TWO EYES, 3D

SUMMATIVE EVALUATION REPORT

This report summarizes findings from an evaluation of the NSF-funded project: *Two Eyes, 3D*. Through collaborations with two museums, the project sought to develop and test learning outcomes for stereoscopic (3D) resources. More specifically, the external evaluation—conducted by Rockman Et Al—sought to determine the perceived value of using stereoscopic technology within museums and planetariums, uncover best practices for implementation of stereoscopic resources, and further explore best practices for research partnerships within museum settings.

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SUMMATIVE EVALUATION REPORT

INTRODUCTION

Rockman Et Al, an independent evaluation firm specializing in the evaluation of informal science learning projects, conducted an external evaluation of the *Two Eyes, 3D* project. The evaluation focused on the perceived value of using stereoscopic technology within museums and planetariums from the viewpoint of museum staff and visitors. Additionally, the evaluation sought to establish a preliminary collection of best-practices for developing and implementing stereoscopic resources in museum and planetarium settings based on input from project stakeholders as well as museum staff and technology creators who partnered with the *Two Eyes, 3D* team. Lastly, the evaluation team examined benefits and challenges associated with an external researcher partnering with two informal science education institutions to collect data.

METHODS

The modest evaluation effort included a series of interviews with project stakeholders and partners at the Museum of Science, Boston and the Adler Planetarium in Chicago as well as a review of key staff member's project notes and a limited number of observations of research participants. The evaluation team initially sought to gather input from, and conduct more extensive observations of, research participants but these evaluative efforts were ultimately abandoned so as to minimize obstacles for participant recruitment at both data-collection sites. In short, the evaluation took a back seat to the larger data-collection effort that was at the heart of the *Two Eyes, 3D* project, and ultimately focused more intensively on the nature of the evolving partnership between the project staff and key stakeholders at partnering institutions.

EVALUATION QUESTIONS

The evaluation was designed to answer the following questions:

- What is the perceived value of using stereoscopic technology within museums and planetariums?
- What are the key principals for creating effective stereoscopic programming?
- What methods and resources best help to facilitate partnerships between external researchers and visitor institutions?

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Cover Image: Audience members watching *Bwana Devil,* the first full-length color 3D film in 1952, Hollywood California.

Photo by J. R. Everman/Time Life Pictures/ Getty Images

Report prepared by Jennifer Borland for for Rockman Et Al: August 2014.

FINDINGS

Our primary evaluative findings take the form of major themes from stakeholder interviews, researcher logs, and a limited number of observations of research participants. While efforts were made to address each evaluation question, comments from project stakeholders were more heavily focused on the later question, i.e., what methods and resources best help to facilitate partnerships between external researchers and visitor institutions.

PERCEIVED VALUE OF STEREOSCOPIC TECHNOLOGY

The evaluation sought to learn more about the value of stereoscopic technology within museums and planetariums. To a large extent, the true value of stereoscopic technology is linked to forthcoming findings from the research that lies at the heart of the *Two Eyes, 3D* project (i.e., Study 1: a comparative study of differences between children's responses for a series of perception and application questions related to a series of 2D and 3D static scientific images conducted at the Museum of Science, Boston and Study 2: a pre-post assessment of adult viewers' knowledge/understanding after viewing either 2D or 3D versions of movies about either supernovae or galaxy evolution conducted at the Adler Planetarium in Chicago). As such, the evaluation focused on the *perceived* value of using stereoscopic technology, as well as potential drawbacks to doing so.

Contributing to science trumped visitors' perceived value of stereoscopic technology as a reason for participating in either study. Research associates at both data collection sites, i.e., the Museum of Science, Boston and the Adler Planetarium in Chicago, consistently referenced visitors' interest in participating in the studies being conducted at each site, however, this enthusiasm seemed to stem more from a desire to contribute to scientific research rather than an interest in stereoscopic technology. The ability to participate in a real study that seeks to contribute to science greatly increased participant's interest levels. In both sites, data collectors and museum staff noted high levels of participant enthusiasm for being able to participate in scientific studies. In other words, the *Two Eyes, 3D* studies reaffirmed people's interest in contributing to science and seemed to confirm the perceived value of such opportunities more so than demonstrating an interest in stereoscopic technology. None-the-less, a research associate in Chicago cited recruitment challenges after he was asked not to highlight the 3D nature of the materials being used for the study as he sought to recruit participants.

Subject-matter seems to be more important than delivery format. In Boston there seemed to be greater perceived value for the overall research experience when the study was moved to a space near an exhibition on the five senses, i.e., a study about stereoscopic images made more sense, and was more appealing to visitors when it was located near an exhibition that talked about our sense of sight. One might similarly conclude that there would be a heightened sense of perceived value of stereoscopic technology in so far as it is closely related to the exhibit in which it is utilized.

Potential limitations of stereoscopic technology

Among the potential benefits of stereoscopic technology touted by *the Two Eyes, 3D* research team, e.g., the ability to minimize learners' cognitive load for complex images and even the playing field for learners with higher and lower levels of spatial reasoning abilities, there are also many potential

challenges or limitations. Not surprisingly, some of these challenges were identified by stakeholders during the data collection process for both studies included as part of the *Two Eyes, 3D* project.

3D glasses posed challenges for both youth and adult participants. Previous research has identified many of the challenges associated with use of stereoscopic technology, not the least of which is the need for 3D glasses to be worn in order to see the 3D images properly—a serious issue both for commercial and research applications of stereoscopic technology (Vetro 2008). Not surprisingly, the need for research participants to wear 3D glasses as part of the *Two Eyes, 3D* study proved somewhat challenging in both data collection sites. In Boston, it was sometimes difficult for young participants to keep the glasses in place and, at first, there were not enough glasses to facilitate demonstration experiences for larger groups. In Chicago there were reports of the glasses getting dirty and several reports of eyestrain or headaches. Therefore, in both sites, the need for glasses was a potential barrier for more successful implementation of stereoscopic technology.

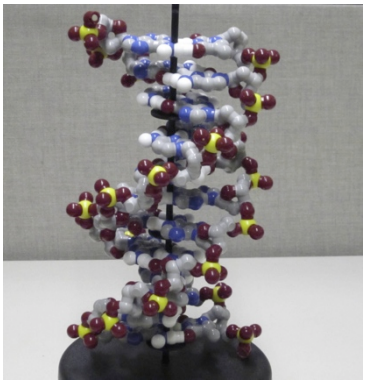
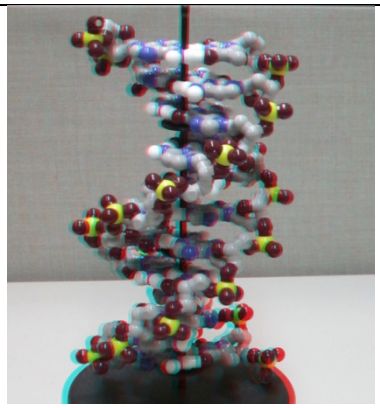
Stereoscopic technology poses challenges for some viewers. The current success of the 3D movie industry and growing sales in 3D technology for home use suggest that there are a large number of people who appreciate the heightened entertainment value of stereoscopic viewing experiences, however, this group is not representative of the entire population. Over the course of conducting both of the *Two Eyes, 3D* studies, researchers encountered a significant number of participants who were either not able to properly view 3D images (due to vision or vision processing issues), as well as people who were physically uncomfortable when viewing 3D media. At one point during the data collection process in Chicago, the research associate noted, albeit anecdotally, that half of the participants in that study indicated that the 3D video clips hurt their eyes or gave them headaches. Clearly, this is not a fault of the *Two Eyes, 3D* project, however, it is an important finding to consider in terms of the potential value for more widespread use of stereoscopic technology in museums or planetariums.

BEST PRACTICES FOR CREATING RESOURCES

Our evaluation also considered best practices for creating stereoscopic resources and sought to identify the key principles in creating effective stereoscopic programming. While somewhat more limited, the findings presented in this section are of great potential value to visitor-oriented institutions seeking to incorporate stereoscopic technologies to a greater extent.

Use of stereoscopic images may be best-suited to instances where spatial properties of the image are a significant factor in viewers' potential understanding. The use of 3D seems to matter most when there is something to be learned about spatial relationships of the elements within an image. For example, a 3D image of a triceratops viewed from the side does not seem to benefit spatial awareness among participants in the same way that a 3D image of a model of a DNA strand can enhance spatial awareness and understanding. In contrast to a 2D image of the DNA where there are minimal depth queues to distinguish the front from the back, the stereoscopic presentation of the image conveys important information about how elements are positioned in relationship to one another. Because of some of the inherent challenges in using stereoscopic images (e.g., the need for 3D glasses and the inability for some visitors to comfortably and effectively view stereoscopic images), the use of stereoscopic images therefore seems best-suited to instances where the spatial properties of an image or video clip significantly enhance viewers' ability to gain meaning from their viewing experience.

SIDE-BY-SIDE COMPARISON OF SAMPLE IMAGES

Image Description	2D Image	3D Image*
Cliff the Triceratops as part of the "Colossal Fossil: Triceratops Cliff" exhibit at the Museum of Science, Boston		
A model of a strand of DNA (the 3D image contains valuable cues about depth and distance)		

*3D glasses are necessary to properly see all features of the stereoscopic images on the right.

All images in the table above were created by Justin Harris at the Museum of Science, Boston to help enhance visitors' understanding of stereoscopic images. The 3D images were created using StereoPhoto Maker freeware.

Design with end-users in mind and situate the technology accordingly. When the *Two Eyes, 3D* proposal was being written there was an exhibition at the Museum of Science, Boston that seemed well-suited to house the study. However, in the intervening times between proposal submission, NSF approval, and the study start date, there were updates to the exhibition spaces at the museum that ultimately required the team to look for a new location to house the *Two Eyes, 3D* study. The first alternate location was more heavily trafficked by children who were younger than those in the target age-range for the study. Subsequent modifications made to the *Two Eyes, 3D* protocol required the research associate to control the display of the images for participants in order to accommodate for limited motor-skills and hand-eye coordination, and to read-aloud instructions. The later adaptation actually brought the study more in-line with Museum of Science, Boston protocols that require all questions and prompts to be read aloud for visitors to help ensure accessibility for all guests. While these adaptations were necessary to help ensure that the study ran smoothly and facilitated the collection of valid data, they also serve as important examples for designers who seek to develop educational resources and a valuable reminder of the need for aids to enable meaningful engagement for younger visitors.

FACILITATING RESEARCH PARTNERSHIPS

Benefits of Research Partnerships

Research studies benefit science and align with institutional goals. Stakeholders at the Museum of Science, Boston and the Adler Planetarium in Chicago, i.e., both institutions that partnered with the *Two Eyes, 3D* project to facilitate data collection, expressed their belief in the benefit of helping to facilitate studies like those conducted as part of the *Two Eyes, 3D* project. "Studies like this are at the very core of our mission," noted one museum staff member who helped to coordinate the data collection effort at her facility. By hosting research studies, museums are able to demonstrate a commitment to scientific research and support of the scientific process. Research opportunities such as the *Two Eyes, 3D* study also align well with some visitors' expectations for visits to science centers with reputations for being highly hands-on and interactive. Even in instances where there may not be expectations for this type of interaction prior to a museum or planetarium visit, interactions with scientists and staff are often rated highly by visitors. For example, a staff member at the Museum of Science, Boston indicates that these interactions are among the top things that visitors provide positive feedback on after their visits, and suggests that it is an added bonus for visitors "to get to be an authentic part of a science experience."

Findings from research studies can have direct implications for future exhibit development. Having access to cutting edge research is one of the most significant potential benefits of research partnerships with museums. For example, a stakeholder at the Museum of Science, Boston indicated an interest in utilizing findings from the research to help inform development of exhibit components that incorporate stereoscopic imagery. As partners in the research process, the museum has access to findings long before they are available in scientific journals or disseminated more broadly within the field.

Challenges of Research Partnerships

Research in museum settings has the added challenge of having to serve as an educational experience. When conducting research in museum settings there is a need to strike a balance between the value of the research experience as an exhibition element and the quality of the data that can ultimately be collected. Understandably, museum stakeholders seek to offer visitors a meaningful experience that enhances their overall visit experience and further the educational objectives of the museum. However, efforts to provide a meaningful experience for visitors—including detailed explanations about the study and limited data-collection time periods—sometimes posed challenges for the *Two Eyes, 3D* research team. Additionally, the research teams were somewhat restricted by limitations on when and where the research could be conducted. Arguably there are fewer challenges when a research study is well-aligned to a specific exhibition, well-suited to time constraints that are typical within informal learning environments, and not negatively impacted by the potential distractions of an informal learning environment. Whereas some studies may be a natural fit for museums, others may not be as well-suited to meeting the additional educational objectives that are often (and justifiably) required in museum settings.

Museums may not be the best location for study recruitment. There is typically a great deal of competition for viewers' time and attention in a museum setting. As such, it can sometimes be challenging to attract potential participants and convince them to give up time to take part in a study (Palmquist & Crowley, 2007). None-the-less, research in a museum setting makes sense when there are mutual benefits to visitors and the researchers. In some instances, however, museums may be the most efficient site for large-scale data collection efforts, especially if there are constraints on days and times that researchers are able to collect data. For example, the research associate in Boston was only able to collect data on weekdays, but youth in the target age-range for the study often came to the museum as part of school groups. Since the researcher could only accommodate one participant at a time, and since there were often no parents on-hand to sign consent forms, it was extremely challenging to find participants at the museum on weekdays. In Chicago, researchers had the opposite problem, many adults were visiting the museum along with their children, but the study being run at that site was only open to participants 18 and older. When considering museums as site for conducting studies, researchers should take note of visitorship numbers for would-be participants in the target demographic for the study. Researchers should also take into consideration the added challenges associated with convincing people to participate when they are part of large groups and/or when their time at a museum is limited. On a more positive note, museum visitors are often interested in opportunities to engage with scientists and museum staff and—as mentioned previously—are appreciative of opportunities to contribute to science.

The Living Laboratory model is highly conducive to some types of research, but might not be the right fit for all studies. The Living Laboratory model, developed at the Museum of Science, Boston, seeks to provide opportunities for researchers from local institutions to conduct studies related to child development within the museum and, in doing so, foster greater awareness and engagement in science among the general public. To accomplish these two goals, the museum stipulates that research experiences take less than fifteen minutes, occur on the museum floor (i.e., in public rather than behind closed doors), and incorporate professional development opportunities for both scientists and museum educators. In the case of the *Two Eyes, 3D* study, it proved challenging for some participants to complete the entire study in the time allotted and some data-collection sessions therefore had to be cut short before all the study components were completed—resulting in partial data sets, and the eventual need to discard some participants' data. Likewise, the Living Laboratory model also required the researcher to run through the entire protocol for the staff at the beginning of each shift and allow participants to participate even if they did not qualify as participants for the study. These requirements help accomplish the goal of creating an educational experience for museum visitors and staff, but they can also be time consuming parts of the experience and are therefore things that researchers must take into consideration. It is also important to note that Living Laboratory studies at the Museum of Science, Boston typically take place within an exhibition where all staff have been trained to support the educational experience for visitors, but the *Two Eyes, 3D* study was also anomalous in so far as it was ultimately relocated to another part of the museum to facilitate the recruitment of older children.

Living Laboratory model requirements are also designed to ensure a meaningful learning experience for the researcher in terms of communicating information about his or her study to museum educators and the public. When the *Two Eyes, 3D* study was proposed, the project's primary investigator was based in Boston and intended to be more involved in the on-site data collection process. However, by the time the study was funded and implemented, he was no longer in Boston and was therefore unable

to be as hands-on with the day-to-day operations of the study as initially desired. Furthermore, the research associate hired to collect data in Boston was not involved in the initial design of the study, nor the data analysis process, and was therefore more limited in her ability to engage with people about the underlying science and to help contextualize the study for visitors. She was ultimately aided by a museum staff member, and this too was outside of the scope of a normal Living Laboratory study.

Admittedly, the *Two Eyes, 3D* study was not a perfect fit with the Living Laboratory model both in terms of its content (i.e., it was not focused on child development as other Living Laboratory studies are) and structure (i.e., its length, location, and reliance on a museum staff member to help with the recruitment process). In sum, the Living Laboratory model seems to be best-suited to research protocols that can comfortably fit within the allotted time period, those wherein there are less overall time constraints on the data collection process, and those where the primary researcher is able to be more engaged onsite throughout the data collection process. None-the-less, *Two Eyes, 3D* highlights the potential for future adaptations to broaden the scope of the Living Laboratory model and a greater need to study these potential adaptations further.

Recommendations for facilitating successful research in museum-settings

Recruitment is a key factor to success in conducting research in museum settings. Undeniably, the main differentiator between a successful and unsuccessful study in a museum setting is whether or not there were effective recruitment strategies in place. As such, the first of recommendations, are all linked to lessons learned about effective recruitment strategies.

Characteristics of good recruiters vs. good research interpreters: Where recruiting is concerned, there is a need for people who are outgoing and skilled at quickly communicating the benefits of participation. There is also a need for researchers who are capable of ensuring a positive research experience (i.e., putting participants at ease and making them feel comfortable throughout the entire process). Ultimately, these may not be the same people. For example, in Boston, the research associate was responsible for conducting the study and helping to ensure that all participants had a positive experience, however, she was initially more reserved in her efforts to recruit participants because she felt that the study took away time from the visit experience. A staff member at the museum helped her see that the research experience was actually a valuable learning opportunity and something that excited visitors. The staff member in Boston was able to help the research associate modify her outlook on recruitment and further helped in the recruitment process by providing a sense of context and other scaffolds that enhanced the educational value of the research experience: e.g., providing families with information about the nature of stereoscopic imagery and its potential educational benefits. While this type of assistance with directly recruiting participants is technically outside the scope of the Living Laboratory model, it proved a valuable enhancement to previous *Two Eyes, 3D* recruitment efforts at that site. Much in the same way that museums seek to provide context for visitors to help make sense of various artifacts, the staff member at the Museum of Science, Boston helped to explain the science behind the study and provided context about what we know and seek to learn about the use of stereoscopic images in education, and in doing so, ultimately enhanced the overall research experience for participants.

It is hard to be recruiting participants and running subjects simultaneously: In both sites, research associates and museum staff suggested the benefit of having two or more people to help run studies

like *Two Eyes: 3D*. In addition to helping explain and contextualize the study, as described above, the museum staff member in Boston was also able to help with traffic flow and minimize distractions while someone was participating in the study. In Chicago, there were also many reported instances where a staff member helped to watch children while the research associate was gathering data from adult participants in the study.

Museum staff can aid in the process of recruitment because they lend a sense of authenticity. Museum staff can serve an instrumental role in facilitating recruitment. In Chicago, the research associate noticed drastic differences in the number of participants that museum astronomers were able to direct to the Space Visualization Lab simply by mentioning the study as they engaged with visitors. Having a staff member on site to explain the study in Boston also helped to generate buy-in to the study among visitors. In short, the museum staff at both sites were uniquely able to facilitate the recruitment process by helping visitors see the research as an authentic and valuable experience.

Just-in-time recruitment seems to be more effective than advanced recruitment. In Chicago a considerable amount of time was spent at the beginning of the study trying to figure out the right scheme for effective recruitment. Over the course of the study, the research associates evolved their recruitment strategies and found that just-in-time recruitment efforts seems to work better than delayed recruitment (i.e., recruitment at the beginning of the day for participation in an experience that will take place at a specified time later in the day).

Location is the key to recruiting success. The study at the Museum of Science, Boston was designed to be housed within an exhibition on Human Biology, but that exhibit closed before the study could be implemented and there was no longer a location that was a natural fit for the *Two Eyes, 3D* study. Museum staff in Boston felt that the study would have been more successful if it could have been housed in a location where all staff could be briefed to provide educational support as is the case with other Living Laboratory studies. In Chicago, the study was conducted at the Space Visualization Lab. Since the lab is only open to the public at specific times during the day, the team had to think creatively about how to guide potential participants to that site. As such, it took some iterating to come up with a recruitment strategy that could effectively deliver adequate numbers of participants.

Effective signage can ease some recruitment challenges. The research associate in Chicago found signage to be an essential component in helping to inform visitors about the study and better enabling them to make decisions about whether or not to participate. The first sign was more of an abstract about the study, whereas a second sign put the most important information at the top and provided a significantly simplified description of the project. “People wanted to know when it happened, how long it took, and what they would get out of it,” he explained. In short, the second sign helped to answer all of the questions that would-be participants had about the study.

Target potential participants with the greatest interest in the subject matter. While this may be a potentially confounding variable for research, it is also more likely that these people will be willing to participate in a research study. The research associates in Chicago found that adults were most likely to participate in the study if they had a greater affinity for astronomy and higher levels of interest in science.

You might need to think outside the box to come up with a recruitment strategy that will be effective—and you should be prepared to modify that strategy over time if necessary. Coming up with the right

strategy for recruitment may require some iteration and creative thinking. It is also important to note that what works well at one site may not work at another. Likewise, strategies that work well at one point in a study may not work consistently throughout the study due to changes in visitorship, exhibitions, or staffing.

Offer the right incentives at the right time. Recruitment and incentivization go hand in hand. Initially, in Chicago, the research associate found that several people were not showing up for the testing sessions for which he had recruited them. At first he was handing out gifts (i.e., movie passes) when participants first arrived at the museum, however, to combat a problem with no-shows for the study, he later switched to handing out the movie passes after participants completed the study. Interestingly, he found that even fewer people showed up during the times they'd been scheduled to participate if they hadn't received the incentive—suggesting that advanced distribution of incentives may be a more effective mode of encouraging participation in a research study at a museum setting than delayed distribution of incentives. However, the nature of the incentive may also have had an impact on resulting participation in the studies. The *Two Eyes, 3D* team initially offered free movie tickets in exchange for participating in the research study, but when the museum switched to a different ticket-sales strategy there was concern that offering free tickets would cut into potential sales and the team therefore had to switch to offering certificates to the gift shop as compensation for participation in the study. Ultimately, the gift certificates proved to be a far better incentive than the tickets had been, and greatly eased the subsequent recruitment process.

Minimize distractions that might impede successful participation in research studies. Museums are chaotic environments, and as such, present unique challenges for conducting research—from noisy children to competing visuals or moving objects in the surrounding areas—there are ample opportunities for research participants to be districted while participating in research studies in museum settings. In Chicago, the research associate and stakeholders from the museum took turns entertaining youth while their adult guardians participated in the study. In some instances, older youth were even permitted to participate in the study (even though their data was not counted) as a way to help keep them occupied while adults were participating in the study. Efforts to minimize potential distractions ultimately eased the process of collecting research data.

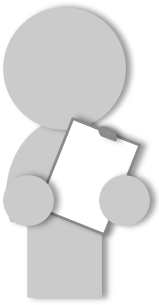
When technology is involved, be sure to have a back-up plan. Use of technology to facilitate data collection presents unique challenges. There were a number of instances recorded by the research associates in Chicago where the iPad being used to collect data malfunctioned in one way or another. The research associates at that site developed strategies to minimize the impact and potential loss of data in the event that the technology malfunctioned, but they also learned to have back-up devices at the ready in case one of the iPads malfunctioned during a session.

Seek to ensure equal input from all partners helps to generate equal levels of buy-in. Partnerships between museums and external researchers are most successful when both parties are equally vested in the research. When museums are fully vested in a study, there is an expectation that their staff will get to play a significant role beyond helping to facilitate data collection. For example, museums want their staff members to have professional development opportunities and the ability to play a meaningful role in the scientific process—including opportunities to analyze data and help contextualize findings or generate recommendations—in contrast to only being used as a site to host data-collection efforts. Museum partners recommend a greater infrastructure for sharing interim findings

and conducting research briefings throughout the research partnership experience. Museum partners also want an opportunity to bring their experiences to bear in order to help design an experience that will be beneficial to both the researchers and participants. It is important to note that timing is also an important factor. An arrangement wherein museum partners can be more vocal participants in the research design process can be mutually beneficial when it happens at the *beginning* of a study, before data collection has begun. In the case of *Two Eyes, 3D*, there were requests for changes that could not be incorporated because data collection had already begun. None-the-less, ensuring a meaningful role for museum partners to play is a key element in helping to ensure that that research experience is mutually beneficial for the researcher and the museum. Museum staff also stress the value of having the researcher/research team members on-site throughout the entire study design and data collection process to help facilitate timely changes and improvements to study logistics. The later recommendation may also help to ensure that a longer-term relationship can be built between the museum and the research team.

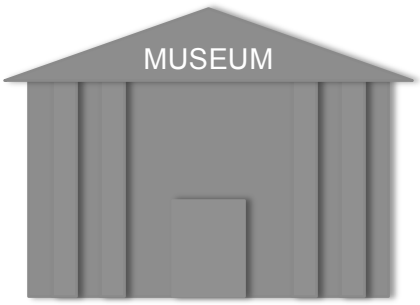
Determine if the museum is the right fit for the study. There are many potential benefits and challenges of conducting research in museum settings, therefore it is necessary for both parties to engage in thoughtful assessment and reflection to ascertain whether the potential benefits will outweigh the potential challenges. The ultimate goal should be an experience that is mutually beneficial for the museum and the external researcher. Before embarking on a museum-research partnership, both parties should reflect on all of the items presented above, and come to a common agreement that the potential advantages of conducting research in a museum setting will make up for the challenges that are likely to be faced along the way. In doing so, all parties can be better assured of a positive experience that will satisfactorily accomplish the goals of all partners and provide meaningful outcomes.

GUIDELINES FOR MUSEUM-RESEARCH PARTNERSHIPS



Questions for Researchers

Discussion Topics



Questions for Museums

Questions for Researchers	Discussion Topics	Questions for Museums
Are there ample visitors in the target demographic to facilitate timely completion of the study?	**Visitors**	Will the study be of interest to our visitors? Does it offer them unique educational benefits?
Do I have helpers who will be effective recruiters in museum settings? Are there museum staff who will be available to help if necessary?	**Staffing**	How much of our staff time will be required to help facilitate the study? Are there things our staff will be able to learn from the study?
Is there a space within the museum that is well-suited to attracting the right kinds of participants and conducive to conducting the study?	**Location**	Is there a space within the museum that will be a good *contextual* fit for the study?
Are there any constraints on the amount of time the study can take? Is it reasonable to assume that visitors will be willing to spend the time necessary to participate?	**Time**	Does the study fit within the parameters our institution has set forth for external research? Can it be done without taking an inordinate amount of visitors' time?
Is there something about the research that makes it beneficial or necessary to conduct the study in a museum setting? Am I open to input/feedback from museum stakeholders?	**Goals**	Does the study help our institution accomplish its educational mission? Are there ways for us to contribute in meaningful ways to the process and ways for us to benefit from the results?

IF YES

Proceed

IF YES

INTERVIEW QUESTIONS

TOPIC A: Perceived value of using stereoscopic technology within museums and planetariums

- What training is necessary for museum staff to effectively scaffold visitors' experiences with stereoscopic technology?
- Do museum staff feel that the inclusion of stereoscopic presentations is a cost-effective way to enhance viewers' understanding of scientific concepts? What are the pros and cons from a logistical point of view as well as an educational point of view?
- What do museum visitors' know and expect for experiences and programming that utilize stereoscopic technologies?

TOPIC B: Key principals for creating effective stereoscopic programming

- What components of stereoscopic programming seem most effective?
- What components of stereoscopic programming seem more problematic for visitors to use or grasp?
- What are the best design practices to capitalize on the strengths of the technology?
- What are the best design practices to capitalize on the educational potential of the technology?

TOPIC C: Key factors to success in partnerships between visitor institutions and external researchers

- What were the greatest strengths of the Two Eyes, 3D research partnership?
- What were the greatest challenges of the Two Eyes, 3D research partnership?
- What features or criteria are most essential for ensuring successful research partnerships between visitor institutions and external researchers?

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More information about the Living Laboratory Model is available at: http://www.livinglab.org.