出國報告（出國類別：業務洽談，開會）

2024 East Coast United States Museum Site Visits and the Annual Meeting of the American Alliance of Museums

服務機關：國立自然科學博物館
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Summary

This report highlights the rationale and outcomes of a spring 2024 visit to the East Coast United States with the dual purposes of fostering strong relationships with peer natural history museums and attending the annual American Alliance of Museums (hereafter AAM) conference. Three museums were chosen for in-depth interviews: the American Museum of Natural History, a large, private, and ticketed museum; the Smithsonian's National Museum of Natural History, a large, public and free museum; and the Fernbank Museum of Natural History, a medium, private and ticketed museum. Additionally, with future capital projects in development, the AAM conference served as a strategic platform for discussion and learning on this year's theme, "Thriving Museums, Healthy Communities," examining the relationship and obligations between cultural and scientific institutions and their stakeholders. This is the first post-pandemic US visit by the National Museum of Natural Science.

Key Words: science communication, museum, informal science education, public engagement

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Report

I. Goals/ Aims

Between May 8 and 21, 2024, representatives from the National Museum of Natural Science (hereafter NMNS) in Taichung, Taiwan traveled to New York, NY; Washington, DC; Baltimore, MD; and Atlanta, GA.

In addition to visiting peer organizations on the East Coast, Director General Chiao Chuan-Chin, Director of Exhibitions Huang Hsu, and Curatorial Assistant Audrey Chang traveled with the following aims:

- **Meet-and-greet with key science museum leadership**: To foster professional relationships with leading natural history museums in the United States.
- **Museum research and public engagement**: To gain insights into how US-based museums promote their research, collections, engage the public, and enable the training and development of next-generation scientists and science advocates.
- **Public-private partnerships**: To explore successful models for sustainable funding and collaboration.
- **Identify collaboration opportunities**: To identify potential areas for project-based and long term future exchanges and partnerships with peer institutions and mission-aligned organizations.
- **Research content and technology applications in museums and science outreach:** To benchmark and evaluate the opportunities currently and potentially available in the marketplace for technology-driven public engagement in the sciences.

II. Background

Three major East Coast-based natural history museums were chosen for formal site visits: the American Museum of Natural History (AMNH; New York, NY), the Smithsonian Institution's National Museum of Natural History (NMNH; Washington, DC), and the Fernbank Museum of Natural History (Fernbank; Atlanta, GA).

NMNS and these three museums (AMNH, NMNH, the Fernbank) are strongly aligned in the below, thus making them a) appropriate sites for comparison of methodologies and outcomes and b) suitable partners for collaboration:

Focus on Natural History
All three museums are dedicated to the study and exhibition of natural history. They aim to educate the public about the natural world, including its biological, geological, and anthropological aspects.

Extensive Collections

Each museum houses extensive collections of specimens and artifacts:

- AMNH: Over 34 million specimens covering various fields such as anthropology, paleontology, zoology, and mineralogy.
- NMNH: Part of the Smithsonian Institution, it has over 145 million specimens and artifacts, making it one of the largest natural history collections in the world. The party toured the Museum Support Center (MSC), the off-site storage of NMNH's wet and dry specimens.
- Fernbank: While smaller in scale, the Fernbank's collections are notable for their focus on the natural and cultural history of the southeastern United States.

Open Collections at the Gilder Center for Education

Educational Mission

All three museums prioritize education and public engagement:

- They offer a wide range of educational programs, including school tours, workshops, public lectures, and outreach initiatives, as well as programs directed toward adults such as evening "science cafes," sleepovers, and others.
- They provide resources for educators, students, and lifelong learners to promote science literacy and appreciation of the natural world.

Research and Scientific Contribution

Each institution is involved in scientific research and contributes to the advancement of knowledge in natural history and the physical sciences:

- AMNH and NMNH: Conducts cutting-edge research across various scientific disciplines with scientists of all career stages (including postdoctoral researchers and fellows, undergraduate students and interns, and high school students).
- Fernbank : Collaborates with local and regional researchers on projects related to the natural history of the southeastern United States.

Temporary and Permanent Exhibitions

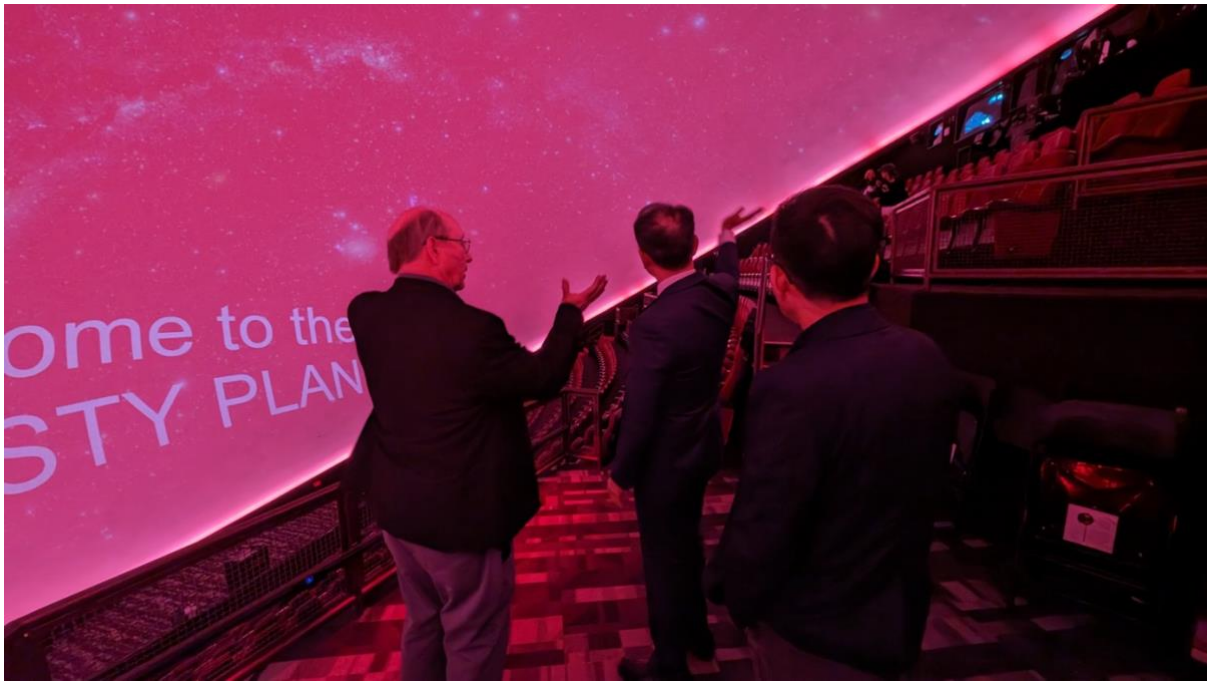
- AMNH: Of particular interest on this visit were the newly opened Gilder Center for Education, the Rose Center for Earth and Space and the recently renovated Hall of Gems and Minerals, as well as the special exhibition on elephants.
- NMNH: The party focused specifically on the renovated Koch Hall of Fossils (also known as *Deep Time*), the collaboration space with NASA, and temporary exhibitions *Lights Out: Recovering Our Night Sky*, *Unseen Connections*, and *Objects of Wonder*; the party also toured Q?rius, NMNH's hands-on learning center.
- Fernbank: With indoor and outdoor space, the Fernbank develops its own permanent and special exhibitions, as well as hosts exhibitions from partner institutions such as AMNH and the Griffin Museum of Science and Industry, among others.

Additionally, AMNH and the Fernbank have on-site theaters (indeed, AMNH serves as the site of the world-renowned Hayden Planetarium); NMNH formerly hosted an IMAX theater but closed the space in 2017 due to slowing box office sales and the need for increased food-and-beverage retail.

To meet potential content partners and to benchmark available technologies for museum and science engagement, the party visited the Liberty Science Center, AMNH's Hayden Planetarium and *Invisible Worlds*, and Mercer Labs.

The Liberty Science Center's Jennifer Chalsty Planetarium Jersey City, New Jersey, is one of the largest and most advanced planetariums in the Western Hemisphere. Opened in December 2017, its dome measures 89 feet in diameter and features a state-of-the-art projection system capable of displaying over 88 million pixels. The planetarium offers a variety of shows that explore the universe, from detailed tours of the night sky to immersive experiences. Importantly, the planetarium offers a daily live show that is delivered by a science and space communication expert; each show is curated to represent unique astronomical events through a narrative that is suitable for young and adult audiences.

The Hayden Planetarium, part of the Rose Center for Earth and Space at AMNH, is features cutting-edge technology and immersive experiences. Reopened in 2000 after a major renovation, its 87-foot-diameter dome serves as the canvas for AMNH's self-produced planetarium films. The planetarium's current main attraction, the space show *Worlds Beyond Earth*, explores the cosmos; this show, like all AMNH planetarium films, is produced by an in-house team of visualizers, artists and astronomers.



Chalsty Planetarium Director explains how the Liberty Science Center engages young and adult learners with the Omnimax dome.

Also on view at AMNH is its brand new immersive exhibition, *Invisible Worlds*, which takes visitors on a journey through the unseen dimensions of life, nature, and the cosmos. The projection-driven experience showcases phenomena that are too small, too fast, or too slow for the naked eye to perceive. Visitors can explore a variety of scales, from the microscopic world of cells and molecules to the macroscopic realms of ecosystems and the universe.

In downtown New York City, Mercer Labs of Art and Technology offers a different immersive experience, one at the intersection of creative arts and projection technology. With a dedicated experience space and a transdisciplinary creative team, Mercer Labs supports experimental works that integrate digital media, interactive installations, and art. Mercer Labs engages its diverse audiences through programs and workshops, in addition to the experience itself; it aims to serve as an innovation incubator for creative expression.

The American Alliance of Museums (AAM) Annual Meeting & MuseumExpo is a leading event in the North American museum sector. Each year, the conference draws over 5,000 participants from museums and cultural institutions representing art, history, science, and botanical gardens. This conference offers a platform for museum professionals to exchange ideas, foster partnerships, and gain insights into the latest industry trends and best practices through sessions, workshops, and networking opportunities. Additionally, the MuseumExpo hosts more than 250 vendors showcasing products and services tailored for museum applications.

AAM 2024 focuses on visitor wellbeing and engagement in museums.

Additional collaboration meetings were held with representatives from the Parsons School of Design's Design and Technology BFA/ MFA program, STEM from Dance, and Storycollider to explore potential learning/ training opportunities and future projects.

III. Process

Date	Location	Activities
5-8-2024	New York, NY	Arrival at JFK International Airport
5-9-2024	New York, NY	Parsons School of Design, Design & Technology tour; meeting with select faculty
5-10-2024	New York, NY	Meeting with STEM from Dance
5-11-2024	New York, NY	Meeting with Storycollider; working meeting Parsons School of Design faculty
5-12-2024	New York, NY	Meeting with Public Television Service
5-13-2024	New York, NY Jersey City, NJ	Tour of AMNH's Gilder Center, meetings with museum leaders from Global Business Development, Science Visualization, Philanthropy and Government Relations Planetarium demonstration at Liberty Science Center with Planetarium Director and meeting with film company GSF

5-14-2024	New York, NY	Tour of Mercer Labs Museum of Art and Technology AMNH meeting with museum President Sean Decatur, Communications, Marketing; tour of temporary exhibitions and the Hayden Planetarium, including viewing of *Worlds Beyond Earth*
5-15-2024	Washington, DC	NMNH tour of temporary and permanent exhibitions, including the newly renovated Koch Fossil Hall (*Deep Time*), and Q?rius; meetings with senior leadership representing Exhibitions and Education
5-16-2024	Washington, DC	Tour of NMNH's off site collections storage (MSC, Museum Support Center); meeting with Sant Director Kirk Johnson, Chief Advancement Officer, and Operations and Collections senior leadership
5-17-2024	Baltimore, MD	AAM Day 1: sessions and vendor meetings
5-18-2024	Baltimore, MD	AAM Day 2: sessions and vendor meetings
5-19-2024	Travel Day	Travel to Taiwan, New York, and Atlanta
5-20-2024	New York, NY	Working meeting with Brad MacDonald (Parsons)
5-21-2024	Atlanta, GA	Tour of Fernbank Museum of Natural History and meetings with Exhibitions and Education

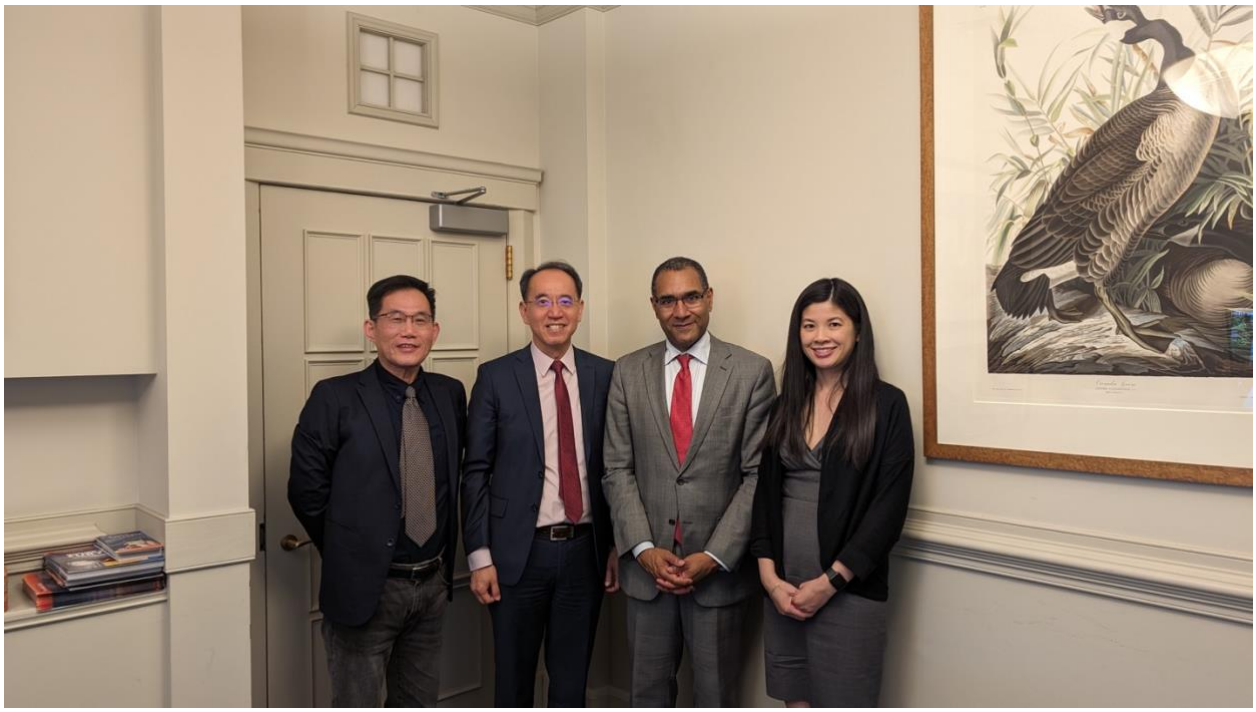
IV. Outcomes

A. Collaborations

In discussions with leadership from AMNH and NMNH, two key areas emerged as foci for joint discovery, cooperation and action.

Climate: COP30 in 2025 is an opportunity for an international forum between AMNH and NMNS, and potentially other scientific and/ or educational institutions. The exchange in 2025 or beyond (depending on funding availability) could leverage the annual COP conference and take place directly at the international meetings, as an adjacent activity at the meeting site, or take place at locations thematically appropriate to the climate theme but concurrent with COP. Activities may range from an international youth event to exhibition exchange to a workshop or conference on climate justice communication. Both museum

leaders expressed that such a collaboration will facilitate both AMNH and NMNS' international relationship development goals.



Meeting with AMNH leadership, including President Dr. Sean Decatur.

Nature: "How do you get kids interested in nature?" This simple but critical question was posed by NMNH Sant Director Kirk Johnson during a conversation on the role of natural history museums in today's society. Interest in the natural world is the first required step to engaging future generations in investment in learning and conservation of nature and its resources. Both NMNH and NMNS promote understanding of the natural world through their strong permanent and temporary exhibition programs. While "traditional" presentation such as nature dioramas continue to appeal to audiences, both institutions are also exploring emerging technologies as pathways to engaging 21st century audiences. *Lights Out: Recovering our Night Sky* is an NMNH-produced temporary exhibition that may serve as a future collaboration opportunity between the two national-level science museums.

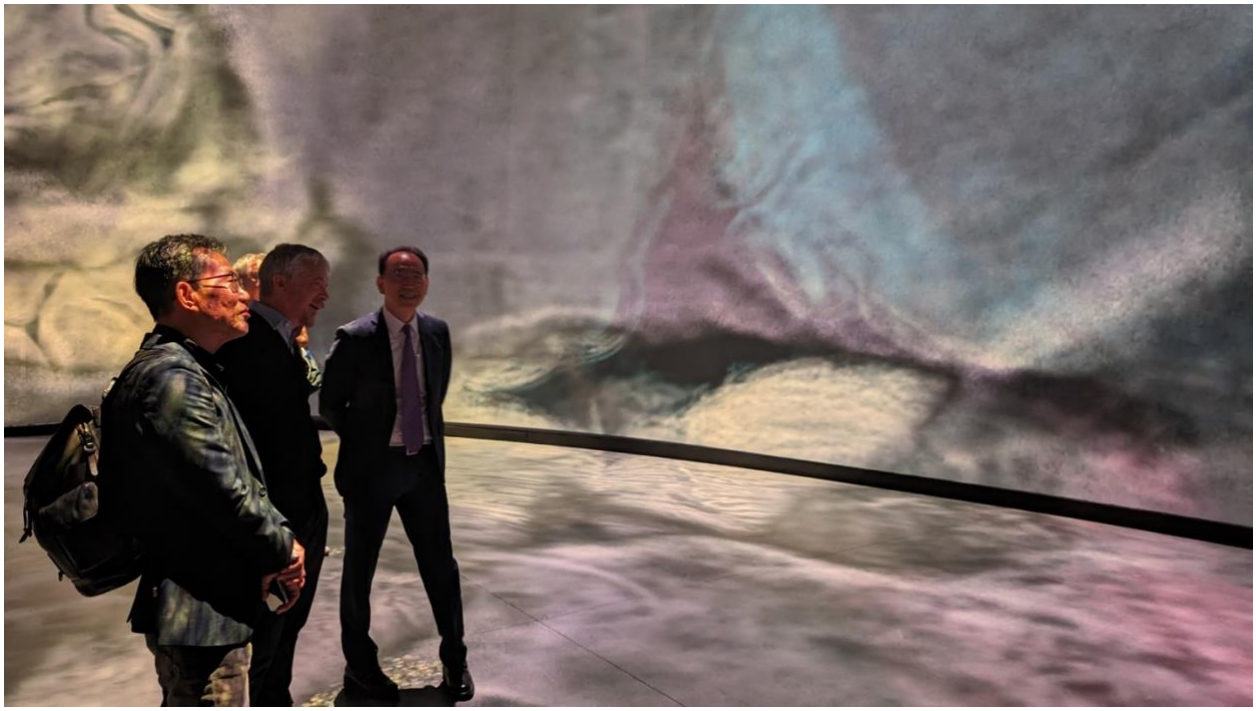
Meeting with Sant Director Dr. Kirk Johnson at the NMNH.

B. Film and Technology Programming

In preparation for theater hardware upgrades and content programming planning, the party viewed the following:

- *Worlds Beyond Earth* planetarium film and *Invisible Worlds* immersive experience at AMNH
- A live planetarium program led by Director Mike Shanahan at Liberty Science Center
- Multiple sound and image demonstrations at the 3D theater at the Liberty Science Center
- *Limitless* by artist Roy Nachum at Mercer Labs
- *Root for Nature* by OASIS and the National Geographic

Parsons School of Design faculty members and immersive creators C.H. Tu and Brad MacDonald also provided additional background and recommendations on the current state of immersive technologies, with particular emphasis on their museum applications.



Experiencing the newest science and art immersive experiences.

C. Exhibitions and Content

To better understand physical space programming and the marketplace for content (as either recipients or producers of exhibitions), the party met with representatives from the following organizations at AAM:

- Blue Rhino
- Field Museum

- Imagine Exhibitions
- National Geographic
- Ontario Science Center
- Science Museum of Minnesota
- World Heritage Exhibitions

Additionally, the party consulted with the technology and visualization production team at AMNH, the exhibitions development and writing team at the NMNH, and the visitor engagement team at the Fernbank. With NMNH, the party additionally discussed and experienced the exhibition evaluation process, and how NMNH integrates evaluation into its education and exhibitions programs as part of its decision-making and planning processes.

Museum exhibitions addressing science, technology, art and society.

D. Research and Collections

1. Museums as research facilities

Both the AMNH and NMNH are sites of active research and include staff scientists, postdoctoral fellows, graduate students, undergraduate researchers, and visiting faculty and curators as part of their scientific program. At NMNH, the party discussed the impact of programs such as the Research Experience for Undergraduates (REU) on museum outreach and training efforts. NMNH additionally shared that its current scientific staff includes the following:

Staff Researchers: 257

- 58 Research Curators
- 178 Collections Staff
- 21 Others

Research Associates: 539

Postdoctoral Fellows: 221

- 115 Post-Docs
- 99 Graduate/Pre-Doc
- 7 Others

Interns: 119

Science Volunteers: 89

2. Collections-focused research project

In 2023, a team of museum researchers and collection managers led by the NMNH jointly published an article in Science magazine accounting for the collections inventories of 73 large museums and herbaria. The authors of the paper state that this methodology is critical to informing current and future sustainability and conservation efforts. Noticeable in this study is the paucity of inclusion of South, East, and Southeast Asian countries in the Pacific and Indian Ocean regions. In discussion with NMNH study leader and museum director Kirk Johnson, Dr. Johnson suggested that NMNS might spearhead such an effort in the Asia-Pacific region.

3. Open collections

Collections have historically served vital roles in museum research and indeed frequently are part of a museum's identity and raison d'etre. More recently, collections are being opened to the public for education and programming – objects in the collections can connect visitors with the past and help them envision their future. As such, many museums, notably The Natural History Museum in London, UK have constructed "open collections" facilities to that end.

AMNH's Gilder Center for Education is perhaps the most recent example of a major effort in open collections. The objects are housed behind glass partitions in the south wall of the newly-constructed education space; visitors are able to view more than 3000 representative objects from AMNH's collections. The purpose of the collections, as well as descriptions

and other information about the objects, are contextualized by exhibits flanking the glass partitions. This is a model for consideration and evaluation as NMNS considers its future renovation projects, specifically the Life Sciences Hall.

Collections as intentional exhibition subjects in museums.

4. Collections management

NMNH's Museum Support Center (MSC) houses more than 31 million objects (of NMNH's 148 million) across multiple acres in Suitland, MD. In visiting the MSC, the party were able to learn best practices for storage, disaster mitigation, and general collections policy management. NMNH provided their 2023 revision to their collections management, including the policy regarding human remains and repatriation.

NMNH's Museum Support Center houses one of the world's largest natural history collections.

E. Operations

1. Accessibility

Museum site visits and meetings with AAM vendors specializing in museum accessibility solutions demonstrated the current best practices and technologies available for creating accessible visitor experiences. Products range from 3D wayfinding tools and maps to audio equipment for visual descriptions (to accompany exhibits) to touchable replicas.

Touchable science exhibitions to support visitors with visual impairments.

2. Master planning

The Gilder Center for Education at AMNH, the Koch Fossil Hall and atrium at NMNH, and the outdoor exhibition space at the Fernbank all provided appropriate benchmarks for future NMNS capital projects. Additionally, at AAM, the party met productively with Senior Principal from the Thinkwell Group, who managed the visitor experience master planning for NMNH in 2015-2016; this project aimed to elevate visitor experience by optimizing throughways in the historical (and constrained) museum space on the Mall while also engaging visitors in learning experiences, dining, and retail.

The Fernbank's new outdoor science education space was added as part of their visitor experience master plan.

V. Recommendations

A. Adopt: methodologies and practices that can be integrated in NMNS' near term operations

- Revising the Museum's collections policies to be copacetic with international museum standards, with consideration for objects that represent Taiwan's peoples, flora and fauna while also reflecting regional and global biodiversity and cultures; special attention should be directed to objects from indigenous cultures, whether they are human remains and/ or funerary objects.
- Enabling scientific fellowship opportunities for undergraduate researchers and postdoctoral fellows, to enhance the Museum's research output and inclusivity of additional emerging scientific talent. To demonstrate the value of museum-based research, fellowships might include science communication and science outreach requirements, leveraging a program's impact on future professional science communities.
- Professionalizing science communication as a specialized skills area for exhibitions and other museum disciplines, to professionalize the textual and verbal vehicles for engaging with the Museum's visitors. Areas for near-future investment may include

science writers for exhibitions and marketing and/ or live space show storytellers for the Museum Omnimax dome theater.

B. Update: improvements to NMNS' facilities and operations systems

- Prioritizing accessibility upgrades to NMNS' campus, facilities and exhibitions, to serve visitors more inclusively and equitably.
- Upgrading the projection and display technologies in NMNS' theater spaces, to offer more compelling and mission-centric content to visitors, while supporting the Museum's revenue goals.
- Enhancing visitor journey through dedicated experience planning process, accounting for wayfinding, food-and-beverage, retail, rest, and entrance/ exit points; additional consideration may include the interaction between NMNS' indoor vs outdoor spaces, the Museum and its science center, and separately charged attractions such as its existing theaters or potential future digital-entertainment opportunities.

C. Invest and Innovate

- Engaging new audience types through art-science collaborations, to challenge visitors to consider their relationship with science and technology through artistic expression and social dialogue. The transdisciplinarity of NMNS' practice is already well reflected in collaborations between peer institutions (e.g., the National Museum of Marine Biology and Aquarium), with social science research, and theater. Art-science exhibition and programming collaborations may forge new relationships in the fine arts and with design and technology organizations both in Taiwan and abroad, while potentially appealing to young adults and visitors who typically identify as "art museum visitors."
- Experimenting with immersive and other emerging technologies, to not only evaluate their efficacy in STEM learning but to develop metrics and tools for evaluation. The museum and science center communities both are ambivalent on technology investments. Arguments for include audience expectations, new methods for storytelling and science communication, necessity of experimentation; arguments against range from cost of start-up and maintenance to managing visitor relationships between technology and "real" collections objects. Tactical investment accompanied by culturally meaningful evaluation frameworks and tools might offer a path forward for NMNS.