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Nano: Modular Exhibit

Nano. Modular exhibit by Nanoscale Informal Science Education Network (NISE Net), USA.

Sarah Scripps

Over[1] the past three decades, nanoscale research and development have swept scientific and engineering communities across the globe. The creation of imaging technologies with the ability to visualize and manipulate matter at the atomic level has led to charting unexplored scientific territory. In the United States, science centers have taken the lead informing the general public about this emerging enterprise. The allocation of federal funding, coupled with the leadership of the museum community to serve as a key platform for informal science education, has led to the formation of the Nanoscale Informal Science Education Network (NISE Net), a national community of museums, engineers, scientists, and university researchers dedicated to "fostering public awareness, engagement, and understanding of nanoscale science, engineering, and technology." Its latest project is devoted to developing a new exhibit to inform the public about this emerging field. Entitled simply *Nano,* the miniature exhibition is available at no cost to all affiliated partners. With the distribution of up to fifty installations across the United States, *Nano* is positioned to serve as a representational standard for nanoscale science and technology in museum learning environments.

The formation of a cohesive museum community has subsequently led to a more unified message regarding nanoscale research. NISE Net has identified four major themes to serve as its core narrative: 1) "Nanometer-sized things are very small and often behave differently than larger things do"; 2) "Nanotechnology is manipulating matter with control at a small (size) scale"; 3) "Nanoscience and nanotechnology lead to new applications"; and 4) "Like any technology, nanotechnology has risks and benefits."[2] NISE Net affiliates have adopted a variety of approaches for conveying nanotechnology to the public, including policy forums, science cafes, films, games, and theatrical presentations.

[1] The writing of this review was supported by the National Science Foundation under Grant No. #SES 0531160.

[2] Marjorie BEQUETTE – Gina SVAROVSKY – Kristen ELLENBOGEN, *Five Year Summative Evaluation of Exhibits and Programs* [online]. 2011. Available at <http://www.nisenet.org/catalog/evaluation/year5exhibitsandprograms> [cit. 1. 7. 2012].

Perhaps the most notable program to date is Nano Days, an annual event where hundreds of museums across the country engage audiences with nano-related activities through kits provided by the network.

In 2010, NISE Net was awarded another five-year grant from the National Science Foundation to continue its ongoing programs and increase network partnership to over three hundred institutional affiliates. This grant has allowed NISE Net to create *Nano*. NISE Net piloted the exhibit at select sites in 2011 and in April 2012 copies of the exhibition began circulating to interested partners. Designed for the core audiences of science centers and children's museums – namely, families with children aged six to twelve – the comfortable, family-friendly atmosphere of *Nano* brings the esoteric theme of nanotechnology down to size, so to speak. Modest in scale at four hundred square feet, *Nano* includes four hands-on interactive activities, four large panels, and a seating area for parents to relax while watching their little ones play. Accessibility is important here, for formative exhibit evaluations have demonstrated that the mere mention of nanotechnology can be enough to turn away visitors too intimidated to venture any further. The modular arrangement also makes the exhibit easily adaptable to work in different museum environments and allows visitors to enter from any starting point. The exhibit text is written in both English and Spanish, and the content is also posted online for visitors who would like to explore the nanoworld virtually.

The four central questions of the exhibit reiterate the core messages of NISE Net:

What happens when things get smaller?
What's new about nano?
Where can you find nano?
What does nano mean for us?

The main themes resonate within each exhibit component. You get a sense of the nanoscale as something ground-breaking and worth exploring more closely. The opportunity to build a giant carbon nanotube emphasizes the message that nanotechnology is a new and interdisciplinary field. The activity entices visitors to work together to build the structure atom by atom, pushing visitors' conceptual limits of size. An "I Spy" panel of everyday household items features the range of consumer products influenced by nanoscale research and development. The panel is paired with several interactive examples that provide tangibility in allowing visitors to see, feel, and even smell products that exhibit unique properties at the nanoscale, such as the changing colors of butterfly wings.

Through the *Balance our Nano Future* tippy table, visitors are invited to weigh in on the potential benefits and hazards of this emerging field by balancing blocks that represent the societal and ethical implications of nanotechnology. Here we learn of the potential of nanotechnology in shaping the future. Upon first glance, the nanoscale might seem too far removed from everyday experience to matter, but the exhibit does a great job in grounding nanotechnology in terms of its broader social implications.

Nano suffers from pitfalls typical of exhibits of this field. Its undivided focus on the novelty of nanoscale research is inherently synchronic and leaves little room for historical contingency. Many of the questions posed by nanoscale research are not new. Epistemic quandaries regarding the faithfulness of images capturing invisible phenomena or the long-term solvency of emerging scientific fields have circulated for centuries. Without a historical frame of reference, the qualities that make nanoscale science and technology unique are not readily apparent. Situating nanotechnology within a broader historical context would help visitors grapple with the major questions that this field raises and consider the potential impact it will have on contemporary society.

With an estimated reach of millions of American visitors, *Nano* is positioned to serve as a representational standard for nanoscale science and technology in informal learning environments. NISE Net has, without a doubt, strengthened the capacities of its institutional partners by providing high quality programs and exhibits on nanoscale research and development. Much like the broader field of nanotechnology, it has also demonstrated successful interdisciplinary collaboration between museums, researchers, and the academy. However, the network model may also lead to unintended consequences. With the production of an exhibition mass distributed across the country, the story of nanoscale science and technology has become homogenized. The mini exhibit is a ready-made, mass-produced product that lacks variation. In presenting a "one size fits all" story, this approach loses nuance that could be gained through using artifacts and sharing local stories. Nanoscale research is occurring all over the country, and although several scientists and engineers assisted in the development of *Nano*, their day to day experiences in the laboratory remain noticeably absent. The predominant narrative describes the scientific principles behind constructing carbon nanotubes, for instance, but not the messy trial and errors, faulty equipment, and blurry, frequently unreliable images necessary to create these structures.

As objects remain off of the gallery floor, so too do their unique stories that help reveal the ambiguous and exigent nature of scientific practice. In this regard, the incorporation of artifacts could tell a more compelling narrative about the daily realities of nanoscale science and engineering. Questions also remain as to how this standardized approach will affect public understandings of nanoscale research. To what extent will *Nano* serve as the canon by which American audiences comprehend this emerging field? How will its prevalence affect future exhibitions on nanoscale science and technology? And in what ways will this initiative shape collaboration across the informal science education community at large?

In spite of these challenges, *Nano* leaves a considerable impression. According to one NISE Net study, visitors spent an average of seven minutes in the gallery space, an impressive number for an exhibit of such a modest size.[3] The challenge, of course, is to consider how to make compelling, interactive exhibits about emerging technoscientific fields with the history left in. The solution could be as simple as more humanities researchers joining NISE Net. The Network has successfully demonstrated collaboration across disciplines; perhaps it is time for more scholars outside of the science center community to take notice of the groundbreaking work they are doing.

[3] Paul MARTIN, "Roundtable – Engaging the Public in Nanotechnology: Strategies, Approaches, and Resources." Presentation delivered at the *Third Annual Conference of the Society for the Study of Nanoscience and Emerging Technologies*, 8 November 2011.

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O čem by měl komiks mlčet: *Logikomiks* a snaha o popularizaci moderní matematické logiky

Apostolos DOXIADIS – Christos H. PAPADIMITRIOU – Alecos PAPADATOS – Annie Di DONNA, *Logikomiks: Hledání absolutní pravdy*. Praha: Dokořán 2012, 336 s. Z anglického originálu *Logicomix: An Epic Search for Truth* (New York: Bloomsbury 2009) přeložil Jaroslav Peregrin.

Pavel Kořínek

Úspěch, který grafický román *Logikomiks* sklízí prakticky nepřetržitě od svého prvního řeckého vydání roku 2008, se neomezuje pouze na oblast komiksové kritiky: snad ještě častěji než tuto oborovou obec, u níž bychom snad poněkud fanouškovské nadšení mohli předvídat, uchvacuje více než 300 stran čítající matematicko-biografický příběh o „hledání absolutní pravdy"