

**29th Annual**

**Visitor Studies Association Conference**

*July 19-23, 2016 Boston, Massachusetts*

# **The Data Revolution**

**Abstracts**



# Introduction

Welcome to the 2016 Visitor Studies Conference Abstracts! The Abstracts provide both a glimpse into the future and as a record of the Conference in years to come. This year's conference takes us to Boston and dives into the Data Revolution, with sessions exploring how data shapes our work in the field of visitor studies. The following abstracts outline the multifaceted discussion that this theme generates, from reflections on our current data collecting practices to questions about how we ethically utilize data in decision making.

Previous years' Abstracts are available on the VSA website, at <http://www.visitorstudies.org/past-conferences>.

Thank you and see you soon!

Valerie Grabski

June 26, 2016

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# Thursday, July 21

## 10:30-11:45, Concurrent Session—One

### Testing New Ways to Engage: Prototyping in Art Museums

#### Presenters

Lynn Courtney, Head of Planning and Evaluation, Museum of Fine Arts, Boston

Tiffany Leason, Assistant Director of Audience Research and Evaluation, Indianapolis Museum of Art

Hannah Ridenour, Research Coordinator, the Cleveland Museum of Art

Adam Tessier, Head of Interpretation, Museum of Fine Arts, Boston

Maia Werner-Avidon, Manager of Research & Evaluation, Asian Art Museum

#### Purpose

In an effort to reach new and diverse audiences, many art museums are using prototypes to test ways to engage visitors. Four art museums will share their prototyping experiences, highlighting key considerations, sharing approaches and methods, and exploring the impact on decision making. Concrete examples of prototypes and associated evaluation instruments will be provided. We have identified two goals for this session:

1. Participants will learn about different ways art museums have allocated space to prototyping (e.g. mobile stations, pop-up spaces, kiosks, dedicated gallery spaces) and different prototyping methods (from paper formats to almost finished versions covering both analog and digital activities).
2. Participants will gain ideas of interactive experiences that they could try in their own museums through seeing examples of real experiences that have been tested in art museums.

#### Perspectives

In this session, four art museums present on recent prototyping experiences in order to share a variety of approaches and methods and document how data gathered through prototyping can be used to aid decision making.

##### *Prototyping on the Go:*

The Indianapolis Museum of Art (IMA) uses mobile stations and pop-up spaces to gain visitor feedback on potential interpretive tools and interactives for upcoming exhibitions. IMA researchers, occasionally accompanied by interpretation specialists and designers, have been on the move throughout the museum as well as holding several iterations of Test It Lab in three different locations, which was open to museum guests during four-day periods. Prototypes tested were at various stages of development and ranged from basic paper formats to almost finished versions covering both analog and digital activities.

##### *Dedicated Gallery Spaces:*

From Nov. 2015 to April 2016, the Asian Art Museum of San Francisco dedicated a gallery space as a prototyping lab to test new approaches for engaging visitors with artwork. The museum used a variety of approaches, including focus groups, community meetings, and visitor observation, to gather visitor feedback. Because the gallery space is accessible to visitors all times the museum is open and cannot always be staffed by evaluators, the museum also experimented with asynchronous feedback mechanisms, asking visitors to respond to specific evaluation questions using post-it notes.

### *Digital Prototyping:*

The Cleveland Museum of Art's Beta Gallery is designated for temporary installations of digital prototype projects. The first of these are Ask an Expert and Storybooth. Available at iPad stations and on the museum's website, Ask an Expert provides an avenue for visitors to learn more about the museum's history and collections. Storybooth invites visitors to talk about their memories and favorite things about the museum in recorded videos that can be shared on the museum's website. By incorporating analytics tracking alongside more traditional observation and interview methods, the Beta Gallery study will inform future prototype design at the CMA through digital strategies, content development, and visitor experiences, while also testing a broad range of evaluative methods for digital projects.

### *Hands-on Prototyping for Interactive Resources:*

The Museum of Fine Arts, Boston undertook a formative study for a planned touch-screen interactive to accompany a display of Chinese handscroll paintings. Through open-ended questions, card sorts and multiple-choice questions, selecting locations for informative "hotspots" in the image of one scroll, and a "think aloud" about the content of another scroll, the museum solicited visitors' opinions and thoughts about what they noticed in the paintings, how they interpreted what they were seeing, what they wanted to learn, and how they might interact with a touch-screen resource. The study included multiple methods of soliciting visitor feedback, providing an enjoyable, interactive, and even educational experience for visitors while assessing their knowledge and preferences.

At a time when many art museums are considering introducing user testing into their practice, this session may be able to help institutions make informed decisions and provide evidence for how this practice furthers broad institutional priorities.

## **Importance**

Across the country, major demographic shifts are resulting in the growth of populations for whom traditional museums may be unfamiliar. Additionally, societal changes in the way individuals interact with one another and the world mean that many potential arts audiences desire new ways of engaging with artwork beyond what many art museums currently offer. These changes have resulted in declining audiences (Silber & Triplett, 2015) and a growing "relevance gap," as outlined in a 2012 James Irvine Foundation report (Rabkin, Linett, & Lee, 2012). That same report articulates the need for museums to shift their interpretive approaches from simple exposure to artworks to active engagement with and dialogue about art. But these new approaches require early testing to ensure successful development. This session is designed to help art museums think about new ways to engage their audiences and how they can prototype those experiences to help ensure their success.

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- Silber, B. & Triplett, T. (2015). A Decade of Arts Engagement: Findings from the Survey of Public Participation in the Arts, 2002-2012. NEA Research Report #58. Washington, DC: National Endowment for the Arts, Office of Research & Analysis. Available at <https://www.arts.gov/sites/default/files/2012-sppa-feb2015.pdf>.

## **Additional Resources**

Asian Art Museum Prototyping Gallery Web page:

<http://www.asianart.org/exhibitions/prototyping>

The Cleveland Museum of Art's Ask an Expert web page:

<http://www.clevelandart.org/ask-an-expert/>

The Cleveland Museum of Art's Storybooth web page:

<http://www.clevelandart.org/learn/education-and-interpretation/storybooth>

<http://www.asianart.org/exhibitions/prototyping>

Museums and the Web 2016 Paper:

<http://mw2016.museumsandtheweb.com/paper/a-seat-at-the-table-giving-visitors-a-voice-in-exhibition-development-through-user-testing/>

## **Innovative Continuity: Extending and adapting evaluation as a project changes**

### **Presenters**

Chris Cardiel, OMSI

Smirla Ramos-Montanez, OMSI

Katie Todd, Museum of Science

### **Purpose**

Evaluators often have the opportunity to reassess practices when projects face a new funding situation, staff turnover, shifting priorities, or other periods of transition. However, tools and resources to help inform and guide our decision-making during such transitions remain scarce. During this session, participants will: (1) learn about opportunities, challenges, and benefits of methodological continuity and innovation during periods of project change; (2) feel empowered to assess, plan, and implement methods that benefit participants and organizations; and (3) build connections with other evaluators and practitioners who can share insights and serve as potential collaborators to strengthen participants' work. This session will engage participants in considering opportunities, challenges, and benefits of methodological continuity and innovation during periods of project change, with the goal of beginning a conversation and a sharing of ideas and strategies that we can apply when facing this common evaluative dilemma.

### **Perspectives**

When a program faces a transition, project leaders often must innovate to ensure sustainability. At the same time, as evaluators we must ask ourselves how much evaluation should remain consistent with past work or change to meet new project agendas. Throughout the visitor studies field, many of us have developed approaches and tools (formal or informal) to help guide our thinking and planning during such periods of transition; however, these tools remain largely individualized and are rarely shared in a systematic way across institutions. In this session, three members of a multi-institutional evaluation team will start this conversation by sharing how they have navigated project transition, finding ways to benefit from past evaluation while also testing innovative approaches. Participants will consider the benefits and challenges of evaluation during project change, discuss situations they face in their own work, and come away with a worksheet that provides resources and practical tools for making decisions about evaluation practice during transitions.

*Katie Todd* will introduce the NSF-funded Museum & Community Partnerships (MCP) project and discuss several benefits of continuing existing prior evaluation practices. The MCP project is a supplemental extension of the ten-year, NSF-funded Nanoscale Informal Science Education Network (NISE Net), which had established infrastructure and methods for evaluation over that project's past decade of funding. Session participants will learn how MCP's evaluation team has benefited from these existing structures such as frameworks and logic models, participatory evaluation methods, and comparisons with past data.

*Chris Cardiel* will take a different perspective on the MCP project's evaluation, sharing ways the team has departed from existing evaluation methods to create new processes. Project constraints precluded direct public data collection, but evaluators needed ongoing information about their experiences. After discussing the context that necessitated its creation, Chris will share a new instrument developed specifically for this project. The instrument takes an embedded approach that helps educators debrief from each educational experience while providing evaluators with prompt data that would otherwise be unfeasible with the NISE Net's prior survey method.

*Smirla Ramos-Montanez* will discuss ways the MCP project was able to take a middle road by using existing methods but adapting them for the new project context. She will share how the survey and data-mining team promoted continuity with past NISE Net activities while also testing new improvements. Ramos-Montanez will discuss some of the challenges of adapting previous tools and share two novel ways of increasing pre- and post-survey response rates in targeted groups.

Following the three speakers, participants will be invited to discuss other considerations for evaluation during project transition. A handout of scenarios will seed small group activities, allowing participants to consider different types of project change at various institution types. The emphasis will be on applying the lessons learned from the panelists and using a worksheet including an inductively developed decision-making flowchart as a guide for weighing options in practical contexts. The session will conclude with large-group Q&A during which participants will learn from one another and share options for their own project changes.

## **Importance**

Evaluators are constantly dealing with change. A program might address new needs, meet a wider audience, or apply existing approaches in different ways to recreate itself and attract new support. In parallel, evaluators have the opportunity to reexamine their strategies. This session addresses this common situation by providing a framework for considering opportunities and weighing options in these situations. A balanced approach recognizes the complex benefits and challenges of continuity, innovation, and adaptation. This reflective session will provide the valuable opportunity to consider evaluators' priorities, opportunities, and constraints and use those aspects to inform systematic decision-making. Recognizing the scarcity of tools to support the alignment of decision-making processes throughout the field, it is also our hope that this session will spark an ongoing conversation and sharing of resources and ideas, with the goal of better equipping evaluators to recognize and respond to key considerations while remaining mindful of contextual factors.

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## Exploring Shared Question Questions about Visitors Experiences

### Presenters

Sarah Cohn, Cohn Consulting, LLC  
Elisa Israel, Saint Louis Science Center  
Alex Lussenhop, Museum of Science, Boston

### Purpose

- Participants will leave the session with an increased understanding of the possible implications of the language used in questionnaires and interviews.
- Participants will better understand the potential implications of language use in different settings.

### Abstract

Currently, Collaboration for Ongoing Visitor Experience Surveys (COVES) is focused on science centers in its pilot study, as it is being run out of the Museum of Science Boston and has a leadership and development team comprised of staff from eight science museums across the country. However, the COVES project seeks to become a sustainable, field-wide project once it is fully functional at the end of the three-year IMLS project. In this VSA session, the COVES team will look to share its current instrument, discuss how the questions came to exist in their current form, and seek to brainstorm ways to expand the instrument such that it will be relevant to more varied institutions, more useful for all informal education professionals, and more adaptable for different contexts.

The working group session will provide a project and Year 1 background on the COVES project, but the majority of the time will be spent in smaller groups focusing on the possibilities for enhancing and expanding the instrument so that it is relevant to all types of organizations supported by VSA members and conference

attendees. Fundamental to the COVES project is the ability to be responsive to the needs of the informal education field and built out of the needs of museum community. ASTC is a partner in the COVES project, and though VSA is not a project partner, 70% of the Governing Body members (project leadership) are active members of VSA.

In addition to enhancing and expanding the instrument, a portion of the discussion will focus on the implications of word use and language choices in survey design. The COVES project team made a decision to be inclusive and universal in the demographic questions, which is causing difficulty for some data collection locations due to cultural differences and visitor assumptions about the purpose of the study. For example, some locations are having difficulty getting complete responses as participants quit the study when they get to a non-binary gender question. Evaluation has an impact, though most of the studies we do in museums are benign enough that we have the ability to forget this. In this work group, we hope to dig more deeply into what the VSA community believes the role of evaluation is for patrons and institutions – should we push at the edges to support inclusiveness and equity, or should we stay within the constraints of what is safe and accepted by our current community?

The COVES project is built by and for the informal education community, and though it is focusing on science museums, the project team is planning for and seeking to immediately integrate the needs, ideas, and concerns of all VSA-supported institutions. Much like the BISE project sought ongoing, diverse feedback from VSA members and conference attendees, the COVES project seeks to develop, iterate, and test the tools of the project on the VSA community to ensure the best alignment for a future field-wide initiative.

### **Importance**

Across museums, parks, zoos, and other cultural organizations, few opportunities exist to synthesize and compare visitor/participant engagement, satisfaction, and demographics across organizations. Resources such as Visitors Count, ASTC's annual analysis, Reach Advisors and other paid programs exist, but none of them span multiple content areas while being built by and for the organizations that will use the data for insights and action. The Collaboration for Ongoing Visitor Experience Surveys (COVES) is an IMLS-funded project that updates that model in an effort to create, collect, analyze, and inform museums using methods and tools created by museums.

## **Researching Methods: Pilot Study Findings to Inform Your Data Collection**

### **Presenters**

Ryan Auster, Science of Museum of Minnesota

Mike Rathbun, Discovery Center

Cara Lonardo-Roy, The Discovery Museums

Tania Tiburcio, New York Hall of Sciences

### **Purpose**

Think you know the best way to collect audience-level data? Results from a multi-institutional pilot effort that focused on different data collection methods and sampling strategies will inform a conversation between panelists and the audience on how—and why—we study our visitors.

## Paper Sessions

### How Data Changed NISE Net's Programming Efforts

#### Presenter

Marta Beyer, Museum of Science, Boston

#### Purpose

This presentation will highlight how evaluation findings influenced the types of materials and professional development opportunities offered by the Nanoscale Informal Science Education Network (NISE Net). In particular, this presentation will focus on evaluation findings from year 5 and year 10 of the Network about professionals' use of resources related to societal and ethical implications of nanotechnology. Conference attendees will have a sense of how data can be used to change practices even in the middle of a project. They will also learn about how professionals in the Network were impacted by NISE Net's efforts aimed to increase awareness of societal and ethical issues related to nano. Conference attendees will also have a deeper understanding of the types of products and professional development opportunities that encourage societal and ethical programming.

#### Abstract

From early in the history of the NISE Net, materials and products were developed to raise societal and ethical implications of nanotechnology. However, by year 5 of the NISE Net, data indicated that only about one-quarter of NISE Net's products emphasized this content and that partners were using these resources to a lesser degree than others offered by the Network. Data suggested that although professionals were not as interested in implementing products such as forums or science cafes into which NISE Net had infused much of this material, they were still intrigued by the topic (Kollmann, 2011). These findings from a review of 41 evaluation, research, and annual reports about NISE Net's work related to SEI topics, products, and forums prompted leaders of the Network to adjust their work in this area.

After learning these results, the Network started creating new products and offering specific professional development opportunities that might be better suited to science and society-related content. This included developing more hands-on demos with a focus on societal connections, offering professional development workshops about how to integrate these considerations into professionals' work, and creating a guide about covering ethical issues.

By year 10, data from the summative evaluation show that focused efforts related to science and society were particularly successful for professionals who had close contact with the Network or worked in informal science education settings (Goss et al., 2016). Specifically quantitative data from this three-year study indicate that professionals had increased confidence about this content and were using products and practices more frequently.

This presentation will highlight how data played a key role in informing the Network's decision-making related to offerings that covered topics such as risks and benefits of nanotechnology. This presentation will also emphasize findings from the recent summative evaluation that indicate how, in the end, content related to science and society was an area of particular gain for professionals.

## Importance

This presentation will benefit evaluators and practitioners interested in hearing about how the NISE Network increased efforts around societal and ethical implications of nanotechnology. Evaluators will gain insight into why NISE Net leaders altered their work once data from the project's midpoint indicated low usage of products related to science and societal issues. Of note to practitioners will be descriptions of the changes and new professional development offerings that the Network provided after learning these interim results. Both audiences will discover how, by the end of the project, these additional efforts led to increased gains for professionals.

## Reference

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Goss, J., Auster, R., Beyer, M., Mesiti, L.A., Grack Nelson, A. Guberman, S. & Kollmann, E.K. (2016). NISE Net Professional Impacts Summative Evaluation. Boston, MA: NISE Network.

## Network Analysis for Sustaining a Community of Practice

### Presenters

Deborah Wasserman, Lifelong Learning Group, COSI Center for Research and Evaluation

Sasha Palmquist, Palmquist Associates

Catlyn Stylinski, Appalachian Laboratory, University of Maryland Center for Environmental Science

### Purpose

This presentation provides visitor studies researchers and evaluators with a practical application of social network analysis. It involves a case study of how social network analysis was used to dialogically engage stakeholders in strategic planning—in this case, informal climate change educators in the sustainability planning conversations for their MADE CLEAR Informal Climate Change Education (ICCE) Community of Practice. The intention is to illustrate how social network analysis can generate strategic planning dialog. In addition to its methodological relevance, the session presentation will be of interest to visitor studies professionals interested in utilizing communities of practice for professional development or helping informal educators incorporate into their practices ways of engaging visitors with complex scientific issues.

### Abstract

Social network analysis methods have become an important tool for researchers and evaluators. We report on how, within a community of practice of informal educators, we designed and used a four-step iterative process to engage them in strategic planning by using social network analysis to understanding and adjust their own community structure. We explain the four steps with description of how community members (1) came to understand, define, and create the value of the network and then constructed and reviewed their first sociogram, (2) participated in discussion guided by key questions and identified the need to gather new data points (3) reflected on results to help develop strategy for successful, self-sustaining, Community of Practice structure; and (4, not yet implemented) plan to reiterate the first step to evaluate progress.

In this case, the social network analysis revealed three useful findings: (1) a permeable core-periphery structure with core group membership expanding from 20% of the full membership in year 2 to 32% in year 3 (with no correlation to membership longevity); (2) The value of the relationships did not differ for core or

periphery members (based on how much the relationship contributed to member-identified intended outcomes of ICCE participation); and (3) even with all core members removed, peripheral members remain linked in one connected component. Also, there were no significant patterns of relationships or subgroups across attributed categories including: type of organization (zoo, science center, park, etc.); audience focus (e.g., K-12 youth, teachers; families; etc.); organizational reach (local, regional, national); or climate change focus (e.g., mitigation vs. adaptation. We also report on the theoretical foundation for using this method to support the dialogic nature of a community of practice, particularly one centered on professional development for informal educators seeking to address complex social/scientific issues.

Based on these findings, the ICCE's sustainability committee members felt encouraged about the strong structural potential for the group to continue after its initial NSF funding and have focused on maintaining a community of practice model (as opposed to adopting a work-group or consortium approach). However unlike more typical communities of practice, they have recognized their central planning and governing structures can quickly invite and absorb both new and veteran members.

### **Importance**

As a relatively new methodology in the “data revolution” toolbox, social network analysis challenges visitor studies researchers to find opportunities for its use. This study contributes to understanding one way it can be used to further dialog and direction of a learning community.

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## Measuring Social Value: An SROI Exhibition Evaluation

### Presenter

Jo Brehaut - Visitor and Market Research Manager, Auckland Museum

### Purpose

In response to a global interest in better understanding the impact and value created by cultural institutions, the Auckland Museum in New Zealand undertook a Social Return on Investment (SROI) evaluation of a major exhibition. The Museum's Visitor and Market Research Manager will take you on their SROI journey; through the unique methodology, highlighting key findings and discussing its place in future practice.

### Abstract

SROI evaluation was developed to provide organizations with a framework for more completely accounting for the social, environmental and economic value they create.

SROI tells the story of how change is created. What's most unique about this method however, is that it then takes this change and articulates it in monetary terms, comparing it to the investment in the project.

The SROI evaluation undertaken at the Auckland Museum examined a temporary exhibition called 'Moana, My Ocean'. Through the SROI method, the Museum was able to evidence that the exhibition created 8.5 million NZD worth of value, far exceeding the development investment.

### Importance

While this was a fabulous project to be part of, produced an enviable result and a compelling story to tell funders, supporters and critics alike, there are wider lessons for other organizations – and not necessarily that they too should undertake SROI evaluations.

Instead, I'd advocate for practitioners to be brave and experiment with new approaches and methods, look for ways to work with others who have similar, or a vested interest in the outcomes of their work, better utilize the research and evaluation findings that others generate and of course, be generous with their own work.

### Additional Resources

Full report:

<http://www.aucklandcouncil.govt.nz/SiteCollectionDocuments/aboutcouncil/planspoliciespublications/technicalpublications/tr2014014sroianalysismoanaaucklandmuseumrpt.pdf>

Additional information about SROI:

<http://socialvalueuk.org/>

## 2:00-3:15, Concurrent Session— Two

### Roundtable Discussions

#### Who's Not Here?: Questions About Better Understanding Potential Visitors

##### Presenters

Patience Baach, The Field Museum  
Andréa Giron Mathern, Denver Museum of Nature & Science  
Nicole Baltazar, Slover Linett  
Shannon McManimon, Science Museum of Minnesota

##### Purpose

As museums seek to better understand our reach and impact it has become ever more important to learn more about communities which are currently underrepresented in our free choice visitorship. The presenters will share experiences from their research in and with communities to better understand what lies beneath the “barriers” of visitation. This session is aimed at creating critical dialog centered on three concerns:

1. Methods for understanding why people don't visit the museum (how do we get the information we are seeking),
2. Equity/diversity (how not to replicate patterns of inequity; building relationships with different communities)
3. How to use data for next steps/decision making (what is the data used for).

##### Abstract

We know from previous research that museums are not necessarily welcoming or engaging experiences for everyone; we also know that much of the work is framed around "barriers" to access and participation. This framing may represent deficit views and just surveying people may not get at the real reasons why people don't visit our museums.

The presenters have engaged in a variety of research and evaluation studies including racial-equity focused research, interviews with people who haven't visited, ethnographic research, visitor panels, and surveys of residents near our museums.

The presenters will share experiences from their research in and with communities to better understand what lies beneath the “barriers” of visitation and how our museums have used the information to institute thoughtful change from strategic focus, to volunteer programs to marketing efforts.

##### Importance

This dialog is critical to creating welcoming spaces built on equity and evaluation and research are not separate from that work. In fact, this work relates to data in pretty much every way: what kinds of data do we want to gather? What will be actionable? And finally, what information *should* we be gathering? And how can we do this work in a responsive and responsible manner? Creating space for these important conversations can allow for critical reflection of our work.

## Using Evaluation to Strengthen Community and Learning Organization Partnerships

### Presenters

Diane Miller, Detroit Zoological Society  
Claire Lannoye-Hall, Detroit Zoological Society

### Purpose

Participants will have a better understanding of how partnership-created learning opportunities can be facilitated in informal learning spaces. A year-long grant from IMLS allowed us to explore a partnership with the local Boys and Girls Club Staff and create a mutual vocabulary and understanding of situated learning opportunities between our education team and their staff.

The evaluation tool used to assess the SPARKS grant partnership was used in conjunction with anecdotal conversations at the workshops and planning meetings to allow staff from both organizations to target important concepts and teaching methodology to maximize the relationship as we prepared a larger grant proposal for future funding and strengthened the relationship between our organizations.

### Abstract

The Detroit Zoological Society received an IMLS SPARKS! Grant to explore a partnership with a community organization. We engaged with our local Boys and Girls Club, who serve thousands of metro Detroit youth. A series of four workshops were designed to bring the staff of both organizations together and begin to build a common vocabulary and mutual understanding of educational pedagogy amongst all the staff.

The workshops focused on understanding our audience, creating safe science learning environments, communication and humane education. We contracted with content area experts to provide a keynote for each workshop and then spent time exploring the concepts more in-depth through hands-on activities and discussions.

As part of the grant, all of the staff received a pre and post evaluation created by an external evaluator. We also took notes and met regularly with key staff to ensure each organization's needs were being met by the workshops. As a result of the in-person experiences and the information gathered, we crafted a proposal for a NSF grant to request funding for a multi-year program to build the staff's science literacy and implement authentic science learning opportunities for the youth they work with.

Having the anecdotal information from the workshops to compare what we were hearing in person to what was being shared on the written surveys was key to building an effective partnership. The ability to engage with BGC administrators as well as the staff that work at each club also allowed us to build a deeper understanding of the complete needs of the organization – from top to bottom. Synthesizing this information provided the opportunity to secure buy-in at all levels as we move forward with future programming.

### Importance

Authentically evaluating partnerships between organizations is essential to creating long-term, mutually beneficial relationships. This session will engage the audience in interpreting data collected from two newly partnered organizations, create actions plans based on common data themes, and compare the audience's interpretation with what our organizations found and acted upon.

## Developing a Common Language for Equity and Inclusion in Evaluation

### Presenters

Patricia A. Montano, Center for Advancement of Informal Science Education, Bridging Communities FIG Co-Chair

Lisa Trahan, The Lawrence Hall of Science, Bridging Communities FIG Co-Chair

### Purpose

Offered by the Bridging Communities Focused Interest Group (FIG), this roundtable discussion will bring together research and evaluation colleagues to pool perspectives on equity, inclusion, and culturally responsive evaluation. The FIG will document the discussion of terminology, examples of projects in informal learning environments, and related practices with the goal of sharing key takeaways with the greater VSA community. We hope this initial discussion, to be documented by FIG Co-Chairs, will feed into VSA resources available to members and the broader field, and contribute to a common understanding of these terms and practices within VSA.

### Abstract

Association members have voiced a need and desire to bring forth greater attention to recent work in visitor studies and related fields regarding diversity, inclusion, and cultural competence in evaluation as evidenced by the formation of the Bridging Communities Focused Interest Group (FIG), and several conference sessions devoted to those topics. Bridging Communities, formally established in 2015, aims to provide a forum for discussion and to connect colleagues on these topics. And over the past several years, VSA conference sessions have offered insight into the ongoing dialogue within the field; some examples of past sessions include, “Point of No Arrival: Cultivating Culturally Responsive Evaluation Practices” (Garibay, 2015) in 2015, “Rethinking the Language of Evaluation to Promote Inclusion of Diverse Audiences” (Stein, 2014) in 2014, and “Forum: Applications of AEA’s cultural relevance in evaluation statement to VSA” (Stein, 2012) in 2012. VSA members have also been influenced by BeyondRigor.org and various literature on culturally responsive evaluation and multicultural validity. Thus, we propose pooling together association members’ knowledge and experiences to discuss and reflect on what works best in our field, and work towards further building resources on these topics.

This session provides an opportunity to reflect on what frameworks and practices related to equity, inclusion, and culturally responsive evaluation are part of our work to further build common language, understanding, and practice. The discussion will be framed by questions such as:

- What presence and role do equity, inclusion, and culturally responsive evaluation have in your institution, consultancy, or individual evaluation practice? What were the sources and rationales for adopting those frameworks?
- What influences and resources (such as from universities, other professional organizations, colleagues, and research) help you to do intentional work related to equity, inclusion, and culturally responsive evaluation?
- How are these various frameworks operationalized in your work?
- What are examples of projects, tools, and approaches from the work of VSA members?
- What terminology, frameworks, and tools are most relevant and useful for VSA members and the visitor studies field?

Responses to the questions, and the ensuing conversation, will be documented and provide information to share with Association members. After the conference, the conversation and reflections will continue among FIG participants on topics that emerge as important and interesting, and which will be shared with the wider VSA membership through avenues such as future conferences and resources for VSA members.

### **Importance**

According to the American Evaluation Association, “[A]ll evaluation reflects culturally influenced norms, values, and ways of knowing—making cultural competence integral to ethical, high-quality evaluation” (AEA, 2011). This session will act as a forum to discuss visitor studies through this lens. This supports the FIG’s goals, which aim to build capacity for practices and competencies that support inclusion of diverse communities and perspectives, to provide collegial support and a voice for members seeking to develop cultural competencies in the various facets of visitor studies work. By reflecting on the influences to our field, discussing our own practices, and considering applications to visitor studies, we hope this discussion will illuminate more resources for members, and we hope this will be an early step in the long-term goal of building VSA as a resource on these topics for members and the wider field.

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- Stein, J., Garibay, C., Heimlich, J., Reich, C., & Valdez, S. (2012, July). Forum: Applications of AEA’s cultural relevance in evaluation statement to VSA. Presentation at the Annual Visitor Studies Association Conference. Raleigh, NC.
- American Evaluation Association. (2011). American Evaluation Association Public Statement on Cultural Competence in Evaluation. Fairhaven, MA: Author. Retrieved from [www.eval.org](http://www.eval.org).

### **Additional Resources**

- Developing an Evaluation Plan: Resources for Culturally Responsive Evaluation  
<http://www.informalscience.org/evaluation/developing-evaluation-plan>
- Hood, S., Hopson, R., Frierson, H. (Eds.). (2015). Continuing the Journey to Reposition Culture and Cultural Context in Evaluation Theory and Practice. Information Age Publishing, In.

# Science Engagement in Young Adulthood: A Golden Opportunity for Museums?

## Presenters

Josh Gutwill, Chair, Exploratorium

Marjorie Bequette, Science Museum of Minnesota

## Purpose

Science museums offer learning experiences for adults and children that spark curiosity and inspire lifelong engagement with scientific phenomena (National Research Council, 2009). Recent research on adult development suggests that “emerging adulthood” (ages 18-29 with no children)—the stage between adolescence and full maturity—is a period when young people become “unmoored” from the normative daily experiences of K-12 schooling and family-of-origin routines, and begin to explore and develop their adult identities (Arnett, 2000, 2006; Tanner, Arnett, & Leis, 2009). At the same time, popular media and some research points to a generational model of “millennials”—young adults born between 1980 and 1996—as possessing distinctly different habits, interests, and behavioral patterns from preceding generations. By directly engaging millennials during this transitional life period of emerging adulthood, museums may help to launch or strengthen lifelong science learning patterns.

Two studies conducted at different science museums investigated the learning experiences of emerging adults and millennials.

One study explored how millennials engage with the Science Museum of Minnesota to better understand their learning preferences, what form of marketing communications they connect with, and their attitudes and behaviors towards philanthropy and charitable giving. The study drew on data from two sources: (1) data from two surveys of adult audiences and (2) a review of the literature.

The first part of the study assessed how younger millennials might engage with the Science Museum of Minnesota differently from more mature adults. Data were collected during regular hours and at 21+ events. Ongoing work is exploring the ways that millennials who are parents (i.e., full adults) engage with the museum differently from those who are not parents (emerging adults). In the second stage, a literature review was conducted for internal museum use. From these two sources we explore ideas and suggestions for how to better engage with millennials at the museum in ways that align with their preferences and meet their wants and needs.

In a study at the Exploratorium, emerging adults were surveyed before, immediately after and 3 months after a museum visit. Half of the 244 participants were also interviewed immediately after and 3 months after the visit. The surveys and interviews focused on three aspects of learning, potentially affected by the visit: intelligence mindset (views of intelligence as either fixed or changeable), science interest (both new and developed interests), and science self-efficacy (beliefs in one’s ability to do and learn science).

Results indicate that, compared to pretest levels, both interest and self-efficacy significantly increased immediately after the visit, while growth mindset was unaffected. Self-efficacy was improved by mastery experiences and positive emotional states at exhibits. Long-term, self-efficacy for women remained significantly above pretest levels 3 months after the visit, but dropped back to pretest levels for men. The data on interest suggest that both new and developed interests were activated during the museum visit. Developed interest in some domains of science, however, dropped below pretest levels for both genders 3 months after the experience. This result demands further research, which is currently underway.

## **Importance**

John Dewey argued that in a thriving democracy citizens are immunized against coercion and dogma when they learn to make sense of the world for themselves. When confronted with environmental, medical, or other scientific controversies, adults' interests in science and beliefs about their ability to learn science may be critical to their responses. But how do people develop such interests and beliefs? These research studies investigated the behavioral patterns of millennials and found positive effects of science museum experiences on emerging adults' STEM-related interests and self-efficacy beliefs. In addition, the museums were able to meet the expectations of people in this age group and provide them with a valuable experience through both special targeted events and regular museum attendance. Science museums are well known for offering joyful learning experiences, but this research indicates they may also be important sources of interest and self-efficacy for emerging adult millennials.

## **References**

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- National Research Council. (2009). *Learning Science in Informal Environments: People, Places, and Pursuits*. Washington, D.C.: National Academies Press.
- Tanner, J. L., Arnett, J. J., & Leis, J. A. (2009). Emerging adulthood: Learning and development during the first stage of adulthood. In M. C. Smith & N. DeFrates-Dench (Eds.), *Handbook of research on adult development and learning*. New York: Routledge/Taylor & Francis.

## **Perspectives on Professional Growth, Impacts, and Organizational Change**

### **Session Chair**

Juli Goss, Crystal Bridges Museum of American Art

### **Session Presenters**

Marta Beyer, Museum of Science, Boston

Joe E. Heimlich, Lifelong Learning Group of the Center of Science and Industry

Leigh Ann Mesiti, Museum of Science, Boston

### **Purpose**

Museum professionals are often involved in various types of professional development (PD) over the course of their careers. What can research and evaluation tell us about the needs of these professionals and the many ways that enrichment opportunities impact these individuals or lead them to implement change at their organizations? Through this session, conference attendees will learn about new resources and frameworks for assessing professional growth, and they will have a greater understanding of the types of impacts that can be achieved by projects incorporating professional development. Conference attendees will also have deeper knowledge about the factors that facilitate or hinder the adoption of new practices following professional development events.

## Abstract

Importance and findings from large-scale professional development projects will provide conference attendees with a better grasp of how to support the work and professional growth of museum staff and help them implement new practices in their organizations. In this session, a moderator and three panelists who have studied museum professionals will share what the field knows about those working in informal science education (ISE) organizations.

*To provide context for the session, the moderator, Juli Goss, will present a broad overview of why it is important for the field to study and understand the needs and experiences of museum staff. She will touch upon key areas that should be considered when studying professionals and lay the groundwork for the presentations that follow.*

*Joe Heimlich will share information about a collaborative research project focused on an evidence-based informal STEM learning professional framework. His presentation will summarize the steps taken to develop a framework for the types of understanding and capacities science museum professionals need to acquire throughout their career. His presentation will underscore practical considerations for strengthening the professional development of the ISE workforce.*

*Leigh Ann Mesiti will then present findings from the Nanoscale Informal Science Education Network's (NISE Net) Professional Impacts Summative Evaluation. As one of the largest informal education networks ever created, NISE Net offered over 50 professional development resources and hosted gatherings for hundreds of professionals from informal science education institutions, colleges, and universities. In particular, the summative evaluation highlights areas in which professionals grew in terms of their sense of community, learning and understanding of nano, and use of products and practices that were encouraged by the Network. Through qualitative and quantitative data, this presentation will emphasize what we know about professionals' implementation of various public engagement practices such as engaging Spanish-speaking audiences and applying principles of universal design, and the types of experiences and materials they found useful.*

*Marta Beyer will take the conversation about professionals further, using a community of practice conceptual framework (Wenger, 1998) to consider how organizations facilitate or hinder professionals from enacting what they learn in professional development opportunities in their places of work. This research study looked at organizational change among museums participating in NISE Net and will provide attendees with a lens for understanding how to think about the factors that promote and inhibit change on a larger scale. Central to the analysis are how the existence of shared goals and the spread of information among staff members factor into whether or not professionals can implement new practices that result in lasting change.*

By hearing about a newly created framework related to professional growth and learning, coupled with findings from multi-year evaluation and research studies, attendees will expand their understanding of informal science professionals and effective PD opportunities. The moderator will conclude the session by providing thoughts on how this work can apply beyond those in ISE to professionals in museums of all types including the art world.

## Importance

Evaluators and researchers at all levels will benefit by learning from three perspectives about informal science education professionals. Through hearing more about each project's aims and findings, researchers and evaluators in attendance will have a better sense of what is known about science museum professionals' needs and preferences when it comes to professional development as well as factors that influence professional change on an organizational level. This information offers insights to all those currently designing and studying professional development opportunities in ISEs and other types of museums.

## References

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- Goss, J., Auster, R., Beyer, M., Mesiti, L.A., Grack Nelson, A. Guberman, S. & Kollmann, E.K. (2016). NISE Net Professional Impacts Summative Evaluation. Boston, MA: NISE Network.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. New York, NY: Cambridge University Press.

## Let Your Data Talk: Engaging Stakeholders in Data Discussions

### Presenters

Anna Lopez, Woodland Park Zoo  
Kimberly Pratt, COSI  
Rena Youngs, Minnesota State Arts Boards

### Purpose

As a move towards creating meaningful conversations about and around data and findings, this panel explores three approaches for engaging stakeholders more deeply in data conversations. Accessible to conference attendees with varied backgrounds in evaluation, this panel will encourage participants to consider audience, purpose, and context considerations when presenting data and findings for discussion. In addition, participants will learn about three distinct reporting or presentation approaches designed to engage stakeholders in making their own meaning of data and findings.

### Abstract

At the core of evaluation is the need to not only measure the impact of our institutions' work, but also provide the data and information necessary for decision-making and encouraging stakeholders' engagement with evaluation findings. Panel attendees will hear three organizations present different approaches to this challenge. By sharing their experiences, the presenters hope to inspire discussion about how to enhance effective communication about data and findings with stakeholders.

*The Audience Research team at Seattle's Woodland Park Zoo (WPZ) strategically added participatory analysis to engage stakeholders in the evaluation process. On top of creating and presenting traditional reports to internal clients, the team involved relevant stakeholders in the analysis and interpretation of preliminary and final data. To facilitate this new approach, WPZ evaluators implemented the use of data placemats in the evaluation of the new tiger exhibit. Using these tools, zoo staff ranging from educators and*

managers to exhibit designers and field conservationists delved into the data alongside the audience research team. What ensued was a participatory interpretation of findings and the creation of a collaborative space to draw conclusions and move forward with data-driven decisions.

COSI's Center for Research and Evaluation works with a diverse group of internal and external clients on a wide variety of research and evaluation projects each year. The desire to effectively present data and results to meet those stakeholders' needs is at the heart of their work. To accomplish this, the research and evaluation team developed a toolbox of novel practices. They work to determine the needs of different audiences and purposes then tailor the communication of individual findings to meet those needs – including meaning-making conversations, one-page summaries, innovative data visualizations, and in-depth technical reports. They often employ multiple techniques in any given project in order to address the different needs of varying audiences. This intentional thinking before and during projects has enabled COSI's Center of Research and Evaluation team to meet both their communication goals and client needs.

The Minnesota State Arts Board is a public agency that rewards grants supporting artists and arts organizations statewide. Because it grants public dollars, it faces explicit accountability requirements – not just for individual funded projects, but for its impact as a whole – including evidence related to five specific intended outcomes. A dashboard of key indicators was developed for two purposes: helping staff examine day-to-day performance and identify areas for improvement and helping the governing board make policy or program design decisions while keeping agency goals clearly in view. The lead developer of this arts dashboard will talk about the process of selecting indicators, tailoring selected data to the relevant stakeholders, and how design considerations play a role in keeping a wide range of single data points manageable for dashboard users.

In examining three approaches to strategically interpret and report findings, session participants will be equipped with new tools and considerations that support their own data-driven discussions with internal and external stakeholders, thereby promoting the use of visitor studies data in organizations more widely.

## **Importance**

Over the years, the field of evaluation and visitor research has grown. With the reliance on data to illustrate the visitor experience, questions arise as to how to use both data and findings to create meaningful conversations, influence the decision-making process, and increase capacity of stakeholders to understand and communicate findings to others. While data has the capacity to inform many changes, how we frame conversations with our clients and engage them in data is often left out. By discussing three strategies for engaging stakeholders in data and findings discussions, attendees will leave enlightened and inspired to engage their own stakeholders in conversation to achieve more effective communication and add relevance to findings that can influence future applications of evaluation results.

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Wilder Research (2016) Compass points 2016. Retrieved from [http://www.mncompass.org/\\_pdfs/compass-points-2016.pdf](http://www.mncompass.org/_pdfs/compass-points-2016.pdf)

Wilder Research (n.d.) Minnesota Compass: The data: Frequently asked questions about our data. Retrieved from <http://www.mncompass.org/about/the-data>

### **Additional Resources**

Aquarium of the Pacific - SITI Year 3 Data Summary for Discussion  
<https://drive.google.com/file/d/0BwSUsqlZSr41eWpaMVIVNVFmUnM/view>

Cincinnati Zoo & Botanical Garden – 2015 Reflective Tracking Study Executive Summary  
<https://drive.google.com/file/d/0BwSUsqlZSr41U3lyWjNOTTMyWkU/view>

Adapting Worldviews Programming for Your Institution <https://www.youtube.com/watch?v=C1c5Zu4--gY>

Worldviews Network Sites <https://www.google.com/maps/@31.1146289,-111.255307,4z/data=!4m2!6m1!1szK37aBsnuROI.kI3EUWGfjjdk>

Worldviews Network Evaluation <http://worldviews.net/evaluation/>

## **3:45-5:00, Concurrent Session—Three**

### **Time to Stop Talking to Ourselves: Capacity Building with Non-Evaluators**

#### **Presenters**

Taline Kuyumjian, Oregon Museum of Science and Industry  
Marianna Adams, Audience Focus Inc.  
Cindy Foley, Columbus Museum of Art  
Michelle Grohe, Isabella Stewart Gardner Museum

#### **Purpose**

The goal of this session is to encourage evaluators to consider alternative ways of learning from visitors by engaging those who work in direct service to them with them in the process. Evaluators and practitioners will share stories from their respective sides of the experience to show how valuable and easy it can be to do evaluation with non-evaluators.

- Specific themes explored will be:  
Innovative, practical, and useful strategies for documenting visitor experiences (collecting data) in informal learning environments that busy museum practitioners can implement.
- Time-efficient and rewarding data interpretation techniques that museum practitioners can directly apply to their work.
- Insights into the realities and potential effect of integrating evaluative thinking practices into the day-to-day work of an informal learning environment.

## Abstract

The intent of this session is to make the traditional panel presentation more participatory while efficiently presenting content and context of several evaluation processes and tools currently utilized by museum practitioners. The session will also give participants opportunities to experience some aspects of evaluative thinking. We will address three key points.

1. *Adapting evaluation methods for practitioner use*

Museum practitioners are typically over-scheduled and under-resourced so suggesting that they take on another time-consuming task like traditional evaluation is unrealistic. Yet the professional development value of engaging in various aspects of visitor research has wider reach than just finding out something about visitors. So it is critical that we adapt traditional methods and experiment with alternative methods of data collection to make it feasible for busy museum professionals. The Isabella Stewart Gardner Museum in Boston will share assessment tools that practitioners used to better understand learning over time (multiple years) as it pertained to retaining and growing school partnerships.

2. *Developing a Practical & Useful Documentation Processes*

The Columbus Museum of Art is working with Harvard's Project Zero Making Thinking Visible researchers as they develop Making Creativity Visible, an initiative to embed documentation practice into nearly all of the Museum programs. Documentation serves different purposes during different stages of learning. The criteria for what counts as quality documentation depend on the context. What seems to remain constant is that quality documentation focuses on some aspect of learning--not just "what we did"--and it prompts questions and promotes conversations among children and adults that deepen and extend learning.

3. *Engaging the Museum in the Interpretation of Data to Inform & Change Practice*

Analyzing the data that museum practitioners collect is often the most challenging part. Through conversation, multiple approaches for analyzing and interpreting findings in ways that are time-efficient and seek to build organizational capacity around evaluative thinking will be explored.

Oregon Museum of Science and Industry ground conversations by sharing experiences conducting formative evaluation on an Educational Model for engineering experiences. Using a team-based inquiry approach, all team members were involved in collecting, analyzing, interpreting and using data to move development forward. As a result of this experience, participants have become more comfortable using evaluation language, have begun advocating for more time to spend analyzing data from visitors, have actively sought out ways to embed data collection into future offerings and developed a deeper appreciation for what formative evaluation can offer to a project.

## Importance

Discussion explored in this session will focus on how adopting a culture of evaluative thinking can have wide-ranging effects on practitioners and institutions, including building stronger bonds with visitors and making data-driven decisions in service to them. By investigating ways to adapt traditional methodologies and create innovative, embedded methodologies that makes handling data accessible for busy practitioners, evaluators will learn how easy it is to broaden their work to include non-evaluators.

Experience has shown that engaging a diverse range of practitioners in evaluative work helps all parties gain deeper perspectives throughout all phases of the process. Institutionally this practice proves to be an effective means of building capacity and making data-driven decisions that can be applicable beyond evaluative work.

# Making Childrens' Learning through Play Visible: Developing an Observation Tool for Caregivers

## Presenters

Camellia Sanford, Rockman et al  
Claire Quimby, Rockman et al  
Robin Meisner, Providence Children's Museum  
Susan Letourneau, Providence Children's Museum

## Purpose

Session participants will learn about ways that children demonstrate thinking and learning processes through verbal and nonverbal play behaviors, and strategies for engaging caregivers in noticing and learning about children's learning and development. Participants will see an example of a project that incorporated existing research findings, interviews with visitors, observations, and conversations with educators to develop tools for observing children's thinking, and will practice using these tools and discuss possible applications for adult education and evaluation in play-based settings.

## Abstract

What does learning through play look like? One children's museum tackled this question in a recent project focused on how children demonstrate their thinking through play and caregivers' awareness of this learning at the Museum. This work included conducting a literature review to identify aspects of metacognitive thinking that might appear in children's play (for example, see Schneider, 2008; Whitebread, 2010; Zimmerman, 2002); holding group discussions with Museum educators; interviewing families to find out how they recognized children's thinking in the moment; cross-referencing the literature with behaviors mentioned by adults on the museum floor; and identifying a key set of observable behaviors that appear in children's play and that related to thinking skills like planning, strategizing, and reflecting.

The observable behaviors included:

- a.) Exploring with their senses
- b.) Watching and imitating others
- c.) Thinking out loud
- d.) Telling others what to do
- e.) Using trial and error
- f.) Repeating over and over
- g.) Looking focused
- h.) Expressing frustration
- i.) Sharing discoveries

The above behaviors were then incorporated into an Observation Tool — an activity designed specifically for caregivers to increase their awareness and appreciation of children's learning processes in the Museum. This tool contained a list of behaviors that caregivers could notice in their own children's play, along with brief explanations of each behavior's importance for children's thinking, and space for caregivers to record their own observations. By encouraging adult visitors to try their hand at observation, the Museum hoped to highlight aspects of learning that are visible in children's play, share specific information with caregivers

about their children's cognitive processes, and bring attention to the power of observation and similar research activities at the Museum. Formative testing of the Observation Tool indicated that caregivers were most interested in the connections between specific behaviors and information about children's thought processes. Using the tool caused many caregivers to observe their children in a more focused way and see the purpose behind seemingly common behaviors. Caregivers also expressed interest in the possibility of sharing their observations with Museum staff to contribute to research and evaluation.

The external summative evaluation of the Observation Tool found that the activity had an impact on caregivers' behaviors, caregivers' perceptions of their children's learning, and caregivers' ideas about conducting observations at the museum. Specifically, while caregivers used the tool, they were significantly less likely to be observed playing alongside or along with their children or teaching using verbal instructions, compared to caregivers who did not use the tool. However, several caregivers who tried the activity indicated that it had changed their perspective on their museum visit, noting that they had not previously reflected on behaviors, such as trial and error and repeating over and over, in their children's play. Evaluators also compared their own observations to caregivers' to investigate possibilities for adapting the tool for museum research or evaluation. Here, caregivers' observations of some behaviors were consistent with those of the evaluators, while caregivers tended to report other behaviors significantly more often than evaluators.

### **Importance**

The Observation Tool has potential for engaging adults in actively observing and reflecting on their children's play, but there are several questions that we must consider. In terms of observing children's thinking in museum settings – What behaviors can we identify, and how do we know when we are observing them? How can we identify and define behaviors that are meaningful for children's learning and recognizable by educators, caregivers, and researchers alike? What aspects of the environment and children's interactions with others might support these behaviors? In thinking about the future directions and implications of the research: How can caregivers' observations inform and possibly contribute to museum research? What types of learning are observable to museum visitors, staff, and evaluators? How can observation activities engage caregivers as learners in informal learning environments designed for young children? What roles do caregivers assume while using the tool?

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- Zimmerman, B. (2002). Becoming Learner: Self-Regulated Overview. *Theory into Practice*, 41(2), 64–70.

# Tackling Common Measures: Designing Evaluation Tools for Cross-Project Use

## Presenters

Karen Knutson, UPCLOSE–University of Pittsburgh Center of Learning Out of School Environments  
Mac Cannady, Lawrence Hall of Sciences  
Karen Peterman, Peterman Consulting  
Amy Grack Nelson, Science Museum of Minnesota

## Purpose

The informal learning research field has become increasingly interested in understanding how to compare experience and impact across settings. Papers discuss four different common measures studies; looking at family learning in natural history museums, public participation in science festivals, and youth experiences and the development of teamwork skills in science programs in informal settings. Presenters will discuss findings and methodological challenges of common measures studies.

- Mac Cannady: The Activation Approach: A Comprehensive Method and Toolkit for Evaluating the Impact of Science Learning Experiences Across Environments.
- Karen Peterman: Evalfest: Creating common measures for Science Festivals
- Amy Grack Nelson: Teamwork skills in out of school settings
- Karen Knutson: A Family Learning Framework: Common measures to capture learning experiences

## Abstract

### *The Activation Approach*

This presentation discusses the creation of a system for widespread measurement of Science Learning Activation (Activation). Activation is the combination of dispositions, practices, and knowledge that enable success in science learning experiences. Activation includes four dimensions: Fascination with science, Valuing science, Competency Belief in science, and engagement in Scientific Sensemaking. While the field recognizes the importance of studying these elements, whether they are called engagement, interest, enjoyment, including efficacy beliefs or even statements about student learning and behavior, these constructs are difficult to measure, and the resulting data are often difficult to interpret. By developing an online system which takes advantage of common technology we want to generate high-quality data and can still be used in low-technology environments.

### *Evalfest:*

EvalFest was based on the idea that a community-created multisite evaluation would be an effective model for creating common measures if it achieved a balance between evaluation items that were required and an opt-out option for items that were not. This presentation will share the process used to help the community identify a sub-set of common survey items that was used to collect data from 11,000 Festival attendees in 2015. The presentation will also show the project's data dashboard which was created to share the common results from the survey with EvalFest sites, and to allow comparisons between Festivals based on Festival and event characteristics. Finally, the presentation will include attempts to integrate existing scales into common measures for Festivals.

### *Teamwork skills:*

This presentation discusses the development and validation process of instruments to measure teamwork skills in STEM out-of-school time programs. Teamwork skills are part of the range of 21st century skills vital for developing tomorrow's STEM workforce, yet there are a lack of measures for evaluating these skills in

informal programs. Grack Nelson will describe the project's four-phase instrument design and validation process. She'll discuss results of a field-wide study to help decide what specific teamwork skills to focus on for middle and high school youth and how those skills are defined. She'll share the process and findings from expert reviews, think-aloud interviews, and various statistical procedures. Attendees will see a draft of the self-report rating scale instruments and be encouraged to provide feedback on the potential utility of the instruments for their settings.

#### *A Family Learning Framework:*

This presentation discusses a common measures study designed to capture family learning across a variety of natural history museums. Designed as part of the BISE project in conjunction, the study asks:

- What are the characteristics of families that are associated with deeper engagement and learning in museums?
- What are the dimensions of families that could potentially matter to the resulting learning and engagement that could take place?
- Can we adequately assess learning or engagement of a family museum visit in an easy to administer survey?

We have been able to create composite measures to explore learning across museums as well as differential measures to look at within family variances.

#### **Importance**

The session explores different ways of thinking about the use of evaluation data to advance the field's understanding of learning in informal settings.

#### **Additional Links**

Activation Lab Toolkit: <http://www.activationlab.org/toolkit/>

EvalFest: [evalfest.org](http://evalfest.org)

Science Festival Alliance: [sciencefestivals.org](http://sciencefestivals.org)

Collaboration in the 21st Century Project: <https://www.facebook.com/C2C.Survey>

Building Informal Science Education Project: <http://www.informalscience.org/building-informal-science-education-supporting-evaluation-exhibitions-and-programs>

# Evaluators Leading and Shaping Institutional Change

## Session Chair

Rebekah Sobel, Manager, Planning and Evaluation US Holocaust Memorial Museum

## Panelists

Rita Deedrick, Co-Director, COSI Center for Research and Evaluation

Nick Visscher, Audience Research & Evaluation Manager, Denver Zoo

Lei Zhao, Data Analyst, Audience Research and Evaluation, Shedd Aquarium

## Purpose

This session will help participants increase their knowledge and understanding of the evaluator's role in institutional planning and socializing change through data informed decisions.

Some key questions the panelists will address:

- Talk briefly about your institution's current place in operationalizing a "new" strategic plan.
- Share how your role has changed or how you are trying to change it in order to lead change in your institution.
- Talk about how your leadership of data projects and data informed decision making has helped and challenged change in your institution.

The panelists will then facilitate small break-out groups to discuss and help point out ways to combat challenges in driving change coming down from the top; managing and mapping out the beginning of large scale institutional change, looking at socializing change within the programmatic ranks, and using visitor feedback to drive institutional change.

## Abstract

The US Holocaust Memorial Museum in is year 3 of a 5 year plan to operationalize our programmatic outcomes and measure success toward those outcomes. Along the way we have had a few consultants help us in various capacities, but socializing change has come about organically. While we can identify sporadic "wins", we find this work slower and harder than we all expected it to be. We are tasked with developing systems to use data to: engage staff in the strategic plan language, measure success against language new to staff, and use that data to demonstrate both success and need to donors, as well as eventually make programmatic decisions. Through a VSA listserv post looking for advice, I was able to identify a number of colleagues in a similar role.

We are all involved in planning, socializing change and measuring "success" -- usually tasked by the highest levels of executive leadership, mostly in addition to our current roles in evaluation and data management. While our institutions are similar in size, visitation and operating budget, our roles vary. We are in different places along the path of institutional planning, working in the muck of change, or along side new ideas and staff entrenched in traditional ways. We are trying to figure out new systems, and will share with the audience how socializing institutional change through data informed decision making has helped and complicated the path and process along the way.

Historically, it has been difficult for many institutions to justify the commitment to add evaluators and evaluation to institutional staff. Many evaluators start in other roles and take on this hat. It is interesting that now a number of institutions now have internal evaluation staffs and units to call upon for a variety of data

collection, management and reporting needs, as well as the ability to conduct a large variety of independent and collaborative visitor studies. Coupling this growth with the changing non-profit leadership environment, institutional planning and socializing change among the wider staff seems to be an emerging or additional role for internal evaluators. We are leading and driving change from the inside. Our panel consists of internal evaluators in key planning roles talk about the "data revolution" going on in their institutions, where we are acting as catalysts, using our own data projects in many cases to drive change, socialize new plans within and prepare our institutions for the future. The panelists represent a variety of institutions that are involved in socializing change and operationalizing institutional plans, each less than five years into the introduction of new institutional language/ strategic plans. Each panelist has a unique vantage point in this discussion.

## **Importance**

Over the past 15 years, we have seen widespread growth of internal evaluation roles and staffs in museums, zoos, and aquaria nationwide. Coupling this staff commitment with the changing nonprofit leadership environment, institutional planning and socializing change among the wider staff seems to be an emerging or additional role for internal evaluators. We are leading and driving change from the inside. Our panel consists of internal evaluators in key planning roles talk about the "data revolution" going on in their institutions, where we are acting as catalysts, using our own data projects in many cases to drive change, socialize new plans within and prepare our institutions for the future. The panelists represent a variety of institutions that are involved in socializing change and operationalizing institutional plans, each less than five years into the introduction of new institutional language/ strategic plans.

## **Paper Presentations**

### **Beyond Self-Reports: Direct Measures of Informal Learning Experiences**

#### **Presenters**

Alice Fu, SK Partners

Archana Kannan, SK Partners

#### **Purpose**

While wary of false dichotomies, we find it useful to broadly distinguish outcome measures in informal STEM education as either indirect (e.g., self-reports of behaviors) or direct (e.g., observed behaviors). The goal of the session is to provide an overview of direct measures, including examples of their use in studies of informal STEM learning, and compare their strengths and weaknesses to self-report measures. We present preliminary results from a study of the feasibility of using performance assessments--a direct measure of participants' science knowledge, skills, and reasoning--in a STEM tinkering program. Session participants will be encouraged to share their experiences with direct and indirect measures.

#### **Abstract**

##### *Background*

The questions we ask drive the choices we make about the methods and measures we use. In turn, these choices largely determine the bounds of our understanding, as every measure sheds light on some aspect of the visitor experience but leaves another aspect in the shadows.

Interviews and surveys are often used in visitor studies. Offering an invaluable viewpoint, visitors may communicate their perspective on any number of outcomes, such as their own and others' learning, attitudes, engagement, and behaviors. We will briefly present findings of the overwhelming reliance on self-

reports in evaluations of informal learning (Fu et al., 2016). We reviewed all (N=36) summative evaluation reports from 2012 posted on informalscience.org, a central online resource of the informal STEM community. All but one of 36 reports included surveys and/or interviews.

Direct measures of targeted outcomes are less pervasive. Of 112 data collection instruments identified across the 36 summative evaluation reports, we classified fewer than one-quarter as direct measures; these mostly included tracking and timing and other observations, but also web analytics, performance assessments, tests, and concept maps (Fu et al., 2016). Employing such measures, especially in combination with self-reports, can help triangulate findings and draw a fuller picture of the informal experience.

#### *Examples: Advantages and Drawbacks*

We will share examples of direct measures used in various informal STEM environments to capture evidence of a range of outcomes. These include engagement (e.g., Serrell, 1998; Yalowitz & Bronnenkant, 2009); interest (e.g., Sneider et al., 1979); learning (e.g., Camargo & Shavelson, 2009; Randi Korn & Associates, 2008); choices (e.g., Schwartz & Arena, 2013); and visitation behavior (e.g., Kisida et al., 2014) (Fu et al., 2016). We will compare these examples with self-report measures of similar outcomes and discuss the advantages and drawbacks of both approaches.

#### *A Pilot Case*

Performance assessments are a class of direct measures focused on how learners execute tasks that are authentic to the targeted outcome(s). We studied the feasibility of employing performance assessments in an informal STEM environment, specifically a tinkering “workshop” where programs ranged from unstructured drop-in programs for the community-at-large to more structured afterschool and camp programs for students. We piloted performance assessments in the form of hands-on “puzzles” to capture evidence of participants’ knowledge, skills, and reasoning related to electric circuits. Each puzzle posed a question to be answered by manipulating physical materials commonly used in the workshop (i.e., wires, batteries, bulbs, motors). These performance assessments were adapted from tasks originally developed for school classrooms, and we will highlight some of the design choices made during the iterative development and piloting process.

Throughout, an essential goal was creating tasks that systematically measured learning outcomes, yet were integrated as a natural and seamless part of the informal experiences in the workshop. We will discuss lessons learned and questions raised regarding this goal.

Time permitting, we will invite session attendees to share their experiences with direct and indirect measures--their reasons for using (or not using) them, insights gained, lessons learned, and enduring challenges and questions.

#### **Importance**

Measures that illuminate the visitor’s perspective, including interviews, questionnaires, and other self-reports, have flourished in visitor studies. They will continue to do so, as the visitor’s own voice is irreplaceable. Yet, employing multiple ways of knowing provides a more robust and complete understanding about visitors and their experiences in informal learning environments. In addition to (or sometimes instead of) asking visitors to report on key outcomes, there are ways to measure some of those outcomes directly; more remain to be discovered.

We need to better understand the use of direct measures in informal learning--their strengths and weaknesses for different outcomes, audiences, settings, decisions, and so on. The conference theme, The Data Revolution, suggests considering how to generate new insights of and for the field. Our session intends to encourage the visitor studies field to look beyond self-reports and explore creative data sources that may serve as direct measures of outcomes.

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- Sneider, C. I., Eason, L. P., & Friedman, A. J. (1979). Summative evaluation of a participatory science exhibit. *Science Education*, 63(1), 25-36.
- Yalowitz, S. S., & Bronnenkant, K. (2009). Timing and tracking: Unlocking visitor behavior. *Visitor Studies*, 12(1), 47-64.

## Additional References

Enhancing Evaluation Capacity in Informal Science Education (project website from SK Partners): <http://www.informalscienceevaluation.org/>

## Using Sequence Analysis to Understand Visitor Behavior

### Presenter

Joyce Ma, The Exploratorium

### Purpose

This presentation will introduce the application of sequence analysis techniques to understanding visitor behavior at the museum, gallery, and individual exhibit level. Through three examples, the talk will illustrate how these techniques can help researchers and evaluators make sense of chronological data and shed new light on familiar questions using data (e.g. timing and tracking, computer logs) our field already collects.

## Abstract

Sequential data consist of a series of states and events ordered chronologically. Researchers and evaluators collect such data in timing and tracking studies and as clickstream data at multimedia and web exhibits. Although sequential data are nothing new in visitor studies, these datasets are rarely analyzed as sequential patterns where time ordering and dependencies matter.

Sequence analysis techniques can help researchers and evaluators understand the sequential data collected in visitor studies. These techniques encompass methods and metrics for understanding a chronological series of events or states as a unit, by providing means for 1) summarizing the time-dependent characteristics of a dataset, 2) grouping similar sequences to build a typology, 3) visualizing sequences, and 4) analyzing covariates across sequence types. First defined in biology to make sense of DNA sequences, these metrics and methods have since been adapted in the social sciences to study a broad range of topics including community traditions (Abbott & Forrest, 1986), career trajectories (Buehlmann, 2008), public health (Stone, Evandrou, Falkingham, & Vlachantoni, 2015), and historical events (Mercklé & Zalc, 2014).

In this presentation, I will introduce sequence analysis and illustrate, with three examples, how its analytic techniques and metrics can provide insights into questions about the sequential aspects of the visitor experience at the museum, the gallery and the exhibit level:

- Example 1: How do visitors typically move through a museum? Using location data collected from visitors' whole museum visit, I looked at the duration and sequence of galleries visited and identified and visualized the dominant movement patterns.
- Example 2: Is there a difference between how girls and boys experience the exhibits in a gallery? Mining timing and tracking and observation data, I looked for patterns in exhibit stops for girls versus boys.
- Example 3: What usability problems do visitors have at a multimedia exhibit? Using computer clickstream data in a formative evaluation study, I applied sequence analysis to identify problematic sequences that led to unproductive visitor experiences.

Accompanying each example are pointers to software packages (the TraMineR R package (Gabadinho, Ritschard, & Studer, 2011)) and scripts that researchers and evaluators can use to explore sequential patterns in their own datasets. In addition, attendees will be encouraged to think about and share how they might apply sequence analysis in their own practice during the Q and A portion that concludes the talk.

## Importance

The sequence analysis techniques introduced in this talk can be an important addition to the methods and tools used in visitor studies. They can enable visitor researcher and evaluators to re-examine prior data from a different perspective and pose and answer questions about the (sequential) nature of the visitor experience.

## References

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- Stone, J., Evandrou, M., Falkingham, J., & Vlachantoni, A. (2015). Women's economic activity trajectories over the life course: implications for the self-rated health of women aged 64+ in England. *Journal of Epidemiology and Community Health*, 69, 873–879.

## Talking About Thinking: Eliciting and Comparing Novice and Expert Strategies

### Presenter

Leigh Ann Mesiti, Museum of Science, Boston

### Purpose

- Participants will gain a better understanding of why looking at novice and expert strategies can inform design and learning supports.
- Participants will learn how to elicit and compare novices' and experts' thinking strategies and learning approaches.
- Participants will gain an understanding of the challenges and affordances of using video and interview-based retrospective, stimulated recall to investigate thinking and learning strategies used in informal learning experiences.

### Abstract

Strategies that experts use to learn about new things in their areas of expertise are, in some ways, more sophisticated than the strategies used by relative novices. This is because experts use their wealth of prior experiences to decide how to approach a problem (Chi, 2005). Through the use of strategically-designed learning supports, novices can be guided to use some of the more sophisticated thinking and learning strategies that are used by experts, enhancing what they are able to achieve at a given activity.

In this session, we describe a study that used a video-stimulated retrospective think-aloud approach to reveal the thinking and learning strategies used by visitors at computer science-based interactive activities. In the study, we compared the thinking and learning strategies used by experienced professional computer programmers and middle and high school students with little-to-no prior experience in programming.

As part of this protocol, an iPad was used to video-record learners as they engaged with each exhibit. Participants were then prompted to reflect upon and talk about their thinking as they watched the video

playback. This session will talk about the affordances and challenges of using video-stimulated, retrospective, think-aloud interviews to capture information from participants. Additionally, it will demonstrate how learning about the diverse perspectives of novice and expert learners helped designers and content developers make user-informed decisions around informal learning experiences. Our findings from this stage of the research suggested that both novices and experts used general thinking strategies and personally identified with the exhibits. However, experts were more likely to leverage their existing knowledge to try to understand or suggest modifications to the computer program represented in the researched exhibits. This session will consider how these findings encouraged the exhibit team to embed new learning supports into the design of the exhibits.

### **Importance**

Informal education settings strive to support a diverse group of learners with differing levels of knowledge and prior experiences. By looking at the engagement and outcomes of different types of learners, we can start to identify places where novice and expert learning strategies diverge, and where that divergence suggests opportunities to support learners to also engage in more sophisticated (or fruitful) learning and thinking strategies applied by those with greater levels of expertise. In our study, video-stimulated retrospective think-alouds were used to reveal variety in visitors' learning strategies at computer programming-based exhibits, and these findings were used to both understand and leverage the impact of design on learning for audiences with a range of prior experiences. This session provides an example of how this method was implemented during the study, and discusses the affordances and challenges of using this method in an informal learning environment.

### **References**

Chi, M. T. H. (2005). Commonsense conceptions of emergent processes: Why some misconceptions are robust. *Journal of the Learning Sciences*, 14(2), 161–199.  
Online link: <http://chilab.asu.edu/papers/EmergJLSpdf.pdf>

# Friday, July 22

## 10:15-11:30, Concurrent Session— Four

### Roundtable Discussions

#### Measuring Program Impact across a Community

##### Presenters

Kathy Kiser, Manager of Evaluation and Learning Research, Hurvis Center for Learning Innovation and Collaboration, Lincoln Park Zoo

##### Purpose

The goal of this round table discussion is to bring evaluators together to explore and discuss how to expand evaluation from focusing on individual outcomes to measuring a program's impact on the community as a whole. Through review of relevant literature and open discussion with colleagues we hope to better understand how other institutions are approaching the measurement of community impact as well as what the possibilities are for this work moving forward.

##### Abstract

Many organizations have spent considerable time and resources on building capacity to evaluate the impact of the various environmental advocacy and stewardship programs offered. While evaluations of these programs may show positive impacts on the program participants, it is important to understand how these individual outcomes relate to or result in impact to the community as a whole.

This idea is not new; this sort of evaluation has been done in many fields, such as public health. However, Lincoln Park Zoo plans to expand the usual approach by identifying, facilitating, and measuring community outcomes, rather than expecting participant outcomes to be replicated at a larger scale. Thinking about and measuring impacts on the community level presents challenges, just as in measuring program outcomes. Some of these challenges include:

- Selecting a manageable number of appropriate neighborhood or community level outcomes where impact can be demonstrated in a reasonable amount of time.
- Developing a logic model or strategy that details the intermediate outcomes required to achieve the longer term outcomes.
- Bringing together relevant knowledge, including research and practice, to serve as a framework for relationships in the logic model.
- Identifying valid indicators and finding measures for intermediate outcomes.
- Obtaining data at the community level.
- Linking program outcomes to community level outcomes.
- Communicating organizations' role in community impact.

Lincoln Park Zoo is still in the early planning stages of community impact evaluation. This session will explain our reasons for tackling this topic, how we are going about planning for evaluation while developing community programs, what we have learned along the way, and our plans moving forward. Once we've provided context, we invite participants to share their knowledge, work and ideas on this topic to address the above challenges or other relevant issues in measuring community impact. We hope that this session will not only benefit participants, but will help us refine an evaluation that we hope will contribute to the field.

### **Importance**

We are all aware of many wonderful programs that promote environmental advocacy and stewardship. Although evaluations of these programs show positive impacts on the program participants, our planet is still in crisis. A natural next step is to evaluate what, if any, impact these programs are having on the entire community, how individual outcomes relate to community impact and at which scale true environmental change may be possible.

### **References**

United Way of America. (1999) Achieving and Measuring Community Outcomes: Challenges, issues, Some Approaches. Downloaded 6/1/2016 at <https://www.epa.gov/sites/production/files/2015-09/documents/achieving-measuring-community-outcomes.pdf>

## **Museum Data Systems: How to Use What We've Got**

### **Discussion Leader**

Erin Gong, Evaluation Consultant

### **Discussants**

Jocelyn Mulvaney, Data Analyst, COSI

Jennifer Rigney, Senior Visitor Research, Monterey Bay Aquarium

Keri Ryan, Associate Director, Interpretation and Visitor Research, Art Gallery of Ontario

### **Purpose**

Participants will increase awareness of current trends and real-life projects at the intersection of visitor research and transactional data.

Participants will better understand the promises and pitfalls of using other forms of data (big data, existing data) to answer research questions.

Participants will be able to better identify the opportunities for and costs of leveraging transactional data at their institutions.

### **Abstract**

Join a dynamic discussion with evaluators leveraging data systems (admissions, point-of-sales, CRM) for visitor research. What can we learn from large data vs traditional visitor studies? What's the line between visitor research and market research? How do we wrangle this data, with what tools? Organizationally, who owns these data projects?

## **Importance**

In this roundtable we'll examine the role of transactional data in visitor research. We define transactional data as data routinely collected in museums' transactional systems (like point-of-sales, admissions, theater sales, gift shops, membership databases, email marketing software, event management software, etc.) that provides a wealth of information about visitors and visitor engagement, but is rarely utilized to its full potential. We've observed a growing interest in leveraging transactional data to inform visitor research, but as a field we're just starting to explore the possibilities. We plan to address this issue from both a practical and a philosophical perspective.

## **Thinking about Thinking: Fostering Studying Metacognition in Science Museums**

### **Presenters**

Josh Gutwill, Chair, Exploratorium

Toni Dancu, Exploratorium

Elizabeth Fleming, Museum of Life and Science

Wendy Meluch, Visitor Studies Services

### **Purpose**

The Science of Sharing project developed museum exhibits and month-long online social experiences (called Experimonths) to (a) foster public experimentation with cooperation, resource allocation, and collaborative problem-solving; (b) promote awareness of connections between these experiences and STEM-related research in psychology and economics; (c) build skills in metacognitive reflection on social behavior; and (d) help people link individual behaviors to issues of resource depletion and group conflict, such as energy crises, arms races, ecosystem collapse, and climate change. Metacognition—thinking about thinking—was a crucial learning goal and was assessed in multiple ways across the project. In the session, participants will learn the definition of metacognition and its importance in the learning process; multiple methods for assessing it in a museum environment; results from two studies of metacognition within the project; and research-supported exhibit and activity designs that successfully fostered such reflection.

### **Abstract**

Two streams of research associated with the project produced significant results. Both of them focused largely on the effectiveness of the Science of Sharing deliverables in prompting personal and social metacognition--thinking about how oneself and others think, process information, form opinions and beliefs, and make decisions. Metacognition has been identified as an important factor for enhancing student learning in formal learning environments (Baird, 1986; Dunlosky & Metcalfe, 2008; Mevarech & Fridkin, 2006; Pugalee, 2001; Wang, Haertel, & Walberg, 1997; Veenman, Van Hout-Wolters, & Afflerbach, 2006). Promoting metacognitive awareness of how people perceive behavior, interpret motives, and make decisions in social situations, and learning more about factors that spark and sustain metacognition, were key goals of SOS exhibits and Experimonths.

More than 500 Exploratorium visitors and Experimonth participants were included in the project's external summative evaluation, which found evidence that Science of Sharing users (a) engaged in metacognition about thoughts and behaviors involving competition, collaboration, and resource sharing and about contextual factors affecting human behavior; and (b) made connections between these experiences and broader issues involving social behavior and human impacts on the environment. In fact, a comparative

study found that museum visitors using Science of Sharing exhibits were significantly more likely to engage in metacognition than visitors using Physics exhibits. Methodologically, the summative study utilized a quasi-experimental treatment-control design with tracking-and-timing, interviews of museum visitors and immediate and 6-month delayed interviews of Experiment participants. For coding and analysis, the study developed interview protocols and coding schemes for assessing metacognition. (The latter were adapted from schemes created for the research project, described below.)

In a second study, researchers on the team sought to explore the efficacy of the broadly-used educational strategy of question asking for triggering metacognitive reflection (Abell, 2009; Choi, Land & Turgeon, 2005) by incorporating reflective questions into a multipage flipbook-style exhibit label. Study participants used one of three exhibits requiring visitors to communicate and consider one another's perspectives, goals, or motives. After exploring the exhibit, they saw two questions on the added flipbook label—a specific one asking them to reflect on how they interpreted and made decisions at the exhibit itself, and a general one asking them to think about similar situations in their everyday lives. Their interactions and discussions were recorded on video and analyzed for evidence of metacognition during the process. Data from 59 participant dyads revealed that these label questions led to a large and statistically significant increase in the proportion of time visitors spent engaging in metacognition. The video coding required development of a reliable coding scheme.

The methodological deliverables created in these studies include valid and reliable protocols for coding metacognition in audio/video data and interview responses, coding schemes for interview questions about “scaling up” museum interactions to real-world environmental issues, and tracking and timing approaches using overhead cameras.

## **Importance**

Scientific research on how people cooperate, weigh short-term personal goals against longer-term community outcomes, and share resources sheds light on social interactions at the heart of critical problems facing our world, including sustainable resource use, climate change, income inequality, and ethnic and religious conflict. The beliefs, social interactions and behaviors of individuals represent a microcosm of those of larger communities and nations. Consequently, for museum visitors to consider these issues deeply, it is not enough to simply learn about them; they must reflect on their own thinking and behavior. Our studies found that exhibits that portrayed visitors' social interactions as the phenomenon under study were successful at promoting metacognition. Building on Ma's (2012) research on exhibit designs to enhance metacognition, these exhibits typically involved at least two simultaneous users, offered a challenge or social dilemma to explore, and presented a metacognitive question for visitors to answer.

## **References**

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Mevarech, Z., & Fridkin, S. (2006). The effects of IMPROVE on mathematical knowledge, mathematical reasoning and meta-cognition. *Metacognition and learning*, 1(1), 85-97.

Pugalee, D. K. (2001). Writing, mathematics, and metacognition: Looking for connections through students' work in mathematical problem solving. *School Science and Mathematics*, 101(5), 236-245.

Wang, M. C., Haertel, G. D., & Walberg, H. J. (1997). What Helps Students Learn? Spotlight on Student Success.

Veenman, M. V., Van Hout-Wolters, B. H., & Afflerbach, P. (2006). Metacognition and learning: Conceptual and methodological considerations. *Metacognition and learning*, 1(1), 3-14.

### **Additional Resources**

Exploratorium's Science of Sharing Website: <http://www.exploratorium.edu/visit/west-gallery/science-of-sharing>

Museum of Life and Science's Experimonth Website: <http://science.experimonth.com/>

Science of Sharing project description on informalscience.org: <http://www.informalscience.org/full-scale-development-project-science-sharing-exhibits-and-activities-fostering-investigation>

Science of Sharing Summative Evaluation Report: [http://www.informalscience.org/sites/default/files/2015-11-24\\_SoS\\_Summative\\_Report\\_Fin\\_12Nov2015.pdf](http://www.informalscience.org/sites/default/files/2015-11-24_SoS_Summative_Report_Fin_12Nov2015.pdf)

## **How to Keep from Drowning in Data**

### **Presenters**

Jennifer Borland, Rockman et al

Elee Wood, IUPUI

Claire Quimby, Rockman et al

### **Purpose**

There is a wealth of data that can be accessed or collected, but just because you *can* doesn't mean that you should. We examine ways to triage different datasets to identify those that are best-suited to answering the questions they seek to answer. Participants will be able to identify "Personal Flotation Devices" i.e., resources that can help evaluators organize and analyze large sets of data in the "safest" and most efficient ways possible. We'll also seek to provide an overview of strategies for ongoing data collection in the absence of current evaluation goals (i.e., data collection with "No Guard On Duty").

### **Abstract**

Drawing on a variety of lifeguarding analogies, our team of data-collection and analysis "lifeguards" seek to provide tips and strategies for evaluators. Our "pool rules" for working with data will help novice and veteran evaluators alike in their efforts to stay afloat and avoid the risk of drowning in data.

In this digital age of ever-abundant data, it is more important than ever for evaluators to be strategic in their approach to data collection and analysis. Just because you can get your hands on data, doesn't always mean that you should. Without a strategic plan for data collection and analysis, evaluators can end up with

too much, too little, or possibly the wrong types of data and in some instances the presence of too much data can present obstacles to timely or cost-effective completion of evaluation projects.

We will explore differences between “shallow-end” and “deep-end” data (i.e., simple vs. more complex sets of data that might require more skill, time and/or resources to process) and identify strategies for self-assessment of one’s skills for survival in different depths of data. Likewise, we will explore the benefits and drawbacks of contained vs. open-ended approaches to data-collection that are not unlike the challenges faced by lifeguards in pools vs. open-water settings.

Sometimes evaluators don’t have the luxury of being able to plan for data collection in advance--sometimes we simply inherit large, unruly sets of data. We’ll offer strategies for these instances, including approaches that allow evaluators to grab hold of their data without allowing it to bog them down and drag them under. Likewise, institutions and organizations sometimes seek to gather data outside of the context of a specific evaluation so we will present effective strategies for collecting data when there is “No Lifeguard on Duty.”

We’ll also examine a variety of different “Personal Flotation Devices” i.e., specific resources and tools that can make the data collection and analysis process go more smoothly and “safely” (e.g., protecting against data loss or miss interpretation of specific data points).

### **Importance**

Data can be a great blessing and incredible resource - but it can also present serious challenges when there is an abundance of it and no clear plan for how to make sense of it all. This session seeks to discuss this challenge and present potential solutions and strategies for how to keep from drowning in data.

### **References**

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### **Additional Resources**

Session Slides: [https://docs.google.com/presentation/d/1-CZZYAu7vn7cWLWVUH-sAd\\_ve71HPBdrPpJOS-IY1Sw/edit?usp=sharing](https://docs.google.com/presentation/d/1-CZZYAu7vn7cWLWVUH-sAd_ve71HPBdrPpJOS-IY1Sw/edit?usp=sharing)

# How Audiences Find Relevance: Research Methods and Findings in Two Innovative Exhibitions

## Session Chair

Jessica Luke, University of Washington

## Panelists

Alice Anderson, Science Museum of Minnesota

Allison Cosbey, Conner Prairie

Elizabeth Kunz Kollmann, Museum of Science, Boston

## Purpose

This session will explore how two exhibitions were designed to prompt visitors to make connections to their lives, interests and experiences and how two research teams analyzed these instances in recorded family conversations. The exhibitions that will be discussed were different in terms of setting and scope: the Create.Connect exhibition at Conner Prairie in Fishers, Indiana brought STEM hands-on activities and historical setting together, and the Nano "mini" exhibition was developed by the Nanoscience Informal Science Learning Network (NISE Net) and distributed to over one hundred museums nationwide. Take-aways from the session will include methodological best practices around data collection, data analysis for rich data sets (approaches to coding, data management, connection to intentionality in exhibit design) and discussion of findings. Session attendees will be invited to listen to visitor conversations, participate in a data sorting and coding activity, and engage in discussion around the purpose of such studies.

## Abstract

Both exhibitions and the analysis of visitor experience drew from previous studies of group conversations in museums and how visitors find personal relevance in the exhibitions that can lead them to make deeper connections or new insights. The session facilitator, Jessica Luke, will bring in reflections from other studies and analysis methods used to document visitor experience. Presenters from both study teams will detail their respective experiences examining how family groups discuss exhibitions in relation to their lives, taking session attendees on a comparative tour of their processes.

### *Exhibition Design*

We will describe the exhibitions through audio and video to highlight the ways in which the exhibits were designed to be innovative and elicit personal connections. In particular, we will note the influence of historical objects in Create.Connect as a key trigger for historical thinking conversations, and the way in which these conversations interacted with conversations at hands-on STEM activities. In terms of Nano, we will discuss how the content presented in the exhibition was a trigger for discussions of relevance.

### *Coding Frameworks*

After describing the exhibits, we will share audio of visitor conversations in the exhibits and have a chance to explore our coding schemes through a hands-on activity. Through this activity we will discuss how we developed our coding schemes and what other sources they were drawn from. We will also compare our coding schemes and analysis as they related to our research questions and the goals of the exhibit.

### *Lingering Questions and Emerging Theories*

Examining visitor talk in this in-depth qualitative analysis raised many questions about how additional contextual factors may influence conversations, such as:

## Intra-group dynamics

- Visitor agenda
- Prior content knowledge
- The influence of staff facilitation or adult support on children's learning
- Design of the exhibition experiences
- Prior experience with related skills, such as scientific experimentation or the engineering design process

The presenters will discuss the conclusions drawn from the present studies, new hypotheses, and ideas for future studies.

## Importance

Creating exhibits, programs and media that allow for participants to connect with their own lived experience helps learners situate information within what they already know and act as a bridge into new content. In these projects, we asked similar questions about how connections were triggered by the exhibition and what effect they had on a family's conversation and learning. The extensive coding in both projects illustrate the interplay between exhibit content, personal meaning making, and group conversation. These studies enhance our understanding of how science and history are made relevant to families' lived experiences through hands-on interactive activities and facilitation.

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### **Additional Resources**

<http://createconnect.org/research/>

<http://nisenet.org/catalog/nise-net-research-how-visitors-find-and-discuss-relevance-nano-exhibition>

## **Multilingualism in Museums: A Case for Broadening Our Thinking**

### **Presenters**

Cecilia Garibay, Garibay Group  
Laura Huerta Migus, Association of Children's Museum  
Juli Goss, Crystal Bridges Museum of American Art

### **Purpose**

In this session, we examine critical issues regarding language and access for multilingual audiences, including the role of evaluators and researchers in more adequately addressing issues of language in museums. This session draws and builds on key ideas outlined in the "Redefining Multilingualism in Museums" issue of the Museums and Social Issues journal as a springboard for discussion. A goal of this session is to spark discussion on the implications of ideas presented for the work of evaluators and researchers.

### **Abstract**

As the museum field increasingly turns its attention to shifting demographics and providing access to a broader public audience, making museums accessible to multilingual audiences has become a major question. In the spring 2015, the Museums and Social Issues journal published a special issue, "Redefining Multilingualism in Museums," which examined the role of language in the museum experience.

Garibay and Yalowitz (guest editors) argued that the issue of language in museums is not solely about providing bi-/multilingual interpretation or access to content. Rather, language is a central aspect of culture that requires museum professionals to consider it as a core to the visitor experience. To that end, the volume brought together articles that united theory, research, and reflections from practitioners to examine "the nuances of linguistic theory and practice, and bilingual and multilingual identity, [so that] museum

practitioners can begin to see and think differently about communication with diverse audiences” (Woods, 2015). The issue of language and bi-/multilingual audiences, of course, are as critical for researchers and evaluators to consider as they are for museum practitioners.

In this session, we use key ideas presented in the articles from this volume of the journal to further examine critical issues regarding multilingual audiences and the role researchers and evaluators play in more adequately addressing issues of language in museums.

*In our discussions for example, we examine the following areas:*

The ways language is inherently tied to socio-cultural practices and identity. How might this understanding help evaluators and researchers consider the implications of these ideas for museum experiences? How might this lead researchers/evaluators to develop different study designs than those currently typical in visitor studies?

Using a critical theory lens, we can examine the power politics of privileging one language over others and ways museums can either uphold existing societal power structures or adjust their practices to be more inclusive. Discussions might lead us to consider not only how museums fit into larger social structures, but it may also raise questions about our roles and responsibilities we each have in our individual work in addressing issues of under-representation by linguistic communities.

Challenging our assumptions of multilingualism as something confined to spoken language, can expand our conceptions and conversations about language and which audiences are included. How might we approach our work differently, for example, if we included communities using American Sign Language in our conversations about multilingual visitors?

Examining this topic through various perspectives can help broaden our understanding of the complexity of linguistic diversity and museum audiences, and can help push our thinking about our evaluation and research practices.

### **Importance**

Although as a field we have begun to recognize the need to deepen our understandings about multilingual audiences and to consider implications for practitioners, there has been scant conversation about the implications for evaluation and research both in terms of their own practice or the role evaluators/researchers play in broadening participation of multilingual audiences.

### **References**

Garibay, C., & Yalowitz, S. Y. (Eds.). (2015). Redefining Multilingualism in Museums. [Special Issue]. *Museums & Social Issues*. Issue 1, 1-94.

## 1:45-2:00, Concurrent Session— Five

### Roundtable Discussions

#### What Does That Mean? Exploring the Language of Outcomes

##### Presenters

Cathy Sigmond, Randi Korn & Associates, Inc. (RK&A)

Sarah May, Boston Children's Museum

Elizabeth Bolander, Cleveland Museum of Art

##### Purpose

The words we use to talk about our goals for audiences have an enormous effect on how we move forward in our work as museum professionals. Words like "connections" and "engagement" regularly emerge in discussions about a project's intended outcomes, for everything from programs to interactives to whole exhibitions. But what do we really mean when we say that we hope visitors "connect" with content or a theme? What does it mean for visitors to "engage" with an artwork or multimedia piece? Simply put, in what ways does language create a barrier to successfully defining outcomes and ensuring that everyone on a project team, from designers to educators to evaluators, is truly on the same page? In this roundtable, VSA attendees will discuss the challenges evaluators and practitioners face when outcomes include ambiguous language, and will learn ways to find common ground when defining outcomes to ensure successful evaluation projects.

##### Abstract

What do we really mean when we use words like "connections," "comfort," and "engagement" in intended project outcomes? This active roundtable discussion will investigate questions and issues surrounding the language we use when defining and communicating our work. We'll look intensely at a few words that commonly find their way into project outcomes—connections, engagement, and comfort—in addition to other rampant buzzwords like familiar and relevant. Drawing from their own experiences, panelists will discuss the variety of definitions of and issues around the use of these words in defining outcomes for various projects. Session attendees will then rotate through a series of breakout activities to dive deeper into the semantics of some of these all-too common words.

*Cathy Sigmond* will discuss her experiences at RK&A working with a variety of museum clients to define outcomes; most recently, for teen programs at a contemporary art museum and for a fossil exhibition at a natural history museum. She'll highlight some of the qualities of well-articulated outcomes, different categories of outcomes, and the differences between outcomes and actions; and, along the way, introduce some common struggles practitioners encounter when defining outcomes as well as the powerful ways in which language can shape our practice and ways of thinking. Common "problem words," such as "engage," "understand," "appreciate," and "become aware" will be discussed.

*Sarah May* will discuss how various staff members at Boston Children's Museum have conceptualized "comfort" as a visitor experience outcome, although definitions have been ambiguous and have changed over time. She'll discuss how going through the process of clarifying various definitions of "comfort" led stakeholders to realize they were actually talking about several distinct ideas. By breaking down the concept

of "comfort" into more accurate language that described several visitor experience outcomes, the process helped shape specific programming and exhibit design strategies, and has allowed teams to identify clear indicators of success from the beginning of new projects.

*Elizabeth Bolander* will discuss the different avenues of “engagement” that occur at the Cleveland Museum of Art, including with the community, programs, art, and technology. This often-cited word meant very different actions to different stakeholders. Through a collaborative process, researchers worked with internal stakeholders to define different actions and levels of “engagement” appropriate for their projects. During a recent Community Engagement study, the opinions of outside stakeholders were incorporated into defining what engagement really meant to them. This led to important findings about what they perceive to be the museum’s role in their lives and neighborhoods and ultimately helped drive future strategy decisions regarding the museum’s programming in previously underserved communities.

Throughout the session participants will have opportunities to brainstorm and discuss “problematic” words as well as learn practical tips for clarifying outcomes in their own projects.

### **Importance**

Characteristics that define informal learning environments can lead to challenges when defining outcomes of informal learning. Working to clarify the meaning of outcome-related terms may not be quick or easy, but it is an important part of evaluation work because it will affect the project later on. Through participation in this dynamic roundtable, VSA attendees will leave with practical knowledge about issues related to defining outcomes. Additionally, hearing about concrete examples of realistic ways to be intentional about language at the outset of a project and throughout the project will offer attendees tangible suggestions for how to better implement these practices in their own work. Attendees will leave this session armed with a deeper understanding of how talking through the semantics of what we do and what we hope to achieve has real impact on the meaningful subject matter that museums create and how we approach evaluating the visitor experience.

### **Additional Links**

Korn, Randi. (2007). The Case for Holistic Intentionality. *Curator* 50(2): 255-264. Retrieved from: [http://randikorn.com/docs/the\\_case%20for\\_holistic\\_intentionality\\_042007.pdf](http://randikorn.com/docs/the_case%20for_holistic_intentionality_042007.pdf)

Korn, Randi. (2015). Thinking Critically About Outcomes. *Intentional Museum Blog*. Retrieved from: <https://intentionalmuseum.com/2015/09/30/thinking-critically-about-outcomes-plus-rkachat-is-back/>

## **Survey Defense is Common Sense: Securing Our Online Data Tools**

### **Presenter**

Dolly Hayde, MA – Lifelong Learning Group, COSI

### **Purpose**

Researchers and evaluators will learn about a range of simple and widely applicable strategies for making online surveys more secure and ensuring that data gathered online come from authentic sources. Attendees will benefit from discussing how data security strategies can be implemented in realistic scenarios. Additionally, they will practice using these strategies in combination for greater efficacy. All participants will receive a suite of take-home resources that will help them implement these strategies in their own

professional contexts. Following this session, participants will be aware of widely-applicable strategies for building secure surveys, ensuring that data are authentic, and for preventing data security issues. Participants will also be aware of ethical considerations and best practices for working with data gathered online, and they will have the opportunity to see and practice processes for incorporating security strategies into their online survey tools.

## **Abstract**

This session aims to offer a primer on protecting online surveys from the ground up, as well as on methods for dealing with suspicious activity connected to online surveys. In addition to the group conversation about issues and lessons learned, the session will include discussion of best practices, potential threats to data security, and practical strategies for protecting online surveys, as well as take-home resources and opportunities to apply some of the principles described. The session will begin with some background information to support understanding of online threats to data authenticity, quality, and security, as well as some strategies for preempting such threats and protecting human subjects and evaluands. Following this overview, participants will have the opportunity to raise additional considerations or examples from their own work. This session will allow for hands-on practice in 1) developing and including up-front safeguards that can be built into surveys, and 2) strategies for authenticating data and mitigating impacts to respondents when unanticipated threats affect online survey tools. Topics will include various types of inauthentic data, including bots and “professional respondents,” along with rationales usually connected to each; ways to prevent inauthentic data from being submitted; and ways to identify and quarantine inauthentic responses while cleaning survey data. A major theme will be the ways in which multiple strategies for securing online tools can be combined. To ensure that these strategies can be implemented most effectively, the session will also review key considerations for working in online contexts, including protecting human respondents, storing digital data, and browsing and communicating securely.

## **Importance**

Even as online data collection tools provide unprecedented opportunities for gathering feedback from respondents, digital space comes with unique contextual considerations about how to collect and store data effectively and ethically. Most professional survey systems provide top-of-the-line encryption and use practices that align with the requirements of government agencies and institutional review boards; together, these safeguards are consistently successful at preventing data breaches. However, both data quality and the privacy of human subjects can still be affected by the behaviors of respondents and researchers. For example, when public surveys are targeted by opportunist respondents, their structures can be exploited for informational or financial gain. Meanwhile, even private surveys can pose risks to anonymity and confidentiality of data if researchers do not manage their online activity securely. Therefore, best practices for developing online tools, as well as for managing data collected online, should be considered an important skill set for evaluators.

## **References**

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## **Effectively Working With and Supervising Research and Evaluation Support Staff**

### **Presenters**

Chris Cardiel, Oregon Museum of Science and Industry  
Ellen Roth, Denver Museum of Nature & Science  
Nick Visscher, Denver Zoo

### **Purpose**

Are you a supervisor of research and evaluation support staff, thinking about establishing a support staff system at your organization, or just interested in learning how to work productively and effectively with support staff? Then we have just the session for you! As a result of involvement in this session, participants will (a) possess increased awareness of systems and strategies for working effectively with research and evaluation support staff, (b) gain a more nuanced understanding of the types of research practices and tasks which may be suited to support staff involvement, and (c) establish connections with others active in the field of visitor studies who can serve as resources and collaborators in their own efforts to effectively work with and supervise research and evaluation support staff. Join our diverse group of panelists for a discussion of successes, challenges, and lessons learned!

### **Abstract**

In this session, a group of panelists from a variety of institutions across the country (including a science center, a museum, and a zoo) will discuss their experiences supervising and working with R&E support staff. By exploring the unique opportunities and challenges involved in the oversight of support staff systems, we hope to advance the field’s knowledge and capacity related to this exciting and promising avenue for growth and flexibility. Intended outcomes for session participants include (a) improved capacity in both supervising and working with R&E support staff, (b) a better understanding of the potential challenges and opportunities involved, and (c) greater awareness of systems and structures which have been used by others and of professionals across the field who may serve as resources for ongoing discussion.

The session will begin with a brief activity to solicit questions and encourage active engagement; this will likely take the form of a show-of-hands Q&A accompanied by audio/visual supplements as appropriate. This will be followed by brief presentations by a panel of three R&E support staff supervisors, each highlighting strategies and approaches to the management and structure of these teams and posing a question to “seed” discussion among session participants. Panelists will use their own experiences, successes, and struggles to frame specific key issues for consideration and discussion.

*Chris Cardiel, OMSI*, will bring his experience supervising a team of R&E Assistants and R&D Assistants possessing a range of proficiencies, scheduling needs, and professional goals and identities. Chris will share systems to (a) receive support requests from staff in a clear and consistent manner; (b) track the individual and overall workload of the support staff in order to identify and address potential concerns; and (c) solicit feedback from support staff and the team members with whom they work for each assignment.

*Ellen Roth, Denver Museum of Nature and Science, and Nick Visscher, Denver Zoo*, will discuss the benefits and challenges of working with and managing part-time research assistants that mostly do not have a social science background, but are greatly interested in museums, zoos, and learning about how these organizations impact their community. Both will share lessons learned growing capacity in these staff to fulfill more challenging roles. Additionally, both presenters will address their experiences with utilizing unpaid graduate student research assistants in audience-based studies.

Following these presentations, participants will engage in discussions where they can share examples and perspectives and consider key questions. (While panelists will circulate and contribute to conversations as appropriate, discussion will be largely guided and informed by the experiences and interests of session participants.) Additionally, each panelist will bring at least one example of tools or resources they have used to coordinate teams of R&E support staff, and participants who have experience with similar roles or who are currently exploring the establishment of such teams are encouraged to bring examples from their work. The session will end with a large group discussion; panelists will also offer a few closing thoughts synthesizing the key points raised during the roundtables.

### **Importance**

As museums, science centers, and other informal learning institutions seek effective strategies for balancing research and evaluation (R&E) workloads while keeping staff turnover to a minimum, flexible “support staff” systems are increasingly being explored as a means of responding to fluctuating needs. By recruiting and maintaining a support staff, R&E departments have the ability to increase their internal capacity, supplement their team’s skill set and toolkit, and position themselves to better meet increasingly complex administrative, planning, and data collection and analysis needs. Through participation in the session, the presenters hope that participants will build their capacity to both supervise and work with R&E support staff by gaining a stronger understanding of the dynamics of these teams within larger institutional systems, and that they leave inspired to continue this discussion with one another and with session presenters as appropriate to the unique needs and opportunities of their home institutions.

## Museum Theatre: Evaluating Affect Learning Experiences

### Presenters

Rachael Mathews, The Children's Museum of Indianapolis  
Betsy O'Brien, The St. Louis Science Center

### Purpose

Session leaders will present two different case studies from separate institutions that examine the question of measuring the visitor experience when that experience is emotionally driven, through the medium of Museum Theater. Presenters will share their methodology, analysis, and results, as well as facilitate an interactive discussion with attendees about successes and challenges with this topic.

## Generating Causal Evidence in Visitor Studies: The Potential of Quasi-Experimental Designs

### Presenters

Scott Pattison, Oregon Museum of Science and Industry, Institute for Learning Innovation  
Ryan Auster, Museum of Science, Boston  
Mac Cannady, Lawrence Hall of Science

### Purpose

Quasi-experimental designs offer researchers one method for determining causality in informal or free-choice learning environments. In this session, presenters will share examples of quasi-experimental studies and facilitate a discussion about strategies for applying the approach to other projections. Participants will: (a) gain awareness of the potential for quasi-experimental designs to address important questions in visitor studies evaluation and research; gain knowledge of techniques and strategies for using quasi-experimental designs, including practical strategies for addressing threats to internal validity; and engage in discussions about the implications of quasi-experimental designs for the visitor studies field.

### Abstract

This session will feature two federally funded research projects, REVEAL and FREDE, that used quasi-experimental designs to study the impact of staff facilitation on visitor engagement and learning in science centers.

#### *Researching the Value of Educator Actions for Learning (REVEAL)*

REVEAL is a three-year, NSF-funded research project focused on describing and measuring the impact of staff facilitation with families at interactive math exhibits in a science center. Building on an initial design-based research (DBR) study, investigators tested key aspects of the project's theoretical model of staff facilitation through a quasi-experimental study with four different museum educators that had been trained in the techniques and strategies developed during the DBR phase.

Over the course of six months, the research team collected video and audio data and post-interaction surveys from 263 visitor groups who chose to approach the math exhibits, either facilitated by an OMSI educator or not. Two conditions (facilitation, greeting) were rotated systematically across the data collection shifts. In the facilitation condition, the museum educators were instructed to facilitate all visitor groups at the exhibits as they felt appropriate, based on the REVEAL training they had received. In the greeting condition, the museum educators verbally greeted visitor groups within 30 seconds after they had engaged with the

exhibits and then remained within the informed consent area without providing additional facilitation. The greeting condition was intended to control for potential sampling bias within the study, assuming some visitors might be more or less likely to approach an exhibit when a facilitator is present, and to support strong causal evidence of the impact of staff facilitators on family learning and mathematical discourse.

### *Facilitation Research for Engineering Design Education (FREDE)*

FREDE was an IMLS-funded research study focusing on the Museum of Science's highly successful Design Challenges program—a facilitated drop-in program that engages visitors in the engineering design process. Seeking to explore the effect staff facilitation has on visitor outcomes, FREDE employed a quasi-experimental design to compare “treatment” and “control” groups. Children between the ages of 8 and 14 were the target of study. To avoid a fatigue effect and prevent attrition, separate individuals were used to create these groups. Purposeful random sampling allowed researchers to create equal samples of boys and girls, while background characteristics such as age and previous participation in Design Challenges were also collected. This allowed comparisons to be made to test for statistical equivalency between groups. The treatment of interest—and theoretically, the cause of the effect, if found—was therefore participation in the facilitated Design Challenges activity.

Although imperfect, when coupled with a relatively large sample size (150 individuals in both groups for a total of 300), this design provided an adequate level of statistical power (0.78) for a relatively small effect size ( $\omega^2=0.2$ ). Lacking randomization, this type of research design helps provide causal evidence when faced with logistical constraints (time, money) and ethical considerations (randomly assigning groups to prevent participation).

### **Importance**

Visitor studies researchers and evaluators are increasingly interested in generating causal evidence about the impact of museum programs and experiences (Allen et al., 2007; NSF & ED, 2013). “True” experiments, in which participants are randomly assigned to treatment and control conditions, are often argued to be the most effective approach to generating causal evidence (NRC, 2002; NSF & ED, 2013). However, in a museum setting, these designs can be difficult to implement and may undermine the essential characteristics of informal and free-choice learning (Allen et al., 2007; NRC, 2009; Pattison & Shagott, 2015). Quasi-experimental designs (Shadish et al., 2001), where participants are grouped without random assignment, hold promise for generating robust causal evidence while still preserving the unique characteristics of these settings. However, to be used effectively, investigators must carefully design studies and analyses to address possible alternative explanations to the hypothesized causal connections (West et al., 2013).

### **References**

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## Demystifying "p<.05:" How to Find Significance in Your Data

### Presenters

Jennifer Rigney, Senior Visitor Researcher, Monterey Bay Aquarium

Lei Zhao, Data Analyst, Shedd Aquarium

### Purpose

The purpose of this session is to promote discussion among the participants about the limitations of using null hypothesis significance testing (NHST) as the primary tool for data interpretation and to raise awareness of how other social science fields have responded to criticisms of NHST. We'll draw on participants' experience and expertise as they describe their current data interpretation practices. We'll also present confidence intervals and effect sizes as alternative tools to using NHST for interpreting study results. Our goal is to inspire participants to use these alternative tools and facilitate discussion around the need to update standards of reporting in VSA publications.

### Abstract

Many of us learned to use  $\alpha=.05$  as the cut-off value for statistical significance, deeming any p-value less than .05 to be "significant." However, what does it really mean to deem a result "statistically significant"? How does this statistical decision get applied to practical decision making? Have you ever wondered whether there was more you could do to understand your data? This workshop will present critiques of null hypothesis significance testing (NHST), including the slavish commitment to the  $p<.05$  convention. We hope to inspire participants to think critically about what "statistical significance" does and does not mean and the potential misleading use of "significant" to describe statistical differences or relationships. We'll guide a discussion about how to make meaning out of research results and propose power analyses, confidence intervals, and effects size as key tools in the pursuit of practical significance.

We'll begin this workshop by eliciting a discussion of how participants interpret statistical significance in their own work, followed by a summary of the critiques of NHST and recommendations for moving forward (Bakker, van Dijk, & Wicherts, 2012; Cumming, 2014; Vadillo, Konstantinidis, & Shanks, 2015; Valentine, Aloe, & Lau, 2015; Verdam, Oort, & Sprangers, 2013). This isn't about finger-pointing; we too have relied on NHST to report findings and have benefited from thinking about our data in new ways. We'll share our examples of overreliance on p-values, discuss our attempts to move beyond relying on statistical significance to interpret data, and encourage participants to discuss their own experiences interpreting and reporting results to stakeholders.

The second part of the workshop will introduce participants to tools that can be used together with traditional significance testing (or perhaps even in lieu of it) to aid in understanding the practical significance of results. These tools will include power analyses, confidence intervals, and effect sizes. While NHST and

corresponding test statistics and p-values only allow us to say whether an effect exists, confidence intervals and effect sizes allow us to say something more about the magnitude of the effect. We'll demonstrate how to calculate and interpret some of these metrics and ask participants to practice interpreting examples too.

Finally, we'll lead a discussion around updating VSA reporting standards and core competencies. Updating our research and evaluation standards is crucial for advancing the field of visitor studies and necessary for eventually validating research claims through meta-analytic methods.

## Importance

Although the proper use and interpretation of NHST has been debated in the field of Psychology for over a decade, this conversation has yet to make its way into Visitor Studies. The Journal of Basic and Applied Social Psychology recently banned NHST from its manuscripts in lieu of reporting strong descriptive statistics and effect sizes (Trafimow & Marks, 2015). Although they have yet to jump on the banning bandwagon, both the American Psychological Association and the American Educational Research Association require an index of the quantitative relation between measured variables (i.e. effect size) and an indication of the uncertainty of that index (i.e. confidence intervals) in their journals (AERA, 2006; APA, 2010). It's important to bring awareness of the NHST debates to the VSA community and align VSA Competency C with the current conventions in the social sciences. Updating our research and evaluation standards is crucial for advancing the field.

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# Impacting Institutional Decision-Making: Reflections on Developing an Evaluation Department

## Presenters

Elizabeth Kunz Kollmann, Museum of Science, Boston

Wayne Bouchard, Museum of Science, Boston

Heather Calvin, Museum of Science, Boston

Paul Fontaine, Museum of Science, Boston

## Purpose

Participants will:

- Better understand the value of evaluation for diverse internal stakeholders
- Come away with new approaches and techniques for developing evaluations that will be relevant to an organization, and sharing evaluation findings in actionable ways

## Abstract

Whether an institution has “big data” or data from a single program evaluation, ensuring that data is used to make decisions is a critical aspect of an evaluator’s work. This session will share how evaluation has been integrated into decision-making across the Museum of Science, Boston. Since it was founded 12 years ago, the Museum of Science’s Research & Evaluation Department has gradually expanded from working mainly with exhibit developers and educators in helping them develop their exhibits and programs to working with nearly every department in the Museum to aid them in decisions around various aspects of their work. At the same time, the Research and Evaluation Department grew from 1.5 to 14 members. Three senior leaders from the Museum of Science, Boston and one long-time member of the Research and Evaluation Department will share their reflections on how this increased internal capacity has influenced decision-making and planning within the institution.

Since its inception, the department has aimed to conduct evaluations that not only help Museum staff members to answer questions critical to their own practice, but also to build institutional knowledge across projects and departments. Part of this approach relies developing evaluation plans that are responsive to both the needs of an individual project as well as broader institutional goals and plans. However, building productive working relationships with evaluation stakeholders at all levels of the institution is also critical. The session will present four perspectives on how capacity, use, and relationship were built with the evaluation department:

- The Senior Vice President of Education, will share his perspective on moving from focused, practitioner-executed evaluations prior to the founding of the department to working with dedicated evaluators in a new department. In addition to reflecting on the impact of this change on the institution, he will also share how well-planned evaluations conducted with a focus on a particular program or exhibit can also inform the planning of the Education Division more broadly.
- The Associate Vice President of Visitor Services and Membership, will share her experience moving from smaller, focused evaluations related to the visitor experience and membership, to collaborative institution-wide studies, to field-wide efforts. She will also share her perspective on where evaluation can add value and improve practice in the areas of visitor services and front-line aspects of a museum visit.

- The Chief Operating Officer at the MOS, will share his experience using evaluation studies to inform the decision-making of the Museum's senior management team, the long-range planning efforts of the Museum. He will also discuss the benefits of using evaluation to share the accomplishments of the museum with trustees and key funders.
- Finally, a Senior Project Manager in the Research & Evaluation Department will share her reflections on the growth of the department, its approach to stakeholder involvement, and encouraging data-informed decision making throughout the organization. She will include tips for gradually building institutional buy-in for evaluation, appropriately and strategically expanding its expertise and focus, and building a culture of professional learning.

### **Importance**

This session describes how one organization, the Museum of Science, Boston, built internal buy-in and capacity for evaluation. The purpose of this session is to help other evaluators think about how they may also build evaluation capacity and use among their clients, and to help practitioners think about the various ways that evaluation data may be useful to their decision making.

### **Additional Resources**

<http://www.mos.org>

# Saturday, July 23

## 9:00-10:15, Concurrent Session— Six

### Roundtable Discussions

#### Mission Impossible?: Mission Statements and Strategic Planning

##### Presenters

Patience Baach, The Field Museum

Andréa Giron Mathern, Denver Museum of Nature and Science

##### Purpose

Mission statements and strategic planning are not just for the institution you work within; they can be a useful tool for internal evaluation departments. WPK Darbi, a professor of public administration, states, “Mission and vision statements can be used to build a common and shared sense of purpose and also serve as conduit through which employees’ focus are shaped” (Darbi, 2012). In this roundtable, two featured presenters will share their experiences at different stages of development; one from the beginning stages and benchmarking, and another from an institution that has been undergoing a shift in mission and strategic alignment. As a group, we will discuss key questions for developing mission statements, as well as how these mission statements can contribute to a department’s strategic plan. Participants will have the opportunity to learn from one another and workshop potential drafts of their own mission statements for their respective departments.

##### Abstract

Mission statements not only allow institutions to benchmark its activities and successes, but, as the American Alliance of Museums states, “a clearly delineated mission statement...[is the museum’s] reason for existence” (page 33.) A mission statement gives the institution direction, focus, and a benchmark by which it can be publicly held accountable. These same characteristics are also beneficial to staff at the departmental level.

Internal evaluation departments often collaborate with different departments or divisions without a clear focus. This can result in confusion among colleagues and staff, who find themselves weighed down with unnecessary work requests, uncertain chain of command, or an unreasonable workload. How can internal departments use mission statements to clarify and strengthen their role and place in the institution? How can an internal department use their institution’s mission statement to build their own? As AAM cautions, mission statements must be realistic, measurable, achievable, and must be tended to ever few years as to keep it relevant and up-to-date (page 34).

This working group session centers on developing and implementing mission statements and strategic plans, specifically for internal evaluation departments. Two presenters will discuss their process, obstacles, victories, and reflection. The audience will participate in discussion to brainstorm potential mission statements for their department and other strategic plan possibilities.

##### Importance

This session will benefit managers of internal evaluation departments, internal evaluators without a department (but looking to grow), and perhaps external evaluators who are looking to develop a mission statement and/or strategic plan for their firm. Strategic planning conversations happen often in institutions

and include a variety of stakeholders. With proper language, materials, and planning, evaluators can better address their value and role in the institution and argue more effectively for data-driven decision making institution-wide. A well-crafted mission statement can be a key component to effectively communicating with the whole institution. This most directly corresponds with VSA Competency D – Business Practices, Project Planning, and Resource Management. Strategic planning requires a complete understanding of the institution’s needs as a whole and evaluation and visitor studies’ role in helping to achieve them. Through proper scheduling, strategizing, budgeting, and systematizing, evaluators can build capacity and collaboration within their department and organization.

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## Publish Your Work: Chat with the Editors

### Presenters

John Fraser  
Elee Wood  
Steven R. Guberman

### Purpose

In this Roundtable, the editors of the three primary journals that publish work about visitor studies—Visitor Studies, Curator: The Museum Journal, and Museums & Social Issues—will familiarize VSA members with the publication process and engage them in a discussion about how journals are changing in the era of big data.

### Abstract

In this Roundtable, the editor of VSA's journal, Visitor Studies, the editor of Curator: The Museum Journal, and the editor of Museums & Social Issues: A Journal of Reflective Discourse will engage the audience in a discussion about the journal publication process and how journals are changing in the current environment. We will review the publication process, including (a) determining if you have something to publish, (b) finding the right journal, (c) preparing and submitting a manuscript, (d) dealing with reviews and revisions, and (e) final acceptance and publication. Discussion of contemporary publication issues will begin with a brief introduction into how online experience is changing the journal field. This will be followed by a discussion of what participants are interested in reading from the field, how article sharing sites like ResearchGate and others are shifting copyright and the future of the field, and what subjects are most relevant to those working in the field. Additional topics will be generated by participants as they examine how they wish to explore the role of literature in practice.

## Importance

Understanding the publication process is important for VSA members interested in disseminating their conceptual and methodological approaches and their research and evaluation findings with others in the field. Similarly, it is critical for authors to understand what articles may look like in an age of big data and low attention spans, how reading habits are changing, and how online access to grey literature is shifting how authority is conferred.

## Additional Resources

Curator: <http://onlinelibrary.wiley.com/doi/10.1111/cura.2016.59.issue-2/issuetoc> (publisher site);  
<http://CuratorJournal.org> (social media site)

Museums & Social Issues: <http://www.tandfonline.com/loi/ymsi20#.V1xf2FfdFE4>

Visitor Studies: <http://www.tandfonline.com/loi/uvst20 -.V1xh1fdFE0034>

## Getting in Touch with Emotional Engagement

### Presenters

Christine Reich, Museum of Science, Boston

Sunewan Chunhasuwan, Museum of Science, Boston

Gabrielle Rappolt-Schlichtmann, EdTogether and Harvard Graduate School of Education

### Purpose

Studying visitors' emotions within and across the learning experience can provide new insights into how different aspects of the informal learning context can impact learning and engagement. This session explores the nature of emotion in informal learning environments, and examines affordances and challenges of different strategies for measuring emotional engagement in museums. Participants will engage in an interactive discussion of methods, data, findings, and implications from a cross-disciplinary study of emotional engagement in informal learning, and explore how to measure and interpret data from eye tracking, skin conductance, and experience sampling measures.

### Abstract

Core emotions are our raw physiological reactions to our appraisal of the opportunities and challenges of our surrounding context (Linnenbrink, 2006). These emotions guide behaviors, influence motivations, and inform thinking (Barrett, 2006; Lazarus, 1991). The important mediating role that emotions play in learning and engagement means that it is important for the field of visitor studies to develop understanding of emotional engagement during informal learning. However, measuring and making sense of emotions can be challenging: different people have diverse ways of expressing emotions through behavior, conversation, and engagement. This variability makes it difficult to both measure and make sense of emotional engagement through the familiar methods of observations and conversational analysis alone.

Researchers studying emotion in the fields of developmental neuroscience and cognitive science have found that emotional engagement generally varies along two dimensions. The first dimension is activation, which varies from nonactivated to highly activated. The second dimension is valence, which varies from negative (displeasure) to positive (pleasure) (Russell, 2009). The combination of these two dimensions forms a person's core affect (Russell, 2003; Storbeck & Clore, 2007). Core affect reflects a learner's disposition, prior experiences, and identity, and changes dynamically as the learner engages with others and

their environment. Studying core affect across the learning experience can provide new insights into how the designed environment and social context impact engagement and learning for a variety of audiences.

Through the NSF-funded research study partnership, Emotion and Thinking in Designed Informal Science Environments (DRL #1222613), we addressed the challenge of measuring emotional engagement in informal learning, and explored its variation during exhibit-based learning. The study applied and studied a number of different measurement strategies. Electrodermal activity or skin conductance – measured through a wristband sensor – was used to measure emotional activation. Validated experience sampling measures were used to measure positive and negative emotional valence. Eye tracking was used to identify where participants were looking and what they were focusing upon while using the exhibit, and analyses of video-recorded behaviors were analyzed to assess learners' behavioral, cognitive, and social engagement during the experience.

Findings revealed marked variation within and between individuals: Individual emotional experiences varied from exhibit to exhibit, and each exhibit supported a range of emotional engagement experiences among visitors. However, aspects of the social and designed environment were found to systematically impact emotional engagement. For example, the presence of a parent moderated children's levels of engagement. Children who used the exhibits on their own experienced more activation peaks than those who experienced the exhibit with a parent. Findings also suggest that learners often experienced both positive emotions and feelings of frustration or confusion during the same exhibit experiences. When experienced in conjunction with high activation, feelings of frustration and confusion were associated with indicators of behavioral engagement, including longer dwell time, increased signs of concentration, and increased use of exhibit materials, feedback, and instructions. This suggests that struggle (active engagement combined with feelings of confusion) can be an important element of informal learning.

### **Importance**

This session will share insights from the collaborative development and application of strategies for measuring emotional, behavioral, and cognitive engagement during informal learning. We will share findings from our study of emotion and engagement in informal learning settings. Participants will have a chance to explore a range of measurement strategies used in this study - including eye-tracking video and skin-conductance data – and engage in small-group discussions about the benefits and constraints of applying some of these methods and findings in research and evaluation efforts.

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## A Multitude of Methods for Diverse Audiences

### Presenters

Claire Thoma Emmons, The Children's Museum of Indianapolis, [clairet@childrensmuseum.org](mailto:clairet@childrensmuseum.org)

Alexander Lussenhop, Museum of Science, Boston [alussenhop@mos.org](mailto:alussenhop@mos.org)

Renaë Youngs, Minnesota State Arts Board, [renae.youngs@gmail.com](mailto:renae.youngs@gmail.com)

### Purpose

This session features a “methods swap” focused on tips and strategies for making instruments and methods more inclusive of diverse visitors, including young children, visitors with physical or cognitive disabilities, or visitors from different cultural backgrounds. The intended learning outcomes are:

1. Attendees will learn successful methods and adaptations for gathering feedback from visitors regardless of age, ability, or cultural contexts.
2. Attendees will consider how to incorporate practices from core literature (e.g., principles of universal design, the AEA statement of cultural competence in evaluation) into museum and visitor-focused settings.
3. Attendees will share, compare, and practice new strategies for accessible evaluation in a peer learning environment.

This session will be especially useful for attendees whose work involves developing, conducting, or authorizing data collection with visitors or members of the public.

### Importance

The principles of Universal Design are used to “design products and spaces so that they can be used by the widest range of people possible.” It is widely acknowledged that designing according to these principles results in environments and products that are more functional and user-friendly for everyone. The presenters for this session posit that the goal of being user-friendly for a broad audience can be carried over to the work of planning methods and instruments for research and evaluation to make them accessible to diverse participants. In this way, principles of accessibility begin to intersect with broader considerations about cultural competency in evaluation. For instance, an evaluator may wish to consider how visitors who do not speak the same language or visitors with physical or cognitive disabilities can participate so that their feedback is not excluded.

### Abstract

In her work as an evaluator at a children's museum, Claire Thoma Emmons has learned strategies for collecting feedback from children, especially between the ages of 5-10 years, some of which are also applicable to other populations. She will discuss methods from her experience that have worked, as well as some that have not. Some of the suggestions include:

- Keeping written surveys very short and making them visually interesting
- Allowing children to talk about an experience or what they learned is less onerous than writing
- Tips for minimizing power imbalances and social bias during interviews with children
- Paper chains allow youth to document their experience in the moment and on a regular basis for long-term programs

- Creating a community feedback wall with youth feedback gives more purpose to the data collection
- Embedding content assessments within activities
- Creating a game show-style survey that includes a mix of trivia and opinion-based questions

The Research and Evaluation Department at Museum of Science, Boston has been engaging in accessibility work for several years, working to improve accessibility of the Museum’s exhibits, programs, and shows, and leading broader field-wide initiatives. Recently members of the Department conducted an internal review of instruments, protocols, and practices to ensure that evaluation practices are accessible to a range of visitors. Alexander Lussenhop will discuss some of the changes and best practices that emerged from this review, including:

- Compiling a list of commonly-used evaluation questions and brainstorming alternate wordings and multiple choice options to improve visitor understanding
- Revamping informed consent signage to include pictures
- Designing instruments with multiple methods of communication in mind (space for writing, large print, etc.)
- Designing observation instruments to prompt data collectors to look for physical, cognitive, and social inclusion
- Writing down best practices for recruitment, communication, and scheduling when setting up specific appointments
- Creating an internal “living document” to detail recommendations for increasing accessibility at every step of the evaluation process, from recruiting participants to developing instruments to reporting

As we collect ever more data, we must consider multiple facets of cultural competency—from interrogating assumed values to deciding when and how to collect demographic information. Renae Youngs has spent time thinking about when, how, and why to collect and use demographic information and will prompt attendees to think through these considerations in their own work in several areas:

- Ways the specific language and tools we use to gather data from audiences can shape their perceptions of the questions, the study, or even the institution itself.
- Specific suggestions for item wording, method selection, and outreach practices that are responsive to potential differences between cultures of the evaluator or museum and participants.
- Strategies for communicating why or how personal and demographic data are used - or even why different groups are asked for feedback - in order to cultivate trust and participation.
- Ways of addressing structural, political, or interpersonal power dynamics in the context of gathering feedback or “expert opinion” data.

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- “What is Universal Design?” <http://www.universaldesign.com/about-universal-design.html>

## Additional Resources

- Association of Science-Technology Centers. Accessible Practices. Washington, DC: Association of Science-Technology Centers. Retrieved from <http://astc.org/resource/access/index.htm>
- Association of Science-Technology Centers. Equity and Diversity Toolkit for Museums and Science Centers. Washington, DC: Association of Science-Technology Centers. Retrieved from <http://astc.org/resource/equity/toolkit.htm>
- Dictionary resources for looking up ASL terms: [www.handspeak.com](http://www.handspeak.com); [www.aslpro.com](http://www.aslpro.com)
- Antoine Hunter talks about communicating with d/Deaf people: <https://www.youtube.com/watch?v=x5V9xr2xMZA&feature=youtu.be>
- Sighted Guide demonstration video from the Washington State School for the Blind: [https://www.youtube.com/watch?v=YoRQiG\\_hlHk&feature=youtu.be](https://www.youtube.com/watch?v=YoRQiG_hlHk&feature=youtu.be)
- Activity-based Assessment Toolkit for Programs: <http://taasa.org/product/activity-based-assessment-toolkit/>
- Participatory Evaluation Methods for Youth: The Evaluator’s Cookbook: [http://www.bath.ac.uk/marketing/public-engagement/assets/the\\_evaluators\\_cookbook\\_participatory\\_evaluation\\_exercises\\_for\\_young\\_people.pdf](http://www.bath.ac.uk/marketing/public-engagement/assets/the_evaluators_cookbook_participatory_evaluation_exercises_for_young_people.pdf)
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## Beyond Surveys: Tech-Savvy Methods to Engage, Capture, and Drive Action

### Presenters

Gary Timko, Ph.D., Lifelong Learning Group Senior Associate (COSI)

Kate Livingston, M.S., Founder and Principal of ExposeYourMuseum LLC.

Amy Niedbalski, M.B.A., Manager of Audience Research at the Saint Louis Zoo

Elaine Horr, Ph.D., Lifelong Learning Group Associate (COSI)

### Purpose

The purpose of this session is to share three alternative methods to the traditional data collection methodologies when collecting data: technologies utilizing videos, physiological monitors, and electronic tablets. In addition to when and how it is appropriate to use the various technologies, project results, challenges, and successes using these methods will also be explored.

### Abstract

As technology continues to evolve and become more integrated into the fabric of our society, we as evaluators are faced with questions as to whether an innovative technology is an asset or liability as a data collection tool. Will the technology make data collection easier or pose additional challenges? Is data quality compromised? Does technology engage audiences in the evaluation or distract them? This presentation will examine how different technology-based data collection methodologies were utilized for three very different studies.

In 2015, ECHO Lake Aquarium and Science Center in Burlington, Vermont took a new approach to master planning. Kate Livingston, Founder & Principal at ExposeYourMuseum LLC, worked with ECHO to engage community-based nonprofit leaders and community members in “video walk-throughs” to create a community-informed and community-minded master plan. These video walk-throughs used a qualitative, highly personal “talk aloud” methodology. Participants, from diverse socioeconomic and cultural backgrounds, were encouraged to talk on camera, candidly and critically, about what they saw, felt, and experienced walking around ECHO’s indoor and outdoor campus, deeply incorporating community voices and perspectives.

As part of a study funded by the Association of Zoos and Aquariums (AZA) Conservation Grants Fund in 2014, Saint Louis Zoo and University of Missouri – Columbia researchers investigated how a zoo visit may provide health benefits to visitors in the form of stress relief through an immersive animal encounter. To carry out this study, researchers monitored the heart rate of participants during an animal encounter, who also completed a mood checklist as a self-reported measure of stress relief. As one of the first studies conducted at an AZA institution which utilized gathering both physiological and psychological data from visitors, researchers anticipate this study will provide some clarification of the role animal encounters in zoos may play in human health outcomes.

A series of formative evaluations was done at COSI in Columbus, Ohio during the early implementation of the new COSI After Dark program geared for adults 21 years and older. Data were collected with a questionnaire consisting of Likert-type and open-ended items, using pen-and-paper and tablet platforms to collect data. To address anecdotal concerns regarding concerns about the potential compromised quality of open-ended responses collected using tablets, a study was developed that compared the quality of qualitative responses collected using each of the two platforms. The methodology and results of this study will be shared with participants

As presenters share results of these studies, a session-specific twitter hashtag will be shared with the audience and monitored so that questions can be posed or issues identified at any point during the session. A traditional Q&A session will also be facilitated by the moderator at the end of the session.

## **Importance**

While traditional methods of collecting data have proven to be very effective for decades, new technology such as that which will be discussed in this presentation provides new, exciting opportunities to collect data in ways that can be just as effective, if not more so. Using video to capture both voice and expressions/body language or using physiological monitors to measure participants' affective responses to stimuli such as animal encounters or using tablets to more efficiently and accurately collect and enter data lead to a more engaging experience for study participants and richer qualitative and quantitative data for the evaluator.

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## **Approaches to Video Analysis: Studying Learning and Catalyzing Reflection**

### **Presenters**

Scott Pattison, Oregon Museum of Science and Industry, Institute for Learning Innovation  
Lisa Brahms, Children's Museum of Pittsburgh  
Kevin Crowley, University of Pittsburgh  
Peter S. Wardrip, Children's Museum of Pittsburgh  
Thomas Akiva, University of Pittsburgh  
Annie McNamara, University of Pittsburgh

### **Purpose**

In this session, presenters will share two distinct approaches to analyzing video of informal learning and leveraging that video to facilitate reflective discussions with researchers and educators. Session participants will gain knowledge of and familiarity with techniques and strategies for collecting and analyzing video data in museum research and evaluation studies and discuss implications of recent work on video data collection and analysis for the visitor studies field. Presenters will discuss the questions and theoretical frameworks that motivated their use of video, the tools and strategies they used to understand and analyze the data, and ways they leveraged the video to inform theory and practice.

### **Abstract**

This session will address some of the challenges and opportunities related to video data by sharing the experiences of two project teams that have taken distinct approaches to data collection, analysis, and team reflection.

### *Facilitation of Making as a Learning Process: Reflective Practice and Theory Building*

For makerspaces, facilitation is a key resource for design (Litts, 2015). Using the tools properly, understanding the affordances of materials, creating the conditions for guided discovery as well as facilitating a developmentally appropriate experience, all speak to the contingent possibilities of maker pedagogy and facilitation. In the present study, researchers used the context of a well-established, high-functioning makerspace in a children's museum to understand the important features of facilitation in making. Through a partnership between the Children's Museum of Pittsburgh and the University of Pittsburgh, researchers and makerspace educators have used video of facilitator-learner interactions to develop a framework for identifying productive facilitation.

The process began by collecting clips of each makerspace educator interacting with children during a typical day, specifically highlighting successful child-adult interactions. In professional development workshops, educators watched clips of themselves and colleagues and a facilitator guided them through a strengths-based discussion using an empirically-based professional development model (Akiva et al., 2015) that characterizes features of interaction. This provided the background on which to co-construct an initial model of facilitation in a makerspace setting.

The videos of interactions have provided the team a concrete, common experience with which to reflect on educator practice, while also serving as a corpus of data from which to make empirical claims and build knowledge about facilitation moves and learner engagement with respect to particular activities and over time.

### *Designing Our World (DOW)*

DOW is an NSF-funded project led by OMSI, in partnership with local community-based organizations, and aimed at addressing the need for more girls to pursue careers in engineering. The program engages cohorts of adolescent girls and other adult stakeholders in synergistic informal STEM learning experiences, including afterschool programs, exhibit-based experiences, professional development for educators, and learning opportunities for parents.

Leveraging these programs, OMSI researchers are conducting a qualitative, longitudinal investigation to understand (a) how girl program participants construct and negotiate engineering-related identities through discourse; (b) what contextual factors shape this discourse; and (c) how the discourse changes over time and across contexts. Using NVivo software and building on a constructivist grounded theory approach (Charmaz, 2006; Glaser & Strauss, 1967), the team has analyzed video data in three broad stages: initial coding, focused coding, and Interpretation. Through this process, researchers developed a conceptual framework for describing the engineering-related identity negotiation observed during the program and a coding protocol for tagging critical identity talk and actions at a micro level, adult and peer responses to these critical identity moments, and macro and holistic characteristics of the youth and programs, such as levels of engagement in the activities overall. The team is also developing narrative profiles for each youth in order to complement the video analysis and provide a more holistic understanding of identity negotiation patterns.

### **Importance**

Thanks to the technological revolution over the last several decades, visitor studies researchers and evaluators can now use affordable, consumer-grade equipment to record high-definition video of education and learning even in chaotic museums environments. Because of these changes, video data has become an increasingly popular tool to study education and learning outside of school (Derry et al., 2010; Goldman et al., 2007). Videos can serve as rich documentation of learning (e.g., Pattison & Dierking, 2013) and facilitate

reflection and professional development for researchers and educators (e.g., Humphrey & Gutwill, 2005). Despite the opportunities, however, dealing with video data remains a daunting challenge. Even a preliminary review of video is extremely time consuming and the complexity and density of the information makes it difficult to analyze. Ongoing discussions are needed, therefore, to ensure that the visitors studies field is able to leverage this powerful tool to study and support learning.

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## 10:30-11:45, Concurrent Session— Seven

### Shaking It Up: Finding New Ways to Use Existing Data

#### Presenters

Stephen Ashton, Ph.D., Director of Audience Research and Development, Thanksgiving Point Institute  
Elaine Horr, Ph.D., Center for Research and Evaluation Associate, COSI  
Elisa Israel, Director of Research and Evaluation, Saint Louis Science Center  
Joyce Ma, Ph.D., Senior Researcher, Exploratorium

#### Purpose

The purpose of this session is to have a discussion about repurposing data.

Specific learning outcomes include the following:

- Participants will gain knowledge of the advantages and disadvantages of repurposing data.
- Participants will gain an awareness of when it is and is not appropriate to repurpose data for multiple studies/projects.
- Participants will gain a better understanding of a variety of ways to repurpose data as attendees share out their experiences.

#### Abstract

This interactive session will explore ways in which data can be repurposed for uses that differ from why it was collected originally. Panelists will share examples from their own work and, using a Fishbowl discussion format, will encourage others to ask questions and share their own experiences.

In this session, Stephen Ashton, from Thanksgiving Point Institute; Elaine Horr, from COSI; Elisa Israel, from the Saint Louis Science Center; and Joyce Ma, from the Exploratorium, will each present brief examples of ways data collected for one purpose have been used for a different purpose, which can save the evaluator both time and resources. This will lead into an interactive, Fishbowl sharing discussion format that will encourage attendees to share their own experiences with repurposing data. This will be helpful as we all seek to “revolutionize” the data we already have.

Using the Fishbowl format, attendees will be encouraged to join the conversation to ask questions and share their experiences. The following questions, along with other ones posed by attendees, will be discussed:

- What does it mean to repurpose data?
- What are the advantages and disadvantages of repurposing data?
- What success or challenges have you faced when repurposing data?
- It seems that we, as a field, should be doing this more often. What are the barriers to repurposing data?
- What are the ethical considerations we need to make when repurposing data?
- What, if anything, was special about the cases presented that allowed this to happen?

Responses to questions posed in the Fishbowl section of the presentation will be recorded and made available to panel presentation attendees.

## Importance

So many resources are spent conducting evaluation studies. In an effort to "revolutionize" data, we feel it is worthwhile to discuss how data from these evaluation studies can be repurposed. Doing so can save time and resources and can prevent redundancy in evaluations. We also feel like there is a lot to learn from one another. The Fishbowl discussion format will provide many people with the opportunity to share their experiences and ask questions.

## Exhibition Tracking-and-Timing Data: What's It Good For?

### Presenter

Beverly Serrell

### Purpose

This workshop session will actively review several methods of analysis and visualization to support conclusions and implications of tracking and timing (T&T) data. Not a workshop on how to do T&T, but rather, what conclusions and generalizations about visitor behavior in exhibitions can we draw from it.

### Additional Resources

Paying More Attention to Paying Attention

<http://www.informalscience.org/news-views/paying-more-attention-paying-attention>

## What Does Data Have to Do with Social Justice?

### Presenters

Swarupa Anila, Detroit Institute of Arts

Marjorie Bequette, Science Museum of Minnesota

Noah Feinstein, University of Wisconsin Madison

Cecilia Garibay, Garibay Group

Ken Morris, Detroit Institute of Arts

### Purpose

Museums are continually challenged in becoming more inclusive organizations. Data generated from research and evaluation can facilitate organization learning and the development of more inclusive and equitable practices. This session discusses examples from several studies of ways organizations are using data for organizational learning and transforming practices.

### Abstract

In recent decades, museums have made efforts toward engaging more diverse audiences (e.g., Matelic, 2008; Sandell, 2003). Yet evidence from both research and practice suggests that progress on equity is difficult to sustain. Museums frequently encounter practical and ideological challenges when they seek to enact changes around equity and diversity. For example, Garibay (2006) notes that many organizations are constrained by a staff-centric view that leads them to see non-dominant groups as outside of the organization and its visitor base. Museums are also constrained by the norms and practices of the museum world—what sociologists call their "institutional field." When they try something new, they encounter

pushback from colleagues, funders, and collaborators outside of their organization (Lounsbury, 2007): no museum or science center can change beyond the tolerance of its community, however that community is defined.

This session argues that meeting the challenges of equity and diversity involves deep organizational change, which in turn requires significant organizational learning. Each presentation in this session draws on the experiences of researchers and practitioners to show how evaluation and research data can inform the iterative, reflective process of organizational learning.

*Over the past 15 years, the Detroit Institute of Arts* has engaged in visitor evaluation and audience consultation to gather a multiplicity of perspectives during exhibition development and permanent collection installations. Front-end and summative studies have been used with greater frequency to understand non-traditional audiences more deeply. The increasingly consistent application of evaluation in exhibition and program development has led to infrastructural shifts that have changed DIA exhibition practices. It is also beginning to expose and challenge internal attitudes about audience engagement as well as the museum's responsibilities to cultural representation, inclusion, and diversity.

*At the Science Museum of Minnesota*, ongoing NSF-funded research projects have prompted internal changes as well as changes visible to visitors, but the museum is still challenged in embedding changes across the organization. Two projects—Making Connections, a design-based research initiative and Race Forward, a team-based inquiry project—illustrate the ways research data are being used for organizational learning and the ways the different structures of each project seems to influence the kinds of organizational change that have resulted to date within the museum.

*The third initiative discussed in this session focuses on findings from a cross-institutional study* of museums that hosted the RACE: Are we so different? traveling exhibition. The study explores how different museums have responded to the challenges and opportunities of hosting RACE. The process of adopting, adapting, and implementing a traveling exhibition reveals the tacit norms of each host museum. Drawing on concrete experiences from multiple institutions help illuminate how the host museums' ability to gather and use data about the exhibition (and about their communities) affected their implementation of RACE and ultimately the extent to which it informed the organizations' learning and practice.

## **Importance**

The discussions and examples of ways data-driven work can contribute to positive changes in equity and diversity practices will help researchers/evaluators conceptualize the sorts of data most useful to addressing this critical, field-wide concern.

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Matelic, C. T. (2008). Understanding change and transformation in history organizations. *History News*, Spring 2008, 7-13.

Sandell, R. (2003). Social inclusion, the museum and the dynamics of sectoral change. *Museum and society*, 1(1), 45-62.

## From Wow! to Why?: Building Science Literacy with Data Visualization

### Session Chair

Dolly Hayde, MA – Lifelong Learning Group, COSI

### Presenters

Emily Yam, MT, MS - Aquarium of the Pacific  
Stephen Uzzo, PhD - New York Hall of Science

### Purpose

Attendees will learn how research and evaluation findings have informed decision-making and the development of resources created to support learner interactions with real data sets. Attendees will benefit from hearing processes for implementing multi-faceted programs, as well as key takeaways from evaluation findings and iterative study of those programs. Additionally, they will learn about the educational strategies and outcomes defined for multiple technological platforms and pedagogical approaches. Following this session, participants will be aware of widely-applicable, research-based principles for engaging learners with large, complex data sets, as well as strategies for integrating data sets into learning about science content and scientific practices.

### Abstract

Each of the projects described in this session represents interpretation needs requiring attention to how audiences engage with data and experience science. Presenters will introduce their projects, all of which provide technology-rich opportunities for learners to directly explore data and make meaning through strategies designed to facilitate inquiry-based learning. In relation to these projects, they will discuss considerations related to teaching with large and complex data sets, as well as data-driven decision-making; each presenter will address these issues as they relate to particular environments and project roles. These overviews will briefly describe the context, development process, and applicable evaluation findings from panelists' projects, but each is intended to give a concrete starting point for thinking through a context-specific set of issues, with data as a strong, consistent content touchstone for informal science learning across examples. First, Yam will describe strategies for inviting audiences to find relevance and insight in unexpected narrative connections, as well as for intentionally integrating discrete project efforts across a single institution's interpretation strategy. Next, Uzzo will describe how theoretical perspectives, learning

research, and site-specific evaluation has informed the planning and development of fully immersive visitor experiences. After these overviews, Hayde will serve in a discussant role to highlight key themes across projects and draw out implications for those who conduct and use visitor studies. Finally, attendees will participate in facilitated conversation to elicit more detail about projects, raise emergent questions, and offer additional perspectives.

Collective questions include the following:

1. What affordances and challenges are peculiar to individual platforms and strategies for sharing large, complex data sets with learners?
2. To what degree and in what ways are strategies for supporting data literacy common across learning contexts?

## Importance

As public discourse about data has become a fixture of daily life, educational organizations have increasingly explored ways to expand learners' data literacy, as well as learners' understanding of how data relates to real-world concerns. This work invites us to critically consider strategies for using large, interactive data sets to support learners in both physical and digital spaces. Meanwhile, research and evaluation continue to yield data about how learners process information and how program activities can support authentic, meaningful learning that connects people to important, immediate issues like environmental sustainability and conservation. Our experiences in developing and evaluating data-rich learning resources suggest that successful outcome achievement depends on socially, technologically, and logistically responsive strategies for interpretation across platforms and project phases.

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## Additional Resources

Our Instrumented Earth

<https://informal.jpl.nasa.gov/museum/CP4SMP/our-instrumented-earth-sos-science-sphere>  
[http://www.aquariumofpacific.org/events/info/our\\_instrumented\\_earth/](http://www.aquariumofpacific.org/events/info/our_instrumented_earth/)  
<http://sos.noaa.gov/Datasets/dataset.php?id=454>

Science Interpretation and Technology Integration (SITI)

<https://www.imls.gov/grants/awarded/ma-06-12-0002-12>

Connected Worlds

<http://nysci.org/connected-worlds/>

## Paper Presentations

### Understanding the Visitor Experience: Spatial, Visual and Verbal Data

#### Presenters

Pippa Gardner - University of Sheffield

#### Purpose

The case study presented sought to answer the question: how can museum spaces support curiosity, creativity and innovation. This presentation will offer inspiration around how to use visual methods to answer such questions.

#### Abstract

A visitor's museum experience is made up of many different elements including the use of space, a narrative of their experience over time and the influence of the visual environment. If we want to understand the subjective experience, methods that collect different types of data (including spatial, verbal and visual) may help to answer our questions. Drawing upon a case study of visitor research conducted at Weston Park Museum (Sheffield, UK), this presentation will describe two methods of data collection. Firstly, participant observation is an ethnographic method drawn from the social science tradition. Observation data can be visually and spatially mapped within a space to understand which elements are attended to and what behaviors result. Secondly, draw-and-write (2015) is an emerging arts-informed method that originated in health and education research.

#### Importance

By asking visitors to respond to a question prompt about their museum experience, verbal and visual data is collected and can be used for many purposes – from evaluating a space or program to assisting marketers and fundraisers. The case study will show the application of the methods for curators and designers (in evaluating existing and new spaces), for education staff (in evaluating programs, materials and learning spaces), and for marketing and fundraising staff (in using data to create a 'case for support').

## References

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## Additional Resources

[https://www.sheffield.ac.uk/geography/phd/pg/pippa\\_gardner](https://www.sheffield.ac.uk/geography/phd/pg/pippa_gardner)  
<http://www.museums-sheffield.org.uk/museums/weston-park/home>

## Visitors Stories: What can They Tell Us?

### Presenters

Dr. Catherine Haden, Loyola University  
Tsvia Cohen, Chicago Children's Museum

### Purpose

This presentation will focus on the reflective narratives told by Chicago Children's Museum (CCM) visitors shortly after their hands-on tinkering experiences in CCM's Tinkering Lab exhibit. We focus on narrative reflections because, from our perspective, inviting visitors to step back and reflect on their experiences can be very revealing of what they have learned, and even advance that learning. Visitors record their reflective narrative in Story Hub: The Mini Movie Memory Maker, a CCM exhibit designed to encourage visitor reflection. We will share initial findings of what visitors' stories reveal about STEM learning processes and outcomes.

Session goals:

1. Learn how an informal analysis of content from visitors' conversations can inform practice
2. Consider how a strategy to enhance visitors' memories and learning can also serve as a data source
3. Share initial findings from a study of visitors' narrative reflections following a hands-on tinkering experience in a museum

## **Abstract**

Reflection is widely considered a critical aspect of learning, and may be especially important for learning from a visit to a children's museum. Consider that many museum exhibits are designed to encourage active, hands-on engagement with concrete object to enhance early learning (Borun, 2002; Paris & Hapgood, 2002). But a critical requirement of learning is that children be able to use what they learn through object manipulation in new and different contexts (e.g., from the museum to home and/or school). Reflective narratives can help meet this challenge of constructing understandings of experiences that are portable and relatable across contexts and time (see Haden, Cohen, Uttal, & Marcus for further discussion). This is because narratives can make physical engagement with objects the topic of conscious reflection, and ultimately long-term remembering and generalization. Opportunities for narrative reflection, such as those being offered to visitors at Chicago Children's Museum (CCM), can add layers of understanding of events beyond what is available from direct hands-on engagement alone (e.g., Bruner, 1991; Fivush & Haden, 1997). Moreover, we have found that narrative reflection can be an important tool for making learning visible to families, museum professionals, and researchers.

In this presentation, we will focus on the reflective narratives CCM visitors tell in Story Hub: The Mini Movie Memory Maker. Story Hub is a new, interactive exhibit that was developed at CCM with funding from the Institute of Museum and Library Services. It allows visitors to video and audio record reflective narratives about their choice of the museum's current exhibits. As Story Hub was being designed, there was considerable thought given to how this component might be useful for research that can inform practice (something that has been true in other exhibits at CCM, as well). For example, analysis of the Story Hub narratives allow us to understand how opportunities for STEM learning might be enhanced by different availability in an exhibit of materials, visual displays, cues and forms of facilitation.

Our analysis here will focus on about 40 narratives that have thus far been transcribed and analyzed of families' talking about the hands-on tinkering experiences they had in CCM's Tinkering Lab exhibit. We are interested in what the families say they made in Tinkering Lab and what the narratives can reveal about STEM learning. For example, we count the frequency with which families mention tools and tool use (e.g., nails, hammering). We also count references to planning, defining a problem, asking a question, brainstorming solutions, testing and re/designing, trying, retrying, and other narrative content that refers to the engineering design process. We further score the narratives for talk about the value of the tinkering experience, such as when families refer to how easy, hard, complicated or difficult the activity was, or their emotions and feelings while building. We will discuss how the results of these analyses are being used to understand visitors' STEM learning in the museum's Tinkering Lab as well as the importance of narrative reflection for learning.

## **Importance**

Visitors' recorded reflections about their exhibit-based experiences can deepen their learning while providing a rich data base of information about how visitors are processing, valuing and recalling these experiences. As professionals who seek to study the visitor experience, narratives recorded as part of the museum experience can help us better understand learning and memory making in a way that is in character with the museum setting.

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