Sustainability: Professional Development Summative Evaluation Report

Community Environmental Services in partnership with OMSI

Prepared by

Renée Bogin Curtis, Evaluator
Community Environmental Services, Portland State University

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Executive Summary

Overview of the *Sustainability* Project

As part of the National Science Foundation funded *Sustainability: Promoting Sustainable Decision Making in Informal Education* project, the Oregon Museum of Science and Industry (OMSI) and its partners developed a bilingual (Spanish/English) exhibition, event series, outreach campaign including a public website, and a professional development website and workshop. The goal of these deliverables was to promote sustainable decision making by building skills that allow participants to weigh the tradeoffs of their choices and choose more sustainable practices. The project duration was September 2009–April 2015. Portland State University, in collaboration with OMSI, supported many phases of evaluation during the project and led all summative evaluation activities.

Overview of ExhibitSEED

ExhibitSEED (Exhibit **S**ocial **E**nvironmental and **E**conomic **D**evelopment) refers to the professional development website and the Museum Advisory Committee (MAC) workshops created by OMSI during the *Sustainability* project. ExhibitSEED resources are based on a three pillars approach to sustainability that includes environmental, economic, and social considerations. The website (www.ExhibitSEED.org) launched in 2012 as a place for exhibit and museum professionals to find resources for developing, designing, and building more sustainable exhibits. The website tools were developed from the perspective of an interactive science museum, but the information is valuable to exhibit professionals in all types of museums. The MAC workshops were conducted in 2013 at five museums in different regions of the country. They provided opportunities for attendees– 100 design and fabrication professionals from 81 organizations– to practice sustainable decision-making skills and use the ExhibitSEED tools.

The summative study evaluated whether the tools achieved the following impacts:

1. Workshop participants will understand considerations for the development, design, and fabrication of more environmentally, economically, and socially sustainable exhibits.
2. Website users will become aware of skills associated with environmentally, economically, and socially sustainable decision making in exhibit development, design, and fabrication.
3. The Green Exhibit Checklist (GEC) will foster skills associated with environmentally responsible decision making in exhibit design and fabrication.

Key Results

The findings are based on data from 85 post-workshop surveys conducted at the end of each event, 45 delayed post-workshop surveys conducted within 6–8 months of the workshop, and a team debrief conducted after the final workshop with workshop facilitators and planners. The data do not always directly measure the percentages outlined in the intended outcomes, yet relevant data were evaluated and overall indicated the deliverables successfully achieved their intended impacts and outcomes.

Museum Advisory Committee (MAC) Workshops

Based on a scale of 1–5 (5 being the highest and 1 the lowest), participants in the post-workshop survey gave the MAC Workshop very high mean ratings in terms of its usefulness (4.52), relevancy to work (4.59), and applicability to practices (4.44). Those participants also rated the workshop fairly high in terms of its effectiveness at facilitating sustainable practice (4.0) and very high in terms of their likelihood to apply the tools (4.47). These ratings indicate success in encouraging industry professionals to understand considerations for the development, design, and fabrication of more environmentally, economically, and socially sustainable exhibits. In the post-delayed surveys, many participants also indicated ways that the three pillar model impacted their thinking or approach after the workshop.

ExhibitSEED Website
Based on a scale of 1–5 (5 being the highest and 1 the lowest), participants in the post-workshop survey gave the ExhibitSEED website high mean ratings in terms of its usefulness (4.19), relevancy to work (4.24), and applicability to practices (4.02). These ratings indicated successful awareness of skills associated with environmentally responsible decision making. In the post-delayed surveys, 78% of participants reported use of the website often because of the website's good tools and information.

Green Exhibit Checklist
Based on a scale of 1–5 (5 being the highest and 1 the lowest), participants in the post-workshop survey gave the Green Exhibit Checklist (GEC) high mean ratings in terms of its usefulness (4.14), relevancy to work (4.25), and applicability to practices (4.08). These ratings indicated successful acquisition of skills associated with environmentally responsible decision making. In the post-delayed surveys about half of participants (49%) had used the GEC, while many others stated they have not yet had the opportunity.

Considering the Three Pillars of Sustainability
Based on a scale of 1–5 (5 being the highest and 1 the lowest), participants in the post-workshop survey rated moderate-to-high confidence in their ability to consider each of the three pillars with the highest rating in environmental (4.35), fairly high confidence in economic (4.00), and moderately high confidence in the social (3.85), with fairly high confidence in the three pillars combined (4.05).

Project Team and Host Museum Staff Debrief
The debrief session revealed that impressions among participants about the workshops and tools were largely positive. Debrief comments identified the following highlights for attendees: the chance to network with others in the industry around the sustainability topic, new channels to continue the conversation, and the possibility of additional or longer workshops in the future.

Conclusions & Recommendations for the Field

Generally, the deliverables achieved the desired impacts. Overall, participants reported positive and valuable experiences with the workshops and tools. The largest value of exposure to the workshop and tools over time appears to be the integration of sustainability considerations into general thinking and the approach to design and development. This impact on general thinking suggests the project deliverables helped to foster sustainable decision-making skills. Some participants reported barriers to use including uncertainty about how best to use the tools or limitations in the workplace due to lack of support or absence of new development opportunities. The tools may be most useful for new projects or opportunities. Participants' ability to apply the three pillars approach was strong but varied by pillar. Confidence was strongest in the use the environmental pillar and weakest in use of the social pillar. While recollection and/or use of some tools diminished over time, the majority of participants reported continued use of the ExhibitSEED website tools and the continued impact of the workshop on their thoughts and decisions around sustainability.

Specific recommended actions include the following:

- **Continue the conversation.**
- **Promote more participation and encourage norm development.**
- **Advance and promote the workshop themes.**
- **Recognize and respond to regional, industry, and workplace barriers.**
- **Further evaluate tools and resources.**

Introduction to the *Sustainability* Project

As part of the National Science Foundation funded *Sustainability: Promoting Sustainable Decision Making in Informal Education* project, the Oregon Museum of Science and Industry (OMSI) and its partners developed a bilingual (Spanish/English) exhibition, event series, outreach campaign, and website for the public. The goal of these deliverables was to promote sustainable decision making by building skills that allow participants to weigh the tradeoffs of their choices and choose more sustainable practices. The project duration was September 2009 – April 2015.

The project team used a positive, story-based approach to engage the target public audience of English- and Spanish-speaking families in the Portland metropolitan area. The deliverables focused on people and places in the area and highlighted simple choices available to everyone.

The project also features professional audience deliverables that build upon the groundbreaking work already done at OMSI in the area of sustainable exhibit development, design, and fabrication.

Project Goals

1. Promote sustainable decision making.
2. Promote sustainable practices for developing, designing, and fabricating exhibits.

Target Audiences

Public Audience

- Families, with a focus on families with middle and high school aged youth
- Residents of the Portland metro area (Clackamas, Washington, and Multnomah counties)
- Underserved audience: parents who prefer to speak Spanish and their families

Professional Audience

- Exhibit developers, designers, and fabricators in non-profit and for-profit sectors
- Secondary audiences include museum administrators and others working in Informal Science Education (ISE) organizations

Project Deliverables

- A 1,500 square foot bilingual (Spanish/English) exhibition, *Clever Together/ Juntos somos ingeniosos,* designed to engage the public in developing an understanding of the skills needed for sustainable decision making in their everyday lives
- Bilingual (Spanish/English) outreach campaign that uses access points outside of the museum to encourage people to engage with sustainability-related stories and activities via phone or computer (*Local Voices, Clever Choices/ Nuestras voces, nuestras decisiones* campaign)
- Eight bilingual (Spanish/English) museum events about sustainable living
- ExhibitSEED workshops for museum professionals on sustainable exhibit development
- A set of documented practices and guidelines, tools, and resources for sustainable exhibit development, design, and fabrication that may become an industry standard (ExhibitSEED.org)

Project Partners

- Coalition for a Livable Future
- Metro Regional Government
- Portland Bureau of Planning and Sustainability
- Portland Community College
- Verde

Overview of ExhibitSEED

ExhibitSEED (Exhibit **S**ocial **E**nvironmental and **E**conomic **D**evelopment) is a professional development website and workshop created by OMSI during the course of the *Sustainability* project. ExhibitSEED resources are based on a three pillars approach to sustainability that includes environmental, economic, and social considerations. The website (www.ExhibitSEED.org), launched in the fall of 2012, is a place for exhibit and museum professionals to find resources for developing, designing, and building more sustainable exhibits. The resources on this website were developed from an interactive science museum perspective, but the information is valuable to exhibit professionals in all types of museums.

The Oregon Museum of Science and Industry (OMSI) developed ExhibitSEED.org with input from local and national museum industry and design advisors. This team included the Museum Advisory Committee (MAC) partners that also hosted ExhibitSEED workshops for museum professionals in their regions.

Museum Advisory Committee:
Children's Museum of Houston
The Franklin Institute
Miami Science Museum
Science Museum of Minnesota

Design Advisors:
Madison Children's Museum
Gyroscope, Inc.
Paul Orselli's Workshop
National Building Museum

The intended impacts for the ExhibitSEED deliverables were:

1. Through the ExhibitSEED workshops, participants will understand considerations for the development, design, and fabrication of more environmentally, economically, and socially sustainable[1] exhibits.
2. Through the website, users will become aware of skills associated with environmentally, economically, and socially sustainable decision making in exhibit development, design, and fabrication.
3. Through the Green Exhibit Checklist, the target audience will foster skills associated with environmentally responsible decision making in exhibit design and fabrication.

[1] "Sustainability is commonly defined as the concept of providing society with current needs in a way that doesn't harm the ability of future generations to meet their needs. Definitions often include the three components environment, economy, and society (sometimes referred to as the three "Ps": planet, prosperity, and people)." – Trautmann, Charles H. (2007). A Change in the Weather: European Museum Coverage of Global Climate Change. Sciencecenter Report. p.3. Retrieved on October 3, 2014 from http://informalscience.org/images/research/A_Change_in_the_Weather.pdf.

ExhibitSEED Website

The resources included on the website and introduced in the workshops included the following:

- Sustainable Practices: Practical tips for incorporating social, economic, and environmental considerations into each phase of exhibit development including proposal writing, project management, content research and development, design, prototyping and visitor testing, production, evaluation, and end-life
- Decision Making Tool: An activity intended to inspire a well-rounded conversation that leads teams to decisions that consider all three (social, environmental, and economic) aspects of sustainability
- The Green Exhibit Checklist: A tool to evaluate the environmental sustainability of exhibit production
- Materials Guide: An online guide to help exhibit designers and builders choose materials that are better for the environment, safe for visitors and workers, and make economic sense
- Case Studies: Individual case studies about how museums have integrated the three pillars[2] of sustainability into their operations
- Envisioning Sustainability Activity: An activity designed to help teams explore the concept of sustainability

Workshops

The team hosted five one-day, hands-on ExhibitSEED workshops. At these workshops, exhibit developers, designers, and fabricators discussed practical skills for creating more sustainable interactive exhibits using case studies and practical tools. To encourage participation from diverse disciplines, institutions, and geographic areas, there was no charge for the workshop, and participants could apply for travel assistance.

The first workshop was conducted at OMSI in February 2013 and acted as a pilot workshop for remedial evaluation. The team used reflections from the OMSI workshop and the remedial evaluation report to update the workshop before conducting subsequent Museum Advisory Committee (MAC) workshops in April and May 2013. MAC workshops were held at the Children's Museum of Houston, Miami Science Museum, Science Museum of Minnesota, and The Franklin Institute in Philadelphia. Each workshop had approximately 25 participants from the region surrounding the host museum. A total of 131 people registered for the workshops from 110 institutions.

Green Exhibit Checklist

A key element of ExhibitSEED was the Green Exhibit Checklist (GEC). The GEC was a tool to evaluate the environmental sustainability of exhibits. The goal of the GEC was to inspire exhibit teams to plan exhibits with five key environmental considerations in mind and extra points awarded for innovation:

- Reducing new materials
- Using local resources
- Reducing waste
- Reducing energy consumption
- Reducing toxic emissions

[2] The United Nations General Assembly defines the three pillars as, "efforts [to] promote the integration of the three components of sustainable development – economic development, social development and environmental protection – as interdependent and mutually reinforcing pillars." – 2005 World Summit Outcome, Resolution A/60/1. (15 September 2005). p.11-12. Retrieved on October 3, 2014 from http://data.unaids.org/Topics/UniversalAccess/worldsummitoutcome_resolution_24oct2005_en.pdf

The initial outline of the GEC was developed in 2007 when designers at OMSI looked to the LEED standards for buildings to try to create a similar scoring system for exhibits. LEED assesses and assigns a numerical score for the environmental sustainability of building construction. However, the LEED system has many categories that do not apply to exhibits and involves complex calculations that seemed unnecessarily complicated for the purposes of museum professionals. The OMSI exhibit designers and production staff worked together to find a simpler approach based on basic material and design information. Since its creation, OMSI has used the GEC to assess past exhibit builds and to set sustainability goals for future projects. See Figure 1 for an example of the GEC cover sheet.

Figure 1. Cover sheet for the Green Exhibit Checklist (GEC). A complete version of the GEC is included in Appendix IV and online at http://www.ExhibitSEED.org/green-exhibit-checklist

The Development of ExhibitSEED

ExhibitSEED deliverables were developed based on the team's experiences creating the *Clever Together* exhibition, literature research, partner and advisor input, and early project evaluation.

Front-End and Remedial Project Evaluation
The purpose of the evaluation was to understand the professional audiences' needs and concerns with regard to designing and fabricating more sustainable exhibits. The OMSI evaluation team conducted front-end research to identify existing needs and interests of the field through targeted surveys of industry professionals in the winter of 2010, at the Spring 2010 Sustainability Symposium (a conference hosted by OMSI to inform the *Sustainability* project), and through additional targeted survey research in spring 2012 to obtain industry feedback on the ExhibitSEED website and Green Exhibit Checklist. The evaluation team conducted remedial evaluation of the workshops and website content by conducting observations and surveys with participants at the first ExhibitSEED workshop held at OMSI in February 2013.

Developing the Deliverables
In the original National Science Foundation (NSF) grant, OMSI proposed to create "tools and indicators for assessing the sustainability of the project development process using a triple bottom line of financial, environmental, and social impacts." During the process of creating these tools and indicators, though, the team found it difficult to determine meaningful ways to calculatethe impacts of the team's decisions for all three pillars of sustainability.

At the beginning of the project, the team attempted to devise a set of indicators to measure and assesses the sustainability of the exhibit development process and a weekly online survey for team members to track its progress over time. Social indicators included "team learning" and "team satisfaction," economic indicators focused on "variance to budget," and environmental indicators included activities such as "waste generated" and "greenhouse gas (GHG) emissions from staff project-related travel." The team quickly realized that the time and energy necessary for completing these surveys was not worth the information that they were gathering. For example, counting every paper printed or mile driven to the few offsite meetings did not capture the true impacts of the project. In some cases, such as electricity used for computers and lighting, it was actually impossible to identify how much the team used specifically on the *Sustainability* project because team members were working on multiple projects simultaneously and shared workspaces with staff who were not working on the project. Similarly, some impacts, especially social considerations, were not quantifiable or comparable to other measures. For example, how do you measure a missed opportunity for supporting underserved audiences or compare the value of team cohesion with the financial cost or GHG emissions of having an offsite retreat?

Through this experience, the team began to understand that sustainability was a much more complex concept and that these indicators were almost meaningless without an explanation of the context surrounding each one. They also recognized that most of the indicators that they were focusing on captured only a small portion of the relevant environmental issues. Other environmental impacts, and many of the social and economic impacts that the project might have outside of the museum, were difficult to identify or quantify.

Therefore, after a year of trying to quantify the social, economic, and environmental impacts of the team's actions, the team decided to try a different approach. Instead of focusing on indicators, the team started concentrating on identifying and carefully considering the range of impacts embedded in the decision-making process. The team created the "Envisioning Sustainability" exercise and the "Sustainable Decision-making Tool" to help OMSI and other teams through this process. When using the Sustainable Decision-making Tool, teams explore all of the visible and invisible impacts of their choices with the goal of maximizing positive benefits while recognizing that every choice has tradeoffs. See Figure 2 for an example of the Decision-making Tool's cover page.

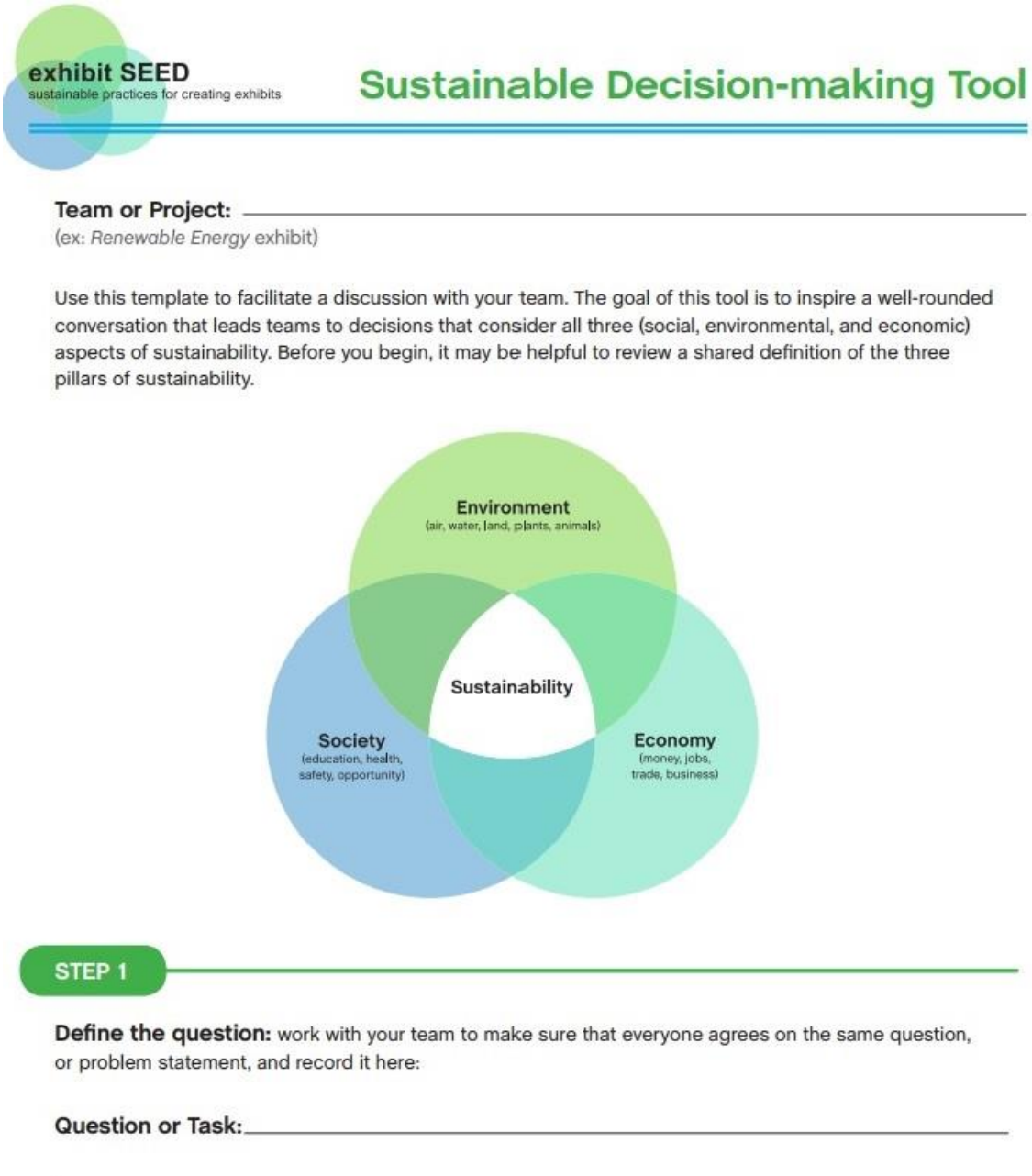


Figure 2. The cover page for the Decision-making Tool. The complete Decision-Making Tool is included in Appendix V and online at http://www.ExhibitSEED.org/decision-making-tools.

Measures of Success

The purpose of this summative evaluation was to assess the degree to which the professional development deliverables met the goals of the project. The goals of the project were specified as impacts and measurable outcomes.

Professional Audience Deliverables: Impacts and Outcomes

1. Green Exhibit Checklist
Impact: The checklist will foster skills associated with environmentally responsible decision making in exhibit design and fabrication.
Outcome: Over 75% of participants will demonstrate skills associated with environmentally responsible decision making in exhibit design and fabrication.

2. MAC Workshops
Impact: Professional developers, designers, fabricators, and others will understand considerations for the development, design, and fabrication of more environmentally, economically, and socially sustainable exhibits.
Outcome: 75% of attendees will consider how to make choices and address challenges in order to integrate and implement environmentally, economically and socially sustainable practices into exhibit development, design, and fabrication.

3. ExhibitSEED Website
Impact: Users will become aware of skills associated with environmentally, economically, and socially sustainable decision making in exhibit development, design, and fabrication.
Outcomes:
A. 85% of users will be able to identify available practices, resources, and tools for the development, design, and fabrication of environmentally, socially, and economically sustainable exhibits.
B. 85% of users will be aware of the purpose of the website that will allow and empower users to integrate and implement environmentally, economically, and socially sustainable practices into exhibit development, design, and fabrication.

Evaluation Methods

Portland State University's (PSU's) Community Environmental Services (CES) planned, designed, developed, executed, and reported on all aspects of the evaluation activities with input from OMSI's project team.

A total of 100 professionals registered for the workshops hosted by the MAC. Attendees were from 81 different museums, institutions, consultation practices, and private organizations within the exhibit design and fabrication industry. Participants included exhibit designers and developers, program developers, administrators, graphic designers, and curators. See Figure 3 for an example of participants during a workshop activity.

The workshops evaluated were held at the four MAC museums:

- Children's Museum of Houston (Houston, TX) (April 23, 2013)
- Miami Science Museum (Miami, FL) (April 25, 2013)
- Science Museum of Minnesota (St. Paul, MN) (May 14, 2013)
- The Franklin Institute (Philadelphia, PA) (May 16, 2013)

The Green Exhibit Checklist and the ExhibitSEED website were evaluated by workshop participants.

Post-Workshop Participant Survey

Participants were asked to complete a survey (see Appendix I) at the end of the workshop to provide feedback on workshop activities, workshop content, and general impressions. Surveys included close-ended questions using a scale of 1–5 (5 being the highest rating and 1 being the lowest) with open-ended comments and open-ended questions. The average rating for close-ended questions is reported as well as common themes for open-ended comments and questions. All participants who stayed to the end of the workshop completed a survey (N = 85).

Surveys were designed to capture participant experiences in order to evaluate achievement of the following goals:

1. Did the workshop produce the desired outcomes?
2. Specifically, did participant feedback and discussions reflect intended learning goals and objectives?

Delayed Post-Workshop Surveys

In January 2014, within 6–8 months of the MAC workshops, participants were asked to complete a second survey (see Appendix II).

Delayed post-workshop surveys were designed to capture the longer-term impact of participant experiences to evaluate the following:

1. What were participant experiences like in their workplaces after the workshop?
2. How did participation in the workshop impact their practices and decision making?
3. What successes and challenges did they encounter personally and within their workplaces (related to implementing new sustainable decision-making practices)?

Surveys included close-ended yes or no questions and open-ended questions. The frequency of responses for close-ended questions is reported as well as common themes for open-ended questions.

Participants were recruited from the same group that had been asked to complete the post-workshop surveys. The survey was delivered electronically by email to 96 participants in the four MAC workshops. A total of 87 emails were successfully delivered. Thus a total of 87 participants were recruited. Of those 87, there were 45 respondents (52%) with fully or partially completed surveys. Responses and comments are summarized in Findings.

Project Team and Host Museum Staff Debrief

In June 2013, the project team met with the CES and OMSI evaluation team to debrief on the workshops. Representatives from host museums participated as well via a conference call. The discussion included a review of the workshops. This informal small group debrief discussion was designed to capture the experience of workshop hosts and the OMSI workshop facilitators in order to respond to the following question: Did organizers perceive that the workshop effectively accomplished the expected goals and outcomes?

Figure 3. Participants practice using tools during a workshop activity.

Evaluation Process

Methods conducted through the summative evaluation phase involved collaboration between members of the OMSI Sustainability Team and the Evaluation staff. The measures of success guided the development of evaluation instruments. Additionally the Sustainability Team used the evaluation research to gain important insights to improve the MAC tools. Thus, the design of survey instruments reflects a strategic compromise between evaluation of intended outcomes through the measures of success and feedback for the team to inform future use of the MAC tools. As a result the findings did not always yield a percentage of participants who could demonstrate an intended outcome as defined in the measures of success. Yet the findings revealed other outcomes that demonstrated whether an impact was achieved.

Findings

The findings below are based on data from the post-workshop surveys and the delayed post-workshop surveys. While the data collected via surveys and the team debrief do not directly measure the percentages outlined in the intended outcomes, relevant data was evaluated to infer whether or not the outcomes were met for each deliverable.

1. Green Exhibit Checklist
Impact: The checklist will foster skills associated with environmentally responsible decision making in exhibit design and fabrication.
Intended Outcome: Over 75% of participants will demonstrate skills associated with environmentally responsible decision making in exhibit design and fabrication.

The evaluation instrument did not always yield a percentage of participants who could demonstrate decision-making skills related to the GEC. Yet other outcomes captured indicate that this impact was achieved. In addition, all attendees had an opportunity to practice environmentally responsible decision-making skills and the use of the GEC during the workshop.

Post-Workshop Survey
In the post-workshop survey at the conclusion of the workshop, participants were asked to rate the Green Exhibit Checklist in terms of usefulness to them, relevance to their work, and applicability to real world practices. They were also asked about their confidence in their ability to use and consider the workshop tools and lessons. Ratings were based on a scale of 1–5 (5 being the highest rating and 1 being the lowest). Participants also had an opportunity to provide open-ended comments. Ratings and comments are summarized below.

Activity: Green Exhibit Checklist
The workshop facilitator introduced the GEC to the entire group. Then the facilitator broke participants into small groups and assigned each group a museum exhibit component to evaluate with the GEC. Participants were also given background information and encouraged to examine the exhibit component to help them complete their evaluation. This activity received high mean ratings in all the categories (see Table 1 for details). This indicated successful acquisition and practice of skills associated with environmentally responsible decision making.

Table 1. Q1.- Green Exhibit Checklist.

Category	**Mean Rating** ($N^3 = 84$)
Usefulness	4.14
Relevancy to work	4.25
Applicability to practices	4.08

While several participants found the GEC to be a useful tool (e.g., *"good blueprint for internal evaluation"*), many open-ended comments suggested that it could benefit from clarification. One participant said, *"the layout was a little confusing -- the percentages a bit arbitrary."*

[3] *In all tables throughout the report, "N" refers to number of respondents.*

Delayed Post-Workshop Surveys

In the surveys provided 6 months after the final workshop, (see Appendix II), participants were asked for feedback on the long-term impact of the workshop experience with the GEC. Surveys included close-ended yes or no questions and open-ended questions to better understand the experiences, challenges, and recommendations for improvement. The frequency of responses for close-ended questions is reported in Table 2.

Table 2. Q5 - Have you had a chance to use the Green Exhibit Checklist (GEC)?

Response	**Frequency** (N= 35)	**Percentage**
Yes	17	49%
No, not that I recall	18	51%

Experience with the Green Exhibit Checklist

Questions 6–8 were open-ended questions requesting general feedback about the GEC. The responses to each question are below. Participants generally reported positive experiences with the GEC, but some did not use or find it directly applicable. Primary barriers to use, if any, included challenges with the rating system or lack of time or opportunity to use it. Improvements were recommended by very few participants, but included suggestions for a simpler tool with more examples. The frequencies of responses for these questions are reported in Table 3, Table 4, and Table 5.

Table 3. Q6 - Please tell us about your experience with the GEC.

Comment Theme	**Frequency** (N = 13)
Useful tool	4
Considered/ discussed its relevancy	2
Didn't fully apply to us	2
Guides the process well	2
Only used as required	2
Subjective scoring	1

One participant noted the tool's value early on in the development process and explained, *"I found the checklist to be a useful tool in the beginning of the design process to target areas for more sustainable choices."* Despite its value, another participant acknowledged potential limits and noted, *"it was kind of tough to use because some materials don't really fit well into defined categories. It's also hard to know where some materials come from, making the sourcing question hard to determine."*

Table 4. Q7 - Please tell us about the barriers to using the GEC.

Comment Theme	**Frequency** (N = 27)
Challenges with rating system	6
No barrier	5
No chance or time to use yet	5
Workplace culture	4
Depends on our processes	3
Internalized, don't need form	2
Others make decisions	2

One participant explained that the tool still needed to be integrated into processes and explained, "*the self-evaluation and rating system makes it more difficult to have clear indicators of success."* While others identified no barrier, one participant said they "*have looked it over but haven't had a project to use it on."* Another participant noted the internal challenges and explained, "*using it more broadly outside of exhibits is a challenge and would require more culture change institutionally."*

Table 5. Q8 - How could we improve the GEC?

Comment Theme	**Frequency** (N = 15)
N/A, not necessary	3
Simpler, more accessible	3
More examples	2
Not sure	2
Online version	2
Other	3

One participant indicated improvement was unnecessary and reported, "*it was really excellent,"* while another participant wanted to simplify the tool and suggested that, "*some simple, concrete baselines would be helpful."* Another participant wanted more information and suggested, "*having examples of zero/low VOC, materials that emit toxic compounds and what electronics are energy efficient in the checklist."*

2. MAC Workshops

Impact: Professional developers, designers, fabricators, and others will understand considerations for the development, design, and fabrication of more environmentally, economically, and socially sustainable exhibits.

Intended Outcome: 75% of attendees will consider how to make choices and address challenges in order to integrate and implement environmentally, economically, and socially sustainable practices into exhibit development, design, and fabrication.

The evaluation instrument did not always yield determine a percentage of participants who understood the considerations outlined in the workshops. Yet other outcomes captured indicate that this impact

was achieved. In addition, all attendees had an opportunity to practice this approach to decision-making during the workshop.

Post-Workshop Survey

In the post-workshop survey at the conclusion of the workshop, participants were asked to rate the overall workshop and an activity about the three pillars of sustainability (economy, environment, and society) in terms of usefulness to them, relevance to their work and applicability to real world practices. They were also asked about their confidence in their ability to use and consider the workshop tools and lessons. Ratings were based on a scale of 1–5 (5 being the highest rating and 1 being the lowest). Participants also had an opportunity to provide open-ended comments. Ratings and comments are summarized below.

Overall Workshop

The workshop received high mean ratings in all the categories (see Table 6). This indicated the workshop's overall success at providing information that was useful, relevant, and applicable to making sustainable choices. The three pillars of sustainability activity also received high mean ratings in all the categories. This indicated the workshops were successful at encouraging considerations of how to integrate and implement sustainable practices into exhibit development, design, and fabrication.

Table 6. Q1.- Overall Workshop.

Category	**Mean Rating** (N = 84)
Usefulness	4.52
Relevancy to work	4.59
Applicability to practices	4.44
Presentation of material	4.45

Most open-ended comments referred to the effectiveness of the tools and workshop. One participant said it was "*an excellent start of establishing/ pivoting towards sustainable practices."*

Activity: What does Sustainability look like at the museum level?

Participants brainstormed the environmental, social, and economic impacts museums and exhibit development might have on local communities and the world. They then used these potential impacts to envision what a "sustainable" exhibit could look like. This activity received high mean ratings in all the categories indicating success regarding participants' addressing socially, economically, and socially sustainable practices. See Table 7 for mean ratings.

Table 7. Q1 - What does *Sustainability* look like at a museum level?

Category	**Mean Rating** (N = 85)
Usefulness	4.22
Relevancy to work	4.41
Applicability to practices	4.07
Presentation of material	4.26

Most open-ended comments referred to the effectiveness of this activity. One participant said it "*helped to change my thinking about how to talk about sustainability in the museum."*

Considering the Three Pillars of Sustainability
Participants rated their confidence in their ability to consider each of the three pillars of sustainability. This activity received high mean ratings in the environmental and economic categories as well as in the integration of all three pillars, and a moderate rating in the social category. This indicated moderate-to-high success regarding participants' consideration of the integration of socially, economically, and socially sustainable practices. The mean rating of responses for this question is reported in Table 8.

Table 8. Q3 - Confidence in ability to consider each of the three pillars.

Category	**Mean Rating** (N = 82)
Environmental	4.35
Economic	4.00
Social	3.85
All combined	4.05

Most open-ended comments revealed the value of the workshop, but also the ongoing need for deeper understanding of all three pillars, especially the social and economic pillars. Examples of comments include, "*this is a little tricky, since there is obviously overlap between the 3 pillars," and "I need some practice, but the tools… put me on an excellent track."*

Facilitating Sustainable Practice
Participants rated the effectiveness of the overall workshop at facilitating an understanding of ways to integrate and implement sustainable practices into exhibit development, design, and fabrication. The mean rating was high at 4.0 (N = 80). This indicated success of the workshop at addressing the integration of socially, economically, and environmentally sustainable practices. Open-ended comments referred to the challenges of implementation but the value of ongoing discussions and expanded resources. Comments included, *"integration of the 3 pillars is clear, implementation is of course more difficult and only happens with practice and habit," and "to me it seems that it's less about the practices themselves, and more about facilitating conversations and decision-making in order to implement sustainable practices."*

Likelihood to Apply Tools
Participants rated the likelihood they would apply some of the tools they learned about at the workshop to their work. The mean rating was 4.47 (N = 81). This indicated success at encouraging participants to consider sustainable choices. Open-ended comments also indicated a strong likelihood to apply the tools. In an open-ended comment, one participant said, "*I think that this workshop has given me tools to support some of the projects I have already started as well as ammunition to justify future goals."*

Delayed Post-Workshop Surveys
In the surveys completed 6 months after the final workshop (see Appendix II) participants were asked for feedback on the long-term impact of the workshop experience with the three pillars model. Surveys included close-ended yes or no questions and open-ended questions to better understand the experiences, challenges, and recommendations for improvement. The frequency for close-ended questions is reported as well as common themes for open-ended questions. Responses suggest that the model continued to affect participants' thinking and their approach to projects for months beyond the initial workshop.

Impact of Three Pillars Model

Participants discussed their awareness of the three pillars model and reported that it had an impact on how they think about and discuss sustainability. The most frequent responses suggest an impact on holistic thinking and approaches to decision making. The favorable responses suggest the workshop had a positive impact on the survey participants' ability to integrate the three pillars model into decisions about sustainable practices.

Question 13 was an open-ended question requesting general feedback about the three pillars model. Most respondents reported that the model was a helpful tool to inform their thinking on sustainable museum practices. The frequency of responses is reported in Table 9.

Table 9. Q13 - Has awareness of the Three Pillars Model affected the way you think about and discuss sustainability?

Comment Theme	**Frequency** (N = 26)
Leads to holistic thinking	5
Informs approach and decision-making	4
Applies to exhibit design/construction	3
Applies to environmental goals	3
It has value, but is not easy to use	3
Consider economic pillar	2
Consider social pillar	2
Caused awareness of materials	2
Other	2

Many comments referred to a new approach to exhibit development. For example: *"It gives me a structure to organize my thoughts and the pros and cons of a project approach." "We use the model in all our new exhibit development as a consideration in design."*

General Feedback about the Workshop or Tools

Question 14 was an open-ended question inviting additional comments or feedback. Respondents generally described the experience as valuable, further suggesting the workshop's positive impacts on respondents. The frequency of responses is reported in Table 10.

Table 10. Q14 - Do you have any other comments or feedback to share about the longer-term impacts of the MAC workshop and tools?

Comment Theme	**Frequency** (N = 12)
Great experience/tool	5
Provided awareness and perspective	2
Good opportunity to network	2
Potential for future efforts	2
No comment	1

Many comments identified the value of the workshop to the field. For example, participants wrote: *"With the pace of field and other responsibilities, the workshop and tools are great vehicles to keep professionals and educators thinking and planning long term." "Planning on longer term use for exhibit components makes them better as it further justifies the costs involved and allows more people to learn over a longer time." "We are at the very, very beginning of this and will benefit enormously when sustainability becomes more of an industry standard, i.e. that's just the way things are done."*

3. ExhibitSEED Website

Impact: Users will become aware of skills associated with environmentally, economically, and socially sustainable decision making in exhibit development, design, and fabrication.

Outcomes:

A. 85% of users will be able to identify available practices, resources, and tools for the development, design, and fabrication of environmentally, socially, and economically sustainable exhibits.
B. 85% of users will be aware of the purpose of the website that will allow and empower users to integrate and implement environmentally, economically, and socially sustainable practices into exhibit development, design, and fabrication.

The evaluation instrument did not always yield a percentage of participants who were able to identify practices, resources, and tools or were aware of the purpose of the website and its resources. Yet other outcomes captured indicate that this impact was achieved.

Post-Workshop Survey

The Decision-Making Tool is one of the tools available on the website and all participants had an opportunity to use it during the workshop. In the post-workshop survey at the conclusion of the workshop, participants were asked to rate the Decision-Making Tool in terms of usefulness to them, relevancy to their work, and applicability to real world practices. They were also asked about their confidence in their ability to use and consider the workshop tools and lessons. Ratings were based on a scale of 1–5 (5 being the highest rating and 1 being the lowest). Participants also had an opportunity to provide open-ended comments. Ratings and comments are summarized below.

Activity: Practice Using the Decision-Making Tool

Facilitators posed sample scenarios requiring decisions and asked participants to use the Decision-Making Tool to outline the environmental, economic, and social impacts and tradeoffs of their potential options. For example, one scenario posed the following dilemma: "Your exhibition budget was cut and you have to remove $20,000 worth of components from your plans. Do you cut the big, iconic, fun component that uses a lot of electricity or two of the smaller non-electric components that don't reinforce the big idea, but are more environmentally sustainable to build and maintain?" Based on these tradeoffs, participants either suggested a course of action or identified the additional information that they would need to make a decision. This activity received high mean ratings in all the categories. This indicated success at encouraging participants to identify skills associated with the tool. The mean rating of responses for this question is reported in Table 11.

Table 11. Q1 - Practice using the Decision-making Tool.

Category	**Mean Rating** (N = 85)
Usefulness	4.19
Relevancy to work	4.24
Applicability to practices	4.02
Presentation of material	4.30

Most open-ended comments reported positive experience with the activity and tool. However, participants also reported a need for additional guidance on the tool's use and purpose. While one participant reported *"lik[ing] the more real-world application of this activity,"* another commented that it *"will be useful with some modification to fit our needs."*

Delayed Post-Workshop Survey

In the surveys provided six months after the final workshop (see Appendix II) participants were asked for feedback on the long-term impact of the workshop experience with the ExhibitSEED Website and the Decision-making Tool. Surveys included close-ended yes or no questions and open-ended questions to better understand the experiences, challenges, and recommendations for improvement. The frequency for close-ended questions is reported as well as common themes for open-ended questions. The frequency of responses is reported in Table 12.

Overall ExhibitSEED Website

Question 1 asked participants if they had used the website. The majority (78%) had used it.

Table 12. Q1 - Have you had a chance to use the ExhibitSEED website?

Response	**Frequency** (N= 45)	**Percentage**
Yes	35	78%
No, not that I recall	10	22%

Experience with ExhibitSEED

Questions 2–4 were open-ended questions requesting general feedback about the website. The responses to each question are below. Participants generally reported positive experiences with the website, but sometimes identified barriers in their work environments. While the feedback on the site itself was positive, there was some concern about the need for maintenance of the public comments section and a desire for more content. The frequencies of responses for these questions are reported in Table 13, Table 14, and Table 15.

Table 13. Q2 - Please tell us about the experience with ExhibitSEED.

Comment Theme	**Frequency** (N = 24)
Good information	7
Useful tools	5
Enjoyed workshop conversations	4
Good resource to generate ideas	2
Easy navigation	2
Challenging tool to use	2
Other	2

Comments generally suggested participants valued the tools and informative and inspirational resources. One participant reported they *"used the documents…to go over with other exhibits designers,"* while another enjoyed *"the interaction with people from other institutions."*

Table 14. Q3 - Please tell us about the barriers to using ExhibitSEED.

Comment Theme	**Frequency** (N = 30)
Workplace: culture, costs, time	6
No new project, may use later	5
Not enough time or staff	4
None	4
Non-intuitive navigation	3
Recollection of it	3
Hard to interpret	2
Needs better design and site moderation	2
Needs more specific information	1

One comment revealed the impact of inconvenience as a barrier and explained *"Time and Money - Sometimes it is easier to save time and money by starting with new materials rather than re-purposing old exhibits/materials."* Another participant addressed the limits within their workplace and explained *"our staff is very small so although we do use some of the tools in ExhibitSEED, it is hard to do full implementation without an exhibit staff."*

Table 15. Q4 - How could we improve ExhibitSEED?

Comment Theme	**Frequency** (N = 24)
Not sure	5
Edit comments and spam	4
Keep updated	4
More direct content	4
Outreach to institutions	3
Other	4

Several participants were unsure how to make improvements, but one commenter explained that spam is distracting and recommended that website developers *"develop some way to limit the types of 'spam' comments put on the site, so then people might be encouraged to [post]… examples and ways to utilize green and sustainable exhibit building practices."* Another participant would have liked more content and suggested the site *"generate a list of materials that rank the advantages and disadvantage of commonly used materials within exhibit design."*

Experience with the Decision-making Tool

Questions 9–12 were open-ended questions requesting general feedback about the Decision-making Tool from the website. Question 9 was about the Decision-making Tool. Frequency of responses is reported in Table 16.

Table 16. Q9 - Have you had a chance to use the Decision-making Tool in decision making since the workshop?

Response	**Frequency** (N = 33)	**Percentage**
Yes	10	30%
No, not that I recall	23	70%

Decision-making Tool

Questions 10–12 were open-ended questions requesting general feedback about the Decision-making Tool. The responses to each question are below. Participants who had used it had mixed experiences. Those who had not used it either had not yet had a chance to use it or had not yet found it applicable to their work. There were few suggestions for improvement. The frequencies of responses for these questions are reported in Table s 17, Table 18, and Table 19.

Table 17. Q10 - Please tell us about your experiences with the Decision-making Tool.

Comment Theme	**Frequency (**N = 8)
Didn't use but considered tool	2
Useful guide	2
Easy to use	1
Hard to grasp pillars	1
Helps to grasp pillars	1
Used as required	1

One participant explained the value even though they hadn't yet used it: *"although we have not formally used the tool, we have used those pillars in discussing programming / exhibit development."* Another participant described it as *"a very useful tool"* and pointed out its impact in discussions because *"the questions are not black and white and it forces discussion about priorities rather than absolutes."*

Table 18. Q11 - Please tell us about the barriers to using the Decision-making Tool.

Comment Theme	**Frequency** (N = 18)
No chance yet to use it	5
N/A	4
Don't use it	3
Haven't made changes	2
Not accessible to all positions	2
Need to get into the mind set	1
Not priority to all decision-makers	1

One participant explained they *"internalized it and don't need form,"* while another lamented that *"there is lots of room for interpretation which can be confusing at times."*

Table 19. Q12 - How could we improve the Decision-making Tool?

Comment Theme	**Frequency** (N = 8)
N/A	3
More defined content, examples	2
More intuitive approach	1
Not sure	1
Train administrators	1

One participant suggested adding *"some more definitive definitions of the topics and questions,"* while another suggested it be used to *"train administrators on it, not exhibits staff who don't get to make those decisions."*

Project Team and Host Museum Staff Debrief

The debrief session revealed that impressions among participants were largely positive. Lessons learned focused primarily on initial perceptions of primary benefits of the workshops for attendees. Debrief participant comments emphasized highlights for attendees as the chance for networking with others in the industry around the sustainability topic, desire for continued and expanded conversation, the possibility of future workshops, as well as interest in longer workshops. The host museum staff generally felt the professional audience tools were likely to be most useful during the planning stages of exhibit development. All debrief participants also acknowledged how different sustainability and industry backgrounds impact the relevancy and utility of the workshop tools.

Conclusions and Recommendations for the Field

Generally, the deliverables achieved the desired impacts, although the data collected did not directly provide the percentages identified in the desired outcomes, the available data indicate that the deliverables achieved the desired impacts. Overall, participants reported positive and valuable experiences with the workshops and the use of the individual tools. The relevance, utility, and applicability were most notably conveyed through the post-workshop surveys completed at the end of each workshop. The responses on the delayed post-workshop surveys suggested continued positive experiences with the tools, but recollection of the tools and opportunity to use them diminished over time. The largest value of exposure to the workshop and tools over time appears to be the integration of sustainability considerations into general thinking and the approach to design and development. This impact on general thinking suggests the project deliverables helped to foster sustainable decision-making skills. Barriers to use among some participants included uncertainty about how best to use the tools or limitations in the workplace due to either lack of support or absence of new development opportunities. The tools may be most useful for new projects or opportunities. Participants' ability to apply the three pillars approach was strong, as indicated in both the post-workshop and delayed post-workshop surveys, however participants' confidence in the use of each individual pillar was notably strongest in the environmental area and weakest in the social area. While recollection and/or use of some tools waned over time, the majority of participants reported use of the ExhibitSEED website tools and the workshop's continued impact on their thoughts and choices around sustainability.

Given the enthusiasm of workshop participants, there are opportunities to continue the conversation and work together to promote strategies to support and promote sustainable practices and eventually to foster new industry norms. Future workshops should emphasize how the tools are evolving resources that vary in application depending on regional resources, opportunities, and challenges. The tools may be most useful to impact general decision-making skills, especially at early phases of exhibit design and development. When resources are available, more frequent and incremental follow-up with engaged industry professionals may better ensure recollection of these tools and encourage discussions about barriers and opportunities in workplaces.

Specific recommended actions include the following:

Continue the conversation.

- Build on the momentum and enthusiasm to further wide-scale change in museum practices.
- Expand workshops to include more networking opportunities and provide chances for more in-depth discussions.

Promote more participation and encourage norm development.

- Continue to promote workshops, tools, and related activities.
- Capitalize on the social capital created through cross-country networks and continually expand practices and knowledge.

Advance and promote the workshop themes.

- Continue to promote the Three Pillars Model (or comparable) and holistic approaches to sustainable choices.
- Further address economic and social pillars of sustainability to enhance understanding and use.

Recognize and respond to regional, industry, and workplace barriers.

- Allow future workshops to capture local elements and participant experiences to enrich discussion.
- Conduct research before future workshops to adapt the activities to address challenges and barriers to sustainable practice relevant to specific regions and workplaces (e.g., workplace culture).

Further evaluate tools and resources.

- Consider additional resources with more details, examples, and specific references. For example, further investigate (possibly customizable) material lists. However, acknowledge the impact of local infrastructure and resources on the availability of materials.
- Re-assess the Green Exhibit Checklist and the Decision-Making Tool to provide more content for long-term use and use within the workplace. Or recognize their potentially greater short-term value.
- Continue to examine tools and investigate opportunities for refinement to make them clearer and more useful.
- Update content in the tools and resources regularly to include current knowledge.

Appendix I. Post-Workshop Participant Survey

ExhibitSEED*:* Beyond Green Exhibits Workshop Survey

Please take a few minutes to give us feedback about the OMSI workshop experience. Your input will be useful for future planning and to ensure the quality of our program. Thank you for participating.

Workshop Activities

These questions are about the overall workshop and the individual activities. Please rate these activities on a scale of 1-5, (5 is the highest rating, 1 is the lowest).

1. Rate each activity and the overall workshop in terms of its usefulness to you, relevancy to your work, applicability to real world practices and the presentation of material.

Workshop Activity	usefulness to you	relevancy to your work	applicability to practices	presentation of material	Comments
What does sustainability look like at the museum level?					
Practice using the Decision-making Tool					
Green Exhibit Checklist					
Overall Workshop					
Other?_____					

Workshop Content

These questions are about the workshop content and tools. Please rate the workshop on a scale of 1-5, (5 is the highest rating, 1 is the lowest).

2. Rate the effectiveness of the overall workshop at addressing how to consider all 3 pillars of sustainability._____
COMMENT:

3. Rate how confident you feel in your ability to consider each of the 3 pillars of sustainability:
environmental_____ economic_____ social_____ all combined_____
COMMENT:

4. Rate the effectiveness of the overall workshop at facilitating ways to integrate and implement sustainable practices into exhibit development, design and fabrication._____
COMMENT:

5. Rate the likelihood you will apply some of the tools you learned here to your work._____
COMMENT:

6. What else would you like to see included in this workshop?

General Feedback

7. What was the best part of the workshop?

8. What could be improved and why?

9. Portland, Oregon is known for its "sustainability" culture, past and present. As such, there already exists a certain attitude about things like environmental well-being and bicycles. What needs, if any, could be better addressed to make the workshop more relevant to other regions?

10. Any additional comments?

Thank you very much!

Appendix II. Delayed Post-Workshop Survey

Museum Advisory Committee (MAC) Sustainability Workshop Follow Up Survey[4]

This survey is for the Summative evaluation of the MAC workshops led by Oregon Museum of Science & Industry (OMSI). Information gathered through this survey will help us evaluate the tools of the Sustainability Project. You are under no obligation to complete the survey and may stop at any time. Your answers will be completely anonymous. If you would like to receive any information publicly released regarding the results of this survey, please contact: Renee Bogin Curtis from Portland State University at rbogin@pdx.edu.

Q1 Have you had a chance to use the ExhibitSEED Website?
- ❍ Yes (1)
- ❍ No, not that I recall (2)

Q2A Please tell us about the experience with ExhibitSEED.

Q2B Please tell us about the barriers to using ExhibitSEED.

Q3 How could we improve ExhibitSEED?

Q4 Have you had a chance to use the Green Exhibit Checklist (GEC)?
- ❍ Yes (1)
- ❍ No, not that I recall (2)

Q5A Please tell us about your experience with the Green Exhibit Checklist.

Q5B Please tell us about the barriers to using the Green Exhibit Checklist.

Q6 How could we improve the Green Exhibit Checklist?

Q7 Have you used the Decision-making Tool in decision making since the workshop?
- ❍ Yes (1)
- ❍ No, not that I recall (2)

Q8A Please tell us about your experiences with the Decision-making Tool.

Q8B Please tell us about the barriers to using the Decision-making Tool.

Q9 How could we improve the Decision-making Tool?

Q10 Has awareness of the Three Pillars Model affected the way you think about and discuss sustainability? Please explain.

Q11 Do you have any other comments or feedback to share about the longer-term impacts of the MAC workshop and tools?

Thank you for your participation. Your feedback helps us to evaluate the long-term impacts of the tools and workshops as part of our overall evaluation of OMSI's NSF-funded project, Sustainability: Promoting Sustainable Decision Making in Informal Education. For questions about the research, contact Renee Curtis at rbogin@pdx.edu.

[4] Format and images vary from web version.

Appendix III. Logic Model

Sustainability Project Logic Model – Professional

April 2013

Professional audience strategic impacts: 1. Knowledge of practices and resources for development, design, and fabrication of more sustainable exhibits.
2. Skills associated with sustainable decision-making in project and exhibit development.

Target audience	Project impacts	Educational approach	Deliverables	Deliverable characteristics and guidelines	Outcomes
Professional developers, designers, fabricators, and others who create interactive exhibits.	**Through the Green Exhibit Checklist:** Foster skills associated with environmentally responsible decision making in exhibit design and fabrication. **Through the MAC Workshops:** Professional developers, designers, fabricators, and others will understand considerations for the development, design, and fabrication of more environmentally, economically, and socially sustainable exhibits. **Through the website:** Users will become aware of skills associated with environmentally, economically, and socially sustainable decision making in exhibit development, design, and fabrication.	**Social cognitive characteristics of exhibits, tools, and workshops that support behavior change (Bandura 2001) include that:** 1. They are attention attractors, usable, and engaging 2. They are easily remembered 3. They are reproducible on a personal, professional, and institutional level 4. They motivate people to produce the desired behavior **Situated cognition characteristics for skill building (Brown et al. 1989) through exhibits, tools, and workshops include that:** 1. They are situated in "authentic" context (physical, personal, social) 2. They encourage role-playing or apprenticeship, learning, and doing are indistinct 3. They provide multiple outcomes 4. They refine prior skills	A. A web-based collection of practices, tools, and resources (www.ExhibitSEED.org) for green exhibit development, design, and construction, for use by museum and exhibit professionals. **The website will include sections that address:** 1. The practices in the development, design and fabrication of environmentally, economically, and socially sustainable exhibits. 2. Case studies that highlight the development, design, and fabrication of environmentally, economically, and socially sustainable exhibits. 3. A materials resource guide 4. A Green Exhibit Checklist 5. Decision-Making Tools B. Five regional workshops for exhibit developers, designers, fabricators and others who create interactive exhibits.	**Effective ways for integrating sustainability into the design process (Handfield et al. 2001):** 1. Enlist support of a corporate champion 2. Define environmental goals 3. Select a pilot project 4. Set product launch goals and evaluation system 5. Enlist support of team members 6. Provide tools and training 7. Monitor the project 8. Celebrate successes	**Green Exhibit Checklist:** Over 75% of participants will demonstrate skills associated with environmentally responsible decision-making in exhibit design and fabrication. **Workshops:** 75% of attendees will consider how to make choices and address challenges in order to integrate and implement environmentally, economically and socially sustainable practices into exhibit development, design and fabrication. **Website:** 1. 85% of users will be able to identify available practices, resources, and tools for the development, design, and fabrication of environmentally, economically, and socially sustainable exhibits. 2. 85% of users will be aware of the purpose of the website that will allow and empower users to integrate and implement environmentally, economically, and socially sustainable practices into exhibit development, design, and fabrication.

Appendix IV. Green Exhibit Checklist

Green Exhibit Checklist

The Green Exhibit Checklist (GEC) is a tool to evaluate the environmental sustainability of exhibits. The goal of the Checklist is to inspire exhibit teams to reduce the environmental impacts of exhibit production.

The Green Exhibit Checklist can be a useful tool in early planning to help set project goals. Then, once the exhibit is on the floor, the Checklist is used to assess the final outcome.

The GEC awards points in 5 KEY STRATEGIES:

- Reduce new material consumption
- Use local resources
- Reduce waste
- Reduce energy consumption
- Reduce products with toxic emissions

A sixth category awards points for innovation in the design and construction of the exhibit. This encourages exhibit teams to strive for new and creative solutions to reduce environmental impacts.

Step 1 Team sets goal for the exhibit: Platinum, Gold, Silver, and Bronze.

Step 2 Designer and fabricator review checklist to find the best strategies for meeting goal.

Step 3 After production, the fabricator fills out the GEC with the relevant material information.

Step 4 Exhibit team conducts walk-through, using the material information to award points.

We encourage teams to post their Checklist results online for the benefit of the entire museum industry. For more information or to post your Checklist evaluation see *www.exhibitseed.org*.

Exhibition Title: _____

_____

Date: _____

Producing Facility: _____

Host Site: _____

Your Name: _____

Role/Title: _____

Ratings are awarded for the total score:

- PLATINUM (20–24 points)
- GOLD (15–19)
- SILVER (11–14)
- BRONZE (8–10)

Reduce new material consumption.

INTENT: Reduce demand for virgin materials thereby reducing industrial practices that pollute the environment and exploit natural resources.

STRATEGIES:
- Use recycled materials (regrind HDPE, aluminum, etc.).
- Reuse building materials (from previous exhibits or deconstruction of houses, etc.).
- Use wood from responsibly-managed forests.
- Use rapidly renewable materials (bamboo, wheat board, etc.).
- Construct exhibits using fewer materials.the environment and exploit natural resources.

List all materials that were recycled, reused, FSC-certified wood, or rapidly renewable:	Estimated % of total exhibit (by volume):
	Total %: 0
List any virgin materials (no recycled content, newly purchased, not renewable):	**Estimated % of total exhibit (by volume):**
	Total %: 0

SCORING: **SCORE:**

- ☐ 4 points if **AT LEAST 90%** of the materials meet any one of these criteria.
- ☐ 3 points for **AT LEAST 75%**
- ☐ 2 points for **AT LEAST 50%**
- ☐ 1 point for **AT LEAST 10%**
- ☐ 0 points if **LESS THAN 10%** of the materials meet these criteria.

WAYS TO IMPROVE SCORE: _____

Use regional resources.

INTENT: Reduce negative effects on environment from the transportation of goods while contributing positively to the local economy.

STRATEGIES:
- Specify local raw materials, within 500 miles (ex: lumber in Pac NW).
- Source products manufactured locally, within 500 miles.
- Hire local contractors for labor, within 250 miles (ex: local welder).
- Batch orders of goods to reduce packaging material.

List all materials that were sourced locally:	Source:	Estimated % of total exhibit (by volume):
		Total %: 0
List all materials that were not sourced locally:	**Source:**	**Applied to est. % of total:**
		Total %: 0

SCORING:

SCORE:

- ☐ 4 points if **AT LEAST 90%** of the materials were sourced locally.
- ☐ 3 points for **AT LEAST 75%**
- ☐ 2 points for **AT LEAST 50%**
- ☐ 1 point for **AT LEAST 10%**
- ☐ 0 points if **LESS THAN 10%** of the materials meet these criteria.

WAYS TO IMPROVE SCORE: _____

_____

_____

_____

_____

Reduce waste.

INTENT: Reduce amount of waste and consider end-life of exhibit.

STRATEGIES:
- Design components to be re-purposed after exhibit retires (ex: standard table top)
- Choose materials that can be recycled at end of exhibit (glass, cardboard are best).
- Choose construction methods that allow components to be taken apart (no glue).
- Eliminate need for consumables that end up in trash.
- Design for durability and low-maintenance.
- Use water responsibly in exhibit.

List all materials that can be re-purposed or recycled:	Reuse or recycling plan:	Estimated % of total exhibit (by volume):
		Total %: 0
List any materials that cannot be recycled or repurposed:	**Destination:**	**Applied to est. % of total:**
		Total %: 0

SCORING: **SCORE:**

- ☐ 4 points if **AT LEAST 90%** of the materials can be repurposed or recycled.
- ☐ 3 points for **AT LEAST 75%**
- ☐ 2 points for **AT LEAST 50%**
- ☐ 1 point for **AT LEAST 10%**
- ☐ 0 points if **LESS THAN 10%** of the materials meet these criteria.
- ☐ -1 Deduct point for wasteful use of consumables or water.

WAYS TO IMPROVE SCORE: _____

Reduce energy consumption.

INTENT: Reduce energy consumption by exhibit components.

STRATEGIES:
- Choose energy-efficient electronics and parts.
- Reduce number of energy-consuming interfaces.
- Use alternative energy sources (human-powered, solar, wind).
- Use auto-shut off on electronic components.

List all electronic components:	Auto shut-off? Yes or No:	Energy efficient model? Yes or No:

SCORING: **SCORE:**

- ☐ 4 points if the exhibit is **NET-ZERO energy consumption.**
- ☐ 3 points if **SIGNIFICANT** energy-conserving efforts are in place
- ☐ 2 points if **SOME** energy-conserving efforts are in place
- ☐ 1 point if exhibit **USES** energy-efficient electronics
- ☐ 0 points if **NO ATTEMPT to conserve energy**
- ☐ -1 Deduct one point if more than 75% of the exhibit components are electronic

WAYS TO IMPROVE SCORE: _____

Reduce toxic emissions.

INTENT: Reduce quantity of materials that emit VOC's, either in processing or after installation, because of their threat to the environment and indoor air quality.

STRATEGIES:
- Choose zero/low VOC paints & finishes.
- Avoid PVC, styrene.
- Use soy inks on graphic panels.
- Use products that are formaldehyde-free.
- Avoid carpet with toxic materials.

List all materials, sealants, adhesives, paints, and finishes that are zero or low-VOC:	Applied to estimated % of total exhibit:
	Total %: 0
List any materials that do emit volatile organic compounds:	**Applied to est. % of total:**
	Total %: 0

SCORING:

SCORE:

- ☐ 4 points **if ALL** materials are low-VOC.
- ☐ 3 points for **AT LEAST 75%**
- ☐ 2 points for **AT LEAST 50%**
- ☐ 1 point for **AT LEAST 10%**
- ☐ 0 points if **LESS THAN 10%** of the materials meet these criteria.

WAYS TO IMPROVE SCORE: _____

Innovation.

INTENT: To encourage exhibit teams to strive for new and creative solutions.

STRATEGIES:
- Post checklist assessment on ExhibitSEED website for peer review.
- Incorporate a new design or production strategy that reduces environmental impact.
- Plan ahead for the exhibit's end-life.

SCORING: **SCORE:**

☐ 1 Bonus point for posting assessment on ExhibitSEED website

☐ 1 Bonus point for creating big visual impact with minimal materials:

_____

☐ 1 Bonus point for innovative end-of-life plan for once the exhibit is retired:

_____

☐ 1 Bonus point for any new design approach or construction method that increases environmental sustainability:

_____

WAYS TO IMPROVE SCORE: _____

_____

_____

_____

_____

POINTS AWARDED:

0 **Reduce new material consumption**
0 **Use local resources**
0 **Reduce waste**
0 **Reduce energy consumption**
0 **Reduce toxic emissions**
0 **Innovation**
0 **TOTAL points**

CERTIFICATION:

PLATINUM (20+ points)
GOLD (15–19 points)
SILVER (11–14 points)
BRONZE (8–10 points)

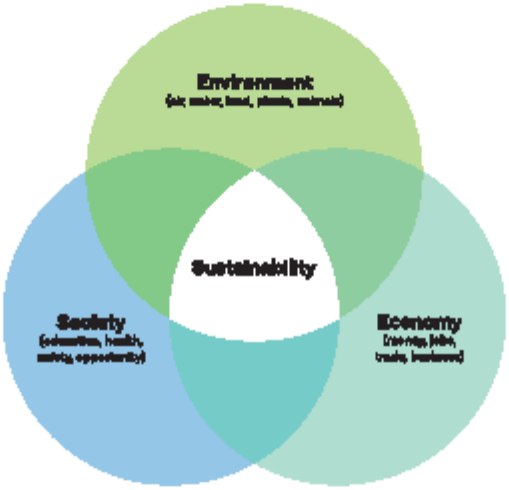
Appendix V. Decision-Making Tool

exhibit SEED
sustainable practices for creating exhibits

Sustainable Decision-making Tool

Team or Project: _____
(ex: *Renewable Energy* exhibit)

Use this template to facilitate a discussion with your team. The goal of this tool is to inspire a well-rounded conversation that leads teams to decisions that consider all three (social, environmental, and economic) aspects of sustainability. Before you begin, it may be helpful to review a shared definition of the three pillars of sustainability.



STEP 1

Define the question: work with your team to make sure that everyone agrees on the same question, or problem statement, and record it here:

Question or Task: _____

_____

_____

(ex: *Should we use computer electronics even though they use more energy than mechanical interactives?)*

STEP 2

Invite each member of the team to fill out the following table.
List all of the social, environmental, and economic considerations (large or small, good or bad) that come to mind regarding the question at hand. If more space is needed, attach an additional page.

3 PILLARS	CONSIDERATIONS
SOCIAL	
Considerations that affect the health, opportunity, and well-being of all people involved in the exhibit—from fabricators to visitors and community members.	*ex: Exhibits without immediate light or audio response may be less intuitive for visitors.*
ENVIRONMENTAL	
Considerations that affect the health and well-being of the natural environment—including impacts on land, air, and water quality, natural resources, and wildlife.	*ex: Using electricity may result in more carbon emissions over the life of the exhibit.*
ECONOMIC	
Considerations that affect the health and well-being of the project as well as the economy—from supporting local jobs and businesses to meeting the project's budget goals.	*ex: Engineering mechanical solutions may cost more than developing a computer interface.*

STEP 3

Discuss each realm of consideration as a team.
For each category (social, environmental, economic), go around the table and have each team member share the considerations that they wrote down. Invite discussion around which considerations are the most important and record them here.

SOCIAL

ENVIRONMENTAL

ECONOMIC

STEP 4

Identify any areas where more information is needed to make a well-informed decision and record them here. *(ex: Research possible new fabrication material)*

STEP 5

End the meeting by identifying next steps toward making final decisions and record them here.