Topic Selection
A Research Report

Prepared for

OMSI

OREGON MUSEUM OF SCIENCE AND INDUSTRY

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Topic Selection Paper

The purpose of this paper is to examine how museums currently select topics and themes for exhibits, provide a sample of what some of the literature has suggested, and give some suggestions for future research. Three scales were created to compare how museums select topic, the first ranged from audience very involved to audience not involved, the second ranged from appeal to the mass to appeal to niche groups, and the third ranged from intuition to process. In general museums tend to use focus groups, one-on-one interviews, surveys, and prototyping when consulting audience members for topic suggestions or feedback on potential ideas. The literature agrees with these methods. Museums should also make sure to refer back to their mission statements and look in disparate fields for topics that are original and attractive to a wider and more diverse population.

As people continue to work longer hours and lead increasingly busy lives, the amount of leisure time available to them continues to decrease. Socioeconomic status, individual interests, one's level of education, and the cultural activities an individual participated in when they were young are all factors in how people choose to spend their small fraction of available recreation time (Falk, 1992). Science and technology museums want to choose topics and create exhibits that appeal to a wide section of the population, one that is diverse in race, ethnicity, gender, and age. Exhibit design teams strive to create exhibits that resonate with large numbers of individuals on a personal level while also including members of groups that are underrepresented at museums. Exhibit design and evaluation teams want to create exhibits that are educational, entertaining, and culturally relevant both to the local population and the larger population as well. There is no precise formula for the creation of a successful exhibit, and an explanation about how exhibits succeed in filling all of these needs is too large for the scope of this paper.

There are a variety of factors that go into the creation of a successful exhibit, but the focus of this paper is specifically on topic and thematic selection. In this paper, topic is defined as the overarching subject of an exhibit. Theme is defined as a textual, visual, or experiential treatment that is easily recognizable to the target group(s) and serves to unify all of the components of an exhibit. Before any research had been conducted, the hope at the outset was that a new or an effective but underused method for topic generation would be discovered and could be suggested to institutions for future use. Although that model for topic selection was not found, this paper suggests a new way of examining how museums vary in their methods for topic selection. The research suggests that although museums vary in how they conduct topic selection, this greater concept can be broken down into three variables that are witnessed in all institutions. These three variables can be further examined through the use of three continuums that are anchored with diametric opposites. The first variable examines if the audience is involved in topic selection, with the anchors of the corresponding scale being structured as "audience very

involved" versus "audience not involved." The second variable examines to whom topics are chosen to appeal, with anchors of "appealing to masses" versus "appealing to niche markets." The third and final variable examines how museums interpret their data for determining a topic, and this scale is anchored in "following intuition" versus "following a system."

The purpose of the research that has been conducted over the past three months is to determine how both internal and external evaluators help exhibit teams select science, technology, engineering, and math (STEM) content and themes with high audience appeal. A literature review was conducted to examine how researchers suggest museums choose viable topics and themes. To compare academic recommendations to practical applications, in depth phone interviews were conducted with internal evaluators at the Oregon Museum of Science and Industry (OMSI), the Exploratorium, the Boston Museum of Science (MOS), the St. Louis Science Center, the Science Museum of Minnesota, the Franklin Institute, and the Monterey Bay Aquarium (MBA). In depth phone interviews were also conducted with external consultants at Slover Linett Strategies in Chicago and Randi Korn & Associates in San Francisco. Internal and external evaluators received the questions in advance of the interview and the interviewer recorded responses on a word processor while conducting the interviews. Appendix I contains the questions that were posed to evaluators, both external and internal, and Appendix II contains copies of the author's notes from these interviews, which have been individually reviewed and edited by the respective evaluators.

Academic Topic Selection: A Literature Review
Audience research methods

Extensive research has been done on the benefits of front-end research during the creation of an exhibit. Much less research has been performed on the timeframe before an exhibit topic has been chosen, in which the staff of a museum must decide the topic of the exhibit they want to create. One suggestion for determining which topics are the most viable is to consult members of the museum's audience. Harris Shettel is credited with having done some of the pioneering work in audience research during the 1970s, in which he would, "use mock-ups systematically to pre-test viewers' reactions and revise text and illustrations prior to final production" (Screven, C., 2004, p. 162). He argued that audience information was very useful for the design team because it

> would include data on the knowledge, attitudes, expectations, and
> misconceptions that visitors have about prospective exhibit topics,
> objects and artists and on the kind of questions they might pose, their
> special interests, personal experiences, beliefs and preferences
> (Screven, C., 2004, p. 165).

If the museum wants to obtain a lot of detailed information from a small group of individuals, focus groups and one-on-one interviews are the methods commonly used (Pekarik, A., 2007; Rubenstein, R; 1993; Thomas, G., 1992). These types of methods are particularly helpful when the museum wants to create an exhibit whose target audience is a specific population or if the topic is complex. Focus groups are especially encouraged in the early stages of deciding on a range of topics from which to choose because, "the format gives the participants ample opportunity to consider and discuss the topic in depth" (Rubenstein, R., 1993, p. 4). However a problem that can occur in focus groups,

particularly when dealing with young adults or children is that individuals can pressure other members of the group to agree with them on a particular topic they might otherwise not have been as interested in (Thomas, G., 1992). In-depth individual interviews can help uncover the "individuality and personality of the visitor" and help design teams gain a better understanding of the particular demographic they are targeting their exhibit towards (Pekarik, A., 2007). When asked the right questions or conducted by an astute staff member, in-depth interviews can provide a wealth of information, but they are also time consuming and may showcase the interests of only a small section of the museum's audience. Therefore it is necessary to either target a specific group within the general museum audience or talk to a large enough sample size to paint an accurate portrait of what interests are shared by many museumgoers.

　　　If the museum wants to obtain input from a larger portion of the general audience, surveys and prototyping are two commonly used techniques. The goal of a prototyping exercise is to see if audience members react to a theme within a proposed topic as the evaluation and design teams predict they will. Ideally these exercises can help better direct design teams into salient areas for thematic treatments and will "effortlessly transform them in their thinking" (Pekarik, A., 2007, p. 133). Prototyping can reveal hot areas of interest that had not originally occurred to the evaluation and design team and reduce long-term development costs (Hardgrave, B., & Wilson, R., 1994). Individuals can actually see part of the proposed topic and give more accurate feedback than if they had been left to imagine what it would look like. Surveys are useful for obtaining information in a controlled fashion from a large population. By using a large sample size of individuals who can rate and rank different ideas on scales, the margin of error will decrease and popular themes should become apparent. A benefit of surveys over other research methodologies is that, "surveys obtain information that can be quantified and analyzed statistically and thus can reach a higher degree of precision about the group being studied that other forms of research cannot duplicate" (Berger, A. A., 2000, p. 191). By coupling a verbal description with photographs or drawings, surveys can provide audiences with a framework for the direction in which the topic is aimed.

Motivations to attend

　　　Given the variety of leisure activities accessible to an individual at any time, it is important to understand why an individual would choose to go to a museum over another cultural institution, like the zoo or the movies. Zahava Doering, the Director of the Institutional Studies Office at the Smithsonian Institution argues that visitors will attend exhibits and programs, "that are personally relevant and with which they can easily connect" (Kotler, N. & Kotler, P., p. 174). Museums are encouraged to generate topics that examine how the individual either impacts or is impacted by a cultural phenomenon and create thematic treatments that explore the relationships that consequently result (Kotler, N. & Kotler, P; Pendretti, E., 2003; Thomas, G., 1992). Museums should create topics that appeal to niche markets but are also interesting to museum members or visitors who regularly attend the museum (Falk, J. H. & Sheppard, B. K., 2006; Kotler, N. & Kotler, P., 1998; Weil, S.; 2002). Topics should encourage individuals to take a critical look at themselves and inspire curiosity to learn more and discuss their newfound knowledge with their peers (Pendretti, E., 2003; Perry, D., 1993; Thomas, G.,

1992). Topics must not be too novel or unusual, otherwise they are liable to cause anxiety or be seen as unappealing to many viewers (Falk, J., 1992).

Practical Topic Selection: An Exploration of Seven Institutions
Audience very involved versus Audience not involved

Science museums want to choose exhibit topics that will appeal to their primary audiences, but they vary greatly in how they consult their audiences during the topic-testing stages and how this information is interpreted. Typically science museums will internally determine a list of potential STEM (science, technology, engineering, and math) topics and then go to the audience to get their feedback on the proposed topics. These topics can be generated from the museum's mission statement, particular interests of staff members, suggestions from board members, the current collection, and so forth. Science museums, like the Exploratorium, will also contact research institutions with whom they have an established relationship or current fellows who are studying at the museum. Both Minda Borun at the Franklin Institute and Elizabeth Kunst-Kollman at the Museum of Science in Boston said they will first consult their present collection to see what resources already exist for them or if there are internal renovations that need to occur. Almost all museums said they will have internal brainstorming sessions amongst staff members and will look to journals and magazines to see what is current and could become a possible topic for an exhibit. Johanna Jones, a consultant at Randi Korn & Associates, encourages museums who ask for help with topic selection to consult their mission statement, collection, and passionate interests of their staff to find inspiration.

Once a museum has determined a potential list of topics, most will consult audience members to see which topics are the most intriguing or potentially successful. They use many of the same methods suggested in the literature; focus groups, one-on-one interviews, surveys, and prototyping. A table in Appendix III outlines the specifics of which institutions test topics with the audiences and the methods used by each institution. A common way for many museums to test a topic is to go to audience members with a list of a few different topics and either a one-page description of the topic or some sort of illustration or prototype to help provide the audience member with a clearer idea of what the proposed topic would look like if it were turned into an exhibit. Some museums, like OMSI, will go back to the audience more than once if audience members find two or more topics to be equally attractive. The sample size for these types of surveys is generally in the range of 50–100. Surveys are conducted either online using software like SurveyMonkey or in person, again this depends upon what specific audience the evaluator is attempting to reach. External consultants are also used to survey audience members for opinions on potential topics but the sample size that is used is much larger, which is helpful for reducing the margin of error. Almost everyone agreed that although this information can be difficult to sort through and does not always provide clear results, it is considered to be credible.

The Exploratorium was the only museum that rarely incorporated audience input during the topic selection phase. Audience input is considered to be very useful in the subsequent evaluative stages, especially when researchers are trying to target a specific population within their general audience. However, when choosing a topic, Sue Allen said the evaluative staff at the Exploratorium is unlikely to contact the audience because, "they [the staff] assume they can pick an appropriate exhibition topic and create exhibits that are

engaging; also, they don't see early front-end research (polling people early on) as being very reliable because exhibits are heavily experiential rather than information-based and are developed organically rather than mapped out at the start, so early mockups are likely to be quite different from final exhibits" (Sue Allen, notes, Appendix II).

Appeal to the masses versus appeal to niche groups

In a recent *Curator* article (2007), "The Extraordinary Growth of the Science-Technology Museum," Alan Friedman describes the three stages science-technology museums have gone through to become the institutions that exist today. During the third stage of the evolution of museums, which occurred during the 1950s, the goal became to not only showcase artifacts to audience members and involve some hands-on activities, but to have public education as, "usually the only goal, and World's Fair-inspired intensive animation and interactivity are the primary techniques" (Friedman, A. J., 2007, p. 68). By actively deciding to educate the public, and thereby taking a more involved role as a community leader than they had in the past, science museums were committing themselves to creating exhibits that appealed to as many people as possible. Most of the exhibits that came out of this period in museum history have been described as being part of the "Blockbuster Era," in which, "museums were emerging from an inward-looking focus on collections to an outward-looking focus on the public" (Falk, J. H., & Sheppard, B.K., 2006, p. 31). Although public education is still a paramount goal in topic selection and thematic design, more recently museums have been attempting to create treatments where the focus is more on appealing to niche groups than to a broad range of audience members (Falk, J.H. & Sheppard, B.K., 2006).

When choosing topics, museums can pick those that have a broad appeal to the entire community, or they can choose topics that appeal to subsections of the greater population. Why might a museum decide to choose the later as opposed to the former? If one of the goals of a science museum is to be a community leader, they may choose topics that appeal to segments that are underrepresented in museum attendance to make the museum feel more inviting and accessible. This is not to say that museums will choose topics that seem exclusive to the greater population, rather that they will design certain themes and treatments within the exhibit to be aimed at a variety of smaller sections of the population. Science museums, like the Franklin Institute, will often use focus groups when evaluation staff want to include an outreach component in their exhibits in order to talk with individuals who are not part of their primary audience.

More recently, thematic treatments have been designed so that individuals feel they are getting something personally relevant out of the exhibit. Peter Linett, at Slover Linett Strategies, explained, "The specific topic for a gallery is less important than what the person can get out of it; what will it mean to them as an experience?" Sue Allen echoes this sentiment and explains that topics are chosen with broad accessibility but every topic also has multiple components that should appeal to the individual on a personal level. When choosing a topic, the question of "How can we make this personally relevant?" is one that is always being asked by evaluation and design staff. By making exhibits more personal, people who would typically not go to a museum are more likely to attend because they can see the resulting connections between their life and more abstract or general topics.

Intuition versus process

The procedure for choosing a topic for a potential exhibit varies from museum to museum and can change even within the same museum depending upon what else is occurring at the same time in the institution. Museums vary across a range from having a well-organized system that is used each time they want to select a new topic to having a more fluid system that is based on the intuition of exhibit evaluation and design staff. Minda Borun has devised her own model that she teaches at conferences and in-house workshops and has found to be very effective and is described in the interview notes (Appendix II). However, most other museums said they tried a variety of methods for determining a topic, as described in the earlier sections of this paper, but did not have a steadfast system. The methods were flexible and could be adapted to various situations, depending upon how clear the results were or what additional information was needed. Marcie Benne at OMSI explained that because of production and budgeting constraints, their methods are often shaped by convenience. Elisa Israel at the St. Louis Science Center said it was common practice to do qualitative research and go through a naturalistic evaluation process with audience members. Steve Yalowitz at the Monterey Bay Aquarium said he uses "the tool kit approach: until you know what you want to build don't open the tool kit, don't be afraid to ask for help—recognize your strengths and weaknesses" (see Appendix II, Steve Yalowitz notes). Museums that have less structured methods will often rely more heavily on the intuition of staff members in addition to the audience feedback they receive when deciding what topic the museum should pursue.

One museum that stood out from the rest is the Exploratorium. Topics are chosen at the Exploratorium based almost entirely on intuition instead of a particular system. Sue Allen explained that she likes to "look for possibilities for cross-disciplinary exhibits and enjoys doing unusual pairings or abstract ideas." She trusts the intuition and experience of her colleagues and does not find it necessary to have potential topics validated by audience input. Just as the creation of different exhibits is dictated more by the content of the exhibit than by any other factor, there is no precise methodology for choosing a topic. Sue Allen stressed the "organic nature" of how projects are completed at the Exploratorium, and topic selection is no different.

Conclusion

A lot of research has been conducted documenting the experience visitors have with exhibits through front-end, formative, and summative evaluation. Museums have gone to great lengths to document the timeline of exhibits from the time the topic is chosen until the exhibit is opened through its run at the museum. However, there has been very little research examining the models and methods museums use before the topic is chosen and during the process of topic selection. There is not a "go-to" list of topics that are guaranteed to be successful, just as there is not a "go-to" list of topics that are guaranteed to fail. Rather it is up to the museum to choose topics that are relevant to their audience, support their mission statement, and are influenced by the knowledge of their staff.

This paper has attempted to create a framework upon which future research can be built. Three different scales were delineated covering a range of topics that are pertinent to topic selection including audience involvement, target audience, and the structure of methods used in topic selection. Each museum has its own strategy, but

similarities can be seen amongst institutions and in comparison to the literature. The Exploratorium has used a model that is different from most other museums in that it rarely involves the audience and topic selection is guided almost entirely by intuition. The Exploratorium is unique and serves as a case study to compare other museums to but should not be seen as the only viable model. The Exploratorium's model is largely the result of internal connections, not applied methods that can be easily replicated by other science museums.

There are many factors that occur between a particular topic being selected and the actual execution of an exhibit making it difficult to determine how direct the connection is between topic selection and the success of the exhibit. The influence of the marketing departments, environmental factors, and decisions by the design team are just some of the variables that can contribute to the success of an exhibit and should not be discounted. However, one element that is becoming increasingly pertinent, and explained by both Peter Linett and Sue Allen, is the ability for elements of the themes and topics to connect with the individual on a personal level. As Peter Linett explained, "People really want personal and contemporary connections, not academic-feeling topics that are 'out there' apart from us and our experience… people want to know 'what I can do' (Appendix II, Peter Linett). If museums can create exhibits that truly resonate with the audience on an individual level, there is potential for the success of almost any topic imaginable.

Appendix 1
Interview Questions

Internal Evaluator
1. Is your evaluation team involved with the selection of STEM content or thematic treatment for the exhibits developed at your museum?
    -   If 1 is **NO**: ask if any primary or secondary audience research is conducted by **another party** to help with the selection of STEM content or thematic treatments.
    -   If the answer to this question is **YES**: ask who that is and if you can have their contact information. Then thank this person for their time.
    -   If **#1** is **YES**, proceed with questions #2–#3.

2. First, I'd like to know how the evaluation team helps the development team select STEM content for an exhibit. I have several questions about this.
    a. Do you gather information directly from your audience(s)?
        i. If so, what method(s) do you use (including sample sizes)?
        ii. Are these methods based on any models or guidelines from psychology or marketing?
    b. Do you gather information from other sources?
        i. If so, what are some of the sources you use?
    c. I'd like to know how helpful the information is once you gather it and introduce it back into the development team's decision-making process.
        i. Does the information you provide as evaluators typically sway the development team's decision?
            1. Do your methods yield "clear" results (i.e., an obvious favorite)?
            2. Does the team perceive the information as highly credible?
            3. Has the information you've provided led to topics with high audience appeal (brings them in the door)?
    d. If you were to make improvements to your method, what changes might you try?

3. How does the evaluation team help the development team select thematic treatments for an exhibit? If the methods are the same as those for the selection of STEM content, you can tell me that now or as we go through each question.
    a. Do you gather information directly from your audience(s)?
        i. If so, what method(s) do you use (including sample sizes)?
        ii. Are these methods based on any models or guidelines from psychology or marketing?
    b. Do you gather information from other sources?
        i. If so, what sources do you use?
    c. Once you gather the information and introduce it back into the development team's decision-making process, how helpful is it?

4. Does the information you provide as evaluators typically sway the development team's decision?
    a. Do your methods yield "clear" results (i.e., an obvious favorite)?
    b. Does the team perceive the information as highly credible?
    c. Does the team "believe" audiences should have a major voice in the decision?
    d. Has the information you've provided led to topics with high audience appeal (brings them in the door)?
    e. If you were to make improvements to your method, what changes might you try?

External Evaluator
1. How do external evaluation consultants help development teams select specific STEM content?
    a. Do you gather information directly from targeted audiences?
        i. If so, what methods (including sample sizes) do you use?
        ii. Are these methods based on any models or guidelines from psychology or marketing?
    b. Do you gather information from other sources?
        i. If so, what are some of these sources?
    c. Once you've received the information, how do you explain or portray it to the development team?
        i. How is it incorporated into the development team's decision-making process?
        ii. Does it tend to sway the development team's decision?
        iii. Do you find your methods tend to yield clear results (i.e., an obvious favorite)?
        iv. Has the information you've provided led to topics with high audience appeal?
    d. If you were to make improvements to your method, what changes might you try?

2. Finally, how do external evaluators help the development team select thematic treatments for an exhibit? If these methods and processes vary from those for selecting STEM content, please explain how.

Internal Evaluators
Marcie Benne, Senior Exhibit Evaluator, OMSI
1. Yes, involved with both STEM content and thematic treatments. Usually with large scale exhibits, depends on the funder; if it's a national funder (NIH, NOAA, NASA) yes.

2. Yes, do gather information from the audience.
   a. May go to the audience 2 times; first time with a long list (10) and then pare down the list to be considered by the team to about 4. Then go back to the audience again.
   b. A couple of different tactics:
      i. Will interview people at random, as long as they're in the target audience and age range; shoot to do about 50–100 interviews that last about 8 minutes; 4 questions long; done for STEM content and thematic combination.
      ii. Had people waiting in line to watch an OMNIMAX film rate ideas on a scale; only used once, only with adults, about 40 participants (quick and dirty way to get it done).
      iii. Online surveys targeted at members; have less control over gender; targeting parents with kids in a specific age range; goal is to get 100 back.
   c. When researching for STEM content usually only use a verbal description in the questions.
   d. When researching hybrid (STEM/theme) or just theme, will usually use a verbal and visual description; rank the concept.
   e. These methods are based more on trial and error and convenience than anything else; not psychology or marketing methodology.

3. Other sources used:
   a. Thematic: will do a pop culture review and consult magazines.
   b. Also will have focus groups with specific target audiences; about 10 people per group, 3 groups total; more for STEM content.

4. How evaluators view this information:
   a. Sometimes they want a clear favorite, but that is not the result (no clear winner); need to talk to different audiences, have different preferences.
   b. Team thinks it is credible information.
The information has led to moderately good appeal but not super results; no "blockbusters."

Barb Siples, Grants Coordinator, OMSI

2. Do gather info from the audiences.
   a. Survey about 100 people.
   b. Focus groups with about 10 people.
   c. Pretty standard methods (not based on one particular model).

3. Other sources used:
   a. Literature surveys/reviews, journals.
   b. Interests of certain age ranges—checking websites, magazines.

4. How evaluators view this information:
   a. It's very valuable.
   b. Try to focus on themes that come out whenever possible.
   c. Literature reviews have clear results, but the focus groups and surveys often do not.
   d. Credible? Not so much, because the groups are small and research is conducted in less than perfect environments; take the data "with a grain of salt."

5. Ways to improve:
   a. Have a more systematic, well thought out process.
   b. Use a method that is easier to replicate.

Scott Ewing, Exhibit Evaluator, OMSI

2. Do gather info from the audience.
   a. Interviews with visitors, about 30—100, at museum.
   b. Occasionally interviews offsite (e.g., at a mall for title testing).
   c. Focus groups, generally with underserved or targeted audience,
   d. Pretty standard methods,

3. Other sources used:
   a. Literature review, informal learning review, ASTC *Dimensions*.
   b. Internet as a starting point.

4. How evaluators view this info.
   a. Get mixed info, good to get feedback on things early on.
   b. See it as credible.

5. Ways to improve.
   a. Want well articulated questions, can be difficult to visualize things at times.
   b. Give people clearer materials, not just a blurb.

Sue Allen, Director of Visitor Research & Evaluation, Exploratorium
  2a. There is not a standardized method for doing everything; a lot of it depends on the chosen topic/exhibition.
- Usually don't use evaluation staff to check with visitors for top-level choice of STEM topic; they assume they can pick an appropriate exhibition topic and create exhibits that are engaging; also, they don't see early front-end research (polling people early on) as being very reliable because exhibits are heavily experiential rather than information-based and are developed organically rather than mapped out at the start, so early mockups are likely to be quite different from final exhibits.
- Instead they generally rely on an extensive network of senior scientists and artists or a content expert who has a "burning desire" to explore one particular area.
- Once a grant is funded/topic is chosen, then front end interviews will occur; typically ask the audience: associations, definitions, motivators, what they specifically are interested to know about, use props (ex. a listening exercise to see how you can use noise to your advantage) or create prototypes whenever possible.
- Know that other places do use audiences to predict (ex. Monterey Bay Aquarium), but they tend to rely more heavily on the intuitions/experiences of people who have worked there.
- Look for possibilities for cross-disciplinary exhibits; enjoy doing unusual pairings/abstract ideas (ex. current liminality exhibition, art exhibition about thresholds).
- Really interested in the professional side of things—evaluating the exhibition to find ways to improve it, but also to inform professional audiences where relevant, and to explore new methods for doing research and evaluation. Information goes into various levels of reports, from rough formative to peer-reviewed journal publications, books, or monographs and most is published online (http://www.exploratorium.edu/partner/visitor_research/reports.php)
- Want to explore questions like how to sustain visitors with short attention spans for longer amounts of time; come up with ways for visitors to be able to better answer their own questions while being in the museum; some projects don't have a STEM topic as much as a learning approach being explored.
- Like to incorporate learning models; though this more often happens in the research than in the evaluation.
- Tend to look at science education info more often than developmental psychology because they don't view themselves primarily as a children's museum; for many exhibitions the target age is 10+, though **generally the aim is for broad accessibility** and many levels of possible engagement.
- Emphasis on constructivism and scientific inquiry (e.g., Barbara White), less developmental (though have worked with Alison Gopnick).
- Exhibit development vs. research.

2b. People are always looking online for potential topics and areas to explore.
- Have a lot of professional connections to use, like Stanford, UC Berkeley, UCSF, scientists in Antarctica, particle physicists in Switzerland, Osher Fellowships (distinguished scholars), artists and scientists in residence.

2c. Very integrated teams.
- All teams have at least one evaluator and maybe 2 and are constantly providing evaluation from beginning to end.
- Ex. interviewed people about listening; realized the importance to visitors of listening for meaning/wanting more skills to improve listening abilities in a social context; ideally evaluators come up with 2 or 3 big points like that to share with the team, though some teams want detailed reports.
- Try to conduct at least one round of formative evaluation on every exhibit element.
- Development is a very organic process, with individuals on the team pushing for things that they want, and very open for the exhibit developers to follow directions they believe worthwhile; not much structure.

2d. Personally, wish they were less focused on topic; of less significance than mechanisms of learning more generally.
- See them as a research and design house for the field.
- Positing site for professional audiences; would like to study assumptions in the field of how learning happens, and to explore and expand ways to support it; ISE is pushing that (*Going APE* exhibit project is a good example). Another example: *Finding Significance* was a research project to understand the learning process; can hands-on exhibits be enhanced so that visitors make more personal connections to them. That was pure research—in the end there was nothing new for the public on the floor, but there are publications that can help the field to see what works and doesn't and some idea of why.
- Very interested in doing more with professional audiences

Kirsten Ellenbogen, Director of Evaluation & Research in Learning, Science Museum of Minnesota
1. Evaluation team is involved in selection of STEM content.

2. Selecting STEM:
   a. Do gather information from the audience.
   b. Used for fine tuning once the topic has been selected; help to determine important content, process issues, determine what people know, what are critical issues.
   c. If it's a really complex issue (ex. race) will use focus groups.
   d. If it's straightforward content, will use surveys/questionnaires and web surveys; will use props if possible or sketches; try to figure out what people will get out of an exhibit; sample size usually about 50 for front end but smaller for formative research.

e. Results can be very surprising: find out that there is a lack of information/hurdles that need to be crossed or that there is no difference in visitor preference.
- Other places they look for information: journals like *Science & Education*, *Research in Science and Technological Education*, *Research in Science Education*, John Miller's *Public Understanding of Science*, informalscience.org website, advisors at the museum.
- Also consult *How People Learn* and *Inquiry and the National Science Education Standards: A Guide for Teaching and Learning* by National Academies of Science; Benchmark AAAs: shows interrelationships and maps out contents.
- Different projects take on different approaches; a lot depends on the project; the content really starts to dictate the model; everything is project based; within the museum don't really talk about it as a model.

Minda Borun, Director of Research and Evaluation, Franklin Institute
2. Selecting STEM content:
- Do front end evaluation with visitors to find out what they already know/have misconceptions about/want to know more about.
- Use surveys with SurveyMonkey; put a cap at, e.g., 200. Can get a lot of responses from members.
- Do focus groups, normally 4: parents with kids, older kids, younger kids, teachers.
  o If there's an outreach component they will recruit.
  o Otherwise just use members.
- Contact other ASTC museums and call those evaluators to see what kind of work they've done in the past.
- Everything we do involves STEM because we're a science museum not a science center.
- Will consult their collection to see what they already have/what they can use.
- Will have staff brainstorming sessions.
- Will go to the public and do topic testing: 4–5 topics with 1-page descriptions of each.
- The institution definitely sees evaluation information as being credible and seems to get clear results (have to ask the right questions).
- They devised their own evaluation model which she teaches at conferences and in-house at the Franklin Institute.
- Doesn't know if their work contributes to high audience appeal; too big a gap in time and too many other variables involved.
- Is very happy with the evaluation model, it is constantly evolving.

Elisa Israel, Research and Evaluation Manager, St. Louis Science Center

1. Are involved in STEM selection.
   - There's a rotating schedule of people.
   - Staff who is in charge of updating gallery content; team who is in charge of temporary exhibits.
   - Key staff in the Education, Exhibits, and Programs Division make the primary selection of topics, often with input from the Science Center's Board.
   - Marketing is sometimes involved in the process.
   - Isn't certain about selection of topics; but evaluation, design graphics, exhibit electronics & production, and content expert all play a role; evaluation is present as a member of each gallery development team.

2. Definitely involve the audience.
   - Do thorough front end and formative evaluation; usually about 20 in-depth interviews.
   - Front end: some number of focus groups, with surveys have a small sample size.
   - 50–100 total.
   - All of this helps drive the broader picture.
   - Attempt to determine where are people's entry points into the content.
   - As exhibits are beginning to be designed, they will prototype with visitors.
   - Currently there is a new but temporary prototype space; in the formative stage can test every interactive or just a few.
   - The front end is sometimes sample specific with selected representative key audience.
   - Will do topic testing with existing titles, traveling exhibits, or OMNIMAX.
   - Have talked about doing online surveys in the future.
   - Usually give a title and a brief description, sometimes a verbal description.

3. Determining what to change:
   - Influenced by board members.
   - Visitor feedback is a supporting element.
   - Pay attention to what is happening in specific science fields.

4. Information from visitors:
   - Is trusted, just because it's trusted doesn't always mean it's clear.
   - Need to be careful with methods; use appropriate sample sizes.
   - Example: tested potential title in the formative stages and did not find a strong leader, needed to make a recommendation based on the findings.
   - Recommendations are often followed.

5. Models used:
   - Qualitative research.
   - Naturalistic evaluation process.
   - There are many stakeholders, and they interpret the information from their perspectives.
   - Prototyping: can help to refine over time.

- Evaluators at other institutions have used the report format developed for disseminating findings from formative evaluation activities.

6. Improvements:
   - Ideal process would plan enough time to do all stages of evaluation; the reality is that there is not always time for thorough evaluation; would like to use evaluation more.

Elizabeth Kunz Kollmann, Senior Research and Evaluation Assistant, Museum of Science, Boston
   1. The exhibit team generally comes up with an original or general idea; she has helped with the brainstorming after an exhibit topic has been chosen and the museum is into the planning stage; they usually come into play when exhibit teams are being formed and topics have already been chosen, whereas the marketing department might talk to the audience earlier in the process.
      a. Occasionally will do picture testing and show pictures of concepts that a few people are interested in.
      b. Can have marketing look at what they're doing; marketing will ask similar questions on a scale of 1–10
         i. Marketing department is more likely to ask a question such as which of the following potential exhibits would you like to see at the museum?
         ii. Evaluation department is more likely to ask more specific questions about an already chosen topic to help modify and improve it based on visitor input.
      c. Exhibit team often have an idea and then will create a prototype to test a concept/idea and then either use it or throw it out.
      d. Often there is prototyping done, it includes letting visitors use the prototype and then interviewing them to see what they thought of the activity and what they learned.
      e. Sometimes ask people at random about a series of topics on the exhibit floor. This can include asking about potential titles or topics for an already decided upon exhibit or program.
      f. Evaluation department does not have a lot to do with actual topic selection though.
      g. Exhibit development team will often come up with ideas and then go to the exhibit evaluation department or the marketing department to get visitor feedback. The process of coming up with exhibits takes many years. For programs, the timeline is much shorter.

   2. People tend to work in teams.
      a. Find that interviewing is the most effective way to get information from visitors, sometimes focus groups may be used by evaluation or marketing as well.
      b. Marketing is not always the most applicable strategy.

     c. Lots of prototyping; generally use small populations (no more than 15, but no fewer than 5; typically around 10).

3. Topic selection is based on:
     a. Partly funding.
     b. Partly fixing up old exhibits and changing existing content on current exhibits.
     c. Attempting to figure out what is important now.
     d. Sometimes staff interest may also cause a topic to be pursued.

4. Audience information is seen as credible.

5. Definitely see value in having marketing teams ask questions, but find that people are all over the place in what they're looking for or want. This may not be the best way to get good data. People are going to be drawn to topics they are interested in, and, therefore, there are many topics people will be drawn to. Other times a particular topic may really stand out for a group.

Steve Yalowitz, Audience Research Manager, Monterey Bay Aquarium (MBA)
- Two full-time permanent staff to conduct audience research in three departments: exhibits, marketing, and guest experience (guest service, volunteer guides/docents, visitor programs).
- Evaluation team evaluates content, curriculum, and learning methods, but doesn't assist in specifically designing and developing the exhibits. Their work informs those making the design decisions.
- There are generally 2 models for in-house evaluators and their role in exhibition development and design: have evaluators sit on the team or have evaluators come in to conduct the evaluation (second model is used at MBA).
- Evaluators help bring the visitor's voice to the table.
- They contribute to understanding content and thematic treatment.
- There are three developers and three designers.
- Evaluators not in charge of making decisions about thematic content, but the evaluation findings assists exhibit team in making more informed decisions.
- Final decision for exhibition topics is usually made by senior staff but with a lot of input from exhibits.
- Test an approach to see what's interesting to folks.
- Double check: marketing and thematic balance.
- Temporary exhibits usually have to do something that will bring people in (in addition to educating them); jellies, seahorses, and sharks usually drive attendance.
- A lot of top-down work with a couple of competing topics or see how popular something will be, ex. sharks: fine tuning/setting expectations, especially communicating conservation information.
- Structured interview to gauge the level of interest; use both quantitative methods and open-ended questions.

- Since opening in 1984 MBA has been very dedicated to audience research, especially two departments: 60–70 total exhibit evaluations and over 100 marketing studies.
- Case Study: River Otters (new temporary exhibition).
  o People associate the aquarium with sea otters, how would they respond to river otters?
  o Exhibit team wants feedback from visitors, but certain decisions have already been made—get feedback about specific approaches or range of realistic options for exhibition.
  o Need to see what knowledge people have of river otters; if this was an exhibit, what would they want to see?
  o Will the exhibit lead to positive or negative word of mouth and a positive overall experience?
- Never know what the methods will be until he sits down with the team. First develop research questions, then decide on methods.
- There are misconceptions at any institution about what visitors want, like, or need in an exhibition—evaluation helps test or correct some misconceptions.
- For quantitative studies, will conduct about 400 interviews, which drops the margin of error down to 5%.
- For qualitative studies, it depends, but 30 to 40 visitor groups or individuals is typical.
- Will use visuals to cue visitors and get reactions to exhibit approach: either a picture or a prototype, lots of lists of hands-on activities or pictures of animals to see what people are most interested in and why. When you ask visitors to think of an exhibition or exhibit, they rarely picture what we can produce. Provide as much visual detail as possible in the evaluation process if you're asking about whether they would be interested.
- Is best to be consistent in methods, so you can compare findings across exhibits.
- Evaluation team goes to the audience and works closely with the exhibit developers to plan and conduct the evaluation.
- Information brought back is seen as credible and reliable (but not infallible).
- The aquarium conducted 22 studies interacting with audiences just in 2006 alone.
- In his opinion, it's better if the evaluator is not on the exhibit team—more objective, focuses their expertise in the most appropriate areas, frees up time to conduct more studies—but there is not consensus in the field about which is better.
- Will do focus groups, but more on the marketing side: advertising/key messages.
- Sometimes hire out for focus groups or other methods; depends on the topic and in-house expertise; will use members or other groups (sometimes underserved portions of the population if that is the focus).
- There has been a top-down push for standards from places like IMLS and NSF; outcome based research. AAM and VSA are discussing standards.
- Methods: observational, structured in-depth interviews, single exhibit observation, surveys; use the tool kit approach—until you know what you want to build don't open the tool kit; don't be afraid to ask for help— recognize your strengths and weaknesses.

- Timing and tracking, to see how long it takes someone to go through a whole thematic experience (150); determine hot spots.
- In-depth interviews with family groups about 40.
- Formative/prototype testing—20 to 30 groups/individuals, but depends on if you need to make changes and retest.

External Evaluators
Johanna Jones, Managing Director, Randi Korn & Associates, San Francisco
- Has a philosophical problem with evaluation determining content versus ensuring it is understood because it is engaging.
- Finds that it is hard to ask people about their interests on topics when they know nothing about the topic.
- People can only respond based on what they already know, and finds it to not be very effective.
- Ex. Liberty Science Center—gave people a list of topics and had them rank them not very interesting–very interesting; gave them a second list of topics but this time with a description and got COMPLETELY different results; CONTEXT is everything.
- Really thinks the topics should connect to the mission of the museum, the interests of the staff, and the collection the museum has.
- Do front end evaluation a little later on in the process otherwise there are often misunderstandings and miscommunications.
- To start the process: have a long conversation with stakeholders in order to determine what information they want to know and how it will be used; afterwards do front-end evaluation like 1-1 interviews, surveys, focus groups.
- If the museum asks them for topic suggestions she would say they should look at their collection, manifesto, and determine what the staff is passionate about.
- Will become involved again once the museum knows what they want to do and then they will determine what they want to know about visitors (often do front-end too early, otherwise).
- Like to have something to show to the public/an activity to do with audience members; ex. determining how people look at fossils—either like paleontologists or just old bones.
- Really helps to have a concrete object or specimen; then will conduct interviews or surveys. The sample size depends on museum attendance, the target audience, kinds of questions you're asking and the type of instrument you're using, and the kind of analysis you're planning to conduct (and, of course, budget).
- End result of the bone work determined that people don't look at bones like paleontologists and caused a visual literacy element to be included in the exhibit.
- Really finds that context is everything.
- What makes their evaluation seem credible is that they're seen as being unbiased and not subject to the politics and issues that museum staff would be if they conducted the evaluation.

Peter Linett, Partner and co-founder, Slover and Linett, Chicago, Illinois
- Museums come to him when they are facing strategic change: a new wing, doing a large renovation, branding effort, have a new leader.
- Want help determining what to invest in.
- Inside efforts, for example, surveying members.
- External surveys.
- Qualitative at the start with IDIs and focus groups.
- Later on will do quantitative survey of population at large.
- Observational research.
- Focus groups are good because the audience guides the conversation, easier to tap into what people are really interested in exploring.
- Exhibit design folk and educators want to know how to convey information to the audience; the audience wants to know how will things come alive for theme, are interested in immersion and being transported to another time or place.
- Audience really wants emotional, personal relevance in an exhibit.
- Need to back up qualitative research with quantitative research; ask broader questions and sample over a few months (due to seasonal changes in people who visit); will conduct 500+ surveys; a full audience would be 750–.1000 in order to cover a whole population
- Then begin to segment psychographically with cluster analysis due to attitudinal variables.
  o Example: Natural History Museum in Midwest—majority of the population wants progressive practices like immersiveness, activism; but a minority of the population wants more traditional, familiar museum practices.
- Research can help the museum figure out where it should focus its energies: mission of the museum, needs of marketplace/community, interests of curators and staff.
- Need to also figure out what people want to feel or experience versus what we want to teach them: where's the overlap or sweet spot?
- Always opportunistic/serendipitous occurrences as well; i.e., Global Warming month, grant from x foundation, etc.
- Use market research tools, but the researcher has to be open to new information.
- Always questions about motivation:
  o Number one answer is to spend time with friends and family, second is to have fun.
  o After that comes learning/education (but people do want the education to be fun…it's not a separate experience).
  o Often a mix of all three.
- People like museums because they see them as safe and nurturing environments.
- Also are favorably disposed toward them because of cultural values (people know they're supposed to favor and support museums and other learning institutions).

- People feel guilty about not going to a museum; know that it's good for us but just can't get self to go; went when they were kids but haven't gone since or only go very rarely.
    o Cultural differences: education is the strongest demographic predictor of attendance (wealth is also a factor, but less so…and ethnicity isn't a strong influence at all, once you control for education and income).
- Topics:
    o The specific topic for a gallery is less important to the visitor than what he or she can get out of it; what will it mean to them as an experience?
    o Compare real artifacts (that you can't touch) with exhibits that are more hands on and interactive: people want both.
    o People are becoming less interested in dinosaurs and are more interested in how the past relates to the present and future: biodiversity; e.g., how does what we know about dinosaurs affect me, my family, my town? They say they're more interested in biodiversity than seeing more dinosaur bones…ready to move beyond the familiar topics and approaches.
    o People really want personal and contemporary connections, not academic-feeling topics that are "out there" apart from us and our experience.
    o In conservation and other contemporary topics, people want to know "what I can do."
- In general what makes people feel connected to museums as a whole, rather than just to one exhibit? That's the real marketing (and branding) question. Broader and more strategic than most evaluation projects.
- Focus groups and other qualitative methods can be misused as a way to reaffirm the plans or beliefs of the staff (or researchers). Should really be exploratory (an issue Peter can expand upon).

Appendix III
Museum Methodology: Audience Involvement

Institution	Focus Groups	Interviews	Surveys	Prototype
OMSI	X	X	X	
Franklin Institute	X		X	
Science Museum of Minnesota	X		X	
St. Louis Science Center	X	X	X	X
MOS		X	X	X
Monterey Bay Aquarium	X	X	X	X
Exploratorium				

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