

## **In Search of Earth's Secrets: Year 2 External Evaluation Report**

Year 2 of the AISL project marked a significant milestone in the implementation of the project's work. The plans for the exhibit created and piloted during Year 1 were initiated with the creation of the—now named—*In Search of Earth's Secrets* exhibition. The external evaluation team, Drs. Tina Bishop and Howard Walters, and joined by Mr. Peter Tuddenham (also of The College of Exploration), undertook significant formative efforts during this year, but also began the transition to monitoring and summative evaluation efforts during the three installations of the exhibit in: 1) Martinsville, Virginia; 2) New Brunswick, New Jersey; and 3) Brooklyn, New York; in the spring and summer of 2018. This report will summarize the formative efforts during year two up through the leadership training in College Station, Texas, and the exhibition impact data through the New Jersey site. As of the date for this final annual report, the Brooklyn, New York exhibition is underway, with data only beginning to emerge.

### *Formative and Training Data*

The evaluation team participated in a sequence of team planning phone conferences and observed substantive interaction between the exhibit design/build contractor and the leadership team. This interaction included distribution of pilot versions of the video segments (initially via YouTube to facilitate group access) and which incorporated a survey instrument to obtain team input on the project video materials and web site information. These surveys were intended to support project leadership formatively, as were the consistent communications efforts in the first half of the project year, leading up to a training workshop early in 2018. The

use of these formative surveys by the project director, as well as the consistent schedule of communications calls is evidence of effective administrative procedures and oversight of the project, as well as a determined desire to seek excellence through wide participation by the broader community related to the project as described in the project narrative.

From January 28 through February 2, 2018, the first annual project training workshop was implemented in College Station, Texas, at the International Ocean Discovery Program (IODP) headquarters at Texas A&M University. Attending the workshop were the leadership and site representatives for the first three exhibitions of the project (Martinsville, Virginia; New Brunswick, New Jersey; and Brooklyn, New York) as well as select JRON Community members (scientists, former School of Rock teachers consulting on the project, the project director and evaluation team members, and the exhibit design/build contractor). The exhibit was shipped to the IODP facility for staging purposes and to train the exhibit teams on installation and assembly. It was perceived by all of the attendees that the piloting of the exhibition assembly using the actual exhibit was extraordinarily valuable—though physically demanding on the team members—for identifying challenges and issues with respect to the physical shipping and assembly of the exhibition, but also challenges and opportunities for educational programming during the exhibitions. The exhibit was fully assembled and a pilot public program was provided to personnel, friends and family members of the IODP facility as a test run of the exhibit prior to its first official exhibition. The evaluation team provided two surveys during or following this workshop, which are summarized below.

First, a survey was provided to the team members who assembled from the first three exhibition locations to be held during year two of the project (locations delineated above). For the twelve site team members who completed the survey, there was a consistent, strongly positive perception of the value of the workshop in preparing them for their upcoming exhibitions, although there were clear indications of some uncertainty and concern expressed. At the end of the workshop, 100% of twelve respondents agreed or strongly agreed that their knowledge of the exhibit content, assembly and repacking of the exhibit, and their comfort level was positive. These respondents also expressed satisfaction with the length and structure of the workshop, and particularly with the time provided to assemble the exhibit. They all strongly agree or agree that they are prepared for the exhibit installation.

These perceptions seemed clearly related to the novel tasks associated with assembly of the new exhibit, and perceptions of the physical challenges from moving heavier parts of the exhibit. None of these perceptions rose to a level that necessitated a redirection of the project plans, however. A number of positive recommendations and observations did emerge, and which have been or are being addressed by project leadership. These include the need to revise the exhibit assembly manual, a need for better labeling of exhibit parts—much of which was undertaken immediately during the training workshop, as well as numerous, discrete recommendations for sequencing the assembly and installation when it begins to travel. The evaluation team observed similar opportunities for enhancing the exhibit experience, as did project leadership. The consistency of these

observations with the survey responses, and the immediate movement in responding to these observations by project leadership is substantive evidence of effective management, and suggests movement toward overall project success in the face of the complexities of the exhibit.

As a second evaluation strategy tied to the training workshop, the evaluators disseminated a survey to the IODP and JRON scientists and staff members who had visited the exhibition on site at IODP for the “friends and family event.” We note that this JRON community (and scientists) are a critical audience for this project. A total of sixteen respondents with encompassing knowledge of the science and engineering technology incorporated in the exhibit content provided feedback. Among the respondents, 69% (n=11) perceived that the exhibit content illustrated the work that they personally accomplish at IODP or aboard the drilling vessel. All (100%) respondents perceived, after visiting the exhibit, that it had high potential for engaging and informing the public about ocean drilling and related research. Fifteen of the respondents (94%) reported that the exhibit’s scientific content was accurate (One respondent initially reported an inaccuracy, but corrected this response in her narrative by indicating that “it was not necessarily inaccurate but potentially misleading” and then provided further explanation that this concern was related to the accuracy of a source citation that was questionable.)

Scientists responding to the survey expressed and described a number of benefits and strengths of the exhibit. Select narrative quotations as follows were typical of these responses: “The public will learn more about marine science and learn first hand what we actually do on a ship like this and why we study cores.”

“The public will be exposed to a scientific program that has been around for fifty years but that they maybe didn’t know about...it gives them a much broader view of the world, science, and maybe even a type of job they might want to pursue in the future.” “I thought the activity centers were as good as any I’ve seen at a museum in Houston...This should be huge in creating interest in kids for the sciences.” “ Overall, it is excellent and very engaging.”

Such strong support from the IODP science community whose work is represented in this exhibit is an important observation for the project evaluation. Of even more importance, however, is the observation that the most informed scientists with regard to the content of the exhibit have reviewed the content, found it scientifically accurate, and endorsed the exhibit for the public. This enhances an assertion of the credibility of the exhibit and its value as a source of accurate science education for the identified communities and populations that it will serve.

The use of formative data by the project leadership during the exhibit design phase and the personnel training phases, as well as through this first year of exhibition (project year two) has been a consistent strength of this AISL project and team. As with any new project of this type, there is a substantive need for creativity, flexibility, and responsiveness. The formative evaluation processes, and the deep involvement of the evaluation team as an instrument of assessment themselves, has positioned this project for success. During year three, as the project evaluation turns to more emphasis on impacts and achievements, the team will nevertheless invest effort in reflecting on, and learning from, the uses of formative assessment as a structural element in this overall project.

### *Exhibition Impact Data*

The *In Search of Earth's Secrets* exhibit opened for its first public event at the Virginia Museum of Natural History, in Martinsville, Virginia, then moved to New Brunswick, New Jersey (Rutgers University) in April 2018. It then moved to Brooklyn, New York in early June 2018.

The evaluation team attended the opening event in Martinsville to observe and collect participant assessment data as a first effort at ascertaining the summative impact of the exhibit and its related programs (reported below). The evaluation team also attended the opening of the exhibition in New Brunswick, attending the Rutgers Day event, and visiting the Geology Museum and also the New Brunswick Public Library events. Because of budget constraints, the evaluation team has not currently visited the New York site.

The evaluation team designed two visitor impact surveys to pilot at the exhibition. One is a traditional paper-based instrument, which is administered to visitors as they exit the exhibit space when the entire *In Search of Earth's Secrets* exhibit is intact. The second is an iPad-based, electronic survey, which is an abbreviated version of the paper-based survey and is being used at both intact exhibit sites and at sites where only select elements of the exhibit are located. Ten, extensive paper surveys have been completed, representing a total of thirty-six individuals (families were provided only a single survey for an adult to complete), and sixty-six electronic surveys have been completed, representing a total of approximately 327 individuals (note: additional paper surveys are currently being

collected at the New York exhibition). The survey summaries are provided separately as follows.

The iPad based survey was piloted to allow for larger response groups in less time and with less intrusion into visitor schedules than the lengthier paper survey. The use of electronic survey systems is a widely utilized market research technique in the private sector, but less regularly utilized in public education and educational research sectors. The success of this pilot system in this context suggests a possible path forward for incorporating business sector strategies for data collection in museum and exhibit contexts and will be continued with this exhibit moving forward. Respondents indicated strong, positive ratings for the exhibit overall, with 77% (45 responses) and 23% (13 responses) rating 5 (highest) or 4 (second highest) quality points for the exhibit. Fifty-nine respondents indicated agreement with the statement “This exhibit increased my interest in science,” which is one of the target goals for the exhibit overall. It is noted that these responses were limited, but the reader is reminded the purpose of this iPad survey during year two was to test the utility of the technology. The iPad system will be replicated at the third exhibition in New York, with expanded question sets on the survey at that point.

The paper-based visitor survey was more expansive, allowing for more detailed information collection from respondents. The demographic items on the respondent reflect six female and four male respondents, and nine Caucasian and one African American respondent. The ages were widely distributed across the bands from 12-17 (one respondent), 18-29 (three respondents), 30-49 (2 respondents), 50-69 (three respondents), and one respondent in the 70 or over

category. Eight of the respondents indicated Rural as their primary residence, with two indicating Urban. Visitors were asked to describe the exhibit with respect to recommending it to friends and family. All respondents indicated that they would recommend the exhibit, with descriptions provided that included: “there was a wealth of information in an interesting setting...it was an amazing visual experience...So well done! Something for everyone! (And) it is an interesting and a learning experience.” Overall, there were no negative reactions to the exhibit, and two respondents provided additional, final comments: “Great exhibit! Great for Southwest Virginia where there are not a lot of opportunities to see this quality of science exhibit...Great for younger audiences, and I enjoyed the hands on activities.”

The evaluation team perceives that a combination of the iPad survey and the paper-based survey may be an ideal combination for gauging visitor impact at this stage of the exhibit installation process. The iPad is shorter and lacks the detail of the paper survey, but it is less time-intensive and intrusive on visitors, which seems critical in the context of a walk-through exhibit space in an organization where there are either many more exhibits drawing the visitors’ attention (in the case of a science museum) or where the exhibiting organization is not primarily a display organization and where visitors are likely to have other, more primary motives for being at the facility (in the case of a community library or shopping facility). This issue will continue to be considered and discussed by project leadership and the internal and external evaluators.

Programmatically, the project includes not only the exhibit installation itself, but also a variety of supplemental events offered in conjunction with the exhibition

that are collectively termed *Drill Down* events. The intent of these is to provide additional, in-depth learning experiences to a variety of audiences held in conjunction with the installation of the exhibit. For the Martinsville, VA, exhibition, there have been at least four different Drill Downs implemented: an intense workshop for training of Girl Scouts, who were then scheduled as Volunteer Docents during and in the exhibit to interpret the science for visitors. The second and third Drill Downs implemented in Virginia included two different live-streaming broadcasts: one with a scientist from IODP in College Station, TX, and one with a scientist aboard the JOIDES Resolution drilling ship. The final Drill Down included a book reading by a member of the JRON community who authored a book for children on a previous, pilot phase of the AISL project. In New Jersey, the Drill Down events included a quasi-public university festival (Rutgers Day), the Girl Scout training, open house, and a Girl Scout career night event; a “late night” at the museum event at the Rutgers Geology Museum; a *Cinco de Mayo* Festival; a book reading with JRON educator and author Kevin Kurtz; and a variety of other library events and opportunities.

The external evaluators attended two live-stream broadcasts (Virginia) to observe the use of the technology with the public, and to observe visitor/participants for formative planning purposes in conceptualizing future evaluation of these program elements. Additionally, the evaluators attended several library based opportunities in New Jersey.

A formal survey was developed and implemented to the Girl Scouts (or other youth) at the conclusion of their training events at each of the three state exhibitions as a more formal evaluation of a single type of Drill Down event during year two.

On February 9-10, 2018, a group of Girl Scouts were assembled for a Friday evening training event, with an overnight “camp in” program at the Virginia Museum of Natural History, and again on April 21 at the New Jersey site. Forty-three girls completed the post-training survey. Each of the girls indicated positive perceptions of the experience. A series of “before and after” questions were provided to the girls pertaining to knowledge of science topics addressed, careers at sea, the deep-sea drilling program, the JOIDES Resolution ship, ocean sciences, geology, and STEM careers. A chi square analysis of the change in perception before training and after training provides evidence of statistically significant knowledge changes based on experience in the workshop ( $\chi^2=4.3$ ,  $p<.01$ ), although this is qualified with the observation that these are self-reported responses by the participants and should be reevaluated with supportive data. The evaluators will be replicating the youth survey in New York, as well as following up with Girl Scout leadership to ascertain if there is additional support for Drill Down learning by youth participants. It should be noted that the evaluators observed the Girl Scouts volunteering at the Martinsville exhibition, and also interviewed several girls at both Martinsville and in New Brunswick. Observation data support high involvement of the girls in interpreting the exhibit, as well as content accuracy in their interactions and explanations with the public. From the perspective of the

exhibit itself, as a formative evaluation, there were no negative responses from the girl scouts on the survey items that warrant consideration.

Overall, initial reporting from the Site Coordinators in Virginia and New Jersey, using a Site Coordinator Log completed weekly, documents a total of nearly 6,400 individuals have attended the In Search of Earth's Secrets exhibition (note: this is only documented attendance; public festival events in open spaces clearly account for thousands of additional individuals). Of these, it is estimated by Site Coordinators that the highest proportion of attendees are from Urban communities (noting that this is skewed from the initial Virginia site, that was essentially rural, to the urban communities of New Brunswick and Brooklyn). It is additionally observed that the impacted youth are primarily females because of the adoption of Girl Scouting as a primary vector for training for exhibit volunteers and Drill Down, enhanced science teaching.

The evaluators do perceive a systems concern with the overall project evaluation that will require continued discussions with the project leadership team. The *Drill Down* events are highly diverse, representing a wide range or potential range of instructional methods and learning goals. In the Martinsville exhibition, the *Drill Downs* included lectures, a book reading, distance touring of the JOIDES Resolution, and a formal training workshop for young adults. In New Brunswick, there were public festivals, library events, evening museum events, as well as additional arrangements of the kiosks. There are no efficient methods for evaluating such a wide range of programs within existing resources. For year two, this has necessitated a careful curating of evaluator effort linked to programs. This

issue will continue to be monitored and discussed among the program leadership team, and will likely be revisited in year three planning efforts this coming winter.

In conclusion, the evaluation efforts undertaken to date for year two—reflecting two installations of the exhibition and related *Drill Down* events—demonstrate the overall project is successful in meeting its stated goals and objectives. There is evidence of proactive leadership, problem-solving, appropriate flexibility to adapt to changing contexts of exhibit use and personnel realities. There is emerging evidence of high demand for year three use of the exhibit, as well as increased sophistication and expertise in the design of exhibit supplemental materials, activities, and *Drill Down* events. The evaluation team does not perceive any unmet challenges or needs for reconceptualization of the project moving forward (that have not already been addressed by project leadership).

Finally, the exhibit is currently in New York, centered out of Brooklyn in the highly urban, diverse and multi-cultural communities of that metropolis. At the time of the submission of this report, the data for this New York exhibition have not been analyzed, or completely collected. These data will be included in a supplemental evaluation report in Winter of 2018.