaluation focused on conducting a summative evaluation of the *Nano* mini-exhibition. This appendix will provide a more complete description of our study methods as well as supplemental findings that support and expand on those presented in the Summary of Findings.

Description of the *Nano* mini-exhibition

Nano is an interactive mini-exhibition that engages family audiences in nanoscale science, engineering, and technology. Hands-on exhibits present the basics of nanoscience and engineering, introduce some real world applications, and explore the societal and ethical implications of this new technology.

The mini-exhibition was originally designed to have footprint of 400 square feet. There are seven main components, including four panels (*What Happens When Things Get Smaller?, Where Can You Find Nano? I Spy Nano, What's New About Nano?* and *What Does Nano Mean for Us*), the *Balance Our Nano Future* tippy table, the *Small, Smaller, Nano* ferrofluid interactive display, and *Build a Giant Carbon Nanotube*. The mini-exhibition also contains a *Static Beads* component and a seating area with a variety of nano-themed books and reading boards. At the time this report is being written, over seventy identical copies of *Nano* will be produced and distributed to Network partners; as of January, 2013, 43 copies have been shipped. For a more detailed description of the mini-exhibition, please see http://www.nisenet.org/catalog/exhibits/nano_mini-exhibition.

The Network established three broad public-focused goals for the mini-exhibition:

1. *Nano* will reach tens of millions of visitors during the life of exhibition copies.

2. *Nano* will create an environment that encourages engagement and learning for a broad public audience.

3. *Nano* will complement other nano learning experiences, including NanoDays.

The Network also identified a set of goals focused on professionals at partner institutions; however, examining those goals was beyond the scope of this public impacts study.

Summative Evaluation Questions

By committing to the small footprint design and national distribution plans of *Nano*, the NISE Network took several risks. First, in order to achieve the desired reach numbers for the mini-exhibition, it had to be something that Network partners wanted to put out and

keep on public display. Second, the mini-exhibition needed to be successful in a wide range of institutions that each drew an even wider range of visitors. Lastly, the mini-exhibition needed to effectively and efficiently communicate key messages about nano to visitors within a compact space. Together, the goals and risks of *Nano* led to the articulation of the following evaluation questions for the summative study:

1. What is the projected reach of the *Nano* mini-exhibition?

2. Is *Nano* successful in providing visitors with an engaging experience and promoting visitor learning of nano concepts?

3. Is *Nano* successful in these ways for different types of contexts and for different types of audiences, including Hispanic visitors and visitors with disabilities?

4. Does *Nano* catalyze new or expanded public programming around nano at the host institutions?

Methods

In order to study the mini-exhibition from a summative perspective, the Network Leadership strategically placed a set of six *Nano* copies within a range of institutions that varied in size, geographic region, visitor demographics, and institution type (science museum or children's museum). All of the initial host institutions were active and engaged NISE Net partners: Arizona Science Center in Phoenix, AZ, Duluth Children's Museum in Duluth, MN, Port Discovery Children's Museum in Baltimore, MD, Sciencenter in Ithaca, NY, Science Museum of Minnesota in St. Paul, MN, and Science Spectrum in Lubbock, TX.

As the work of the study unfolded, two additional partner institutions, the Oregon Museum of Science and Industry (OMSI) in Portland, OR and the Museum of Science in Boston, MA, were added as data collection sites for further exploration of specific audiences. All eight study contexts are described in more detail below.

The study used an array of methods – including a counting study, visitor observations, surveys, and interviews, and NISE Net partner responses on a reporting form focused on the mini-exhibition – to answer the four summative evaluation questions.

Counting Study

The first evaluation question in our study was answered through a counting study conducted at seven of the host sites described below.

Data Collection

For this counting study, the number of adult and child visitors over the age of three present within the mini-exhibition over the course of a half-hour time period was recorded at different times during the week and weekend for each institution. Since both the type and quantity of visitors at museums may vary based on the day of the week and time of day, the number of visitors exposed to the exhibition was counted four different

times and days during the week, and four different times and days during weekends. Daily attendance and hours of operation were also collected from each site on each day that the counting study was done, as well as total annual attendance for the full prior fiscal year.

Visitors were counted if they were in the gallery or entered the gallery during the ½ hour data collection, and engaged with an exhibit in the mini-exhibition by touching it or paying attention to it for at least five seconds. Children were counted separately from adults, and included all participants between the ages of approximately three years to 18 years. Adults were counted to include every participant approximately 18 years or older.

Calculation of Projections

To calculate the estimated total number of visitors exposed to the *Nano* Mini-Exhibition, the number of adult and child visitors were totaled for each data collection session. Using daily attendance and hours of operation, an average actual number of visitors per half hour was calculated for each day at each site. The number of visitors counted at the mini-exhibition for a half-hour data collection session was divided by the average total museum attendance per half-hour per site, giving an approximate percent of museum attendees observed in the mini-exhibition. These calculations assumed that attendance was evenly spread out throughout the course of the day.

Since attendance often varies greatly depending on the time of day and time of the week, the average percent of museum attendees exposed to the Mini-exhibition was calculated by the average morning and afternoon weekday and weekend audiences. From this percentage and the total annual museum attendance, an estimate of the total number of visitors who may attend the exhibit over the course of a year at each study site was calculated.

To provide an example, we walk through the projection calculations from the Arizona Science Center.

Tallies of visitor contact with the mini-exhibition over a half-hour period were taken in the mornings and afternoons of both weekday days and weekend days, as seen in Table 1.

Table 1. Counting Tallies

(A)	(B)	(C)	(D)	(E)
Day of week	**Morning or Afternoon**	**Number of adults**	**Number of children**	**Total people in contact with *Nano* per 1/2 hour**
Sat	Afternoon	10	18	**28**
Sun	Afternoon	14	18	**32**
Thurs	Afternoon	8	6	**14**
Sat	Morning	17	23	**40**
Sun	Morning	2	3	**5**
Tues	Afternoon	4	2	**6**
Wed	Morning	3	22	**25**
Thurs	Morning	10	49	**59**

Next, information about the total hours of operation for a given day and the total museum attendance per day allowed for the estimated number of people in the museum for every half-hour it was open, as seen in Table 2.

Table 2. Estimation of Museum Attendance per Half Hour of Operation

(F)	(G)	(H)	(I)	(J)	(K)	(L)
Day of week	**Morning or Afternoon**	**Total data collection time (in hours)**	**Hours of operation**	**Percent of total hours of operation**	**Total museum attendance for the day (if available)**	**Estimated museum attendance per ½ hour**
Sat	Afternoon	0.5	7	7%	1209	**85**
Sun	Afternoon	0.5	7	7%	656	**46**
Thurs	Afternoon	0.5	7	7%	317	**22**
Sat	Morning	0.5	7	7%	1124	**79**
Sun	Morning	0.5	7	7%	950	**67**
Tues	Afternoon	0.5	7	7%	455	**32**
Wed	Morning	0.5	7	7%	209	**15**
Thurs	Morning	0.5	7	7%	728	**51**

Averages were then calculated for the estimated percentage of people who came into contact with *Nano* during a weekday day and during a weekend day, bolded and found in Columns O and R in Table 3 below. These numbers were calculated using the half-hour tallies in Table 1 and half-hour attendance estimates found in Table 2.

Table 3. Average Estimated Percentage of People in Contact with Nano During Weekday Days and Weekend Days

(M)	(N)	(O)	(P)	(Q)	(R)
Average number of visitors who see *Nano* per weekday 1/2 hour	**Average estimated weekday attendance per 1/2 open**	**Average % of visitors who see *Nano* on weekdays**	**Average number of visitors who see *Nano* per weekend 1/2 hour**	**Average estimated weekend attendance per 1/2 hour open**	**Average % of visitors who see *Nano* on weekends**
26	30.52	**85.20%**	26.25	70.34	**37.32%**

Finally, an average of the weekday and weekend percentages yielded an overall estimated percentage of people who came into contact with *Nano* during any given day, as seen in Column S, Table 4 below. When this percentage is combined with the documented yearly attendance of the institution, the final projection for the number of visitors coming into contact with *Nano* for a given year is calculated, as seen in Column U, Table 4.

Table 4. Final Attendance Projections for Arizona Science Center

(S)	(T)	(U)
Average % of visitors who see *Nano* per year	**Documented yearly attendance**	**Projected number of visitors to encounter *Nano* in one year at site**
61.26%	181,755	**111,339**

These calculations were carried out for each of the seven institutions included in the counting study, as seen in Table 5, which led to the projection that over 1.1 million visitors will see *Nano* across these organizations, as seen in Table 6.

Table 5. Average Percentage of Visitors Seeing Nano at Seven Host Institutions During Weekday Days and Weekend Days

Institution	Average number of visitors who see *Nano* per weekday 1/2 hour	Average estimated weekday attendance per 1/2 open	Average % of visitors who see *Nano* on weekdays	Average number of visitors who see *Nano* per weekend 1/2 hour	Average estimated weekend attendance per 1/2 hour open	Average % of visitors who see *Nano* on weekends
Arizona Science Center	26	30.52	**85.20%**	26.25	70.34	**37.32%**
Duluth Children's Museum	14	5	**over 100%**	11.83	5	**over 100%***
Oregon Museum of Science and Industry	34.4	74.29	**46.30%**	51	107.74	**47.34%**
Port Discovery Children's Museum	11.25	38.32	**29.36%**	38.75	81.93	**47.30%**
Science Museum of Minnesota	55	96.17	**57.19%**	53.5	101.77	**52.57%**
Science Spectrum	11.75	24.77	**47.44%**	17	24.27	**70.05%**
Sciencenter	19.25	13.3	**over 100%**	39	40.77	**95.66%**

In two smaller institutions, Duluth Children's Museum and Sciencenter, nearly all visitors within the half hour observation period came into contact with the mini-exhibition. These tallies produced estimates over 100% for the percentage of visitors who saw the mini-exhibition for a given half hour, thus reinforcing the anecdotal data provided by data collectors that the exhibit was seen by all or nearly all visitors within these small museums.

Table 6. Yearly Projections for Visitor Contact with Nano at Each Site

Institution	Average % of visitors who see *Nano* per year	Documented yearly attendance	Projected number of visitors to encounter *Nano* in one year at site
Arizona Science Center	61.26%	181755	**111,339**
Duluth	Capped at 100%	no annual attendance figures available	**---**
Oregon Museum of Science and Industry	46.82%	761500	**356,537**
Port Discovery Children's Museum	38.33%	261822	**100,349**
Science Museum of Minnesota	54.88%	796,051	**436,873**
Science Spectrum	58.75%	140252	**82,395**
Sciencenter	97.83%	97486	**95,368**
GRAND TOTAL PROJECTED ACROSS ALL SEVEN SITES			**1,182,861**

This projection is conservative across seven sites because an estimate for Duluth Children's Museum was not included. The organization had just moved into a new facility a few months before we conducted the counting study, and therefore they did not yet have any annual attendance data.

Finally, annual attendance data from the mini-exhibition applications of 67 NISE Net partners (all approved to receive a mini-exhibition copy at the time this report was written in March, 2013) were used to make a Network-wide projection for the number of visitors across the nation that would come in contact with *Nano*. Using the most conservative percentage number from Table 6 (38%) and multiplying it by the average annual attendance reported by the 67 partners (222,225 visitors per year), we were able to determine the average number of visitors coming into contact with *Nano* per copy placed in a partner institution: 84,456.

Multiplying that number by 70 copies yields a projection of 7,094,836 visitors viewing *Nano* over one year across the Network, assuming all copies are displayed for one full year (which partners are contractually bound to do). Considering the Network has already committed to at least five additional copies, for a total of 75, at the time of this report, that suggests that **over 7.1 million people** will come into contact with *Nano* in a given year.

Core Study of Visitor Experiences and Learning

In order to answer evaluation questions 2 and 3, visitor observations, surveys, and interviews were conducted. These data made up the section of the summative study that is called the *Core Study of Visitor Experiences and Learning*, which includes 455 data

points across all eight study contexts described below.

As mentioned earlier, the *Nano* mini-exhibition was designed to be engaging for both individuals and groups, providing a welcoming space that allowed for multiple types of interaction as well as learning about nano content. Through the design, development, and formative evaluation processes (Bequette & Van Cleave, 2011), the *Nano* design team articulated and refined a set of success indicators (NISE Network, 2012) for visitor experiences, which is described in Table 7 below.

Table 7. Indicators of Success for the Nano Mini-exhibition

Indicator	Definition	Evidence
Sustained Use	Visitors stay in the exhibition a long time; some will make repeat visits.	Observed visitor dwell times. (Repeat visitation is not a focus of the current study.)
Interest and Enjoyment	Visitors find the exhibition fun and interesting.	Visitor responses to relevant questions.
Social Interaction	Visitors work together and talk about their experience.	Observed group use of components.
Broad Age Range	All ages are present and use the exhibition; different ages tend to use different parts.	Observed ages of visitors.
Further Exploration	Some visitors use materials such as panels, flips, and reading boards.	Observed visitor use of these elements.
Learning About Nano Content	Visitors take away key messages from the four areas of the NISE Network content map.	Visitor responses to relevant questions.

These indicators also informed the design of our observation, survey, and interview instruments, which can be seen in Appendix B.

Observations

Unobtrusive and uncued observation data were collected to capture group level data before talking with a target visitor (the first adult in a group to enter into the exhibition) via the survey and interview. Groups who entered the exhibition area were randomly sampled following the standard of observing and approaching every third group that entered the exhibition area. To make sure we could talk with our target person (the first adult in a group to enter into the exhibition) we focused mainly on "adult and children" and "adult only" groups.

To determine how groups utilized the exhibition components and interacted with each other, we first determined our definition of a "group" as four consecutive people who entered the exhibition within 30 seconds of each other and appeared to be visiting the museum together. We also worked with the *Nano* design team to identify key pieces of information we wanted to learn from the observation data, such as who out of the group utilized which components, interactions with each other at components, if anyone in the group utilized the sofa and chair provided as components within the mini-exhibition, and how long the group spent in the exhibition. These conversations led to the development of our observation form, which can be seen in Appendix B.

Visitors who interacted with components were identified on our map simply as an "adult,"

or a "child." When a visitor engaged with an exhibition alone it was coded as "individual" and when visitors engaged with an exhibition together it was coded as "group." Interaction at an exhibition was coded as more than one of the above, but once it was coded as one of the above it was not double coded. We were interested in use of the sofa and chair, but again not at a micro level. To accommodate this, we recorded a person's gender and if he or she was an adult or a child along with a time of how long the individual sat on the sofa or chair. In addition, time in the exhibition was recorded at the group level with the time the first person entered marked as the beginning time and the time the last person left marked as the end time.

Observation data was entered using a Survey Gizmo survey and the resulting data file was cleaned by one of the lead data collectors. Mean and median dwell times were calculated using observation data, and a Sweep Rate Index (Serrell, 1998; Yalowitz & Bronnenkant, 2009) was also calculated as one point of comparison to the broader informal science education field. It should be noted that we opted to use the median value in our sweep rate index calculation as opposed to the standard mean value in order to minimize the effect of outliers, particularly on the upper end of the dwell time range – thus leading to a more conservative estimate.

Surveys and Interviews

Once the last person in the group had left the exhibition area, the target adult was approached to complete a survey and interview about his or her individual experience. A subset of visitors, including all of those surveyed at children's museums, were also asked about their perceptions of the experiences of children in their group. Once again, survey and interview instruments can be seen in Appendix B.

Survey data were analyzed for frequencies and patterns. Confidence scores were calculated for the retrospective-pre and post questions on the survey and then compared with a non-parametric Wilcoxon Ranked Sign Test. Interview data were coded for emergent themes as well as for areas of the NISE Net content map as appropriate.

Reports from 2013 Mini-exhibition Host Sites

Lastly, the fourth evaluation question was answered through the *Nano* mini-exhibition reporting survey sent to 41 Network partners hosting mini-exhibition copies as of January, 2013.

Small Exploratory Studies

In addition to the core study, two small exploratory studies were conducted with visitors from traditionally underrepresented audiences. Hispanic audiences were observed, surveyed, and interviewed at two sites. Observations of visitors with disabilities were conducted at two sites. In addition, family groups of mixed abilities were surveyed and interviewed at one of those sites. While the sample sizes for these small studies do not allow for generalizations to be made, they do begin to provide some insight into how *Nano* is or is not successful for these audiences.

Study Contexts

The summative study of *Nano* required data collection at eight different sites which are described in this section.

Arizona Science Center; Phoenix, AZ
Data from the Arizona Science Center contributed to the counting study portion of the summative evaluation.

Nano is located on the first floor in the lobby of the Arizona Science Center just near the entrance. Visitors walk down the ramp into the building and the exhibit is clearly visible as they turn the corner, even before they reach the admissions and membership counters. Technically, anyone can visit *Nano* for free because of its location. Featured next to *Nano* is ASU's *Lunar Reconnaissance Orbiter Camera* exhibit. The lobby is a vast open area and a fairly high traffic zone, especially on the weekends and when school groups head to lunch in the lunch room located immediately behind the exhibition. *Nano* is located between the gift shop and café, both of which are also considered to be high traffic areas.

Duluth Children's Museum; Duluth, MN
Data from the Duluth Children's Museum contributed to the counting study and core study portions of the summative evaluation.

Data was collected in two rounds at the Duluth Children's Museum. The first round of data was collected during a normal weekend at the museum. The second round of data was collected during the museum's annual Bubble Festival. An estimated 2,800 people attended based on the number of t-shirts given away, food and gift store sales, and the estimated numbers of people who attended performances and events such as skating, a puppet show, and rock climbing.

The Duluth Children's Museum (DCM) just moved to a new location one month prior to the NISE Net data collection. At their new location, the museum has two floors. On the first floor is the gift shop, the party room, and an exhibition space consisting of the NISE exhibition, an exhibition on aging and memory produced by Oregon Museum of Science and Industry, a butterfly room where projected butterflies will land on your shadow, a room where you can draw on the wall, and an area where you can dig up dinosaur "fossils." The second floor is more of a "play area" with a couple of houses for kids to play in, an art area, and Legos. The second floor also has an exhibition geared towards children that teaches about the stock market. The mini-exhibition is located directly in front of the entrance the exhibition space and if visitors walk straight into the room they walk into *Nano*. In addition to the mini-exhibition components, the Duluth Children's Museum put up the "How tall are you ruler" from the NanoDays kit and has lab coats for kids to wear while they play with the exhibition. They also have programming around the mini-exhibition, and there is a staff person who demonstrates how components work and who talks about nano with groups when he has time.

The mini-exhibition installation at Duluth Children's Museum contains all nine components of *Nano* and takes up about 600 square feet of the museum space on the first floor.

Museum of Science; Boston, MA
Data from the Museum of Science contributed to the small exploratory study of visitors with disabilities portion of the summative evaluation.

The Museum of Science (MOS) building has two wings, with its main exhibit hall in the Blue Wing. The Blue Wing has three stories and an open design such that visitors can see the other two floors from the floor they are on. The escalators for travelling between levels are in the middle of the floor. The NISE Net mini-exhibition is on the bottom floor of the Blue Wing in what was previously an open area, colloquially called "The Well." The four panels and the chair are positioned up against the escalator, with the couch sitting next to the chair at an angle, forming a partial border for the exhibition. The rest of the components are positioned a few feet away from the panels or the couches, and there is no boundary on the other side. The mini-exhibition is abutted by another exhibition about nanotechnology with only a couple of feet of space in between. Other exhibitions nearby are related to energy conservation, including "Energized!" and "Catching the Wind." The energy exhibitions are separated from *Nano* by a larger amount of space.

Oregon Museum of Science and Industry (OMSI); Portland, OR
Data from OMSI contributed to the counting study, core study, and small exploratory study of Hispanic visitors.

The mini-exhibition at OMSI is installed in the Turbine Hall exhibit floor on the main level, 1 out of 2, of the building. This floor contains an Earthquake House, a lunch room for visitors, a group of engineering exhibits, the Physics Chemistry and the Vernier Technology Lab, Autovation exhibition, the Inventor's Ball Room, along with a spinning wheel table, probability ball drop exhibit, computer hardware exhibits, and robotic exhibits.

The mini-exhibition installation at OMSI contains all the nine components developed by NISE Net and a seating area including all books and materials for the seating area. The mini-exhibition occupies approximately 415 square feet and it is located in an alcove on the river side of the building right in front of the elevator located in the northwest part of the hall. The mini-exhibition is shaped in a rectangular form with the reading rail panels facing the river view wall and the rest of the components distributed throughout the rest of the alcove space. Staff are not stationed at the mini-exhibition specifically, and there were no floor staff re-setting or cleaning exhibit components while data collection was conducted.

Port Discovery Children's Museum; Baltimore, MD
Data from Port Discovery contributed to the counting study, core study, and small exploratory study of visitors with disabilities portions of the summative evaluation.

Port Discovery Children's Museum has three floors. The mini-exhibition at Port Discovery is located on the first floor and is set in it's own gallery space separated from the rest of the museum (See Figure 1). The *Where Can You Find Nano? I Spy Nano* panel is set outside two open doors to the gallery. Having this piece outside of the gallery is meant to act as a marker indicating that there is more about nanotechnology within the gallery.

The mini-exhibition installation at Port Discovery contained only the nine components developed by NISE Net and a seating area. In addition, Port Discovery has *NanoFabulous* in the same space . *NanoFabulous* was designed to complement the mini-exhibition and was produced by the Materials and Research Science and Engineering Center (MRSEC) at the University of Maryland with support from NSF and the University

of Maryland Departments of Physics and Chemistry. They also have several Port Discovery specific components including posters and a picnic table with toys for visitors to measure as well as the *How Tall Are You Ruler* which is provided in the NanoDays kit. There is a staff person located at the entrance to the mini-exhibition almost all the time.

Science Museum of Minnesota; St. Paul, MN
Data from the Science Museum of Minnesota contributed to the counting study and core study portions of the summative evaluation.

The mini-exhibition at the Science Museum of Minnesota (SMM) is installed in the Atrium on level 3 of 5, which is the bottom floor of the exhibit hall. This floor contains the Experiment Gallery, Math Moves, Dinosaurs and Fossils Gallery, Future Earth, Science Live Theater, several freestanding exhibit components, and the "Chomp" eating area. The reading rail panels and the staircase create the perimeter, but there are no clear boundaries setting the exhibit apart from the surrounding area. Nearby exhibits include the Wave Tank, Gear Rations, and the Chain Lariat.

The mini-exhibition installation at SMM contained only the nine components developed by NISE Net and a seating area. The mini-exhibition is located directly next to the bottom of the stairs and fills roughly 710.5 square feet in a half-oval shape.

Staff are not stationed at the mini-exhibition specifically, however gallery attendants on the floor regularly visited the area to assist visitors, clean the space, and reset exhibit components.

Science Spectrum; Lubbock, TX
Data from Science Spectrum contributed to the counting study, core study, and small exploratory study of Hispanic visitors portions of the summative evaluation.

The NISE Net mini-exhibition at Science Spectrum in Lubbock is installed on the exhibit floor on the lower level, 1 out of 3 of the building. This floor contains a series of exhibits related to human health and biology, dinosaur models, a rock climbing wall and a major exhibit Texas Alive: The Brazos River Journey. There is also a computer lab, a classroom, a tinkering counter, and the birthday party room. The mini-exhibition is located in the corner occupied by the birthday party room and classroom. The reading rail panels and the natural corner of the room limit the perimeter of the exhibit.

The mini-exhibition installation at Science Spectrum contains all the nine components developed by NISE Net and a seating area. The reading area does not have the books and the laminated materials are incomplete. It fills out approximately 500 square feet in a square shape.

Staff are not stationed at the mini-exhibition specifically, however floor educators leading birthday party activities often re-set exhibit components, mainly the *Build a Giant Carbon Nanotube*.

Sciencenter; Ithaca, NY
Data from Sciencenter contributed to the counting study portion of the summative evaluation.

The *Nano* exhibition is in an upstairs galley and connects the front staircase with the rest of the upstairs galleries, so it gets used a bit as a hallway. This area is considered to be a high traffic zone at the institution.

General Audience Sample

The General Audience sample for this study included all possible visitor data sets across each of the data collection sites. The total number of observations collected (n=427) was greater than the total number of complete observation-survey-interview sets (n=320). Please see Table 22 for a summary of the data collection and analysis groupings across the different data sites.

Demographic data is presented in Tables 8-21 and includes visitor Gender, Age, Race, Ethnicity, Cultural Background, Languages Spoken at Home, If the Household is MultiLingual, Education, Income, Disability, Type of Disability, Use of Science in Daily Work, Previous Visits to the Museum, Interest in Science, and Previous Exposure to Nano.

Tables 8. Gender (n=323)

Male	Female
38.4%	61.6%

Tables 9. Age (n=318)

Under 21	21-29	30-39	40-49	50-59	60+
3.8%	17.0%	40.9%	21.7%	7.2%	9.4%

Tables 10. Race (n=300)

African-American	White	American Indian or Alaskan Native	Native Hawaiian or Other Pacific Islander	Asian	Not Sure	Two or More
3.7%	85%	2.0%	0.3%	5.7%	2.0%	4.0%

Tables 11. Ethnicity (n=290)

Hispanic/Latino	Not Hispanic/Latino	Not Sure	Other
19.7%	65.5%	0.7%	14.1%

Tables 12. Cultural Background of Hispanic/Latino Visitors (n=58)

Mexican	Puerto Rican	Salvadoran	Guatemalan	Ecuadorian	Peruvian	Other
86.2%	8.6%	3.4%	1.7%	1.7%	3.4%	3.4%

Tables 13. Languages Spoken at Home (n=340)

English	Spanish	Other
87.1%	9.7%	3.2%

"Other" languages included Cantonese, Chinese, Hmong, Japanese, Korean, Maya, and Vietnamese.

Tables 14. Is Household Multi-Lingual (n=329)

Yes	No
6.1%	93.9%

Tables 15. Education Level (n=317)

Less than high school	Completed high school	Some college or technical ed.	College degree	Post- graduate degree
5.7%	8.8%	20.8%	40.4%	24.3%

Tables 16. Income (n=286)

Under $20,000	$20,000-$39,999	$40,000-$59,999	$60,000-$79,999	$80,000-$99,999	$100,000-$149,999	$150,000+
8.7%	16.4%	17.1%	15.6%	12.2%	21.0%	8.7%

Tables 17. Disability (n=322)

Yes	No
8.7%	91.3%

Tables 18. Type of Disability (n=24)

Mobility	Visual	Auditory	Learning	Cognitive	Other
50.0%	17.4%	17.4%	26.1%	25.0%	16.7%

"Other" disabilities included autism, autism and anxiety, neurological

Tables 19. "Do You Use Science in Your Daily Work?" (n= 317)

Yes	No
45.4%	54.6%

Tables 20. Visits to the Museum in the Last Two Years (n= 325)

None	1-2 times	3-4 times	5 or more times
41.8%	27.1%	15.7%	15.4%

Table 21. St. Paul, Scale Questions Regarding Interest in Science and Previous Exposure to Nanoscience

	N	Mean	*SD*
Interest in Science (on a scale of 0-10)	319	7.57	1.9
Previous Exposure to Nanoscience (on a scale of 1-4)	329	2.99	.848

Table 22. Data Collection and Analysis Summary

Location	Counting study site?	N, Complete sets (Obs, S, I)	N, Obs only	General Audience Analysis		Science Center (inst. type) Analysis		Children's Museum (inst. type) Analysis		Hispanic Visitors Analysis		Visitors with Disabilities Analysis		Institution Totals
				S,I	Obs	S,I	Obs	S,I	Obs	S,I	Obs	S,I	Obs	
Science Museum of Minnesota	Yes	100		X	X	X	X							***158***
			58		X		X							
Duluth Children's Museum	Yes[A]	103		X	X			X	X					***108***
			5		X				X					
Port Discovery	Yes	32		X	X			X	X					***59***
			2		X				X					
			25[B]										X	
Science Spectrum	Yes	14		X	X									***51***
			16[D]		X									
		21[C]		X	X					X	X			
OMSI	Yes	22		X	X	X	X							***67***
			17[D]		X		X							
		28[C]		X	X	X	X			X	X			
Sciencenter	Yes	N/A	N/A											***N/A***
Arizona Science Center	Yes	N/A	N/A											***N/A***
Museum of Science	No	12[B,E]		X (7)								X	X (7)	***12***
Group Totals		***332***	***123***	*320*	*418*	*150*	*209*	*135*	*142*	*49*	*49*	*12*	*32*	***455***

A = Site was not included in annual projections because annual attendance for the site was not available.
B = Visitors with Disabilities.
C = Hispanic Visitor Groups.
D = Language preference undetermined.
E = Recruited groups; some groups had more than one survey and interview set associated with it.

Supplemental Findings

The data reported in the Summary of Findings was based on the full analysis performed on the data collected during the study. Below, we provide the additional tables and information that could not be included in the Summary of Findings but still contributed in some way to the document. The format of this section will echo that of the Summary and be divided by the indicators of success listed above in Table 7 and outlined by the *Nano* design team. It should be noted that for the ***Social Interaction, Broad Age Range***, and ***Further Exploration*** indicators, all relevant data was reported in the Summary of Findings.

Sustained Use

Table 23. Mini-exhibition Use (n=418)

Indicator	Time
Mean Dwell Time	6:07 (min, sec)
Median Dwell Time	4:00
Sweep Rate Index	100, assuming 400 sq. ft.

Once again, we are using the median dwell time in the Sweep Rate Index calculation, in order to provide a more conservative estimate of this ratio.

Interest and Enjoyment

Table 24. Interest and Enjoyment Reported by Visitors (n=320)

Interest and Enjoyment	Percent of Visitors or Responses
Top two levels of interest	95%
Top two levels of enjoyment	96%
Top two levels of interest for child	79%
Top two levels of enjoyment for child	87%
As or more interesting than other exhibits	71%
Percent of positive adjectives chosen to describe experience	96%, with 1,210 total adjectives chosen

In addition, 29% of visitors across all five sites (total n=318) reported finding something about the mini-exhibition challenging. When those visitors were asked to elaborate on what was challenging, 31% of those respondents said the content was confusing or challenging, as seen in Table 25.

Table 25. Reasons Nano was Challenging for Visitors (n=97*)

Reasons it was Challenging	Percent of Responses
Confusing/Challenging content	30.9%
Difficult to use	22.7%
Not engaging	18.6%
Non-NISE Net Component	8.2%
Not sure how something works	7.2%
Something not working	4.1%
Other	11.3%

*Responses could be coded into more than one category

Visitors most commonly indicated the *Small, Smaller, Nano* component was the favorite part of the mini-exhibition, with 45% of respondents making this choice. The next most frequently identified favorite components were *Build a Giant Carbon Nanotube* (with 15% of respondents choosing this element as their favorite) and generally the panels of the exhibition in general (with 12%) identifying at least one panel as their favorite piece, as seen in Table 26.

Table 26. Favorite Exhibit Components as Identified by Visitors (n=348)

Favorite Component Identified	Percent of Visitors
Small, Smaller, Nano	44.8%
Build a Giant Carbon Nanotube	15.2%
Exhibition Panels	11.5%
Balance Our Nano Future	8.0%
No favorite named	6.3%
Static Beads	4.6%
All components	1.7%
Sofa/reading area	0.3%
Other	5.2%
I don't know	2.3%

Visitors provided several reasons for why a particular component was their favorite piece, such enjoying the interactive nature and the visual appearance of the exhibition. They also reported enjoying the accessible and welcoming nature of the content as well as the fact that it was family friendly and something they could do as a group. Table 27 provides the range of reasons that visitors shared.

Table 27. Reasons Why Visitors Identified Components as Their Favorite (n=298*)

Reason why something was a favorite part of the exhibition	Percent of Responses
Overall experience - interactive	19.5%
Overall look and feel – visual appearance	16.4%
Content information	16.1%
Engaging for kids only	14.0%
Accessible/welcoming – I can understand	6.4%
Family friendly/something we all could do	5.7%
Other	10.1%
No reason given	25.2%

*More than one reason could be given

Learning About Nano Content

The tables below were summarized in the Summary of Findings document and provide evidence to suggest that visitors across the different sites were engaging with nano content and learning about different areas of the NISE Net content map. Table 28 shows the percentage of visitors who identified at least one area of the content map when asked two different questions about what they learned at the exhibition.

Table 28. Visitors Who Mentioned at Least One Area of the NISE Net Content Map When Responding to Questions About Learning in the Exhibit (n=320)

Visitor Learning	Percent of visitors who mentioned at least one area of the NISE Net content map
Q3. What do you think the exhibit was about overall?	62.0%
Q10. If a friend asked you what you leaned at the exhibit today, what would you tell them?	58.0%

In addition, 59% of visitors answered "Yes" to the question "Did the exhibit connect to anything in your own life?", suggesting visitors found the experience relevant.

Table 29 reports the non-parametric Wilcoxon Ranked Sign Test performed on the confidence scores of Hispanic visitors, showing a statistically significant increase in confidence from retrospective pre- to post scores.

Table 29. Difference in Visitor's Reported Confidence Levels Based on Retrospective Pre and Post Answers (n=320)

Confidence Items	Percent of visitors reporting top two levels of confidence after visiting the mini-exhibition	*Mean confidence score, pre*	*Mean confidence score, post*	*Z*
Talk about how scientists are able to build things atom by atom at the nanoscale.	21%	1.53	1.94	-9.589**
Describe one example of how nanoscale objects behave differently than other objects.	28%	1.52	2.02	-9.750**
Name a product, technology, or example in nature that involves nanoscale science.	41%	1.81	2.26	-9.019**
Identify at least two factors to consider when thinking about using new nanoproducts or nanotechnologies.	24%	1.47	1.89	-9.435**
Identify at least one way that nano will impact my life in the future.	38%	1.79	2.22	-9.086**

***p<0.01, Wilcoxon Signed Rank Test; Scale goes from 1-4.*

Spanish Translations and Audio Descriptions

Visitors were asked about whether they noticed two specific exhibition elements to make *Nano* more inclusive: the Spanish translations and the Audio Descriptions. Visitors were handed a sheet with images of the translations, the audio description label, and the flip panels. Visitors were then asked whether or not they noticed each of the three elements, and if so, what impact the element had on their experience.

Across the different data collection sites, 73% of visitors (with the total n=322) reported noticing the Spanish translations. Responses from these visitors who noticed were coded for a positive, neutral, or negative impact, as seen in Table 30.

Table 30. Reported Impact of Spanish Translation on Visitors' Experiences (n=234)

Impact of Spanish Translations on experience	Percent of Visitors
Positive	31%
Neutral	43 %
Negative	9%
No impact - did not use	18%

Exploring themes within the responses coded as Positive and Negative, we find additional information about how the ways the translations impacted visitors, as seen in Tables 31 and 32 below.

Table 31. Positive Impact of Spanish Labels on Visitors' Experiences (n=64*)

Positive Impact of Spanish Labels	Percent of Responses
Inclusive	37.7%
Learn about language	24.6%
Other	21.7%
General positive comment	15.9%

*Responses could be coded into multiple categories

Examples of visitor responses for each of the themes include the following:

- Inclusive: "*I thought it was more culturally sensitive. This area is not so much. I appreciated it.*"
- Nice to have: "*No but I liked that it was available.*"
- Learn about language: "*I look at the words and try to figure out how to say things in Spanish. Otherwise, how would I know how to say "nanotechnology" in Spanish?*"

Table 32. Negative Impact of Spanish Labels on Visitors' Experiences (n=18*)

Negative Impact of Spanish Labels	Percent of Responses
Distracting	44.1%
Not appropriate	27.8%
Confusing	16.7%
Other	11.1%

*Responses could be coded into multiple categories

Examples of visitor responses for each of the themes in Table 32 include the following:

- Distracting: "*It was a little distracting", "I was looking for English",* or "[My experience was impacted] v*ery negatively. Eyes were drawn to it more. Blue should be the more predominant language.*"
- Not appropriate: "*It made me think if you live in America, you should learn to read and speak English.*"
- Confusing: "*This makes it a little confusing.*"

As for the Audio Description labels, 28% of visitors across the different sites reported noticing these exhibit elements. Responses from these visitors who noticed were coded for a positive, neutral, or negative impact, as seen in Table 33.

Table 33. Reported Impact of Audio Descriptions on Visitors' Experiences (n=73)

Impact of Audio Descriptions on experience	Percent of Visitors
Positive	12.3%
Neutral	24.7 %
Negative	2.7%
No impact - did not use	31.5%
No impact – did not know what it was	28.8%
No impact – others used them	2.7%

Exploring the comments of these visitors who had noticed, but not used, the audio description label illustrates that visitors were generally neutral about the presence of this feature, as described in Appendix D, focused on the exploratory study of visitors with disabilities. Of the nine visitors who felt positively about the audio descriptions, the most common theme within the reasons provided for their view was that having the audio descriptions made the exhibition feel inclusive. The two visitors who felt negatively about the audio descriptions reported being confused about or by them.

Discussion and Implications

As seen in the Summary of Findings and within this appendix, the findings from the summative study of the mini-exhibition show that it is successful for visitors, providing both an engaging experience and as well as an opportunity to learn about nano concepts and content.

Methodologically, studying *Nano* from a summative perspective was a complex endeavor for several reasons. The "small footprint/many copies" model embraced by the Network was quite innovative, and as such, required a creative, highly-collaborative multi-institutional evaluation team being deployed across a multi-site study. Experts within the team lead the two small exploratory studies, and the collective expertise of the Public Impacts team, the larger NISE Net Evaluation team, the NISE Net Committee of Visitors, the *Nano* design team, and the Network Leadership informed the design and interpretation of this work.

This study has many implications for the field and leads to additional interesting questions for future inquiry, including:

- **What made the mini-exhibition successful for visitors?** The summative study suggests that the mini-exhibition was successful, but more investigation around how and why it was successful would be powerful. Specifically, this type of

deeper inquiry could advance the understanding of the field in terms of designing compact exhibits that are "content-efficient" and "message-optimized" such that visitors can engage with ideas but are not overwhelmed by their level, amount, or complexity.

- **What infrastructure and groundwork needed to be in place within the NISE Network in order the mini-exhibition to be successful?** The success of the mini-exhibition was not solely based on its design. In order for *Nano* to achieve its projected public reach and engage visitors in nano learning, NISE Net partners first and foremost needed to be ready to commit to placing a mini-exhibition on their floors and integrating it into their institutional culture. Understanding what it took to prepare the Network for this type of broad deployment can provide key insights for the Informal Science Education (ISE) field, as well as for funders and policy makers.

- **How do we continue to expand on the work from our exploratory studies, in terms of both advancing theory and methodology for the field?** The study of Hispanic visitors and visitors with disabilities lead to many additional questions that would be worthwhile for the field as a whole to pursue. Understanding in more detail how and why these visitors engaged with *Nano* in the ways that they did can provide a wealth of information focused on broadening participation in ISE experiences and STEM learning overall. Informal learning institutions provide an opportunity to engage with traditionally underrepresented groups in authentic ways, thus creating a fruitful window into advancing and refining theories about how different perspectives and cultures participate in informal learning. In addition, the ISE field can lead innovation in the methods used to study and collaborate with these groups, such that the ways we invite members of these communities to share their stories and co-construct meaningful experiences are not only culturally appropriate and but also culturally responsive.

- **What are the longer-term impacts of the mini-exhibition for ISE organizations, ISE professionals, and ultimately, the public?** This study focused on assessing the success of *Nano* as an exhibition. However, returning to partners in a few years – after the mini-exhibition has been on the floor for a while – and examining about how *Nano* functioned as a multi-platform catalyst would provide valuable insight into the longer term impact of this effort and useful information for the ISE field about the potentially powerful ways a network can be mobilized around a key product deliverable.

These questions are just an initial set of possible future directions to consider as the story of the mini-exhibition continues to unfold in the coming years. Through the nature of the mini-exhibition replication and distribution model, *Nano* provides a dynamic and rich context for studying informal learning across contexts and for a broad range of visitors that can be leveraged in meaningful and powerful ways to advance theory and practice within the ISE field.

References

Bequette, M. & VanCleave, S. (2011). *NISE Net Mini-Exhibition, Formative Evaluation*. Science Museum of Minnesota.

NISE Network. (2012). NISE Net Mini-Exhibition Scope and Goals.

Serrell, B. (1998). *Paying Attention: Visitors and Museum Exhibitions*. Washington, DC: American Association of Museums.

Yalowitz, S. and Bronnenkant, K. (2009). Tracking and Timing: Unlocking Visitor Behavior. *Visitor Studies* 12(1), 47-64.

Appendix B: Instruments

This appendix contains the observation, survey, and interview instruments used in the Summative Study of the *Nano* mini-exhibition.

Data Collection Instruments

Example Observation Sheet

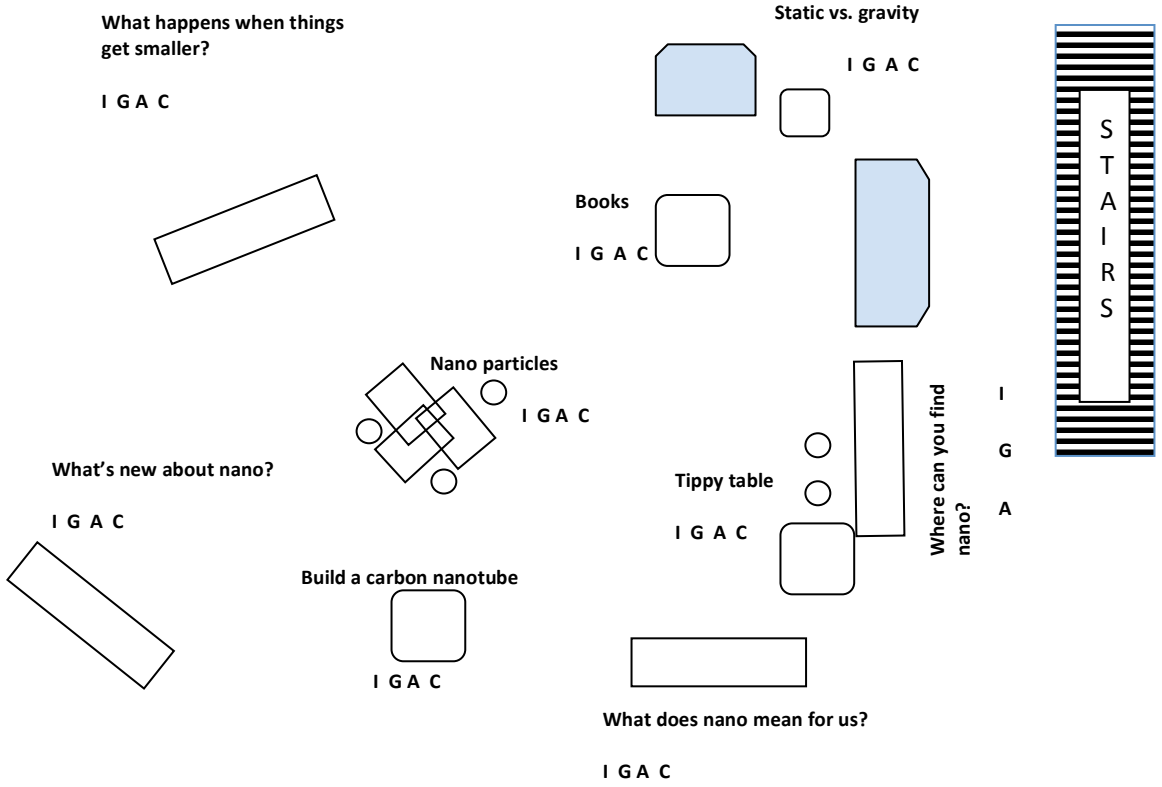
Visitor Information: Circle the visitors in your Group of 4

Time enter (1st person)_____ Time leave (last person)_____ GROUP TOTAL TIME_____

Adult F _____ # Adult M _____ # Child F _____ # Child M _____ TOTAL #____ ~age(s) _____ ~age(s) _____ ~age(s) _____ ~age(s) _____

Group type: ❑ Adults only ❑ Adults and kids ❑ Other: _____

- Record visitor information for all visitors thought to be part of group no matter when they enter
- Observe up to 4 people per Group if traffic is high
- (Group = people who enter within 30 seconds of each other)



Sofa/Chair time – Indicate if visitor is an Adult (A) and/or Child (C) and record time.
Visitor AMF/CMF: Start:____ End:____ Total:___
Visitor AMF/CMF: Start:____ End:____ Total:___
Visitor AMF/CMF: Start:____ End:____ Total:___
Visitor AMF/CMF: Start:____ End:____ Total:___
Visitor AMF/CMF: Start:____ End:____ Total:___

_____

Circle code for each behavior observed next to appropriate component:
I = component used by individual
G = component used by smaller Group of 4 (joined within 10 seconds)

NOTES OR COMMENTS:
Chair/sofa is occupied by other visitors ☐
*If someone from group stays on sofa/chair longer than 20 minutes note and proceed to survey if necessary ☐
Someone in the Group of 4 interacted with staff person ☐
Someone in the Group of 4 Interacted with someone from the larger group (not a stranger) ☐
*Enter Spanish component usage (S) next to exhibit if used
*Enter Audio component usage (AU) next to exhibit if used

_____

OBSERVATION ONLY BECAUSE:
Couldn't find target person ☐
Target person refused ☐

NISE Mini-Exhibition Study
Visitor Questionnaire

Thank you for agreeing to participate in our study! Your responses will help us understand how our exhibits are working for our visitors. Please read and answer the questions below.

1. How interesting was the exhibit you just saw? (CHECK ONLY ONE)

- ☐ I was so interested I'd encourage others to see it.
- ☐ I was interested.
- ☐ I wasn't really interested.
- ☐ I didn't find it interesting at all.

2. How enjoyable was the exhibit? (CHECK ONLY ONE)

- ☐ It was so enjoyable I'd encourage others to see it.
- ☐ It was enjoyable.
- ☐ I didn't really enjoy it.
- ☐ I didn't find it enjoyable at all.

3. How interesting was the exhibit you just saw <u>for the children</u> in your group? (CHECK ONLY ONE)

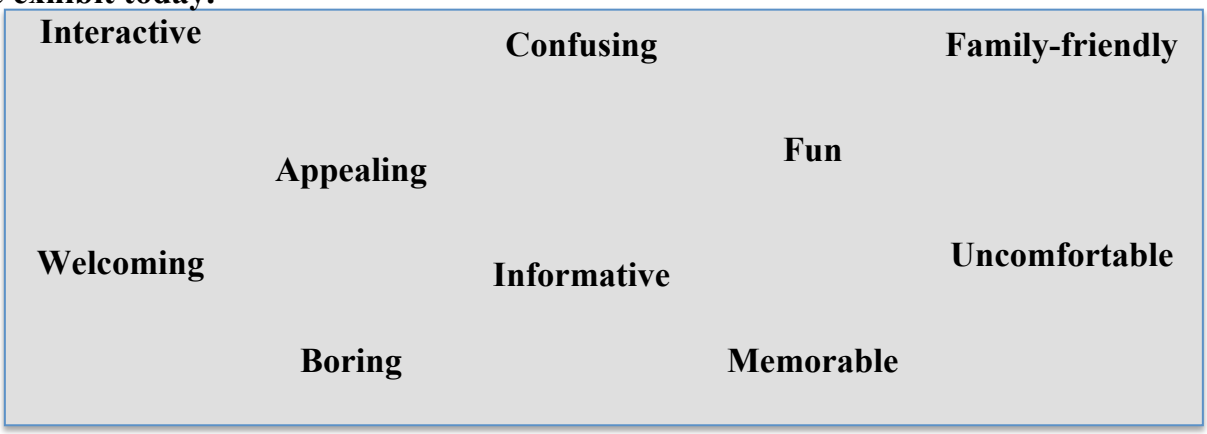
- ☐ They were so interested they'd tell others about it.
- ☐ They were interested.
- ☐ They weren't really interested.
- ☐ They weren't interested at all.
- ☐ Not Applicable – there are no children in my group.

4. How enjoyable was the exhibit <u>for the children</u> in your group? (CHECK ONLY ONE)

- ☐ It was so enjoyable they'd tell others about it.
- ☐ It was enjoyable.
- ☐ They didn't really enjoy it.
- ☐ They didn't find it enjoyable at all.
- ☐ Not Applicable – there are no children in my group.

TURN OVER

5. Please CIRCLE ANY OF THE WORDS BELOW that describe your experience with the exhibit today.



6. Before today, how much have you heard about nanoscale science and technology? (CHECK ONLY ONE)

- ☐ I hear about it all the time.
- ☐ I hear about it often.
- ☐ I have heard about it a few times.
- ☐ I have never heard about it.

7. Before today, how would you rate your confidence in your ability to do each of these? (CIRCLE ONE PER LINE)

Opportunity	Level of Confidence			
Talk about how scientists are able to build things atom by atom at the nanoscale	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Describe one example of how nanoscale objects behave differently than other objects	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Name a product, technology, example in nature that involves nanoscale science	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Identify at least two factors to consider when thinking about using new nanoproducts or nanotechnologies	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Identify at least one way that nano will impact my life in the future	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**

8. Now after visiting this exhibit, how confident are you in your ability to do each of these? (CIRCLE ONE PER LINE)

Opportunity	Level of Confidence			
Talk about how scientists are able to build things atom by atom at the nanoscale	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Describe one example of how nanoscale objects behave differently than other objects	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Name a product, technology, example in nature that involves nanoscale science	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Identify at least two factors to consider when thinking about using new nanoproducts or nanotechnologies	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Identify at least one way that nano will impact my life in the future	**Not at all confident**	**Somewhat confident**	**Confident**	**Extremely confident**

Thank you for your responses. We'd now like to ask you a few questions.

NISE Mini-Exhibition Study: Visitor Interview

(to be conducted after survey is completed by visitor)

1. *(Look at response to survey question #2.)* **I see that you found the exhibit** *(fill in response to Survey Question #2)*. **What made the exhibit enjoyable/not enjoyable for you**? *Probe: Was it the subject matter? The interactive elements? Something else?*

2a. What other exhibits have you seen on your visit today?

2b. On average, was this exhibit *(point to the mini-exhibit)*, **AS interesting, MORE interesting, or LESS interesting than the other exhibits you've seen today?**

☐ as interesting ☐ more interesting ☐ less interesting

2c. What made this exhibit [as/more/less] interesting to you?

3. In your own words, what would you say the exhibit *as a whole* was trying to show visitors?

4. Did this exhibit connect to anything in your own life? ☐ yes ☐ no

(If yes) **In what way?**

5. What was your favorite part of the exhibit?

Probe: If you had to choose only one specific thing, what would it be? Why?

6. Did you find any parts of the exhibit challenging? ☐ yes ☐ no

(If yes) Which parts? What was challenging about them?

(if no) Additional probes: Difficult to use? Things you don't agree with? Difficult to understand?)

7. *(Look at response to survey question #5 – circled words.)* **I see you've circled these words under Question 3. Which word do you think BEST describes your experience?**

Probe: Can you tell me more about why you chose that word?

8. *Look at response to survey question #8, last row. Skip this question if they marked "Not Confident" or "Somewhat Confident."* ***If Confident/Extremely Confident****, ask:*

I see you marked [x] here. Can you tell me how you think nano will connect to your life in the future?

9. *(Use handout)* **Here is a page with a few images from the exhibit. Please point to ***ANY*** of the following features you noticed within the exhibit.**

(Check features visitor points at below. Circle here if NONE.)

(For each one checked)

☐ How did Spanish Content affect your exhibit experience?

☐ How did Audio Description affect your exhibit experience?

☐ How did Flip Panels affect your exhibit experience?

10. If a friend asked you, "What did you learn about nanotechnology at the exhibit today?," what would you say?

Please answer the following questions to help us better serve our audience.

1. How would you rate your interest in science on a scale of 0 to 10?

No Interest										Extreme Interest
0	1	2	3	4	5	6	7	8	9	10

2. Who did you come to the museum with today? (CHECK ONLY ONE)

☐ Adults only ☐ Adults and children ☐ Alone

3. Your age: _____

4. Please list the ages of the other people in your group:

_____ _____ _____ _____ _____ _____ _____ _____

5. Are you…?

☐ Male ☐ Female ☐ Other

6. What is your race? (check as many as apply)

☐ White
☐ Black or African American
☐ American Indian or Alaskan Native
☐ Asian
☐ Native Hawaiian or Other Pacific Islander
☐ Two or more races
☐ Not sure

7a. What is your ethnicity? (Check one)

☐ Hispanic/Latino ☐ Not Hispanic/Latino ☐ Not Sure ☐ Other:_____

7b. If Hispanic, which of the following cultural background(s) do you most identify with?

☐ Mexican
☐ Puerto Rican
☐ Cuban
☐ Salvadoran
☐ Dominican
☐ Guatemala
☐ Colombian
☐ Honduran
☐ Ecuadoran
☐ Peruvian
☐ Other: _____

8. Are you or your family a member of this museum?

☐ Yes
☐ No
☐ No, but I have been in the past
☐ Not sure

9. Before today, how many times have you visited the museum in the last 2 years?

☐ 1-2 times
☐ 3-4 times
☐ 3-4 times
☐ 5 or more times
☐ None

TURN OVER

10a. Do you homeschool your children?

- ☐ Yes
- ☐ No
- ☐ I don't have school aged children

10b. If yes, are you using the museum today for homeschool activities?

- ☐ Yes
- ☐ No, but we have in the past
- ☐ No, we don't use the museum for homeschooling needs

11a. Do you or someone you came with to the museum today have a temporary or permanent disability? ☐ Yes ☐ No

11b. *If yes*, how would you describe the disability? (CHECK ALL THAT APPLY)

☐ Mobility	☐ Me	☐ Someone I came with
☐ Visual	☐ Me	☐ Someone I came with
☐ Auditory	☐ Me	☐ Someone I came with
☐ Learning	☐ Me	☐ Someone I came with
☐ Cognitive	☐ Me	☐ Someone I came with

☐ Other:_____ ☐ Me ☐ Someone I came with

12. What is your zip code? _____

13. What language or languages do you MOSTLY speak at home?

_____
_____

14. What was your total annual household income last year? (CHECK ONLY ONE)

- ☐ Under $10,000
- ☐ $10,000 to 19,999
- ☐ $20,000 to 29,999
- ☐ $30,000 to 39,999
- ☐ $40,000 to 49,999
- ☐ $50,000 to 59,999
- ☐ $60,000 to 69,999
- ☐ $70,000 to 79,999
- ☐ $80,000 to 89,999
- ☐ $90,000 to 99,999
- ☐ $100,000 to 149,999
- ☐ $150,000 or more

15. What is the highest level of education you have completed? (CHECK ONLY ONE)

- ☐ Elementary School
- ☐ Middle School
- ☐ Some High School
- ☐ Completed High School
- ☐ Some College or Technical Education
- ☐ College Degree
- ☐ Post-Graduate Degree

16a. Do you use science in your work? ☐ Yes ☐ No

16b. If Yes, how?

_____

NISE Mini-Exhibition Study
Visitor Interview, Question #8

Please point to any of the following features you noticed within the exhibit.

Spanish Content

Flip Panels

Audio Description Label