04. Narrative

1. Audience awareness

McKissick Museum is a university museum and the primary target audience was university faculty and students. With this in mind, exhibit labels assumed a minimum of a high school reading level proficiency. Content was selected as appropriate for a university curriculum, and professors in several disciplines were encouraged to incorporate the exhibit into their courses. For example, Dr. Joseph November created an assignment for his introductory Science and Technology in World History course to analyze an artifact in the exhibit.

The careful selection of objects and images reinforced the exhibit’s objectives. Although it is not surprising that an exhibit focused on scientific imaging featured numerous prints and photographs, the range of images featured proved expansive. Art installations inspired by nanoimaging, original prints of Harold Edgerton and Eadward Muybridge, both hand-drawn and GIS-generated maps of the ocean floor, SEM, TEM, and AFM microscopy images, and pop culture references such as the “Nanobama” presidential portraits were all incorporated within the exhibit, reinforcing the exhibit’s exploration of the relationship between scientific images and art. Similarly, each section featured the technical equipment used to produce the images; optical and scanning tunneling microscopes, lead weights for measuring the ocean’s depths, and Edgerton’s microflash cameras compelled visitors to consider if they produced faithful images of an invisible reality.

The exhibit also included two short videos (one silent, one narrated) and background music throughout the gallery that was inspired by one of the case studies (more information about this in the design section).

The exhibit opened with four questions intended to prompt the visitor to reflect on the nature of images and imaging technology. These questions were reinforced throughout the gallery, with each section complicating the narrative. In each section there were objects and images that a non-scientist could enjoy but also enough technical detail for engineers and scientists to investigate.

Visitors could proceed through the exhibit, contemplating each object and image, or they could casually drift from point to point. Visitors approached the exhibit as an art installation, a history exhibit, an invitation to explore technology, or to muse about the philosophical meaning of representation. Ideally, the visitor began to see how art, history, science, and philosophy combined in the exhibit.

Recognizing the limitations of drawing conclusions from visitor guest books, the team is still proud of some of the comments the exhibit elicited:
“Really neat exhibit and perfect timing! My senior thesis explores the creation of scientific imaging & visual knowledge.”
  – Emily Phifer, 8/19/11

“To combine art and science, two very different things, is amazing.”
  – Sarah Rubinstien, 9/20/11

“Good to see a synthesis of science & history. Thanks.”
  – K. Murphy, 10/29/11

“Enlightening! I will return w/my 8th graders.”
  – (signed, but name illegible), 12/1/11

“Really cool! Loved all the ways history, science, & art depicted – something for every type of learner! Production value = 10”
  – Emily Hopkins, 12/3/11

These comments reflect an appeal to a diversity of audiences, as well as a clear sense of the interdisciplinarity of art, science, and history

2. Content

Imaging the Invisible tackled a topic that spanned three discrete disciplines: art, history, and science. Its content maintained standards of excellency for each of these disciplines while at the same time providing a coherent message to the visitor. Complex ideas were communicated through evocative objects and images. Text panels provide information, but also provoke curiosity and further inquiry. Objects range in size from a few centimeters to several meters. Images of various size represented scale from the nano to the cosmic.

The content of the exhibit not only reflects current knowledge, but in many cases is the first public glimpse of the active research projects of professors at the University of South Carolina. Each section of the exhibit includes a “Spotlight on USC” that focuses on a particular research area. The exhibit highlighted a diversity of disciplines, showcasing biology, mechanical engineering, archeology, and art. Although academics often consider dissemination of their research through published papers, this exhibit demonstrated their research through visual engagement. The exhibit team worked closely with each professor to assure the accuracy of the content. Additionally, the guest curators had tremendous support from USC’s NanoCenter, from access to images to explanations of research.

The exhibit puts the objects and images in conversation with each other, facilitated by object labels that follow an inquiry-based approach. Labels ask the visitor to look at the image and the equipment used to create the image to consider the iterative,
reflexive nature of the process of image making. Visitors can examine multiple attempts to capture the perfect shot, and then reflect on what is more realistic: the dozens of imperfect images or the final photograph. Visitors can look at scientists’ lab notebooks and see how they tweaked the process and then see the resulting image.

The team developed free, 34-page companion booklet provided activities, lesson plans, and resources for further reading. A special section in the booklet, labeled “On Our Bookshelf,” included a selection of the resources that the curatorial team consulted in developing the exhibit. This allowed visitors to explore examine the foundational premises for the exhibit content.

With a nod towards the museum studies students enrolled in the formal coursework McKissick offers, one panel questions: “Why do we collect? Why do we preserve?” It then shows how plant specimens collected over 100 years ago and preserved in the A.C. Moore Herbarium have a role in modern research projects.

A strength of the exhibit is that the content can resonate with the students, no matter what their major.

3. Collections

As an AAM-accredited museum, McKissick adheres to best practices of object conservation and exhibition, including appropriate mountings, light levels, climate control, and security.

One object in the exhibit that required special attention was a 1665 edition of Robert Hooke’s Micrographia. The staff of the Irvin Department of Rare Books and Special Collections of the University of South Carolina Libraries originally objected to the loan of the book for the entire run of the exhibit, noting that they did not usually display rare books for more than one month at a time. A compromise was reached where each month the page would be turned to highlight a different folio. This standard had the added benefit of showcasing four of Hooke’s spectacular drawings over the course of the exhibit: the flea, the louse, the fly’s eye, and the cork cell.

An interesting example where collections practice runs counter to research needs was the use of the A.C. Moore Herbarium plant specimens. The Herbarium collects and preserves plant specimens, but also maintains an active research agenda. Sometimes research requires the destruction of the preserved sample. This is the case with imaging using a scanning electron microscope (SEM). For the exhibit, the team created seven sets of SEM images of five different plant species (one species had three samples). SEM imaging requires taking a small sample size (a few millimeters) and coating it with gold, thus destroying the sample. However, the destruction of the sample is justified because new information is generated. The
images created for the exhibit were transferred to the Herbarium staff and are now part of the files for the samples used. This process also became a teaching element of the exhibit, with a panel explaining why we collect and preserve objects and how research collections are currently used. Additionally, the gold-coated samples were included in the exhibit to show how SEM images are created.

McKissick Museum maintains a no-touch environment, with all artifacts safely secured in plexiglass vitrines. However, the exhibit team thought nanotechnology was such a foreign concept to most visitors, they wanted something tangible to engage visitors. The team procured two tee shirts to use as props, one a basic cotton shirt and one made with specialty nanotechnology fabric. The shirts were displayed on mannequins without any protective encasements. The label invited visitors to feel the shirts and consider the differences in the fabrics. This solution gave an outlet for inquisitive hands while protecting the remaining artifacts.

4. Interpretation/Communication

*Imaging the Invisible* is an evocative title. Although it communicates to the visitor the exact nature of the content of the exhibit, it also is alluring and allows the visitor to begin imagining an unseen world. The exhibit subtitle, *Challenging Visitors to Think about Scientific Images*, offers some clarification, but also gives the visitor a directive, a personal challenge to engage with the content.

The exhibit opens with four fundamental questions on the introductory panel:

- How do you document a world that is not visible to the human eye?
- How do you convince people of things that are too small or too fast or too deep to see?
- Why do we trust scientific instruments to produce faithful images of an invisible reality?
- When do scientific images become works of art?

Throughout the exhibit these questions are reinforced and complicated by the introduction of new imaging technologies. The exhibit is divided into four main sections, each focusing on a different imaging challenge. *Imaging the Invisible* was initially conceived as a history of science and technology exhibit and is grounded in that discipline’s standard of scholarship. One of the exhibit’s learning outcomes specifically states that “Visitors will understand that imaging science is not a steady march of progress.” A common assumption among the general public is that science and technology are always improving. Historians of science and technology dismissively refer to this as “Whig History,” preferring to complicate the progress narrative by challenging these assumptions and countering with examples where new technologies created new problems or raised more questions.
This anti-positivist account is reflected in panels such as “Choosing a Microscope,” which explains that “newer technologies do not necessarily replace older instruments. Rather, each type of microscope offers a different set of tools for gathering information, and the information revealed spurs researchers to ask new questions.” Panels such as “Nanoimaging” similarly describe how the breakthrough technologies that have allowed for imaging at the nanoscale have also raised new questions about scientific representation.

The conclusion panel echoes the questions found in the introduction, but turns the focus from the nanoscale to the cosmic. This surprising twist ending highlights the fact that the challenge of creating images is universal. *Imaging the Invisible* engages directly with current debates in the academic community and offers its target audience – university students – the tools to participate in the dialog.

This exhibit is exemplary for posing questions that lack simple answers, demonstrating that even though advances in technology have allowed scientists to produce images down to the nanoscale, familiar dilemmas remain. At its core, *Imaging the Invisible* calls on visitors to reflect on the nature of the visual world around them.

### 5. Design and production

The exhibit sections are delineated by color, each with its own thematic color scheme that is carried through from the text panels to the mat board in the object cases. The colors are introduced in the title panel and reiterated in the accompanying printed materials. Each section has several recurring features: a historic example of an imaging technology, a modern counterpoint to the same imaging question, examples of the instruments used to make the images, and the images themselves. Additionally, each section includes a “Spotlight on USC Research” panel that focuses on the current research of a USC faculty member.

*Imaging the Invisible* was organized to flow in counter-clockwise fashion, with visitors first encountering microscopes and building to the conclusion with nanotechnology. However, great care was taken for each section to stand on its own. Although the exhibit is arranged in roughly chronological order, there is no overarching story of causation that directly ties one section to the next. Visitors can move through the exhibit in any direction without losing content or meaning.

During the initial conversations with USC’s NanoCenter, a recurring concern was that most audiences cannot conceive of the nanoscale. And so, in the entrance hall leading to the exhibit gallery, the show opens with a video of Charles and Ray Eames’s *Powers of Ten*. The video sets the stage for understanding scale.

Because the exhibit gallery is situated at the end of a long, narrow hallway, the team wanted a visual draw to pull people into the space. This was a 4 by 8 foot map of the
ocean floor based on the measurements of oceanographer Marie Tharp. The map is one of the most popular images in the exhibit, with students and adults spending significant time considering how to image the ocean floor and talking about the visual effects of seeing the underwater ridges and valleys. In front of the map, there is a desk set up to mirror Tharp’s drafting table, as pictured in a companion wall panel.

An unusual audio element is an operatic piece by Philip Glass that is played throughout the gallery. The composition, *The Photographer*, is based on the life of Eadward Muybridge (featured in that section). The instrumental music complements the storyline in that section, but also simply provides pleasant background music for visitors contemplating the images and objects. “Love the music!” is one of the most common comments in the guest book.

The exhibit has a second video in the *Imaging the Fast Moving* section that corresponds to the Spotlight on USC Research for that section. Mechanical engineering professor Dr. Michael Sutton uses high speed imaging to calculate propagation of waves through a test specimen during a standard impact test. The video illustrates the experiment and shows the test in slow motion, allowing the visitor to understand how imaging techniques are being applied to the study of materials science.

An undergraduate graphics arts student designed all of the wall panels, reinforcing McKissick’s role as a teaching museum.

### 6. Ergonomics: human comfort, safety, and accessibility

As an AAM-accredited museum, McKissick maintains all accessibility standards for ADA compliancy.

The open flow design of the space, created by using movable walls that did not reach the ceiling, provided clear view lines through the exhibit so that visitors could judge how much remained to be seen and decide how to spend their time in each section. Although much of the content presented was new to the audience (no prior knowledge of nanotechnology was presumed), none of it was deemed potentially troubling or controversial.

Seating was provided in front of the nine-minute *Powers of Ten* video for visitors who wished to rest while watching the entire video.

The exhibit only contained one interactive, a simple flip/reveal interactive that featured magnified images created using a scanning electron microscope. Visitors could flip up the panel to see the plant that was imaged. Despite being a seemingly self-evident interactive, the panel did instruct visitors: “Examine the image. *Make* a hypothesis. **Reveal** the answer.” The key actions were designated in an accent
color. The panel offered additional instructions, encouraging the visitor to consider the images further by asking: “Can you tell what part of the plant is magnified? What characteristics of the plan does the SEM reveal?” This interactive was also accessible to children and people in wheelchairs by being low on the wall.

All object labels were clearly printed with black ink on white paper. Although a standard font size of 18-point was used throughout the exhibit for object labels, the font size was increased for two labels that were placed on cases on the floor. This allowed visitors with low vision to read the labels without bending over.

For wall panels, the designer used a standard for legibility of the smallest font at a distance of 6 feet. Information was arranged hierarchically on the wall panels, with titles being in the largest font, main points in a secondary size, and detailed information in the smallest print.

The team used three types of object labels to keep visitors reading. Some were informative, written in a simple, declarative style; some were inquiry-based, asking the visitor to consider a specific question or do a close examination of the object; some were light-hearted and playful. Recognizing the student body as the primary target audience, some labels even joked about whether students glanced over images in textbooks instead of taking the time to “read” them properly. The curators hoped that these playful jabs would make the students think about how they approached their coursework.

For important content that might be new or confusing, such as the different types of microscopes, the information was often presented in multiple formats and in multiple locations throughout the exhibit. For example, scanning tunneling microscopes were introduced in the first section in conjunction with the optical light microscope; this information was reinforced in the nanotechnology section with an example of an STM and a second wall panel explaining differences among microscopes.