STAR_Net Summative Evaluation Report

PREPARED FOR

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Space Science Institute's National Center for Interactive Learning

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STAR_Net
Executive Summary of the Summative Evaluation Report, December 2013

STAR_Net brings inquiry-based STEM[1] learning experiences to public libraries through two traveling exhibits, associated programming for library patrons, and a virtual community of practice for library staff and others who are interested in bringing STEM programming to libraries. In 2010, the National Science Foundation (NSF) awarded a three-year grant to the Space Science Institute's (SSI) National Center for Interactive Learning (NCIL) and its partners—the American Library Association (ALA), the Lunar and Planetary Institute (LPI), and the National Girls Collaborative Project (NGCP)—to develop a hands-on learning program for libraries and their communities.

Evaluation & Research Associates (ERA) conducted the summative evaluation of the STAR_Net project, investigating the implementation of the project and its impact on library staff and patrons. Methods included pre- and post-exhibit surveys administered to staff from each library that hosted the exhibits; interviews with staff from host libraries; patron surveys; exhibit-related circulation records; web metrics regarding the online STAR_Net Community of Practice; and site visits to five *Discover Earth* and *Discover Tech* libraries, during which patrons and library staff were observed and interviewed.

> **STAR_Net professional development helped *Discover Earth* and *Discover Tech* librarians host the exhibits and deliver informal science education programming.**

- Although the majority of the *Discover Earth* and *Discover Tech* directors and coordinators had facilitated STEM programming prior to becoming involved in STAR_Net, most did not have extensive experience with such programming. Half of the directors and coordinators had facilitated three or fewer STEM-related programs, including 15% who had never facilitated such activities. Only 15% of STAR_Net directors and coordinators reported that they had received training focused on how to implement science or technology programs for library patrons prior to STAR_Net.

- Participating librarians generally found the STAR_Net professional development to be helpful, and the project team to be responsive. Most librarians said the initial kick-off trainings prepared them to host the exhibit, and that the follow-up webinars about informal science activities helped them deliver exhibit-related programming.

- Librarians from both exhibits increased their knowledge about exhibit-related topics six months after they had hosted the exhibit. However, *Discover Tech* librarians reported greater gains in their knowledge and greater expertise in exhibit-related topics than *Discover Earth* librarians. The pre-/post-surveys asked librarians to rate their knowledge about several exhibit-related topics on a five-point scale from 1=Beginner to 5=Expert; librarians were asked a set of questions about either engineering or earth sciences, depending on the exhibit they were hosting (for example, *Discover Tech* librarians were asked to rate the extent of their knowledge about who engineers are, while *Discover Earth* librarians were asked to rate the extent of their knowledge about the difference between weather and climate). On average, *Discover Tech* librarians increased their knowledge from 1.83 to 3.20 on the five-point scale—an increase of more than one point. *Discover Earth* librarians increased their knowledge from an average of 2.45 to 2.70—an increase of a quarter of a point on the five-point scale. In

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[1] STEM stands for science, technology, engineering, and mathematics.

interviews, several library staff said the STAR_Net training and resources had increased their knowledge of earth science or engineering and technology topics.

- Many *Discover Earth* and *Discover Tech* library staff also became more interested in developing and delivering STEM-based library programming as a result of their involvement in STAR_Net. They became more knowledgeable about how to create and deliver such programs as well as more confident in their abilities to deliver informal science programs effectively. On a set of pre-/post-survey questions designed to measure librarians' interest, skill, and confidence with informal science programming, *Discover Tech* librarians' average scores improved modestly from pre- to post- (increasing from an average of 3.18 to an average of 3.40 on a five-point scale of 1=Strongly Disagree to 5=Strongly Agree). *Discover Earth* librarians' average scores were essentially unchanged before and after participation in STAR_Net. Because they had higher pre-scores on many of the items (an average of 3.5 on a five-point scale), there was less room for improvement.

- In interviews, several library staff from both exhibits said the STAR_Net training and resources made it easier for them to offer STEM programming. Each library hosting the exhibits implemented at least six programs related to the exhibit, while most implemented more than ten programs. A few librarians said implementing informal science activities was "scary" at first, but over time they learned they had the skills and abilities to implement informal STEM activities and they planned to keep offering STEM programming after the exhibits left their libraries.

- A number of *Discover Earth* and *Discover Tech* librarians appear to perceive their library as a STEM learning center for their community. Some librarians said the project pushed them to connect with STEM organizations and professionals in their community they had not worked with previously, and contributed to them offering more STEM programming.

> **The redesigned STAR_Net Community of Practice website has increased reach, but has not yet reached its potential.**

- Librarians most commonly reported that they used the STAR_Net Community of Practice (CoP) site to look for ALA exhibit materials, LPI programming materials, and project announcements. Some librarians reported that they had found the resources and information they needed. One library developed a relationship with another library that will last beyond the exhibit.

- However, host librarians also reported that the original CoP platform was difficult to navigate, and that it was challenging to find quick answers to their exhibit questions.

- In May 2013, a redesigned CoP was launched, which has attracted more visitors. While the original CoP had an average of 17 visits per month (for the period of January through May 2013), there were an average of 366 visits per month to the newly launched CoP site (from July through early October 2013). The redesigned CoP site has new features that support increased communication. However, while five *Discover Earth* librarians and two *Discover Tech* librarians posted comments, questions, or resources on the original CoP website, no host librarians have posted to the redesigned site.

- Host librarians' suggestions for improving the CoP included streamlining the site to make it easier to navigate, and sharing more promotional materials, programming ideas, and best practices for

engaging library patrons in STEM. In spite of difficulties with the original site, the project team is optimistic about the future for the CoP.

All of the libraries implemented informal science activities while they hosted the *Discover Earth* or *Discover Tech* exhibit, and at least two thirds of the libraries reported that they had offered additional STEM programming after the exhibit had left their libraries.

- The eight libraries that hosted *Discover Earth* through September 2013 facilitated a combined total of 162 programs (and average of 11.5 exhibit-related programs per library). The five libraries that hosted *Discover Tech* through September 2013 facilitated a total of 111 activities (an average of 15 exhibit-related programs per library).

- A total of approximately 15,000 individuals attended *Discover Earth* or *Discover Tech* programs, including more than 9,000 children.

- About one third of exhibit-related programs were facilitated (or co-facilitated) by library staff. Most of the programs were created by other STEM professionals not affiliated with the project, or by the librarians themselves. Several libraries recruited professionals who delivered programming that connected the content of the exhibits to local issues in the host libraries' communities.

- Two of the 11 libraries delivered curriculum developed by LPI, while several others adapted LPI's programming to fit their local needs.

- Four of the six *Discover Earth/Discover Tech* directors who completed the post-survey reported that their library had organized, hosted, or promoted additional science, technology and/or engineering activities or programs during the six months since the exhibit had left their libraries. Five of the six *Discover Earth/Discover Tech* directors said they have plans to organize or host science, technology or engineering activities or programs at their libraries in the future.

- The majority of libraries that hosted one of the exhibits successfully reached out to their local STEM community for help with programming. Library staff reported they had developed new partnerships, including with local colleges and universities, K-12 educators and administrators, museums, and individual STEM professionals. All but one of the libraries that had a local affiliate of the National Girls Collaborative Project in their state reported that they had collaborated to develop programming or other resources aimed at girls. A number of librarians said they expected to continue working with these STEM partners.

STAR_Net succeeded in reaching the targeted library participants and audiences at the host libraries.

- Library staff estimated that almost 350,000 visitors had seen a STAR_Net exhibit through September 2013. A total of 284,473 individuals had seen the *Discover Earth* exhibit, and 60,900 individuals had attended the *Discover Tech* exhibit.

- Although most of the host library communities had access to at least some STEM resources, several librarians pointed out that most of the members of their community would not have otherwise had access to the high-quality exhibit materials and programming that STAR_Net provided.

- Librarians from libraries that hosted the exhibits reported that they successfully reached their communities, and often attracted new visitors. Several librarians said the exhibits and associated programming helped them draw more families (especially fathers), K-12 educators, and school-age students, many of whom had never come to the library before.

- Almost all the host librarians reported that the *Discover Earth* or *Discover Tech* exhibit was very successful at their library (16 of the 19 respondents, or 84%, to the post-survey). Two librarians (11%) thought the exhibit was somewhat successful and one respondent was neutral about their assessment of the exhibit at their library.

Many library patrons at the host libraries became more interested, knowledgeable, and engaged in the STEM topics presented in the exhibits and related programming.

- Patrons were enthusiastic about the exhibits. They were impressed with the high quality of the exhibits and appreciated that they included interactive technology, activities, and visual artifacts. Visitors especially valued the hands-on nature of the exhibits, and wanted even more interactive activities. Visitors' enthusiasm about the exhibits is particularly noteworthy because almost all of the library visitors who were interviewed during site visits said they had not realized that the exhibit was at their library prior to visiting—they just stumbled across it.

- On the Patron Surveys, *Discover Earth* patrons reported spending an average of 60 minutes looking at the exhibit, while *Discover Tech* patrons reported spending an average of 83 minutes. Similarly, on site visits to five of the libraries, the evaluation team observed that patrons spent more time interacting with the *Discover Tech* exhibit (an average of eight minutes) than the *Discover Earth* exhibit (an average of five minutes). The difference between the two exhibits may be because *Discover Tech* had more hands-on, interactive activities, which were particularly appealing to visitors.

- Patrons who attended associated programming said they had found the presentations to be engaging, informative, and/or thought-provoking.

- The majority of patrons who responded to the Patron Survey said that the exhibit increased their awareness of earth science or engineering and increased their interest in learning more about these topics. Most planned to visit the exhibit again, and most said they would like to learn more about earth science or engineering by attending another educational institution (like a museum).

- About two thirds of the *Discover Earth* patrons and just over half the *Discover Tech* patrons said they intended to use library resources to learn more about earth science or engineering. Many library staff indicated that they promoted exhibit-related materials to patrons, such as through temporary displays of books or DVDs located near the exhibits. Although there was considerable variation by library, the average *Discover Earth* library circulated 27% more materials related to earth science while the exhibit was at their library, and the average *Discover Tech* library circulated 3% more technology and engineering-related materials while the exhibit was at their library.

- Like library staff, patrons from the *Discover Earth* and *Discover Tech* libraries may be beginning to see the library as a place for STEM learning. The majority of patrons who completed the Patron Survey (57% of *Discover Earth* patrons and 52% of *Discover Tech* patrons) "strongly agreed" that their library was a good place to learn about earth science or engineering (most of the remaining patrons "agreed"

with this statement). All patrons who were interviewed during site visits said they were supportive of libraries hosting STEM exhibits. Several librarians said that patrons continued to talk or ask about the exhibit, even months after it left their facility. About half of the librarians (47%) who completed the Six Month Post-Exhibit Survey said that patrons had asked for more activities or programs. Many librarians also said they believe that patrons now see the library as more than just a repository for books.

There were several unanticipated but positive consequences of STAR_Net on librarians, libraries, and patrons.

- The exhibits supported free-choice learning. Adults and children could look at the exhibits whenever they chose for as little or as long as they liked, and could easily return to interact with different parts of the exhibit again.

- Several teachers and parents reported that the exhibits supported what students were learning during the school day in traditional classrooms or through home schooling.

- The exhibits supported intergenerational learning. Parents, children and even grandparents were frequently observed learning together.

- Several libraries hope to leverage their STAR_Net experience into providing additional educational experiences to their patrons.

Conclusion

The majority of participating librarians, library staff, and library patrons were enthusiastic about the STAR_Net exhibits. Librarians and library staff reported that the resources the project provided were helpful, and increased their knowledge, interest, and confidence in offering STEM programming in their libraries. The STAR_Net Community of Practice has not reached its potential yet, although the project team is optimistic that it could become a valuable resource for library and STEM communities with additional staff time and resources. In spite of difficulties with the CoP, many libraries reached out and developed connections with organizations and individuals they had not worked with previously. The project reached patron audiences with STEM exhibits and programming that patrons in many of the STAR_Net communities would otherwise have not had access to. The exhibits appeared to spark the interest of many patrons to learn more about science and technology. The majority of libraries that have hosted the exhibit thus far reported that they planned to continue to offer STEM programming.

Conclusions regarding the longer-term impact of the project should be considered tentative because a relatively small number of libraries were able to provide follow-up data six months or more after the exhibits left their libraries—an artifact of the exhibit schedule and the timing of when the summative evaluation concluded. However, preliminary data from a subset of the host libraries suggests that the project may have a lasting impact on some libraries' interest in and capacity to educate their patrons about science.

Contents

Introduction

STAR_Net, a project funded by the National Science Foundation (NSF), brings inquiry-based STEM[2] learning experiences to public libraries through two traveling exhibits, associated programming for library patrons, and a virtual community of practice for library staff and others who are interested in bringing STEM programming to libraries. Evaluation & Research Associates (ERA) conducted the summative evaluation of STAR_Net (which stand for the **S**cience, **T**echnology, **A**ctivities and **R**esources Library Education **Net**work). This report summarizes the findings from all three years of the project (2010-2013) regarding the impact of the exhibits and accompanying project activities on the host librarians and patrons.

Project Description

In October 2010, the National Center for Interactive Learning (NCIL) at the Space Science Institute (SSI) was awarded a three-year NSF grant to develop a hands-on learning program for libraries and their communities. As articulated in the proposal to NSF, STAR_Net has the following goals:

1. Inspire interest and increase understanding of science and technology and the vital role they play in our everyday lives.
2. Reach underserved audiences and rural communities with hands-on, inquiry-based learning.
3. Build and sustain a Community of Practice between libraries and professional STEM organizations.
4. Assess informal, free-choice learning in a library setting and compare results to other informal education environments (e.g., science centers) and disseminate the results to the Informal Science Education (ISE) community.
5. Evaluate the effectiveness of hands-on exhibits and programs in a library setting and across a variety of STEM subjects (earth science, technology/engineering; math concepts will be integrated into the science-technology exhibits) and disseminate the results to the ISE community.

STAR_Net is a partnership between NCIL and the American Library Association (ALA), the Lunar and Planetary Institute (LPI), and the National Girls Collaborative Project (NGCP). NCIL managed the entire project and led the development of two traveling exhibits for public libraries (*Discover Earth: A Century of Change* and *Discover Tech: Engineers Make a World of Difference*); each exhibit has multiple display panels and interactive hands-on activities. SSI also created an online platform for libraries and STEM professionals to exchange ideas and resources about STEM programming. (The project's website, www.starnetlibraries.org, has more information about the project.) The ALA promoted the project through its network of libraries, led the library selection process, and coordinated exhibit scheduling and transportation between the host libraries. Ten public libraries from across the United States were selected to receive the *Discover Earth* exhibit (from 72 libraries that applied). Eight public libraries were selected to receive *Discover Tech* (from 43 libraries that applied). Each library hosted (or will host) the exhibit for eight weeks.[3] Two staff from each selected library (a project director and a project coordinator) attended a two-day, in-person training during which they learned about the set-up/take down and content of the exhibits, as well as associated programming. LPI developed and piloted hands-on activities related to the content of each of the exhibits for school-age

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[2] STEM stands for science, technology, engineering and mathematics.

3 As of September 2013, eight of the ten libraries had hosted *Discover Earth* and five of the eight libraries had hosted *Discover Tech*.

children, and trained library staff in how to implement these activities during the in-person trainings and online webinars (which were also open to libraries that were not hosting the exhibit). LPI also followed up individually with many of the libraries before they hosted the exhibits to consult with the library staff about their plans for exhibit-related programming. NGCP helped to connect libraries hosting the exhibit to local Girls Collaboratives, who promoted the exhibits to girls, developed STEM programming related to the content of the exhibits, and shared resources particularly targeted at girls. NGCP also conducted outreach for the project, and hosted some of the online webinars.

Evaluation Overview

Evaluation & Research Associates (ERA) began working with the project team in December of 2011 after the original summative evaluation team had to withdraw from the project. ERA helped the STAR_Net team to revise the logic model describing STAR_Net's activities and outcomes (see Appendix A). The following evaluation guiding questions were developed regarding the implementation and impact of the exhibits and accompanying project activities on the host librarians[4] and patrons:

1. Does the professional development delivered by the STAR_Net project help *Discover Earth* and *Discover Tech* librarians deliver informal science education programming?
   a. Do *Discover Earth* and *Discover Tech* librarians improve their knowledge about STEM topics presented in the exhibit?
   b. Are *Discover Earth* and *Discover Tech* librarians more interested in, knowledgeable about, and confident about how to develop and deliver STEM-based library programming?
   c. Do *Discover Earth* and *Discover Tech* librarians perceive their library as a STEM learning center for their community as a result of their involvement in STAR_Net?

2. How does the Community of Practice (CoP) develop?
   a. Do *Discover Earth* and *Discover Tech* librarians participate in the CoP?
   b. What do *Discover Earth* and *Discover Tech* librarians gain from the CoP?

3. Do host libraries develop and/or implement informal science activities for the targeted audiences?
   a. To what extent do the programs make use of the exhibits?
   b. Do the programs leverage existing resources from the library, local community, and online community of practice?
   c. Do partnerships develop? Are the partnerships sustainable?

4. To what extent does STAR_Net succeed in reaching the targeted library participants and audiences at the host libraries?
   a. What are the demographics and characteristics of host libraries, their communities, and their library patrons?
   b. Is attendance at the exhibit and participation in exhibit-related programming representative of the community?

5. To what extent do library patrons at the host libraries become more interested in, knowledgeable about, and engaged in the STEM topics presented in the exhibits and related programming?

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[4] "Librarians" and "library staff" are used interchangeably throughout this report (although technically, not all library staff members are librarians).

a. To what extent do library patrons find the exhibits and related programming to be engaging?
b. To what extent do library patrons improve their interest and engagement with STEM?
c. To what extent do library patrons improve their knowledge about STEM topics presented in the exhibits and programming?
d. Do library patrons perceive their library as a STEM learning center for their community as a result of STAR_Net?

6. What, if any, are the unanticipated consequences of STAR_Net (positive or negative) on librarians, libraries, patrons, and others?

The evaluation utilized mixed methods to investigate the implementation of the project and its outcomes, and to answer the evaluation questions. Institutional Review Board approval was received for the evaluation plan and instruments before data collection began. ERA administered pre- and post-exhibit surveys to library staff who hosted the exhibits; conducted site visits to five *Discover Earth* and *Discover Tech* libraries; conducted interviews with exhibit staff at the libraries that hosted the exhibits; collected patron surveys, circulation records, and web metrics regarding the online STAR_Net CoP; and administered ALA exhibit reports and webinar surveys on behalf of STAR_Net project partners. Table 1 shows the data collection instruments and when they were administered. A detailed description of the evaluation methodology can be found in Appendix B.

Table 1. STAR_Net Summative Evaluation Instruments and Timeline for Administration

Instrument	When Administered
Discover Tech Training Satisfaction Surveys	August 2012
Librarian Pre-Exhibit Survey	August 2012
Librarian Six Month Post-Exhibit Survey	Six months after *Discover Earth*/*Discover Tech* exhibit left each library
Interviews with *Discover Earth* and *Discover Tech* project directors and coordinators	After *Discover Earth*/*Discover Tech* exhibit left each library
Library Patron Survey	While *Discover Earth*/*Discover Tech* exhibit was at each library
Site visits to a total of five *Discover Earth* and *Discover Tech* Libraries to observe patrons interact with exhibit, interview library patrons, interview library staff, and observe library staff conduct exhibit programming (identity of libraries confidential)	Fall 2012 – Summer 2013
ALA Final Report Form	Immediately after *Discover Earth*/*Discover Tech* exhibit left each library
Exhibit-related circulation records	Immediately after *Discover Earth*/*Discover Tech* exhibit left each library and again one year later (if applicable)
Metrics re: STAR_Net Community of Practice website use	Monthly from January-October 2013
Interviews with members of STAR_Net Project Team (SSI, ALA, LPI, and NGCP)	September 2013

Findings by Evaluation Question

This report is organized around the guiding evaluation questions. Results from all relevant data sources are presented together for each question. The six overarching evaluation questions are shown in boxes like the one below for Question 1. Evaluation sub-questions are marked with a "?" (such as the box on the top of the following page). Program indicators that relate to the evaluation sub-questions are marked with a "✔" (such as the grey box on the following page).

Charts and tables show results for **Discover Earth in green** and for **Discover Tech in blue**.

Question 1:	**Does the professional development delivered by the STAR_Net project help *Discover Earth* and *Discover Tech* librarians deliver informal science education programming?**

The STAR_Net project team provided professional development (PD) to library staff who applied for and received the *Discover Earth* or *Discover Tech* exhibits. The team also made some of this PD available to other library staff and STEM professionals who were interested in implementing informal science education programming. The PD was delivered in a variety of formats. A two-day, in-person training was conducted for each exhibit during which library staff learned about the contents of the exhibit as well as how to set it up and take it down. *Discover Tech* librarians were especially pleased with the initial two-day training they received, in part because they were given ample opportunity to set up and take down the actual exhibit components. Participants were also introduced to pre-made programs and activities for school-age children, and learned about other possibilities for developing exhibit-related programming. Participants were able to meet and talk with the STAR_Net project team, and network with staff from other libraries that would be hosting the exhibit. In addition, each library received a resource notebook, was invited to attend follow-up webinars related to programming, and was encouraged to participate in an online Community of Practice (CoP). The webinars and CoP were open to library staff from libraries that were not hosting the exhibits, as well as other interested participants.

In interviews, library staff reported they felt prepared to do informal science programming for the *Discover Earth* or *Discover Tech* exhibits. Librarians also appreciated the opportunity to share ideas with other library staff members, and several said this helped them to develop ideas for new programs. For example, one library staff member said that although her library was already experienced in delivering informal programming, the PD gave their library new ideas for programming content. The librarian explained,

> "The training [STAR_Net] provided was really, really good. I think we could have carried off all the programs we did without the training because of what our library and staff has done in the past. But it is always good to get together. Because of the training we talked about ideas…on our way back. We had a lot of great ideas, and a lot of that came from attending."

Another library staff member said, "The training helped us feel confident about what we were doing. Beyond listening to the trainers, interacting with the other libraries was useful and sparked ideas for programs of our own." Another librarian said the idea for their Mindstorms program came from the workshop with subsequent input from a teacher in the library's community.

Library staff members from both exhibits also said they felt the project team was responsive to their questions and requests for follow-up assistance.

> **?** Do *Discover Earth* and *Discover Tech* librarians improve their knowledge about STEM topics presented in the exhibit?

Librarians from both exhibits increased their self-reported knowledge about exhibit-related topics six months after they had hosted the exhibit, although *Discover Tech* librarians demonstrated greater gains than *Discover Earth* librarians.

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians indicate that STAR_Net training and resources increased their knowledge of the earth science or engineering and technology topics

Project directors and coordinators from each library were asked to report their level of knowledge about either *Discover Earth* and *Discover Tech* exhibit-related topics (depending on which exhibit they hosted) before the exhibit came to their library and again six months after the exhibit left their library. Library staff rated themselves on each topic on a scale of 1=Beginner to 5=Expert. Only those library staff who completed both the pre- and post- survey were included in the analysis shown in Charts 1 and 2 on the following page (11 *Discover Earth* library staff and 5 *Discover Tech* library staff).

Librarians from both exhibits increased their exhibit-related knowledge, although *Discover Tech* librarians demonstrated greater gains than *Discover Earth* librarians. On average, *Discover Tech* librarians increased their knowledge 1.33 points (to an average of 3.20 six months after they had hosted the exhibit), while *Discover Earth* librarians increased their knowledge 0.25 points (to an average of 2.70 six months after they had hosted the exhibit). Two of the mean pre-post increases for *Discover Tech* librarians were statistically significant: "Grand Challenges for Engineering" and "Who Engineers Are" ($p < .05$).[5]

In interviews, several library staff said they felt the STAR_Net training and resources increased their knowledge of the earth science or engineering and technology topics. Librarians said they learned more "science" and became more aware of science in their daily lives. Staff from one library said they felt they did not have enough of a science background to conduct informal science programming, but used kids to educate the librarians about science concepts rather than not doing the informal science programming. The librarians learned how to ask questions and have the students answer, thus facilitating a conversation about science. This took the stress about "not knowing" off of the librarians. After participating in the project, another library changed their continuing education requirements for staff, and had their librarians take an astronomy course. Staff from this library also felt the exhibit had changed their library culture, increasing their ability to work as a team.

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[5] $p < .05$ is an example of a "p-value." Researchers and evaluators use p-values to help them decide whether apparent differences might simply be due to chance. In technical terms, a "p-value" indicates the likelihood that a measured value could occur just by chance, assuming that the null hypothesis is true. (In this case, the "null hypothesis" is that STAR_Net has <u>no</u> impact on librarians' knowledge.) In simpler terms, a p-value indicates the likelihood that an apparent difference in librarians' pre- to post-knowledge is actually just due to chance (assuming that the project did <u>not</u> actually have any impact on librarians' knowledge).

A p-value of less than .05 means that you might expect a similarly extreme result five times out of 100 when there is no relationship between the project and the measured outcome. A p-value of less than .01 means that there is less than one chance in 100 that the measurement is due to chance. P-values of less than .05 are generally considered to be "statistically significant," that is, sufficiently unlikely to have occurred due to chance that it is reasonable to reject the null hypothesis. P-values of less than .10 are sometimes considered "marginally statistically significant" when the sample size is small, which is the case in this project. For this reason, this report includes findings where $p < .10$.

Chart 1. *Discover Earth* librarians made small gains in their knowledge of exhibit-related topics *(Source: Librarian Pre-Exhibit and Six Month Post-Exhibit Surveys; n = 11)*
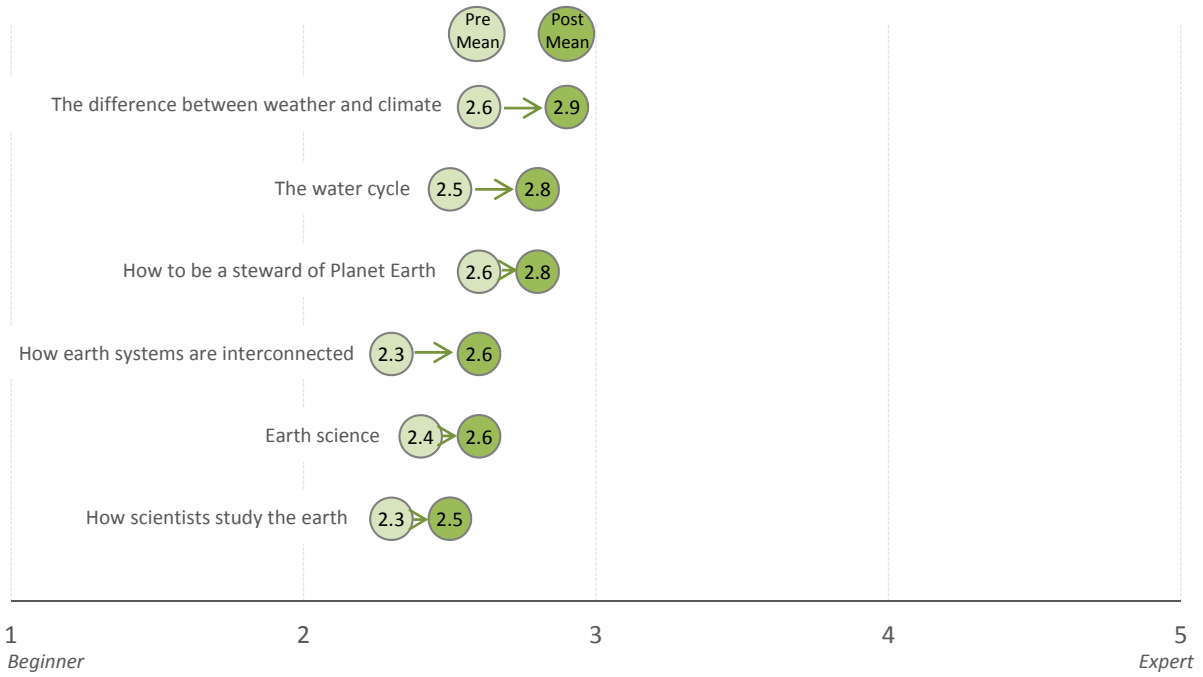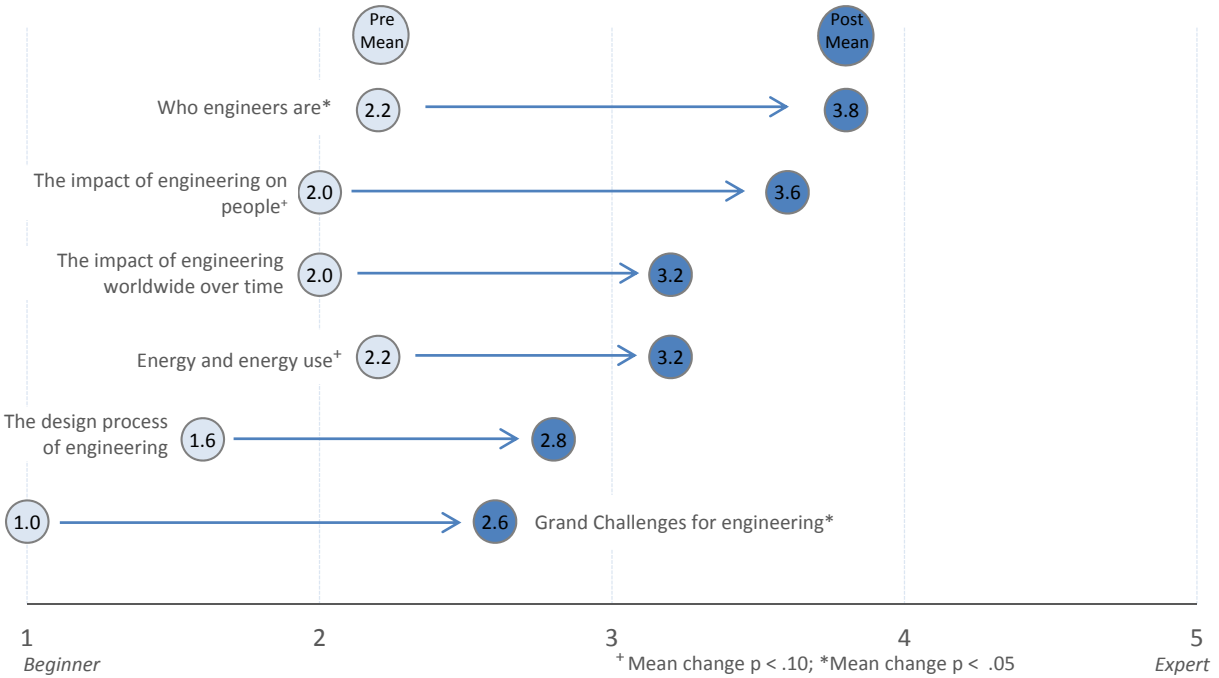

Chart 2. *Discover Tech* librarians made larger gains in their knowledge of exhibit-related topics *(Source: Librarian Pre-Exhibit and Six Month Post-Exhibit Surveys; n = 5)*

[+] Mean change p < .10; *Mean change p < .05

> **?**   Are *Discover Earth* and *Discover Tech* librarians more interested in, knowledgeable about, and confident about how to develop and deliver STEM-based library programming?

Many *Discover Earth* and *Discover Tech* library staff became more interested in developing and delivering STEM-based library programming as a result of their involvement in STAR_Net, and became more knowledgeable about how to create and deliver such programs, as well as more confident in their abilities to deliver informal science programs effectively.

> ✓   **Indicator:** *Discover Earth* and *Discover Tech* librarians indicate that STAR_Net training and resources increased their knowledge and increased their confidence about how to develop and facilitate STEM-based library programming

Another expected outcome of the project was that library staff would increase their interest, knowledge, and skill in facilitating informal science education activities related to earth science or to engineering and technology. The evaluation team gathered pre- and post-data using a series of survey questions regarding librarians' familiarity and confidence with implementing informal STEM programming. Librarians indicated their agreement with each topic on a scale where 1 = Strongly Disagree to 5 = Strongly Agree. Library staff were also asked in interviews about the exhibit-related programming they facilitated, including which activities they used, how they chose these activities, and how they felt the programming was received by participants.

On the pre-survey, almost all the STAR_Net directors reported that their libraries had offered STEM-related programming during the 12 months prior to receiving the exhibit. (All nine *Discover Earth* library directors and five of the six *Discover Tech* library directors reported they had previously offered STEM programs at their libraries.) Although almost all the libraries had experience with STEM programming prior to becoming involved in STAR_Net, the extent of their experience varied. Libraries had offered as few as one program to as many as 480 programs for patrons during the year before they received the exhibit. Individual library staff members' prior experience with implementing STEM programs for library patrons also varied. Half of the *Discover Earth* and *Discover Tech* directors and coordinators who completed the pre-survey reported they had facilitated three or fewer STEM-related programs, including 15% who had never facilitated such activities. Only 15% of STAR_Net directors and coordinators reported that they had received training prior to STAR_Net focused on how to implement science or technology programs for library patrons.

Pre/post survey results regarding librarian's confidence with informal science programming were mixed (see Charts 3 and 4 on the following page). On most items, *Discover Tech* librarians' average scores improved modestly from pre- to post- (increasing from an average of 3.18 to an average of 3.40), though none of the changes was statistically significant. *Discover Earth* librarians' average scores were essentially unchanged before and after participation in the program. Because *Discover Earth* librarians had higher pre-scores on many of the items (an average of 3.5 on a five-point scale), there was less room for improvement.

In interviews, some librarians said the STAR_Net training and resources increased their knowledge and confidence about how to deliver STEM-based library programming. For example, one *Discover Earth* librarian said, "As you tackle these big projects you become more confident. We now have more confidence in our own ability, and we learned more science….We became aware of other librarians' skills and we merged those across librarians. Different skills came up in each other and ourselves that we didn't know before." Staff from one *Discover Tech* library said the exhibit helped show them that science was not scary, and inspired them to continue STEM programming. A librarian from another *Discover Tech* library said, "I don't think we are going to be afraid to have programs like this!"

Chart 3. *Discover Earth* librarians' knowledge of exhibit-related topics was essentially unchanged *(Source: Librarian Pre-Exhibit and Six Month Post-Exhibit Surveys; n = 10)*

Pre Mean | Post Mean

I am capable of generating new ideas for earth science programs for my library — 4.0 (No change)

I am unsure about how to network with others to have them present their earth science based programs at my library (reverse coded) — 3.8 ← 4.1

I am confident I can implement my own ideas for earth science programs at our library — 3.7 3.8

Even if I try hard, I do not facilitate informal earth science programs as well as I will other subjects (reverse coded) — 3.4 → 3.6

I wonder if I have the necessary skills to facilitate earth science learning for my patrons (reverse coded) — 3.4 (No change)

I understand earth science concepts well enough to be effective in facilitating earth science learning for my patrons — 3.3 3.4

There are more important items on my agenda than implementing earth science programs at my library (reverse coded) — 2.8 → 3.0

Implementing earth science programs at my library is one of my highest priorities[+] — 2.7 ← 3.2

| 1 | 2 | 3 | 4 | 5 |
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

[+]Mean change p < .10

Chart 4. *Discover Tech* librarians' knowledge of exhibit-related topics increased somewhat *(Source: Librarian Pre-Exhibit and Six Month Post-Exhibit Surveys; n = 5)*

Pre Mean | Post Mean

Even if I try hard, I do not facilitate informal engineering programs as well as I will other subjects (reverse coded) — 3.4 → 4.0

I am capable of generating new ideas for engineering programs for my library — 3.2 → 3.6

There are more important items on my agenda than implementing engineering programs at my library (reverse coded) — 3.6 (No change)

I am confident I can implement my own ideas for engineering programs at our library — 2.8 → 3.4

I am unsure about how to network with others to have them present their engineering based programs at my library (reverse coded) — 3.0 → 3.4

I wonder if I have the necessary skills to facilitate engineering learning for my patrons (reverse coded) — 3.2 → 3.4

Implementing engineering programs at my library is one of my highest priorities — 3.0 → 3.2

I understand engineering concepts well enough to be effective in facilitating engineering learning for my patrons — 2.6 ← 3.2

| 1 | 2 | 3 | 4 | 5 |
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians indicate that STAR_Net training and resources increased their interest in developing and facilitating STEM-based library programming

Discover Earth and *Discover Tech* librarians indicated that STAR_Net training and resources increased their interest in developing and facilitating STEM-based library programming.

Some library staff reported they had never done programming like the kind provided by STAR_Net. They felt it "opened new doors" for them and encouraged them to introduce STEM programming to their libraries. For example, one librarian said the exhibit "launched" them into STEM programming. Another talked about how *Discover Earth* had enhanced their work and gave them a STEM focus.

Other libraries had previously done various informal science programming, but had not called it STEM. For example, one library had implemented gardening and healthy cooking programs, but had not thought of them as science topics. Another library did a program on snow where they talked about ice crystals and the participants created snowflakes. The librarian had not considered this program to be a STEM activity until after the exhibit arrived at their library.

Many librarians said the exhibits inspired them to continue STEM programming they were already doing, but with increased frequency, additional hands-on activities, or greater thought. For example, staff from one library that implemented STEM-related programming prior to the exhibit said they were doing more activities after the exhibit. A librarian from another library said STAR_Net provided technical, hands-on programming that allowed them to expand their current STEM programming. The library was also able to develop additional STEM programming through new connections they developed through the project. The STEM focus helped some libraries increase their youth programming by identifying new resources and potential partners in their communities they could use to develop events and programs. One library used their $1,000 grant to purchase LEGO Mindstorms robotics kits. Another library had a science club that they thought was good for home school children, but *Discover Tech* broadened their outlook and now they think about the library's role in providing science programming for other audiences in their community. A librarian from another library said her library was making programming decisions more collaboratively because they formed a STEM committee that gives them more opportunities to share ideas and be thoughtful about their programming choices. The librarian explained, "It's more intentional. In the past, [a program for children] would sometimes start with a book, whereas now it might start with the [science] idea or the concept and the books are added on [later]."

Staff from several libraries said they are now on the lookout for other opportunities and grants to do STEM-related programming. They had increased confidence in the own abilities to conduct STEM programming and host large exhibits, and were ready to go after other opportunities.

Additional information about what kinds of STEM programs libraries facilitated after the exhibit left their library begins on page 25.

Many *Discover Earth* and *Discover Tech* librarians said libraries can and should promote STEM learning in their communities, and described ways in which STAR_Net energized them to continue offering STEM programming.

✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians identify and secure STEM library resources after the exhibition (e.g., books, videos)

Of the six project directors who completed the post-exhibit survey, five reported that their library had acquired additional science, technology, or engineering resources in the six months since the exhibit had left their library. (One director was "Not sure.") All five directors reported that their library had acquired books and DVDs (see Table 2, on the left). Some libraries also acquired movies and audiobooks. Two directors reported other types of exhibit-related acquisitions, such as articles, eBooks, and prints. None of the directors reported acquiring databases, maps, music, photographs, or recordings. Three of the directors reported that they had acquired five to six different types of resources since the exhibit left their library. Two directors reported that their library had acquired two types of resources.

When asked about their reasons for acquiring additional science, technology, or engineering resources, four directors reported that it was due to interest from librarians and other library staff (see Table 3, on the right). Three noticed a gap in the collection due to the exhibit. Three directors reported they had received requests from library patrons, while two reported requests from science, technology, or engineering professionals. One director reported requests from K-12 schools, and one director reported requests from informal educators.

Table 2. Types of Science, Technology, or Engineering Resources Libraries Acquired in the Six Months Since the Exhibit Left the Library
(Source: Six Month Post-Exhibit Survey; n = 5 libraries)

Resources	Count
Books	5
DVDs	5
Movies	3
Audiobooks	2
Other	2
Articles	1
eBooks	1
Prints	1
Web resources	1
Databases	0
Maps	0
Music	0
Photographs	0
Recordings	0

Table 3. Reasons for Acquiring Additional Science, Technology, or Engineering Resources for Collection
(Source: Six Month Post-Exhibit Survey; n = 5 libraries)

Reasons	Count
Interest from librarians or other library staff	4
Noticed a gap in the collection due to the exhibit	3
Requests from library patrons	3
Requests from science, technology or engineering professionals	2
Requests from K-12 schools	1
Requests from informal educators or programs (e.g., after-school program leaders or museums)	1
Other	1

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* promote STEM materials in their library by featuring/displaying STEM materials

Many library staff reported that they promoted exhibit-related books and DVDs to patrons through temporary displays near the exhibits. One library also featured books related to each program they delivered. Another library also highlighted databases they subscribe to which school children could use in their classroom research.

Four of the five STAR_Net libraries the evaluation team visited displayed STEM-related materials near the exhibit. Two of the site visit libraries featured STEM-related books available for check out, while two other libraries borrowed and displayed additional exhibit-related materials.

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians indicate the library as one place to learn STEM
> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians indicate that STAR_Net helped them perceive their library as a STEM learning place
> ✓ **Indicator:** *Discover Earth* and *Discover Tech* promote STEM materials in their library by continuing programming in STEM areas either related to the exhibit or in other STEM areas

When asked if they saw a role for their library in encouraging science, technology, and/or engineering learning, almost all the librarians involved in the project said "Yes" (five of the six *Discover Earth/Discover Tech* directors and 12 of 13 *Discover Earth/Discover Tech* coordinators and other librarians). When asked to explain their answers, librarians responded:

- "Especially in our community, it is important for the library to champion science, technology, engineering learning as there aren't other local organizations doing so, nor are there places for residents to go to access high-quality opportunities or resources on these topics."
- "We will definitely be looking for future programming in these areas mainly because of interest and the need of STEM learning in the schools."
- "Informal STEM programming at [our library] is a priority because presenting STEM to the community in the form of general interest/entertainment programming is essential to informing the public and not making them feel as though they have to read a text book or attend a lecture that is above their heads."
- "The library is a natural place for people to investigate the world around them regardless of their age. Building that piece in to our programming helps to remind people that the library is about learning at all stages, not just recreation."

One director was "Unsure" if they saw a role for their library in encouraging science, technology, and/or engineering learning, and one coordinator or other librarian said "No." The librarian who answered "Unsure" said, "On the academic side, we do support student learning; on the public side, it's a tough sell."

In an interview, one library staff member said, "[The *Discover Earth* exhibit] contributed to us going in a STEM direction—[it] launched us into that direction and now we are pros!" Another librarian said, "Education is definitely the focus of the public library, and our public library in particular. STEM, of course, ties right into that. The mission itself says [we meet] the evolving needs of the community. Certainly STEM has always been important in one way, but now it's the buzzword and the new hot thing. Obviously, this is a direction we need to pay attention to and respond as best we can. STEM is a big part of education. It fits right in."

The Six Month Post-Exhibit Survey also asked librarians to describe what, if any, impact the exhibit had on them. A number of librarians said their involvement in STAR_Net inspired them to see their library as a STEM learning center for their community. Selected responses include:

- "It was a wonderful project, and one we thoroughly enjoyed implementing and providing for our library users. This has set the stage for us to have many future programming events here. It was also a good test for us in that we now know what to expect and what we can do in our new community room."
- "I've been impacted by the project mostly by getting acquainted with STEM professionals and catching their enthusiasm. Everyone associated with the project have been wonderful to work with, and most notably have treated those of us who don't have a Ph.D. in astrophysics as equals in the project and experts in our own areas. What a great group!"
- "Wow. I've been sold on including STEM in library programming now for several years. The STAR_Net project really cemented for me how fun building, engineering, and STEM-related things can be to share with my staff and youngest customers. [We] finally have all of the youth services on board with committing to including STEM in what we do."
- "I'm more confident in the planning and implementation of STEM programming than I would have been before, and it has made me much more aware of the resources that are available to help me with my program planning."
- "It has increased my awareness of current engineering concepts and challenges and how I might be able to design related programs."
- "It made me more aware of the need for and interest in STEM programming."
- "STAR_Net has heightened my awareness of STEM learning in our library, particularly with programs for children and teens. I have also thoroughly enjoyed watching my staff's excitement grow as they research, plan and implement STEM programming. It is so fun to geek out, if you will, about science experiments!"

Librarians described several examples of ways they had and were continuing to promote STEM in their libraries. One library was building on the momentum of the *Discover Tech* exhibit by integrating new programming with the STEM community after the exhibit left. Another library added science kits that patrons could check out. Another library said the library had changed the way they do things because of *Discover Earth*; they now recycle, installed a rain gauge, set up bird feeders, and distributed bird seeds, seedlings, and wild flower packets with *Discover Earth* and their library logo on the packaging. Another library hooked their children's program to a state science festival, holding two programs in which they provided 12 science experiments to 120 kids. Another library created a STEM Committee in part because the exhibit was coming to their library; library staff believed that having the exhibit moved the committee's work along faster than it otherwise would have. Another library had a mandate to up the quality of their programming and

work toward changing the public's perception of libraries. The director felt *Discover Earth* fit right in, and said it made her "hunger" for more exhibits.

The STAR_Net project hosted an online community of practice in order to help project librarians communicate and collaborate with STEM professionals and others. The STAR_Net CoP was designed to bring people together from multiple professions so they can converse about STEM and potentially collaborate to educate the public about science and engineering. The STAR_Net Community of Practice (CoP) has features that allow members to exchange information and find ideas, resources, activities, and news/blog items contributed by CoP members and project partners. Members can also download archived webinars and communicate with other CoP members, who include librarians, museum educators, teachers, scientists, engineers, and other STEM professionals.

During the third year of the project, the project team moved the CoP from the original SharePoint-based platform to a hosted WordPress site. The original CoP consisted primarily of STAR_Net project team members and librarians, and was password protected. There were 87 visits to the original CoP site between January 1, 2013 (the date the evaluation team began collecting CoP use data) and May 31, 2013 (approximately when the original site shifted to the new WordPress site). Members generated 615 page views, suggesting that once a member was at the CoP site, they spent time navigating through multiple pages. Librarians used the original CoP site primarily to gather "additional" information about the *Discover Earth/Discover Tech* exhibits by visiting pages that described the exhibit, resource pages to help them promote and set up the exhibit, and discussion boards to share ideas with other librarians.

In interviews, six librarians reported using the CoP site regularly. Some librarians used the site when they needed ideas for programming or advice about how to set up the exhibit. A few library staff used the CoP to make contact with other librarians who already had shown the exhibits and then either called or emailed them outside of the CoP. At least three librarians said they relied on other staff members to access and use the CoP, indicating that not all staff in a single library used the CoP.

Though all the exhibit librarians were instructed on how to use the CoP, in interviews, at least 11 library staff members indicated the original site was hard to navigate. For example, one library staff member talked about sending a STEM professional to the CoP to find resources for an upcoming program. However, the professional was not able to find what he was looking for until the librarian wrote down the exact path. Eight librarians reported they never used the site, or that they forgot or lost their passwords.

After receiving feedback from multiple sources, the project team decided to expand the CoP site and move it to a WordPress blog-type site (www.community.starnetlibraries.org). Several features were included in the redesigned CoP to provide resources and encourage collaboration between librarians and STEM professionals. The new CoP site was fully launched by July 1, 2013. Two of the features, the blog and the forums, are described below.

Blog – The CoP site houses a blog in which guest writers are invited to submit posts. Twelve entries were posted between May 8, 2013 and October 2, 2013. (Some of these blogs were posted before the new site was officially launched.) Early posts focused on the role of libraries in STEM. More recent posts offer suggestions on how to encourage youth interest in STEM, describe different community STEM opportunities such as

after-school programs or modern-day science fairs, and provide links to online resources such as online computer games and websites. Guest authors include educators, librarians, and a college student.

Forums – Five forum topics were created in order to facilitate collaboration and provide a framework in which librarians could have meaningful conversation about STEM and issues related to the *Discover Earth/Discover Tech* exhibits.

- **Collaboration:** An area to share experiences in collaborating with outside organizations to bring STEM activities to the library.

- **STEM Activities:** An area to share STEM activity idea for patrons. Ideas were added to the CoP site resource list. STEM organizations were given the opportunity to provide logos and links to their website.

- **Funding:** An area to share funding opportunities and solutions.

- **Training/Professional Development:** An area to provide opportunities for additional training, professional development, and conferences.

- **General/Other:** An area to share other stories that don't fit into the four aforementioned forum topics.

Between July 1, 2013 and October 6, 2013, there were 1,098 visits to the redesigned CoP site. Three-quarters of the visitors (76%) were new to the site. Returning vistitors spent nearly twice as long on the site (3:96 minutes versus 2:01 minutes) and visited nearly twice as many pages during their visit (4.03 pages versus 2.15 pages). (See Chart 5 below.)

Chart 5. Returning visitors to the STAR_Net Community of Practice visited more pages and spent more time during each visit than new visitors
(Source: Google Analytics from 7/1/13 - 10/6/13)
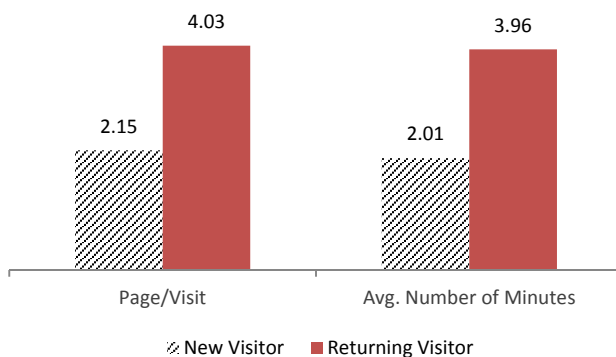
A significant proportion of the traffic came from users searching for and accessing the site via Google (43%). About one third of the users went directly to the CoP URL (31%). (See Chart 6 below.)

Chart 6. Most users landed on the STAR_Net Community of Practice website from Google or by entering the CoP URL
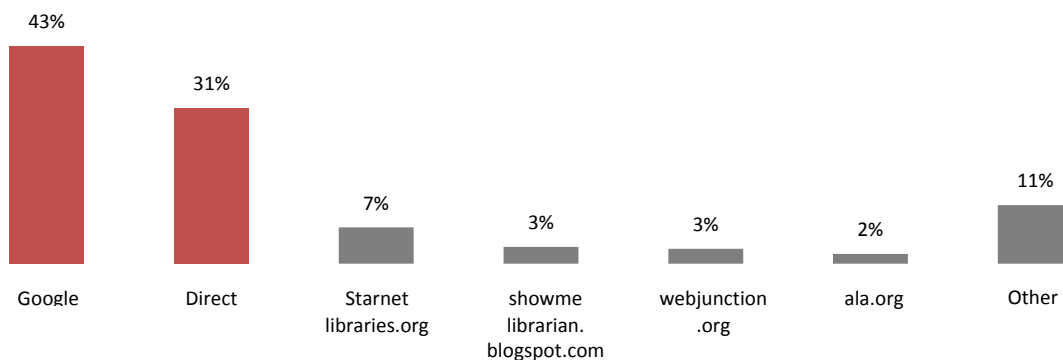*(Source: Google Analytics from 7/1/13 - 10/6/13)*

Chart 7 shows the number of visits per week to the redesigned CoP, as well as the blog posts and CoP newsletters during this period. The number of visits per week varied during the first three months of the new CoP, from about 50 to over 100 per week. In late September and the begining of October, the number of weekly visits leveled off to between 80 and 100 visits per week.

Chart 7. Visits to the redesigned STAR_Net Community of Practice tended to increase after blog posts and CoP newsletters were distributed
(Source: Google Analytics from 7/1/13 - 10/6/13)
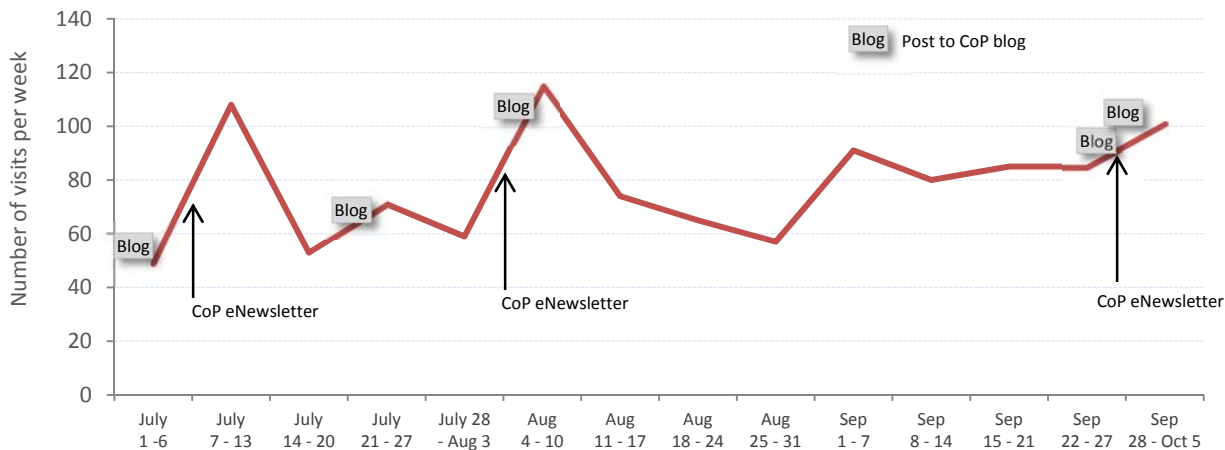
Visits to a particular landing page, the page in which the user enters the site, is one indicator of how users are finding and using the website. Guest blog posts (described in further detail below) generated a significant amount of usage within the site. Visits to the CoP site via a single blog post entitled "How to Start a LEGO Club in Your Library" accounted for 41% of the total visits from July 1, 2013 to October 3, 2013. This same page also accounted for 41% of the visits to exit pages (the page in which a user leaves the site).

On the redesigned CoP site, the five forum topics had generated 44 posts between July 1, 2013 and October 3, 2013. Ten of the posts appeared to be posts about STEM-related topics. They were started by three unique users, all of whom are affiliated with the STAR_Net project. Of these ten posts, one generated further

discussion by one additional user. Half of the posts shared professional development opportunities, while the remaining posts shared links to different articles and guides related to STEM. The remaining 34 posts were unrelated to STEM topics, originated by nine unique users. The content suggested that these were spam posts.

While new site visitors can become members just by registering, it is not required. The advantage of becoming a member is that it allows members to comment and post, otherwise all site visitors have access to viewing all the CoP content. The new site has been promoted via newsletters and partner blog posts. One project team member stated that it looked like about half of people who get newsletters are clicking on the blog posts, "[w]hich is amazing compared to other newsletters."

The STAR_Net project team believes that the CoP has the potential to evolve further. One project concern is letting people know about the CoP. During the course of this grant, the project team was learning not only how to construct the site, but also about how to feed and nurture it. When asked about future plans for the CoP, the project team indicated they plan to keep it going with additional webinars and newsletters, with hopes of fostering broader interaction. They would love to see more librarians posting their own activities and connecting with STEM professionals.

> **?** Do *Discover Earth* and *Discover Tech* librarians participate in the Community of Practice?

Although many of the library staff logged on to the original CoP a few times, fewer than half the librarians actively participated in the CoP by posting activities, comments, or questions. No *Discover Earth* or *Discover Tech* librarians have posted materials or comments on the redesigned CoP.

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians participate in the CoP by attending webinars, sharing information and strategies, and answering and asking questions on the online CoP

There was a mixed participation in the CoP by *Discover Earth* and *Discover Tech* library staff. Many of the library staff interviewed reported that they had tried the CoP a few times, but did not end up using it on a regular basis. They mostly used the CoP when they had questions about exhibit set up or take down and/or were looking for promotional materials or programming ideas.

The Six -Month Follow-up Survey asked librarians if they had looked at the STAR_Net CoP (see Table 4). All of the project directors and six of the 13 project coordinators (45%) who completed the survey reported "Yes." The remaining project coordinators reported "No" or "Not sure."

Table 4. Looked at CoP Website in Past Six Months[a]
(Source: Librarian Six-Month Survey; n = 19)

	Directors	**Coordinators**	**Total**
Yes	100% (6)	45% (6)	12
No	0	39% (5)	5
Not sure	0	15% (2)	2
Total	100% (6)	100% (13)	19

[a] This question does not distinguish between the old and new CoP sites.

Of the 12 library staff members who reported that they use the CoP site, half had visited the site a total of one or two times (see Chart 8). Four librarians visited the site between once a week and every other month. Two were "Not sure" how frequently they visited the site.

Chart 8. Staff at host libraries who reported using the STAR_Net CoP most often reported using it once or twice
(Source: Librarian Six-Month Survey; n = 12)
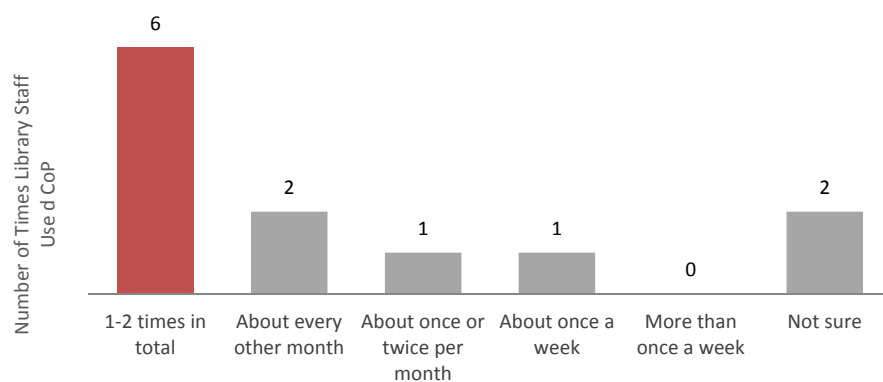
Five *Discover Earth* librarians and two *Discover Tech* librarians posted to one or more of the discussion boards on the original CoP website. (Seven individuals who were not affiliated with STAR_Net also posted to the discussion boards on the original CoP, including four librarians and three STEM professionals.) Of these seven *Discover Earth* and *Discover Tech* librarians, two posted once, two posted twice, and one each posted three, four or five times, respectively. Postings were regarding programming ideas (13 of the 18 posts), setting up the exhibit (three of the posts), and suggestions to the project team (two of the posts). At the time this report was being prepared (November 2013), no *Discover Earth* or *Discover Tech* librarians had posted to the forums on the redesigned CoP site.

The ALA Final Report Form asked directors to describe programs their library had offered during the exhibit. Of the 273 programs offered by 13 libraries, less than 1% (two libraries) used the CoP as a resource for finding those programs.

In interviews, some library staff said the original CoP was hard to navigate and that they had to sift through a lot of information to find something helpful. Others reported finding good or helpful information. One example was a librarian who communicated with another library who had the exhibit prior to her library. She saw they had posted an activity that her library was in the process of developing and compared the version they had posted on the CoP to the one she was planning. This same library staff member was concerned when she first set up the Magic Planet Globe because the planet was "dim." When the bulb eventually needed to be replaced, a member of the project team told her that the Magic Planet should be turned off when the library was closed. The librarian said it would have been helpful if the CoP contained information recommending that the globe be turned off at night. Another librarian looked for promotional materials on the CoP, but was unable to find anything. One library staff member said it was hard to post anything and ended up sending the post to a project team member who posted it on the CoP. Another librarian said, "I've posted to the Community of Practice...but really haven't gotten any feedback and I really haven't found much useful on there. I could see it reach critical mass and become a really cool thing, but it's not a cool thing yet." Many library staff said they were pleased when the new platform was rolled out with the expectation that the new site would be easier to navigate.

What do *Discover Earth* and *Discover Tech* librarians gain from the Community of Practice?

Gains from the CoP were mixed. Levels of participation varied from little or no participation to those who posted resources, programming ideas, and read or contributed to online discussions or blogs. In order to promote use of the CoP, the project team gave each library a notebook with links to the CoP and posted the notebook on the CoP. Libraries were expected to go to the CoP for information about the exhibit.

The ALA Final Report Form asked project directors to report which resources they used from the CoP website (see Table 5). Across both exhibits, the "ALA exhibit materials" and "the Lunar and Planetary Institute exhibit materials" were each cited by eight of the 13 directors (62%). "Announcements" and the "Discussion Board" were each cited by six directors (46%). "Earth and Space science activities (not from LPI)" and "Other" were cited by 31% and 23% of the librarians, respectively.

Table 5. Resources Utilized on the CoP Website
(Source: ALA Final Report Form; n = 13)

Resources	*Discover Earth*	*Discover Tech*	Total
ALA exhibit materials	75% (6)	40% (2)	62% (8)
Lunar and Planetary Institute exhibit materials	63% (5)	60% (3)	62% (8)
Announcements	63% (5)	20% (1)	46% (6)
Discussion Board (see below) • Checked briefly in the beginning • Checked updated emails and discussion board for programming ideas • Sent in pieces on activities, events, our website, photographs. • I used the Community of Practice site and lost my password. Got involved in the all the activities and never caught up with the site.	25% (2)	80% (4)	46% (6)
Earth and Space science activities (not from LPI)	38% (3)	20% (1)	31% (4)
Other (see below) • Contact lists of other libraries and participants, contacts for NFS, JPL participants • Publicity materials and guidance, assistance with the weather station set up, attendance at a teleconference call was helpful. • While the information on the CoP was useful, it was a cumbersome product and was not user-friendly. Some of the information was difficult to locate and access. LCLS uses a wiki on PBworks.com that is very user friendly.	38% (3)	0	23% (3)
Total	100% (8)	100% (5)	100% (13)

One library reported that they had developed a connection with another library that had already hosted the exhibit, and expected this relationship would last beyond the exhibit. Staff from another library that hosted the exhibit early on in the project reported that when the exhibit was ramping up, the CoP discussions were good and that staff had received questions from other libraries about how to prepare for the exhibit. They hoped their responses on the CoP had helped new libraries with their exhibits. After that initial surge, they noticed the CoP activity seemed to slow down.

Twelve respondents to the Six Month Post-Exhibit Survey reported using the CoP. Librarians were asked to identify which CoP features they had used and how useful each feature was. The most frequently used part of the CoP site was the "Exhibit-specific resources/support" with 11 users. This feature also had the highest usefulness rating, of 4.0 on a five-point scale where 1=Not at all useful and 5=Very useful (see Table 6). Eight librarians reported "Learning about best practices in science education" with a usefulness score of 3.6. The average usefulness score across all seven CoP features is 3.7, between "Neutral" and "Useful."

Table 6. Usefulness of CoP Features
(Source: Librarian Six-Month Survey; n = 11 [a])
Respondents used the following scale: 1=Not at all useful; 2=Not very useful; 3=Neutral; 4=Useful; 5=Very useful

Features	Average Score (n)	Haven't Used Yet Percent (n)
Exhibit-specific resources/support	4.0 (11)	8% (1)
Networking with other library staff	3.8 (4)	67% (8)
Webinars	3.8 (4)	67% (8)
Learning about best practices in science/technology education	3.6 (8)	33% (4)
Networking with science/technology professionals	3.5 (4)	67% (8)
Participating in science/technology discussion groups	3.3 (4)	67% (8)
Sharing my best practices about science/technology education	3.0 (2)	83% (10)
Overall average	3.7 (11)	

[a] *One librarian reported that they used the CoP website, but also reported not using any of the listed features of the website.*

One stakeholder said that the CoP ended up being a place only to store documents and therefore stopped going to the site after a while. This person also felt the project may not have fostered activity in the CoP as effectively as they could have given its great potential and the high participation during some of the webinars regarding STEM activities. Many other library staff commented that they were not able to get onto the original site or were unable to find what they were looking for. One librarian said, "It would be nice if they made it a lot easier for the non-techy types to communicate with others."

When asked to share, six librarians provided the following recommendations for improving the CoP site on the post-exhibit survey.

- "For some reason I have not been able to access this website. I have communicated some thru email. I wish I could take advantage of it. Of course, we were the [number] site to have the exhibit and much of the material on the site now was not available back when we had the exhibit."
- "Remove the requirement for a login and password, or let individuals reset both to something they can remember."
- "I would have been more likely to use it on a regular basis if it had been more intuitive to navigate."
- "I was looking for promotion materials, ideas, and best practices. Expansion of this area would be helpful."
- "Streamlining the site a bit would be great... just making it easier to look at and quickly scroll through. It is very useful as is though."
- "It seems a bit cumbersome and clunky to use. Seems like a lot of text and lots to sift through in the hopes that you will find useful information."

Of the 10 respondents who answered the question "If your recommendations were implemented, do you think you would visit the STAR_Net CoP website more frequently?" five of the ten checked "Yes," one checked "No," and four checked "Not sure."

Once the new CoP site was up and running it was suggested that if the project team had used the WordPress site right away and allotted more hours to work on it the CoP might have been more successful. One stakeholder said, "We could grow the online community if we had a specified number of hours per week to work on it. When we have time, it benefits the community. I think to really do it well, it takes some dedicated staff time to do it."

Increased input from librarians was also mentioned by the STAR_Net project team as one way to improve the CoP. Other suggestions included regular calls with exhibit librarians to foster connections within the community.

Question 3: **Do host libraries develop and/or implement informal science activities for the targeted audiences?**

All of the libraries implemented informal science activities while they hosted the exhibit, and at least two thirds of the libraries reported that they had offered additional STEM programming after the exhibit had left their libraries.

? To what extent do the programs make use of the exhibits?

Discover Earth and *Discover Tech* librarians made use of the exhibits, either indirectly by offering programming related to exhibit topics, or directly by encouraging visitors to interact with the exhibits or check out library materials about science, technology or engineering.

✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians facilitate activities related to the exhibit while they have the exhibit

All of the libraries offered exhibit-related programs while they hosted the exhibit. Each STAR_Net library was required to facilitate at least six programs. All of the libraries that hosted the exhibit through September 2013 met this expectation and most exceeded it. On the ALA Final Report Form, the average *Discover Earth* library reported offering 11.5 exhibit-related programs while the average *Discover Tech* library reported offering 15 exhibit-related programs. (There was space on the form for libraries to describe up to 15 programs in detail.) The eight libraries that hosted *Discover Earth* through September 2013 facilitated a combined 162 programs, while the five *Discover Tech* libraries facilitated a total of 111 activities. Libraries hosted a variety of programming for children and adults. Tables A and B in Appendix M includes example programs libraries delivered while they hosted the exhibit. About three quarters of the programs were delivered by STEM professionals the libraries recruited to facilitate activities or deliver lectures.

Chart 9. Almost all of the STAR_Net libraries hosted more than the minimum number of six exhibit-related programs while they hosted the exhibits. *(Source: ALA Final Report Form; n = 13)*
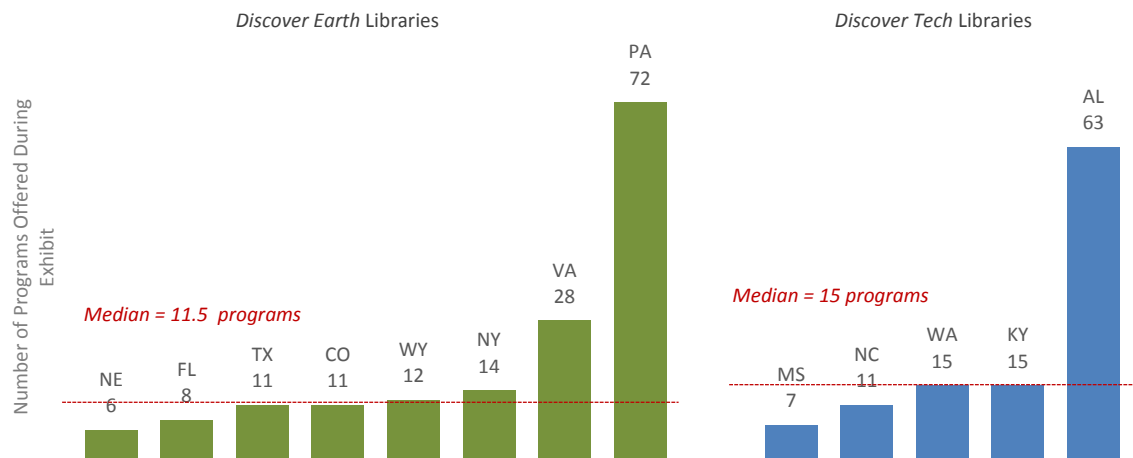
Indicator: *Discover Earth* and *Discover Tech* librarians report and are observed to (during site visits) facilitate visitor interactions with the exhibit

The ALA Final Report Form listed various ways library staff might have helped visitors to interact with the exhibit. STAR_Net Library Directors were asked to indicate which of these behaviors they had engaged in (see Table 7). All the librarians said they had answered visitors' questions about the exhibit and encouraged them to interact with specific parts of the exhibit. Ten of 11 librarians who were asked said they had also asked visitors if they had interacted with the exhibit and directed patrons to related library materials. An open-ended question gave librarians the opportunity to list other ways they had helped visitors to interact with the exhibit. Three librarians said they had encouraged visitors to attend exhibit-related programming. Two librarians said library staff or paid docents gave visitors tours of the exhibit. Two librarians said they made exhibit-related materials available for visitors to take home (one library allowed patrons to check out a Snap Circuit kit and another library gave away a science book to a child each day).

Table 7. STAR_Net Library Directors Report How They Helped Visitors Interact with the Exhibit
(Source: ALA Final Report Form; n = 11)

	Discover Earth (n = 6ª)	*Discover Tech* (n = 5)
Answered visitors' questions about exhibit	100%	100%
Encouraged visitors to interact with specific parts of exhibit	100%	100%
Asked visitors if they had interacted with exhibit	100%	80%
Directed patrons to related library materials	100%	80%
Other • Encouraged visitors to attend related programs (3) • Used exhibit to open and close particular programs. Used exhibit for a paper scavenger hunt; the answers could be found if you used the stations • Hired docents and trained them to give tours and run field trips • We conducted tours and provided books and activities • We used our Mystery Book program as an opportunity to give one child a day a science book to keep • Checked out Snap Circuits kits	83%	60%

ª Two Discover Earth libraries received an earlier version of the ALA Final Report Form and were not asked these questions

A few library staff said they thought patrons, especially children, benefitted from having an adult encourage them to engage with the exhibits. In an interview, one librarian described how she helped a 10-year-old boy and his family interact with "The Environment Impacts Life" touch table that is part of the *Discover Earth* exhibit:

> "It's flat and you can move pictures around with your fingers. They thought that was just totally neat, that they can actually touch it, move it, make it go. Rather than just statically pushing a button, they could actually make things move on the screen. I noticed they were having so much fun doing that, I said, 'Did you know you can also see these videos?' Then I showed them the Antarctica video. They thought that was just fabulous, so fun, so then they had to go view all the videos that were in there. That child was definitely loving it, very engaged. At first, I think [the reason he was engaged] was,

'Oh, the cool stuff I could do with it.' But then once I started pointing things out, he got really interested in the other parts. He said, 'Oh, Antarctica. Wow! Neat.' There was something [in the exhibit] on the gas from glaciers [methane sublimation]…He said, 'I didn't know that could happen.' So that brought about more understanding."

Another library staff member said she made a point of helping girls and young women engage with *Discover Tech*:

"We would have a couple of different girls look at [Snap Circuits] and I think they felt intimidated by it. I talked them through breaking it down, and told them you can do this. And they figured it out. And then once they did it, they realized, 'Oh, this is totally something I can do. This is totally something fun. I can understand it and understand how to do it.' I've seen that a couple of different times where they were like, 'Oh, I don't know if I can do that.' And then they loved it. They had a great time…. I don't know that they would have had the patience without someone standing next to them saying, 'Here, this is actually how it works, and oh, look, you actually got a result.'"

The evaluation team conducted site visits to five libraries. During each two-day visit, evaluators noted when they observed a library staff member assist visitors with the exhibits. The team observed a total of three staff members (from three libraries) help patrons interact with the exhibits. Two librarians approached patrons who were looking at the *Discover Tech* hands-on catenary arch activity, offering to show them how it worked. A children's librarian told several patrons about *Discover Earth* exhibit-related programming the library was offering.

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians facilitate activities related to the exhibit after the exhibit has left their library

Four of the six *Discover Earth/Discover Tech* directors who completed the Six Month Post-Exhibit Survey reported that their library had organized, hosted or promoted additional science, technology, and/or engineering activities or programs during the six months since the exhibit had left their libraries. Two directors were unsure if their library had done any follow-up activities or programs.

Discover Earth and *Discover Tech* project directors were asked to describe the first three STEM activities and programs their library had offered during the six months since the exhibit left their libraries. The four directors who said their library had implemented programs described a total of eight programs, attended by a total of approximately 582 attendees. (Of the 582 attendees, 432 were actual counts and 150 were estimates.) The list of activities and programs included the following (library names were removed):

- "We have an astronomy program that meets once a month from October through April and an ecology program that meets with the [Organization]. We observe the Moon, Space Place, and Star Wars Reads Day with which we stress STEM learning."
- "[A local astronomy organization] presents a program on Comets and How Water came to Earth."
- "[A local astronomy organization]: How Curiosity Landed on Mars."
- "[A local environmental education group]: Creating a Terrarium on self-sustaining eco-system. Done twice."
- "[Name] Forest Service; Presentation on area trees and how last year's drought affected them."

- "Get Ready for the Science Fair! In this entertaining and informative session is on how to start, make and present amazing science fair projects. A great opportunity for students! Grades 4-6 and Parents."
- "Food + Math = FUN! Explore math with a variety of food and snacks! Learn about fractions, percentages and everything math that goes hand-in-hand with food. Grades 3-6."
- "Recycled Robots. Build your own make-and-take recycled robot, take part in our photo booth and munch on a nuts and bolts snack. Grades K-2."
- "We hosted an engineer's week program. We built paper airplanes and launched them all over our buildings."

The most frequent source of programs offered since the exhibits left has been library staff, followed by other professionals (see Chart 10 below). The STAR_Net CoP and LPI were each sources for three activities or programs.

Chart 10. Libraries that reported hosting exhibit-related programming after the exhibit left their libraries most often reported offering activities that were their own creation
(Source: Librarian Six-Month Survey; 4 librarians listed the source of 17 activities/programs)
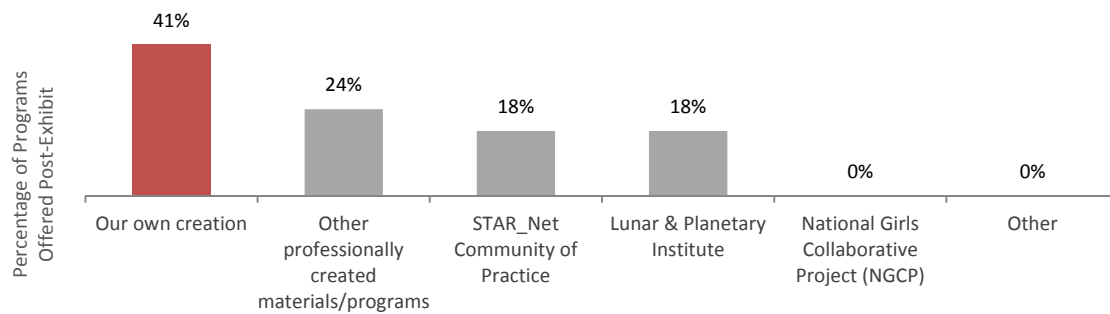
Five of the six *Discover Earth/Discover Tech* directors who completed the Six Month Post-Exhibit Survey have plans to organize or host science, technology, or engineering activities or programs at their libraries in the future. Those include:

- "We are a pilot library for the program 'Pushing the Limits—Making Sense of Science.'"
- "In conjunction with the library's 2013 summer reading celebration, DIG IN, we'll be hosting several programs for children, teens and adults focusing on soil science, botany and archaeology. Also, the Youth and Outreach Services division of [organization] plans to host more STEM programs in 2014. In the fall [organization] will be hosting a special showing of 'Chasing Ice' for adults."
- "We are presenting Star Wars Read Day on October 5. We have the Cradle of Aviation coming with [organization]. The [local astronomy organization] is hosting Space Travel and Silence in Outer Space, and a robotics program. In September and October, [a local environmental education group] is presenting four ecology programs. The [local astronomy organization] are meeting once a month. We will be doing International Observe the Moon Night."

- "We try to build STEM into all of our children's programs. For instance, our other spring program was Beanfest! And we investigated seeds, how they grow and then planted ones to take home and observe."

> **?** Do the programs leverage existing resources from the library, local community, and online community of practice?

The ALA Final Report Form asked librarians to indicate the source of each of the programs they offered while they hosted the exhibit (up to a maximum of 15 programs). The chart below shows the sources of these programs. Libraries reported that most of the programs were created by other STEM professionals not affiliated with the project, or by the librarians themselves. A number of libraries connected one or more of their programs to issues within their communities.

Chart 11. Libraries reported that most of the programming they offered while they hosted the exhibit was created by other professionals or their own creation

(Source: ALA Final Report Form; 75 activities/programs with source information from 6 Discover Earth *libraries; 63 activities/programs with source information from 5* Discover Tech *libraries)*
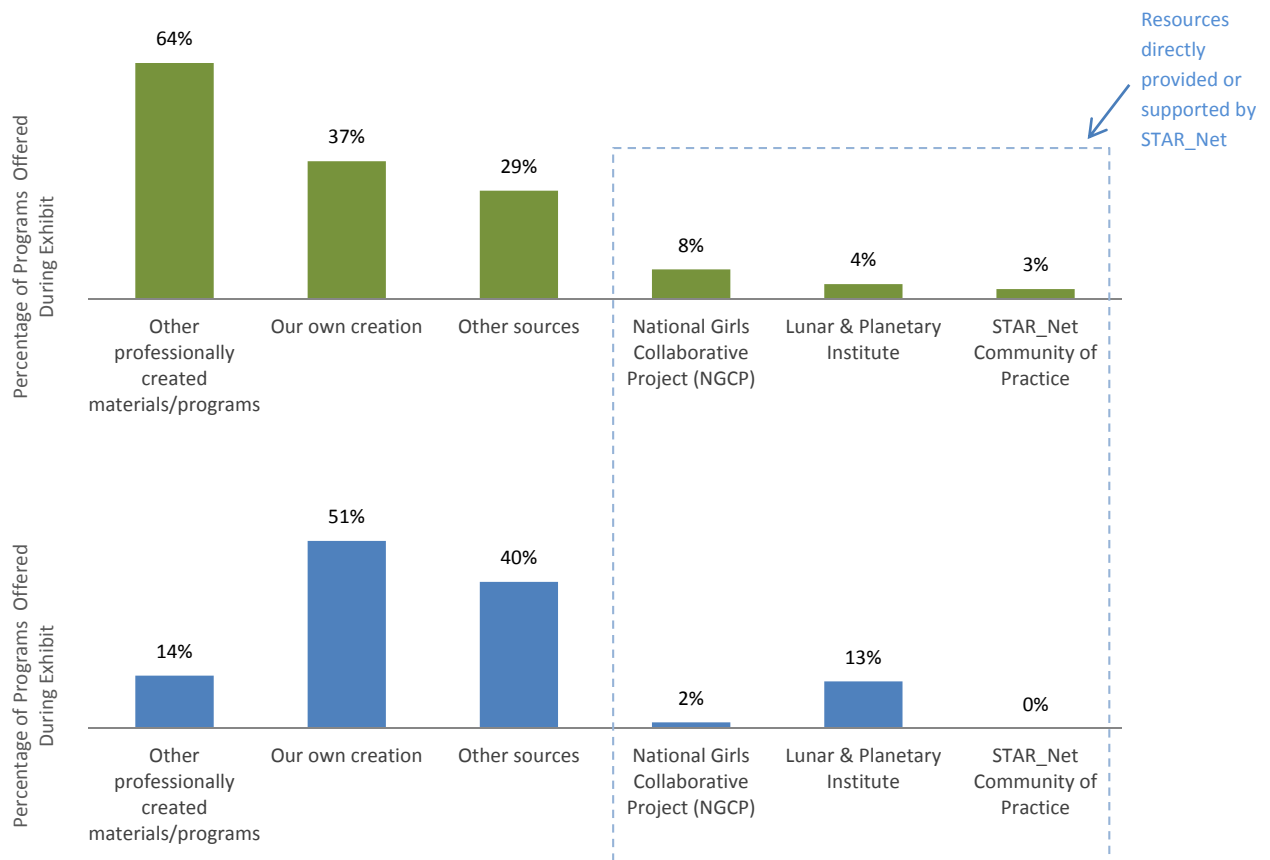
Indicator: *Discover Earth* and *Discover Tech* librarians adapt and deliver activities related to the exhibit developed by the Lunar and Planetary Institute

Two out of 11 libraries reported on the ALA Final Report Form that they delivered curriculum developed by the LPI while they hosted the exhibit. (One was a *Discover Earth* library and the other was a *Discover Tech* library). As shown in Chart 11 (on the previous page), 4% of *Discover Earth* programs and 13% of *Discover Tech* programs that were delivered while libraries hosted the exhibits used curriculum developed by LPI. One program facilitator said the *Discover Tech* activities were easy to use. "They have been really good…I was really grateful to see that it was such a robust, well thought out, nicely designed curriculum."

While some libraries used the LPI activities in their entirety, several other librarians said they adapted LPI's programming to fit their local needs. For example, one library changed an LPI activity's focus from alternative energy to climate change. Another library supplemented the inclined planes activity with an activity making roller coasters. Two *Discover Earth* librarians, who attended one of the LPI webinars, were inspired to create two "programs in a bin" based on LPI activities (one on planets and one on weather). Staff at branch libraries can check out the bins to implement programs with children. Another library shared the LPI activities with local teachers so students could have additional hands-on learning experiences to supplement their field trips to the exhibit. Another library loved the *Discover Tech* programming but was concerned about attracting enough visitors given the timing of the exhibit; they decided to add some more "flashy" and quick activities such as "Bet You Can't" about impossible science followed up by "Science Possibilities."

Two libraries reported that the timing of the STAR_Net training did not coincide well with the when they hosted the exhibit. One library that did not use the *Discover Earth* modules said they did not have the staff to implement the activities when the library hosted the exhibit. They just used the general ideas and created their own programs. The librarian said, "I hope we use them in the future. We still have all those resources. It was a challenge for us overall to do programming." A *Discover Tech* librarian was concerned about implementing programming because she had been trained several months before the exhibit came to her library and felt that was a disadvantage when preparing for the programming.

A few librarians offered critical comments about the LPI activities. Two librarians said they thought the activities were too simple for their patrons. One librarian said the "modules were too expensive and the amount of activity time wouldn't get traffic flowing."

Indicator: *Discover Earth* and *Discover Tech* librarians develop and deliver their own activities and/or identify non-LPI activities related to the exhibit (and share these activities through the Community of Practice)

Based on data from the ALA Final Report Forms, about one third of the programs delivered while libraries hosted the exhibits were facilitated (or co-facilitated) by library staff. All but one library delivered at least one program that they created. For example, one library used ideas and key concepts from the exhibit to develop weekly themes, each with related programming and featured library materials. Several libraries delivered afterschool programs for school-age youth. One library took virtually all of their existing activities and relabeled them as "project-related" without necessarily linking the activities to the exhibit.

The STAR_Net team hoped that librarians would share activities they developed through the online CoP. Three *Discover Earth* librarians and two *Discover Tech* librarians posted programming ideas on the original CoP site. At the time this report was prepared, no librarians had posted activities to the "STEM Activities" forum (or any of the other forums) in the redesigned version of the CoP.

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians contact and coordinate with science and engineering professionals to deliver programs related to earth science or technology topics

The majority of libraries that hosted one of the exhibits reached out to the STEM community for help with programming, and successfully developed connections with science or engineering professionals. There were many examples of successful programming that involved STEM professionals from the local communities, from a family program put on by a civil engineer to a talk about cleaning uranium that lasted an hour longer than planned and continued outside the library. The Blue Angels spoke at one library's exhibit kick-off event while another library had their ribbon cutting done by Jan Davis, an astronaut. Another library applied for an intern at a nearby university and ended up connecting with a department that placed college students in the library to teach science programming. It worked so well, the professor who supervised the students was applying for a grant to get the library a Mobile Makers Space which could travel from branch to branch, and was planning to work with the library in the fall on another project. The librarian said, "The partnerships have been phenomenal… It's helping us tremendously with things we can't do, especially in tight budget times. We would have had a much narrower focus." One *Discover Tech* library did not have success when the staff first approached several engineers about adding their profiles to the "Engineering in Your Community" wall. However, the library director, who is well connected in the community, was able to persuade several local engineers to agree to let the library post their pictures and biographies. Although most libraries were able to connect with local STEM resources or individuals who helped deliver programs, one library sent out invitation to 100 people and only received 4-5 responses and another library said there was a dearth of STEM resources in their community.

Several libraries recruited professionals who delivered programming that connected the content of the exhibits to local issues in the host libraries' communities. A number of *Discover Earth* libraries hosted programs about the connection between earth systems and the local environment, including water conservation issues in Colorado, the impact of climate change and Hurricane Sandy on Long Island waterways, and how native animals in Pennsylvania are adapted to the local climate. Similarly, several *Discover Tech* libraries hosted programs about how engineering and technology have been used within their communities, including storm-water management in Spokane, the ways in which companies in Alabama are tackling some of the Grand Challenges for Engineering, and the role civil engineering projects (levees) have in controlling flooding in Mississippi.

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians collaborate with local National Girls Collaborative Project (NGCP) Collaboratives

One of the goals of the project was that libraries would connect with local National Girls Collaborative Project Collaboratives to develop STEM-related programming particularly aimed at girls. Two thirds of the libraries are located in states that have a local affiliate of the National Girls Collaborative Project (see Table 8 on the following page). In interviews with library staff who had hosted one of the STAR_Net exhibits by

September 2013, seven libraries reported that they had collaborated with an existing local affiliate of the National Girls Collaborative Project. For example, one Collaborative designed and delivered a program to teach adult library patrons how they can help girls become interested in STEM. Another Collaborative helped design a new program "From the Eyes of the Newborn"; staff from the library will visit parents of newborn infants, giving out baby library cards and books. One library said they had attempted to reach out to their local collaborative but were not successful. Another library is becoming the lead organization for a new NGCP Collaborative in their state.

Table 8. National Girls Collaboratives Located in STAR_Net Libraries' States
(Source: http://www.ngcproject.org/find)

Discover Earth **Library**	**Location**	**Local NGCP Collaborative**
Garfield County Libraries	Rifle, CO	Colorado Collaborative for Girls in STEM (CoCoSTEM)
Central Rappahannock Regional Library	Fredericksburg, VA	Mid-Atlantic Girls Collaborative (MAGiC) Project
Ephrata Public Library	Ephrata, PA	PA STEM Girls Collaborative Project
West Florida Public Library	Pensacola, FL	Florida Girls Collaborative Project
TLL Temple Memorial Library	Diboll, TX	Texas Girls Collaborative Project
Winnebago Public Library	Winnebago, NE	None
Laramie County Library System	Cheyenne, WY	None
East Meadow Public Library	East Meadow, NY	None
St. Charles Parish Library	Luling, LA	Louisiana STEM Girls Collaborative Project
Inglewood Public Library	Inglewood, CA	California Girls in STEM (CalGirlS) Collaborative Project
Discover Tech **Library**	**Location**	**Local NGCP Collaborative**
Huntsville-Madison County Public Library	Huntsville, AL	None; currently forming
Spokane Public Library	Spokane, WA	Pacific Northwest Girls Collaborative Project
Mary Wood Weldon Memorial Library	Glasgow, KY	Kentucky Girls STEM Collaborative Project
Wayne County Public Library	Goldsboro, NC	North Carolina Girls STEM Collaborative
Carnegie Public Library of Clarksdale and Coahoma County	Clarksdale, MS	None
Baxter County Public Library	Mountain Home, AR	None
International Falls Public Library	International Falls, MN	Minnesota Girls Collaborative Project
Carson City Public Library	Carson City, NV	None

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians share information and strategies, answer and ask questions on the online CoP

As previously described regarding Evaluation Question #2 about the CoP, five *Discover Earth* librarians and two *Discover Tech* librarians posted to one or more of the discussion boards on the original CoP site.

STAR_Net librarians offered programming ideas (13 of the 18 posts), shared information about setting up the exhibit (three of the posts), and made suggestions for the project team (two of the posts). As of November 2013, no *Discover Earth* or *Discover Tech* librarians had posted information, strategies, or questions to the forums on the redesigned CoP site.

> **?** Do partnerships develop? Are the partnerships sustainable?

In interviews, a number of librarians said they had developed new partnerships while the exhibits were at their libraries and that they expected to continue working with these partners.

> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians contact and coordinate with science and engineering professionals to deliver programs related to earth science or technology topics
> ✓ **Indicator:** *Discover Earth* and *Discover Tech* librarians collaborate with local NGCP Collaboratives

Several libraries said STAR_Net facilitated the formation of new partnerships within their community. For example, one *Discover Tech* library said they had gotten a fuller picture of who was in their community, developed new connections, and become more invested in their community. Another librarian said, "[*Discover Earth*] made us focus outside of the library—opened [us] up to working with other groups, other libraries and school districts. [It] opened [us] up to working with other people that we wouldn't have worked with before." A library staff member from another library said, "I think it has built a lot of connections that will pay off for me professionally and for the organization as well."

Library staff reported developing new partnerships with local colleges and universities, science teachers for local K-12 schools, museums, the National Oceanic and Atmospheric Administration, professional organizations, foundations, a national lab, and individual STEM professionals (including a cartographer and an environmental journalist). For example, a *Discover Earth* librarian said, "We are now getting people in place for adult programming which we have always been slim on it has given us a bump up in getting that in place. We are grateful for that." Another librarian said the exhibit helped demonstrate that the library could be a reliable partner, and a state museum decided to place an exhibit at the library. Another librarian said they had developed a partnership with the local school district, explaining, "We gave the gift of speakers and school field trips. We had every school but one in our city attend the exhibit!" Another library forged stronger connections with local (aerospace) industry; they plan to seek funding from these organizations for science-related projects for the first time.

Several libraries said that not only had they made new connections with STEM professionals to deliver programming while they hosted the exhibit, but also developed connections that they expected to continue in the future. For example, one library reached out for the first time to the science coordinator of the nearby school district, and several schools had come to the library that never had before. She added, "I think I learned some connections I didn't know about before that I will definitely continue to use…There are professional connections that have been made." Another librarian said, "These relationships will not end when *Discover Earth* packs up."

Some librarians referenced the exhibit as a source of greater visibility in the community. A few libraries described other helpful connections they had made, including with the local media and with their branch libraries. One *Discover Tech* librarian was able to develop media contacts that she said would have taken her one or two years to make if the library was not hosting the exhibit, telling them 'Hey, we're one of eight libraries in the country. Don't you want to come talk about it? Another library forged stronger alliances with their branch libraries that they plan to use in the future. This connection was facilitated by the exhibit and by funds that the main branch disseminated to branch libraries to spend on exhibit related materials. In the past there has been a disconnect between the main branch and outlying branches.

Question 4:   To what extent does STAR_Net succeed in reaching the targeted library participants and audiences at the host libraries?

The libraries that hosted the exhibits reported that they had success in reaching their communities, often attracting new visitors to their libraries.

?   What are the demographics and characteristics of host libraries, their communities, and their library patrons?

The STAR_Net libraries and their communities vary in size, proximity to major urban areas, and demographics. Tables C and D in Appendix M show the characteristics of each of the STAR_Net libraries, based on information they provided on their application to join the project. Five of the eight *Discover Tech* libraries self-identified as being located in rural communities, while six of the 10 *Discover Earth* libraries described themselves as being located in rural or rural/suburban communities (see Chart 12 below). Libraries serve a wide range of card holders, from 1,200 to almost 184,000. Two thirds of the host libraries are branches, meaning they operate as part of a larger library system.

Chart 12. The majority of *Discover Earth* and *Discover Tech* libraries are located in rural or rural/suburban locations
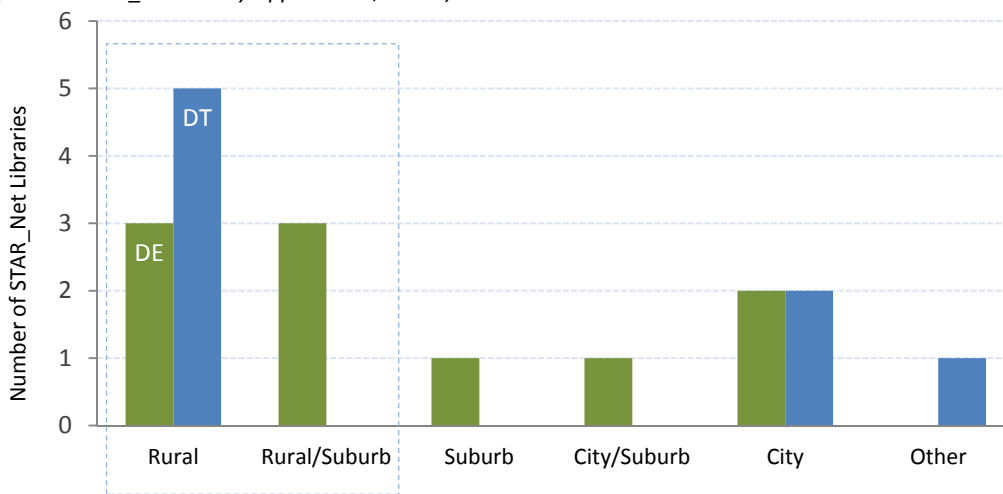*(Source: STAR_Net Library Applications; n = 18)*

Table E in Appendix M shows the demographics of each of the STAR_Net communities, including the race/ethnicity of the population, the percentage of the population that speaks English less than "very well," the percentage of the population below the poverty line, and level of educational attainment. The demographics the communities vary. For example, the percentage below the poverty line ranges from a low of 3.6% (in Nassau County, New York) to a high of 33.1% (in Coahoma County, Mississippi). The rate of bachelor's degree attainment ranges from 13.3% (in Thurston County, Nebraska) to 41.2% (in Nassau County). The race/ethnicity of most of the library communities is predominately White, with the exceptions of Thurston County (58.6% American Indian), the City of Inglewood in California (50.6% Hispanic/Latino), and Coahoma County (75.9% Black). In three of the communities, more than 10% of the population speaks English less than "very well," suggesting that exhibit materials may need to be made available in other languages.

The Librarian Pre-Survey asked project directors to indicate if there were any other organizations in their community that provided science-related resources (see Table 9 below). All but one director reported that there was at least one such organization in their community, typically a college or university. Seven of the 15 directors who completed the survey reported that there was a children's museum and/or a science museum in their community (including four directors who reported they had both).

Table 9. Organizations that Provide Science-Related Resources in STAR_Net Communities (As Reported By *Discover Earth* **and** *Discover Tech* **Project Directors)**
(Source: Librarian Six-Month Survey; n = 15)

	Discover Earth (n = 9)	*Discover Tech* (n = 6)
College or university	78% (7)	100% (6)
Children's museum	44% (4)	33% (2)
Science museum	33% (3)	33% (2)
Other; responses: • Amateur Observers • Cheyenne Botanic Gardens Children's Village • Local magazine; parks and rec • Numerous non-profit organizations	44% (4)	17% (1)

Although most of the host library communities had access to at least some STEM resources, several librarians pointed out that most of the members of their community would not normally have had access to the high-quality exhibit materials and programming that STAR_Net provided. Librarians said:

- "One group of our population really benefited from *Discover Earth.* The younger sector would not have been exposed to something like *Discover Earth* unless their parents take them to [city] to see museums. They do not have a choice. For them to have this experience is so valuable; it could spark their imagination and carry them far! They see that science is cool. Spark for down the road."
- "The [exhibit] brought something in for kids that don't necessarily have the money to travel to a larger city where there are museum-quality presentations; they got a little bit of exposure that they may have not gotten any other way."
- "We don't have any traditional resources for people to go in and learn about STEM-related topics, but it [*Discover Earth*] gave us a chance to feature some people on our community who are the experts

in these areas—make them accessible to the public—and that was well received. The fact that those are high-quality exhibits lent credibility to everything that was involved in it."

> **?** Is attendance at the exhibit and participation in exhibit-related programming representative of the community?

The ALA Final Report Form asked librarians to report the race/ethnicity of patrons who attended the exhibit and patrons who attended the associated programming. Only six of the 13 libraries that had had the exhibit through September 2013 reported exhibit attendance by race/ethnicity, and all of these libraries indicated the figures were estimates (often based on U.S. Census statistics for their community). For this reason, it is not possible to conclude whether attendance at the exhibits was representative of the racial/ethnic composition of the communities that hosted them.

Nine libraries provided race/ethnicity figures for the patrons who attended exhibit-related programming (see Table G in Appendix N for combined totals). (The Final Report Form did not ask librarians to indicate how they had determined the race/ethnicity of the program attendees or whether the figures they provided were estimates.) A comparison of each libraries' program attendance figures to U.S. Census data for their presumed service area showed that the demographics of program attendees were approximately similar to the demographics of the host communities.

In interviews, the majority of libraries reported the exhibit helped them attract new patrons, including more families, new school groups, and even visitors from out of the district or out of state. In fact, two libraries' total exhibit attendance figures were more than twice the number of library card holders. (See the discussion regarding exhibit attendance figures beginning on p. 39.) One library staff member said, "I think it does bring in the people…This tells them that there are things at the library besides the books and besides the videos— that we have things that are doable, rather than just readable…We proved that this works…because we're seeing groups that normally don't come." One library staff member said new members joined the library, while another library said more patrons from the inner city came to the library. Another library staff member said, "The library is bringing in people who have not had positive STEM experiences, and is reaching people who are fresh blood for [our STEM community]." Several libraries said they had attracted more families, and especially fathers:

- "Our programs were open to whole family—we had children attend as well. The happy surprise was that we had adult audiences that we had not gotten to see in the past."
- "We're getting more families down here than we normally would. We're getting a lot of dads. I've noticed that they are coming in with their kids that we don't always necessarily see because they're playing....We'll see them engaging and playing and having a lot of fun."
- "I saw a lot of dads come in. We see them sit at Snap Circuits and they will sit there for hours."
- "The bulk of our programming has been for children [in the past]. We geared our [*Discover Earth*] programming primarily to whole families, and as a consequence I think a lot of adults attended programs who otherwise would not have."
- "We don't have anything like this. I we can't believe how wonderful and amazing this exhibit is! People were really impressed and really excited. We had many repeat visitors…Amazon may have gotten an uptick on orders for Snap Circuits due to our exhibit! I was surprised at the age groups— 45-60 to 5-16 [years old]—[who visited] the exhibit. We saw lots of parents that were helping kids and they were influenced just as much."

Several libraries said the exhibits and associated programming helped to attract K-12 educators and students to their libraries for the first time. One library staff member said, "At our Family Science Night, the principal came to see what we were doing. He was very interested in our STEM programming and he didn't realize that the library was actually doing STEM things. He was very interested in that and wants to know more. When the library does more STEM programming, he wants to know more about it." Another library had a few teachers who had never previously visited the library come in one evening and then later bring their classes to see the exhibit. Another library believed they had reached new readers by hosting school field trip tours and providing teachers with flash drives linking state curriculum requirements with the exhibit. Staff from another library reported that only half of students on field trips had ever been to the library. Staff from two other libraries reported that students had come back to the library after their school field trip, bringing their parents, grandparents, or siblings to see the exhibit and show them what they had learned.

Librarians also said that they did not necessarily attract new patrons, but served their existing patrons in a new way. One library staff member said:

> "When [the exhibit] first came in, some of our jaded patrons—who are here day-in and day-out on their laptops—even they came over and checked things out when it was new and looked at everything. Now that it's not new and it's been here a while, they're back on their computers. But we even got them over here, which is really unusual because they just go for the wireless, and that's what they're here for all day. They don't do books, they don't do movies, they just do their wireless. So to get them off the wireless and over here to check things out, even if it's only once to walk through, I thought it made an impact. It exposed people to things."

Librarians were pleased that they had reached new patrons or existing patrons in new ways. In fact, almost all the host librarians reported that the *Discover Earth* or *Discover Tech* exhibit was very successful at their library (16 of the 19 respondents, or 84%, to the Six Month Post-Survey).

"It made us focus outside the library"

Discover Earth library staff member

Library staff from a *Discover Earth* library said one of the biggest impacts of the exhibit was that it brought people back to the library who had not been there in a while. The majority of their patrons were older and did not come to programs—they came to the library solely to check out books. Since the library hosted *Discover Earth*, their patrons now expect a little more. The library hosts a movie night once a month and patrons feel like they can spend time at the library; it is not just for books.

The exhibit also helped the library reconnect with a home school group that had stopped using the library. Library staff were able to reach out to the home school group and bring them back into the library for programs related to *Discover Earth*. The home school group told other families about the exhibit, and the library has seen an increase in the number of home schoolers who are using the library. Library staff report that multiple home school groups now keep a closer eye on library events.

Library staff reported that they had a bigger reach than they expected given their size, and that there has been a continuous interest in the library since the exhibit left. The library staff think that *Discover Earth* opened them up to the community, and to doing other similar projects.

Librarians were invited to explain their answers. Librarians' comments included the following:

- "We had a significant turnout for the exhibit and accompanying programming. Many participants expressed their hope that the library continue to offer this type of programming and resources in the future. Additionally, hosting such a high-quality exhibit lent credibility to the library as a valuable community resource."
- "We had nothing but positive feedback from hosting it. It also caused us to make some great future contacts and opened the door to future programming and activities."
- "Community members were very supportive of the exhibition and the associated events were well-attended. People of all ages were interested in the components, particularly the interactive units."
- "The exhibit was constantly being used. There was never a time when people were not enjoying it. We received rave reviews and thanks from patrons. They were sorry to see it leave."
- "We got great coverage from the media, city government was impressed, our gate count was up, several more class visits than we normal during the time it was here, and our staff and regular customers loved it! We still have customers asking when we will be doing something similar."
- "We engaged many rural students as they came in classes to tour the exhibit. We also had good participation in our opening event which created a 'stir' and brought more people in. This exhibit was a good launch for more STEM programming at the library."
- "We still have people talk about the exhibition as well as have staff refer to it. We also have many science-related programs that have continued on since *Discover Earth*. We have also focused on STEM learning in general since we aimed to use *Discover Earth* as a jumping off point for STEM programming."
- "I think it was great for the younger audiences, especially the grade school participants who came to see the exhibition and programs."
- "Our patrons LOVED the exhibit while it was here, and have been very enthusiastically attending related STEM programs that we have planned since then."
- "The exhibit generated media attention and drew more people to the library branch that housed the exhibit."
- "We had many school groups visit and many children with repeat visits. We also had numerous compliments from adult patrons."
- "The exhibit was interactive and the children especially liked the wall and building the arch. It was an incredible experience to offer what I thought of as a mini science museum. We had numerous schools visit and I like the grant requirement of including local engineering projects and engineers. Some of the younger children had not heard of engineering, so hopefully it planted a seed. All of the programs we offered were also excellent and promoted engineering."
- "Many of our customers, both adults and children, were very engaged with the exhibit. The exhibit also brought in people who had never been to this library."

Two librarians (11%) thought the exhibit was somewhat successful at their libraries. One of these two librarians provided an explanation, saying, "I think it was very successful for the local community, especially the children. I was disappointed that, for all of our advertising, we had very few people from the surrounding area come to the exhibit." One respondent was neutral about their assessment of the exhibit at their library, and explained the reason for this rating was because the exhibit was hosted at a different branch.

Question 5: **To what extent do library patrons at the host libraries become more interested in, knowledgeable about, and engaged in the STEM topics presented in the exhibits and related programming?**

Many library patrons at the host libraries became more interested, knowledgeable, and engaged in the STEM topics presented in the exhibits and related programming.

? To what extent do library patrons find the exhibits and related programming to be engaging?

Library patrons reported that they found the exhibits and related programming to be highly engaging: they spent time interacting with the exhibits, attended programming, and reported that they found the exhibits to be very interesting.

✓ **Indicator:** Library patrons spend time engaging with exhibits

According to library staff, almost 350,000 visitors saw a STAR_Net exhibit. A total of 284,473 individuals had attended the *Discover Earth* exhibit through September 2013, and 60,900 individuals had attended the *Discover Tech* exhibit (see Table 10 on the following page). Library staff were also asked to report the demographics of exhibit attendees, including age, race, and ethnicity. However, the majority of libraries did not track demographics of attendees and were not able to provide this information.

Table 10. Exhibit Attendance Through September 2013, As Reported By STAR_Net Librarians
(Source: ALA Final Report Form; n = 13)

		State	# Exhibit Attendees	# Library Visitors While Exhibit Was at Library	% of Library Visitors Who Saw Exhibit	Number of Library Cards in Use[1]	% of Library Card Holders Who Saw Exhibit
Discover Earth Libraries	T.L.L. Temple Memorial Library and Archives	TX	2,465	3,569	69%	4,000	62%
	Winnebago Public Library	NE	447	6,615	7%	1,200	37%
	Garfield County Libraries	CO	15,000	92,000	16%	34,000	44%
	Laramie County Library System	WY	31,428	62,856	50%	85,652	37%
	East Meadow Public Library	NY	66,348	81,886	81%	31,885	208%
	Central Rappahannock Regional Library	VA	91,167	91,167	100%	183,824	50%
	Ephrata Public Library	PA	65,550	Not reported	Not reported	26,828	244%
	West Florida Public Library	FL	12,068	40,228	30%	48,563	25%
	All *Discover Earth* libraries		**284,473** Total	**378,321** Total	**50%** Median	**32,943** Median	**47%** Median
Discover Tech Libraries	Spokane Public Library	WA	32,453	49,929	65%	111,476	29%
	Mary Wood Weldon Memorial Library	KY	4,560	22,702	20%	11,940	38%
	Wayne County Public Library	NC	2,279	40,495	6%	77,698	3%
	Huntsville-Madison County Public Library	AL	11,183	74,552	15%	161,578	7%
	Carnegie Public Library of Clarksdale and Coahoma County	MS	10,425	15,446	67%	11,734	89%
	All *Discover Tech* libraries		**60,900** Total	**203,124** Total	**20%** Median	**77,698** Median	**29%** Median
All STAR_Net libraries (through September 2013)			**345,373** Total	**581,445** Total	**40%** Median	**34,000** Median	**38%** Median

[1] As reported by library staff on their application to host Discover Earth *or* Discover Tech.

Chart 13. Exhibit attendance varied by library. On average, library staff reported that one out of two library visitors attended the *Discover Earth* exhibit and one out of five library visitors attended the *Discover Tech* exhibit. *(Source: ALA Final Report Form; n = 13)*
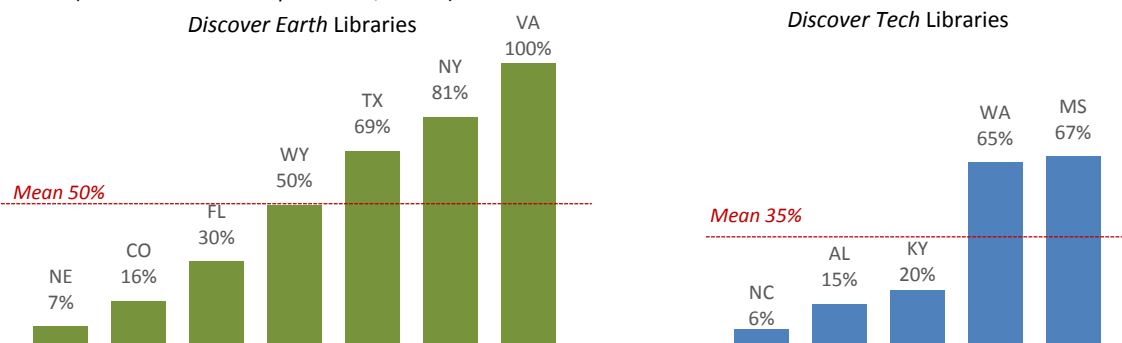
There are at least three potential inconsistencies in how libraries reported exhibit attendance, suggesting the attendance figures should be considered as estimates rather than as exact counts.

First, almost all the librarians said they had estimated the number of visitors to *Discover Earth* or *Discover Tech* because the exhibit components were scattered throughout their libraries and it was therefore impossible to track the exact number of library visitors who had looked at one or more of parts of the exhibit.[6] Because the *Discover Earth* and *Discover Tech* exhibit components were typically placed in multiple locations throughout the library (including prominent locations such as at the library's entrance or near the circulation desk), some librarians assumed that the majority of the people who came to their library during the exhibition period also spent time interacting with the exhibit. However, estimates of exhibit attendance varied even amongst librarians who reported that they had placed components of the exhibit in prominent, "can't miss" locations. For example, one librarian, who reported that the exhibit "was laid out in such a way that anyone who walked in the door couldn't help but see it," assumed that every library visitor also attended the exhibit (i.e., 100% of library visitors attended the exhibit). Another staff member from another library reported the exhibit "was positioned at the front entrance to the library; you could not enter the library without noticing it," but estimated that 67% of visitors actually attended the exhibit. A third librarian, who reported the exhibit was located in "in the main lobby where all entrances to the main library enter and exit," assumed that 30% of all library visitors also visited the exhibit. Such variations in estimated exhibit visitorship—from 30% to 100% of library visitors—amongst libraries that appear to have displayed the exhibit in similar ways suggest that librarians were uncertain how to count visitors.

In fact, a second issue with the attendance figures relates to what librarians counted as exhibit attendance. Unless it is an unticketed exhibition, science and technology museums usually can easily count the number of individuals who enter their facilities, and can reasonably assume that all (or almost all) their visitors spend time looking at several exhibit components and/or attending programming. However, libraries serve

> **Selected Questions Regarding Exhibition Attendance from the ALA Final Report Form**
>
> 1. What was the total number of attendees to the exhibit? _____
>
> 2. Please record the total number of visitors to your library/branch during the exhibit period. Please include both those who attended the exhibit plus those who did not attend the exhibit. _____
>
> 3. Please record the source of your information about the number of visitors to the exhibit.
> _____
> _____
> _____
>
> 4. If you are having difficulty estimating the number of visitors to the exhibit, would a figure of 10% of the total number of visitors to your site be reasonable?
>   - ❍ Yes
>   - ❍ No
>   - ❍ Not sure
>
> 5. If 10% of the total number of visitors to your site is not a reasonable estimate of the number of visitors to the exhibit, what percentage would you suggest (if you are not sure of the exact number of visitors to the exhibit)?
> _____
> _____
> _____
>
> 6. Use the space below to add any comments you have about counting the number of visitors to your *Discover Earth/Discover Tech* exhibit.
> _____
> _____
> _____
>
> *The complete ALA Report Form can be found in Appendix J.*

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[6] Three libraries are known to have placed the *Discover Earth* or *Discover Tech* exhibit in a separate room. One of them used an automatic people counter to track exhibit attendance.

multiple purposes in addition to hosting the exhibits. (In fact, that is one of the reasons the STAR_Net project team partnered with libraries.) Library visitors could spend time casually interacting with *Discover Earth* or *Discover Tech* exhibit components over the course of multiple visits to the library, and each interaction could range from very brief (a minute or less) to extensive (an hour or more). (Information on how long visitors reported looking at the exhibits and were observed to interact with the exhibits is reported later in this section.) What "counts" as having attended *Discover Earth* or *Discover Tech* exhibits? Does a library patron who looks at an exhibit panel for one minute "count" as an attendee? (In fact, "attendance" may not be the best word to describe individuals who look at or interact with exhibit components at a library.) The ALA Report Form (see sidebar on previous page) did not instruct librarians about how to count exhibit attendance. Only one librarian described how the library counted attendance, saying, "The display of engineers was popular with adults, and every adult viewed this portion of the exhibit as they descended the stairs. At least half of our visitors are adults, so the number who viewed the exhibit is much higher than the number I gave. *Our numbers are based on active interaction with the exhibit* [emphasis added]." Other librarians may have (consciously or unconsciously) adopted different definitions of how to count whether library patrons "attended" the exhibit, resulting in variations in reported attendance figures.

A third and final issue with exhibit attendance is that librarians may or may not have reported unduplicated counts of the number of library visitors and/or exhibit attendees. Some librarians may have counted the number of exhibit "visits" rather than the number of unique exhibit "visitors." In other words, although the same person may have visited the library (and/or the exhibit) multiple times, librarians may have counted each time that person visited as a separate count. In addition, librarians may have counted the number of library visitors and the number of exhibit attendees differently—perhaps reporting the number of library visitors as a cumulative count (i.e., including every library visit in the count, regardless of whether individuals had visited the library more than once during the count period) but reporting the number of unique exhibit visitors (counting the total number of individuals who visited the exhibit). If librarians counted library and exhibit visitors differently, it would be inappropriate to calculate the ratio of exhibit visitors to library visitors.

Although the exhibit placement may have hindered the ability to track visitorship accurately, it may have also (and more importantly) made it more likely that library visitors would interact with at least part of the exhibit. The scattered placement of exhibit components fostered serendipitous exploration of the exhibit. One librarian explained, "Because the exhibition was spread out throughout the building, people who were at the library for normal library-related activities and not specifically to see *Discover Earth* encountered the exhibition and had the opportunity to interact with it." Another library distributed *Discover Tech* on two different floors, and put some components near the stairs between the floors. A librarian explained, "As a result, many people interacted with the exhibit on their way to other parts of the building." Librarians from one of the few libraries to place the exhibit in a separate room speculated that exhibit visitorship was lower than they had hoped because visitors had to take a set of stairs to get to the exhibit room.

As shown in Chart 13 on p. 38, library staff reported that, on average, about one out of two library visitors viewed the *Discover Earth* exhibit and one out of five library visitors viewed the *Discover Tech* exhibit. Although a smaller percentage of visitors interacted with the *Discover Tech* exhibit than the *Discover Earth* exhibit, they tended to interact with it longer. The Library Patron Survey asked attendees to write in the number of minutes that they had spent looking at the exhibit.[7] If patrons had attended the exhibit more than once, they were instructed to add the total the number of minutes they had looked at the exhibit. (The survey did not list

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[7] A total of 80% of *Discover Earth* patrons and 77% of *Discover Tech* patrons answered the question.

specific answer choices so as not to unintentionally bias visitors' time estimates upward or downward.) Patrons' responses were subsequently grouped into categories for analysis based on the distribution of responses. The majority of patrons reported spending more than 30 minutes looking at the exhibit (52% of *Discover Earth* patrons and 69% of *Discover Tech* patrons reported spending more than 30 minutes). *Discover Tech* patrons reported spending more time looking at the exhibit than *Discover Earth* patrons did (see Chart 14 below). On average, *Discover Earth* patrons reported spending 59.6 minutes and *Discover Tech* patrons reported spending 82.6 minutes looking at the exhibit (p < .10).

Chart 14. *Discover Earth* **patrons most often reported spending 16-30 minutes looking at the** *Discover Earth* **exhibit while** *Discover Tech* **patrons most often reported spending at least 60 minutes looking at the** *Discover Tech* **exhibit.**
(Source: Patron Survey)

Discover Earth Patrons (n = 572)

Discover Tech Patrons (n = 316)
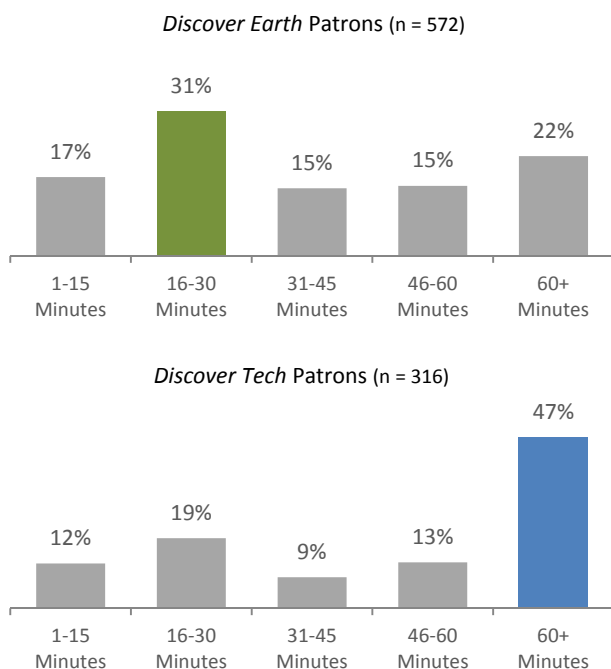
Patrons were observed to spend more time interacting with the *Discover Tech* exhibit than they were observed interacting with the *Discover Earth* exhibit.[8] The average patron was observed to interact with the *Discover Tech* exhibit for eight minutes (range of 1-42 minutes), while the average patron was observed to interact with *Discover Earth* exhibit for five minutes (range of 1-37 minutes).

It is possible that patrons reported and were observed to spend more time interacting with *Discover Tech* than *Discover Earth* because the libraries that hosted the *Discover Earth* exhibit were somehow different from the libraries that hosted the *Discover Tech* exhibits, and/or that patrons at *Discover Earth* libraries were different than *Discover Tech* library patrons. Each library hosted only one of the two STAR_Net exhibits, so it is not possible to determine whether the two exhibits would have been equally engaging to the same group of patrons. However, data from patron interviews and open-ended questions on the Patron Surveys suggest that

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[8] The evaluation team spent two days at each of three *Discover Tech* libraries and two *Discover Earth* libraries observing patrons as they interacted with the exhibits. A total of 42 *Discover Tech* observations and 29 *Discover Earth* observations were conducted; some of these observations were of multiple individuals in small groups, such as families.

the difference between the two exhibits may have been due at least in part to the fact that *Discover Tech* had more hands-on, interactive activities, which were particularly appealing to visitors.

> ✓ **Indicator:** Library patrons attend library programs associated with the exhibits

Librarians were asked to track the number of individuals (by age) who attended each of their exhibit-related programs. A total of approximately 15,000 individuals attended *Discover Earth* or *Discover Tech* programs, including more than 9,000 children.

Chart 15. A total of 15,099 individuals attended exhibit-related programming through September 2013

(Source: ALA Final Report Form; n=13)
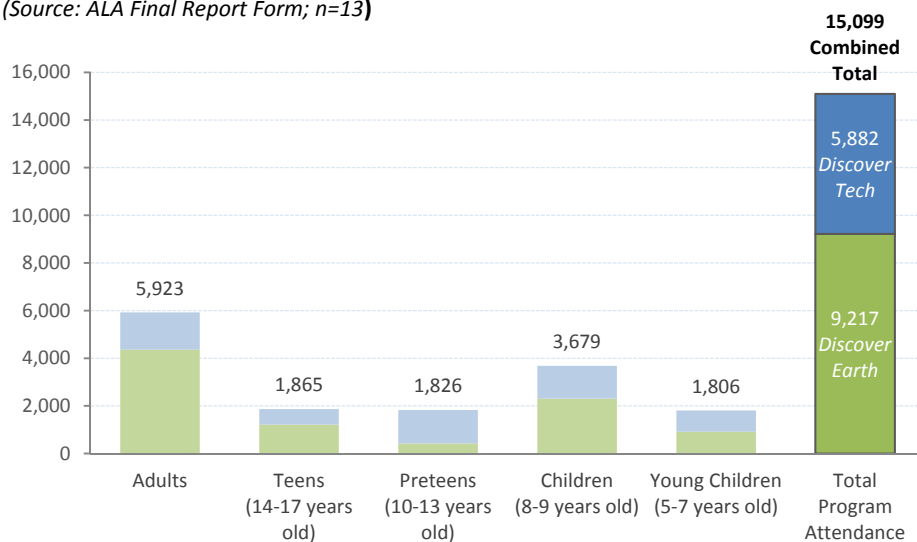
About one third of the patrons who completed a Patron Survey reported that they had attended one or more programs, lectures, or presentations related to the exhibit at their library (36% of the *Discover Earth* patrons and 29% of the *Discover Tech* patrons; see Table J in Appendix N). In response to an open-ended question which asked patrons to share comments about the exhibit or related programs they attended, several respondents said they had attended a specific presentation (primarily related to *Discover Earth*). Almost all of their comments were positive. Patrons said they had found the presentations to be engaging, informative, and/or thought-provoking. Comments included:

- "Loved the grand opening panel!" (*Discover Tech* patron)
- "Enjoyed the presentation. The presenter was patient with the kids and spoke at a level appropriate for the audience." (*Discover Earth* patron)
- "Presenter very interesting and enthusiastic. Great job!" (*Discover Earth* patron)
- "*Radioactive Wolves* was very informative/eye-opening." (*Discover Earth* patron)
- "The video series is great. Finding a local tie-in with *My Life as a Turkey* in particular was good." (*Discover Earth* patron)
- "The astrophysics lecture was very interesting and inspiring." (*Discover Earth* patron)
- "Wetlands…program was great. Presenter was enthusiastic and knowledgeable." (*Discover Earth* patron)

Only three of the 20 comments patrons wrote regarding exhibit-related programming were critical. One patron wrote, "Keep to your time schedules—speaker went on for too long and kids got restless/lost interest." Another patron wrote, "The astrophysicist was giving an interesting lecture when he was rudely interrupted by library staff. Boo!" A third patron wrote, "I didn't enjoy the PowerPoint."

> ✓ **Indicator***:* Library patrons express excitement during exhibit interaction

Patrons who were interviewed during site visits to five of the STAR_Net libraries were very positive about the exhibit and said it was a great addition to their library. Most said that they would recommend the exhibit to their friends or family members, and several said they planned to bring their children or grandchildren back to the library to see the exhibit.

The vast majority of survey respondents were also enthusiastic about the exhibits (see figure below; complete survey results are in Appendix N, Tables H-N). The majority of patrons strongly agreed that they found the exhibit to be very interesting, and (if they had children with them), strongly agreed that their children were very interested in the exhibit. The majority of survey respondents also said the exhibit was a valuable addition to their library and that they would recommend it to others. One library patron wrote, "Even if I didn't love science, I would still be amazed and interested! ...I loved it!"

Chart 16. The majority of patrons were enthusiastic about the exhibit *(Source: Patron Survey)*

I think the exhibit is very interesting.

	Agree	Strongly Agree	Agree + Strongly Agree
Discover Earth (n = 701)	27%	66%	93%
Discover Tech (n = 401)	34%	57%	91%

The exhibit is a valuable addition to my library.

| Discover Earth (n = 690) | 26% | 64% | 90% |
| Discover Tech (n = 393) | 25% | 57% | 83% |

I would recommend the exhibit to others.

| Discover Earth (n = 697) | 24% | 65% | 89% |
| Discover Tech (n = 388) | 24% | 57% | 81% |

The children/young people with me were very interested in the exhibit.

| Discover Earth (n = 593) | 26% | 60% | 86% |
| Discover Tech (n = 354) | 25% | 57% | 82% |

Several patrons said they appreciated that the *Discover Earth* and *Discover Tech* exhibits included a variety of components, including interactive technology, activities, and visual artifacts. Visitors especially valued the hands-on nature of the exhibits.

Discover Earth patron survey comments included:

- "It's so visual and tactile—just like Epcot at Disney World. Great for all kids."
- "Excellent exhibit, engaging, informative, lots of different ways to engage to maximize student interest—hands on, computer-based stimulation, computer-based quiz, etc."
- "It makes education fun."
- "The games were a very fun ways of learning!" (See story on the following page.)
- "Using videos and games engages visitors and holds interest."
- "My 10-year-old science lover says, 'Pretty cool—wait, what's that over there? I haven't seen that yet!'"
- "My children were very engaged!"
- "This is great! Thank you for providing this interesting, fun, and interactive exhibit. I really enjoyed it."

Discover Tech patron survey comments included:

- "It was really cool and fun; my kids loved it."
- "My students loved the hands-on opportunity. It gave them a chance to connect in real world situations."
- "I had to drag the kids away from the library. They enjoyed it as much as I did."
- "I thought this trip was very fun and would like to attend again. I thought all the activities were more fun than I thought a library would be….[I] didn't expect THAT much fun at the library!!
- "Loved Inventor's Lab." (See the sidebar to the right.)
- "One of the best exhibits [this library] has ever received. Educational and fun."

"It makes your mind work"

Adult Visiting *Discover Tech*

A man in his early thirties sits down at the Inventors Lab table, which has three stations where library visitors can experiment with Snap Circuits components and learn how to build electrical circuits. He begins putting together a circuit of his own design, carefully snapping parts onto the plastic board glued to the table in front of him. His wife, also in her early thirties, comes over after using one of the library's computers and stands next to him, watching him work. After a couple of minutes, she sits down at another Inventors Lab station and begins assembling her own electrical circuit, following one of the guides that is displayed at the station. They both sit working quietly for 10 minutes.

During a subsequent interview, the man says he had visited the library the week before and briefly played with the Snap Circuits, as well as the *Discover Tech* generator exhibit and water filtration system model. Although he already knew how to build circuits, the Inventors Lab drew him back because he thought it was fun and encouraged creativity. "It makes your mind work," he said.

The woman says that she plans to bring her nine-year-old and two-year-old back to see the exhibit. "My kids would love it." She adds, "I don't want to go home."

"That's crazy about icebergs being under water!"

Kindergartener Visiting Discover Earth

On a sunny afternoon, shortly after school has let out, a kindergartener and her pre-schooled-aged sister sit down at the *Discover Earth* Quiz Game together with their mother. The two sisters begin the game, in which an animated polar bear asks a series of multiple-choice questions about the earth's geology and natural history. Five minutes later, the preschooler leads her mother away to look for a book in the adjacent children's book section while the kindergartner studiously continues to answer the polar bear's questions. After a few minutes, the mom and preschooler return from their book-finding expedition and sit in comfortable chairs nearby while the kindergartener continues to play. Then two more kindergarten girls (who are friends) join her at the Quiz Game.

All three girls appear to be very engaged in the game, carefully reading the questions aloud and speculating about the answers. They jump up and down when they get a question right, and groan or sigh when they get an answer wrong. The polar bear asks how much of an iceberg's mass is underwater. The first kindergarten girl, who guesses incorrectly, says, "That's crazy about icebergs being under water."

After the girls finish a round of questions, the first kindergarten girl says, "Let's do Level 2." The girls start another round of questions. The polar bear asks a question about trees. The first kindergartner presses an answer button confidently and announces to the other girls, "I knew it from a book." The other two girls copy her answer, which turns out to be incorrect. The first kindergartner says, "That can't be. You are the worst polar bear ever."

The three girls play the Quiz Game together for about 20 minutes. Then the second pair of kindergartners leaves. Meanwhile, the first girl continues to play on her own. Her mom sits a few feet away, sometimes watching her while at other times looking at a book or interacting with the preschooler. When her daughter gets a quiz answer correct, the mom says, "Good work, kiddo!" When the kindergartner comes across a question she doesn't know, the girl sometimes tries to draw her mother in, asking, "Mom, do you know?"

About 15 minutes later, the other two kindergartners return and resume playing the Quiz Game. All three girls appear to be enjoying the activity. They are giggling and having good time.

In subsequent interviews, the mothers share they had seen the exhibit several times previously with their daughters. One of the moms says, "It's wonderful. We already love books and to have something hands-on like this makes the library an even more amazing place to be. It changes your library—changes it up. It's a new library! She loves it."

Library staff also thought that the interactive exhibits served as a powerful draw for children and adults. A *Discover Tech* librarian said, "It's been so cool to see people come in and play with it…It's just the right size for the space we created for it, and I think the community has been really engaged by it." A *Discover Earth* librarian said,

> "It's definitely promoting their curiosity and their excitement about learning. The activities themselves are fun, but then they're also learning [by] being able to explore. The globe is so much fun to make it rotate it around and make it have different weather patterns or different things you want to see on it. I think there's so much in there: curiosity, exploration, discovery. It's all in there."

Another librarian said, "One mother brought her son to the Inventor's Lab and they worked together for quite a long time. When she left, she offered effusive compliments. She said they would not have an opportunity to experience something like this if it had not been for the library. When we told her we now have Snap Circuit kits to check out so she could continue her son's exploration, her face lit up." Several library staff said that children who visited the exhibits as part of a school field trip appeared to be highly engaged, and often did not want to leave. For example, one librarian said, "When it was time to go, [the school children] were not quite done. We had to pry their hands off of pieces and say, 'You just come back on Saturday!'" Another library staff member said, "One boy spent a long time at the water filtration station. He did not move from that spot. They had to send someone back up to take him back to the school. He did not want to leave!" Library staff believed that the exhibit engaged patrons and enriched their experience at the library. One librarian said, "Having hands-on things in the library is the way things are moving and need to move, and will happen more and more. Having that opportunity to interact and play with something and investigate something new, I think really gives the books more meaning."

During site visits, adults were observed to play an important role in facilitating children's engagement in the exhibits. These adults included parents, grandparents, teachers, and library staff. Adults were observed suggesting that children look at a particular exhibit, helping them understand how an exhibit operated, or encouraging them to stay focused on an exhibit-related activity. Caregivers could also discourage engagement by telling their children they did not have time to look at the exhibit or that it was time to leave the library.

While adults often helped children engage with the exhibits, the reverse was also true. Children also frequently provided a way for adults to begin interacting with the exhibits. Upon entering the library, many children immediately ran over to an exhibit component as their parents trailed along behind them; often, their parents then began looking at the exhibit, too. Some librarians observed that adult caregivers and children can mutually encourage engagement and learning. A librarian said, "One woman came with her three grandsons. She brought them here because she wanted them to see the exhibit and then they taught her how to use the machinery. When they couldn't understand some of the content, she could explain it to them. It was a real give and take." Another librarian said, "I think people are realizing more that they can influence their child's opinion about math and science learning, and I think we can find ways to aid that…We make it interesting and model that for parents in our programs and provide them with resources in our collection."

In interviews and on the surveys, several patrons said they were impressed with the high quality of the exhibits. One patron said it reminded her of a Smithsonian Museum and she appreciated that she didn't have to travel to Washington, DC to see it. Visitors' enthusiasm about the exhibits is perhaps particularly noteworthy because almost all of the library visitors who were interviewed during site visits said they had not realized that the exhibit was at their library prior to visiting—they just stumbled across it.

The majority of library patrons said they were interested in learning more about earth science or engineering. *Discover Earth* and *Discover Tech* libraries circulated more exhibit-related materials while the exhibit was at their library.

> ✓ **Indicator***:* Library patrons indicate that the exhibit or program increased their interest in learning more about the earth science or engineering and technology topics
>
> ✓ **Indicator***:* Library patrons indicate they plan to return to exhibit/library to learn more about ideas presented in the exhibit
>
> ✓ **Indicator***:* Library patrons indicate they plan to or would like to attend another educational institution or events to learn more about earth science, engineering or technology

One of goals of the STAR_Net is to increase the likelihood that library patrons become active science learners as a result of attending the exhibit and/or related programming. As shown in Chart 17 on the following page, the majority of patrons who responded to the Patron Survey agreed or strongly agreed that the exhibit increased their interest in learning more about earth science or engineering. Most patrons also agreed or strongly agreed they would like to learn more about these topics by attending another educational institution or event, and reported that they planned to visit the exhibit again. Patrons who attended the *Discover Earth* exhibit were somewhat more likely to strongly agree with each of these statements than patrons who attended the *Discover Tech* exhibit ($p < .05$ for the statement regarding interest in attending another educational institution; $p < .001$ for the statement regarding interest in learning more about the exhibit topics and intentions to re-visit the exhibit).

Chart 17. The majority of patrons said they were interested in learning more about the exhibit topics
(Source: Patron Survey)

I would like to attend another educational institution (like a museum) or event to learn more about earth science/engineering.

	Agree	Strongly Agree	Agree + Strongly Agree
Discover Earth (n = 692)	33%	49%	**81%**
Discover Tech (n = 394)	27%	45%	**72%**

The exhibit increased my interest in learning more about earth science/ engineering.

Discover Earth (n = 690)	33%	48%	**81%**
Discover Tech (n = 391)	26%	42%	**68%**
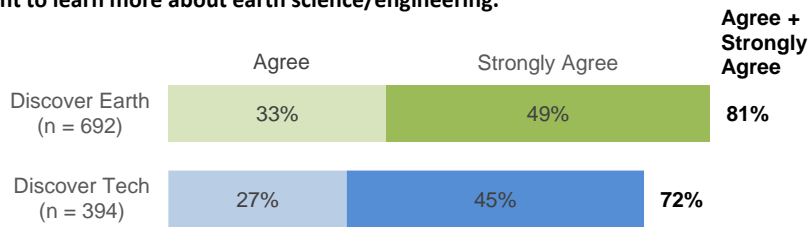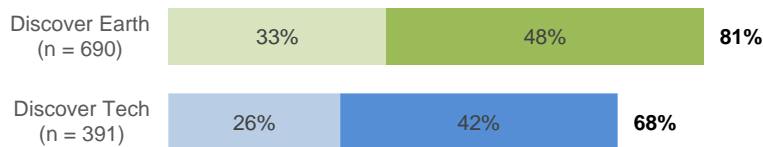
I plan to visit the exhibit again at my library.

Discover Earth (n = 676)	30%	48%	**78%**
Discover Tech (n = 395)	31%	36%	**67%**
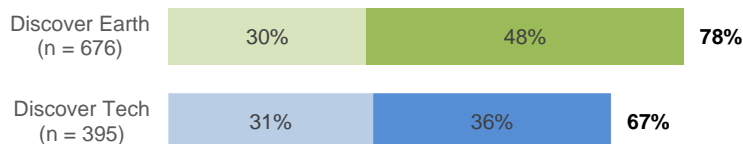
In response to an open-ended question asking patrons for feedback about the exhibit and programming, about one in ten survey respondents expressed interest in learning more about STEM—either by returning to the exhibit or by engaging in activities outside of the library.

Discover Earth patron survey comments included:

- "My son wants to go to his grandfather's cabin upstate and take weather readings."
- "It was great and really sparked my interest in science!"
- "I think I'll pay more attention to the moon and stars. Constellation program: very interesting."
- "My children learned a great deal from the exhibit and been excited to share the exhibit with other family members."
- "*Discover Earth* was a fun way to learn. I learned a lot from it and I would love to do it again."
- "This is excellent! I plan to bring my nephews and other students before it closes."
- "Wonderful—will be back to explore more!"
- "We have enjoyed the *Discover Earth* exhibit so much that we visited the LA Science Museum while on vacation. [Facilitator's] atmosphere modeling was extremely interesting; would love to see a Part 2."

Discover Tech patron survey comments included:

- "I thought it was very fun and interesting and I would like to learn more."
- "Very good information. I want to come back."
- "I learned a lot from today. I feel like I will attend it again really soon. I feel like everybody learned."
- "I thought it was very fun and interesting and I would like to learn more."
- "I will come back and bring my grands."

> ✓ **Indicator***:* Library patrons borrow library materials to learn more about the specific idea(s) presented in the exhibit
> ✓ **Indicator***:* Library patrons increase the number of STEM library resources checked out after the exhibit

Another STAR_Net goal is to increase library patrons' interest in learning more about the subject matter of the *Discover Earth* and *Discover Tech* exhibits. The Patron Survey asked exhibit visitors if they planned to use library resources to learn more about earth science or engineering. About two-thirds of the *Discover Earth* patrons and just over half the *Discover Tech* patrons said they intended to do so (see figure below). One patron noted, "My children loved the exhibit and after we checked out several books about earth science. Very positive addition." Although the majority of patrons said they planned to learn more, it is noteworthy that of the 11 survey questions asking patrons' about their interest, attitudes, and dispositions toward the exhibits and STEM, this question received the lowest percentage of agreement. *Discover Earth* patrons were more likely than *Discover Tech* patrons to indicate they planned to learn more about the exhibit topics (p < .001).

Chart 18. The majority of patrons said they plan to learn more about the exhibit topics.
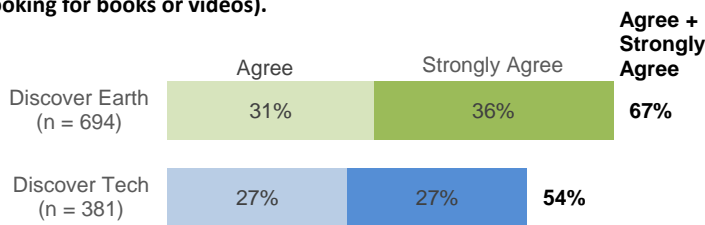*(Source: Patron Survey*)

I plan to learn more about earth science/engineering using library resources (such as looking for books or videos).

	Agree	Strongly Agree	Agree + Strongly Agree
Discover Earth (n = 694)	31%	36%	**67%**
Discover Tech (n = 381)	27%	27%	**54%**

As a proxy for measuring changes in patrons' interest in learning about STEM, exhibit-related circulation records were collected from exhibit libraries for a two-month period one year prior to each library receiving the exhibit, and the two-month period while each library had the exhibit.[9] More patrons checked out STEM-related materials during the exhibit than they had the year before from six out of eight of the libraries that provided circulation records. Five *Discover Earth* and three *Discover Tech* libraries provided records for the period before they hosted the exhibits and while they hosted the exhibits. (Library staff were told that circulation records would not be reported by library, but in aggregate by exhibit.) The average *Discover Earth* library circulated 27% more materials related to earth science while the exhibit was at their library, and the average *Discover Tech* library circulated 3% more technology and engineering-related materials while the exhibit was at their library. However, this average disguises considerable variation by library. Year-to-year circulation patterns for the eight libraries that provided records ranged from a decrease of 18% to an increase of 1,000%. Although there was considerable variation by library, the majority of libraries reported that they circulated more science- or technology-related materials while the exhibit was at their libraries: four of the five *Discover Earth* libraries and two of the three *Discover Tech* libraries that provided records reported increases in the number of exhibit-related materials that circulated while the exhibits were at their libraries.

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[9] Records were also collected for the two-month period one year after the exhibit has left each library. However, only two libraries were able to provide these records.

Many library staff indicated that they promoted exhibit-related materials to patrons, such as through temporary displays of books or DVDs located near the exhibits. One library staff member observed, "We've had increased membership, higher circulation overall, and have also noticed that since we hosted the exhibit, we have more homeschool families as well as public school students using our collections to complete school work….The connection that we made with them during the exhibit run here has carried over and they now view the library as a place where they can find materials to assist them in the classroom."

> **?** To what extent do library patrons improve their knowledge about STEM topics presented in the exhibits and programming?

The majority of patrons who responded to the Patron Survey said that the exhibit increased their awareness of earth science or engineering. A number of patrons were able to recall ideas presented in the exhibits.

> ✓ **Indicator:** Library patrons indicate that the exhibit or program increased their awareness of the earth science or technology topic
>
> ✓ **Indicator:** Library patrons recall topics and ideas presented in the exhibit or program about earth sciences, technology and/or engineering
>
> ✓ **Indicator:** Library patrons understand one or more of the exhibit's key themes and have met one or more of the exhibit's learning goals

Patrons said that the exhibits increased their awareness of earth science or technology. About eight out of ten patrons agreed or strongly agreed they learned a lot from the exhibits. Based on the number of survey responses to questions about children, about 84% of the survey respondents had children with them. The majority of caregivers said their children found the exhibits interesting and learned a lot.

Chart 19. The majority of patrons reported that they (and their children) learned from the exhibits.
(Source: Patron Survey)

I learned a lot from the exhibit.

	Agree	Strongly Agree	Agree + Strongly Agree
Discover Earth (n = 702)	33%	49%	**82%**
Discover Tech (n = 400)	37%	46%	**83%**

The children/young people with me learned a lot from the exhibit.

Discover Earth (n = 588)	30%	53%	**83%**
Discover Tech (n = 343)	28%	55%	**83%**
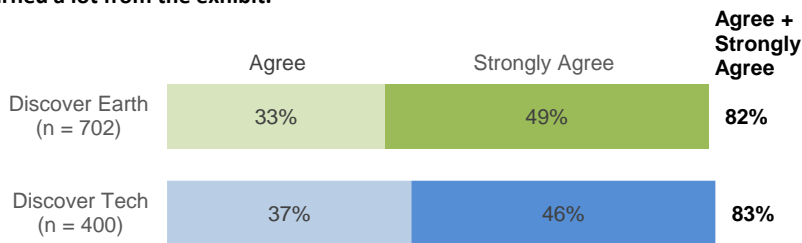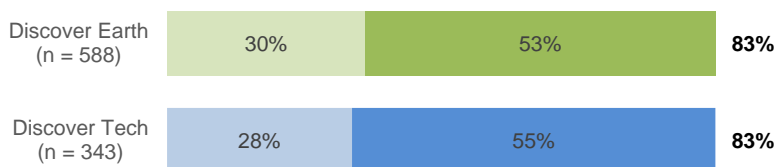
About one in six library patrons' responses to an open-ended question asking for their feedback about the exhibit and programming related to learning. Most of these patrons' comments were general, saying that they had found the exhibit at their library to be educational, but (not surprisingly, given the broad wording of the question) did not mention any specific concepts or facts that they had learned.

Discover Earth patron survey comments included:

- "If anything can teach kids about earth science, this is it."
- "My kid and I enjoyed this very well. It showed us a lot that we didn't know. Thank you."
- "I thought it was very interesting and if they had this back when I was in school, I probably would have learned better."
- "Very easy to understand. The photos were amazing. I really learned a lot, very interesting! Great job! Thank you."
- "I enjoyed learning about the weather and geology."

Discover Tech patron survey comments included:

- "*Discover Tech* was really cool. I learned how engineers are really important to this world."
- "I think that *Discover Tech* has helped me realize certain things around me."
- "I brought my children and was surprised at how much I enjoyed the exhibit and how much I learned from the experience."

In interviews conducted as a part of site visits to STAR_Net libraries, library patrons were asked what they had learned from the exhibit. Most patrons were able to recall at least one or two topics and ideas presented in the exhibit about earth sciences, technology and/or engineering. Table 11 (on the following page) shows the key themes and learning goals for *Discover Earth* and *Discover Tech*. The column on the right shows examples of comments patrons made on the surveys or in interviews that demonstrated they may have understood one or more of the exhibit's key themes and met one or more of the exhibit's learning goals.

Librarians also believed that the exhibits had affected their patrons. One librarian described a library patron whom she believed was encouraged to continue her activism because her library hosted the *Discover Earth* exhibit. The librarian explained,

> "Since I don't often work directly with the public, my perception may be different than other staff members who do. However, one patron in particular visited the exhibition several times and was encouraged to continue her activism in relation to climate change. She hosts a local climate change organization's meetings here at the library and encourages members to check out library materials."

Another librarian said, "I believe it has raised awareness of STEM programs we have, as well as opened the channels to have more discussions about certain fields of study for children in school."

Table 11. Learning Goals of the STAR_Net Exhibits *(Source: STAR_Net documents; Patron Survey and Interviews)*

Exhibit	Big Idea	Key Themes	Project Learning Goals	Examples of Patron's Comments Demonstrating Understanding of Learning Goals
Discover Earth	MY CHANGING WORLD: The global environment changes—and is changed by—our community's local environment.	• **Global:** We belong to a complex system of interacting land, water (which includes ice or the cryosphere), air, and life systems. • **Regional:** Changes to distant oceans, air moving freely around our globe, and all living things have an influence on our local environment now, in the past, and in the future. • **Local:** Earth's systems interact over long-term scales to determine our community's future environment. • **How Do We Know?:** The tools scientists use and the process of science.	Through the *Discover Earth* exhibition, patrons will: 1. Be inspired about the interconnected earth system of interacting subsystems—rock, water, air, and life. 2. Understand that Earth's global system changes on short and long-term time scales. 3. Understand the water cycle and the important role that water plays in the earth system. 4. Learn about the basics of weather and how meteorologists predict it locally. 5. Understand the difference between weather and climate. 6. Learn how to become a thoughtful steward of Planet Earth. 7. Understand how scientists know what they know. (Tools of the Trade and the scientific process.)	• "We learned a lot about the Earth and what storms they have on Earth. I love *Discover Earth*." • "Film on wolves [was] excellent [part of a *Discover Earth* program]—[it] raised many questions in my mind." • "The weather cycle was very engaging; my five-year-old enjoyed herself a lot." • "Really liked investigating the storms and natural disasters and looking at the real time weather system with the barometer." • In an interview, a patron said she didn't know there was such a gap between when earth was created and things happened • In an interview, one patron said she learned about ecosystems • In interviews, three patrons said they learned about weather systems
Discover Tech	Engineers are real people who create practical solutions to help address societal wants and needs in our country and throughout the world.	1. Engineering provides solutions that can better meet human needs (for survival, sustainability, and enhanced quality of life). 2. Technology and engineering are creative processes that build on advances made in the sciences and improvements developed through invention and innovation. 3. The people who "do" technology—engineers and technologists—are very different from most popular stereotypes—and creatively adapt their skills as the needs for technology change.	Through the *Discover Tech* exhibit patrons will: 1. Discover that engineering is a design process that involves creating, testing, and iterating. 2. Be inspired by what engineers do, and who they are as people. 3. Become familiar with the 14 Grand Challenges for Engineering that the National Academy of Engineering has identified as the critical goals for the 21st century. 4. Learn the fundamentals of energy and become aware of their own energy use. 5. Understand the impact of engineering on societies over place and time.	• "I am going home and changing out the light bulbs in my house to LED bulbs. Had no idea the difference in energy consumption." • "*Discover Tech* was really cool. I learned how engineers are really important to this world." • In an interview, a patron said she learned about how solar panels work and that she needs to get LED lights • "I liked the arch because it was like you engineered it because you had to put blocks in certain place. " • "We made water cleaner." • In interviews, two patrons said they learned what fusion is • In an interview, a patron said he found it most interesting how stored energy can create light

Like library staff, patrons from the *Discover Earth* and *Discover Tech* libraries may be beginning to see the library as a place for STEM learning. The majority of patrons who completed the Patron Survey <u>strongly</u> agreed that their library was a good place to learn about earth science or engineering. All patrons who were interviewed during site visits said they were supportive of libraries hosting STEM exhibits.

✓ **Indicator***:* Library patrons indicate that the library is one place to learn science

The majority of patrons who completed the Patron Survey strongly agreed that their library was a good place to learn about earth science or engineering.

Chart 20. The majority of patrons said that their library is a good place to learn about STEM.
(Source: Patron Survey)

My library is a good place to learn about earth science/engineering.

	Agree	Strongly Agree	Agree + Strongly Agree
Discover Earth (n = 694)	32%	57%	**89%**
Discover Tech (n = 389)	30%	52%	**82%**
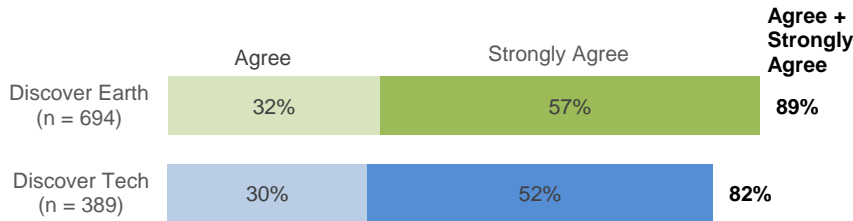
During interviews with patrons, patrons were informed that having a travelling exhibit like *Discover Earth* or *Discover Tech* at libraries was a new idea, and then they were asked what they thought of having exhibits like these at libraries. All 32 of the patrons who were asked this question responded positively and were supportive of libraries hosting STEM exhibits. On the Patron Survey, one individual wrote:

> "I think it is a great idea to bring emphasis to sciences into libraries. Libraries are not typically perceived as science meccas. Our kids are also not exposed to scientific endeavors enough in our society. This exhibit lends it some glamour and attention. Science and math are not popular and influential fields of study. They are seen as boring and nerdy types of work. We need to show our kids knowing science is part of being in this world. And can be fun!"

Another patron said he thought having a STEM exhibit in the library was "kind of strange at first, but I think it's perfect because lots of kids come here." In fact, several patrons said the exhibits were especially valuable for children—either their own or others in the community. Patrons seemed to view the exhibit as a resource for their community. Several library patrons said that they appreciated the exhibit provided a museum-quality experience for free. Other patrons said the exhibit added to the experience of the library, made them want to come to the library more often, or kept the library "fresh."

The majority of library staff who were interviewed shortly after the exhibit left their library and/or completed a survey six months after the exhibit left their library said they thought the exhibit had a lasting impact on their patrons. Several librarians said that patrons continued to talk or ask about the exhibit, even months after it left their facility.

- "Quite a few people missed it when it was gone and I think it may have helped them see the library as a different kind of place."
- "We have people after several months asking about it—is it still in our building? People remember it! It was just such a unique thing for us to have such an exhibit. I wish we could have it back or get *Discover Tech* or get any other nice exhibit to bring people in. Now that they have had a taste, we don't have anything to offer as an encore!"
- "There were people still asking if the exhibit was here two months after it was gone."
- "Even not the kids and parents are still talking about the exhibit. It was a very good experience for everyone."

At least half of the librarians made comments suggesting that they believed that patrons now saw the library as more than just a repository for books.

- "The exhibit informed library patrons that they can access high-quality science resources locally. Additionally, the exhibit exposed younger viewers to these topics for the first time, which can have a long-term impact."
- "The quality of this exhibit has added to the interest in our library, as well as our image."
- "Our patrons view us as a learning center more than just a place to come check out books. Our local teachers, as well as the area homeschool parents, trust that when we have STEM programs here at the library they will be both fun and relevant educational opportunities for their children."
- "There seems to be more awareness of the library as a place that has fun educational opportunities as well as books and entertainment."
- "[The grand opening of the exhibit] was…not a great day to have programming…Within four hours we still had about 1,200 people in spite of bad timing. We are further redefining our role in the community, so that we are not just books. That is going to have a lasting impact. People looking to us to do more of these varied programs. We are becoming a community cultural center and STEM brings us closer to that goal. And it fits so well with cultural and education standards we have... There is the social aspect of still going to a Library—the exhibit helps make the library 'cool again.' *Discover Earth* was so well done—because if it was boring it would have not enhanced our reputation as a good place to visit."
- "We have now shown the public we can have adult programs as well as children's programs and that the library does have things to offer adults beyond checking out books or the computer lab."
- "For me personally, I think it makes them be aware that we're not just books in a building, that we have other things to offer here. Working on getting more science programming, especially telescopes and stargazing...[It] gave us a nudge. We didn't realize people where as interested as they were. People in programming or interacting with *Discover Earth* started to see the library as a community resource."

Although almost all the library staff who completed the Six Month Post-Survey said they thought the exhibit had a lasting impact on their patrons, two said they had not observed such impact:

- "I think that the patrons I interact with (adults) enjoyed the exhibit and programs that were put on with it, but I have not seen any measurable impact since then."
- "None that I can see for my branch."

✓ **Indicator***:* Library patrons indicate a greater demand for STEM programs at the library after the exhibit

All librarians completing the Six Month Post-Exhibit Survey were asked if patrons at their libraries had asked for more STEM activities or programs. Just under half of the respondents (47%) said that patrons had asked for more activities or programs: seven library staff reported that "Many" had asked for STEM activities or programs and two staff reported that "A few" patrons had asked for STEM programming. Many of the respondents indicated they were not sure (8 of the 19 respondents; 42%). Two library staff (11%) reported that "No patrons" had requested more STEM activities or programs. One librarian wrote, "*Discover Earth* caused a greater interest to develop in the environment, weather, and robotics than ever before. It created a lot of excitement, and they look forward to our future programming."

Chart 21. Responses to Survey Question: "In the six months since the exhibit left your library, have patrons asked for more science, technology or engineering activities or programs?"
(Source: Librarian Six Month Post-Exhibit Survey; n = 19)
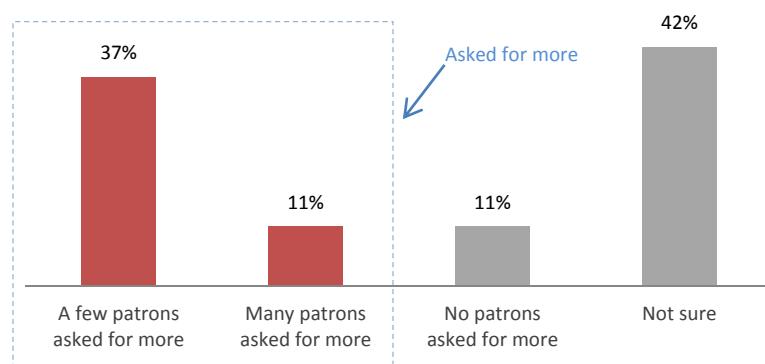
On the Patron Survey, one in 20 of the respondents said they would like to have another STEM-related exhibit visit the library and/or have more STEM programming.

Discover Earth patron survey comments included:

- "*Discover Earth* was fun and I would like more programs like this to come to our library.
- "I thought it was very interesting and informative. You should have similar things like this in the future."
- "Enjoy seeing the library having these exhibits. Do more on all subjects."
- "Loved it! Space next!"
- "The library needs more exhibits like this!"
- "Would love to see more types of these things."

Discover Tech patron survey comments included:

- "I think it was very educating and a lot of fun. Not only did we learn something, but it was hands on, so I hope you do this again."
- "I strongly recommend an exhibit about the human muscle system! I loved it!"
- "Thanks so much! Please have more of these programs!"
- "This is a great exhibit. Would like to see more exhibits."
- "I think it was good and learned a lot, but I wish the exhibit would stay."
- "The exhibits were fun and some were funny. I liked going and I want to go back next year."

Question 6:   What, if any, are the unanticipated consequences of STAR_Net (positive or negative) on librarians, libraries, patrons, and others?

The STAR_Net team specified the outcomes they expected and hoped the project would achieve. However, projects often have additional benefits and costs that project planners may not (and often could not) have anticipated. This section of the report describes a few additional outcomes of the project that did not fit under the pre-specified evaluation questions or indicators.

The exhibits supported free-choice learning:

> It was easy for patrons to interact with the exhibits. Unlike a typical science museum, there was no admission charge to see the exhibits or attend the programming. The components were typically scattered throughout the library, including in high traffic areas. Adults and children could look at the exhibits whenever they chose—whether it was on a special visit to see the exhibit or related program, or (as was the case for the majority of patrons interviewed during site visits) when they stumbled across the exhibit on a visit to the library for some other purpose. Patrons could interact with the exhibits for as little or as long as they liked, and could easily return to interact with different parts of the exhibit again.

> The flip side of having such informal, free-choice learning is that some patrons may have been less likely to interact with the exhibits without an additional "push," such as by having a librarian, a tour guide, a teacher, or a parent encourage them to try it.

The exhibits supported students' in-school learning:

> Multiple libraries hosted school field trips and some even provided teachers with supplemental materials. Several teachers and parents reported that the exhibits helped to support what students were learning during the school day, either in traditional classrooms or through home schooling. Four teachers who visited the exhibits on a school field trip completed a Patron Survey and commented that the exhibits helped scaffold classroom curriculum. One teacher said, "The weather exhibits [in the *Discover Earth* exhibit] were great for enhancing our 2nd grade weather unit." Another teacher wrote that the *Discover Earth* exhibit was "excellent for my advanced 5th graders who just finished a long study of science." A third patron wrote that *Discover Tech* was a "wonderful resource! Excellent hands-on exhibits. Students loved it. Reinforces classroom learning. More please!!!"

Another teacher commented, "Just brought class to exhibit. Awesome exhibit! So thankful to have a quality exhibit close to home."

The exhibits also helped to support home school learning. Multiple libraries said that the exhibits helped to attract home schooling groups. Four patrons who completed the Patron Survey said they homeschool their children. These parents were also appreciative of the exhibit and said it was "very helpful." One parent wrote, "Excellent exhibit and opportunity to learn hands-on for my homeschool children. Thank you!" Another wrote, "We came with our homeschool group. My child is in kindergarten and it was a little bit over her head but I thought it was great." A third parent said, "Perfect for homeschoolers."

The exhibits supported intergenerational learning:

Several librarians said they observed multiple generations interacting with the exhibits together. For example, one library director described how three generations of women (a grandmother, a mother, and young children) talked as they interacted with the Magic Planet Globe. Each member of the family appeared to be getting something out of it; each of them was seeing the earth in new ways. The library director reported that the grandmother had never had such an experience and obviously loved experiencing it with her family. Another librarian described seeing multiple generations square off against each another on the Quiz Game.

The evaluation team observed several such multi-generational interactions during site visits. Children frequently were the ones to draw their parents in to look at the exhibits. Parents also drew their children in and helped them stay focused on the learning.

***Discover Earth* appears not to have antagonized patrons who believe in creationism**:

Multiple patrons (particularly from one library which serves a conservative religious community) commented that they appreciated that *Discover Earth* did not promulgate evolution. Patrons commented that they did not think the exhibit was "too one-sided" and "didn't force evolution," and were "glad that evolutionary theory was minimal." A few patrons still thought the exhibit was too one-sided. For example, one patron said, "We all really enjoyed the technology used to promote scientific concepts. We would have liked to see a bit more balanced approach. A lot of what is taught is…evolution. We would like to see the other theories expressed as well. It would be nice to see some of the Intelligent Design theory shown also. [I have not attended other programs at library] but I will attend when they are available."

Libraries hope to leverage their STAR_Net experience into more providing other experiences to their patrons:

Staff from several libraries said they hope to use STAR_Net as a "springboard" to providing additional educational experiences to their community. As one librarian said, "It makes you hunger for more exhibits!" Staff from another library said they did not think they had a chance of being selected as a STAR_Net library. With support of the project, they learned, "we can do this," and are now more confident that they could do something similar in the future. Three librarians mentioned that they plan to leverage the fact that they were one of a few libraries selected to participate in the project to seek additional partners or other funding. One of them said, "It's a 'Ta da!' that we can

hold out to funders." A few library staff also mentioned that because of the high quality of the exhibit, they believe library patrons now expect more of their libraries. Library staff say they are motivated to continue to provide high quality programming for their patrons.

Summary

The following sections summarize the results for each of the six overarching evaluation questions.

Question 1: **Does the professional development delivered by the STAR_Net project help *Discover Earth* and *Discover Tech* librarians deliver informal science education programming?**

Although almost all the libraries had implemented STEM programming prior to becoming involved in STAR_Net, the number of programs varied considerably (from as few as one program to as many as 480 programs for patrons during the year before they received the exhibit). Some librarians had implemented STEM programming, but had not labelled it as "science." Individual library staff members' prior experience with implementing STEM programs for library patrons also varied. Some library staff had never done informal science programing like the kind provided by STAR_Net. Half of the *Discover Earth* and *Discover Tech* directors and coordinators reported they had facilitated three or fewer STEM-related programs, including 15% who had never facilitated such activities. Only 15% of STAR_Net directors and coordinators reported that they had received training prior to STAR_Net focused on how to implement science or technology programs for library patrons.

Participating librarians generally found the STAR_Net professional development to be helpful. Most librarians appreciated the initial kick-off trainings, and reported that they had the resources they needed to set up and take down the exhibit. Librarians found the project team to be responsive and helpful. The trainings for delivering informal science activities were also well-received though not all librarians used the project's programming.

Results from a pre/post survey measure showed that librarians from both exhibits had increased their self-reported knowledge about exhibit-related topics six months after they had hosted the exhibit, although *Discover Tech* librarians demonstrated greater gains than *Discover Earth* librarians. On average, *Discover Tech* librarians increased their knowledge (regarding such topics as who engineers are and what the Grand Challenges in Engineering are) an average of more than <u>one point</u> on a five-point scale. *Discover Earth* librarians increased their knowledge (regarding such topics as the difference between weather and climate and how earth systems are interconnected) an average of <u>a quarter of a point</u> on a five-point scale. *Discover Tech* librarians' average post-exhibit knowledge was also somewhat higher than *Discover Tech* librarians' (an average of 3.20 versus 2.70 on the six-item scales). In interviews, several library staff said the STAR_Net training and resources had increased their knowledge of earth science or engineering and technology topics.

Many *Discover Earth* and *Discover Tech* library staff also became more interested in developing and delivering STEM-based library programming as a result of their involvement in STAR_Net, and became more knowledgeable about how to create and deliver such programs as well as more confident in their abilities to deliver informal science programs effectively. On a pre/post survey scale designed to measure librarians' interest, skill, and confidence with informal science programming, *Discover Tech* librarians' average scores improved modestly from pre- to post- (increasing from an average of 3.18 to an average of 3.40 on a five-

point scale). *Discover Earth* librarians' average scores were essentially unchanged before and after participation in STAR_Net. Because they had higher pre-scores on many of the items (an average of 3.5 on a five-point scale), there was less room for improvement. In interviews, several library staff from both exhibits said the STAR_Net training and resources made it easier for them to offer STEM programming. Each library hosting the exhibits implemented at least six programs related to the exhibit, while most implemented more than ten programs. A few librarians said implementing informal science activities was "scary" at first, but over time they learned they had the skills and abilities to implement informal STEM activities and they planned to keep offering STEM programming after the exhibits left their libraries.

A number of *Discover Earth* and *Discover Tech* librarians appear to perceive their library as a STEM learning center for their community. For some librarians, this was due at least in part to their involvement in STAR_Net. For example, some librarians said the project pushed them to connect with STEM organizations and professionals in their community they had not worked with previously, and contributed to them going in a STEM programming direction. One such librarian said, "It opened us up to working with other people that I don't think we wouldn't have necessarily focused on before." Other librarians said library patrons now have different expectations regarding library programming, including wanting more hands-on, inquiry-based science activities. A librarian explained:

> "Our customers are coming to expect that there will be some sort of discovery as a part of our programming rather than just a craft. It may be something that we make, but we investigate to see how things might work. For example, some of the beans we sprouted for the last program we did molded before the program. My staff took that as an opportunity to talk about how not every experiment you do works the way you want it to. We have shifted to thinking of our library programs as a way to encourage our youngest customers to explore the world around them and see the library as a resource to help in that endeavor."

Other libraries that had hosted *Discover Earth* or *Discover Tech* said STAR_Net had:

- increased their focus on STEM programming
- helped them start new programs (such as a activities using LEGO Mindstorms)
- changed how the library felt about their role within the community
- encouraged them to develop future plans for STEM programming.

Question 2: How does the Community of Practice develop?

The project team anticipated that the CoP might be challenging to develop since no one had previously attempted to bring together library and STEM professionals to form a community of practice, and busy professionals have many other demands on their time. Librarians most commonly reported that they used the CoP site to look for ALA exhibit materials, LPI programming materials, and project announcements. Some librarians reported that they had found the resources and information they needed. Five *Discover Earth* librarians and two *Discover Tech* librarians posted to one or more of the discussion boards on the original CoP website. One library developed a relationship with another library that will last beyond the exhibit.

However, host librarians also reported that the original CoP platform was difficult to navigate, and that it was challenging to find quick answers to their exhibit questions. One librarian mentioned losing their way through the "text-heavy site" and two others lost their passwords and never returned to the site. Host librarians'

suggestions for improving the CoP included streamlining the site to make it easier to navigate, and sharing more promotional materials, programming ideas, and best practices for engaging library patrons in STEM.

A new CoP was launched in May 2013. While there were just 87 visits to the original CoP site during the five months from January through May 2013 (an average of 17 visits per month); there were 1,098 visits to the newly launched CoP site during the first three months of use from July through early October 2013 (an average of about 366 visits per month). The STAR_Net team publicized the new CoP site via newsletters and partner blog posts. The redesigned CoP site has new features that support increased communication. However, host librarians have not yet posted comments, questions, or resources on the redesigned site. In spite of difficulties with the original site, the project team is optimistic about the future for the CoP.

Question 3:	Do host libraries develop and/or implement informal science activities for the targeted audiences?

All of the libraries implemented informal science activities while they hosted the *Discover Earth* or *Discover Tech* exhibit, and at least two thirds of the libraries reported that they had offered additional STEM programming after the exhibit had left their libraries.

The eight libraries that hosted *Discover Earth* through September 2013 facilitated a combined total of 162 exhibit-related programs, while the five *Discover Tech* libraries facilitated a total of 111 programs. On average, each *Discover Earth* library offered 11.5 exhibit-related programs while they hosted the exhibit, and each *Discover Tech* library offered 15 exhibit-related programs. A total of approximately 15,000 individuals attended *Discover Earth* or *Discover Tech* programs, including more than 9,000 children.

About one third of these programs were facilitated (or co-facilitated) by library staff. All but one library created and delivered at least one program of their own design. Most of the programs were created by other STEM professionals not affiliated with the project, or by the librarians themselves. Two of the 11 libraries delivered curriculum developed by LPI, while several others adapted LPI's programming to fit their local needs.

The majority of libraries that hosted one of the exhibits successfully reached out to the STEM community for help with programming. Library staff reported they had developed new partnerships with local colleges and universities, science teachers for local K-12 schools, museums, the National Oceanic and Atmospheric Administration, professional organizations, foundations, a national lab, and individual STEM professionals. Several libraries recruited professionals who delivered programming that connected the content of the exhibits to local issues in the host libraries' communities. A number of librarians said they expected to continue working with these STEM partners.

All but one of the libraries that had a local affiliate of the National Girls Collaborative Project in their state reported that they had collaborated to develop programming or other resources aimed at girls. Another library is going to be the lead organization for a new NGCP Collaborative in their state.

Four of the six *Discover Earth/Discover Tech* directors who completed the Six Month Post-Exhibit Survey reported that their library had organized, hosted or promoted additional science, technology, and/or engineering programs during the six months since the exhibit had left their libraries. Five of the six *Discover*

Earth/Discover Tech directors have plans to organize or host science, technology, or engineering activities or programs at their libraries in the future.

<table>
<tr><td>**Question 4:**</td><td>**To what extent does STAR_Net succeed in reaching the targeted library participants and audiences at the host libraries?**</td></tr>
</table>

The STAR_Net libraries and their communities vary in size, proximity to major urban areas, and demographics (including race/ethnicity, income, and languages spoken). Although most of the host library communities had access to at least some STEM resources, several librarians pointed out that most of the members of their community would not normally have had access to the high-quality exhibit materials and programming that STAR_Net provided.

Library staff estimated that almost 350,000 visitors saw a STAR_Net exhibit. Through September 2013, a total of 284,473 individuals had attended the *Discover Earth* exhibit, and 60,900 individuals had attended the *Discover Tech* exhibit. Librarians from libraries that hosted the exhibits reported that they successfully reached their communities, and often attracted new visitors. Several librarians said the exhibits and associated programming helped them draw more families (especially fathers), K-12 educators, and school-age students, many of whom had never come to the library before. Some librarians also said that although they did not necessarily attract new patrons, they were able to serve their existing patrons in a new way.

Almost all the host librarians reported that the *Discover Earth* or *Discover Tech* exhibit was very successful at their library (16 of the 19 respondents, or 84%, to the Six Month Post-Survey). Two librarians (11%) thought the exhibit was somewhat successful and one respondent was neutral about their assessment of the exhibit at their library.

<table>
<tr><td>**Question 5:**</td><td>**To what extent do library patrons at the host libraries become more interested in, knowledgeable about, and engaged in the STEM topics presented in the exhibits and related programming?**</td></tr>
</table>

Patrons were enthusiastic about the exhibits. They were impressed with the high quality of the exhibits and said they were a great addition to their library. Several patrons appreciated that the exhibits included a variety of displays, including interactive technology, activities, and visual artifacts. Visitors especially valued the hands-on nature of the exhibits, and wanted even more interactive activities. The majority of patrons said that they would recommend the exhibit to their friends or family members, and several said they planned to bring their children or grandchildren back to the library to see the exhibit. In fact, adults were observed to play an important role in facilitating children's engagement in the exhibits. Visitors' enthusiasm about the exhibits is perhaps particularly noteworthy because almost all of the library visitors who were interviewed during site visits said they had not realized that the exhibit was at their library prior to visiting—they just stumbled across it.

On the Patron Surveys, the majority of *Discover Earth* and *Discover Tech* patrons reported spending more than 30 minutes looking at the exhibit. *Discover Tech* patrons reported spending more time looking at the exhibit (an average of 83 minutes) than *Discover Earth* patrons did (who reported spending an average of 60 minutes). Similarly, on site visits to five of the libraries, the evaluation team observed that patrons spent more time interacting with the *Discover Tech* exhibit (an average of eight minutes) than the *Discover Earth* exhibit (an

average of five minutes). The difference between the two exhibits may be because *Discover Tech* had more hands-on, interactive activities.

Patrons who attended associated programming said they had found the presentations to be engaging, informative, and/or thought-provoking.

One of STAR_Net's goals is to increase patrons' interest and understanding of science and technology. Specifically, the project aimed to:

- *increase the likelihood that library patrons became active science learners*

  The majority of patrons who responded to the Patron Survey said that the exhibit increased their awareness of earth science or engineering and increased their interest in learning more about these topics. Most patrons also said they would like to learn more about earth science or engineering by attending another educational institution or event. Most reported that they planned to visit the exhibit again.

- *increase library patrons' interest in learning more about the subject matter related to the* Discover Earth *and* Discover Tech *exhibits*

  About two thirds of the *Discover Earth* patrons and just over half the *Discover Tech* patrons said they intended to use library resources to learn more about earth science or engineering. Many library staff indicated that they promoted exhibit-related materials to patrons, such as through temporary displays of books or DVDs located near the exhibits. Although there was considerable variation by library, the average *Discover Earth* library circulated 27% more materials related to earth science while the exhibit was at their library, and the average *Discover Tech* library circulated 3% more technology and engineering-related materials while the exhibit was at their library.

Like library staff, patrons from the *Discover Earth* and *Discover Tech* libraries may be beginning to see the library as a place for STEM learning. The majority of patrons who completed the Patron Survey <u>strongly</u> agreed that their library was a good place to learn about earth science or engineering. All patrons who were interviewed during site visits said they were supportive of libraries hosting STEM exhibits. Several librarians said that patrons continued to talk or ask about the exhibit, even months after it left their facility. About half of the librarians (47%) who completed the Six Month Post-Exhibit Survey said that patrons had asked for more activities or programs. (Almost all of the remaining librarians said they were not sure if patrons had asked for STEM materials or activities, perhaps because many of them do not work directly with patrons.) Many librarians also said they believe that patrons now see the library as more than just a repository for books.

Question 6:	What, if any, are the unanticipated consequences of STAR_Net (positive or negative) on librarians, libraries, patrons, and others?

Several project outcomes did not fit under the pre-specified evaluation questions or indicators:

- The exhibits supported free-choice learning. Adults and children could easily look at the exhibits whenever they chose for as little or as long as they liked, and could return to interact with different parts of the exhibit again.

- Several teachers and parents reported that the exhibits supported what students were learning during the school day, either in traditional classrooms or through home schooling.

- The exhibits supported intergenerational learning. Parents, children, and even grandparents were frequently observed learning together.

- *Discover Earth* appears not to have antagonized patrons who believe in creationism, as some project team members had feared.

- Several libraries hope to leverage their STAR_Net experience into providing additional educational experiences to their patrons.

In conclusion, the majority of participating librarians and library patrons were enthusiastic about the STAR_Net exhibits. Librarians reported that the resources the project provided were helpful, and increased their knowledge, interest, and confidence in offering STEM programming in their libraries. The STAR_Net Community of Practice has not reached its potential yet, although the project team is optimistic that it could become a valuable resource for library and STEM communities with additional staff time and resources. However, many libraries reached out and developed connections with organizations and individuals they had not worked with previously. The project reached audiences with hands-on inquiry-base exhibits and programming that patrons in many of the STAR_Net communities would otherwise have not had access to. The exhibits appeared to spark the interest of many patrons to learn more about science and technology. The majority of libraries that have hosted the exhibit thus far reported that they planned to continue to offer STEM programming.

Conclusions regarding the longer-term impact of the project should be considered tentative because a relatively small number of libraries were able to provide follow-up data six months or more after the exhibits left their libraries—an artifact of the exhibit schedule and the timing of when the summative evaluation concluded. However, preliminary data from a subset of the host libraries suggests that the project may have a lasting impact on some libraries' interest in and capacity to educate their patrons about science.

Recommendations

Suggestions Regarding the Exhibits:

- Several patrons requested more hands-on activities and games within the exhibits (especially as part of *Discover Earth*), including activities for younger children.

- On site visits, a number of patrons were observed speaking languages other than English. U.S. Census data indicate that a significant proportion of several of the host library communities speak English less than "very well." The project team may wish to translate exhibit components into languages that are spoken by a significant percentage of the population in host communities. For example, the team could create laminated cards with the content of all the static panels in each exhibit; these cards could be translated into a variety of languages and made available to libraries. The interactive displays could have a button allowing patrons to select the language the display uses. The project team may also wish to add a question to the host library applications

asking what languages the local population speaks and whether (and how) the library plans to make programming accessible to non-English-speaking individuals.

- The majority of patrons interviewed during site visits said they had not realized the exhibit was at their library and were pleasantly surprised to stumble upon it. Patrons offered a number of suggestions for additional ways to publicize the exhibit, including using social media (such as Facebook); promoting the exhibit on local radio stations; submitting articles to free, local tabloids; and informing local businesses about the exhibit and asking for their help in promoting it.

- Some librarians (from both *Discover Earth* and *Discover Tech*) said the boxes the exhibits were shipped in were extremely large and/or heavy, and were difficult to move into and out of their libraries. The exhibits might be packed in smaller boxes. If that is not possible, the project team could include the size/weight of the largest shipping box in the application materials and specify that libraries must be able to manage these materials to receive the exhibit.

- Some elements of the exhibits seemed to need additional monitoring for maintenance and upkeep (e.g., the Snap Circuits, the Clean Water Magnetic Board, the Magic Planet Globe). During the initial professional development, the project team may wish to alert library staff regarding what maintenance issues they should anticipate and how to address them.

- One library suggested creating a cheat sheet listing which exhibit components should be shut down when the library closes each evening in order to save energy (such as the Magic Planet Globe) and which components turn off automatically when not in use.

- A few patrons complained about the volume of the interactive displays, saying it was either too loud or too soft. One patron suggested allowing patrons to adjust the sound of the interactive displays and another suggested creating directional speakers.

- One patron suggested providing chairs near exhibit components to make it easier for older people to sit and look at the exhibits.

Suggestions Regarding Professional Development and Programming:

- Libraries in the smallest and/or most STEM-underserved communities may need additional support regarding the best ways to display exhibit components, promote the exhibit and associated programming, and develop and deliver their own programming.

- Staff from a few libraries said they were initially "overwhelmed" by the exhibit and needed to make adjustments, such as closing the library for a day to set up the exhibit and/or recruiting a number of staff and volunteers to help. These same librarians were then inspired by their success, but might have been less anxious and better able to plan if they felt better prepared. For example, the project team could create and post videos of the exhibit set-up and take-down processes and/or share photos about various ways libraries displayed exhibit components.

- Library staff from *Discover Tech* libraries had lower levels of knowledge and confidence regarding STEM topics prior to hosting the exhibit than *Discover Earth* librarians did. When

exhibit topics, such as engineering, are comparatively new to librarians, the project team may need to offer additional support to librarians than with more familiar subjects, such as earth sciences. Furthermore, the project received fewer applications for the *Discover Tech* exhibit than for *Discover Earth*. The project team may want to reassure future exhibit applicants that library staff will be provided with the training and resources they need to host the exhibits and deliver programming related to the exhibit topic, even if they lack previous experience.

- The project team may wish to provide additional post-exhibit support to participating librarians to help them sustain and increase their knowledge, confidence, and interest in making their libraries STEM learning centers. Since libraries tended to create their own activities and programs, the project team may want to target project support in this area.

- One librarian said it would have been helpful to have a tool to help them evaluate the effectiveness of the exhibit-related programming they provided (which was not within the scope of the summative evaluation).

Suggestions Regarding the Community of Practice

- The project team could create a standardized form on the CoP site to make it easier for individuals to share programming ideas. If this information were stored in a simple database, programming staff could then also search for activities using the data entry fields (e.g., by subject matter, target age group(s), format, or length of the activity).

- The CoP site could benefit from additional "care and feeding." The advantage of the redesigned CoP site is that it is open to all; anyone can easily create a username and password if they wish to post comments to the site. However, this openness also allows individuals to post off-topic comments easily. The discussion forums may need to be monitored more frequently.

- The project team may wish to add a requirement to the host library applications stating that host librarians will be expected to post their experiences, ideas, challenges, and solutions to the CoP (e.g., expecting directors/coordinators to post at least once before, during, and after they host the exhibit). An important indicator of the CoP's success would be whether librarians continue to use it on their own, but getting them in the habit of using it while they are actively participating in STAR_Net may make that more likely.

Appendix A: Program Logic Model

STAR_Net Logic Model
Revised Draft March 9, 2012

INITIAL ACTIVITIES

SHORT-TERM LIBRARIAN OUTCOMES

RESULTING and CONTINUING ACTIVITIES

SHORT-TERM PATRON OUTCOMES

LONG-TERM OUTCOMES

EXHIBIT

Design and fabricate Discover Earth and Discover Tech exhibits

Discover Earth exhibit visits 10 libraries for 8 weeks each

Discover Tech exhibit visits 8 libraries for 8 weeks each

Library patrons interact with exhibits

Library patrons increase their awareness, interest, and knowledge of earth science or engineering and technology topics

Library patrons perceive the library as a STEM learning center

ACTIVITIES for LIBRARIANS

Provide training to DE & DT librarians re: exhibit content, set up and tour process

DE & DT librarians increase their knowledge about STEM topics presented in the exhibits

Develop & provide DE & DT children's and youth librarians with LPI-hands-on activities, programming ideas, and lists of resources in support of exhibits

DE & DT children's and youth librarians increase their interest, knowledge and confidence in facilitating informal science education activities related to earth science or engineering & technology topics

DE & DT librarians network with each other and the STAR_Net team, discuss outreach opportunities and plans, and develop action plans for leveraging partnerships to connect library resources and community expertise

DE & DT librarians leverage resources from the library, local community, and online Community of Practice to deliver activities during and after exhibit

DE & DT librarians facilitate activities during and after exhibit

Library patrons attend activities during and after the exhibit

DE & DT librarians perceive the library as a STEM learning center

Provide training to DT children's and youth librarians on implementing activities in support of exhibit

NGCP Collaboratives apply for mini-grants to develop programming with DE & DT libraries

CoP

Create online Community of Practice platform

Conduct outreach to members of professional STEM organizations, non-DE & DT librarians, STEM program providers, and teachers re: STAR_Net and CoP (through conference presentations, webinars, publications)

Science and engineering professionals contribute to STEM learning in libraries (e.g., deliver public talks, host career learning events, donate STEM materials)

Non-DE and DT librarians facilitate STEM activities at their libraries

Science and engineering professionals contribute to online Community of Practice

Science and engineering professionals, community representatives, practitioners and library staff create lasting partnerships to deliver STEM learning to STAR_Net library patrons

Appendix B: Evaluation Methodology

Evaluation Methodology

The summative evaluation utilized mixed methods to investigate the implementation of the STAR_Net project and its outcomes. Institutional Review Board approval was received before data collection began. ERA administered pre- and post-exhibit surveys to library staff who hosted the exhibits; conducted site visits to five *Discover Earth* and *Discover Tech* libraries; conducted interviews with exhibit staff at the libraries that hosted the exhibits; collected patron surveys, circulation records, and web metrics regarding the online STAR_Net CoP; and administered ALA exhibit reports and webinar surveys on behalf of STAR_Net project partners. The evaluation instruments and data collection methods are shown in Table A and described in more detail after the table. Post-exhibit data were collected on a rolling basis: immediately after the exhibit left each library (the ALA Final Report Form, interviews with library staff, and some circulation records), six months after the exhibit left each library (the Library Six-Month Follow-up Survey), and again one year after the exhibit left (additional circulation records). Table B on p. 73 shows which instruments were administered to which libraries.

Table A. Evaluation Instruments and Administration Notes

Evaluation Instrument	Administration Date	Participation/Response Rate
Discover Tech Training Satisfaction Survey	August 2012	All 15 *Discover Tech* directors and coordinators who attended training
Librarian Pre-Exhibit Survey	August 2012	• 9 of 10 *Discover Earth* directors (90%) • 12 of 25 *Discover Earth* coordinators and other library staff involved in project (48%) • 6 of 8 *Discover Tech* directors (75%) • 13 of 23 *Discover Tech* coordinators and other library staff involved in project (57%)
Librarian Six Month Post-Exhibit Survey	Six months after *Discover Earth*/*Discover Tech* exhibit left each library	• 5 of 5 *Discover Earth* directors (100%; all 5 completed both the pre- and post-surveys) • 7 of 13 *Discover Earth* coordinators and other library staff involved in project (54%; 6 completed both the pre- and post-surveys) • 1 of 2 *Discover Tech* directors (50%; single respondent completed both the pre- and post-surveys) • 6 of 9 *Discover Tech* coordinators and other library staff involved in project (67%; 4 completed both the pre- and post-surveys)
Interviews with *Discover Earth* and *Discover Tech* directors and coordinators	After *Discover Earth*/*Discover Tech* exhibit left each library	• Library staff from 8 *Discover Earth* libraries (including interviews conducted during site visits) • Library staff from 5 *Discover Tech* libraries (including interviews conducted during site visits)
Library Patron Survey	While *Discover Earth*/*Discover Tech* exhibit was at each library	• 717 patrons from 5 *Discover Earth* libraries • 410 patrons from 5 *Discover Tech* libraries
Site Visits to a total of five *Discover Earth* and *Discover Tech* Libraries	Interview library staff and patrons; observe patrons interact with exhibit; observe library staff conduct exhibit programming	• Observed 71 library patron interactions with the exhibits (some observations involved observing multiple patrons) • Conducted 30 patron interviews • Interviewed 25 library staff • Observed 7 exhibit-related library programs
ALA Final Report Form	Immediately after *Discover Earth*/*Discover Tech* exhibit left each library	• 8 *Discover Earth* libraries • 5 *Discover Tech* libraries
Exhibit-related circulation records	Immediately after *Discover Earth*/*Discover Tech* exhibit left each library and again one year later	• Pre- and during records from 5 *Discover Earth* libraries • Pre- and during records from 3 *Discover Tech* libraries • One-year later records from 2 *Discover Earth* libraries
Metrics re: STAR_Net Community of Practice website use	Monthly from January-October 2013	N/A
Interviews with members of STAR_Net Project Team	September 2013	• 4 staff from the Space Science Institute • 2 staff from the American Library Association • 2 staff from the Lunar and Planetary Institute • 3 staff from the National Girls Collaborative Project

- ***Discover Tech* Training Satisfaction Surveys** – A survey was administered to all project directors and coordinators each day of the two-day *Discover Tech* training in August 2012. Questions focused on their satisfaction with the training. The survey can be found in Appendix C; the survey results are in Appendix D.

- **Librarian Pre-Exhibit Survey –** An online survey was administered to all of the STAR_Net project directors, project coordinators, and any other library staff identified as having a role in hosting the exhibit and/or delivering exhibit-related programming.[10] The survey collected background information about library staff members' prior experience with STEM programming, including their knowledge of and comfort with facilitating such activities. Directors were asked several additional questions about the characteristics of their library communities. The survey was administered in August 2012, shortly before the *Discover Tech* libraries attended the two-day exhibit training. (Because ERA joined STAR_Net after it was underway, three of the *Discover Earth* libraries had already had the exhibit before the pre-survey was administered.) The pre-survey can be found in Appendix E.

- **Librarian Six Month Post-Exhibit Survey –** This online survey was administered to the same STAR_Net project directors, project coordinators, and other library staff who completed the pre-survey. The survey was administered on a rolling basis six months after the *Discover Earth/Discover Tech* exhibit left each library. Questions focused on library staff members' experience with the exhibit, related programming, and the STAR_Net Community of Practice (CoP), as well as the continuing impact of their participation in the project during the six months since the exhibit left their libraries. Staff members were asked if they had conducted any STEM-related programming since the exhibit left or if their library had acquired any additional STEM-related materials for patrons. Library staff were also asked the same questions as on the pre-survey regarding their knowledge of exhibit-related topics and comfort with facilitating STEM programming; pre- and post-surveys were matched for analysis of these questions. The post-survey can be found in Appendix F.

  Conclusions from the follow-up surveys should be considered tentative due to the relatively small number of surveys collected at this point in the project. At the time the summative evaluation report was prepared, five of the 18 STAR_Net libraries had not yet had the exhibits. Six other libraries had had one of the exhibits, but within the past six months. Therefore, it was not possible to collect data from these 11 libraries regarding the longer-term impact of the exhibit.

- **Library Staff Interviews –** Interviews were conducted with the *Discover Earth* and *Discover Tech* directors and coordinators within a few weeks after the exhibit left their library (with the exception of the libraries that had hosted the exhibit before ERA was hired). Library staff were asked about the characteristics of their library community; their observations regarding patrons' interactions with the exhibit; their experiences with the STAR_Net professional development, STAR_Net-provided activities, and the CoP; whether and how they had networked with STEM professionals to develop programming; and their reflections on the broader impact of the project on themselves and their library. Interviews were conducted by phone for 45-60 minutes each; most were conducted jointly

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[10] With the exception of one very small library, each STAR_Net library had a "project director," who had primary responsibility for overseeing the exhibit and related programming, as well as a "project coordinator," who assisted with implementation. Project directors were not necessarily the directors of their libraries. Some libraries also had other staff who were involved in delivering programming and/or monitoring the exhibit. The project coordinator version of the survey was administered to the coordinators, as well as to any other staff the project director had identified as having a key role in the project.

with all staff members who were involved in the project at each library. The interview protocol can be found in Appendix G.

- **Library Patron Survey –** A one-page survey was provided to each library to administer to adult library patrons while the exhibits were at the library. The survey included a set of 11 questions using a Likert-type scale regarding their interest in the exhibit, and its impact on their interest in learning more about exhibit-related topics. Patrons were also asked how long they had spent interacting with the exhibit, and to provide basic demographic information. ERA sent paper copies of the survey to each host library, and asked the project director and coordinator to place them in multiple prominent locations in the library, such as near the exhibit components and at the circulation desk. Libraries were also provided with the link to an online version of the survey which they could post on their library website if desired. The survey can be found in Appendix H.

- **Site Visits –** The evaluation team visited a total of five *Discover Earth* and *Discover Tech* sites while they hosted the exhibits. During each two-day site visit, the team observed patrons while they interacted with the exhibits, interviewed a sample of library patrons after they had interacted with the exhibits, interviewed the library staff who were responsible for coordinating the exhibits, and observed library staff as they implemented exhibit-related programs (using the observation and interview protocols in Appendix I). Library staff members were told that the identities of the site visit libraries would be kept confidential.

- **ALA Final Report Form** – Project directors were required to complete this form, which was developed by the American Library Association and modified by ERA, within 30 days of the exhibit leaving their library. The form asked libraries to describe the programs they had implemented while the exhibit was at their library, whether informal educational groups had seen the exhibit, and explain how they had used the $1,000 grant for expenses related to the exhibit. Libraries were also asked enumerate the demographics of visitors to their library, to the exhibit, and to their exhibit-related programming. ERA sent each library a Word version of the form immediately prior to their receiving the exhibit so that they would know what information was required. ERA then administered an online version of the same form immediately after the exhibit left each library. The Word version of the report form can be found in Appendix J.

- **Exhibit-Related Circulation Records** – Libraries were asked to provided circulation records for holdings related to the *Discover Earth* and *Discover Tech* exhibits for three time periods (as applicable): (1) <u>during</u> the eight weeks they hosted the exhibit, (2) during the equivalent eight-week period one year <u>before</u> the exhibit came to the library, and (3) during the equivalent eight-week period one year <u>after</u> the exhibit had left their library. Libraries were sent a set of instructions with the call numbers and dates for what circulation records were requested, which can be found in Appendix K. At the time this report was being prepared, only two libraries (a) had had the exhibits at least one year previously and (b) were able to provide the requested circulation records.

- **STAR_Net Community of Practice metrics** – The STAR_Net project team developed and managed two versions of the online CoP over the course of the project—an original SharePoint site (maintained from approximately October 2011 to May 2013) and a redesigned WordPress site (launched fully by July 2013). The evaluation team collected metrics regarding visitors to both sites. SharePoint metrics regarding the original CoP were collected on a monthly basis from January

through May 2013; Google Analytics were collected regarding the number of visitors and the characteristics of the visits to the redesigned site from July through early October 2013. Both CoP sites were also analyzed to determine how many *Discover Earth* and *Discover Tech* librarians had posted to the discussion boards, forums, or blogs, as well as the content of their postings.

- **Interview with STAR_Net Project Team members** – Phone interviews were conducted with staff from each of the organizations that led the STAR_Net project (SSI, ALA, LPI, and NGCP) in September 2013, when the original NSF funding period reached its end. Project team members were asked to describe their role in STAR_Net, describe the impact of the project on participating libraries, reflect on the CoP, and offer suggestions for project improvement. Each interview, which lasted 45-90 minutes, was conducted jointly with all the staff members from each partner organization who were involved in STAR_Net. The interview protocol can be found in Appendix L.

Results from the above the instruments are included in the report. Additional data tables with selected results from the Librarian Pre-exhibit and Post-Exhibit Surveys, Patron Surveys, and ALA Report Forms can be found in Appendix N.

Table B. Instruments Administered to STAR_Net Libraries That Hosted an Exhibit During the Data Collection Period of August 2012 — September 2013

(Note: Not all libraries completed all requested instruments)

	Library	Dates Hosting Exhibit	*Discover Tech* Training Satisfaction Survey	ALA Final Report Form	Librarian Pre-Exhibit Survey	Librarian Six-Month Post-Exhibit Survey	Library Staff Interviews	Circulation Records (Pre- & During Exhibit)	Circulation Records (One Year Post-Exhibit)	Patron Surveys
Discover Earth Libraries	TLL Temple Memorial Library	Jan. 17, 2012 – March 16, 2012		X	X	X	X	X	X	
	Winnebago Public Library	April 3, 2012 – June 1, 2012		X	X	X	X	X	X	
	Garfield County Libraries	June 19, 2012 – Aug. 17, 2012		X	X	X	X	X		
	Laramie County Library System	Sept. 4, 2012 – Nov. 2, 2012		X	X	X	X	X		X
	East Meadow Public Library	Nov. 20, 2012 – Feb. 8, 2013		X	X	X	X	X		X
	Central Rappahannock Regional Library	Feb. 13, 2013 – April 26, 2013		X	X		X	X		X
	Ephrata Public Library	May 14, 2013 – July 12, 2013		X	X		X	X		X
	West Florida Public Library	July 30, 2013 – Sept. 27, 2013		X	X		X			X
	St. Charles Parish Library	Oct. 15, 2013 – Jan. 3, 2014			X					
	Inglewood Public Library	Jan. 21, 2014 – March 21, 2014			X					
	Total *Discover Earth* Libraries		NA	8	10	5	8	7	2	5
Discover Tech Library	Spokane Public Library	Sept. 25, 2012 – Nov. 28, 2012	X	X	X	X	X	X		X
	Mary Wood Weldon Memorial Library	Dec. 12, 2012 – Feb. 22, 2013	X	X	X	X	X	X		X
	Wayne County Public Library	March 6, 2013 – May 3, 2013	X	X	X		X	X		X
	Huntsville-Madison County Public Library	May 15, 2013 – July 12, 2013	X	X	X		X	X		X
	Carnegie Public Library of Clarksdale & Coahoma County	July 24, 2013 – Sept. 27, 2013	X	X	X		X			X
	Baxter County Public Library	Oct. 9, 2013 – Dec. 13, 2013	X		X					
	International Falls Public Library	Jan. 6, 2014 – March 14, 2014	X		X					
	Carson City Public Library	April 2, 2014 – May 30, 2014	X		X					
	Total *Discover Tech* Libraries		8	5	8	2	5	4	NA	5
	TOTAL ALL LIBRARIES		**8**	**13**	**18**	**7**	**13**	**11**	**2**	**10**

Appendix C: *Discover Tech* Training Satisfaction Survey

Discover Tech: Engineers Make a World of Difference

Exhibit Orientation Workshop
August 28-29, 2012, Louisville, CO

1. How useful was each workshop activity and how well are you prepared to implement it?
Scales:

1 = Not useful	**1** = Definitely not prepared to implement
2 = Somewhat useful	**2** = Partially prepared to implement
3 = Useful	**3** = Adequately prepared to implement
4 = Very useful	**4** = Fully prepared to implement with comfort
NA = Not Applicable to Me	**NA** = Not Applicable to Me

PRE-WORKSHOP

Orientation Teleconference (August 16)					
Usefulness of Presentation	1	2	3	4	NA
Usefulness of Discussion / Q/A	1	2	3	4	NA

DAY ONE

Snowball/Gallery of Libraries					
Usefulness of Activity	1	2	3	4	NA

Exhibit Exploration 1: As a Library Patron					
Usefulness of Activity	1	2	3	4	NA
Usefulness of Discussion / Q/A	1	2	3	4	NA

Presentation: How to Incorporate a STEM Exhibit in Your Library					
Usefulness of Presentation	1	2	3	4	NA
Usefulness of Discussion / Q/A	1	2	3	4	NA

CoP Exercise: How to Access and Post to Site					
Usefulness of Presentation	1	2	3	4	NA

Presentation: Engineering (EWB)					
Usefulness of Presentation	1	2	3	4	NA
Usefulness of Discussion / Q/A	1	2	3	4	NA

Exhibit Tour Requirements, Processes, and Details					
Usefulness of Presentation	1	2	3	4	NA
Usefulness of Discussion / Q/A	1	2	3	4	NA
Ability to implement in my library	1	2	3	4	NA

2. So far, is the workshop meeting your expectations? Why or why not?

Discover Tech: Engineers Make a World of Difference
Exhibit Orientation Workshop
August 28-29, 2012, Louisville, CO

1. How useful was each workshop activity and how well are you prepared to implement it?
Scales:

1 = Not useful	**1** = Definitely not prepared to implement
2 = Somewhat useful	**2** = Partially prepared to implement
3 = Useful	**3** = Adequately prepared to implement
4 = Very useful	**4** = Fully prepared to implement with comfort
NA = Not Applicable to Me	**NA** = Not Applicable to Me

DAY ONE (cont'd) – Exhibit Exploration 2

Station 1: Inventors Lab and Touch Table					
Usefulness of Activity Overview	**1**	**2**	**3**	**4**	**NA**
Ability to implement in my library	**1**	**2**	**3**	**4**	**NA**

Station 2: Energy and Light and Hand Crank					
Usefulness of Activity Overview	**1**	**2**	**3**	**4**	**NA**
Ability to implement in my library	**1**	**2**	**3**	**4**	**NA**

Station 3: Ball Machine and Arch					
Usefulness of Activity Overview	**1**	**2**	**3**	**4**	**NA**
Ability to implement in my library	**1**	**2**	**3**	**4**	**NA**

Station 4: EWB and What's My Job?					
Usefulness of Activity Overview	**1**	**2**	**3**	**4**	**NA**
Ability to implement in my library	**1**	**2**	**3**	**4**	**NA**

DAY TWO

Exhibit Exploration 3: Take Down/Setup					
Usefulness of Presentation	**1**	**2**	**3**	**4**	**NA**
Usefulness of Discussion / Q/A	**1**	**2**	**3**	**4**	**NA**
Ability to implement in my library	**1**	**2**	**3**	**4**	**NA**

Discussion: Exhibit Reflections					
Usefulness of Discussion / Q/A	**1**	**2**	**3**	**4**	**NA**
Ability to implement in my library	**1**	**2**	**3**	**4**	**NA**

Presentation: An Exhibit's Impact on a Community					
Usefulness of Presentation	1	2	3	4	NA
Usefulness of Discussion / Q/A	1	2	3	4	NA
Ability to implement in my library	1	2	3	4	NA

CoP Exercise: Uploading Programming Ideas					
Usefulness of Presentation	1	2	3	4	NA

Discussion: Adult Programming					
Usefulness of Discussion / Q/A	1	2	3	4	NA
Ability to implement in my library	1	2	3	4	NA

Presentation: Engineering (NREL)					
Usefulness of Presentation	1	2	3	4	NA
Usefulness of Discussion / Q/A	1	2	3	4	NA

Discussion: Outreach Partnerships					
Usefulness of Discussion / Q/A	1	2	3	4	NA
Ability to implement in my library	1	2	3	4	NA

Discussion: Children/Youth/Family Activities					
Usefulness of Discussion / Q/A	1	2	3	4	NA
Ability to implement in my library	1	2	3	4	NA

Discussion: Implementation Plan Changes					
Usefulness of Discussion / Q/A	1	2	3	4	NA
I have a plan for implementing these activities	1	2	3	4	NA
I intend to form partnerships with other institutions to implement these activities	1	2	3	4	NA

2. Please rate aspects of the *Discover Tech* workshop using the following scale:

	Strongly Disagree	Disagree	Agree	Strongly Agree
Overall, the workshop provided an effective orientation to the *Discover Tech* exhibit.	❍	❍	❍	❍
The workshop structure provided sufficient opportunities to interact with other library professionals.	❍	❍	❍	❍
The workshop provided an effective introduction to the related exhibit subject areas.	❍	❍	❍	❍
I have increased knowledge of the STEM topics presented in the *Discover Tech* exhibit.	❍	❍	❍	❍
The workshop prepared me to host the exhibit in my library.	❍	❍	❍	❍
The workshop prepared me to use the activities and resources that accompany the exhibit.	❍	❍	❍	❍
The workshop prepared me to partner with other organizations to implement programming at my library.	❍	❍	❍	❍
I feel more prepared to share information about engineering with my community.	❍	❍	❍	❍
I feel comfortable facilitating *Discover Tech* programming in my library.	❍	❍	❍	❍
The *Discover Tech* site support notebook is useful.	❍	❍	❍	❍
I know where to get support if needed as I implement *Discover Tech* in my library.	❍	❍	❍	❍
Overall, the resources provided in the workshop will be useful.	❍	❍	❍	❍
I feel encouraged to participate in the STAR_Net online community of practice.	❍	❍	❍	❍

3. Overall, did the workshop meet your expectations? Why or why not?

4. Do you feel adequately prepared to host the *Discover Tech* exhibit in your library? ❏Yes ❏ No
If No, tell us about areas where you do not feel prepared, and if you have any ideas about how the project team could better help you prepare?

5. What was the most valuable aspect of the workshop? Why?

6. Other comments and wishes about the workshop?

Thank you for taking the time to provide feedback.
This information will help us to better design future workshops and materials.

Appendix D: *Discover Tech* Training Satisfaction Survey Results

STAR_Net *Discover Tech* Orientation Workshop
August 28-29, 2012 in Louisville, CO
Summary of Survey Results

On August 28-29, 2012, the STAR_Net team hosted a workshop for the *Discover Tech* librarians. All fifteen library staff who attended the training completed short surveys at the end of each day of the workshop. (The Day One survey also asked workshop attendees to rate the pre-workshop orientation held on August 16, 2012 via teleconference.) Highlights from the surveys include:

- All 15 workshop attendees indicated they feel adequately prepared to host the *Discover Tech* exhibit in their library.
- The majority of survey respondents rated the workshop presentations and discussions as "useful" or "very useful."
- The majority of respondents indicated that they were "fully prepared" to implement various elements of the exhibit and programming in their library.
- Most librarians "agreed" or "strongly agreed" that the various elements of the workshop prepared them to host the *Discover Tech* exhibit at their library.
- Workshop attendees particularly appreciated having hands-on opportunities to interact with exhibit, including learning how to set it up.
- Survey responses suggest that *Discover Tech* library staff may be relatively less confident—in comparison to meeting other project expectations—about developing partnerships with other organizations to implement programming and using the STAR_Net Community of Practice.

Complete survey results follow.

Survey respondents were instructed to answer each question using the following scales:

1 = Not useful	**1** = Definitely not prepared to implement
2 = Somewhat useful	**2** = Partially prepared to implement
3 = Useful	**3** = Adequately prepared to implement
4 = Very useful	**4** = Fully prepared to implement with comfort
NA = Not Applicable to Me	**NA** = Not Applicable to Me

Respondents' Ratings of Pre-Workshop Teleconference (n=15)

		Mean	Not useful	Somewhat useful	Useful	Very useful
Orientation Teleconference (August 16)	Usefulness of Presentation	**3.07**	-	27%	40%	33%
	Usefulness of Discussion / Q/A	**3.13**	-	27%	33%	40%

Respondents' Ratings of Activities on Day One of the Workshop (n=15)

		Mean	Not useful/ Not prepared	Somewhat useful/ Partially prepared	Useful/ Adequately prepared	Very useful/ Fully prepared
Snowball/ Gallery of Libraries	Usefulness of Activity	**3.67**	-	7%	20%	73%
Exhibit Exploration 1: As a Library Patron	Usefulness of Activity	**3.93**	-	-	7%	93%
	Usefulness of Discussion / Q/A	**3.73**	-	-	27%	73%
Presentation: How to Incorporate a STEM Exhibit in Your Library	Usefulness of Presentation	**3.73**	-	-	27%	73%
	Usefulness of Discussion / Q/A	**3.80**	-	-	20%	80%
CoP Exercise: How to Access and Post to Site	Usefulness of Presentation	**3.60**	-	7%	27%	67%
Presentation: Engineering (Engineers Without Borders)	Usefulness of Presentation	**3.87**	-	-	13%	87%
	Usefulness of Discussion / Q/A	**3.80**	-	-	20%	80%
Exhibit Tour Requirements, Processes, and Details	Usefulness of Presentation	**3.87**	-	-	13%	87%
	Usefulness of Discussion / Q/A	**3.87**	-	-	13%	87%
	Ability to implement in my library	**3.53**	-	7%	33%	60%

[At end of Day 1] So far, is the workshop meeting your expectations? Why or why not? (n = 11)

- *Yes.*
- *Yes.*
- *Yes!*
- *Yes. Very informative and presenters are very prepared and answer questions readily.*
- *Very useful information. Thank goodness for this workshop.*
- *Yes! Very detailed and I'm glad we will have continued support during and after the exhibit.*
- *Yes—I am finding this workshop extremely helpful.*
- *It has been very helpful and interesting. Love the hands on with the exhibit.*
- *Yes, the hands-on learning is very helpful. Also knowing the logistics of the exhibit.*
- *Yes. Because this workshop is held at an open library with the exhibit in action. Plus, we can watch patrons interact with exhibit. Additionally, the Library Director was very informative on what to expect. Great workshop!*
- *Yes, would like more exhibit hands-on. Great about building excitement and allowing us flexibility to meet our community needs.*

Respondents' Ratings of Activities on Day One of the Workshop (n=15, unless otherwise specified)

		Mean	Not useful/ Not prepared	Somewhat useful/ Partially prepared	Useful/ Adequately prepared	Very useful/ Fully prepared
Station 1: Inventors Lab and Touch Table	Usefulness of Activity Overview	**3.60**	-	7%	27%	67%
	Ability to implement in my library	**3.73**	-	-	27%	73%
Station 2: Energy and Light and Hand Crank	Usefulness of Activity Overview (n = 14)	**3.79**	-	7%	7%	86%
	Ability to implement in my library (n = 13)	**3.92**	-	-	8%	92%
Station 3: Ball Machine and Arch	Usefulness of Activity Overview	**3.87**	-	-	13%	87%
	Ability to implement in my library	**3.87**	-	-	13%	87%
Station 4: EWB and What's My Job?*	Usefulness of Activity Overview	**3.93**	-	-	7%	93%
	Ability to implement in my library	**3.93**	-	-	7%	93%

*One respondent wrote, *"Couldn't hear"* next to the questions about Station 4. Another respondent wrote, *"Would have been helpful for there to be some structure in the process of moving to another area; some were left behind."*

Respondents' Ratings of Activities on Day Two of the Workshop (n=15, unless otherwise specified)

		Mean	Not useful/ Not prepared	Somewhat useful/ Partially prepared	Useful/ Adequately prepared	Very useful/ Fully prepared
Exhibit Exploration 3: Take Down/Setup	Usefulness of Presentation	**3.93**	-	-	7%	93%
	Usefulness of Discussion / Q/A	**3.93**	-	-	7%	93%
	Ability to implement in my library	**3.87**	-	-	13%	87%
Discussion: Exhibit Reflections	Usefulness of Discussion / Q/A	**3.60**	-	7%	27%	67%
	Ability to implement in my library	**3.80**	-	-	20%	80%
Presentation: An Exhibit's Impact on a Community	Usefulness of Presentation	**3.93**	-	-	7%	93%
	Usefulness of Discussion / Q/A	**3.87**	-	-	13%	87%
	Ability to implement in my library	**3.93**	-	-	7%	93%
CoP Exercise: Uploading Programming Ideas	Usefulness of Presentation (n = 13)	**3.15**	-	8%	69%	23%
Discussion: Adult Programming	Usefulness of Discussion / Q/A	**3.60**	-	-	40%	60%
	Ability to implement in my library (n = 14)	**3.79**	-	7%	7%	86%
Presentation: Engineering (Steve Davis)	Usefulness of Presentation	**3.93**	-	-	7%	93%
	Usefulness of Discussion / Q/A (n = 13)	**4.00**	-	-	-	100%
Discussion: Outreach Partnerships	Usefulness of Discussion / Q/A	**3.47**	-	7%	40%	53%
	Ability to implement in my library	**3.67**	-	-	33%	67%
Discussion: Children/ Youth/Family Activities	Usefulness of Discussion / Q/A	**3.67**	-	-	33%	67%
	Ability to implement in my library	**3.87**	-	-	13%	87%
Discussion: Implementation Plan Changes	Usefulness of Discussion / Q/A (n = 10)	**3.40**	-	10%	40%	50%
	I have a plan for implementing these activities (n = 9)	**3.56**	-	-	44%	56%
	I intend to form partnerships with other institutions to implement these activities (n = 10)	**3.60**	-	10%	20%	70%

Respondents' Ratings of *Discover Tech* Workshop Overall (n=15, unless otherwise specified)

Scale: 1 = Strongly Disagree to 4 = Strongly Agree

	Mean	Strongly Disagree	Disagree	Agree	Strongly Agree
The *Discover Tech* site support notebook is useful.	**4.00**	-	-	-	100%
Overall, the workshop provided an effective orientation to the *Discover Tech* exhibit.	**3.93**	-	-	7%	93%
The workshop prepared me to host the exhibit in my library.	**3.93**	-	-	7%	93%
Overall, the resources provided in the workshop will be useful. (n = 14)	**3.93**	-	-	7%	93%
The workshop structure provided sufficient opportunities to interact with other library professionals.	**3.87**	-	-	13%	87%
The workshop prepared me to use the activities and resources that accompany the exhibit.	**3.87**	-	-	13%	87%
I feel comfortable facilitating *Discover Tech* programming in my library.	**3.87**	-	-	13%	87%
I know where to get support if needed as I implement *Discover Tech* in my library. (n = 14)	**3.86**	-	-	14%	86%
I have increased knowledge of the STEM topics presented in the *Discover Tech* exhibit.	**3.80**	-	-	20%	80%
I feel encouraged to participate in the STAR_Net online community of practice. (n = 14)	**3.79**	-	-	21%	79%
The workshop provided an effective introduction to the related exhibit subject areas.	**3.73**	-	-	27%	73%
I feel more prepared to share information about engineering with my community.	**3.60**	-	-	40%	60%
The workshop prepared me to partner with other organizations to implement programming at my library.	**3.53**	-	-	47%	53%

Overall, did the workshop meet your expectations? Why or why not? (n = 15)

Feel better prepared and enthusiastic (n = 8):
- *This workshop was great and really prepared me as we get ready to host Discover Tech. I feel more confident in presenting programs related to the exhibit due to the resources and ideas provided in the workshop.*
- *Yes—excited me, prepared me, gave me things to think about and explore.*
- *Yes. I'm excited about this exhibit, and also feel very supported. There are many more resources available than I'd realized.*
- *Yes, I came here and learned the critical things I needed to build the exhibits.*
- *Yes! Now I know what to expect.*
- *Yes—I got a very good sense of the physical and experiential scope of the exhibit. I understand the set-up/pack-up logistics and I'm much more excited about the project—and I came here excited.*

- *Very much so. I feel better prepared to set up and manage the exhibit, as well as advertising, outreach and just general communication with businesses and the community over all.*
- *Yes. This workshop has given me confidence to share this with my staff, community and professionals.*

Seeing and handling the exhibit was helpful (n = 3):
- *Yes—seeing the exhibits.*
- *Yes. Being able to see the exhibit, handle the interactive modules, taking it apart. This workshop was an eye-opener!*
- *Yes, [in] some ways it exceeded them (ex: very helpful to touch the exhibit, binder is great)! There was a lot of repetitive material the second day with the exhibits that felt like it was filling time. Though putting together and taking it down was very helpful.*

Workshop met expectations; reasons not specified (n = 3):
- *Yes.*
- *More than I expected.*
- *Yes! We will take the information and implement based on the patrons' need and exhibit purpose.*

Offered suggestion (n = 1):
- *The COP presentation did not show us how to upload a document.*

Do you feel adequately prepared to host the *Discover Tech* exhibit in your library? (n = 15)

	Count	Percentage of Sample Answering
Yes*	15	100%
No	-	-

*One respondent checked "yes" and wrote "*Mostly*" next to the question

If No, tell us about areas where you do not feel prepared, and if you have any ideas about how the project team could better help you prepare? (n = 2)
- *Listening to the presentations, I feel there are people available for support.*
- *But it is going to be my focus for the next three months.*

What was the most valuable aspect of the workshop? Why? (n = 15)

Opportunity to get hands-on experience with the exhibit (n = 13, including two comments listed in section below re: building relationships):

- *The most valuable aspect was the hands-on session where we learned how to put up and break down the exhibit. I can figure out programming without help—although I do appreciate the resources—but I'm not good with putting things together. I'm much relieved to have the instructions for setting up the exhibit…I just hope I can remember everything until we get the exhibit!*
- *The work with the exhibits.*
- *The hands-on contact with the exhibit was especially helpful.*
- *Hands-on "using" exhibit and putting exhibit together. I've done lots of programming so that doesn't scare me, but excitement from seeing exhibit will help with promotion.*
- *Seeing the exhibit set up and working. Sharing programming ideas. New contacts.*
- *The hands-on with the exhibits. I know how to set up all the way.*
- *Getting to see the exhibit and see how it goes together. Programming is an everyday thing—constructing an exhibit isn't.*
- *Hands-on experience with the exhibits. Allowed me to get an idea of what is coming and what ideas we can build around it.*
- *The hands-on section was most valuable to me because it helps me to not only set it up, but explain it to the staff and patrons.*
- *Disassembly and assembly of exhibits since this is what I will be responsible for.*
- *Seeing and using the exhibit.*

Building relationships with project staff and/or other librarians; Developing programming ideas; Other (n = 4):

- *See, touching the exhibit. Hearing the presentations, brainstorming programming ideas and realizing how receptive the LPI staff will be in regard to communicating and problem-solving.*
- *Middle school/girls programming ideas/presentations. Set-up/pack-up training. Connecting with recipient librarians. Connecting with the sponsors—I feel comfortable asking for help.*
- *Building a personal relationship with other librarians doing Discover Tech. Additionally, I have found that the STAR_Net Community of Practice will be a valuable asset, not only for Discover Tech, but for future planning.*
- *The most valuable aspect I learned was regarding the large target market the exhibit covers.*

Other comments and wishes about the workshop? (n = 9)

Offered praise (n = 7):

- *This was an excellent workshop. The presenters' passion and enthusiasm was infectious. I do feel like I need some time to digest everything before giving feedback at the end of the day.*
- *Great workshop. Got to meet some great professionals. Glad I got to make the trip. :-)*
- *I liked the way they moved us around so that we learned about program ideas, but other librarians.*
- *[Enjoyed] "hands on" the exhibit, plus seeing how to take apart and construct the exhibit. This is one of the best workshops I have been in.*
- *Terrific! Well-paced, excellent food, lovely location, good presentation line-up. Loved the snowball icebreaker. Thanks!*
- *Extremely useful –thank you!*
- *Thank you!!*

Offered suggestions (n = 2):
- *Binder was very helpful. A bookmark template that we can add our library information to and have printed would be great!*
- *Would like summary of changing energy forms for "Energy and Light and Hand Crank" exhibit.*

Appendix E: Librarian Pre-Exhibit Survey

Librarian Pre-*Discover Earth* [*Discover Tech*] Exhibit Survey

Introduction

Evaluation & Research Associates, an external evaluation organization, is collecting feedback about the STAR_Net project's *Discover Earth* [*Discover Tech*] exhibit on behalf of the Space Science Institute's National Center for Interactive Learning (NCIL), American Library Association (ALA), the Lunar and Planetary Institute (LPI), and the National Girls Collaborative Project (NGCP). This survey is designed to collect information about you, your library and your community before the exhibit arrives at your library. The survey will take about 15 minutes to complete. If you have any questions, please contact Julie Elworth of Evaluation & Research Associates at (425) 977-4760, ext. 104 or jelworth@eraeval.org. We appreciate you taking the time to complete this form.

1. Your library: (dropdown list)

2. Your name: _____

Your Library & Community

[Questions in this section—3 to 6—will be asked only of the Project Director at each library.]
We're interested in knowing about other activities and resources at your library and in your community.

3. In the last 12 months, has your library organized or hosted any activities or programs? (Please include all activities whether or not they were related to science, technology or engineering.)
- o   Yes
- o   No (skip to Q4)
- o   Not sure (skip to Q4)

3a. If yes, please record here the number of activities or programs your library has organized or hosted in the last year. (Please include all activities whether or not they were related to science, technology or engineering.)   _____

3b. Of all those activities and programs, how many were related to science, technology or engineering? _____

4. In addition to your library, there may be other resources available in your community for learning about science [technology] through other science, education, civic and other kinds of organizations. Are there other organizations in your community that provide science, technology or engineering related resources? If so, please check all that apply.

- ☐ College or university
- ☐ Science museum
- ☐ Children's museum
- ☐ Other (fill in) _____

5. This next question asks about the ages of your library patrons. You may have records available that make it easier to fill in this table. Thinking about all your library patrons, please enter the <u>percentage</u> that fall into each age group.

Age Group	Percentage
Adults	
Teens (14-17 years old)	
Preteens (10-13 years old)	
Children (8-9 years old)	
Young Children (5-7 years old)	
Youngest Children (0-4 years old)	
Total	100%

5a. The percentages I entered in question 5 were:

- o Estimated percentages
- o Actual percentages

6. This question asks about the racial and ethnic breakdown of your library patrons. Again, it may be easier to fill in this table by referring to your library records. Thinking about all your library patrons, please enter the <u>percentage</u> that fall into each racial/ethnic group.

Racial/Ethnic Group	Percentage
American Indian or Alaska Native	
Asian	
Black, African or African American	
Hispanic/Latino/Latina	
Native Hawaiians or Other Pacific Islander	
White	
Other or unknown	
Total	100%

6a. The percentages I entered in question 6 were:

- o Estimated percentages
- o Actual percentages

Your Experiences

We'd like to know a little about your familiarity with the *Discover Earth* [*Discover Tech*] exhibit topics and earth science [engineering] programming in general.

7. Please report your level of knowledge about each of the following *Discover Earth* [*Discover Tech*] exhibit-related topics where 1 = Beginner and 5 = Expert.

Topic	Beginner 1	2	3	4	Expert 5
Discover Earth items	○	○	○	○	○
a. Earth science	○	○	○	○	○
b. How earth systems are interconnected	○	○	○	○	○
c. The water cycle	○	○	○	○	○
d. The difference between weather and climate	○	○	○	○	○
e. How to be a steward of Planet Earth	○	○	○	○	○
f. How scientists study the earth	○	○	○	○	○
Discover Tech Items	○	○	○	○	○
a. The design process of engineering	○	○	○	○	○
b. Grand Challenges for engineering	○	○	○	○	○
c. Who engineers are	○	○	○	○	○
d. Energy and energy use	○	○	○	○	○
e. The impact of engineering on people	○	○	○	○	○
f. The impact of engineering worldwide over time	○	○	○	○	○

8. We would like you to think about your current familiarity with <u>informal earth science</u> **[engineering] programming. Informal programming refers to activities and programs which are organized outside the regular school day setting. Informal activities/programs would include those that are held after-school, on weekends or during summer. It would also include activities/programs organized by libraries, clubs, and museums, among other types of organizations. Please report your level of agreement with each of the following items related to informal earth science [engineering] programming at your library.**

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
a. I am capable of generating new ideas for earth science [engineering] programs for my library	❍	❍	❍	❍	❍
b. I am unsure about how to network with others to have them present their earth science [engineering] based programs at my library	❍	❍	❍	❍	❍
c. Implementing earth science [engineering] programs at my library is one of my highest priorities	❍	❍	❍	❍	❍
d. Even if I try hard, I do not facilitate informal earth science [engineering] programs as well as I will other subjects	❍	❍	❍	❍	❍
e. I am confident I can implement my own ideas for earth science [engineering] programs at our library	❍	❍	❍	❍	❍
f. There are more important items on my agenda than implementing earth science [engineering] programs at my library	❍	❍	❍	❍	❍
g. I understand earth science concepts well enough to be effective in facilitating earth science [engineering] learning for my patrons	❍	❍	❍	❍	❍
h. I wonder if I have the necessary skills to facilitate earth science [engineering] learning for my patrons	❍	❍	❍	❍	❍

9. We'd like to know about your experience with implementing activities and programs for library patrons prior to the *Discover Earth* [*Discover Tech*] exhibit. Thinking about your experience at <u>all the libraries</u> where you have worked, please check the number of programs you have implemented for library patrons on <u>any topic</u> (not just about science, technology or engineering).

o   0 programs
o   1 program
o   2 to 3 programs
o   4 to 5 programs

o   6 or more programs
o   Not sure

10. **We'd like to know about your experience with implementing science, technology or engineering programs prior to the** *Discover Earth* **[***Discover Tech***] exhibit. Thinking about your experience at <u>all the libraries</u> where you have worked, please check the number of programs you have implemented for library patrons about <u>science, technology or engineering</u>.**
o   0 programs
o   1 program
o   2 to 3 programs
o   4 to 5 programs
o   6 or more programs
o   Not sure

11. **We're interested in learning about any training you have received (through workshops, online webinars, university or college classes, etc.) to implement activities and programs for library patrons. Please check all that apply.**
☐   I have <u>not</u> received any training on how to deliver activities and programs to library patrons (skip to Q12)
☐   I received training as part of STAR_Net on [*Discover Earth* training date] [*Discover Tech* training date]
☐   I received training as part of my regular degree program at my college/university
☐   I have received other training besides my regular degree program and STAR_Net training; describe here: _____
☐   I'm not sure if I have received other training (skip to Q12)

11a. **If you have received training about implementing library programs other than through STAR_Net, did that training focus on <u>science, technology or engineering</u> activities and programs for library patrons?**
o   Yes
o   No
o   Not sure

12. **How many years total have you worked as librarian (including at this library/branch and other libraries)? ____years**

13. **How many years have you worked as a librarian at <u>this</u> library/branch?** ____years

Thank you for all your help. If you have any questions, please contact Julie Elworth of Evaluation & Research Associates at (425) 977-4760, ext. 104 or jelworth@eraeval.org.

Appendix F: Librarian Six-Month Post-Exhibit Survey

Six-Month Post *Discover Earth* [*Discover Tech*] Exhibit Survey for Library Staff
(The survey was customized for *Discover Earth* and *Discover Tech* librarians)

Introduction
Evaluation & Research Associates, an external evaluation organization, is collecting feedback about the STAR_Net project's *Discover Earth* [*Discover Tech*] exhibit on behalf of the Space Science Institute's National Center for Interactive Learning (NCIL), American Library Association (ALA), the Lunar and Planetary Institute (LPI), and the National Girls Collaborative Project (NGCP). This survey is designed to collect information about you and your library since the exhibit was in your library. The survey will take about 30 minutes to complete. If you have any questions, please contact Lara Blake of Evaluation & Research Associates at (425) 977-4741, ext. 4768 or lblake@eraeval.org. We appreciate you taking the time to complete this form.

1. Your library: (dropdown list)

2. Your name: _____

2a. What is your position at the library (e.g., librarian, youth services coordinator, director, programming developer, IT staff)? _____ _____

Your Library

We have some questions about what has happened at your library in the six months since the *Discover Earth* exhibit was at your library.

3. It's been about six months since the *Discover Earth* [*Discover Tech*] exhibit was at your library. We're interested in whether you view the exhibit as a success for your library. Please select the answer that best reflects your assessment of the exhibit at your library.
> Very successful
> Somewhat successful
> Neutral
> Somewhat unsuccessful
> Very unsuccessful

3a. Please explain your answer.
> **_____**
> **_____**

4. Has your library acquired any additional science, technology or engineering resources in the <u>six months since</u> the *Discover Earth* [*Discover Tech*] exhibit left your library?
- o   Yes
- o   No (skip to Q5)
- o   Not sure (skip to Q5)

4a. If yes, please check all the types of science, technology or engineering resources your library has acquired in the <u>six months since</u> the exhibit left your library.
- ☐   Articles
- ☐   Audiobooks
- ☐   Books
- ☐   Databases
- ☐   DVDs
- ☐   eBooks
- ☐   Maps
- ☐   Movies
- ☐   Music
- ☐   Photographs
- ☐   Prints
- ☐   Recordings
- ☐   Web resources
- ☐   Other: please specify _____

4b. What reasons did you have for acquiring additional of science, technology or engineering resources for your collection? Check all that apply.
- ☐ Interest from librarians or other library staff
- ☐ Noticed a gap in the collection due to the exhibit
- ☐ Requests from library patrons
- ☐ Requests from K-12 schools
- ☐ Requests from informal educators or programs (for example, after-school program leaders or museums)
- ☐ Requests from science, technology or engineering professionals
- ☐ Other; please specify _____

5. In the <u>six months since</u> the *Discover Earth* [*Discover Tech*] exhibit left your library, has your library organized, hosted or promoted any additional science, technology and/or engineering activities or programs?
- ○ Yes
- ○ No (skip to Q9)
- ○ Not sure (skip to Q9)

5a. If yes, how many activities/programs has your library implemented since the *Discover Earth* [*Discover Tech*] exhibit? _____

Please provide information below for as many as three science [technology] related activities/programs your library has had in the <u>six months since</u> the *Discover Earth* [*Discover Tech*] exhibit.

Activity/Program #1 after *Discover Earth* [*Discover Tech*] exhibit

6. Briefly describe activity/program #1 here. Include the title, the presenter's name(s) and the name of the presenter's organization.

_____
_____

6a. What was the source of the content for this activity/program? Please check all that apply.
- ☐ STAR_Net Community of Practice
- ☐ Lunar Planetary Institute
- ☐ National Girls Collaborative Project (NGCP)
- ☐ Other professionally created materials/programs
- ☐ Our own creation
- ☐ Other; please describe: _____

6b. Please record the number of attendees to this activity/program. _____

6c. Is this number an estimate or actual count?
- ○ Estimate
- ○ Actual count

If your library has implemented only one activity/program, skip to Q9.

Activity/Program #2 after *Discover Earth* [*Discover Tech*] exhibit

7. Briefly describe activity/program #2 here. Include the title, the presenter's name(s) and the name of the presenter's organization.

_____

_____

7a. What was the source of the content for this activity/program? Please check all that apply.
- ☐ STAR_NET Community of Practice
- ☐ Lunar Planetary Institute
- ☐ National Girls Collaborative Project (NGCP)
- ☐ Other professionally created materials/programs
- ☐ Our own creation
- ☐ Other; please describe: _____

7b. Please record the number of attendees to this activity/program. _____

7c. Is this number an estimate or actual count?
- o Estimate
- o Actual count

If your library has implemented only two activities/programs, skip to Q9.

Activity/Program #3 after *Discover Earth/Discover Tech* exhibit

8. Briefly describe activity/program #3 here. Include the title, the presenter's name(s) and the name of the presenter's organization.

_____

_____

8a. What was the source of the content for this activity/program? Please check all that apply.
- ☐ STAR_Net Community of Practice
- ☐ Lunar Planetary Institute
- ☐ National Girls Collaborative Project (NGCP)
- ☐ Other professionally created materials/programs
- ☐ Our own creation
- ☐ Other; please describe: _____

8b. Please record the number of attendees to this activity/program. _____

8c. Is this number an estimate or actual count?
- o Estimate
- o Actual count

9. Do you have any plans to organize or host any science, technology or engineering activities or programs at your library in the future?
- o Yes
- o No (Skip to Q10)
- o Not sure (Skip to Q10)

9a. If yes, please describe.

_____

_____

10. Are there science, technology or engineering related activities or programs you have considered but haven't implemented? If so, briefly list the type of activity/program <u>and</u> explain why you did not implement.

_____

_____

11. In the <u>six months since</u> the exhibit left your library, have you noticed that patrons have asked for more science, technology or engineering activities or programs? Please select one.
- o   Yes, many patrons have asked for more science, technology or engineering activities/programs
- o   Yes, a few patrons have asked for more science, technology or engineering activities/programs
- o   No patrons have asked for more science, technology or engineering activities/programs
- o   Not sure if patrons have asked for more science, technology or engineering activities/programs

12. What impact, if any, has the *Discover Earth* [*Discover Tech*] exhibit had on your library patrons?

_____

_____

Your Experiences

We'd like to know a little about your familiarity with the *Discover Earth* [*Discover Tech*] exhibit topics and science [technology] programming in general.

13. Please report your current level of knowledge about each of the following *Discover Earth* [*Discover Tech*] exhibit-related topics where 1 = Beginner and 5 = Expert.

Topic	Beginner 1	2	3	4	Expert 5
Discover Earth items	❍	❍	❍	❍	❍
g. Earth science	❍	❍	❍	❍	❍
h. How earth systems are interconnected	❍	❍	❍	❍	❍
i. The water cycle	❍	❍	❍	❍	❍
j. The difference between weather and climate	❍	❍	❍	❍	❍
k. How to be a steward of Planet Earth	❍	❍	❍	❍	❍
l. How scientists study the earth	❍	❍	❍	❍	❍
Discover Tech Items	❍	❍	❍	❍	❍
g. The design process of engineering	❍	❍	❍	❍	❍
h. Grand Challenges for engineering	❍	❍	❍	❍	❍
i. Who engineers are	❍	❍	❍	❍	❍
j. Energy and energy use	❍	❍	❍	❍	❍
k. The impact of engineering on people	❍	❍	❍	❍	❍
l. The impact of engineering worldwide over time	❍	❍	❍	❍	❍

14. We would like you to think about your current familiarity with <u>informal earth science [engineering] programming</u>. Informal programming refers to activities and programs which are organized outside the regular school day setting. Informal activities/programs would include those that are held after-school, on weekends or during summer. It would also include activities/programs organized by libraries, clubs, and museums, among other types of organizations. Please report your level of agreement with each of the following items related to informal earth science [engineering] programming at your library.

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
a. I am capable of generating new ideas for earth science [engineering] programs for my library	○	○	○	○	○
b. I am unsure about how to network with others to have them present their earth science [engineering] based programs at my library	○	○	○	○	○
c. Implementing earth science [engineering] programs at my library is one of my highest priorities	○	○	○	○	○
d. Even if I try hard, I do not facilitate informal earth science [engineering] programs as well as I will other subjects	○	○	○	○	○
e. I am confident I can implement my own ideas for earth science [engineering] programs at our library	○	○	○	○	○
f. There are more important items on my agenda than implementing earth science [engineering] programs at my library	○	○	○	○	○
g. I understand earth science [engineering] concepts well enough to be effective in facilitating earth science [engineering] learning for my patrons	○	○	○	○	○
h. I wonder if I have the necessary skills to facilitate earth science [engineering] learning for my patrons	○	○	○	○	○

15. What impact, if any, has being part of the STAR_Net project had on you?

_____

_____

16. What impact, if any, has being a part of the STAR_Net project had on your library?

_____

_____

Community of Practice

When your library was selected for the *Discover Earth* [*Discover Tech*] exhibit, you were encouraged to use the STAR_Net Community of Practice (CoP) website. The website is designed for professionals who want to provide or support STEM learning experiences in libraries. The CoP is open to librarians, scientists, engineers, educators, museum staff and others.

17. Have you looked at the STAR_Net Community of Practice (CoP) website?
- o Yes
- o No (Skip to Q21)
- o Not Sure (Skip to Q21)

18. How frequently have you gone to the STAR_Net Community of Practice website since it was launched in January 2012?
- o 1-2 times in total
- o About every other month
- o About once or twice per month
- o About once a week
- o More than once a week
- o Not sure
- o Other; please describe: _____

19. Some of the features of the CoP website are listed below. Please indicate how useful you have found each CoP feature. For features you haven't used, please check "Haven't used yet."

CoP Features	Haven't used yet	Not at all useful	Not very useful	Neutral	Useful	Very useful
Networking with other library staff	o	o	o	o	o	o
Networking with science [technology] professionals	o	o	o	o	o	o
Participating in science [technology] discussion groups	o	o	o	o	o	o
Learning about best practices in science [technology] education	o	o	o	o	o	o
Sharing my best practices about science [technology] education	o	o	o	o	o	o
Webinars	o	o	o	o	o	o
Exhibit-specific resources/support	o	o	o	o	o	o

20. Please share any recommendations you have for ways to improve the CoP website.

_____

_____

20a. If your recommendations were implemented, do you think you would visit the STAR_Net CoP website more frequently?
- o Yes
- o No
- o Not sure

Closing

21. Do you see a role for your library in encouraging science/technology/engineering learning?
- o   Yes
- o   No
- o   Not sure

21a. Please explain your answer.

_____
_____

22. Please share other comments or observations you have about the STAR_Net Project.

_____
_____
_____

Thank you for all your help.

Appendix G: Library Staff Interview Protocol

STAR_Net Library Staff Interview Protocol

Library: _____

Names and titles of interviewees: _____

                                            _____

Interviewer: _____

Date and time of interview: _____

Introduction:

Thank you for agreeing to participate in this interview. As you know, Evaluation & Research Associates (ERA) is evaluating the STAR_Net Project. As part of the evaluations, we are conducting interviews with library staff from the Discover Earth and Discover Tech libraries. This interview is part of a larger data collection effort that will allow us to better understand the STAR_Net project. It should take about an hour. We are interested in learning your views about the project and what it has meant to you. At the end of the interview there will be time for you to add any comments or thoughts we haven't covered. Your responses will be summarized and shared in the summative report.

To facilitate our note-taking, we would like to audio record our conversation today. Would that be OK with each person in the group? [Pause and wait for responses from each individual.] If at any point during the interview you feel unwilling to answer a question, let us know and we will skip to the next question.

Do you have any questions about the group interview process before we begin?

Let's get started!

Introductory Questions

1. What was your role with the *Discover Earth*/*Discover Tech* exhibit at your library?

Your Library Community

2. Please tell us about the community your library serves (such as the demographics, community strengths, community needs). How would you describe it to someone who has never been here before?

3. What resources does your community have in science, technology and engineering (e.g., museums, people, nonprofit organizations, employers)? How does the STAR_Net Project complement those resources?

4. How did you promote the exhibit (to current library visitors, to schools, to organizations, etc.)?

5. Are the visitors who visited the exhibit and/or participated in programming typical of the people who normally come to your library and/or attend programs? How are they similar or different?

6. *[optional]* Are the visitors who visited the exhibit and/or participated in programming representative of your community (e.g., in race/ethnicity, age)? How are they similar or different?

7. Was the *Discover Earth*/*Discover Tech* exhibit a good fit for your library and your community? If so, why? If not, why not?

8. *[optional]* How would you describe your library's mission? What do you see as your library's role in encouraging informal science learning?

Library Visitors

9. *[optional]* You may have spent some time observing library visitors as they interacted with the *Discover Earth*/*Discover Tech* exhibit. What are your observations about what visitors seemed to think of the exhibit?

10. Please think about a time when you talked to a library visitor about the exhibit or observed library visitors interacting with the exhibit. Tell me about that interaction and what made it memorable.

11. *[optional]* Do you think the exhibit or programming had an impact on library visitors? If so, what might that impact might be? (Probe evidence.)

STAR_Net Professional Development and Science Programming

12. Have you facilitated any programming related to the exhibit at your library? How did you choose the activities? Did you use the module of hands-on activities that was developed to accompany the *Discover Earth*/*Discover Tech* exhibit? If so, which activities did you use? How did you think the program went? (probe re: appropriateness of activity for audience, resources used including *Discover Tech* kits, library staff's comfort facilitating activity)

13. Before the exhibit came to your library, had you ever facilitated informal science programs at your library? If so, please describe what informal science activities you've facilitated in the past and how they are similar or different from the programming you are doing now for the *Discover Earth*/*Discover Tech* exhibit.

14. Has the STAR_Net project provided you with enough training and support so that your library is able to deliver programming to go with the *Discover Earth*/*Discover Tech* exhibit? Why or why not? What, if any, additional support or resources would be helpful to you and your library?

STAR_Net Community of Practice

15. Have you used the online Community of Practice website? If not, why not? If yes, what do you think of the CoP website?
16. What aspects of the Community of Practice have been most helpful to you (e.g., materials posted on the website, discussion groups on the website, webinars)? How have they been helpful to you?
17. Have you communicated with any other librarians who are participating in STAR_Net? If yes, what did you communicate about? Did you initiate the communication through the CoP website or contact them directly?
18. What suggestions do you have for making the Community of Practice (including the website and webinars) more useful to you?

Networking to Develop Programming

19. Have you reached out to science, technology or engineering individuals or organizations because of your involvement in the STAR_Net project? If so, who and how did you identify them? (probe for use of Community of Practice)
20. *[optional]* Have you worked with your local National Girls Collaborative to develop programming for your library?
21. *[optional]* What have been the rewards of working with these professionals/organizations?
22. *[optional]* What have been the challenges of working with these professionals/organizations?

Final Reflection

23. Why did your library choose to participate in the STAR_Net project? How has the project met your expectations?
24. Has being part of the STAR_Net project changed your professional practice? If so, how? (prompt re: specific impact STEM)
25. What value, if any, does being part of the STAR_Net project bring to your library?
26. What challenges, if any, does being part of the STAR_Net project present to your library?
27. Do you have any suggestions for improving STAR_Net?
28. Is there anything else that you would like us to know?

Appendix H: Library Patron Survey

Discover [Earth/Tech] Exhibit Survey at _____ Library [customized]

We would like to know what you think about the Discover [Earth or Tech] exhibit that is currently on display at your library. This quick survey should take 5-10 minutes to complete. We will be using your answers along with those of other library visitors' to learn what library visitors think about the exhibit. If you have questions about this survey, please contact Evaluation & Research Associates at jelworth@eraeval.org.

Today's date (MM/DD/YYYY): _____/_____/_____

1. About how many minutes have you spent looking at the Discover [Earth/Tech] exhibit? If you have attended the exhibit more than once, please add the total the number of minutes you have looked at the exhibit. _____Total minutes

2. Please indicate how much you agree or disagree with each of the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable
I think the Discover [Earth/Tech] exhibit is very interesting.	❍	❍	❍	❍	❍	❍
I plan to visit the Discover [Earth/Tech] exhibit again at my library.	❍	❍	❍	❍	❍	❍
I learned a lot from the Discover [Earth/Tech] exhibit.	❍	❍	❍	❍	❍	❍
The Discover [Earth/Tech] exhibit is a valuable addition to my library.	❍	❍	❍	❍	❍	❍
The Discover [Earth/Tech] exhibit increased my interest in learning more about [earth science/engineering].	❍	❍	❍	❍	❍	❍
I plan to learn more about [earth science/engineering] using library resources (such as looking for books or videos).	❍	❍	❍	❍	❍	❍
I would like to attend another educational institution (like a museum) or event to learn more about [earth science/engineering].	❍	❍	❍	❍	❍	❍
My library is a good place to learn about [earth science/engineering].	❍	❍	❍	❍	❍	❍
I would recommend the Discover [Earth/Tech] exhibit to others.	❍	❍	❍	❍	❍	❍
The children/young people with me were very interested in the Discover [Earth/Tech] exhibit.	❍	❍	❍	❍	❍	❍
The children/young people with me learned a lot from the Discover [Earth/Tech] exhibit.	❍	❍	❍	❍	❍	❍

3. Your library has held some programs, lectures or presentations related to the Discover [Earth or Tech] exhibit. Have you attended any of these?
- ❍ Yes
- ❍ No
- ❍ Don't know

4. Please share any comments about the Discover [Earth or Tech] exhibit or related programs you attended.

5. Your gender: ☐ Male ☐ Female

6. Your race/ethnicity (check all that apply):
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black, African or African American
- ☐ Hispanic/Latino/Latina
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Other; please describe:
  _____

Thank you very much for completing this survey! Please place it in the specially marked survey box.

Appendix I: Site Visit Protocol

Discover Earth/Discover Tech Exhibit Observation Tool
Library Description

Date: _____ Day(s) of Week: _____ Start Time:_____ End Time:_____

Library Name: _____ Observer: _____

Describe Exhibit

Describe below how the exhibit is organized and displayed in the library. On the back of this page, draw a floor plan of the library and the exhibit, labeling key parts of the library (e.g., the main entrance, circulation desk, where library staff are located) and where each part of the exhibit is displayed. If possible, take digital photos.

Describe any components library staff added to the exhibit, including source of components (e.g., display table with additional resources/books to check out; additional artifacts; additional displays or bulletin boards; place for patrons to share feedback about the exhibit). (If you are unsure, ask a librarian.)

Other notes about the library (e.g., approximate number of people in library, activity level, noise level):

Other notes about the exhibit logistics learn from staff and not already included in interview notes (e.g., number of staff used in set up, any issues with set up or equipment)

Librarian Interactions with Patrons

Date: _____   Observer: _____

Library Name: _____

Observation start time _____   Observation end time _____

Describe whether and how the librarians facilitate interactions with the exhibit. Check all that apply.

	# Times observed	Describe Examples of Observed Behavior
❑ Answered visitors' questions about exhibit		
❑ Asked visitors if they had interacted with exhibit		
❑ Encouraged visitors to interact with specific parts of exhibit		
❑ Directed patrons to related library materials		
❑ Offered help or instruction to a patron without being asked		
❑ Other; describe:		

Additional notes re: librarian-facilitated interactions:

STAR_Net Library Program Observation Tool

Date: _____ Observer: _____

Library Name: _____

Title of Program: _____

Program start time _____ End time _____ _____

1. **Name, position and organization of facilitator(s).**

Facilitator's Name	Facilitator's Title	Facilitator's Organization
1.		
2.		
3.		
4.		

2. **Program format. Check all that apply.**
    - ❑ Hands-on activity
    - ❑ Demonstration
    - ❑ Lecture
    - ❑ Group discussion
    - ❑ Other; describe: _____

3. **What was the source of the content for this program? Check all that apply.** *(Ask facilitator before or after the program, if needed.)*
    - ❑ STAR_Net Community of Practice
    - ❑ Lunar and Planetary Institute
    - ❑ National Girls Collaborative Project (NGCP)
    - ❑ Other professionally created materials/programs
    - ❑ Created by presenting library
    - ❑ Created by program facilitator(s)
    - ❑ Other; describe: _____

4. **Describe the program (content, intended audience, etc.).**

5. **Attendance at the start of the activity.**

	Number of Males at Start of Activity	Number of Females at Start of Activity
Adults		
Teens (14-17 years old)		
Preteens (10-13 years old)		
Children (8-9 years old)		
Young Children (5-7 years old)		
Youngest Children (0-4 years old)		

Notes regarding attendance:

Dimension & Rating	Notes
How closely did the program relate to the *Discover Earth/Discover Tech* exhibit? *Circle one number.* 1 2 3 4 5 6 7 Not at all Very closely related **Did program facilitator refer to *Discover Earth/Discover Tech* exhibit?** ❑ Yes (describe in box to right) ❑ No ❑ Unsure (explain in box to right)	*Describe if/how program content relates to exhibit and any connections facilitator made between program and exhibit.*
How comfortable did the primary facilitator appear to be facilitating the activity? *Circle one number.* ❑ Check if one or more host librarians did <u>not</u> facilitate the observed program 1 2 3 4 5 6 7 Not at all Very comfortable	*Describe evidence of program facilitator's comfort with the program content and program format (e.g., how knowledgeable appeared, how comfortable appeared handling attendees' questions, how familiar facilitator appeared with any materials used).*
On average, how engaged did program attendees appear to be during the program? *Circle one number.* 1 2 3 4 5 6 7 Not engaged at all Very engaged	*Describe evidence of program attendees' interest (e.g., looking at facilitator throughout program, level of involvement in any hands-on activities, whether attendees asked questions).*
Other observations (including anything unexpected).	

STAR_Net Library Staff Interview Protocol

(Interview will be conducted during site visit to selected Discover Earth/Discover Tech libraries. All library staff involved in the project will be interviewed together, as available.)

Library: _____

Names and titles of interviewees: _____

(If applicable) Names and titles of library
staff involved in STAR_Net but unable to   _____
participate in interview: _____
                                                _____

Interviewer: _____

Date and time of interview _____

Introduction:

Thank you for agreeing to participate in this interview. As you know, Evaluation & Research Associates (ERA) is visiting selected Discover Earth and Discover Tech libraries. As part of these visits, we are conducting interviews with library staff. This interview is part of a larger data collection effort that will allow us to better understand the STAR_Net project. It should take about an hour. We are interested in learning your views about the project and what it has meant to you. At the end of the interview there will be time for you to add any comments or thoughts we haven't covered. Your responses will be summarized and shared in the summative report.

To facilitate our note-taking, we would like to audio record our conversation today. Would that be OK with each person in the group? [Pause and wait for responses from each individual.] If at any point during the interview you feel unwilling to answer a question, let us know and we will skip to the next question.

Do you have any questions about the group interview process before we begin?

Let's get started!

Introductory Questions

1. What has your role been with the *Discover Earth*/*Discover Tech* exhibit at your library?

Your Library Community

2. Please tell us about the community your library serves (such as the demographics, community strengths, community needs). How would you describe it to someone who has never been here before?
3. What resources does your community have in science, technology and engineering (e.g., museums, people, nonprofit organizations, employers)? How does the STAR_Net Project complement those resources?
4. How have you promoted the exhibit (to current library visitors, to schools, to organizations, etc.)?
5. Are the visitors who have visited the exhibit so far and/or participated in programming typical of the people who normally come to your library and/or attend programs? How are they similar or different?
6. Are the visitors who have visited the exhibit so far and/or participated in programming representative of your community (e.g., in race/ethnicity, age)? How are they similar or different?
7. Has the *Discover Earth*/*Discover Tech* exhibit been a good fit for your library and your community? If so, why? If not, why not?
8. How would you describe your library's mission? What do you see as your library's role in encouraging informal science learning?

Library Visitors

9. You may have spent some time observing library visitors as they interact with the *Discover Earth*/*Discover Tech* exhibit. What are your observations about what visitors seem to think of the exhibit?
10. Please think about a recent time when you talked to a library visitor about the exhibit or observed library visitors interacting with the exhibit. Tell me about that interaction and what made it memorable.
11. Do you think the exhibit or programming is having an impact on library visitors? If so, what might that impact might be? (Probe evidence.)

STAR_Net Professional Development and Science Programming

12. Have you facilitated any programming related to the exhibit at your library? How did you choose the activities? Did you use the module of hands-on activities that was developed to accompany the *Discover Earth*/*Discover Tech* exhibit? If so, which activities did you use? How did you think the program went? (probe re: appropriateness of activity for audience, resources used including *Discover Tech* kits, library staff's comfort facilitating activity)
13. Before the exhibit came to your library, had you ever facilitated informal science programs at your library? If so, please describe what informal science activities you've facilitated in the past and how they are similar or different from the programming you are doing now for the *Discover Earth*/*Discover Tech* exhibit.
14. Has the STAR_Net project provided you with enough training and support so that your library is able to deliver programming to go with the *Discover Earth*/*Discover Tech* exhibit? Why or why not? What, if any, additional support or resources would be helpful to you and your library?

STAR_Net Community of Practice

15. Have you used the online Community of Practice website? If not, why not? If yes, what do you think of the CoP website?
16. What aspects of the Community of Practice have been most helpful to you (e.g., materials posted on the website, discussion groups on the website, webinars)? How have they been helpful to you?
17. Have you communicated with any other librarians who are participating in STAR_Net? If yes, what did you communicate about? Did you initiate the communication through the CoP website or contact them directly?
18. What suggestions do you have for making the Community of Practice (including the website and webinars) more useful to you?

Networking to Develop Programming

19. Have you reached out to science, technology or engineering individuals or organizations because of your involvement in the STAR_Net project? If so, who and how did you identify them? (probe for use of Community of Practice)
20. Have you worked with your local National Girls Collaborative to develop programming for your library?
21. What have been the rewards of working with these professionals/organizations?
22. What have been the challenges of working with these professionals/organizations?

Final Reflection

23. Why did your library choose to participate in the STAR_Net project? How has the project met your expectations?
24. Has being part of the STAR_Net project changed your professional practice? If so, how? (prompt re: specific impact STEM)
25. What value, if any, does being part of the STAR_Net project bring to your library?
26. What challenges, if any, does being part of the STAR_Net project present to your library?
27. Do you have any suggestions for improving STAR_Net?
28. Is there anything else that you would like us to know?

Individual Patron Observation Record (*Discover Tech*)

Date: _____   Observer:_____   Library Name: _____

Observation #_____   Observation start time: _____   Observation end time: _____   Matching Interview # (if applicable)_____

Demographics of observed patron or group of patrons in same social group (like parent/child or friends).

	# Females	# Males
Adults		
Teens (14-17 years old)		
Preteens (10-13 years old)		
Children (8-9 years old)		
Young Children (5-7 years old)		
Younger than 5 years old		

General observations

Describe what patron was observed to do.

Activity	Time Start	Time End	Total Minutes	Engaged 1=not engaged at all; 7=very engaged	Describe what patron was observed doing. *(include evidence of engagement— how deep gets into multi-level touch-tables, doing hands-on activities, if talking to others in group)*
Inventor's Lab (Snap Circuits)					
Clean Water Magnetic Board (w/PVC pipes)					
Catenary Arch Activity					
Light Bulb Crank Electricity Activity					
Solar Panel Activity					
Discover Tech Quiz Game					
Robots! Game (guess the robot)					
Looping video of robots					
Grand Challenges Touch Table					
Engineers Without Borders Touch Table					
Engineering in Your Community display					
Robotic hand display					
Phone artifacts display					
Stand-alone panels					*Which panels?*
Other:					*Describe activity*

Individual Patron Observation Record (*Discover Earth*)

Date: _____   Observer:_____   Library Name: _____

Observation #_____   Observation start time: _____   Observation end time: _____   Matching Interview # (if applicable)_____

Demographics of observed patron or group of patrons in same social group (like parent/child or friends).

	# Females	# Males
Adults		
Teens (14-17 years old)		
Preteens (10-13 years old)		
Children (8-9 years old)		
Young Children (5-7 years old)		
Younger than 5 years old		

General observations

Describe what patron was observed to do.

Activity	Time Start	Time End	Total Minutes	Engaged 1=not engaged at all; 7=very engaged	Describe what patron was observed doing. *(include evidence of engagement— how deep gets into multi-level touch-tables, doing hands-on activities, if talking to others in group)*
Magic Planet Globe & touch screen					
Wild Weather panel & touch screen					
What Makes Weather panel & touch screen					
Measuring Earth's Changes panel & touch screen					
The Environment Impacts Life panel & touch screen					
You Decide panel & touch screen					
Discover Earth Quiz Game					
Weather Station panel & display screen					
Local Stories Community display					
Animals Adapt panel & fur samples					
Animal artifacts display case					
Weather instruments display case					
Stand-alone panels					*Which panels?*
Other:					*Describe activity*

STAR_Net Library Visitor Interview

Method

Conduct five-minute face-to-face interviews with library visitors during site visit. Evaluator approaches visitors to ask if they would be willing to participate in a short interview. If they agree, conduct interview on the floor near the exhibit (or take library visitor to a place to sit down nearby, if appropriate—ask librarian to identify space where these can take place). After each interview, recruit another individual. Goal is to interview 15 visitors at each library. Evaluator will wear a nametag and have a printed list of *Discover Earth/Discover Tech* programs to show visitor.

Introduction

"We're interested in your opinions about the Discover Earth/Discover Tech exhibit. I'd like to ask you five [or six, if have children] questions about what you thought of the exhibit. I work for an evaluation firm that is helping the [Discover Earth/Discover Tech] exhibit planners understand what library visitors think of the exhibit. We will not use your name or anything that might identify you when we share the information with the exhibit planners. Do you have five minutes to talk with me?"

Date: _____   Library: _____   Interviewer: _____

Interview #: _____   Matching Observation # (if applicable):_____   Gender of Interviewee: ☐ Male   ☐ Female

Notes about interviewees (e.g., if with children):

1. Did you know the [*Discover Earth/Discover Tech*] exhibit was here at your library before you visited today? (ask how many time they visited previously, if applicable)	
2. What do you think about the exhibit given what you've seen so far?	
3. Have you learned anything new from the exhibit? If yes, what are one or two things that you learned looking at the exhibit?	
4. *[If have children with them]* Has your child spent time with the exhibit? If so, what do you think they liked about it?	
5. Would you recommend to any of your friends or family that they visit the exhibit? Why or why not?	
6. Having a travelling [technology/science] exhibit like this in a library is a new idea. What do you think about the idea of having exhibits like this in libraries?	

"Thank you very much for taking the time to talk with me. The information we are collecting from talking with library visitors is very helpful."

Appendix J: ALA Final Report Form

Discover Earth/Discover Tech Final Report Form

Feel free to use this Word version to assemble information to enter into the online report form. Please make sure that you enter all your information in the *online* version of the report form. We will be sending you the link to that form shortly after the exhibit has closed at your library.

Survey Instructions

Evaluation & Research Associates, an external evaluation organization, is collecting feedback about the *Discover Earth* and *Discover Tech* exhibits on behalf of the Space Science Institute's National Center for Interactive Learning (NCIL), American Library Association (ALA), the Lunar and Planetary Institute (LPI), and the National Girls Collaborative Project (NGCP). The report form will take about 30 minutes to complete and is due within 30 days of the closing of the exhibit. Reporting is a requirement for all exhibit projects organized by the American Library Association. If you have any questions, please contact Julie Elworth of Evaluation & Research Associates at (425) 977-4760, ext. 104 or jelworth@eraeval.org. We appreciate you taking the time to complete this form.

1) Library _____

2) Library branch (if applicable) _____

3) Library hours of branch with exhibit _____

Exhibition Attendance

4) What was the total number of attendees to the exhibit?

_____

5) Please record here the number of attendees to the *Discover Earth/Discover Tech* exhibit from each age group.

Count
Adults _____
Teens (14-17 years old) _____
Preteens (10-13 years old) _____
Children (8-9 years old) _____
Young Children (5-7 years old) _____

Source of attendance information

	Actual	Estimate
Adults		
Teens (14-17 years old)		
Preteens (10-13 years old)		
Children (8-9 years old)		
Young Children (5-7 years old)		

6) Please record here the number of attendees to the exhibit from each racial/ethnic group.

Count
American Indian or Alaska Native _____
Asian _____
Black, African or African American _____
Hispanic/Latino/Latina _____
Native Hawaiians or Other Pacific Islander _____
White _____
Other or unknown _____

Source of attendance information

	Actual	Estimate
American Indian or Alaska Native		
Asian		
Black, African or African American		
Hispanic/Latino/Latina		
Native Hawaiians or Other Pacific Islander		
White		
Other or unknown		

7) Please record the total number of visitors to your library/branch during the exhibit period. Please include both those who attended the exhibit plus those who did not attend the exhibit.

_____

8) Please record the source of your information about the number of visitors to the exhibit, including the source of information about their ages and race/ethnicity.

_____

9) If you are having difficulty estimating the number of visitors to the exhibit, would a figure of 10% of the total number of visitors to your site be reasonable?
⦿ Yes
⦿ No
⦿ Not sure

10) If 10% of the total number of visitors to your site is not a reasonable estimate of the number of visitors to the exhibit, what percentage would you suggest (if you are not sure of the exact number of visitors to the exhibit)?

_____

11) Use the space below to add any comments you have about counting the number of visitors to your *Discover Earth*/*Discover Tech* exhibit.

_____
_____
_____

12) Did you help visitors interact with the exhibit? Please check all that apply.
- ❑ Answered visitors' questions about exhibit
- ❑ Asked visitors if they had interacted with exhibit
- ❑ Encouraged visitors to interact with specific parts of exhibit
- ❑ Directed patrons to related library materials
- ❑ Other; please describe: _____

Public Programs

13) Please summarize the target audience and scope of your library's exhibit-related programming in a few sentences.

_____
_____
_____

14) Are there major differences between your library's required public programs and those originally proposed in your grant application? If so, please explain.

_____
_____
_____

Individual Program Descriptions: The following questions ask you to describe each of the programs (including talks or presentations) your library implemented related to the *Discover Earth* or *Discover Tech* exhibit. There is space for you to describe up to 15 programs in detail. Note that there are multiple questions about each program.

Programs (Questions 15 – 18 are repeated for 15 possible programs)

15) Please briefly describe this program here. Include the title, the presenter's name(s) and the name of the presenter's organization.

_____
_____
_____

16) What was the source of the content for this program? Please check all that apply.

- ❑ STAR_NET Community of Practice
- ❑ Lunar and Planetary Institute
- ❑ National Girls Collaborative Project (NGCP)
- ❑ Other professionally created materials/programs

- ❑ Our own creation
- ❑ Other; please describe: _____

17) For this program please record here the attendance number for each age group.

Number in attendance for program
Adults _____
Teens (14-17 years old) _____
Preteens (10-13 years old) _____
Children (8-9 years old) _____
Young Children (5-7 years old) _____

18) For this program please record here the attendance number for each racial/ethnic group.

Number in attendance for program
American Indian or Alaska Native _____
Asian _____
Black, African or African American _____
Hispanics/Latinos/Latinas _____
Native Hawaiian or Other Pacific Islander _____
White _____
Other or unknown _____

Elementary, Middle School and High School Involvement

19) Please record the total number of classes that visited the exhibit.

Number of classes
Elementary School _____
Middle School _____
High School _____

20) Please list the names of schools that visited the exhibit. Please also indicate if any home school students visited the exhibit.

_____
_____
_____

21) Please list the total number of informal or out-of-school groups visiting the exhibition.

_____
_____
_____

22) List the names of the informal or out-of-school groups.

_____
_____
_____

Funding

23) Host libraries received a $1,000 grant for expenses related to local exhibition programming (indirect costs may not be charged to the grant by host sites). Please note that grant funds may not be used to pay for social events, receptions, entertainment, or alcoholic beverages. Please provide a brief report of how your library used the $1,000 grant award.

Type of expenditure   Amount
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

24) Please list sources and actual/in-kind amounts of support for any exhibition-related programs, invitations, printing, events, etc. Include an estimate of staff time cost share.

Source   Amount
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Publicity

25) Please describe the results of your publicity strategies for the exhibit. Include any media organization names and/or contacts.

_____
_____
_____

Please send one copy of all host site-produced publicity pieces, including posters and flyers, all newspaper articles and other materials such as bibliographies, bookmarks, invitations, etc.; copies of your _Discover Earth/Discover Tech_ webpages; and captioned photographs taken at exhibition programs if you have them to:

National Center for Interactive Learning
SPACE SCIENCE INSTITUTE
STAR_Net
4750 Walnut Street | Suite 205
Boulder, Colorado 80301

When sending exhibit photographs, please let us know if we can use these images in project publicity. It is your responsibility to obtain permission for use of photographs. If any image cannot be reproduced, please indicate.

Community of Practice

26) Which of the following resources did you utilize on the Community of Practice site?
- ❑ Announcements
- ❑ Lunar and Planetary Institute exhibit materials
- ❑ ALA exhibit materials
- ❑ Earth and Space science activities (not from LPI)
- ❑ Discussion Board (please describe) _____
- ❑ Other (please describe) _____

Contact Information

27) Please add your name and contact information.

Name: _____
Phone: _____
E-mail address: _____

Circulation Records

Evaluation & Research Associates, who is evaluating *Discover Earth*, and the *Discover Tech* exhibits, will contact you to request that you send them specific circulation records from the period before, during and after the exhibit was at your library. If you have any questions about providing this information, please contact Julie Elworth of Evaluation & Research Associates at (425) 977-4760, ext 104 or jelworth@eraeval.org.

Please note: The ALA Public Programs Office and The Space Science Institute retain the right to use submitted final report materials (i.e., program descriptions, comments, photographs, publicity materials, etc.) for program promotion and other purposes. Personal identification information will not be used without prior consent.

Appendix K: Request for Circulation Records

STAR_Net Project Data Collection Request – Circulation Numbers

Evaluation & Research Associates (ERA), external evaluators of the STAR_Net project, is seeking your help in measuring the impact of the *Discover Earth* and *Discover Tech* exhibits on library patrons. We are requesting circulation records for those holdings related to the *Discover Earth* and *Discover Tech* exhibits.

Based on information collected when the project began, we found that many libraries can supply circulation records before, during and after the exhibit. If your library can provide circulation records for specific call numbers during specific time periods, please read on. *If you cannot do this type of reporting, please tell us by replying to the email that accompanied this attachment. Thank you!*

We are interested in the circulation of library materials in the call number ranges between 520 and 559 (for *Discover Earth*) or between 001-006, 600-629, 660-699, and 720-729 (for *Discover Tech*). We've selected these call numbers because we believe they reflect the subject matter of the STAR_Net exhibit. *If you think there are other call numbers that are relevant to the exhibit, please contact Lara Blake of Evaluation & Research Associates at* lblake@edlabgroup.org *before collecting the circulation numbers for those materials.*

We are asking you to provide circulation numbers now for the following two time periods:

1. During the eight weeks the exhibit was at your library
2. During the same eight weeks in the year before the exhibit came to your library.

One year from now, we will request circulation numbers for the same eight-week period one year after the exhibit was at your library.

Instructions:
1. Please provide us with the circulation records of materials at your library with call numbers between **520 and 559** (for *Discover Earth*) OR between **001-006, 600-629, 660-699, and 720-729** (for *Discover Tech*) for **the eight weeks the exhibit was at your library [fill in time range]**.
   a. Please separate "Juvenile" from "Adult" designations if possible. (Not all libraries have these designations; leave "Juvenile" blank if you are unable to run numbers for that designation.)
   b. Total circulation numbers should include new and renewing materials checked out during the specified time period.
   c. Enter the circulation numbers in #1 on the Circulation Report Form on page 3 of this document. Please enter whole numbers, no ranges or other qualifiers.
2. Run a second report the circulation records of materials at your library with call numbers between **520 and 559** (for *Discover Earth*) OR between **001-006, 600-629, 660-699, and 720-729** (for *Discover Tech*) for the same time period **one year prior [fill in time range]**.
   a. Please separate "Juvenile" from "Adult" designations if possible.

b.   Total circulation numbers should include new and renewing materials checked out during the specified time period.

c.   Enter the circulation numbers in #2 on the Circulation Report Form. Please enter whole numbers, no ranges or other qualifiers.

3.   Because circulation numbers themselves may not tell the entire story, the Circulation Report Form includes a few other questions related to circulation of STEM materials in your library (questions #3-5).

4.   Return the completed Circulation Report Form to Lara Blake at lblake@eraeval.org by [enter due date].

The evaluation team will report the results for all *Discover Earth* libraries, combined, and for all *Discover Tech* libraries, combined. We will not report the circulation records for any individual library.

We recognize the extra time and effort you have made to help with this aspect of the evaluation and want you to know how much it is appreciated. If you have any questions, please do not hesitate to contact us! Email Lara at lblake@eraeval.org or call 425-977-4741 ext. 4768. She will be happy to answer any questions.

Thank you so much for your help with this aspect of the data collection for the STAR_Net project evaluation.

The ERA Evaluation Team
Lara, Ginger, Julie, and Vicky

Lara Blake: lblake@eraeval.org
Ginger Fitzhugh: gfitzhugh@eraeval.org
Julie Elworth: jelworth@eraeval.org
Vicky Ragan Coulon: vragan@eraeval.org

Phone: 425-977-4741 ext. 4768
Fax: 425-977-4761

Circulation Report Form for *Discover Earth* Libraries

1. **Please provide the circulation records of materials at your library with call numbers between 520 and 559 from (INSERT DATE RANGE)**

   _____Total number of "Adult" checkouts of STEM materials in the 520 – 559 Dewey Call Number range. Checkouts may include renewal of materials. Please report as a whole number. *If you do not have separate designations for adult and juvenile, use this line for both.*
   _____Total number of "Juvenile" checkouts of STEM materials in the 520 – 559 Dewey Call Number range. Checkouts may include renewal of materials. Please report as a whole number.

2. **Please provide the total number of checkouts of materials at your library with call numbers between 520 and 559 for the same date range, just one year prior (INSERT DATE RANGE)**

   _____Total number of "Adult" checkouts of STEM materials in the 520 – 559 Dewey Call Number range. Checkouts may include renewal of materials. Please report as a whole number. *If you do not have separate designations for adult and juvenile, use this line for both.*
   _____Total number of "Juvenile" checkouts of STEM materials in the 520 – 559 Dewey Call Number range. Checkouts may include renewal of materials. Please report as a whole number

3. **Please explain any caveats or provide other notes about the numbers you provided.**

4. **Did your library promote other library materials related to the exhibit or programming you implemented not included in the list of call numbers above?**
   ___Yes
   ___No
   Please explain if you answered yes.

5. **Have you noticed any other changes in circulation that might be attributed to the exhibit? Examples might be a change in overall circulation due to increased numbers of patrons coming into the library while the exhibit was at your library, an increase in circulation of fiction books related to STEM, etc.**

Thank you very much! We will contact you for one last report of circulation numbers next year!

Circulation Report Form for *Discover Tech* Libraries

1. **If your library has shown the *Discover Tech* exhibit, please provide us with the circulation records of materials at your library with call numbers between 001-006, 600-629, 660-699, and 720-729 from (INSERT DATE RANGE).**
   Total number of "Adult" checkouts of STEM materials in the following Dewey Call Number ranges. Checkouts may include renewal of materials. Please report as whole numbers. *If you do not have separate designations for adult and juvenile, use this for both.*
   001-006:_____
   600-629:_____
   660-699:_____
   720-729:_____

   Total number of "Juvenile" checkouts of STEM materials in the following Dewey Call Number ranges. Checkouts may include renewal of materials. Please report as whole numbers.
   001-006:_____
   600-629:_____
   660-699:_____
   720-729:_____

2. **In addition, please provide the total number of checkouts of materials at your library with call numbers between 001-006, 600-629, 660-699, and 720-729 for the same date range, just one year prior (INSERT DATE RANGE)**
   Total number of "Adult" checkouts of STEM materials in the following Dewey Call Number ranges. Checkouts may include renewal of materials. Please report as whole numbers. *If you do not have separate designations for adult and juvenile, use this for both.*
   001-006:_____
   600-629:_____
   660-699:_____
   720-729:_____

   Total number of "Juvenile" checkouts of STEM materials in the following Dewey Call Number ranges. Checkouts may include renewal of materials. Please report as whole numbers.
   001-006:_____
   600-629:_____
   660-699:_____
   720-729:_____

3. **Please explain any caveats or provide other notes about the numbers you provided.**

EVALUATION
& Research Associates

discover
TECH

discover
EARTH

4. **Are there other library materials related to the exhibit or programming you implemented that were promoted, but not included in the list of call numbers above?**
    ___Yes
    ___No

    Please explain if you answered yes.

5. **Have you noticed any other changes in circulation that might be attributed to the exhibit? Examples might be a change in overall circulation due to increased numbers of patrons coming into the library during the exhibit, or an increase in fiction books related to STEM, etc.**

Thank you very much! We will contact you for one last report of circulation numbers next year!

Appendix L: STAR_Net Project Team Interview Protocol

Interview Protocol for Project Leadership

(Conduct group interviews by organization: NCIL/SSI, LPI, ALA, NGCP)

Organization interviewed: _____

Names of interviewees: _____

Interviewer: _____

Date and time of interview: _____

Introduction:
Thank you for agreeing to participate in this interview. Evaluation & Research Associates (ERA) is conducting interviews with key informants from the STAR_Net project. This interview is part of a larger data collection effort that will allow us to better understand the STAR_Net project. It should take about an hour. The topics we'll be covering relate to the elements of the STAR_Net logic model we developed in 2012, including the project's progress toward meeting outcomes and successes and challenges. At the end of the interview there will be time for you to add any comments or thoughts we haven't covered. Your responses will be summarized and shared in the summative report.

To facilitate our note-taking, we would like to audio record our conversation today. Would that be OK with each person in the group? [Pause and wait for responses from each individual.] If at any point during the interview you feel unwilling to answer a question, let us know and we will skip to the next question.

Do you have any questions about the group interview process before we begin?

Let's get started!

1. What has your organization's role been in the STAR_Net project? What has been your role personally in the project (*follow up with each person*)?

2. Let's switch gears and talk about the participating libraries.
   a. How were the librarians and their work affected by their participation in the STAR_Net project? *(probe for both positive and any negative consequences)*
   b. Were librarians adequately prepared to have the exhibits and deliver informal STEM programming in their libraries?
      i. What was an area of strength in how the librarians were prepared to have the exhibits and deliver programming?
      ii. What was an area that could have been improved in how well librarians were prepared to have the exhibits and deliver programming?
   c. What is the impact of the *Discover Earth* and *Discover Tech* exhibits on the local communities or library visitors? Do you have any stories or evidence related to a local community or program benefiting from the STAR_Net exhibits? Why was it a success?
   d. Now that you have an opportunity to look back, do you think that the "right" libraries were selected to participate? In retrospect, what characteristics were important for a library to have to benefit from participating in STAR_Net?
   e. Did you notice any differences between *Discover Earth* and *Discover Tech* libraries in the implementation or impact of the project? If so, what differences did you observe?

3. Now we're interested in turning to the STAR_Net Community of Practice.
   a. How did the project foster participation in the CoP?
   b. To what extent did *Discover Earth* and *Discover Tech* librarians participate in the CoP?
   c. Looking back on the project (hindsight being a wonderful thing), what do you think the project could have done differently to make the CoP more successful?
   d. What do you think the *Discover Earth* and *Discover Tech* librarians gained from participating in the CoP?
   e. To what extent do you think host librarians developed new partnerships that will help them continue to deliver STEM programming in their libraries?

4. What do you feel was the most successful part of the project? Why did you choose this answer?

5. What impact has STAR_Net had on your organization? You personally?

6. What has been the most challenging part of the project? Why has it been challenging? How has this challenge been addressed?

7. What suggestions do you have to improve the STAR_Net project?

8. What if any, were unanticipated outcomes or consequences of STAR_Net (positive or negative) on libraries, librarians, visitors and/or others?

9. Do you have anything else to share about the project or the impact it has on local communities, libraries, librarians, visitors, or participating programs?

10. What else should we know about the implementation or impact of STAR_Net as we prepare the summative report? Please share anything else you think would be helpful for us to know.

Appendix M: Information about the *Discover Earth* and *Discover Tech* Libraries and Their Communities

Table A. Example Programs *Discover Earth* Libraries Delivered While They Hosted the Exhibit (from ALA Final Report Form)

Library	Overall Scope of Programming	Example Program
T.L.L. Temple Memorial Library and Archives	Our programming was intended to be accessible for anyone that was interested. With the exception of one of the programs, we did not limit who was allowed to participate in any of the programs. We specifically targeted the underserved homeschool population.	**Chasing4Life** The weather unit of our programming continued with a presentation by "Professor Ready" (Michael Kahlenberg) from the national weather preparedness group Chasing4Life. Michael provided information about how to prepare for bad weather (prepare a kit, have an emergency plan) and what to do in case of weather emergencies. This program was presented at the library and at 3 of the schools in our district. We were also proud to be able to include presentations at two schools in Lufkin, the larger town to our north. This presentation was given a total of eight times.
Winnebago Public Library	Our target audience was the entire Winnebago Reservation, i.e., all ages.	**Lewis and Clark: The Native Perspective** PPT, Dr. Craig Howe
Garfield County Libraries	The Rifle Branch Library held science-related programming for all ages. There was a particular emphasis on animals in the environment for children, and an emphasis on climate change in programming for adults.	**Agriculture: Conserving Water in a Big Way** Presented by Jeff Crane, a member of the Middle Colorado River Water Partnership (MCRWP). He spoke on water conservation by local agriculture producers locally. This presentation covered the many benefits derived from proper management of our water resources.
Laramie County Library System (LCLS)	LCLS's programming targeted families and children 8-13 years old, but we held programs suitable for all age groups.	**Family Fun Night** Mad Scientist for a Day. Presented by Marybeth Finn, LCLS staff and Preston Stafford, science educator. Did you ever want to be a mad scientist? Here's your chance! Participants joined us for some amazing hands-on experiments where they made their own ice cream, had fun with magnets and created slime! Preston Stafford, science educator joined up to perform crazy experiments!
East Meadow Public Library	We designed programs for many different age groups. We had programs for adults, children, teens, and even preschoolers.	**Make a Terrarium** Led by the Friends of the Hempstead Plains (these programs were arranged for Girl Scout troops). Betsy Gulotta of the Hempstead Plains is responsible for spear-heading the effort to restore 19 acres of the lost plains. The Hempstead Plains was a swath of land running from the Queens Nassau border across the center of Nassau County to the Suffolk border. The Plains has a unique ecosystem and is host to a number of endangered and rare plant species, and was the integral to the Native Americans who were the original settlers of Long Island. Ms. Gulotta led girls in creating terrariums with repurposed containers they brought from home. She explained that they were creating small ecosystems and what ecosystems are, how they perpetuate themselves and that fragility of some ecosystems. She also described the Hempstead Plains and how it was destroyed and its value to our lives. She stressed that the human race is responsible for creating and maintaining a healthy planet. The programs were introduced and concluded with visits to the *Discover Earth* Exhibit.
Central Rapphannock Regional Library	While we offered classes & events for all ages at England Run, system-wide we primarily focused on elementary aged children.	**Girls Inventing the Future with Engineering** presented by the Hypatia Living Learning Community at Virginia Tech
Ephrata Public Library	We planned programs for all ages.	**The Water Cycle Game** Presenter: Shuts Environmental Center. Discussion and demonstration of the water cycle for children grades 4-6.
West Florida Public Library	Target audience was primarily adults and school aged children.	*Discover Earth* **Through The Eyes of a Newborn** Presented by Laura Jensen, RN, Baptist Healthcare. 2 NGCP programs provided, one at Main Library and one at Southwest Branch.

Table B. Example Programs *Discover Tech* Libraries Delivered While They Hosted the Exhibit (from ALA Final Report Form)

Library	Overall Scope of Programming	Example Program
Spokane Public Library	Our programs targeted school aged children as one group, and teens and adults as another. We also did two of the school aged programs at our 5 other branches.	**If You Build it They Will Come - Power it up! (Getting Power to Your Park)** We used the wind power module from Playful Building. Michelle Grove from TINCAN presented w/ Sumi Shadduck from Spokane Public assisting.
Mary Wood Weldon Memorial Library	The target audience was the community at large with an emphasis on elementary through high school.	**Wind Turbine Experiment** Developed by Joy Stryzek for grades K-2nd was an amazing program, Friends of the Library provided the manpower as students tested different configurations of blades, used meters to measure the amount of electricity generated, graphing the results. This was part of our field trip package for those grades, 573 children participated. It was shared 15 days, 26 times.
Wayne County Public Library	The target audience for our programming was children in elementary and middle school and their parents.	**I Didn't Know Engineers Do That! Engineering in Action** This program, called "Engineering in Action," was part of a series called "I Didn't Know Engineers Do That!" Members of the engineering club at the local community college presented projects they were working on, and their faculty adviser gave a talk on choosing a career in engineering.
Huntsville-Madison County Public Library	We created programs for youth age 5-13, adults, and family-friendly events.	**Tennessee Valley LEGO® Club Summer Extravaganza** Presenters: Jennifer Garlen, Christopher Bolton, and colleagues Presenting Organization: Tennessee Valley LEGO Club This outstanding amateur exhibition was the highlight of our program lineup. Our local LEGO Club featured robotics and villages, including working trains and a monorail, a miniature diorama from the U.S. Space & Rocket Center, a working ferris wheel, and even a LEGO robot that solves Rubik's Cube in just a couple of minutes. The Club led Bingo games and had door prizes, and well over 100 items were given to participants. The energy was very high all weekend, and the LEGO Club has pledged to make this an annual event at the Library.
Carnegie Public Library of Clarksdale and Coahoma County Mississippi	We included all ages even when we targeted a certain group.	**All Ages Family Program: Playful Building** The program was centered around engineers and the engineering process Think, Build, Test, Do It Again. We built skyscrapers and catapults. After the program everyone spent time at the exhibit. Very successful program!

Table C. Characteristics of *Discover Earth* Libraries (from STAR_Net Applications)

Library	Closest Metro Area	Areas Served	Community Type	Population Served	Number of Library Branches	Number of Library Cards in Use	Average Daily Weekday Visitors	Average Daily Weekend Visitors
TLL Temple Memorial Library, Diboll, TX	Houston, TX	Mainly Angelina county (Diboll, Lufkin, Hudson, Huntington), though we do have patrons from our surrounding counties that regularly use the library. We serve a very diverse population as well, ranging from those just passing through town to those that have live d here all their lives, including people of all races, ages, and with varying interests.	Rural	< 25,000	1	4,000	90	50
Winnebago Public Library, Winnebago, NE	Sioux City, IA	Thurston County, NE	Rural	< 25,000	-	1,200	100	N/A
Garfield County Libraries, Rifle, CO	Grand Junction, CO	We serve all of Garfield County, which includes the towns of Silt, New Castle, Parachute, and Rifle, Glenwood Springs, and Carbondale.	Rural	25,000 - 75,000	6	34,000	1,700	575
St. Charles Parish Library, Luling, LA	New Orleans, LA	The county of St. Charles Parish, Louisiana. Our library also includes a planetarium. The St. Charles Parish Library Planetarium serves the greater community of southeast Louisiana, including the Greater New Orleans area. It offers free, weekly, public shows and hosts school groups from around the area, including inner-city New Orleans.	Suburb/ Rural	25,000 - 75,000	6	40,096	750	410
Ephrata Public Library, Ephrata, PA	Lancaster, PA	Ephrata Borough, Ephrata Township, Clay Township, Akron Borough (55% of circulation); Outside service area: Lancaster County, Berks County, Lebanon County (45% of circulation Note: Ephrata Public Library is an independent library in a Federated System with 14 member libraries.	Suburb/ Rural	25,000 - 75,000	14	26,828	1,303	1,303
East Meadow Public Library, East Meadow, NY	New York City, NY	Nassau County East Meadow (primary), Levittown, Westbury, Uniondale, North Bellmore All Residents from Nassau County have complete access to East Meadow Public Library. We are a Central Library for Nassau County.	Suburb	25,000 - 75,000	-	31,885	1,000	2,700
Central Rappahannock Regional Library, Fredericksburg, VA	Washington DC	City of Fredericksburg, Spotsylvania County, Stafford County, Westmoreland County	Suburb/ Rural	150,000 - 500,000	8	183,824	39,076	42,255
West Florida Public Library, Pensacola, FL	Pensacola, FL	Escambia County	City/ Suburb	150,000 - 500,000	6	48,563	1,916	1,038
Laramie County Library System, Cheyenne, WY	Denver, CO	The Laramie County Library System serves Laramie County, Wyoming with locations in Cheyenne, Burns and Pine Bluffs. The library system's bookmobile serves the communities of Albin and Carpenter along with rural schools and the surrounding populations.	City	75,000 - 150,000	3	85,652	1,700	1,200
Inglewood Public Library, Inglewood, CA	Los Angeles, CA	The Inglewood Public Library directly serves the citizens of Inglewood, a medium-sized city in Los Angeles County. We are also heavily used by students of the Inglewood Unified School District and the nearby El Camino, Southwest and West Los Angeles Community Colleges.	City	75,000 - 150,000	2	85,000	300	200

Table D. Characteristics of *Discover Tech* Libraries (from STAR_Net Applications)

Library	Closest Metro Area	Areas Served	Community Type	Population Served	Number of Library Branches	Number of Library Cards in Use	Average Daily Weekday Visitors	Average Daily Weekend Visitors
International Falls Public Library, International Falls, MN	Duluth, MN	Koochiching County, International Falls, Ranier, Littlefork, Ft. Frances, Ontario	Rural	< 25,000	1	6,964	150	90
Mary Wood Weldon Memorial Library, Glasgow, KY	Louisville, KY or Nashville, TN	Glasgow is the county seat of Barren County, which has a population of 42,000. Park City, Cave City, Austin, Tracy, Hiseville, Temple Hill, Eighty-eight, Railton are some of the communities. It is one of the largest agriculture counties in the state, with row crops, tobacco, dairy and cattle.	Rural	25,000 - 75,000	-	11,940	375	200
Carnegie Public Library of Clarksdale and Coahoma County, Clarksdale, MS	Memphis, TN	Coahoma County Clarksdale Jonestown Coahoma Lula Friars Point Majority African-American 90%+ free lunch	Rural	25,000 - 75,000	1	11,734	200	200
Baxter County Public Library, Mountain Home, AR	Springfield, MO	In Arkansas: Baxter, Marion, Izard, Stone, and Fulton counties with Baxter being the primary service area. In Missouri: Ozark and Howell counties	Rural	25,000 - 75,000	2	39,530	538	600
Carson City Public Library, Carson City, NV	Reno, NV	Carson City County, Carson City Library issues cards to patrons state wide. There are some out of state library cards issued as well. 24% under 18 years of age, 8% 18 to 24 years of age, 29% 25 to 44 years of age, 15% over 65 years of age. The racial makeup of the city is 81.1% White, 1.9% Black or African American, 2.4% Native American, 2.1% Asian, 0.2% Pacific Islander, 9.4% from other races, and 2.9% from two or more races. 21% of the population are Hispanic or Latino of any race.	City	25,000 - 75,000	2	38,188	1,000	1,000
Wayne County Public Library, Goldsboro, NC	Raleigh, NC	Wayne County Public Library serves the citizens of Wayne County (the city of Goldsboro, where the main branch is located, is the County seat), and sometimes those of neighboring counties such as Lenoir and Green. County-wide, our user population is very diverse and includes, among others, military personnel (active and retired) and their families; farm workers from Haiti, Mexico, and Latin America; college students (both traditional and distance); elementary, junior high, and high school students; physically and/or mentally challenged individuals from group homes; and older people attempting to learn computer skills and return to the work force.	Rural	75,000 - 150,000	4	77,698	10,570	1,741
Huntsville-Madison County Public Library, Huntsville, AL	Huntsville, AL	Madison County, AL. City, suburb, and rural populations. Wide diversity in ethnicity, income, education level, national origin, and occupation.	Other	150,000 - 500,000	12	161,578	4,748	30,863
Spokane Public Library, Spokane, WA	Spokane, WA	Spokane, Spokane County (via cross-use agreement)	City	150,000 - 500,000	6	111,476	3,200	3,500

Table E. Demographics of STAR_Net Communities[11]

	Census Area (Based on Area Served Listed on Application)	2010 Census Total Population	Under 18	White	Black	America n Indian	Asian	Native Hawaiia n or Pac Islander	Other	Hispanic /Latino (of any race)	Speak English less than "very well"	Below poverty line	HS grad or higher	Bachelor' s degree or higher
Discover Earth Libraries														
TLL Temple Memorial Library, Diboll, TX	Angelina County	86,771	26.7%	73.6%	15.6%	0.9%	1.1%	0.1%	10.6%	19.8%	7.5%	18.4%	77.8%	15.6%
Winnebago Public Library, Winnebago, NE	Thurston County	6,940	35.5%	41.9%	0.6%	58.6%	0.2%	0.0%	0.7%	2.7%	1.4%	21.2%	85.5%	13.3%
Garfield County Libraries, Rifle, CO	Garfield County	56,389	27.0%	84.6%	1.0%	2.0%	1.0%	0.2%	13.8%	28.3%	12.0%	7.3%	85.3%	24.8%
Laramie County Library System, Cheyenne, WY	Laramie County	91,738	24.4%	91.3%	3.4%	1.9%	1.8%	0.3%	4.6%	13.1%	1.8%	6.8%	92.2%	24.4%
East Meadow Public Library, East Meadow, NY	Nassau County	1,339,532	23.3%	74.7%	11.9%	0.6%	8.5%	0.1%	6.7%	14.6%	10.6%	3.6%	89.9%	41.2%
Central Rappahannock Regional Library, Fredericksburg, VA	Spotsylvania County	122,397	27.8%	78.4%	17.0%	1.1%	3.2%	0.3%	3.7%	7.6%	3.4%	6.5%	88.2%	29.7%
Ephrata Public Library, Ephrata, PA	Lancaster County	13,394	23.3%	95.6%	1.8%	0.6%	1.6%	0.1%	2.2%	5.2%	6.9%	5.4%	83.8%	16.8%
West Florida Public Library, Pensacola, FL	Escambia County	297,619	21.6%	71.5%	24.2%	1.9%	3.8%	0.3%	1.6%	4.7%	3.0%	12.7%	87.1%	23.3%
St. Charles Parish Library, Luling, LA	St. Charles Parish	52,780	26.9%	70.7%	27.3%	0.8%	1.1%	0.1%	1.8%	5.0%	1.6%	11.8%	85.4%	19.5%
Inglewood Public Library, Inglewood, CA	City of Inglewood	109,673	26.7%	26.1%	45.8%	1.5%	1.9%	0.5%	28.7%	50.6%	23.8%	18.2%	71.4%	17.5%
Discover Tech Libraries														
Spokane Public Library, Spokane, WA	Spokane County	471,221	23.2%	92.7%	2.8%	3.0%	3.2%	0.7%	1.7%	4.5%	3.0%	9.3%	92.5%	28.6%
Mary Wood Weldon Memorial Library, Glasgow, KY	Barren County	42,173	24.2%	94.1%	4.7%	0.7%	0.6%	0.1%	1.6%	2.6%	1.2%	15.7%	77.8%	14.2%
Wayne County Public Library, Goldsboro, NC	Wayne County	122,623	24.9%	60.7%	32.6%	0.9%	1.8%	0.2%	6.4%	9.9%	5.2%	15.3%	81.1%	16.0%
Huntsville-Madison County Public Library, Huntsville, AL	Madison County	334,811	23.7%	70.3%	25.1%	1.7%	3.1%	0.2%	2.3%	4.6%	2.6%	9.2%	88.9%	37.4%
Carnegie Public Library of Clarksdale & Coahoma County, Clarksdale, MS	Coahoma County	26,151	29.3%	23.2%	75.9%	0.2%	0.6%	0.1%	0.6%	1.1%	0.5%	33.1%	75.0%	16.5%
Baxter County Public Library, Mountain Home, AR	Baxter County	41,513	18.1%	98.3%	0.3%	1.5%	0.6%	0.1%	0.6%	1.7%	0.7%	10.8%	85.3%	14.9%
International Falls Public Library, International Falls, MN	Koochiching County	13,311	20.9%	96.4%	0.9%	3.7%	0.5%	0.1%	0.4%	1.1%	0.4%	8.7%	89.4%	17.2%
Carson City Public Library, Carson City, NV	Carson City County	55,274	21.4%	83.7%	2.3%	3.4%	3.0%	0.4%	10.2%	21.3%	8.3%	9.9%	87.1%	21.0%

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[11] Data are from Census.gov (http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml) based on the service area libraries described on their applications to join the project.

Appendix N: Data Tables from the Librarian Pre- and Post-Surveys, ALA Report Forms, and Patron Surveys

Librarian Pre-Exhibit Survey and Six Month Post-Exhibit Survey (Selected Results)

Table A. Number of Completed Librarian Pre- and Post-Surveys

Response Counts for Surveys	Discover Earth		Discover Tech		Totals
	Directors[a]	Coordinators[b]	Directors	Coordinators	
Pre-Surveys Only	4	6	5	9	24
Post-Surveys Only	0	1	0	2	3
Pre- and Post-Surveys Only	5	6	1	4	16
Totals	9	13	6	15	43

[a] Data for one librarian were omitted for lack of a signed consent form
[b] Data for four librarians were omitted for lack of signed consent forms and one on medical leave

Table B. Pre- and Post-exhibit Level of Knowledge about Topics Related to *Discover Earth* (n = 11)
Respondents used the following scale: 1=Beginner to 5=Expert

Discover Earth Topics	Mean Pre Score	Mean Post Score	Mean Change[a]
The water cycle	2.5	2.8	+0.4
The difference between weather and climate	2.6	2.9	+0.3
Earth science	2.4	2.6	+0.3
How earth systems are interconnected	2.3	2.6	+0.3
How to be a steward of Planet Earth	2.6	2.8	+0.2
How scientists study the earth	2.3	2.5	+0.2

[a] Change scores were calculated for individual respondents and then averaged. Due to rounding, the Mean Change may not match the Mean Post Score minus the Mean Pre Score.

Table C. Pre- and Post-exhibit Level of Knowledge about Topics Related to *Discover Tech* (n = 5)
Respondents used the following scale: 1=Beginner to 5=Expert

Discover Tech Topics	Mean Pre Score	Mean Post Score	Mean Change[a]
Who engineers are	2.2	3.8	+1.6*
The impact of engineering on people	2.0	3.6	+1.6+
Grand Challenges for engineering	1.0	2.6	+1.6*
The impact of engineering worldwide over time	2.0	3.2	+1.2
The design process of engineering	1.6	2.8	+1.2
Energy and energy use	2.2	3.2	+1.0+

[a] Change scores were calculated for individual respondents and then averaged. Due to rounding, the Mean Change may not match the Mean Post Score minus the Mean Pre Score.
+$p < .10$; *$p < .05$

Table D. Confidence with Informal Earth Science Programming (n = 11)

Respondents indicated their level of agreement on the following scale:
    5 = Strongly Agree   4 = Agree   3 = Neutral   2 = Disagree   1 = Disagree Strongly

Items in italics were reverse coded in order that those items can be compared with the other items in the list

Discover Earth **Items**	**Mean Pre Score**	**Mean Post Score**	**Mean Change**[a]
Even if I try hard, I do not facilitate informal earth science programs as well as I will other subjects	3.4	3.6	+0.2
There are more important items on my agenda than implementing earth science programs at my library	2.8	3.0	+0.2
I understand earth science concepts well enough to be effective in facilitating earth science learning for my patrons	3.3	3.4	+0.1
I am capable of generating new ideas for earth science programs for my library	4.0	4.0	0
I wonder if I have the necessary skills to facilitate earth science learning for my patrons	3.4	3.4	0
I am confident I can implement my own ideas for earth science programs at our library	3.8	3.7	-0.1
I am unsure about how to network with others to have them present their earth science based programs at my library	4.1	3.8	-0.3
Implementing earth science programs at my library is one of my highest priorities	3.2	2.7	-0.5[+]

[a] Change scores were calculated for individual respondents and then averaged. Due to rounding, the Mean Change may not match the Mean Post Score minus the Mean Pre Score.
[+] p < .10

Table E. Confidence with Informal Engineering Programming (n = 5)

Respondents indicated their level of agreement on the following scale:
    5 = Strongly Agree   4 = Agree   3 = Neutral   2 = Disagree   1 = Disagree Strongly

Items in italics were reverse coded in order that those items can be compared with the other items in the list

Discover Tech **Items**	**Mean Pre Score**	**Mean Post Score**	**Mean Change**[a]
Even if I try hard, I do not facilitate informal engineering programs as well as I will other subjects	3.4	4.0	+0.6
I am confident I can implement my own ideas for engineering programs at our library	2.8	3.4	+0.6
I am capable of generating new ideas for engineering programs for my library	3.2	3.6	+0.4
I am unsure about how to network with others to have them present their engineering based programs at my library	3.0	3.4	+0.4
I wonder if I have the necessary skills to facilitate engineering learning for my patrons	3.2	3.4	+0.2
Implementing engineering programs at my library is one of my highest priorities	3.0	3.2	+0.2
There are more important items on my agenda than implementing engineering programs at my library	3.6	3.6	0
I understand engineering concepts well enough to be effective in facilitating engineering learning for my patrons	3.2	2.6	-0.6

[a] Change scores were calculated for individual respondents and then averaged. Due to rounding, the Mean Change may not match the Mean Post Score minus the Mean Pre Score.

ALA Report Form (Selected Results)

Table F. Attendance at Exhibit-Related Programming by Age

	Adults	Teens (14-17 years old)	Preteens (10-13 years old)	Children (8-9 years old)	Young children (5-7 years old)	TOTAL
Discover Earth libraries (n = 8)	4,358	1,219	425	2,302	913	9,217
Discover Tech libraries (n = 5)	1,565	646	1,401	1,377	893	5,882
All STAR_Net libraries (n = 13)	5,923	1,865	1,826	3,679	1,806	15,099

Table G. Attendance at Exhibit-Related Programming by Race/Ethnicity

	American Indian or Alaska Native	Asian	Black, African or African American	Hispanics /Latinos/ Latinas	Native Hawaiian or Other Pacific Islander	White	Other or unknown	TOTAL
Discover Earth libraries (n = 4)	0	63	63	165	3	1,739	46	2,079
Discover Tech libraries (n = 5)	13	234	1,508	309	0	3,881	35	5,980
All STAR_Net libraries (n = 9)	13	297	1,571	474	3	5,620	81	8,059

Patron Survey (Selected Results)

Table H. Number of Completed Patron Surveys

Exhibit and Library		Number	Percentage
Discover Earth	Laramie County Library System, Cheyenne, WY	140	20%
	East Meadow Public Library, East Meadow, NY	91	13%
	Central Rappahannock Regional Library, Fredericksburg, VA	43	6%
	Ephrata Public Library, Ephrata, PA	369	52%
	West Florida Public Library, Pensacola, FL	74	10%
	Total	**717**	**100%**
Discover Tech	Spokane Public Library, Spokane, WA	26	6%
	Mary Wood Weldon Memorial Library, Glasgow, KY	180	44%
	Wayne County Public Library, Goldsboro, NC	34	8%
	Huntsville-Madison County Public Library, Huntsville, AL	55	13%
	Carnegie Public Library of Clarksdale and Coahoma County, Clarksdale, MS	115	28%
	Total	**410**	**100**%

Table I. Patron Survey Respondents' Gender

	Discover Earth (n = 699)		*Discover Tech* (n = 380)	
	Number of Respondents	Percentage of Respondents	Number of Respondents	Percentage of Respondents
Female	478	68%	242	64%
Male	221	32%	138	36%

Table J. Number of Patron Survey Respondents Who Reported Attending Exhibit-Related Programming

	Discover Earth (n = 693)		*Discover Tech* (n = 384)	
	Number of Respondents	Percentage of Respondents	Number of Respondents	Percentage of Respondents
Yes	249	36%	111	29%
No	373	54%	204	53%
Don't Know	71	10%	69	18%

Table K. Patron Survey Respondents Race/Ethnicity (Respondents could check all that applied)

	Discover Earth (n = 717)		*Discover Tech* (n = 410)	
	Number of Respondents	**Percentage of Respondents**	**Number of Respondents**	**Percentage of Respondents**
White	546	76%	256	62%
Black, African or African American	41	6%	91	22%
Hispanic/Latino/Latina	43	6%	19	5%
American Indian or Alaska Native	52	7%	19	5%
Asian	26	4%	12	3%
Native Hawaiian or Other Pacific Islander	10	1%	6	2%
Other; selected responses: • Half Asian/White • Mixed • European • Indian • Race is a sociological construct	36	5%	17	4%

Table L. Patrons said the exhibits are very interesting.

Respondents indicated their level of agreement on the following scale:

    5 = Strongly Agree   4 = Agree   3 = Neutral   2 = Disagree   1 = Disagree Strongly

	Mean[a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
The *Discover Earth* exhibit is a valuable addition to my library.	**4.44**	64%	26%	5%	1%	4%	690
The *Discover Tech* exhibit is a valuable addition to my library.	**4.27**	57%	25%	9%	4%	4%	393

p <.05

	Mean[a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
I would recommend the *Discover Earth* exhibit to others.	**4.44**	65%	24%	5%	2%	4%	697
I would recommend the *Discover Tech* exhibit to others.	**4.26**	57%	24%	12%	2%	5%	388

p <.01

	Mean[a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
I think the *Discover Earth* exhibit is very interesting.	**4.50**	66%	27%	3%	<1%	4%	701
I think the *Discover Tech* exhibit is very interesting.	**4.37**	57%	34%	3%	2%	5%	401

p <.05

	Mean[a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
My library is a good place to learn about earth science.	**4.37**	57%	32%	6%	1%	4%	694
My library is a good place to learn about engineering.	**4.24**	52%	30%	12%	2%	4%	389

p <.05

[a] *P-values are shown below questions where mean values were significantly different for* Discover Earth *and* Discover Tech *respondents.*

Table M. Patrons said the exhibits helped them learn about earth science.

Respondents indicated their level of agreement on the following scale:

    5 = Strongly Agree   4 = Agree   3 = Neutral   2 = Disagree   1 = Disagree Strongly

	Mean [a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
I learned a lot from the *Discover Earth* exhibit.	**4.22**	49%	33%	13%	1%	4%	702
I learned a lot from the *Discover Tech* exhibit.	**4.18**	46%	37%	13%	2%	4%	400

	Mean [a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
The *Discover Earth* exhibit increased my interest in learning more about earth science.	**4.18**	48%	33%	13%	3%	4%	690
The *Discover Tech* exhibit increased my interest in learning more about engineering.	**3.92**	42%	26%	18%	8%	5%	391

p <.001

	Mean [a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
I plan to visit the *Discover Earth* exhibit again at my library.	**4.15**	48%	30%	15%	3%	4%	676
I plan to visit the *Discover Tech* exhibit again at my library.	**3.83**	36%	31%	19%	7%	6%	395

p <.001

	Mean [a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
I would like to attend another educational institution (like a museum) or event to learn more about earth science.	**4.17**	49%	33%	11%	3%	5%	692
I would like to attend another educational institution (like a museum) or event to learn more about engineering.	**3.99**	45%	27%	15%	8%	5%	394

p <.05

	Mean [a]	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
I plan to learn more about earth science using library resources (such as looking for books or videos).	**3.86**	36%	31%	22%	6%	6%	694
I plan to learn more about engineering using library resources (such as looking for books or videos).	**3.50**	27%	27%	23%	14%	9%	381

p <.001

[a] *P-values are shown below questions where mean values were significantly different for* Discover Earth *and* Discover Tech *respondents.*

Table N. About 84% of the patron survey respondents had children with them; caregivers said their children found the exhibits interesting and learned a lot.

Respondents indicated their level of agreement on the following scale:

   5 = Strongly Agree   4 = Agree   3 = Neutral   2 = Disagree   1 = Disagree Strongly

	Mean	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
The children/young people with me were very interested in the *Discover Earth* exhibit.	**4.34**	60%	26%	7%	2%	5%	593
The children/young people with me were very interested in the *Discover Tech* exhibit.	**4.27**	57%	25%	10%	5%	4%	354

	Mean	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Number of Responses
The children/young people with me learned a lot from the *Discover Earth* exhibit.	**4.24**	53%	30%	10%	2%	5%	588
The children/young people with me learned a lot from the *Discover Tech* exhibit.	**4.24**	55%	28%	9%	4%	4%	343