nano

Audiences

Nano Mini-Exhibition Audiences

The NISE Network is committed to making our exhibits and programs as accessible as possible for all museum visitors, including many ages, multiple languages, and a broad range of abilities and disabilities. The interactive, hands-on *Nano* exhibition is designed to be usable by the greatest range of audiences possible given the nature and constraints of the project. *Nano* is fabricated relatively inexpensively so that we can reach and engage millions of people at many institutions across the United States. The team worked to maximize limited resources across multiple copies intended for long-term, low-maintenance display in museums.

This document explains some of the design and development decisions made to optimize use for all audiences, which you may find useful if you choose to customize the exhibition for audiences and challenges specific to your communities. We hope this information will help you to take advantage of work already done to make *Nano* accessible, and perhaps make more changes to further this goal, within your institution.

Contents:

Audiences

Given the wide-ranging constraints of designing a small exhibition meant to work in multiple settings across the United States, we thought carefully about the many audiences that might encounter the exhibition and how to best make the exhibition welcoming and accessible to as many people as possible. The *Nano* exhibition is designed specifically for science and children's museums with a core audience of families with children ages 6-12. Additional accommodations engage visitors of varying ages, interests, and ability levels.

The exhibition was tested with audiences ranging from elementary-school aged children through older adults. The hands-on, interactive centerpieces attracted families in our formative evaluation studies, and we observed family groups using different elements of the exhibition in age-appropriate ways. Younger children used all the interactive elements, as well as the "Where can you find nano?" I Spy activity, both alone and with adults. Adults used the interactives, read the side panels, and sat on the sofa (sometimes looking at nano materials or engaging with their nearby children who were using interactives, and sometimes doing other activities like texting or resting or caring for very young children).

Ongoing evaluation and research will continue to explore how visitors of different ages use the exhibition and learn about nano, but the initial work has shown that visitors of many ages, and in particular, groups that contain visitors of many ages, find the exhibition worth their time.

exhibition) may include members who have limited mobility, who are deaf or hearing impaired, or who have low or no vision. Significant efforts were made to increase the exhibition's capacity to reach visitors with disabilities. Specific layout and accessibility choices at each site will help to ensure that these visitors can access as much of the experience as possible.

Many of our museum visitors speak languages other than English. Because Hispanics and Latinos comprise the second largest ethnic group in the United States, all exhibition text in *Nano* is fully translated into Spanish. For more information about our translation process, see the NISE Network Translation Process Guide in the online catalog:

http://www.nisenet.org/catalog/tools_guides/translation_process_guide

The following chart provides an overview of our strategies for reaching as many different audiences as possible.

Considerations and Mitigation for Different Audiences

Audience	Exhibition design for accessibility	Components not accessible	Visitor group mitigation
All audiences	• welcoming environment that stimulates learning and social interaction • key concepts and graphics are meaningful and relevant across visitor experiences and cultures • easy to use, hands-on components • multi-sensory approach • repeating and reinforcing key concepts • clear and concise text	n/a	n/a
Multi-age groups	• multiple ways to engage in experiences • experiences appropriate for adults located near those for children	n/a	n/a
Young children (non-readers)	• signage has attractive imagery • use-drawings on navigation signage • easy-to-use, hands-on components • age-appropriate books and puppets in reading area • component height accessible to small children	• complex concepts in signage and exhibits	• adults in group may read navigation signs to young children • adults may interpret more complex material for young children
Children (early readers)	• signage has attractive imagery • text has easy to read font, large font size, and very limited us of italics and "all caps" text • layered and chunked signage information • easy to use, hands-on components • age-appropriate books and puppets in reading area	• complex concepts in signage and exhibits	• adults may interpret more complex material for young children
Elderly visitors and others with limited	• seating throughout • signage text has easy to read font and large font size • reading materials in seating area		

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Spanish readers	• bilingual English and Spanish signage • bilingual English and Spanish reading boards • bilingual Spanish language audio description	n/a	n/a
Speakers of languages other than English and Spanish	• signage has attractive imagery • use-drawings on navigation signage • easy to use, hands-on components	• text for non-English and non-Spanish speakers	• English and Spanish readers within visitor's group could interpret for other visitors • host museum could translate into another language (refer to translation guide)
Learning disabilities	• repeating and reinforcing key concepts • layered and chunked signage information • text has easy to read font, large font size, and very limited us of italics and "all caps" text	n/a	n/a
Blind/low vision	• text has high-contrast, easy to read font, large font size, and very limited us of italics and "all caps" text • tactile and multi-sensory exhibit components (e.g. shaped blocks at tippy table, carbon nanotube "starter row," and inscribed outline of I-Spy teddy bear) • brightly-colored, high-contrast images • audio descriptions of experiences and exhibition content • selected raised text and braille decals	• some visual graphics • some printed signage • some activities	• other members of visitor's group may interpret and assist
Color blind	• signage and color palette accessible to color blind visitor	n/a	n/a
Deaf/hearing impaired	• use of images, text and labels (rather than audio)	n/a	n/a
Wheelchair users	• experiences at accessible heights and reach distances • signage at appropriate heights • recommended floorplans allow wheelchair access	n/a	n/a
Limited physical mobility	• some components designed to work with limited reach and mobility • seating provided throughout	• some activities require coordination and dexterity	• other members of visitor's group may assist and work cooperatively

Universal Design Approach and Review – reaching visitors with a range of abilities

The NISE Network is committed to making our educational experiences as accessible as possible for museum visitors of a broad range of abilities and disabilities. Information provided here about our Universal approach may help you make the *Nano* exhibition work best for your setting and your visitors. The Network developed the following framework for use in developing all educational products:

1. Repeat and reinforce the main ideas and concepts by communicating the message through multiple media and representing these ideas in different ways.

2. Provide multiple entry points and multiple ways of engagement.

3. Provide physical and sensory access to all aspects of the exhibition.

These principles guided the design and development of the *Nano* exhibition. Key concepts, exhibit prototypes, and final designs were reviewed iteratively by a panel of advisors from NISE Network with expertise in bilingual translation, universal design, and accessibility, and by external consultants with expertise on universal design and accessibility. All these reviewers offered a range of perspectives; each drew from their own personal experience as well as broader expertise on accessibility issues.

The review by external consultants with disabilities, and with broader expertise on access, was particularly detailed. In the first round, early prototypes of exhibit elements were reviewed in the Summer of 2010 by a reviewer with no vision and with expertise in many forms of disability. This reviewer examined the exhibits, focusing on the accessibility of the exhibits for low vision visitors, visitors with mobility constraints, and visitors with other disabilities. After this review was completed, the exhibition was further developed and prototyped; several elements were set aside and new ones developed.

A second round of universal design reviews took place in April 2011, when three consultant reviewers toured the exhibition, identifying possible barriers and limits to accessibility and suggesting changes to increase accessibility. The three reviewers offered a range of perspectives. Again, all drew from their own personal experience as well as broader expertise on accessibility issues. Reviewers included a man who has had very limited vision from birth; a woman who is legally blind and has spinal stenosis and fibromyalgia, which limits her mobility; and a woman who is in a wheelchair with limited upper body mobility due to cerebral palsy, and also has low vision.

These reviewers made specific recommendations to improve access for visitors with limited mobility, many of which were incorporated. All reviewers specifically emphasized the importance of maintaining easy clearance between elements for visitors with limited mobility, whether or not they are in wheelchairs. They expressed hope that institutions would plan for

high capacity usage when developing layouts, and plan clearance allowances that will work during high traffic times. They noted some elements that could need extra attention: the "Static vs. Gravity" component can easily get buried in the Reading Area; and the most accessible side of "Build a Carbon Nanotube" (the wooden model) needs to be oriented in a way that is easily accessible for visitors in wheelchairs.

All reviewers commented specifically on the need for communicating content and instructions for use to visitors with low or no vision, confirming the need for an audio accompaniment to the exhibition, which is detailed below.

A third round of reviews held in the Summer of 2011 focused on the audio description of the *Nano* exhibition, and included four visitors with limited vision and a range of abilities and expertise. Recommendations from these reviewers informed the continued development of the audio descriptions.

In addition to the expert universal design reviewers, all exhibition components, signage, and the audio description were reviewed by educators, science experts, and universal design advisors at multiple points in the development process. These additional reviews helped ensure that the exhibition is engaging, accessible, and appropriate for a broad public audience.

Audio Description

The audio description that accompanies the exhibition was developed to increase access for visitors with low or no vision. It may also be able to support visitors with learning disabilities, and others for whom reading is challenging. The overall approach for this process is described as follows:

Goals

- Make the experience *accessible* for visitors with low vision, and for blind visitors with a sighted companion (following American Council for the Blind's definition of an audio description as an assistive technology)
- Help visitors *understand and appreciate* the exhibition's most important messages (following statements by American Council for the Blind and Audio Description Coalition)

Audience

- Visitors with varying degrees of vision loss, from congenitally blind to low vision
- English and Spanish speakers

Scope

- Exhibition overview: key features and main ideas
- Interactive components: general description, use instructions, and concepts
- Text and graphics: general description and concepts

Supplementary resources

- Nano exhibition audio description is available at whatisnano.org/ad
- Audio description text available on whatisnano.org/ad in a format accessible to assistive technology readers
- Additional audio podcasts on nanoscience, engineering, and technology are available on whatisnano.org

Like other components of the *Nano* exhibition, the audio description underwent formative evaluation. The pilot audio description was written for one exhibit component and its associated text and graphics. It was tested with four reviewers, each with low or no vision (as described above "Universal design approach and review"). The reviewers' feedback on the pilot audio description was used to develop the full set of audio descriptions, to improve usability of the audio description page (whatisnano.org/ad) and the digital files, and to make recommendations for host sites.

Outreach to local blind and low-vision audiences

Audio description reviewers felt that outreach to the local blind and low vision community could result in increased visitorship and usage of the *Nano* exhibition, and suggested that host museums contact local agencies and let them know about the exhibition and audio descriptions. Possible contacts include state agencies that support individuals with low or no vision, volunteer organizations, local schools, and other networks.

Access to Audio Descriptions
All audio descriptions are provided at www.whatisnano.org/ad

Directions are included on the web page for visitors to download onto personal smart phones or mp3/audio players. Host museums are encouraged to incorporate the audio descriptions into their existing audio systems platforms or add to any hand-held systems in use at their facility.

Additional Audio Description Information and References

- Art Beyond Sight
  Online Accessibility Training
  www.artbyondsight.org/handbook

- American Council of the Blind
  Audio Description Project 2011
  http://www.acb.org/adp/

  Audio Description Project's Audio Description Standards 2009
  www.acb.org/adp/docs/ADP_Standards.doc

- Audio Description Coalition
  Standards for Audio Description and Code of Professional Conduct for Describers. 3rd ed. 2009
  http://www.audiodescriptioncoalition.org/aboutstandards.htm

Bilingual Signage Approach

The NISE Network is committed to making our products and resources accessible to non-English-speaking audiences. The Network provides Spanish language educational materials—such as the *Nano* exhibition—because Spanish is the second most commonly spoken language in the United States, and it is anticipated to continue to be the second most common language nationwide. English and Spanish are used side-by-side throughout the exhibition signage. The text is presented in different colors to assist visitors.

The NISE Network offers some additional resources in this area:

- **NISE Network resources in Spanish:**
  A listing of all other materials translated into Spanish: Based on input from NISE Network partners, we have adapted our most popular programs for Spanish-speaking audiences. We have placed the highest priority on translating products that directly serve public audiences.
  http://www.nisenet.org/catalog/spanish

- **The Translation Process Guide:**
  This guide is intended to help you navigate through the process of creating quality translated educational products. It includes a suggested process model that will help to ensure that your translations maintain an appropriate interpretive tone and a high level of scientific accuracy. Additionally, you will find helpful tips and considerations that will assist you in planning for translation work in terms of timeline, budget, and human resource requirements. This guide also includes a Spanish Style Guide and a nanoscience terminology reference guide. *http://www.nisenet.org/catalog/tools_guides/translation_process_guide*

Evaluation efforts over the coming year will offer insight into how these translations work in settings where a significant number of visitors speak Spanish.

Acknowledgements

These materials were prepared with funding from the National Science Foundation under Award Nos. 0532536 and 0940143. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the authors and do not necessarily reflect the views of the Foundation.