

Jeffrey Rudolph
President and CEO, California Science Center,
On behalf of the American Alliance of Museums
House Committee on Appropriations,
Subcommittee on Commerce, Justice, Science, and Related Agencies
March 21, 2013

Mr. Chairman, members of the Subcommittee:

Thank you for inviting me to testify today. I'm Jeff Rudolph, President and CEO of the California Science Center. I have previously served as chair of the board of the American Alliance of Museums and the Association of Science-Technology Centers.

I am here on behalf of the museum community, including the Association of Science Museum Directors, to request that the Subcommittee continue its strong support of informal STEM education and investing in the National Science Foundation's Advancing Informal STEM Learning, or AISL, program and the informal science education efforts of NOAA and NASA.

AISL received 61.4 million dollars in Fiscal Year 2012. I strongly concur with the request made by Bud Rock, CEO of the Association of Science-Technology Centers in his written testimony for report language to clearly direct NSF to **return the focus** of AISL in support of public engagement in science. This would reverse the recent trend of focusing AISL funding on formal (university-led) research at the expense of effective educational and public engagement programming conducted through museums.

As you know, STEM education is critical to our nation's economic strength and global competitiveness. Museums throughout the country play a vital role in our nation's STEM Education efforts. In its 2009 report "Learning Science in Informal Environments.", The National Research Council of the National Academies found powerful evidence in support of the value of and need for STEM learning in **non-school** settings. It also found that informal learning in museums can have a significant impact on science learning outcomes for those historically underrepresented in STEM fields.

At the California Science Center, we serve almost 2 million guests annually. Our sole focus is to stimulate curiosity and inspire science learning. Our expertise is in communicating science and inspiring interest in science. We have conducted 24 studies over a ten year period in an effort to measure our impact on science learning in our community. The research, published in the Journal of Research on Science Teaching, found that we have had a significant impact on science learning. Over 79% of parents reported that their children's science center experience increased their interest in and understanding of science. The impact of the California Science Center on children from underrepresented and low income families was even greater.

Similar outcomes could be found at museums across the nation, including the Steven F. Udvar Hazy Center of the Smithsonian National Air and Space Museum in Chairman Wolf's district; the Gulf Coast Exploreum in Mr. Bonner's district; the Bronx Zoo in Mr. Serrano's district; and the Adkins Arboretum in Mr. Harris' district.

AISL grants have provided critical investments in research and development of innovative and field-advancing out-of-school STEM learning. Support for programs such as the Franklin Institute Science Museum and Free Library of Philadelphia's afterschool program engaging children and families from diverse audiences in science and literacy has provided important support for advancing the field and our ability to inspire and motivate the next generation of scientists, engineers and explorers.

Once again, I appreciate the opportunity to testify. I encourage you to recognize the importance of STEM education provided by museums and science centers in our communities. I also encourage your support of continued funding of the AISL program at its current 61.4 million dollar level and the inclusion of report language to clearly direct NSF to use the AISL program to continue support of engaging the public in STEM learning.

I am happy to answer any questions.

Written Testimony
Jeffrey Rudolph
President and CEO, California Science Center,
On behalf of the American Alliance of Museums
House Committee on Appropriations,
Subcommittee on Commerce, Justice, Science, and Related Agencies
March 21, 2013

Chairman Wolf, Ranking Member Fattah, and members of the Subcommittee, thank you for the opportunity to testify today. I am Jeffrey Rudolph, President and CEO of the California Science Center. I also previously served as Chair of the Board of the American Alliance of Museums, and am here to represent the Alliance and the larger museum community—including the Association of Science-Technology Centers and the Association of Science Museum Directors—to request that the Subcommittee make a renewed investment in the **Advancing Informal STEM Learning (AISL) program at the National Science Foundation (NSF)**. We urge you to provide \$61.4 million, equal to the FY 2012 funding level, and to reject the President’s Fiscal Year 2013 (FY13) budget request which called for only \$47.82 million, a significant, 22% decrease.

The American Alliance of Museums represents the full range of our nation’s museums – including aquariums, arboretums, archaeological museums, art museums, botanical gardens, children’s museums, culturally specific museums, historic sites, history museums, maritime museums, military museums, natural history museums, nature centers, planetariums, presidential libraries, science and technology centers, zoological parks, and other specialty museums – along with professional staff and volunteers who work for and with museums. The Alliance is honored to work on behalf of the 17,500 museums nationwide that employ 400,000 people, and annually spend over \$2 billion on K-12 educational programming, receive more than 90 million visits from primary and secondary school students, and directly spend \$21 billion in their local economies.

One of society’s greatest challenges is determining how to engage the next generation in the sciences. Museums offer the perfect learning environment – where science, technology, engineering, and mathematics (STEM) education is brought to life through activities and experiences that build a lifetime of interest and enthusiasm for the sciences.

There is a growing consensus that whatever the new educational era looks like, it will focus on the development of a core set of skills: critical thinking, synthesizing information, ability to innovate and think creatively, and collaboration. Museums are uniquely situated to help learners develop these core skills. Millions of Americans of all ages and backgrounds

already learn about STEM subjects each year by visiting museums, science centers, public gardens, zoos, and aquariums.

In 2009, the National Research Council of the National Academies released a report entitled *Learning Science in Informal Environments: People, Places, and Pursuits*, which found:

- “Each year, tens of millions of Americans, young and old, explore and learn about science by visiting informal learning institutions, participating in programs, and using media to pursue their interests.”
- “Do people learn science in nonschool settings? This is a critical question for policy makers, practitioners, and researchers alike – and the answer is yes.”
- “Designed spaces – including museums, science centers, zoos, aquariums, and environmental centers – can support science learning. Rich with real-world phenomena, these are places where people can pursue and develop science interests, engage in science inquiry, and reflect on their experiences through sense-making conversations.”
- “Virtually all people of all ages and backgrounds engage in informal science learning in the course of daily life. Informal environments can stimulate science interest, build learners’ scientific knowledge and skill, and – perhaps most importantly – help people learn to be more comfortable and confident in their relationship with science.”
- “Informal environments can have a significant impact on science learning outcomes for those who are historically underrepresented in science.”

NSF is providing crucial funding to support museums’ educational missions and efforts to improve STEM education.

The mission of NSF’s Directorate for Education and Human Resources (EHR) is to achieve excellence in U.S. STEM education at all levels and in both formal and informal settings in order to support the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians and educators and a well-informed citizenry that have access to the ideas and tools of science and engineering. The purpose of these activities is to enhance the quality of life of all citizens and the health, prosperity, welfare and security of the nation.

EHR’s Advancing Informal STEM Learning program—funded at \$61.4 million in FY12—invests in research and development of innovative and field-advancing out-of-school STEM learning and emerging STEM learning environments. AISL invests in four types of projects that are specific to the program: Research; Pathways; Full-Scale Development; and Broad Implementation.

In addition to AISL, the Directorates for Biological Sciences; Education and Human Resources; Geosciences; and Social, Behavioral & Economic Sciences have all supported museums in the areas of field and collections-based research, collections improvements and digitization, database development, and educational programming. Museum exhibitions and educational programs and resources are built on a firm foundation of research, and museum researchers are making major original contributions to the understanding of important issues such as changes in climate, environments, biodiversity, and human culture. I urge the Subcommittee to fully fund these important directorates.

Following are two examples of how NSF-AISL is helping museums provide increased access to their unique resources and fulfill their potential in educational improvement.

Example #1: The Franklin Institute Science Museum/Free Library of Philadelphia, PA

LEAP into Science is a partnership between the Alliance-accredited Franklin Institute Science Museum and the Free Library of Philadelphia that engages children and families in science and literacy by integrating hands-on science activities with children's literature. This effort was supported by a \$1.2 million 5-year NSF grant which was awarded to build a model museum/library partnership to promote science and literacy.

The Franklin Institute's strength in science programming and the Library's expertise in children's literature result in an innovative afterschool program connecting books and science. The library environment is an ideal setting for informal science programs. With ready access to books and the Internet, and a desire to support kids' scientific exploration, libraries can provide educational science opportunities for children and families during after-school hours and on evenings or weekends. *LEAP into Science* aims to inspire exploration and questioning, providing opportunities for children and families to think like scientists and investigate scientific phenomena with familiar materials and relevant children's fiction and nonfiction books.

LEAP into Science aims to achieve the following impacts:

- Increase science interest, understanding, and engagement by involving underserved families in cross-generational science and literacy experiences;
- Make science accessible to a diverse audience by bringing science activities into community settings; and
- Build community capacity and provide training and experience in informal science and literacy connections to library afterschool staff and children's librarians.

LEAP into Science curriculum resources consist of afterschool workshops designed for children grades K-4 which integrate hands-on science activities and children's books, family workshops which engage children and adults in tabletop science activities linked with related children's books, as well as science bookmarks and exploration cards which extend learning in the home environment.

Another central goal of *LEAP into Science* is to demonstrate how museums, libraries, and other educational institutions can work together to enhance the capacity of urban communities to engage children and families in science. In 2011 and 2012, *LEAP into Science* expanded to 10 new sites nationwide to broaden the reach of this powerful effort.

Example #2: Exploratorium, San Francisco, CA

The Exploratorium, in collaboration with the Boys and Girls Club Columbia Park (BGC) in the Mission District of San Francisco, received a \$525,000 grant in 2012 to implement a two-year exploratory project that supports informal STEM education within underserved Latino communities. Building off of and expanding on non-STEM-related efforts in a few major U.S. cities and Europe, the Exploratorium, BGC, and residents of the District engage in a STEM exhibit and program co-development process that physically converts metered parking spaces in front of the Club into transformative public places called "parklets." The BGC parklet features interactive, bilingual science and technology exhibits, programs and events targeting audiences including youth ages 8 - 17 and intergenerational families and groups primarily in the Mission District and users of the BGC. Together, participants explore concepts underlying the science of sustainability and how patterns and processes at the local and regional scales are inextricably linked to global phenomena. With STEM education's critical role in the twenty-first century economy, programs like this one, that bring critical skills and experiences to underserved communities, are vital both to those they serve and to our economic future.

Conclusion

I appreciate the opportunity to present these views today, and urge the Subcommittee to fund the AISL program at \$61.4 million -- equal to the FY 2012 funding level-- so we can continue to inspire young and old in science, technology, engineering, and mathematics and fulfill our potential of improving the educational landscape.