

National Living Laboratory: Creating Communities of Learners for Informal Cognitive Science Education

Summative Evaluation Report

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Executive Summary

The Living Laboratory model promotes cognitive science research in museums, involves the public in scientific discovery, and builds partnerships between museums and research institutions. With National Science Foundation funding (DRL-113648), the model has spread into a National Living Laboratory community. Evergreene Research and Evaluation, LLC and the Research and Evaluation Department at the Museum of Science, Boston completed the summative evaluation of this work, which spanned from 2011 through 2016.

This study gathered data through: (1) case study observations, interviews, and document review at four sites; (2) community-wide surveys and interviews; and (3) supporting data collection including event observations, a leadership focus group, document review, and a science communication survey. There were four evaluation questions, developed from Coburn's criteria for scale up: depth, spread, sustainability, and shift in ownership (2003). The evaluation questions and a brief summary of findings for each are as follows:

1. *To what degree and in what ways do professionals apply the Living Laboratory model?*
All model aspects are widely adopted in full or modified form. Public-facing aspects are implemented more strongly than professional-facing components.
2. *Who is involved, and how do they get involved?*
Adoption has spread robustly through professional connections and online resources, creating a diverse community with various motivations. While some sites establish partnerships quickly and smoothly, others may need up to 18 months to build a suitable collaboration.
3. *To what extent and in what ways do partners sustain their collaborations?*
Living Laboratory has developed strategies for sustainability including diversified funding and adaptations for new contexts. Many sites are planning well for sustainability, while some are challenged by staff turnover and financial need.
4. *How, if at all, do participants make the model their own?*
Leadership has adeptly met changing needs and promoted sites' abilities to take local ownership of the model. In some cases, adopters' distribution of tasks and understanding of the model emphasizes researchers more than museum professionals. Overall, however, adopters see responsibilities as evenly balanced between museum staff and researchers.

Stemming from this work, the evaluators recommend that leadership promote networking and opportunities for financial support; adjust current practices to emphasize strong professional partnerships and clarify branding; and pursue multi-person staffing structures and novel extensions of the model. Future research and evaluation could include longitudinal investigation of Living Laboratory and its new efforts; further study of researcher communication skills; and drawing connections between this work and other informal science education networks, public engagement with science efforts, and research to practice endeavors.

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How to read this report

To navigate this document smoothly, the authors recommend the following strategies:

- **Know the structure:** There are six main parts of this document, each marked by a different color header.
 - **Front matter (medium blue):** This section, including the executive summary and introduction, introduces the report and describes the Living Laboratory program and background about the evaluation's goals and approach.
 - **Methods (medium green):** This section details the ways the evaluators investigated the program.
 - **Findings (purple):** There are four main findings sub-sections, related to the program's depth, spread, sustainability, and shift in ownership. Each section has a different shade of purple for its header.
 - **Discussion (light blue):** This concludes the report by providing an overview, recommendations, and describing possible future work.
 - **End matter (light green):** There are many resources and additional pieces of data at the end of the report.
- **Review the terms:** The [Living Laboratory terms](#) section defines the way this report uses different terminology. These words will be used frequently throughout the document, so understanding what they mean will be important.
- **Use hyperlinks:** Throughout the text, you will see blue and underlined text (see "Living Laboratory terms" above). Clicking on these links will take you to the point in the document that is being described.
- **Enjoy summary pages:** Each finding sub-section begins with a page that lists the main finding statements for that theme. The sub-sections end with a page about implications of the data about that topic. If a reader is short on time, these two pages provide concise summaries. Other good, comprehensive sections to read include the executive summary and the discussion.

Contents

Executive Summary.....	2
Acknowledgements.....	3
How to read this report	4
Introduction	8
About Living Laboratory	9
Purpose of this evaluation	12
Theory and structure of the evaluation	13
Living Laboratory terms	14
Methods.....	16
Target audiences	17
Approach to evaluation methods	18
Case study methods	19
Community-wide data collection methods.....	21
Supporting data collection methods.....	22
Summative evaluation data analysis.....	23
Limitations.....	24
Findings: Depth	26
Understanding the model: Participants primarily see the Living Laboratory model as a way to do research, collaborate, and engage the public.	27
Fidelity of implementation: The Living Laboratory Essential Elements are being widely implemented—in full or modified form—across a range of sites.	30
Public implementation: The public-facing Essential Elements tend to be the most fully implemented components of the model.	31
Professional implementation: The Essential Elements related to mutual professional development demonstrate diversity of implementation, with some sites demonstrating less activity in these areas.	33
Modification: Participants who consider themselves to be modifying an Essential Element (1) define the Element differently from project leadership; (2) partially implement the Element; or (3) apply the spirit of the Element in a non-traditional manner. These modifications are often due to staff capacity and specific characteristics of the local sites.	36

Plans for future implementation: Sites that are planning for future implementation tend to be new to Living Laboratory, and many demonstrate active efforts to initiate adoption.	38
No desire for implementation: Few community members included in the evaluation plan not to implement Living Laboratory and its Elements.	39
Change in researchers' communication skills: Adopters reported that Living Laboratory improves researcher communication, although the extent to which researchers' communication skills measurably increased was unclear.	42
Museum integration of child development research: Informal educators consistently find researchers' work to be relevant to the informal context, and evidence suggests that some museums are integrating child development research into their work.	45
Implications	46
Findings: Spread.....	47
Community Expansion: The model has spread to a wide array of institutions and states, as well as to a range of professional and public audiences.	48
Motivations: Sites adopt the model because (1) it exposes the public to active scientific research, (2) their partners' work is relevant to their own, and (3) such professional partnerships are advantageous.....	50
Recruitment: Professionals learn about the model by means of professional networking and online resources.	52
Challenges to adoption: Obstacles to successfully spreading the model to new sites include (1) finding partners with similar expectations and goals, (2) developing studies appropriate for the museum environment, and (3) having enough researcher and staff time.	57
Implications	61
Findings: Sustainability	62
Current efforts: Sites are taking steps to ensure sustainability of their work at the local level, with strong communication between partners being the most prominent effort... ..	63
Budget considerations: Financial support is an important aspect of Living Laboratory sustainability, and most active sites have sought funding to support their partnerships. ..	65
Staffing patterns: Involving multiple people at each organization contributes to a sustainable partnership.....	67
Implications	71
Findings: Shift in ownership.....	72

Allocation of responsibility: Overall, ownership is balanced between researchers and museum staff, but when uneven, researchers tend to hold more responsibility.	73
Adaptation to the model: Some sites internally adjusted their programs' location, schedule, research studies, and communication patterns to fit the model.....	75
Leadership contribution: Living Laboratory leadership supports the community of learners by expanding its guidance and resources to help sites take ownership over the model..	79
Implications	82
Discussion.....	83
Overview	84
Recommendations	85
Looking forward: Opportunities for future research and evaluation	88
References	90
Appendices.....	91
Evaluation questions	92
Case study instruments	93
Community-wide data collection instruments	111
Supporting data collection instruments.....	135
Supplemental case study data	160
Community-wide survey supplemental data	164
Community-wide interview supplemental data	167
Researcher communication survey supplemental data	170

Introduction

About Living Laboratory

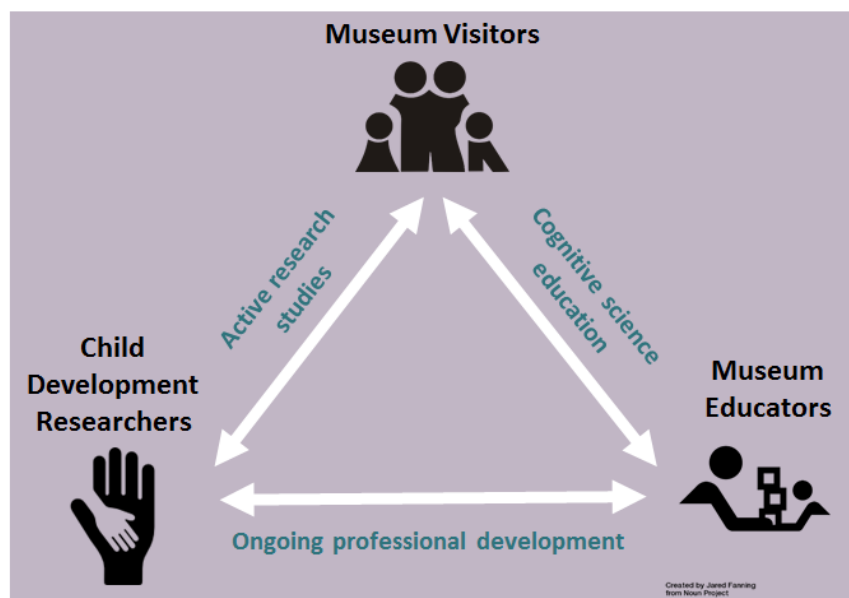
Living Laboratory is a collaborative education model that promotes child development research in museum settings, immerses the public in the process of scientific discovery, and builds partnerships between museums and research institutions. The program began at the Museum of Science, Boston in 2005 when staff in the Museum's early childhood exhibition sought to engage caregivers in active, meaningful learning. Beginning in 2007, the model was refined through National Science Foundation (NSF) support (DRL-0714706). By establishing partnerships with local research institutions and other museums, the project team articulated a model intended to benefit three audiences: researchers, museum staff, and museum visitors (see Figure 1).

Potential benefits to researchers: The researchers run child development studies on the museum floor which they would normally conduct in their laboratory. Often recruitment at the museum is faster, less expensive, and attracts a more diverse audience than in the traditional lab setting. Researchers participate in professional development opportunities with museum staff through which they learn about science communication techniques.

Potential benefits to museum staff: Living Laboratory is intended to help museum staff learn more about the current research about the young people with whom they engage, offering new ways to design appropriate learning experiences and communicate with caregivers about their children's development. The model also offers programming and resources for use with the public on the museum floor.

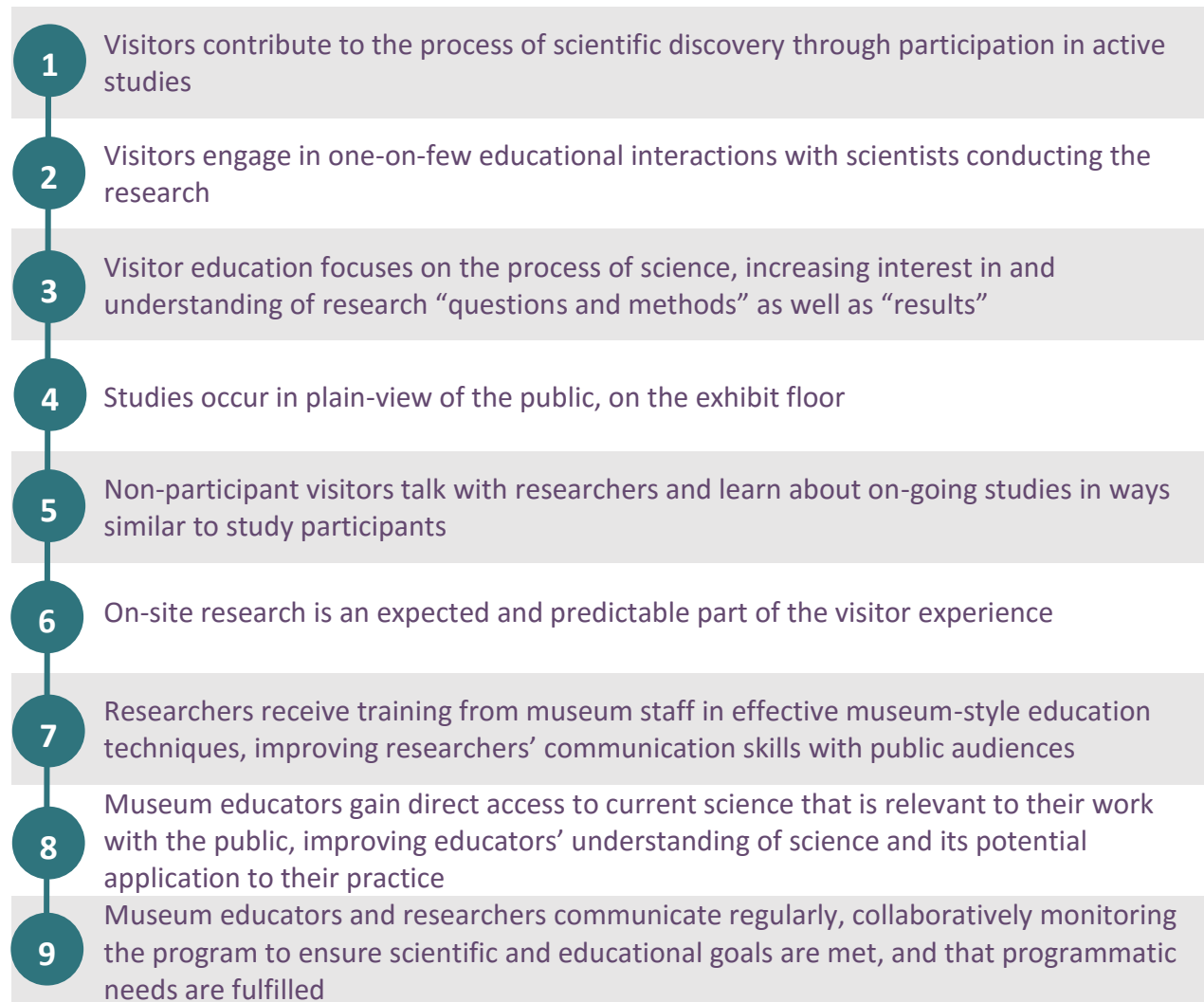
Potential benefits to museum visitors: Museum visitors are able to actively participate in the process of science, contributing to new discovery and knowledge. At the same time, they interact with real researchers and can engage in two-way dialogue about the scientific process. Living Laboratory also offers "research toys," or activities educators can use to expose visitors to child development research without any actual data collection.

Figure 1: The Living Laboratory model



The Living Laboratory model includes nine Essential Elements which outline the different components of the model (see Figure 2). The first six focus on promoting engagement between professionals and the public, and the last three target mutual professional development interactions between researchers and museum staff. Full adoption of the Living Laboratory model means that a site is implementing or working towards meeting all nine of these Elements.

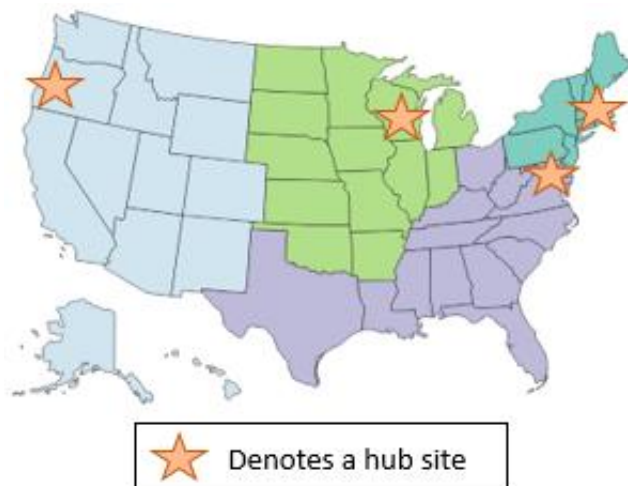
Figure 2: The Living Laboratory Essential Elements



In 2011, NSF granted funding to support the broad implementation of the Living Laboratory model (DRL 1113648). Working with its research partner at Harvard University, the Living Laboratory team at the Museum of Science, Boston formalized partnerships with three other sites in different regions of the country that became full adopters of the Living Laboratory model (see Figure 3). One individual from each of these museums began to act as a hub leader. This hub structure was originally based on the Nanoscale Informal Science Education Network (DRL 0940143) which provides a local, personal connection for a national project (Alexander, et al., 2012). Over time, the Living Laboratory hub structure shifted from a regional system—in which

hub leaders worked with sites geographically near to them—to a cohort model, in which hub leaders support a set of sites at a similar stage of Living Laboratory implementation.

Figure 3: Living Laboratory regional hub structure



The four hub sites are:

1. **Mid-Atlantic and Southeast Region:** Maryland Science Center, in partnership with Johns Hopkins University
2. **Mid-West and Southern Region:** Madison Children’s Museum, in partnership with University of Wisconsin (with additional collaborators from Edgewood College)
3. **Northeast Region:** Museum of Science, Boston, in partnership with Harvard University and Boston University (with additional collaborators at Boston College, Tufts University, the Massachusetts Institute of Technology, and Northeastern University)
4. **West Coast and Southwest Region:** Oregon Museum of Science and Industry, in partnership with Lewis & Clark College

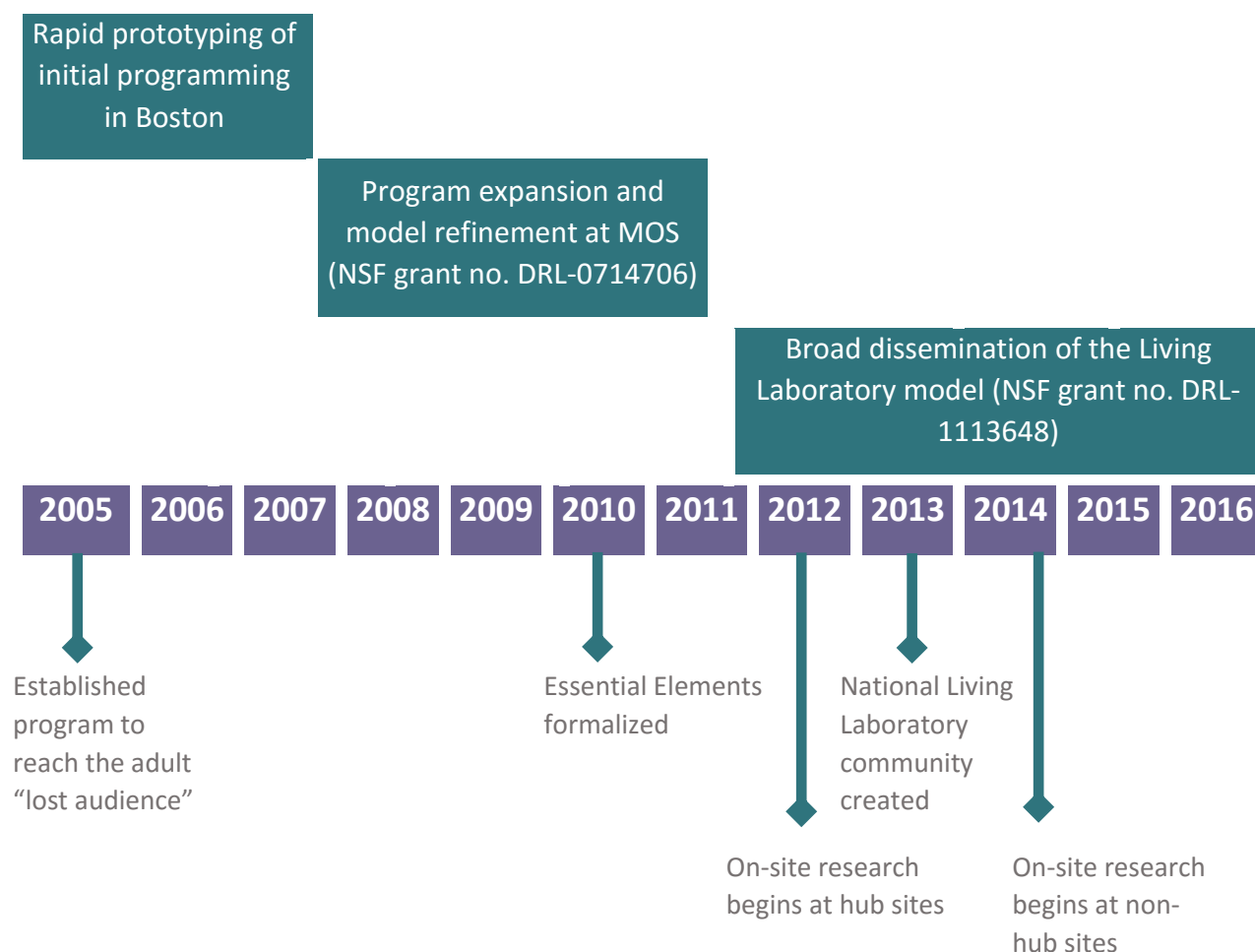
In addition to the creation of the hub structure, efforts to nationalize the Living Laboratory model have involved the creation and dissemination of digital resources through livinglab.org, organizing regular opportunities for community members to convene face-to-face; booths and presentations at professional conferences; published articles; and the production of physical kits of research toy materials.

Purpose of this evaluation

This report details the summative evaluation of Living Laboratory’s dissemination across the United States, or the period labeled “broad dissemination” in Figure 4. This evaluation focuses on the partnerships that are developed between professionals from museums and research institutions. While this report does provide data about impacts on public participants, this is not the main goal of the evaluation. The decision to focus on professional audiences is based on the logic that the National Living Laboratory leadership provides resources for and directly interacts with professionals. Members of the public are a secondary audience because they do not have direct engagement with National Living Laboratory leadership.

To learn more about other aspects of the Living Laboratory model, several past evaluation reports may be of interest: Beaumont (2013) assesses mutual professional development, and Soren (2009) describes the program expansion and model refinement at the Museum of Science (see Figure 4).

Figure 4: Living Laboratory timeline



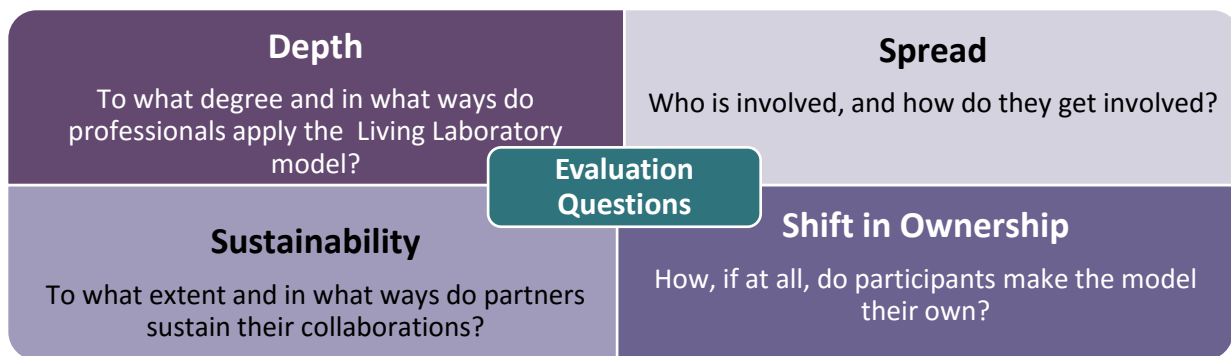
Theory and structure of the evaluation

Evaluating the dissemination of the Living Laboratory model to new sites across the country has multiple aspects. For example, simply knowing how many sites were involved was insufficient for understanding the success of the scale up; it was vital to also investigate the fidelity of implementation and components that would affect the model's potential for lasting impact in the sites where it was adopted. Due to our interest in multiple aspects of dissemination, the structure for this evaluation is based on Coburn's (2003) four dimensions of scale up:

1. **Depth:** The quality and nature of the scale-up
2. **Spread:** The reach to different institutions and various people within those institutions
3. **Sustainability:** The extent to which the scale-up is continued over time
4. **Shift in ownership:** The degree to which adopters conceptualize change as their own

While Coburn's work is designed for formal education reform efforts, the evaluators for this project felt that the four-pronged organization was relevant for the assessment of Living Laboratory's expansion because of its recognition of interrelated aspects of scale. Some specific aspects of the Coburn conception do not apply, but the framework is still relevant. Stemming from the Coburn model, four evaluation questions guided this summative work (see Figure 5). A comprehensive list of sub-questions is available in the [Evaluation questions](#) appendix.

Figure 5: Evaluation questions



While Coburn's theory is the foundational structure for this evaluation, the evaluation also reflects two other conceptual frameworks:

- **Developmental Evaluation:** The Developmental Evaluation approach, developed by Patton (2010), has informed the iterative timeline of data collection and instrument development so emergent themes could be further explored and so the project team could learn from evaluation data throughout the process.
- **Complex Adaptive Systems:** The literature of complex adaptive systems describes collectives wherein the capacities of the whole are greater than individual parts (Davis & Sumara, 2005). Many aspects of this theory—including topics such as diversity, redundancy, neighborhood interactions, and distributed control—are relevant to the findings from this evaluation.

Living Laboratory terms

For this report, the following components, structures, and stakeholders will be defined as below:

Components	<p>Essential Element: One of the nine defined components of the Living Laboratory model (see Figure 2).</p>
	<p>Partnership stipend: Funding (\$1,400 to \$3,000) for sites establishing or enhancing a Living Laboratory partnership and implementing the full model with active research.</p>
	<p>Educational assistance awards: Financial support (\$552 to \$1,000) for sites not implementing active research, but using components of the Living Laboratory model to educate the public about developmental science.</p>
	<p>Research toy: A facilitated, hands-on activity based on published research through which museum visitors can engage in a research-like process without having their data collected. Research toys are often led by museum staff.</p>
Structures	<p>Hub site: One of four Living Laboratory sites that were the first adopters of the model and provide resources for sites in their geographic region: The sites include Madison Children’s Museum; Maryland Science Center; the Museum of Science, Boston; and the Oregon Museum of Science and Industry (see Figure 3).</p>
	<p>Site: An informal learning institution that is actively implementing a portion of the model, but may not necessarily have an active partnership or exhibiting full implementation.</p>
	<p>Partnership: A collaboration between a research organization and an informal learning organization, that may nor may not be fully adopting the Living Laboratory model.</p>

Stakeholders

Community: The greater group of professionals who have access to National Living Laboratory resources or attend events. Community members may be adopters or current non-adopters.

Leadership: The group of project leaders, hub leaders, and their research partners who are the main recipients of the grant or sub awards.

Hub leader: A representative from a hub site who is charged with spreading the Living Laboratory model and supporting sites in its implementation.

Adopter: For the purposes of this report, an adopter is someone who identifies her or himself as being part of an active Living Laboratory partnership (see [Figure 6](#)).

Current non-adopter: Community members who self-identify as not part of an active Living Laboratory partnership at the time of data collection. This group includes those who have been adopters in the past, are working towards adoption or have no plans to ever adopt the model.

Researcher: Professional personnel affiliated with an institution, most frequently a university, that executes active research, such as universities, hospitals, and independent firms. The fields of research typically include cognitive science, developmental psychology, educational psychology, cognitive neuroscience, or social psychology. Researchers may be students, Principal Investigators, or administrators.

Museum staff: Professional personnel affiliated with a museum or informal education organization. These professionals include, but are not limited to museum educators.

Museum visitor: A member of the public—child or adult—who attends a museum or informal education organization and participates in Living Laboratory.

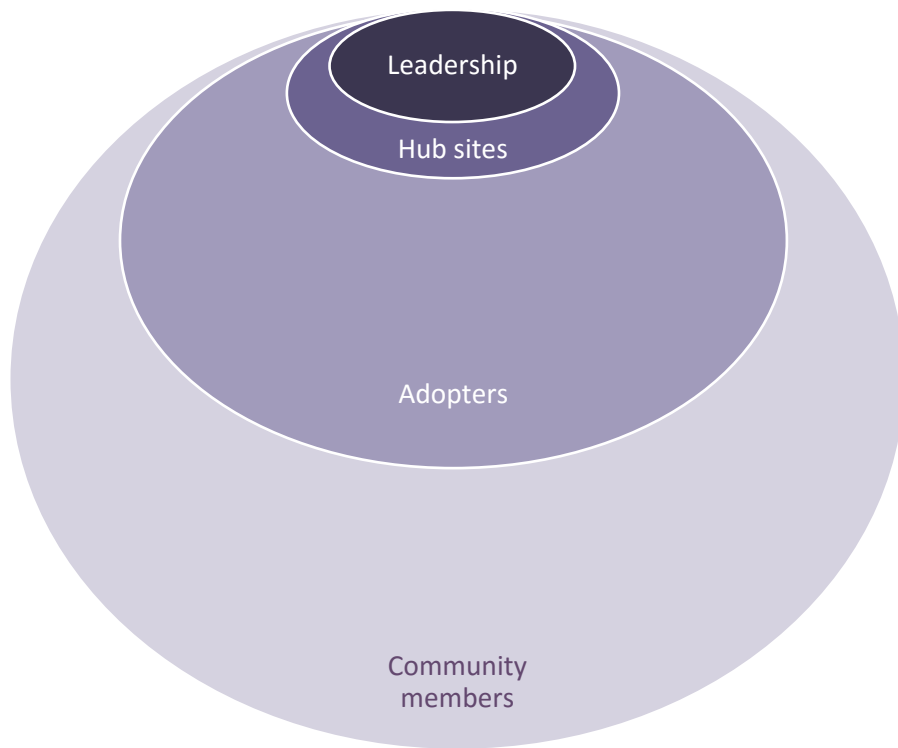
Methods

Target audiences

This evaluation investigated four groups of Living Laboratory participants (see Figure 6):

1. **National Living Laboratory leadership:** Select representatives from the hub sites who manage the dissemination of the model as part of their responsibilities under the broad implementation grant.
2. **Living Laboratory hub sites:** These sites were the first to implement the model and now provide programmatic support and leadership:
 - Museum of Science, Boston
 - Oregon Museum of Science and Industry
 - Maryland Science Center
 - Madison Children's Museum
3. **Adopters of the Living Laboratory model:** Those community members who consider themselves to be part of active Living Laboratory site. This group is the primary target audience for many of the data collection methods.
4. **Living Laboratory community members:** Professionals who have signed up to receive National Living Laboratory resources or attend events.

Figure 6: Living Laboratory audiences



Approach to evaluation methods

As described by Coburn (2003), the approach for exploring the four interrelated dimensions of dissemination—depth, spread, sustainability, and shift in ownership—demands multiple aspects of data collection and a mix of qualitative and quantitative methods. Thus, the evaluators designed an evaluation including a suite of complementary types of data collection. These different data collection methods provide multiple data sources which can offer a triangulating view for the different evaluation questions, deepening the understanding of each finding. The data collection methods fall into three categories:

1. **Case studies:** In-depth investigations of four sites' implementation, with data collection focused around a site visit
2. **Community-wide data collection:** A survey of community members (including adopters and current non-adopters) followed by a phone interview
3. **Supporting data collection:** Methods that look at the leadership's management of the community as well as a study specifically addressing researcher communication skills

Figure 7 shows each of the three categories and the data collection methods used for each, summarizing how each method primarily relates to the evaluation questions. Boxes that are shaded in teal indicate where the methods, listed in rows, meets one of the evaluation questions shown in the columns. Note that for each evaluation question there are at least three methods providing data about that question, enabling us to triangulate findings across methods.

Figure 7: Evaluation questions and methods

		Depth	Spread	Sustainability	Shift in Ownership
Case studies	Observations				
	Interviews				
	Document review				
Community-wide data	Surveys				
	Interviews				
Supporting data	Event observations				
	Hub leader focus group				
	Project document review				
	Researcher communication survey				

Figure 8. Selected research recommendations from Coburn's (2003) theory of scaling up

Coburn makes recommendations throughout her article about how the four aspects of her theory of scale up could be investigated. Below are several excerpts, which this evaluation has applied:

“Capturing depth may require in-depth interviewing and classroom observation” (p. 5).

“If we broaden the notion of spread to include ‘spread within,’ we must also broaden the indicators used to measure spread” (p. 7).

“The explicit focus on sustainability...highlights the need for designs that actually allow researchers to assess whether or not changes in schools and classrooms persist over time” (p. 6).

“Existing research suggests several preliminary indicators for shift of reform ownership at the school and district levels: (a) the presence of structures and mechanisms for ongoing teacher learning about reform (e.g., professional development, teacher study groups); (b) the presence of established strategies to provide continued funding for reform activities; (c) the degree to which districts have taken responsibility for continued spread of reform; and (d) the use of reform-centered ideas or structures in school or district decision-making.” (p. 8).

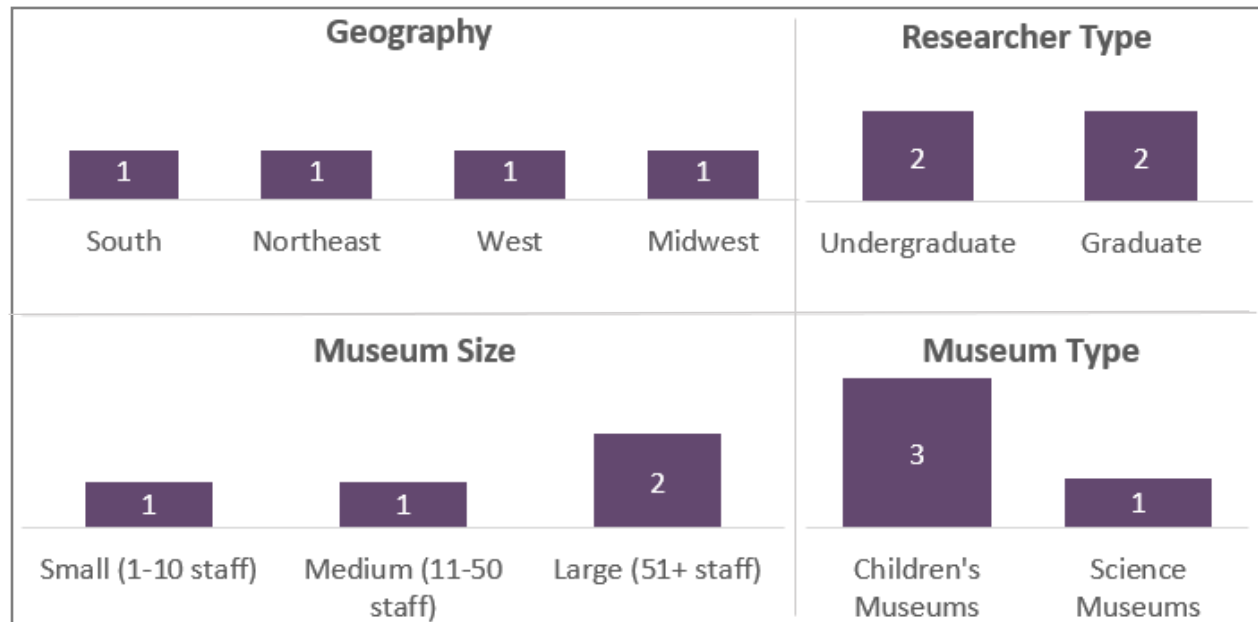
In addition to the ways the methods fit with the evaluation questions, the methods offered a cyclical, developmental approach (Patton, 2011). The case studies were completed before the community-wide data collection, allowing evaluators to develop instruments based on trends that emerged in the case studies. Similarly, the community-wide data collection was completed before the hub leader focus group, helping evaluators identify areas to probe leadership based on concrete examples. Figure 8 provides context about how Coburn's (2003) research recommendations were applied throughout. The following sections describe the nine data collection methods. Instruments and protocols are in the [Appendices](#).

Case study methods

The case studies were designed to provide a comprehensive look at Living Laboratory implementation at four different sites. Four Living Laboratory sites were selected for the in-depth case study data collection, including document review and an in-person site visit during which an evaluator conducted interviews and program observations. Case study investigations sought to understand each site's implementation at the institutional partnership level; all researchers and all museum personnel who were involved in Living Laboratory at the site were included in the sample for these case study sites.

The case study sites were selected for diversity of geographic location, museum size, museum type, and academic level of researchers. Figure 9 shows the number of case study sites in each of these categories.

Figure 9. Diversity of case study sites



During each site visit, an evaluator engaged in the following data collection activities (see protocols and instruments in the [Appendices](#)):

1. **Observations of research (n=33):** The evaluator recorded information about the active research in the museum using a structured observation form and open field notes.
2. **Observations of research toys (n=9):** For sites that used research toys, the evaluator conducted observations using a structured observation form.
3. **Interviews with museum staff (n=12):** All museum staff that were involved in Living Laboratory were invited to participate in individual interviews with the evaluator.
4. **Interviews with researchers (n=19):** Similar to the museum interviews, all researchers at the case study sites were invited to participate in an interview.
5. **Gathering documents for review (n=29):** The evaluator took photographs of the Living Laboratory setup and collected written materials about the program, including flyers, protocols, orientation curricula, tracking and monitoring systems, and other documents.

Community-wide data collection methods

The community-wide data collection evaluated the breadth of model implementation, including a large number of participants. Community members were invited to participate in two data collection activities (see instruments in the [Appendices](#)):

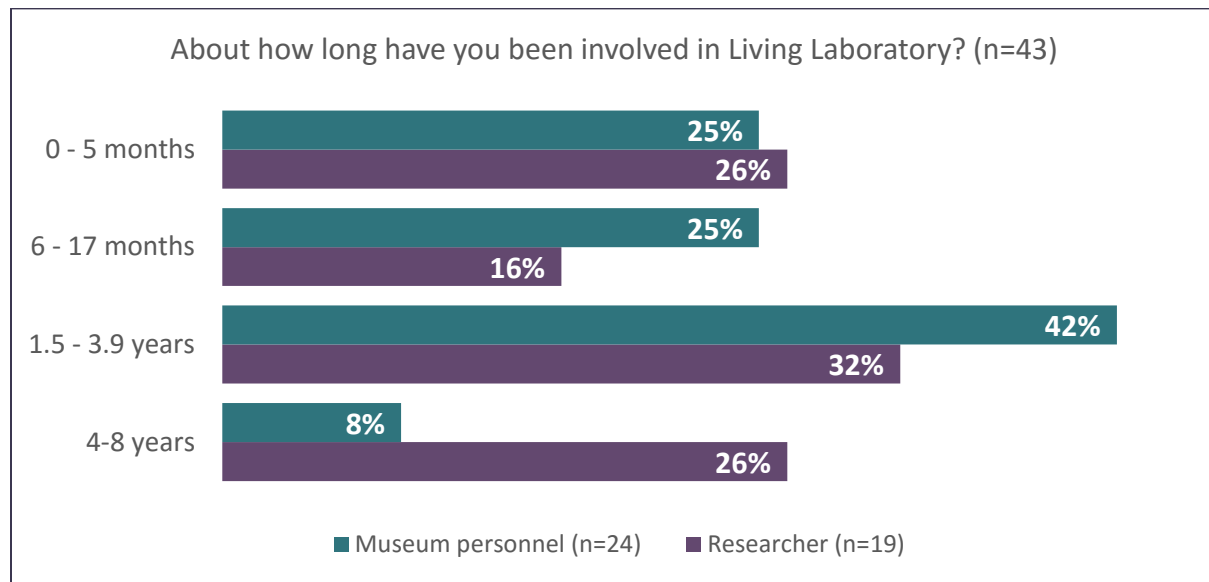
1. **An online survey (n=80):** The survey asked a mix of quantitative and qualitative questions, and was branched such that current Living Laboratory adopters received questions that were different from current non-adopters.
2. **A follow-up interview (n=30):** All survey respondents who agreed to be contacted were invited to complete a follow-up phone interview. Questions followed a semi-structured format that asked respondents to explain their survey responses.

The sample of community members consisted of anyone who had attended a Living Laboratory event, with the following exceptions: people outside the United States, people at hub sites, and people at case study sites. Survey invitations were sent to 119 people, and the response rate was 67%. For the interviews, 38% of survey respondents agreed to participate.

Figure 10 illustrates the proportion of museum versus research respondents and adopters versus non-adopters for each method. Figure 11 shows how long survey respondents who consider themselves adopters have been involved in Living Laboratory, an important characteristic which will be further explored in the [Findings: Sustainability](#) section of this report.

Figure 10: Community-wide survey and interview respondents

	Survey (n=80)	Interview (n=30)
Museum staff	59%	56%
Researcher	35%	44%
Adopter	57%	53%
Non-adopter	43%	47%

Figure 11: Community-wide data collection respondents' tenure with Living Laboratory

Supporting data collection methods

Supporting data collection methods allowed evaluators to examine the impacts of Living Laboratory on specific target audiences that were not covered by the case studies or community-wide methods. This suite of supporting methods included (See the [Appendices](#) for instruments and protocols):

1. **Event observations:** Evaluators observed Living Laboratory symposia, full adopter meetings, and other professional convenings.
2. **Hub leader focus group:** An evaluator led a facilitated discussion with National Living Laboratory leadership to discuss shifting definitions of implementation and Essential Elements.
3. **Document review:** The Living Laboratory project amassed a library of documents (including applications for stipends, reports, communication with community members, etc.) which were reviewed.
4. **Researcher communication study:** Evaluators gathered pre- and post-survey data from researchers at Living Laboratory hub sites. The online surveys asked researchers about their communication with the public, as well as what they valued about participation in the Living Laboratory model. 110 students were invited to take the survey, 34% of whom completed both the pre- and post-test.

Summative evaluation data analysis

All of the data collection methods discussed in the previous sections resulted in a large range of both qualitative and quantitative data about the impacts of the Living Laboratory dissemination efforts. Thus the analysis of this data took place in several stages.

Most case study data were qualitative. These data were coded by Essential Element and by evaluation question using NVivo software. Within the Essential Element coding, evaluators developed sub-codes for each site. The coding for this and other qualitative data collected for this summative evaluation followed an inductive, constant comparison approach (Boeije, 2002; Thomas, 2006). Quantitative data from the case study observations was added to the relevant Essential Elements and evaluation questions. This process raised several key topics for exploration that were further developed into community-wide data collection questions.

Once data had been gathered from the community-wide survey, data were analyzed using descriptive statistics, including counts and percentages. Key issues were identified for probing in the community-wide interviews.

Community-wide interview transcripts were uploaded into NVivo, where they were coded by evaluation question and then sub-coded inductively to find patterns within the data. Some of these patterns were further explored through the hub leader focus group. Then, the transcript from that focus group was added to NVivo along with project documents and notes from project meetings. These, too, were coded by evaluation question and sub-coded inductively.

For the researcher communication surveys, inductive coding analysis was performed to summarize trends in qualitative data. Quantitative questions that were only asked on one survey (pre or post but not both) were analyzed with descriptive statistics. Three questions asked respondents to write a description of different aspects of their research study. These three questions formed the basis of an investigation into communication skill development. Written responses for the three questions were combined for each participant, and the combined text was coded for 13 characteristics of positive science communication (see the [Appendices](#)). Responses were randomized such that the person coding did not know whether the response was from a pre- or post-survey.

Data were then paired for comparison, identifying which were pre- and post- and which two responses came from the same individual. Most of the coded characteristics were binary (a value of 0 if the response did not meet the criteria and 1 if it did). Using SPSS software, these characteristics were compared between pre- and post- tests using McNemar's tests with a $p < .05$ significance level. Then, a combined score was computed for the pre- and post-surveys. The paired pre- and post-scores for the combined scale were compared using a Wilcoxon Signed Rank test and a $p < .05$ significance level.

Limitations

As with any study, this evaluation has a number of limitations. The following should be considered when reviewing this report:

Sampling decisions: The community-wide data collection efforts focused on community members who had in-person contact with a hub leader. This excluded those who have signed up for the website and may be using online resources. The decision to focus on those with in-person contact meant the evaluation focused on those who had received a standardized introduction to the project, offering consistency within the evaluation sample. Hub sites and international sites were also excluded from the community-wide data collection due to the fact that they had been covered by prior evaluation efforts (for hub sites) and the fact that they were outside of the funding scope of the project (for international sites). These decisions were made consciously, but they mean that the data are not necessarily representative of the full community.

Response bias: More museum personnel than researchers participated in the data collection. Additionally, the people who agreed to participate in an interview tended to have answered the survey more positively. This means that we lack some in-depth qualitative information about those who are less satisfied with the model, and that researchers' perspectives may be less prominently portrayed in the data.

Timing: Coburn calls for, "Designs that actually allow researchers to assess whether or not changes in schools and classrooms persist over time" (2003, p. 6). Differences between formal and informal contexts aside, evaluators made efforts to spread data collection out and track the sustainability of partnerships over time. However, there is still evidence that sites are continuing to further adopt the model, and that some partnerships may be lapsing. To make long-term claims about the sustainability of the Living Laboratory model, additional longitudinal data collection would be necessary.

Validity of researcher communication pre- and post-surveys: Several data sources address changes in researchers' communication skills: surveys and interviews of current Living Laboratory adopters, and a pre- and post-survey of researchers at Living Laboratory hub sites. These different data sources show a gap between high levels of reported communication skill development (as measured in surveys and interviews of current Living Laboratory adopters as well as the researcher post-survey), and a lack of identified improvement in communication skills between the pre- and post-survey responses. The pre- and post-survey method was selected because, during pilot testing, the communication patterns were consistent with observed behavior. However, the differences in data between instruments for this summative evaluation raise questions about a possible lack of ecological validity; a written response on an online pre- and post-survey may not reflect true behavior when conversing with the public. Alternatively, the one-semester window may be insufficient duration for demonstrating changes in communication skills. Or, the timing of the pre-survey immediately following Living Laboratory orientation may mean that research communication skills are freshest in researchers' minds, thus masking changes that might have happened if the pre-survey could have been collected before

any exposure to Living Laboratory. Future investigation into instrumentation in this area could prove valuable.

Limitations of the model: As mentioned previously, Coburn’s model (2003) is designed for a formal education context. In adjusting it for an informal setting, nuance may have been lost. For instance, Coburn calls for investigations of depth to consider, “teachers’ beliefs, norms of social interaction, and pedagogical principles as enacted in the curriculum” (p. 4). These aspects or their informal correlates are less prominently featured in this report than her call for depth as, “the nature of change” (p. 4).

Sample sizes: In the community-wide interviews, evaluators’ lines of questioning were tailored based on respondents’ prior survey responses. This provided the opportunity to explore areas of confusion and added great depth to the data. However, this flexibility led to small sample sizes for some individual questions. The small sample sizes limit the strengths of claims that can be made and in some cases may over-emphasize certain perspectives that are included in the data.

Evaluator bias: Finally, every evaluator brings her or his biases to work. The evaluators on this project—including both external and internal evaluators--have grown to value the Living Laboratory model. Evaluators include self-proclaimed feminists, environmentalists, equality advocates, and supporters of education, science, and museums. Every effort has been made to treat data objectively, but these underlying perspectives may have unknowingly influenced the interpretation of data.

Findings: Depth

This section shares findings from evaluators' investigations of the fidelity of implementation (“depth”) of the Living Laboratory model. Findings include:

Understanding the model: Participants primarily see the Living Laboratory model as a way to do research, collaborate, and engage the public.

Fidelity of implementation: The Living Laboratory Essential Elements are being widely implemented—in full or modified form—across a range of sites.

- Public implementation: The public-facing Essential Elements tend to be the most fully implemented components of the model.
- Professional implementation: The Essential Elements related to mutual professional development demonstrate diversity of implementation, with some sites demonstrating less activity in these areas.
- Modification: Participants who consider themselves to be modifying an Essential Element (1) define the Element differently from project leadership; (2) partially implement the Element; or (3) apply the spirit of the Element in a non-traditional manner.
- Plans for future implementation: Sites that are planning for future implementation tend to be new to Living Laboratory, and many demonstrate active efforts to initiate adoption.
- No desire for implementation: Few community members included in the evaluation plan not to implement Living Laboratory and its Elements.

Behavior change: There is evidence that participation in Living Laboratory is leading to changes in researchers' and museum staff's practices, although this level of change is not universal.

- Change in researchers' communication skills: Adopters reported that Living Laboratory improves researcher communication, although the extent to which researchers' communication skills measurably increased was unclear.
- Museum integration of child development research: Informal educators consistently find researchers' work to be relevant to the informal context, and evidence suggests that some museums are integrating child development research into their work.

Understanding the model: Participants primarily see the Living Laboratory model as a way to do research, collaborate, and engage the public.

The first aspect of understanding how deeply the Living Laboratory model is being implemented is the conceptual level: gaining a sense of what community members think the model is. For those community members who had indicated on their surveys that they were currently implementing Living Laboratory, evaluators asked how they would describe Living Laboratory to someone who had never heard of it before. Figure 12 summarizes these responses. The comments are listed by theme with an example quotation for each. The three most common types of responses—with at least half of all respondents mentioning each—were that Living Laboratory is (1) an opportunity for researchers to collect data, (2) a mutually beneficial collaboration between museums and researchers, and (3) a learning opportunity for caregivers.

Figure 12: Adopters' categorizations of the model¹



¹ Note that each individual's response may have included multiple themes, which is why the counts add up to more than 16.

Most responses to this interview question were representatively split between researchers and museum participants. One exception was the coded responses about Living Laboratory being a mutually beneficial collaboration. Six of the eight respondents who described the model in this way were researchers, although only 35% of all respondents were researchers. Responses also tended to be representatively split between respondents who had been involved with Living Laboratory for various amounts of time. However, for the most common code—seeing Living Laboratory as an opportunity for data collection—most respondents were newer to the model. Six of the nine people who shared this understanding of the model had been involved with Living Laboratory for less than 18 months, while only 32% of the overall sample had been involved for this amount of time.

Several codes from Figure 12 present a balanced understanding of the model, whether as a mutually beneficial collaboration, a child development network, or a bridge between research and practice. Others primarily emphasize benefit to one of the Living Laboratory audiences. The most common code in the chart above (an opportunity to gather data) is of clear benefit to researchers, who need data to do their work. Several prominent codes describe the model as a benefit to the public, especially as a participatory or educational experience. The interview responses do not show as strong of a parallel theme around direct benefit to museum staff. However, the public are museum patrons within this model, so a positive visitor experience is also beneficial to museums. Figure 13 illustrates data from the same interview question, categorized by the audience that the respondents mentioned. The audiences are categorized as (1) researchers; (2) the public; (3) mutual benefit across audiences; and (4) museum professionals. Each of these audiences was specifically mentioned by at least nine of the sixteen respondents.

Figure 13: Listed target audiences from adopters' Living Laboratory descriptions

	Respondents 1-16															Total
Researchers																13
The public																12
Mutual benefit																10
Museum professionals																9
# Audiences	4	4	4	4	4	3	3	3	3	3	2	2	2	1	1	1

Figure 14 shares narrative data from two case study sites about how the understanding of the model is distributed across multiple people within a Living Laboratory partnership. The general understandings of the model from [Figure 12](#) are similar to the codes displayed in the table of interview data, showing that there is consistency between case study sites and the broader community. Caregiver engagement—the founding motivation for the model—is a common way participants understand Living Laboratory. However, many describe the model differently.

Figure 14: Case study sites' understanding of the model

In a one-room children's museum, smiling staff greet visitors and direct them to a table topped with engaging toys. Two women behind the table agree they're there to do research in a friendly way. *"It's open and accessible for all visitors,"* says the lead researcher, *"rather than just talking to people I need for research, it's for all. I talk to everyone."* Her assistant chimes in, noting it's, *"to educate families and expose children to research, and to get data."*

The next day at the museum, the table has different toys, and a museum staff person is there instead of the researchers. When she is asked what Living Laboratory is, she describes, *"We're conducting studies in a way to show research without taking any data. It's a friendly experience for everyone."* She doesn't know that yesterday's researchers are part of the same project as her research toy, but nonetheless she, the researchers, and many of her colleagues agree that for them the core aspects of Living Laboratory are education for museum visitors and accessible exposure to research.

In the nearby museum offices an Administrative Assistant, the Director of Education, and a Vice President speak about Living Laboratory. At this organizational level, there is more understanding about the differences between active research and research toys. Like the researchers and educator on the floor, these professionals value public engagement with science. One person shares, *"We're taking a step above exhibits. We're interacting with visitors and having some feedback from the parents and educators."* Something that multiple people here say that the researchers did not talk about is the role of Living Laboratory in raising the public's view of the museum as a learning institution. Several people share things like, *"What I've loved is that it's allowed us to talk to our audience and show we're educational, not just a big playground."*

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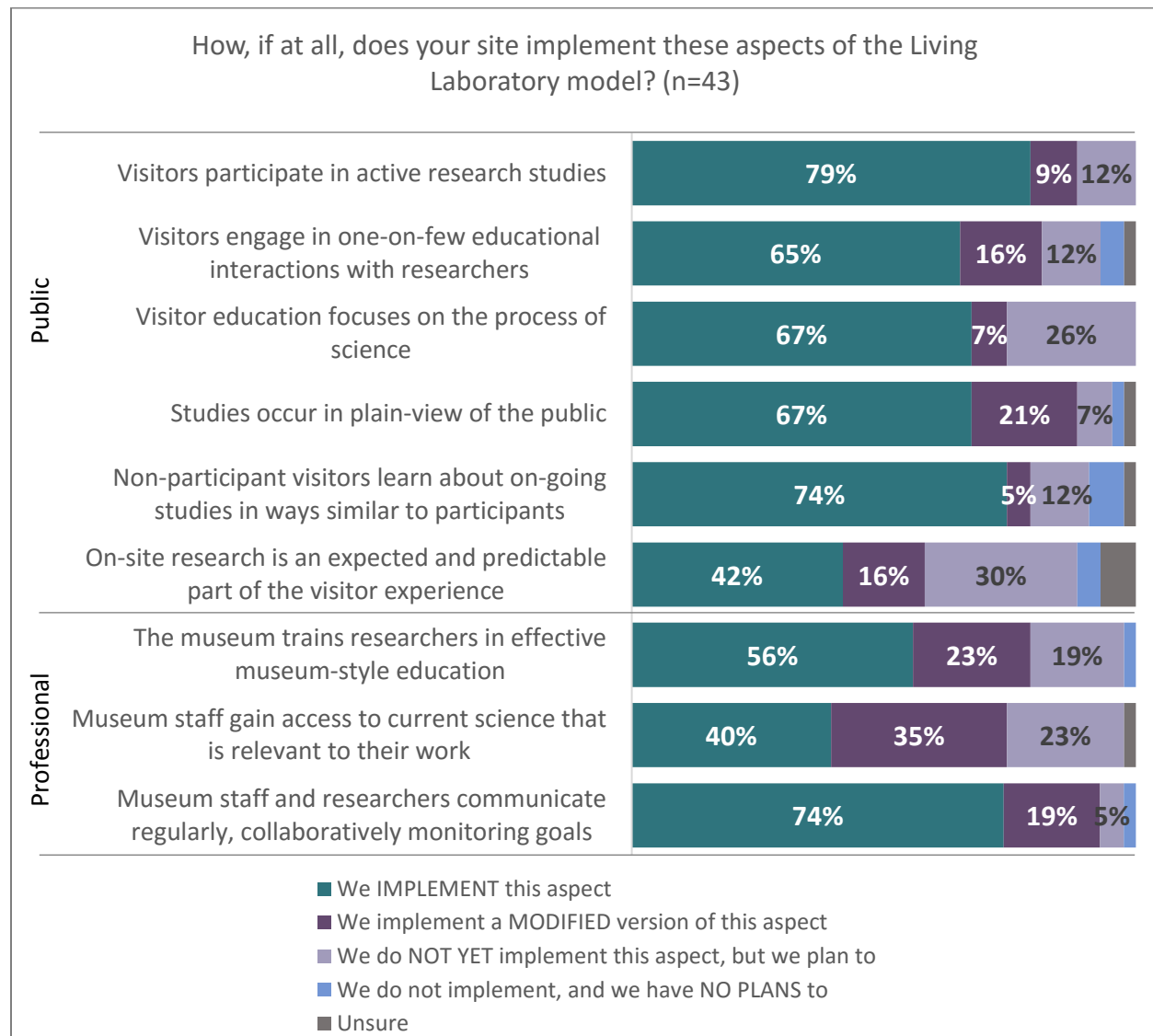
Hundreds of miles away, four researchers at a Living Laboratory in a science center are running multiple studies at once. The team has a cohesive sense of Living Laboratory: a service for visitors. The first says, *"I believe that Living Lab is a really interesting and unique way of educating the public about research and about science."* Her colleague adds, *"Keeping the community interested,"* and a third undergraduate shares, *"It's a family-friendly place, great for kids."* The lead researcher says, *"I would say it's an opportunity to participate in science as it happens."* While the students do not even mention the fact that they are collecting data, this fact does not escape the main researcher. However, she couches that aspect within the desire for serving the public as well, saying, *"The most important things are to project a positive, inclusive view of science in everyday life. The data collection is important, but it's also sharing enthusiasm and why we're doing what we're doing."*

In this large museum, it's harder to find museum staff who know about Living Laboratory than it was at the last museum, perhaps because the museum depends heavily on part-time volunteers. The researcher has one primary contact. His understanding of Living Laboratory is similar to the researchers' but he prioritizes things differently: *"First, researchers have access to subjects that they don't normally have access to. Second, inform the audience."*

Fidelity of implementation: The Living Laboratory Essential Elements are being widely implemented—in full or modified form—across a range of sites.

Data suggest that a wide range of organizations are implementing all nine of the Living Laboratory Essential Elements to a high degree. As shown in Figure 15, nearly all survey respondents who were involved in a Living Laboratory partnership indicated that their sites were currently implementing, modifying, or planning to implement each of the Elements of the Living Laboratory model. This suggests that many sites value the full set of Essential Elements—including those related to logistical setup, public engagement, educational objectives, and mutual professional development.

Figure 15: Adopters' implementation by Essential Element

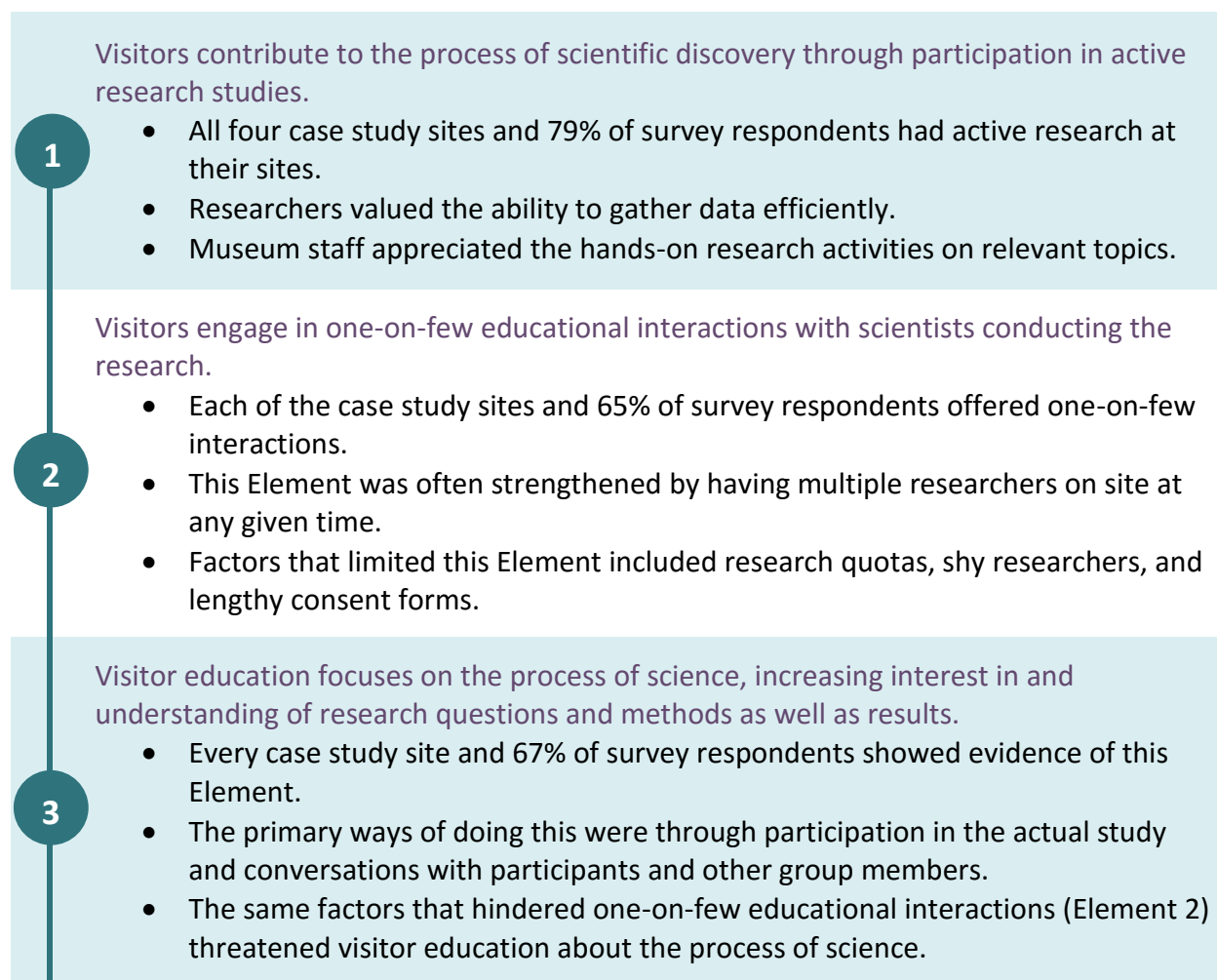


The following pages explore the Living Laboratory Essential Elements described in Figure 15. Examining the qualitative explanations of the data above as well as other supporting data, the upcoming sections investigate what it means when sites say they are implementing, modifying, planning to implement, or choosing not to implement an Element. Additional detail about each individual Element can be found in the [Appendices](#).

Public implementation: The public-facing Essential Elements tend to be the most fully implemented components of the model.

Living Laboratory sites implement the first six Essential Elements—which focus on public audiences—to differing degrees using a variety of strategies. However, this set of Elements holds together as being implemented in a wide range of sites. Figure 16 compiles data from site visits and community-wide data collection to describe implementation approaches and factors that support or hinder implementation.

Figure 16: Implementation of Essential Elements for public audiences



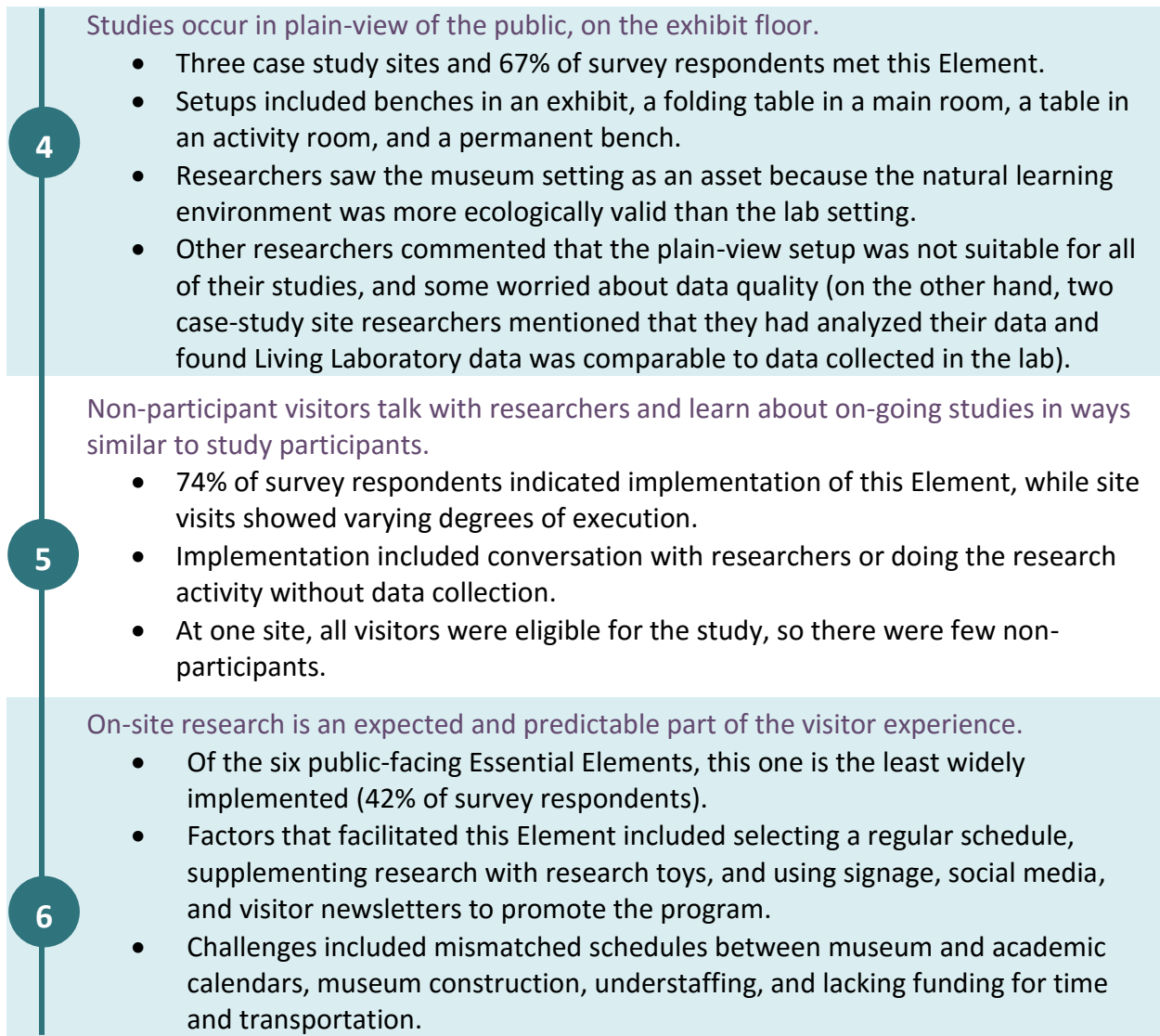


Figure 17 shares an observation of what the public-facing Elements are like to a visitor. Much of the interaction is based on conversation, which reflects personal styles and individuality; the story shows the fluidity of the Living Laboratory experience. The data is an example of a “typical” observation from one case study site, but it should be noted that there was great variety among sites.

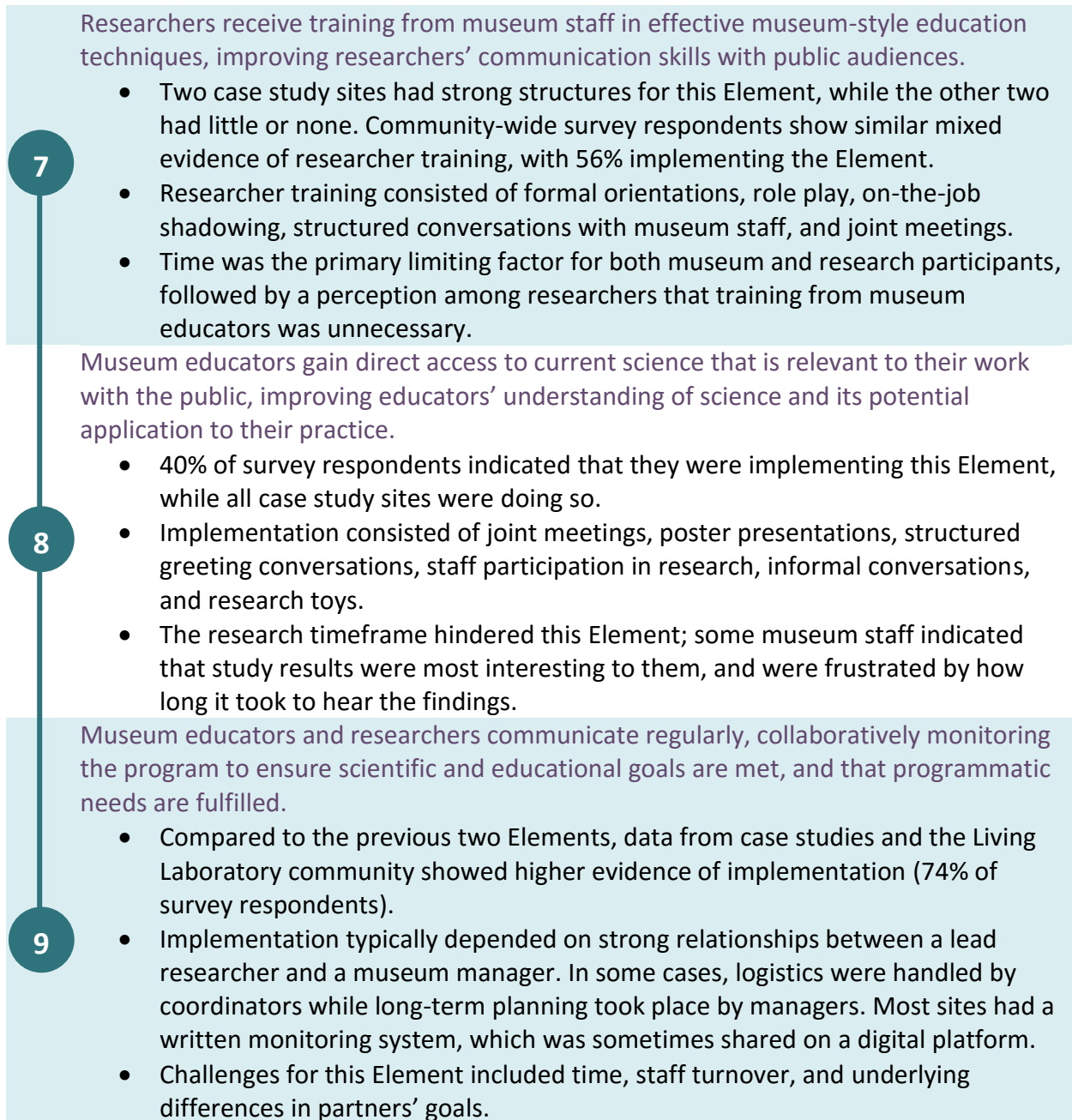
Figure 17. The visitor experience of Living Laboratory

A young girl of about four enters the museum galleries and runs straight into an exhibit where she can ‘harvest’ stuffed fruits and vegetables and prepare them in a cafe. Her caregiver follows behind. A few minutes later, a young student approaches the caregiver and asks if she’s familiar with Living Laboratory. The adult shakes her head and the students explain that researchers from the college down the street are there doing research at the museum, and the young girl is eligible to participate. The student explains that they’re learning about how children play with toys by observing how long they play and what they do with the toys. She asks the caregiver if the girl would like to try it out, handing the adult a clipboard with additional information and a consent form. Looking at the girl playing happily, the caregiver shrugs and says she can participate if she wants to.

The student turns to the girl and asks if she’s having fun. At first, the girl acts shy, but then the student complements her and asks if she can twirl her skirt. The young girl grins and spins quickly, tossing her head back with a sheepish grin. The student oohs and aahs before asking the girl if she wants to play a game with the student. The girl agrees, the caregiver signs the consent form, and the girl starts skipping over to a table filled with toys where the student asks her to build a house. Now the caregiver follows, and stands with another student who is videotaping the research. She watches the girl arrange the tiles in what looks to be a random pattern and shares concern that her daughter’s creation does not look like a house. The second student smiles and assures that this is all part of the process and there are no right or wrong answers to this task; that they’re just trying to learn how different instructions influence how children play. Soon the girl finishes and the student gives her a sticker and a bracelet, which she promptly puts on and runs over to show her caregiver. The students thank the visitors for helping contribute to science, and they smile before the girl turns and runs to the petting zoo with her caregiver in tow.

Professional implementation: The Essential Elements related to mutual professional development demonstrate diversity of implementation, with some sites demonstrating less activity in these areas.

Similar to the first six Essential Elements, sites have different ways of implementing the professional-facing Elements. Overall, the level of implementation is weaker for these three Elements, as shown in Figure 18:

Figure 18: Implementation of Essential Elements for professional audiences

As described above, Living Laboratory's mutual professional development opportunities take many forms. Figure 19 shares data from an interview and observation of one professional at a case study site who has experienced multiple levels of interaction with and learning from Living Laboratory.

Figure 19. A professional's experience with Living Laboratory professional development

A young educator at a small children's museum is excited about a new project she's rolling out. Her manager had introduced her to the Living Laboratory model last year, and for a while, she'd been greeting researchers when they came and did studies at the museum. She especially liked seeing how they were able to engage the children, educate caregivers, and collect research data all at the same time. She feels like she's been able to help the researchers, too, by demonstrating and sharing tips for how to recruit families and get kids excited to participate. When the researchers need additional assistance, she does the initial recruiting before introducing visitors to the researchers for their formal consent process.

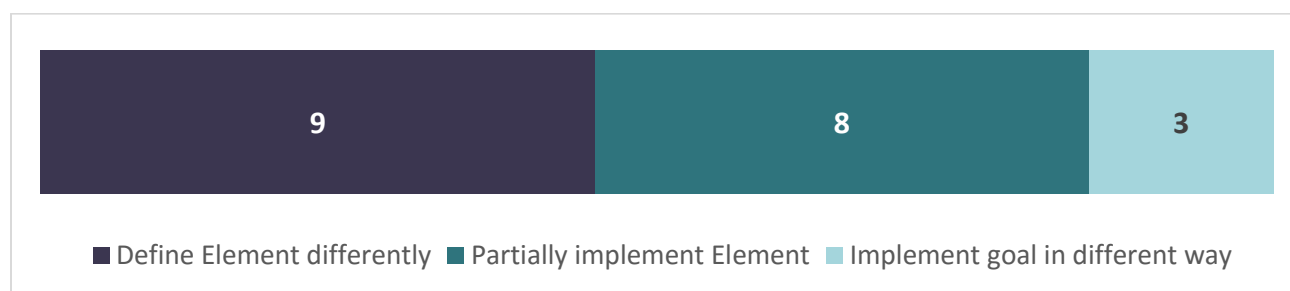
In addition to these interactions with the researchers, the educator's manager had showed her the Living Laboratory website and asked her to start using one of their research toys. She read through the descriptions and picked out Dance and Emotion because it was active. After gathering all the materials, she headed out to the floor, pulled out the supplies, and almost immediately visitors approached to see what was happening. Visitors stayed for the duration of the shift. She danced and talked, asking children how they thought the researchers came up with the game, asking them to make hypotheses, and relating the activity to a familiar children's movie. With the caregivers, she held more intellectual conversations and shared about the research papers she'd read.

Reflecting on the experience, the educator feels that her exposure to Living Laboratory has helped her work. She talked about one day when she'd been frustrated at children who were running and wouldn't stop when she asked them to. Through Living Laboratory, she had learned that many of the children in the museum have not yet reached the developmental milestones during which they gain impulse control. She discussed the fact that this changed her thinking. It wasn't productive to keep telling these children to stop running. They literally could not follow her direction. Smiling, the educator said that this understanding had pushed her to be more creative in finding developmentally-appropriate ways to keep children learning safely.

Modification: Participants who consider themselves to be modifying an Essential Element (1) define the Element differently from project leadership; (2) partially implement the Element; or (3) apply the spirit of the Element in a non-traditional manner. These modifications are often due to staff capacity and specific characteristics of the local sites.

As shown in [Figure 15](#), a number of survey respondents (ranging between 5% and 30% for each Element) indicated that they were implementing modified versions of the Essential Elements. In order to understand what these modifications entailed, evaluators asked interviewees to explain how they were adapting the Elements. These interview responses grouped around three themes, as shown in [Figure 19](#) [Figure 20](#) and described below:

Figure 20: How adopters describe modification (n=20)



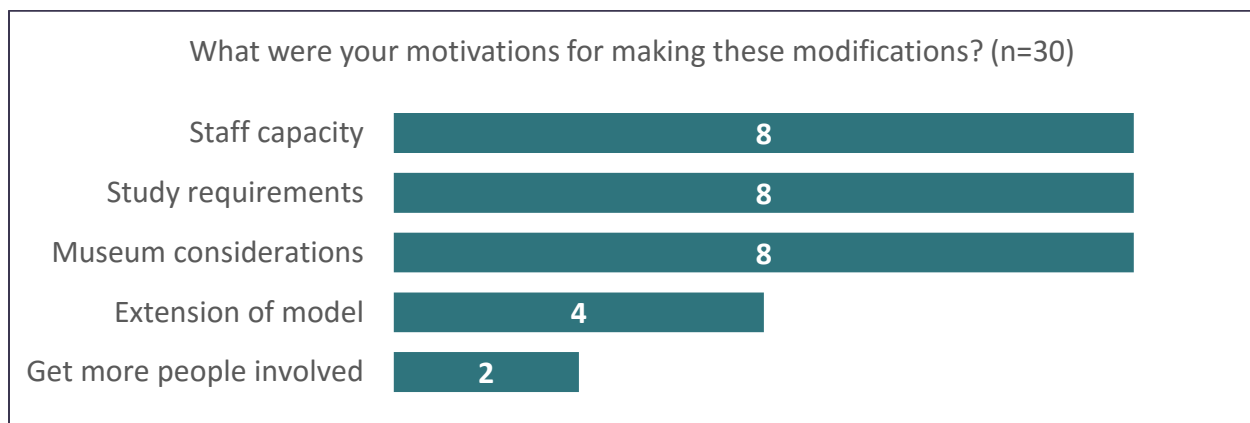
1. **Define an Essential Element differently (9 of 20).** As interviewees explained their modifications, it became clear that many of these perceived “modifications” were not actually modifications. For example, two respondents misunderstood what Element 2 meant, feeling their one-on-one interactions were different from the prescribed “one-on-few” (which is intended to include one-on-one child-to-researcher interaction plus the researchers interacting with the caregivers). One of these respondents shared, *“We can’t do one-on-few. We can only do one-on-one interactions. It was a modified version because we can only interact with one child at a time.”* Other respondents considered their sites to be modifying an Element because it was different from a specific example they had seen at a Living Laboratory meeting. One researcher described how her research used museum artifacts as stimuli, which she felt was different from Living Laboratory examples. Three others felt their approach was more relaxed than the way they had seen it presented. One said, *“It’s not as systematic—it’s much more ad hoc.”*
2. **Partially implement an Essential Element (8 of 20).** Some respondents only carry out parts of an Element or implement the Element only some of the time. Five respondents indicated that they have attempted to implement an Essential Element but have not fully managed to do so. Three were doing some things related to the Element, but not enough for them to consider it fully implemented. One noted, *“Yeah, unfortunately we’ve done far too little training with this so far.”* The other two explanations of partial implementation were from respondents who shared that they were doing components of

the Essential Element but not others. One respondent described, “*There are parts of it that are the standard Living Lab model.*” She then described how she had changed other Elements to suit her site’s needs. Three of the respondents described their modifications of the Essential Elements as a matter of circumstance; while they try to implement the Elements, they are only sometimes able to fully achieve their goals. One respondent tried to do one-on-few interactions with the public but found sometimes there were too many people in the space. She shared that it has, “*less to do with the Living Lab model as it was presented to me in conferences and more to do with the fact that our researchers are in our [exhibit] space that is usually crowded with about 50 people. Those 50 people are curious and approach the researchers. Others see them talking and come up.*” Another respondent shared that some studies worked in the open museum setting while others needed an enclosed space.

3. **Implement goal in different way (3 of 20).** Three explanations described ways the model had been adjusted so that it could fit better at the local sites. For instance, one site introduced a format that it considers to be a modification of the Essential Elements: this consists of hosting Living Laboratory events with multiple researchers. “*As far as ramping up participation and getting more researchers on board, we wanted to have one kind of central time and place where we can say this is all happening,*” explained the respondent. Another site created a physical setup for the research that involved having the educational interactions with children and caregivers occur in plain sight (as dictated by Element 4), but data collection took place in a private alcove.

Sites that were modifying the Essential Elements often did so because of staff capacity, requirements of the specific research studies, and museum considerations that were specific to the local site (see Figure 21).

Figure 21. Reported motivations for model modifications



Staff capacity most often affected the program’s predictability and professional development components. For example, one current museum staff person explained that logistically, “*we don’t have time to allot towards having frequent conversations between research and staff. For instance, we don’t do the [formal] interview at the beginning of each research session.*”

Partners also made changes to the model to address site and research-specific considerations. With respect to the site, this consisted of adapting the model to fit the museum size, visitation patterns, physical space, or general atmosphere. On the other hand, sometimes researchers adjusted the model to yield more useful research data. This most often affected the visibility of the study and the size of group interactions. For example, one researcher explained how the location can be a large consideration for some research projects:

I agree with the theory of having [the research] open in principle, to do research in a very visible environment, but [there is] a trade-off between getting useful data and being visible. [It's] nice in theory, I agree, but [the] challenge is getting good data.

Four additional respondents indicated that they had expanded the model, and two described getting other people involved. To read more about these efforts, see the [Findings: Shift in ownership](#) section.

Plans for future implementation: Sites that are planning for future implementation tend to be new to Living Laboratory, and many demonstrate active efforts to initiate adoption.

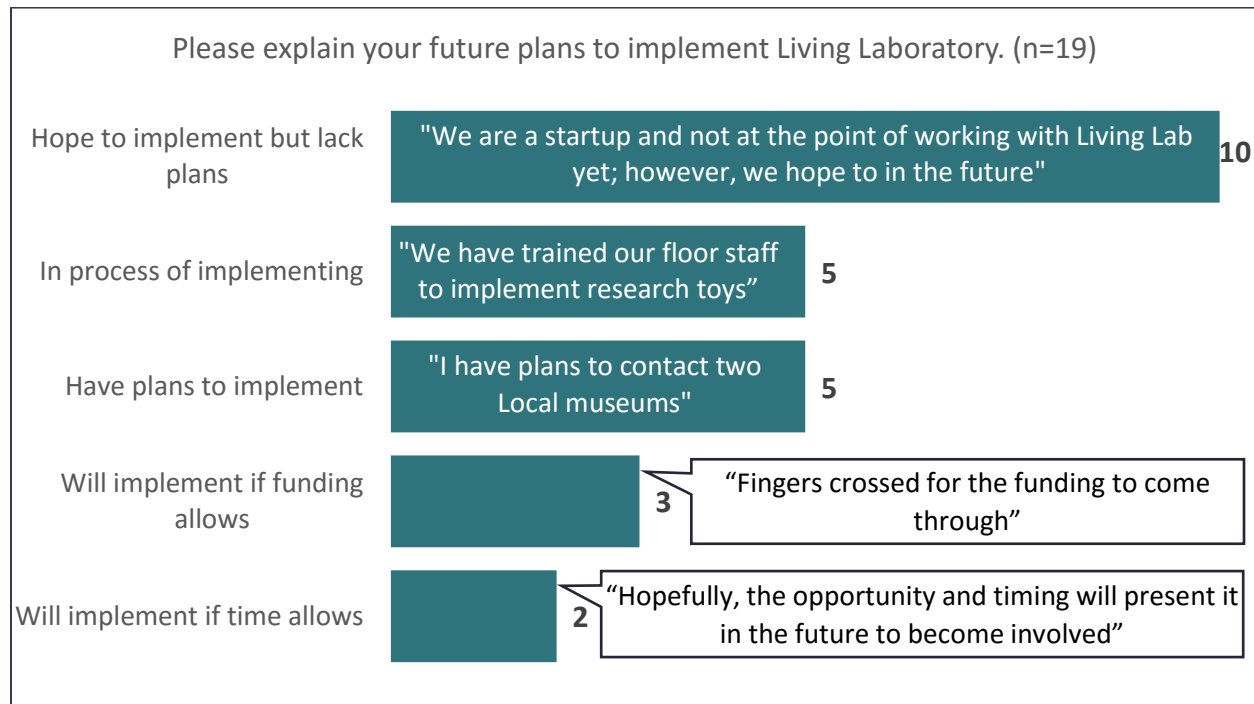
In investigating which respondents indicated that they had plans for future implementation, the data show that sites which are new to Living Laboratory—18 months or less—are significantly more likely to report planning to implement an Element than those who have been involved for 19 months or longer.² 75% of new sites are planning to implement an Element, compared to 33% of more established sites. This suggests that sites continue to progress towards more complete implementation, but after 18 months many sites settle into a more consistent adoption.

For each Essential Element, 5-30% of current adopters indicated that they do not currently implement but plan to implement the Element in the future (see [Figure 15](#)). During follow-up interviews, evaluators gathered nine descriptions of respondents' plans for implementation, which clustered into three themes:

1. Sites that wish to implement the Element but have no current plans to do so (4 of 9)
2. Sites that had begun to implement the Element between the time of the survey and interview (3 of 9)
3. Sites that are currently developing plans to implement the Element (2 of 9)

There were 34 current non-adopters who answered a survey question about future plans to implement the Living Laboratory model, of whom 56% responded that they had plans to adopt the model in the future. Similar to the current adopters, many explained that they had interest but no clear plans for implementing, some were already implementing, and some had plans to do so (see [Figure 22](#)).

² $\chi^2(1, N = 44) = 7.59, p = .006$

Figure 22: Future plans for Living Laboratory implementation

No desire for implementation: Few community members included in the evaluation plan not to implement Living Laboratory and its Elements.

On the community-wide survey, very few adopters indicated that they had no future plans to implement an Essential Element (for each Element, this ranged from 0 to 3 people of 43). While the sample was biased towards active participants, this is nonetheless evidence that each Element is appropriate for a wide range of sites. Two of the respondents who had no plans to implement an Element participated in follow-up interviews. One described that, in the time since the survey, her site had in fact begun implementing the Element. The other was a museum respondent who demonstrated a very specific understanding of Element 6 (research is ‘expected and predictable’) and discussed why she and her research partner had opted not to make their Living Laboratory activities fit that definition. She shared, *“By working with only one lab, it’s hard to make sure someone is always on the floor.”* This respondent then discussed her concerns about how to make Living Laboratory activities predictable when her research partner did not have a study that was actively collecting data. She described that she had decided, *“We were only going to have them on the floor when they were able to really collect data.”*

The content of this quotation is an incomplete understanding of how project leadership considers this Element. Sites have many different ways of making research expected and predictable even when a researcher may not be collecting data for a period of time (see [Figure 16](#) and the [Appendices](#) for more detail). The definition of this Element has also shifted over time, as illustrated in Figure 23, which shares data from the hub leader focus group.

Figure 23. Changing leadership understandings of "expected and predictable"

Project leadership's view of the sixth Essential Element (which says Living Laboratory is an 'expected and predictable' part of the visitor experience) has changed over time. Rather than prescribing a specific, universal definition similar to the way leadership had thought about this aspect at the beginning of the project, one hub leader explained her new feeling that each site should be able to define the terms locally: *"It's also what – what 'expected and predictable' means for your organization."*

A second hub leader described her own process of recognition that the original definition of expected and predictable was unfeasible at her site. She shared, *"For us that meant recognizing that we were never going to pull off the Boston model."* Then she described a way of doing Living Laboratory (an annual event rather than ongoing programming) that had once been considered outside the model's scope but now felt alright given individual sites' circumstances: *"The two little guys – where it's 'expected and predictable' because there's going to be an annual event. I'm okay with that now. Because that's what's expected for them – and predictable for them."*

Project leadership also addressed the concern about what happens when a researcher does not have an active study. The leaders discussed whether Living Laboratory could be used to pilot protocols before they were ready for formal data collection. While this would have been contrary to the original intention of the Element, one hub leader shared that she had seen this as a valuable situation and had thus broadened her definition: *"My conception of contribution changed a little bit because not only have I seen our visitors contribute data, but they also contribute ideas to our scientists ...That's a shift that has happened for me."* A second leadership member noted, *"I think it's a valuable exercise for the visitors, they get something out of it, and the undergrads definitely get something out of it, and I would – I would put that under this Essential Element."*

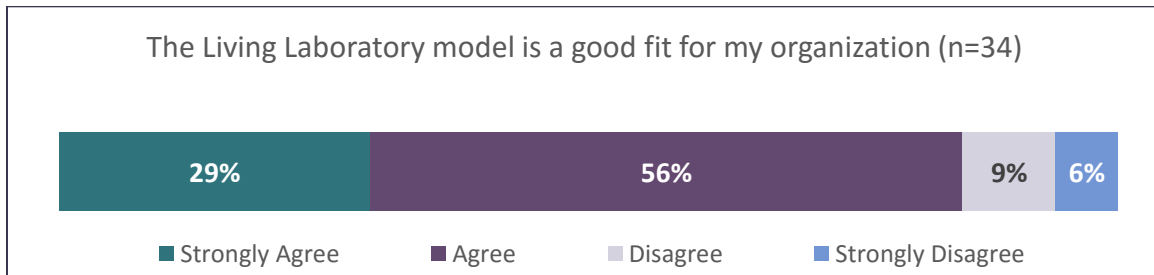
The community-wide survey asked respondents who were not currently implementing the model whether they had plans to adopt Living Laboratory in the future. Twelve percent of these 34 respondents indicated that they did not. Four explained their reasons: two indicated that they already had a partnership between a museum and a researcher. For example, one wrote:

My relationship with my own museum is sufficiently advanced that I don't need to be a formal part of the Living Lab model. I very much appreciate what you're doing, and we do many things that are quite similar to what you do. But we operate on somewhat different rules within our lab and with our museum.

The other two respondents indicated that the model was not a good fit for them; one suggested it was *"too constraining for my research needs"* and the other said it was *"Not appropriate for our situation."*

Following the question about future plans, current non-adopters were asked whether Living Laboratory was a good fit for their organization. Fifteen percent disagreed or strongly disagreed (see Figure 24). One researcher noted that her/his research topic was not a good fit, another said her/his organization had a different model for collaboration between a museum and researchers, and another said generally, *“It's not a fit with where we are now, but it could be in the future.”*

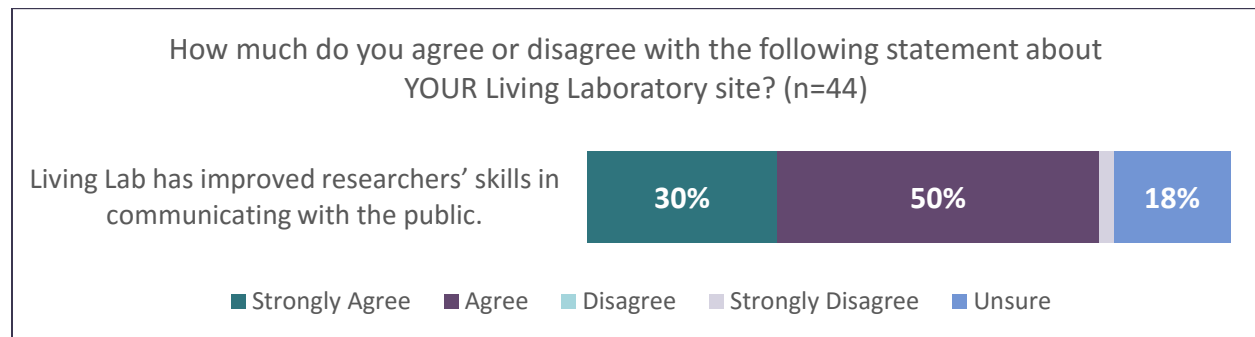
Figure 24: Non-adopters' views on the appropriateness of the Living Laboratory model



Change in researchers' communication skills: Adopters reported that Living Laboratory improves researcher communication, although the extent to which researchers' communication skills measurably increased was unclear.

Both researchers and museum staff reported that Living Laboratory improves researchers' communication skills. On a survey question, only 2% of respondents disagreed with this sentiment (see Figure 25).

Figure 25: Adopters' perception of researchers' improvement in communication skills



During follow-up interviews, respondents explained their survey responses. One researcher reflected,

It was a whole new step to have to communicate with parents and be able to communicate well with children of different ages and people of all different backgrounds. You learn how to really communicate your ideas to parents. You communicate with staff at museum, volunteers at museum, security guards, educators, front desk – whole staff at Museum that you interact with – you have to be able to talk about the research you're doing in a way that's accessible to people.

A museum respondent described,

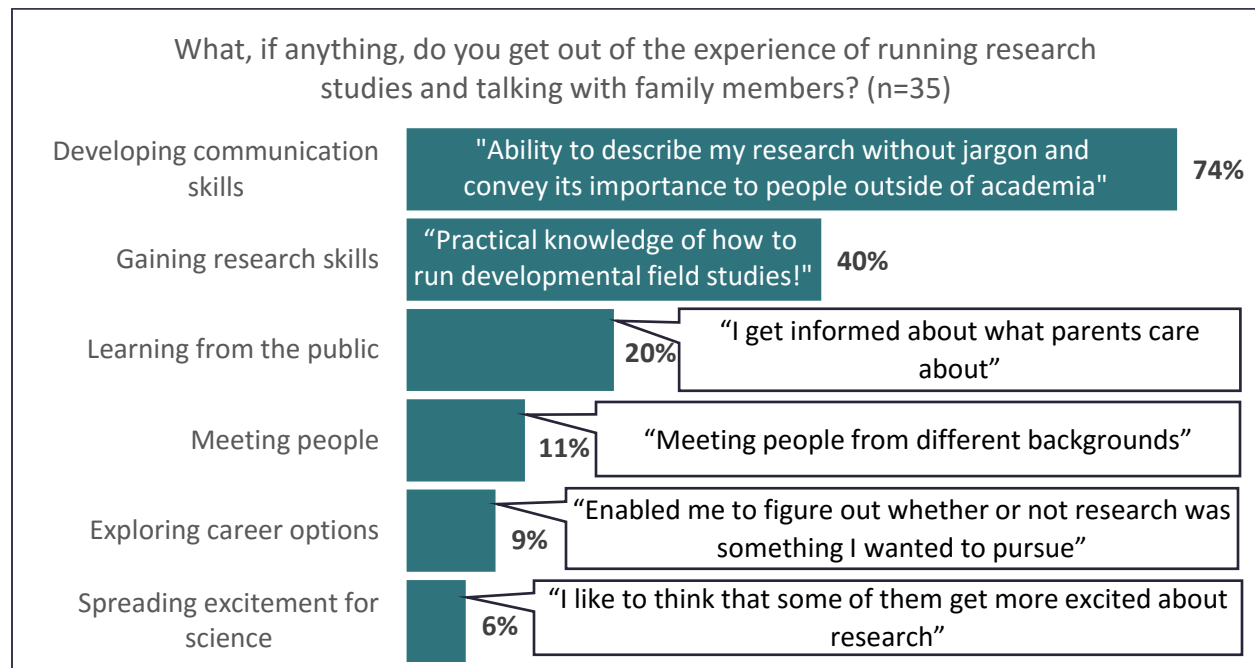
I've seen it myself where a researcher told us about their project in one form as a preliminary explanation and then when I see that turn into a presentation for the public, I see improvement – there's greater understanding, less jargon.

Most of the respondents who indicated that they were unsure were museum staff who shared comments like, *"I won't put words in their mouth."* The one respondent who strongly disagreed with the survey question did not participate in an interview.

The post-surveys of researchers at hub sites similarly showed that respondents felt the model was helping them develop communication skills. These survey respondents described in their own words what they got out of the Living Laboratory experience, and the most frequent code (74%

of respondents) within that data was that researchers developed communication skills (see Figure 26).

Figure 26: Researchers' benefits from Living Laboratory participation



To quantitatively measure this improvement, evaluators asked researchers to respond in writing to three online survey questions at the beginning and end of a Living Laboratory semester:

How would you respond to the following questions from the adult family members of a study participant?

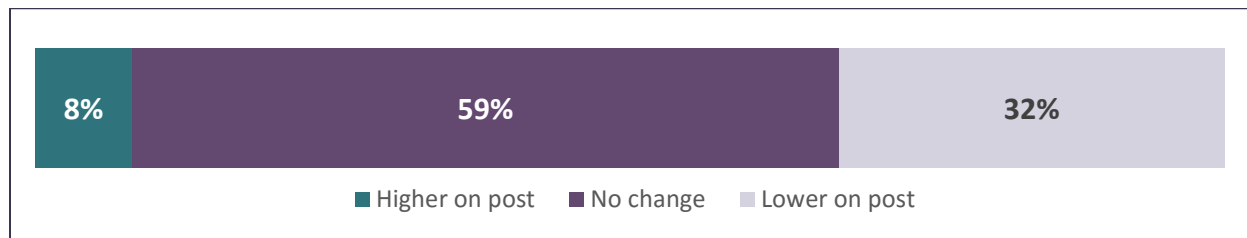
1. What is your study about?
2. Tell me about your study methods: What are you measuring, and how are you measuring it?
3. Why do you think your study is important?

The responses to these three open-ended questions were coded for 13 characteristics of positive science communication (see the [Appendices](#)). Evaluators found that there was no statistically significant difference between researchers' pre- and post-scores for the combined scale of the 13 characteristics.³ Additionally, most of the 13 individual characteristics showed no statistically significant change between pre- and post-tests.⁴ The one exception was a code for the relevance of the response; more researchers provided responses that included irrelevant information (words that were not logically related to the question being asked) on the post-test than the pre-test (see Figure 27).⁵

³ Wilcoxon Signed Ranks Test, $p = .10$

⁴ McNemar Tests (for binary data) and Wilcoxon Signed Ranks Tests (for continuous data), all with $p < .05$

Figure 27: Change in relevance score for researchers' communication on pre- and post-surveys (n=37)⁵



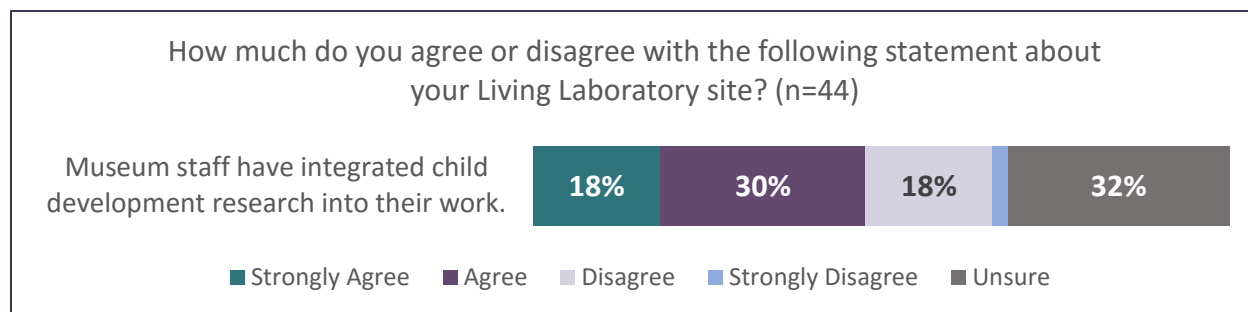
The [Limitations](#) section of this report lays out several considerations with this method which may have contributed to the inconclusive quantitative change between pre- and post-surveys. However, this data raises questions about the extent and characteristics of researchers' communication improvement, which can be further explored in future evaluation efforts.

⁵ McNemar Test, $p = .04$

Museum integration of child development research: Informal educators consistently find researchers' work to be relevant to the informal context, and evidence suggests that some museums are integrating child development research into their work.

In addition to asking about researcher communication, the community-wide survey asked current museum and research respondents whether they agreed or disagreed that museum staff at their site had integrated child development research into their work. The responses were mixed (see Figure 28).

Figure 28: Adopters' perceptions of museum application of child development research



While none of the interviewees who disagreed and strongly disagreed participated in the follow-up interviews, evaluators were able to ask other respondents to explain their survey answers. For the respondents who agreed or strongly agreed that museum staff at their site had integrated child development research into their work, the reasons included examples of using child development research in conversation with families, exhibit development, professional development, and a general appreciation for research. A researcher described:

They're thinking about how to make learning visible to families. They're designing signage about child development. It's tailored to the specific exhibits, so like what developmental benefit do we see with block play, and why do we have this block exhibit at all?

Respondents who were unsure indicated that they did not have enough contact with the museum staff to know (many of these respondents were researchers), felt the public took more out of it than the staff did, or noted that the museum staff did not have very much contact with the researchers. One museum interviewee shared:

We often have educators work along with researchers, who are present to greet them and know that their research is going on, but I don't know how in-depth they are about getting to know about the research itself.

Implications

The previous pages demonstrate that the depth of Living Laboratory implementation is notable, with every Essential Element being applied in its original form or a modified fashion by most current adopters. Given the wide range of sites included in the sample, this finding shows that the model is suitable for diverse professional audiences including researchers in numerous disciplines and institutions as well as various types of informal science organizations. The professional-facing Elements offer a fruitful opportunity for continued growth; the relationship between museums and researchers is at the heart of many Living Laboratory activities. While most sites report being in regular communication with their partners, deepened partnerships can strengthen sites' ability to improve many of the Elements: by knowing each other's strengths, partners can tailor mutual professional development opportunities appropriately, and can creatively discuss ways to improve the public's experience.

Many adopters see Living Laboratory as primarily a model of caregiver engagement—the founding motivation for the model. However, others see the model more as a research opportunity, a mutually beneficial collaboration, or something else. To be sure, the different understandings need not be mutually exclusive; to say that Living Laboratory is a research opportunity does not mean it cannot also engage caregivers and be conducted through a collaborative process. Nonetheless, understanding the diversity within participants' views of the model may help conceptualize why people are attracted to Living Laboratory and why they implement the model differently. Partners with similar understandings may be well-suited to work together.

The data about implementation and understanding show that Living Laboratory looks different in its various local contexts. While leadership has embraced this variety—in some cases adjusting its definitions of the Essential Elements—some sites are unaware of the changing standards. Given that so many sites value the model, it may be valuable to provide sites with clarity about when they should or should not consider themselves Living Laboratory adopters.

The [Findings: Depth](#) section concludes by showing that behavior change has been less widely demonstrated than the adoption of the Essential Elements. This is to be expected, as behavior change is an anticipated result of the Elements. For behavior change to take place, professionals first need to internalize the model (Coburn, 2003). As shown in the section about plans for future implementation ([Page 39](#)), many sites in this study's sample are new to the model and show signs of continued development. As Living Laboratory continues to become more established at sites across the country, there is an opportunity for continued tracking to see whether behavior change becomes more common.

Findings: Spread

This section shares findings from evaluators' investigations into the sustainability of Living Laboratory's dissemination. Findings include:

Community Expansion: The model has spread to a wide array of institutions and states, as well as to a range of professional and public audiences.

Motivations: Sites adopt the model because (1) it exposes the public to active scientific research, (2) their partners' work is relevant to their own, and (3) such professional partnerships are advantageous.

Recruitment: Professionals learn about the model by means of professional networking and online resources.

Challenges to adoption: Obstacles to successfully spreading the model to new sites include (1) finding partners with similar expectations and goals; (2) developing studies appropriate for the museum environment; and (3) having enough researcher and staff time.

Community Expansion: The model has spread to a wide array of institutions and states, as well as to a range of professional and public audiences.

The expansion of the Living Laboratory model is widespread. The Living Laboratory community member directory includes over 500 people from 46 U.S. states and Washington DC. However, the extent to which these people have actually used Living Laboratory resources or implemented the model is difficult to measure. There is no formal process through which sites become official adopters, meaning the exact number of sites is unknown.

The summative evaluation data relied on respondents' self-report about how active or inactive their program was. Participants from 108 individual sites across 30 different states plus Washington DC participated in summative evaluation efforts (see Figure 29). These sites represented a range of institution types, including children's museums, libraries, science centers, universities, colleges and private research firms.

Figure 29: Geographic distribution of Living Laboratory community

U.S. Region:	Number of states represented in member directory	Number of states represented in summative evaluation
Mid-Atlantic & Southeast	16	11
Mid-West & Southern	12	7
Northeast	7	7
West Coast & Southwest	11	5
U.S. Totals	46	30

The number of individuals involved in Living Laboratory extends beyond the number of sites, as many organizations have multiple participants. Out of 30 interviewees, 25 noted that other people within their institutions had roles in their partnerships. On the museum side, interviewees identified professionals in many departments that participate in Living Laboratory, including education, volunteer services, marketing, exhibit teams, outreach departments, and visitor services. Additionally, 6 respondents noted that their museum leadership actively participates in the partnership, largely within the capacity of learning about and introducing the model to the institution. Some examples of these leaders include Chief Executive Officers, Executive Directors, Directors of Operations, Directors of Education, and Board of Directors members. This suggests that the model has established itself as being relevant to staff with a range of backgrounds and roles.

Seven of the researchers who were interviewed described ways in which multiple students and labs from a single college or university are involved in Living Laboratory. One shared:

[We have a] pool of five graduate students across three different labs here at [the university]. Three of four child development labs [from our university] do research for Living Lab. The museum is small. The Education Manager is our

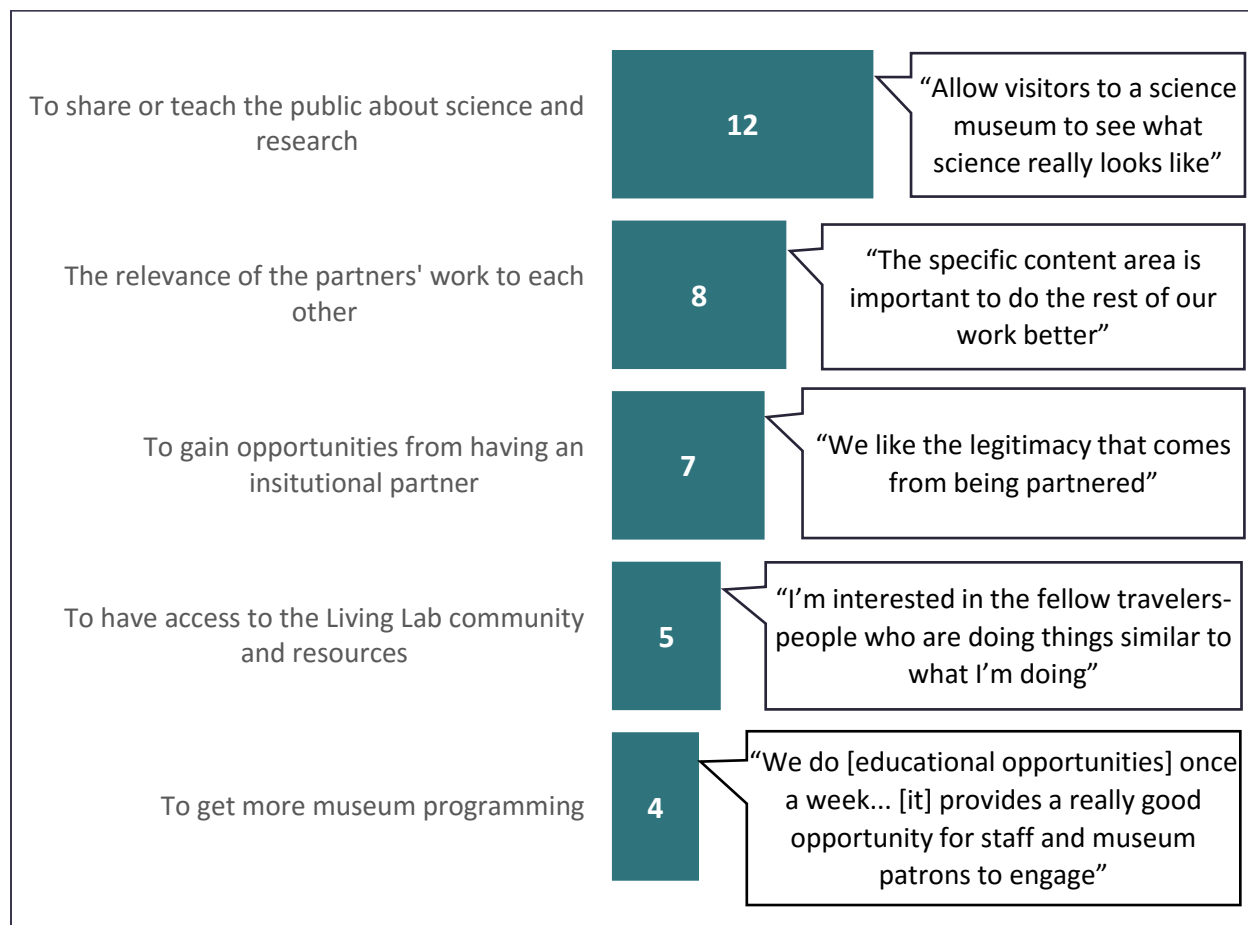
primary contact who helps get things set up and organized. Two to three other museum staff members are involved in marketing and volunteer services-they help coordinate [our visits]. Five undergrads are trained to go to Museum as well as one volunteer research assistant who has been trained in protocols.

While Living Laboratory is reaching the general public, the reach is highly variable by site. For example, over a three-month period, the Museum of Science, Boston collected data from 655 participants and facilitated 594 educational opportunities during active research. During the same three-month period, partnerships at active case study sites saw between 40 and 53 study participants and offered 3 to 104 educational opportunities. Significant variation exists among sites in the numbers describing public impact, due to factors such as size, scale, and maturity of the partnership. For example, each case study site had one research lab that collected data at the museum at most a couple times each week. However, the Museum of Science, Boston, as one of the founding Living Laboratory sites, is an example of a highly developed and multifaceted site, with as many as 8 partnerships with labs that can run studies collectively 16 times or more each week. This site also has about 35 staff participating in the Living Laboratory program, further illustrating the diversity in site demographics, and therefore the significant range of recorded participant numbers and educational opportunities. Overall, within five years, evaluation data suggest that Living Laboratory has reached and impacted many organizations, professionals, and members of the public.

Motivations: Sites adopt the model because (1) it exposes the public to active scientific research, (2) their partners' work is relevant to their own, and (3) such professional partnerships are advantageous.

Many institutions are allotting time, energy, and resources to implement the Living Laboratory model, and this is due to the dedicated investment of interested researchers and museum staff. Figure 30 illustrates the top five reasons interviewees reported being interested in Living Laboratory.

Figure 30: Motivations for pursuing the Living Laboratory model⁶



The most frequently expressed reason for pursuing Living Laboratory in any capacity is because interviewees value the opportunity it provides to educate and share active studies and science

⁶ During interviews, current adopters were asked what their site's motivation to get involved in Living Laboratory was, while current non-adopters were asked what motivated them to learn about the model. Twelve current adopters and twelve noncurrent adopters responded to the question, and because their responses were comparable, they were combined in the graphic.

with the community. This motivation was distributed evenly between researchers and museum professionals. Traditionally, this has been considered a driving motivator for museums, but the fact that just as many researchers mentioned this motivation is especially notable since there were more museums than researchers included in the sample.

The second most common theme among these responses was that both museum professionals and researchers see how the other's mission and work are relevant to their own goals. Researchers see the museum setting as relevant to their work because they are interested in science education and how children learn in informal environments, as described by one researcher, *"My research is on science learning and how young children read scientifically, and how those abilities develop in early elementary years. That seemed to be natural fit for what museums are doing."* Museum professionals value how the content of the studies relates to their daily interactions with children and creation of educational programming throughout their museum. They also acknowledged how Living Laboratory was an opportunity to fulfill their institution's mission of integrating active research into their visitors' experiences. For example, one museum professional expressed:

Current science happening on the floor is important for our brand, and the specific content area is important to do the rest of our work better. They are doing research on gender bias in STEM and attitudes toward STEM, so [it's great] on several levels. Their research is something we think about at our institution anyway.

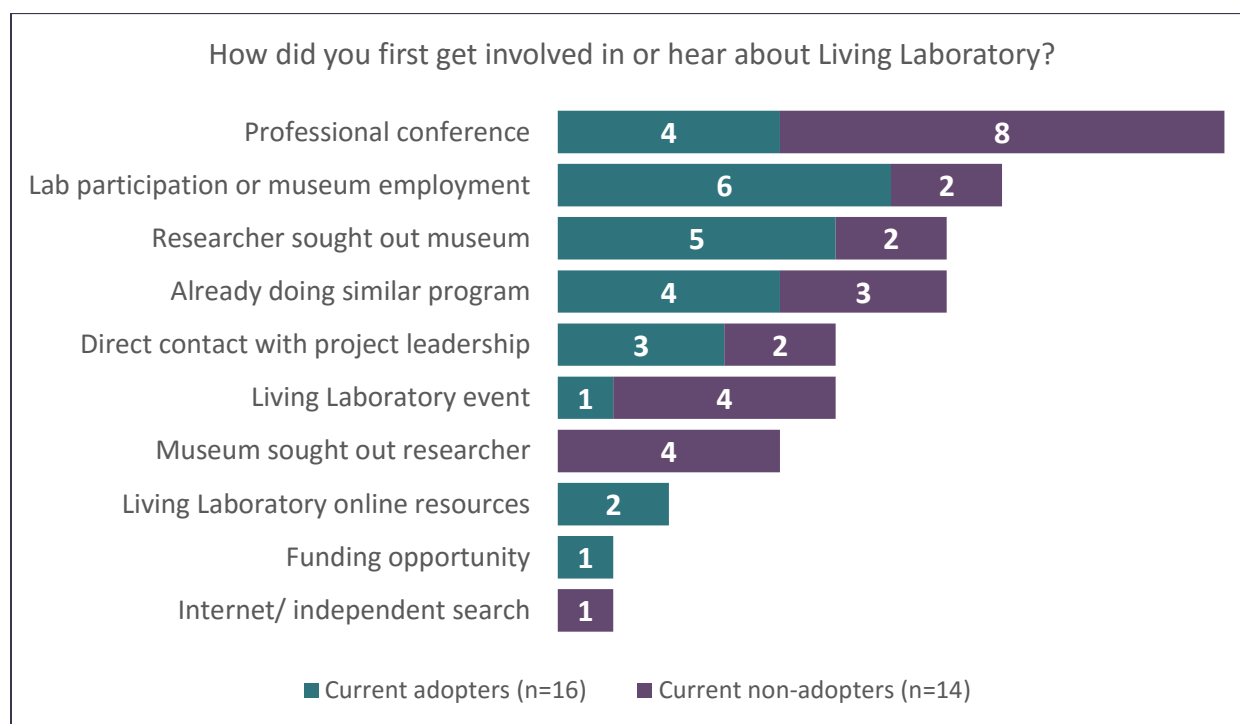
The third most prominent motivation is that researchers and museum professionals value having institutional partners. Both parties see this benefit, as three researchers and four museum professionals cited this as a reason for their involvement. Some respondents want partnerships for collaboration, as expressed by one museum professional: *"Continuing fostering knowledge and that sharing between – facilitation between museums [and the universities]."* Others see an opportunity for recognition. For example, one museum professional shared, *"We like having the legitimacy that comes from being partnered with [a university]."* Researchers value the opportunity to build relationships with local informal education institutions for similar reasons. For example, one researcher expressed that there is *"prestige"* with being part of a program that has a community of members that include *"tier 1 researchers."* Another researcher saw value in the partnership because of the opportunity to *"[work] more closely with museum staff, and having kind of more of a partnership there."* This data suggests that not only do both museum staff and researchers recognize that these professional partnerships can provide new opportunities, but also they see a range of benefits that can result from the relationship.

Recruitment: Professionals learn about the model by means of professional networking and online resources.

Two major mechanisms by which Living Laboratory spreads are: (1) professional networking and (2) access to online resources.

Professional connections: Both current adopters and inactive community members cited hearing or learning about the model through professional opportunities such as conferences, colleagues, hub leaders, and Living Laboratory meetings (see Figure 31⁷).

Figure 31: Mechanisms by which community has been introduced to Living Laboratory



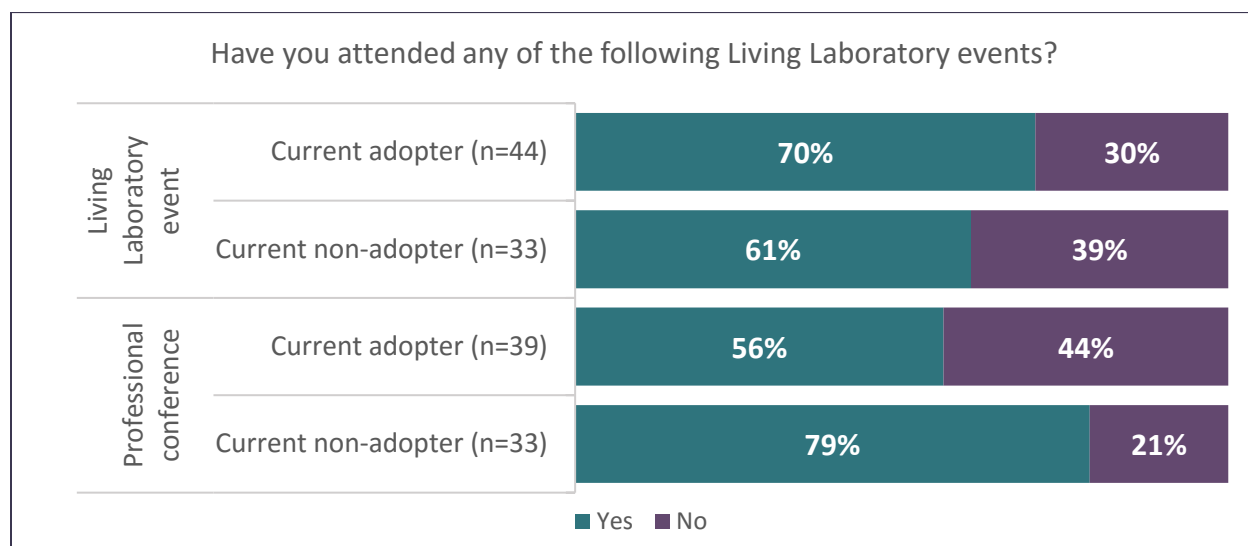
Conferences and meetings: Through Years 1-5, leadership attended between three and six conferences each year. These events included both those catering to museum professionals and researchers.

Current non-adopters, in particular, get exposure to the model through attending tables or sessions at these professional conferences (see Figure 31). This suggests that project leadership is

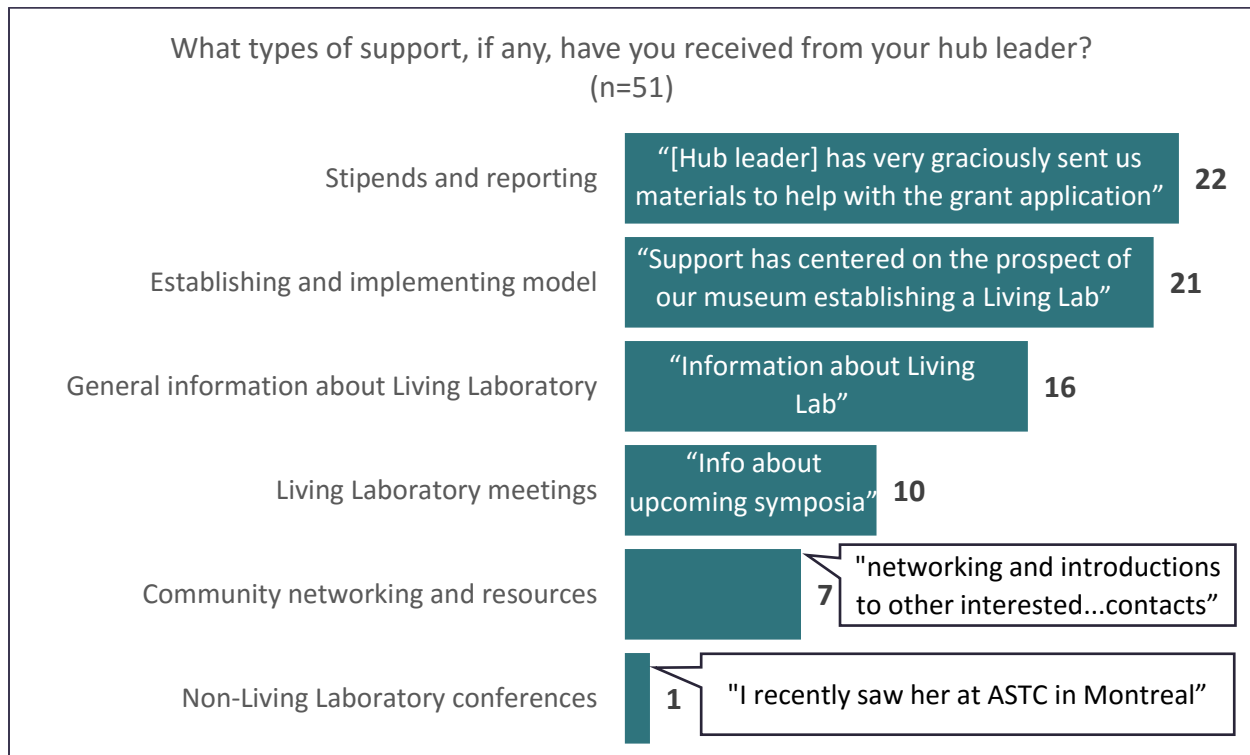
⁷ In the interviews, current adopters were asked how they got involved in Living Laboratory, while current non-adopters were asked how they heard about the model. The two questions are slightly different, but are represented on the same chart because of the overlap in response themes.

recruiting and engaging broader audiences outside of the scope of current adopters at conferences, even if these audiences do not end up implementing the model. This finding is supported by [Figure 31](#), which shows conferences as the means by which most interviewees got involved with the model. Additionally, [Figure 32](#) suggests that the majority of both adopters and current non-adopters have attended a Living Laboratory meeting. Overall, these data suggest that professional events such as conferences and meetings are instrumental to spreading the Living Laboratory model.

Figure 32: Survey respondents' self-reported attendance at events

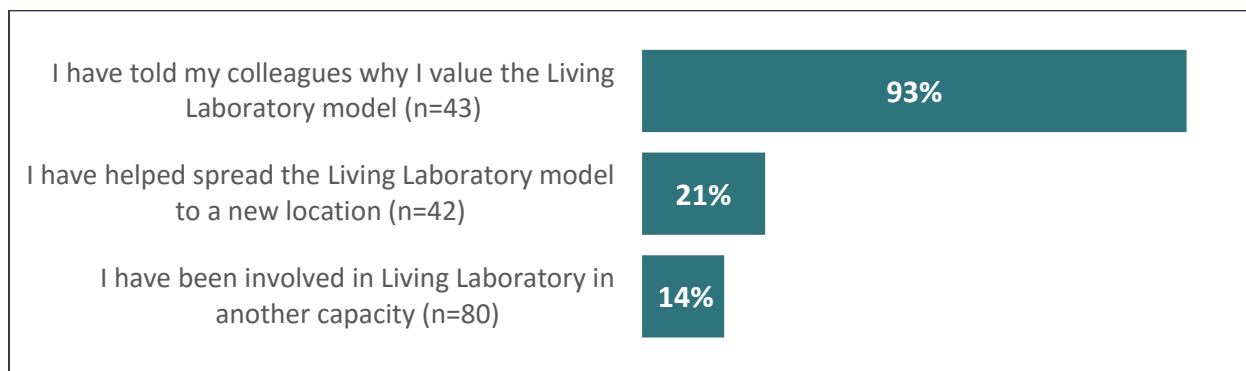


Hub leaders: Often, those representing the Living Laboratory model at events are the hub leaders, who play a critical role in disseminating the model by acting as a primary resource for the community. 79% of survey respondents reported having contacted a hub leader, including interaction in-person (63%), by email (60%), and by phone (37%). Community members most frequently needed hub leader support with funding, implementing the model, and starting a partnership (see Figure 33). Please refer to [Findings: Shift in ownership](#) to learn more about how hub leaders and other program leaders have responded to and supported these community needs.

Figure 33: Support sought from hub leaders

Hub leaders provide direct support to community members at varying frequencies. In the community-wide surveys, 59 respondents explained how often they have been in contact with their hub leaders. Responses ranged from more than monthly (1 of 59) to once or twice ever (14 of 59). However, an important note is that these respondents represent diversity in their length of involvement, so the frequency of contacting a hub leader twice in total is very different for someone who has only been involved for two months in comparison to someone who has been involved for eight years. Further data collection could clarify the frequency of contact with hub leaders in relation to tenure with Living Laboratory.

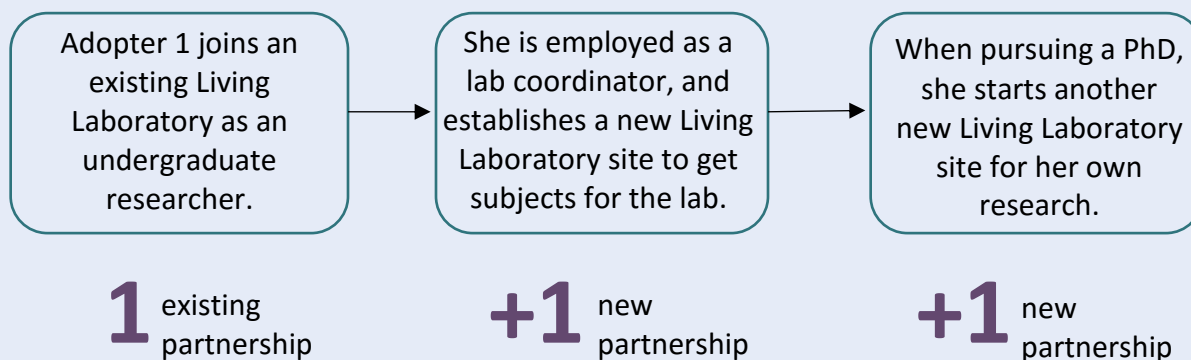
Adopter advocacy: Current adopters also contribute to dissemination through recommending the model to their colleagues or actively taking on the responsibility of establishing new partnerships (see Figure 34). Although the percentage of active spreaders is a minority, the fact that more than one fifth of survey respondents have spread the model is notable evidence that adopters value it and feel that other sites could benefit from it. In addition to directly seeking new partnerships and making recommendations, adopters have advocated for the model through their participation at professional conferences. For example, an adopter from a museum presented at the Association of Mid-West Museums conference in 2012, while researchers presented the research they had done with Living Laboratory for the Cognitive Development Society in 2013.

Figure 34: Survey respondents' experience with spread-related activities

As shown above, 14% of the survey respondents reported having held roles different from their current roles in the Living Laboratory program. Qualitative follow-up responses suggest that seven of these respondents that participated had participated in Living Laboratory at multiple sites. See Figure 35 for an example of how community members themselves actively disseminate the model when they move between sites.

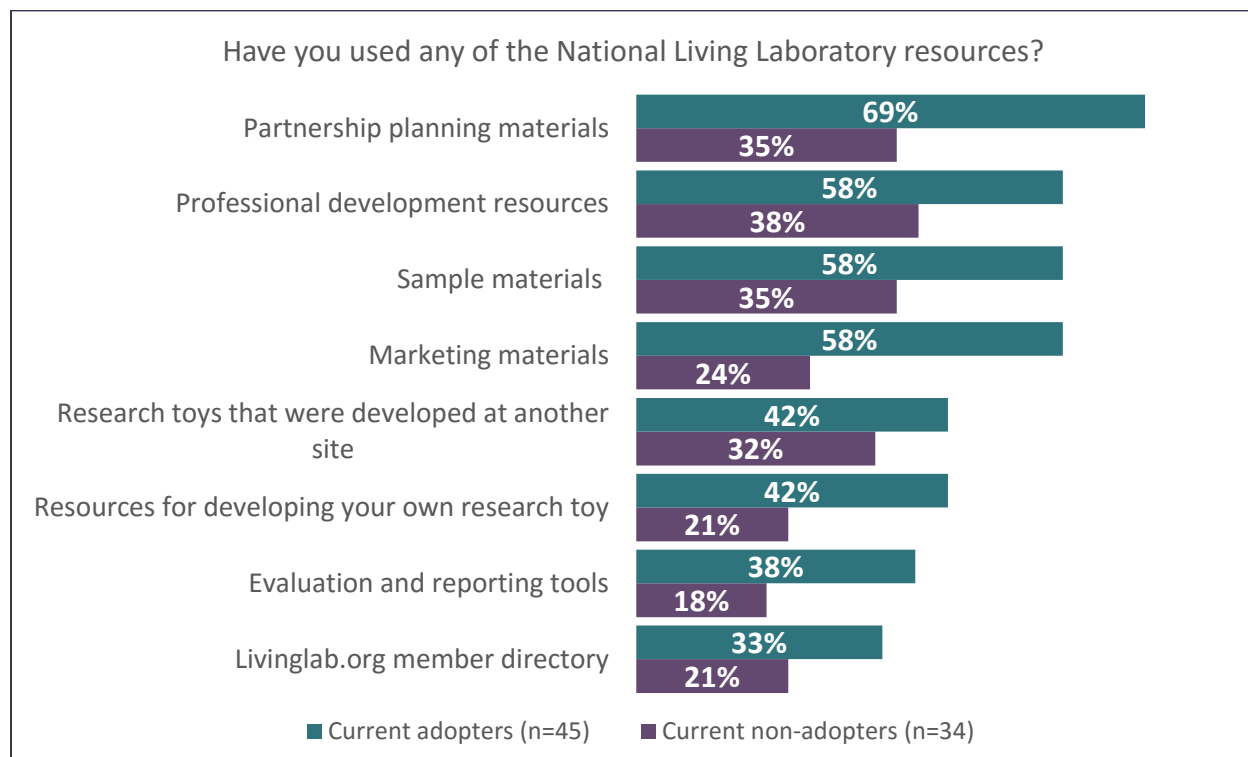
Figure 35: Spreading from within the community

Advocacy for the model has manifested not only from the leadership, but also from adopters who have brought it with them to new institutions. The following graphic illustrates how one member has impacted program expansion by establishing two Living Laboratory partnerships. Summative data show that at least several adopters have had a similar impact on the program by spreading the model to more than one site.



This single adopter has already established two new Living Laboratory programs, in addition to the one she initially joined as an undergraduate.

Online resources: Project leadership developed online deliverables to support and expand the community. Figure 36 shows the community's use of these resources. The resources are particularly well-utilized by current adopters, and at least one-third of current non-adopters are utilizing half of the deliverables.

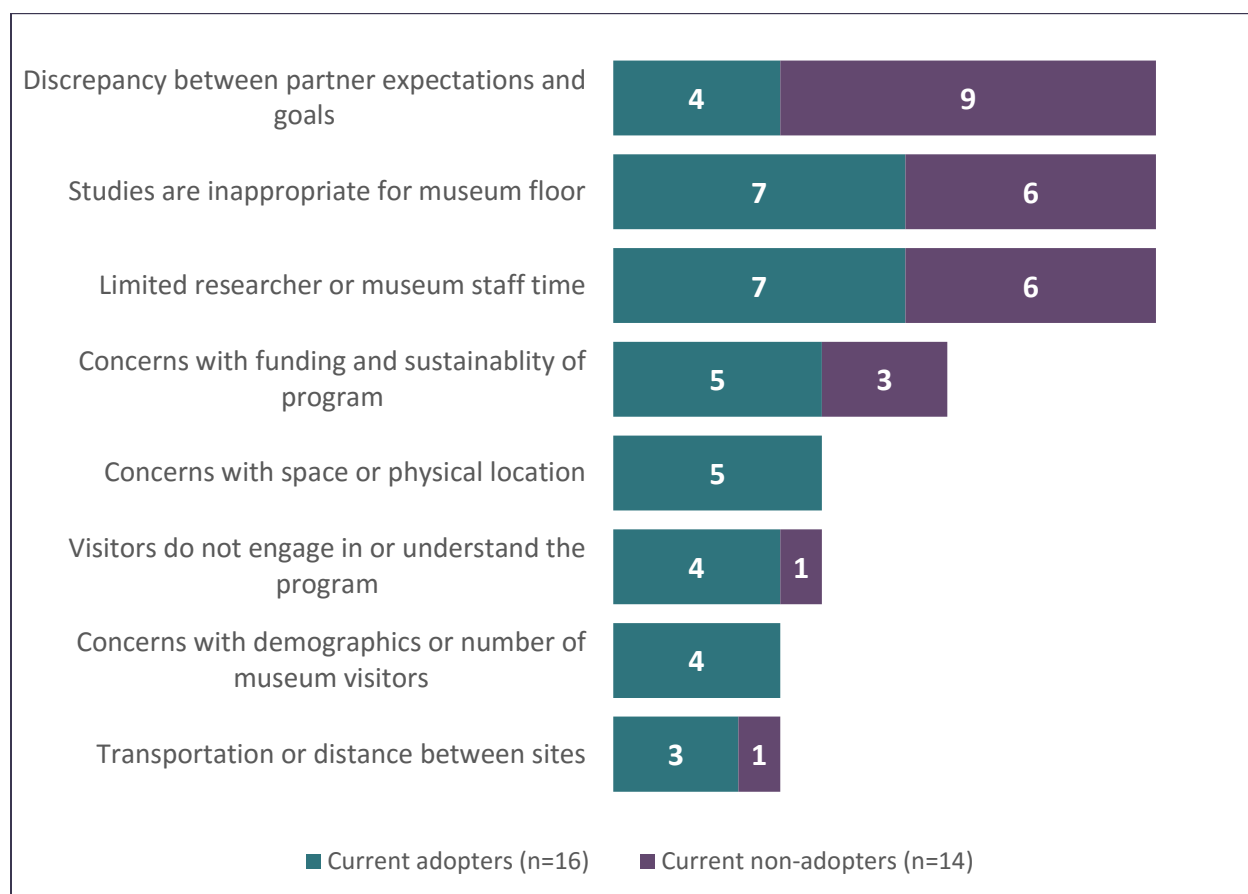
Figure 36: Reported online resource use by community

Interview responses also suggest that the online resources facilitate the model's spread because they increase community members' knowledge about and interest in the model, facilitate implementation of the model, and provide a platform through which partnerships can share and collaborate. For example, one current non-adopter shared, *"I really looked at examples when I first was saying I could do this, I could pull this off. [I] looked at [the] downloadable materials, got very excited about it because I think it had a lot of potential."* Current adopters use the resources to initially implement the model, as illustrated by one researcher: *"Through the first round of stipends we put together a process of [what] research would look like, what the training processes would be, how we would run things. We downloaded resources and saw what applied."* Once established, current adopters continue to value the online materials. One museum professional expressed, *"[I] love the website and how we share everything. Borrow, steal, repurpose. [It's] great to have everything there."*

Challenges to adoption: Obstacles to successfully spreading the model to new sites include (1) finding partners with similar expectations and goals, (2) developing studies appropriate for the museum environment, and (3) having enough researcher and staff time.

Although Living Laboratory has been implemented successfully by many partnerships across the country, obstacles have emerged that may either complicate the adoption process of the model, or stop it completely. Figure 37⁸ portrays the eight most frequent trends from interviews and illustrates how the challenges sites face are often similar between the group of current adopters and current non-adopters. This suggests that these challenges are insurmountable for some sites, but also have been successfully addressed or overcome by current adopters. Therefore, the commonality in these ongoing concerns provides an opportunity for project leadership to focus their efforts toward developing strategies to approach these prominent challenges.

Figure 37: Interviewees' reported challenges and barriers to implementation



For those respondents who had not yet been able to successfully implement a Living Laboratory partnership, the most frequent reason was a lack of complementary goals and expectations of

⁸ In the interviews, current adopters were asked about challenges they faced when implementing the model, while barriers for current non-adopters were collected across questions about the weaknesses of the model and challenges of their past partnerships. The two samples are differentiated in the graphic representation.

potential partner sites. This disconnect manifested in two main ways: for five respondents, the model itself did not fit well with that single institution's mission: for example, a museum staff person explained, *"Science is one of our four pillars, but it's not the focus of our museum. Visitor education focusing on the increase of interest and understanding of research questions- we hope for that but that won't be front and center of our visitor experience. This is just a generalized museum."* Four reported that the expectations and goals between the partners did not align, even if the model itself was a good fit for each institution. To explain, one museum staff person shared, *"We did have a lot of challenges. Just understanding the basic goal of what we're doing, why we're doing it. I'm sure you hear this all the time – they had their goals, we had our goals, and just making that connect."*

Two obstacles are similarly challenging for both current adopters and current non-adopters: (1) finding studies that fit the model and (2) having enough time to allot to establishing the program. When considering how certain studies can impact visitor experience, one museum representative shared, *"[It] might take a while for colleges to understand – we have young visitors, so it was a little tricky to get universities to scale back on what they were doing to fit with young child's family visit,"* while a researcher acknowledged, *"we're thinking about what studies make sense in that environment [and] that would be interesting to families."* Researchers and museum staff also shared similar concerns about the limited staff time available to integrate the program. One museum professional offered, *"Finding the time to balance their regular duties with the space that they run and being able to do the research has been a challenge."* While these challenges are concerns for both current adopters and non-adopters, many current sites have developed strategies to overcome them. Figure 38 shares case study sites' approaches to the challenges of goal alignment, study design, and time.

Figure 38: Case study sites' strategies for overcoming common challenges

Goal alignment: The case study sites generally had well-matched goals. However, three of the four sites built upon the value of the partnership by involving researchers in museum activities beyond the Living Laboratory model. At one site, this meant having the researcher work with an audience of special interest for the museum: senior citizens. Another site engaged the researcher in developing museum programming for visitors on the autism spectrum. The third site involved the researcher in the museum's long-term planning.

Study design: Matching the research topic or study design to the museum setting was an ongoing process for case study sites that for most required pilot testing and adjustment. One site was designing specifically for the museum context and consciously used toys that were available in the museum environment as study stimuli. Another researcher chose to do data collection for which all visitors were eligible; this broad study criterion made the study fit the inclusive museum atmosphere. One site had chosen its Living Laboratory location within the museum so that the study was relevant to other exhibits and activities in the vicinity.

Time: Two case study sites found time for Living Laboratory by having it replace activities that the participants were already doing. For instance, museum staff led research toys instead of other activities they had previously led during those shifts. A busy researcher was able to delegate Living Laboratory activities to undergraduate students who received a grant for their participation in the research. Two case study researchers found time to be the opposite of a problem; they got data faster in the museum than in their labs.

Sometimes, despite sites' best efforts to establish a partnership, confounding factors prevent the model from working in that context. Six survey respondents reported having been part of a Living Laboratory partnership previously, but having since discontinued it. Figure 39 provides three of these respondents' experiences as examples of discontinued partnerships

Figure 39: When the model doesn't fit

“Time commitments. I had a couple of grants due this semester and it was difficult to combine this with teaching and Living Lab.” This researcher was initially contacted by a local museum and was intrigued by the model's science education component as well as the idea of using a public space for her research. However, she was concerned about the types of research projects that would be appropriate for the museum setting and the number of participants she would be able to recruit. As a biology researcher, her study was atypical of the model's intentions, but she chose to run a study about the public perspective of germs at the local museum. In the end, she had a positive experience with the model, but the time commitment, IRB complications, and clashing personalities were too much for her to continue using the model.

“The research project was over.” This museum project coordinator was enthusiastic about the model's potential to make her institution a more respected educational force in her community and to provide an opportunity for an academic relationship. Her institution received a partnership stipend to host a full Living Laboratory program and an educational assistance award to assist graduate students in developing research toys. However, the museum had massive funding constraints, and so could not continue to support the Living Laboratory after the funded projects ended. Coinciding staff layoffs further hindered their ability to continue the partnership.

“The university we were working with was not a research institution. We ran into many bumps in the road when trying to come together on projects and offerings.” This museum professional joined her Living Laboratory program as the museum was implementing the model. She valued the ways the model provided an opportunity for museum staff to have on-the-floor interactions with visitors and the exposure to child development research. The museum received a partnership stipend award to work with a local college at which most professors did not do research. This, along with poor communication, clashing goals, and nonresponsive attitudes towards training, led to termination of the partnership. Currently, the museum staff are exclusively using research toys on their floor, and are trying to recruit a new research partner from a location thirty minutes away. Overall, this museum's geographic location is a barrier, because the necessary research expertise does not exist in a close enough radius to easily establish a successful partnership.

Implications

These data demonstrate widespread dissemination of the Living Laboratory model to varying geographic locations, types of institutions, and stakeholders. The model has the potential to continue spreading after the conclusion of funding if the mechanisms by which interested parties become aware of the Living Laboratory model continue. In addition to the project leadership's work in developing the hub leader system and online resources, community members are emerging as notable players in spreading the model by actively establishing new partnerships, advocating to other colleagues, and maintaining their involvement in the community by sharing their experiences and networking with other interested parties. Leadership can support these community members as they spread the model, and continue recruiting new adopters by sustaining the hub leaders, attending conferences, and sharing online deliverables. As the program moves forward, maintaining these strategies will be critical to future expansion of the program, especially in supporting current non-adopters as they pursue new partnerships.

Most successful Living Laboratory partnerships have at least some of the following components:

- Enough staff and researcher time available to establish and sustain a partnership
- Attainable funding, from either internal or external sources
- Shared visions, missions, and expectations about STEM education between the two partners
- Child development or similar research studies that are appropriate for the museum context and atmosphere, generally having:
 - Short duration
 - Minimal equipment requirements
 - Broad eligibility for participants
- An informal learning center and research institution located within close proximity, often with robust public transportation available

When the above characteristics are not easily accessible to a partnership, they become local challenges or barriers. Many sites have the capacity to overcome these challenges, but situations within the community also exist in which suitable partnerships are unable to establish themselves, despite efforts from both parties and leadership. In these situations, Living Laboratory can offer opportunities to institutions where full implementation is not feasible. For example, research toys equip museum educators with a means to integrate child development education on the museum floor. Additionally, online resources can assist researchers in collecting data at museums that offer limited mutual professional development opportunities.

With respect to spreading sustainable partnerships, data in [Findings: Sustainability](#) illustrate that three of the four case study sites negotiated receiving funding from internal budgets (see [Figure 43](#)). Other sites have actively sought external funding for their Living Laboratory programs. This suggests that when sites can successfully secure the aforementioned components, they can successfully negotiate both institutional and external support. In planning for continuous growth and maintenance of the model, program leadership may find it productive to allocate time and resources to developing strategies for overcoming these common obstacles and successfully obtaining these common characteristics of adopting sites.

Findings: Sustainability

This section shares findings from evaluators' investigations into the sustainability of Living Laboratory's dissemination. Findings include:

Current efforts: Sites are taking steps to ensure sustainability of their work at the local level, with strong communication between partners being the most prominent effort.

Budget considerations: Financial support is an important aspect of Living Laboratory sustainability, and most active sites have sought funding to support their partnerships.

Staffing patterns: Involving multiple people at each organization contributes to a sustainable partnership.

Current efforts: Sites are taking steps to ensure sustainability of their work at the local level, with strong communication between partners being the most prominent effort.

Fourteen interviewees described their efforts to plan for sustainability of the partnership. As shown in Figure 40, communication was the most frequent trend in this open-response data, with half of respondents mentioning communication as a component of their sustainability plans. Figure 41 describes interviewees' communication with their partners.

Figure 40. Adopters' plans for sustainability



Figure 41. Adopters' communication patterns (n=10)

How often do partners communicate? The frequency of communication ranged from “weekly,” or “every week or two” (3 sites) to every semester or “once or twice a year” (4 sites). Two sites mentioned that the frequency had decreased as the partnership became more established, and two others mentioned that the frequency is fluid. One described, *“I would say that this communication sort of ebbs and flows based on availability.”*

In what ways do partners communicate? Communication most often took place through in-person meetings (5 sites) or digitally (3 sites), with only one site mentioning phone calls. One site maintained a shared Google Calendar for scheduling.

Which museum staff are involved in the communication? Some museums had a main contact who handled overall partnership details while other museum representatives managed on-site logistics when the researchers were in the building (4 sites). One site had a museum manager communicate with the Principal Investigator at the research lab, while a museum coordinator interacted with the researchers who actually did data collection to manage scheduling logistics. Another site had no main museum contact, but many people communicated with the researchers over time. At other sites, a single museum representative managed all communication with researchers (3 sites).

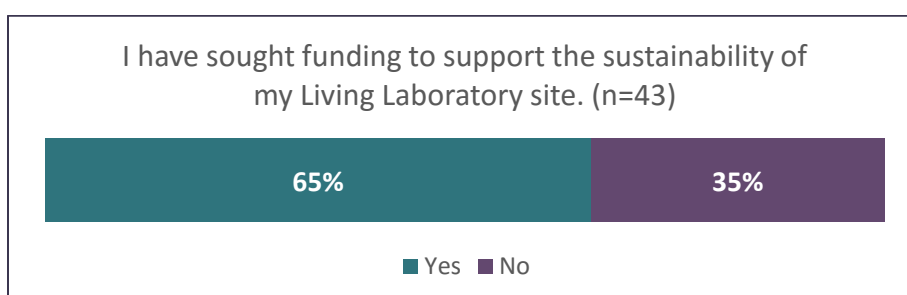
Which researchers are involved in the communication? On the research side, many sites had a main contact who coordinated with the museum (5 sites). In two cases, this coordinator held an administrative role, while three were Principal Investigators. Two sites had multiple researchers involved with Living Laboratory, and there was no single designated main contact for communication with the museum.

What do partners communicate about? When museum staff and researchers were communicating, the most frequent topic of conversation was future plans (6 respondents). One interviewee mentioned, *“It is bigger picture, like where do we want it to go next, how do we want this to work?”* There were four topics of conversation mentioned by four interviewees each: updates about current progress (*“we check in, just to see what each other are up to”*), logistics (*“some of it are just logistics”*), research topics (*“It’s going back and forth about what their particular study at a given time is”*), and challenges (*“if there are any issues on floor we have a conversation”*). Scheduling (3 respondents) and space (2 respondents) were also mentioned as topics of conversation.

Budget considerations: Financial support is an important aspect of Living Laboratory sustainability, and most active sites have sought funding to support their partnerships.

As described in the [Findings: Spread](#) section, funding is a barrier to the spread of Living Laboratory. [Figure 40](#) shows that seeking funding is one of the top ways current adopters are planning for the sustainability of their partnerships. In fact, most adopters have sought funding for their Living Laboratory partnerships (see Figure 42). This funding was used for supporting staff time (actively leading program activities, planning, coordination, etc.); transportation costs for researchers; and material costs for research, research toys, and promotion.

Figure 42. Adopters' efforts to seek funding



In follow-up interviews, eleven respondents explained their efforts to seek funding. Five described the funds from National Living Laboratory. These partnership stipend awards (up to \$3,000) and educational assistance awards (up to \$1,000) were designed to help sites with start-up costs that would ultimately lead to sustainable partnerships. One shared, *“A lot of the funding has come from stipend awards from you guys up at Boston. It helps us get the nitty gritty little things like clipboards... Things that have moved the program forward have come from the stipend award.”*

Another five interviewees spoke about grants that supported the research project and funded the researchers' involvement in Living Laboratory. One researcher shared, *“Most of our research is supported through a grant we had that covers the cost of going down there and materials.”*

Three interviewees mentioned outside funding opportunities. For instance, one described, *“We are trying to figure out what local funders will recognize the value of this and become a third partner, underwriter, or ongoing funder for this. We think there are a lot of possibilities for this.”* Case study sites had a similar mix of seeking funding, as shown in Figure 43.

Figure 43: External funding at case study sites

Site	Museum funding	Research funding	Shared funding
1	Grants from private funders	None	Stipend
2	None	Grant from university	Stipend
3	None	None	Stipend
4	None	Grant from university	Stipend, NSF grant (Pending)

These case study examples show mixed levels of need for Living Laboratory funding. While site 1 had received funding from private funders through the museum's general STEM grant proposals, this site was primarily able to cover Living Laboratory costs within the museum's operating budget. Similarly, Site 2 had received funding from the researchers' university to support the research costs, but additional costs were integrated into existing budgets. Site 3 greatly valued the stipend, but did not need additional funds outside of the research and museum's existing budgets. Site 4 in the chart above felt that additional funding, even beyond the grant from the university, was key to maintaining or expanding their work. A researcher from that site shared:

We need more funds to engage [museum] and to be in the sweet spot for them, to engage them. Otherwise they're much more of a passive role...If this was funded and had specific goals that were part of a program and a project and I can dedicate staff, then that would just change the game.

Staffing patterns: Involving multiple people at each organization contributes to a sustainable partnership.

During case study data collection, staff turnover was a notable challenge that each site had faced, and in some cases it threatened the sustainability of the partnership. The following box describes two of the case study sites' experiences with staff turnover and their strategies for addressing it.

Figure 44. Staff turnover at case study sites

Living Laboratory is running smoothly at a children's museum in a major city. Multiple researchers and multiple museum staff are involved, but the overall program management is led by one researcher and one museum professional. The other researchers report to the lead researcher, and the other museum staff report to the key museum contact.

Then the lead researcher takes a new job. The other researchers who have been part of Living Laboratory are research assistants who rely on a Principal Investigator to lead their projects. They get assigned new projects that have no connection to Living Laboratory, and those studies are not appropriate for the museum setting.

The museum contact has grown to value Living Laboratory. She continues to have her staff use research toys, making sure developmental science has a presence on the museum floor. Meanwhile, she begins to reach out to new potential partners. Fortunately, there are several other local labs to choose from. However, finding the right fit is not easy. One lab is very interested but doesn't seem to understand the educational aspects of the model; the researcher just wants to get data. For now, the full Living Laboratory model is on hold.

Another site is dealing with turnover, as well. In the two years this Living Laboratory has been going, staff turnover has been an ongoing challenge. New student researchers need to be oriented every semester, and the part-time museum educators are in frequent flux. The greetings have been a useful way to give the educators a taste of the program; when the researchers arrive each day, they run museum staff through the research protocol so they can describe Living Laboratory to visitors.

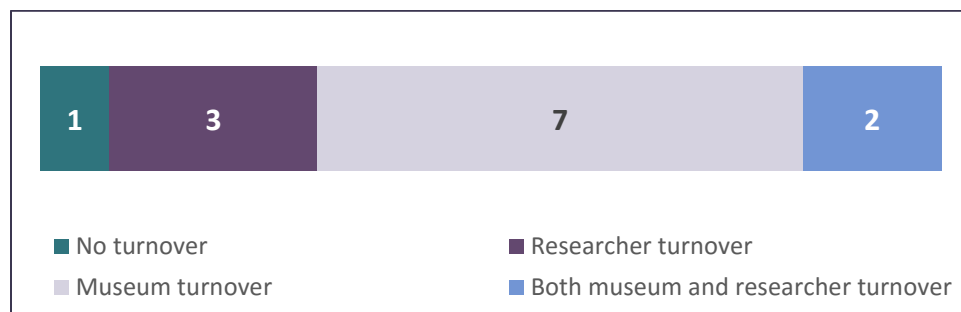
Similar to the last site, one researcher and one museum contact manage the overall leadership for the project. The museum has tried to have a staff person assist with scheduling and grant management (for the stipend). This works well and relieves some of the pressure on the main museum contact, but this role has experienced turnover and the museum is currently introducing a new person to these responsibilities.

Now the main museum contact takes a new position. The specifics of how the leadership of the program will work are still a bit undetermined, but multiple museum staff are stepping in, from the new grant manager, to those leading research toys, to museum leadership—there is a shared understanding of the value of this work and a commitment to keep it running smoothly. Data collection will continue on its regular schedule.

During interviews, evaluators asked respondents to describe how, if at all, staff turnover had impacted their involvement with Living Laboratory. Of 13 responses, 12 indicated that they had experienced turnover (see Figure 45). Five of these interviewees described staff turnover as a major challenge, and two indicated that recent staff turnover had threatened the future of their Living Laboratory. For instance, one shared that turnover was:

Absolutely huge! At the one museum, the University cut their funding. Regular museum cut down to literally 3 people who run the entire museum...They are tragically underfunded and understaffed. My contact at another museum died, so the museum closed. My contact at the second museum left, and at the third museum staff was fired. It definitely impacted my studies.

Figure 45. Interviewees' experience with staff turnover (n=13)



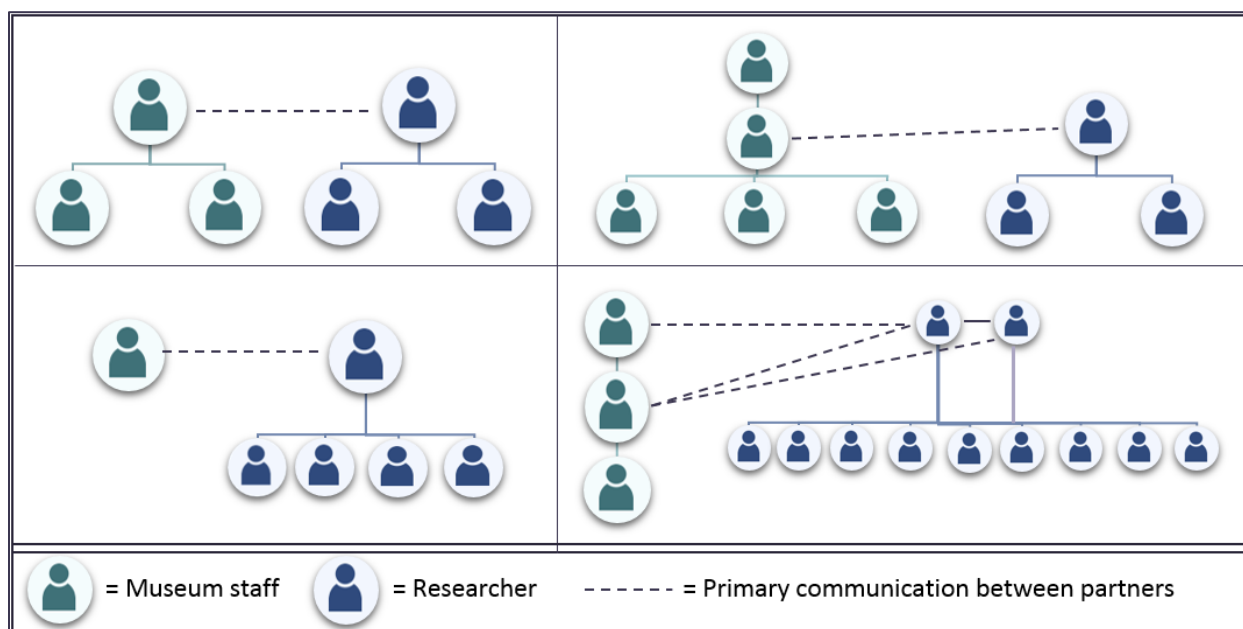
Despite these concerns, some sites had persevered through staff turnover. Successful strategies for managing turnover included:

- **Offering regular trainings (5 respondents):** “Right now we’re thinking about offering a training quarterly to capture staff missing it or new staff coming in so people are always knowledgeable about toys out on the floor.”
- **Having new or existing staff take over the responsibilities (2 respondents):** “We started out with one educator at the museum, and that [person] changed, but overall, pretty stable – it’s been a smooth transition.”
- **Clearly defining roles (1 respondent):** “I think that it really helps to have a clear understanding of what everybody’s roles are. The very first year we did this, we had an MOU, and we had never written an MOU since – we just sort of keep – we don’t even

write anything down – just making it clear the first year so that you kind of do the right things from the beginning is really helpful.”

As mentioned in [Figure 40](#), another approach to sustainability is involving multiple people at each institution in Living Laboratory and spreading responsibilities across the organization. Figure 46 outlines Living Laboratory staffing patterns at the four case study sites, demonstrating how three of the sites depend heavily on a single line of communication. The sites displayed on the right hand side of the figure have more sustainable staffing patterns than those on the left.

Figure 46: Living Laboratory staffing patterns at case study sites⁹



Like the case study sites, respondents from the community-wide data collection showed mixed staffing structures. Nine interviewees explained that they were the key contact who managed multiple roles, such as one who explained, *“Our first stipend was to truly hold Living Lab with a live study on the floor. And I was the coordinator, reaching out to the lab director, coordinating our schedule and also working on professional development pieces.”* On the other hand, seven respondents only listed a single role for themselves, and described how the work was distributed more evenly among more people; for example, one researcher stated that she was a, *“research scientist...one grad student works with [museum staff member] and arranges visits to the museum...[other lab member would] write up the material, a paper to give to parents describing all the ongoing research.”*

⁹ While this chart shows a static structure, with single lines of communication, in many cases the number of research assistants and museum staff fluctuates, and informal communication happens between many participants.

Interviewees also shared how other people at their organization viewed Living Lab. Eleven of the thirteen respondents shared that others thought the model was positive, saying things like, “*I think it is generally viewed positively that there is active research happening. It’s a benefit in general.*” Six shared that some members of the organization were unaware of Living Laboratory. For instance, one noted, “*I don’t know whether people in the university as a whole are aware of it because it is in a museum and an hour away.*”

The differences in understanding among organizational leadership were especially notable. At one site, Living Laboratory was the domain of a single department: “*outside of my department, they don’t really know much about it except that they see people come in occasionally.*” In contrast, at another museum there was support from the top. One interviewee described, “*The board knows about it, the executive director knows about it – they all think it’s fabulous.*” When leadership is supportive of Living Laboratory, it can open doors. For instance, at one site Living Laboratory’s ability to operate in the museum was dependent on this high-level support:

One signal to me [was] from the CEO of museum – for me to get that space reserved for researchers was a pretty big deal, so when she finally okayed it, I felt like she must really value it or believe it to give me that space.

Implications

In looking across these findings and reflecting on their implications for the sustainability of the model, there is encouraging evidence that local sites are making efforts to build lasting partnerships in a variety of ways. The foundation of those efforts is establishing communication patterns that enable partnerships to be agile and ensure mutual benefit while responding to changing needs. Multiple styles of interaction can be effective, and partners' needs may also change throughout the project. Appropriate communication needs to be tailored at the local level to fully reflect individuals' personalities and needs; national support may provide examples of how sites have managed their collaborations successfully, but sites will need to develop positive relationships on their own terms.

Funding needs also vary by site, but most require financial support to make Living Laboratory feasible, whether by supporting staff time, transportation costs, or equipment and material fees. The evidence of sites' success in finding diverse funding outside of the National Living Laboratory stipends is encouraging. Many sites have been able to find internal resources to allocate to the program. Several researchers have secured funding from their universities and some have locally found private funders. Many sites indicate that the program is not expensive, but that they need startup funds. This low budget may make the barrier to entry seem manageable for sites, but it may also mean that—due to its small nature—the model may not receive significant institutional recognition like a larger program might, and thus it may not be as much of a priority as it merits. Some sites are seeking more sizable operations (multiple research laboratories, multiple sites, etc.) and have found it challenging to secure the large-scale funding required for these efforts.

The ability to involve multiple people from each site—especially organizational leadership—can help promote the sustainability of Living Laboratory partnerships. For many sites, this model depends on museum educators and students, groups which are often transient. Sites have developed strategies for addressing turnover, but it can be especially challenging for sites when lead researchers and museum managers (who often serve as primary contacts for the partnership) change positions. Planning for transition among these positions and making sure that multiple people are knowledgeable about the project can provide stability during change. To date, leadership has not prioritized recommendations in terms of staffing structures, offering an opportunity for future growth. Across this data, adopters consistently share an underlying understanding that both researchers and museum personnel need to be involved to support a Living Laboratory site. This is evidence that the model's culture of mutual professional development has taken hold. At the beginning of project planning, some felt that the model could involve researchers running their studies at museums, with minimal involvement from museum staff. However, leadership promoted further interaction, and the data suggest that over time there has been a growing recognition that all parties benefit from deeper collaboration and learning between museum and research professionals.

Findings: Shift in ownership

This section shares findings from evaluators' investigations of how individual partnerships take ownership of the model and lead it locally at their own sites ("shift in ownership").

Findings include:

Allocation of responsibility: Overall, ownership is balanced between researchers and museum staff, but when uneven, researchers tend to hold more responsibility.

Adaptation to the model: Some sites internally adjusted their programs' location, schedule, research studies, and communication patterns to fit the model.

Leadership contribution: Living Laboratory leadership supports the community of learners by expanding its guidance and resources to help sites take ownership over the model.

Allocation of responsibility: Overall, ownership is balanced between researchers and museum staff, but when uneven, researchers tend to hold more responsibility.

Living Laboratory has no formal “ownership,” but in this evaluation, “shift in ownership” refers to sites informally modifying the national leadership’s official model to establish a version of the model they can successfully apply to their context. In order to measure this sense and establishment of local “ownership”, evaluators investigated how partners distribute key responsibilities of the partnership, asking whether each component was primarily handled by researchers, museum staff, or shared evenly between the two. The complete findings in this area are listed and illustrated in the [Appendices](#).

Figure 47 illustrates that across nine different roles that Living Laboratory partnerships must fill¹⁰, 50% of respondents claim that responsibilities are shared evenly between museum staff and researchers, suggesting that most partners consider themselves balanced between the two parties. In situations when respondents felt the responsibilities were shared unevenly, 30% of respondents swayed responsibilities towards researchers and 20% towards the museum. Therefore, when imbalanced, researchers are more likely to take on more responsibility than their museum partners.

Figure 47. Delegation of Living Laboratory responsibilities between partners¹⁰

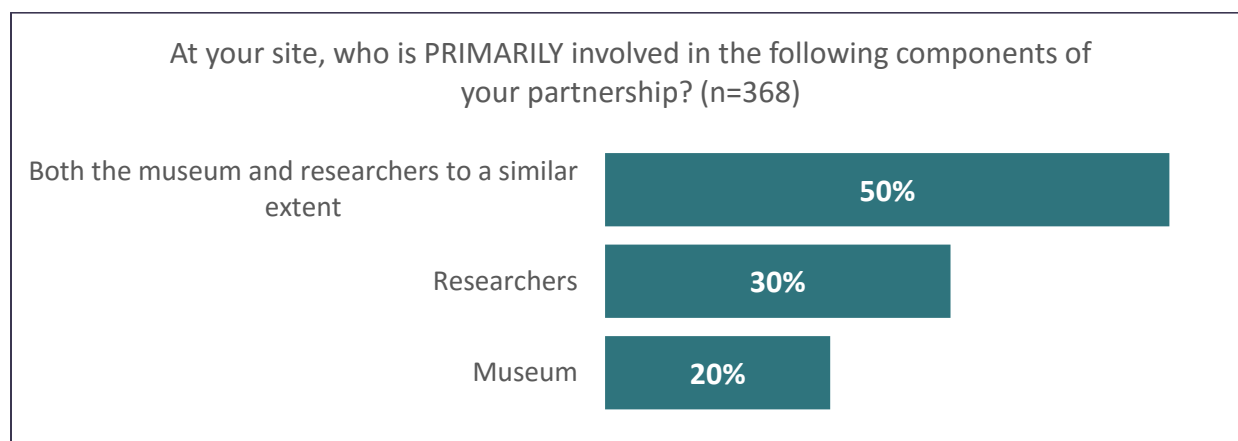


Figure 48 identifies the delegation of supervising researchers on the site of the Living Laboratory program. In this data, the researchers and museum staff each reported that they themselves had

¹⁰ Survey respondents were asked who was primarily involved in nine defined partnership components: (1) scheduling Living Laboratory activities, (2) managing physical aspects, (3) dedicating staff to carry out Living Laboratory, (4) supervising researchers on site, (5) training new researchers, (6) training new museum staff/volunteers, (7) evaluating collaboration success, (8) securing support to sustain partnership, and (9) benefitting the most. This figure combines all responses across all nine components.

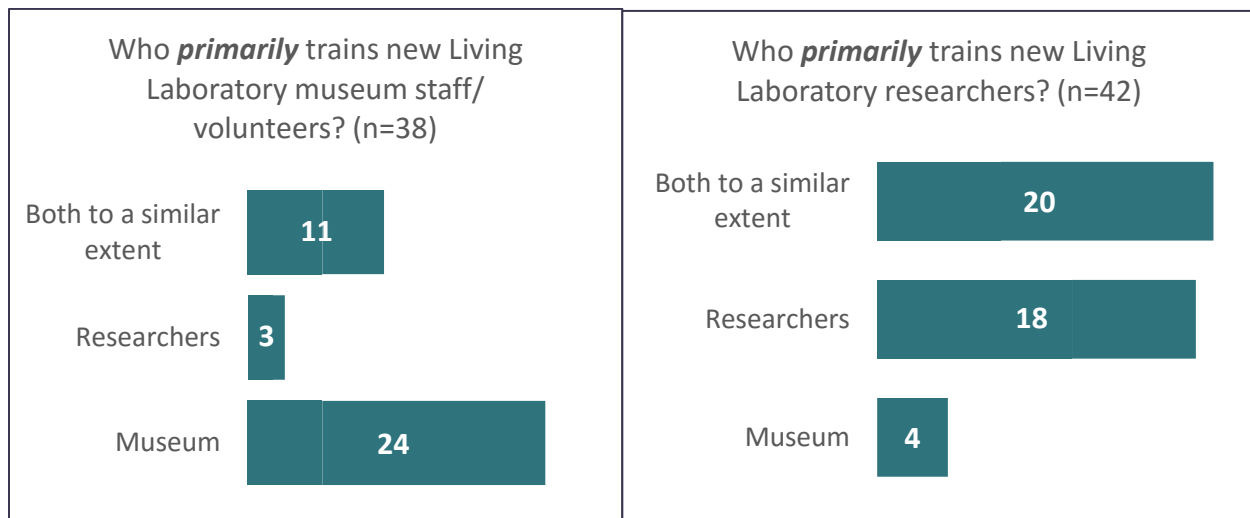
more responsibility in this area, suggesting a disparity in perceptions of ownership. The disparity may demonstrate a gap in understanding and communication between partners.

Figure 48. Allocation of supervision responsibilities



Figure 49 illustrates that, with regard to training, the responsibilities are often one-sided, especially for training museum personnel. A total of 71% of respondents reported unbalanced responsibilities for training museum staff and volunteers. Unbalanced responsibilities for training the researchers were reported by 52% of respondents. In these instances of uneven sharing, museum staff more often trained museum personnel and researchers more often trained researchers. This trend may stand in contrast with the professional development goals of Living Laboratory, which promote mutual professional development across disciplinary lines. Examples of successful training structures at case study sites are illustrated in the [Appendices](#).

Figure 49: Reported training responsibilities between partners



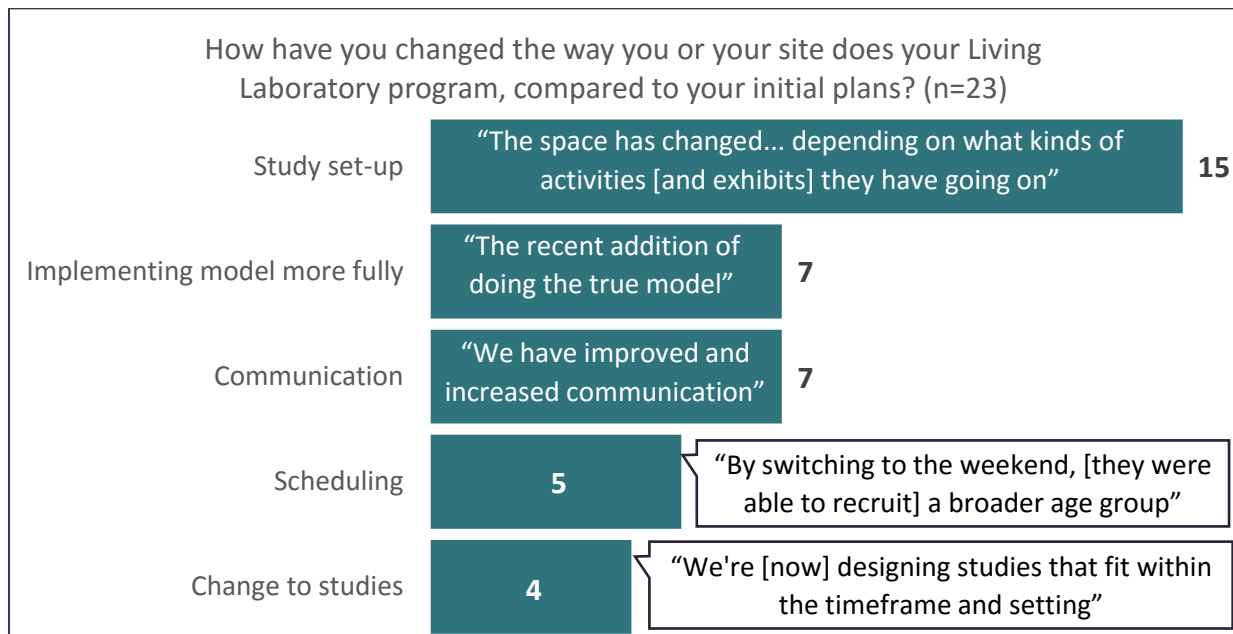
Adaptation to the model: Some sites internally adjusted their programs' location, schedule, research studies, and communication patterns to fit the model.

As described in the [Findings: Depth](#) section, many sites have made changes to the Living Laboratory model in order to fit it into the flow of their institutions. Overall, depending on the specific Essential Element, between 5% and 35% of respondents reported that they implement a modified version of the Element. The reasons for these modifications were to accommodate limited staff capacity, study requirements and museum considerations.

These site representatives also shared examples of how their institutions have evolved to fit the program over time, most often referring to changes in how they physically set up the study to better accommodate the museum or study needs, more fully implement the model and communicate (see Figure 50). Specifically, partnerships alter their communication patterns based on their changing needs. For six sites, this meant increasing communication among the partners and to external stakeholders. Conversely, one respondent shared that as the partnership stabilized, less frequent communication became more appropriate for her site: *“Our communication is not as frequent now. There are few issues, so when we have communicated, it’s about a bigger topic.”* For more information about Living Laboratory communication, see the [Findings: Sustainability](#) section.

Though indirectly linked in the interviews, these changes may also be the result of the limited staff capacity, study restrictions and museum considerations described in the Depth section. For example,

Figure 51 describes how museum size can impact how museums run Living Laboratory, and how they adjust their practices to stay true to the model. Figure 52 provides examples from case study sites about how researchers have adapted their studies to be more cohesive to the museum environment and accompanying considerations.

Figure 50. Changes to partnership practices overtime¹¹**Figure 51. Small museum considerations**

At the 2016 National Meeting, community members led a small-group discussion addressing the challenges of implementing a model designed for a large museum at a smaller institution. A number of adopters expressed the need to have multi-use spaces, and justified modifications to the model to make their Living Laboratory well-suited to their physical size. For example, one adopter explained, *"We have had to rethink the physical space... We are getting ready to build a STEM program room and are holding Living Lab in there. When it can occur, super, and when it's not we will have other STEM programming there. We don't have a four-hour experience; we have one or two. People felt they were missing out on Living Lab when it's not there and got frustrated."*

As the conversation evolved, more group members pointed out other issues that larger museums often don't face, one person sharing, *"Another strength-turned-weakness is repeat visitors. They are enthusiastic but it is a problem for researchers because it makes a small sample. You need to recruit new people for research but also keep [the experience] fresh for repeat visitors."* In response, others at the table offered strategies for addressing varying visitor patterns, including hosting special events with reduced entrance fees to encourage diversity in demographics and including Living Laboratory on the museum calendar, so that visitors know when the studies occur on the floor.

¹¹ Figure 50 utilized responses from both case study and community-wide interviews.

Figure 52: Changes in researchers' practices at case study sites

Site 1: Expansion of research topics

This lab's two Principal Investigators have engrained their college's teaching mission into their Living Laboratory program by embedding student participation into students' coursework, and internships, and independent study opportunities. A result of this dedication to teaching in applied practice and exposure to public research has led them to adjust their initial areas of focus.

"[Living Laboratory] caused me to research other things...I now do different things that are more appropriate for the museum...it's an opportunity to think about community-based learning and types of projects that can achieve my objectives creatively."

Site 2: Altered perspectives of collecting data in a museum

A researcher shared that she had initially considered the model a way to collect contact information and run pilot studies, but not collect actual data. However, once she had compared the data, she found them to be comparable to lab data. After shifting her perspective of the museum as a valid study location, she also critically considered how to alter study components to better fit the context.

"Some situations that aren't my first thoughts as a research environment can be worthwhile."

"You learn how to downscale research questions...I think I became more aware of what is essential in the research."

Site 3: Coordination of study protocols between labs and museums

One PI cannot run her full study on autistic children at the museum; instead, she collects normative data at the museum and recruits additional subjects to her lab. In an interview, she shared that Living Laboratory is valuable in collecting her subset of data, and has modified logistics of her study to fit the museum atmosphere and remain comparable to protocols in her lab.

"I just personally find it very fulfilling...It's loved by the public so much and it's so little effort on our part."

"I used to think about the kind of study I could do for one or one and a half hours with a few people in the lab. Now I think about what I can do in 10 minutes, with many people."

Site 4: Innovating to gain ecological validity

This researcher is grateful that Living Laboratory provides an opportunity for her to gather valid data in studying natural learning environments. The museum as a study site has helped her get published, secure funding, develop professional relationships, and receive awards. Furthermore, she has gained recognition and respect from her university, because she and her Living Laboratory program have altered its perception of the importance of her research.

"This is innovative research."

"What I teach and do is thinking about natural learning environments for kids. I'm in a natural environment. The research I'm getting is more like how kids are like in life."

In addition to changing research practices, some Living Laboratory partnerships have changed the model, not to mold it to a context for which it may have been unsuitable, but because current adopters have innovative ideas about applications of the program outside of leadership's original intention. Some examples of new applications of the model include using it as a traveling museum program, using the child development research to collaboratively build exhibits, hosting events for prototyping future studies, and integrating the research toys into college classes. See Figure 53 for more information about how Living Laboratory has developed a greater presence on a university campus.

Figure 53: Beyond the museum floor: expanding Living Laboratory to college campuses

One child development professor at a small liberal arts college discovered he could integrate the traditional Living Laboratory model into this collegiate classes as an innovative way to get to encourage his students to *“engage in critical thinking, writing, communicating, [and] doing development research.”* This drove him to initiate a different branch of collaboration with his museum partner: one in which a museum professional comes to his class to provide an overview of the museum mission and research toys, launching a semester-long project in which students use academic articles to develop interpretation guides and research toys. Along the way, students construct drafts of their interpretive toys, bring the prototypes to the museum, and receive feedback from museum educators. This project maintains the integrity of the Living Laboratory Essential Elements by allowing students to *“conduct research [by] video record[ing] the kids with them at the museum or [through] written notes, depending on the study. The students collect data and analyze it to see if what they see at the museum is similar to the article that they based their research on.”* In the end, many parties benefited from this creative adaptation of the model. Students gain an opportunity to practice communicating with the public, collect data, and learn about the museum environment through interactions with museum staff. The museum can keep the toys at the end of the semester, gaining new hands-on activities for their visitors. The new research toys are also shared digitally with the broader Living Laboratory community. Finally, according to the professor, this interpretation of the research toy model's potential *“provides great opportunities to complete goals for courses you are teaching through one assignment.”*

Leadership contribution: Living Laboratory leadership supports the community of learners by expanding its guidance and resources to help sites take ownership over the model.

Program leadership has played an instrumental role in disseminating Living Laboratory, as discussed in [Findings: Spread](#). Figure 54 illustrates leadership actions during the grant period, with regard to resource development, financial support, and community meetings. This portrayal suggests that the types of support have remained consistent, but shifted to address the emerging diversity in collaborations, research, and sites, as well as concerns the community has voiced.







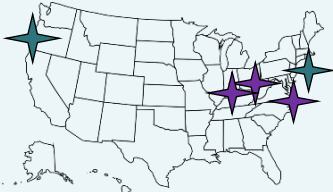
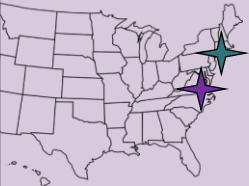



An example of this evolution is in the audiences and topics at leadership-led meetings. Initially, these events targeted new partnerships, such as at the inaugural national Living Laboratory symposium and the new and potential adopter meeting in 2012 and 2014, respectively. The Museum of Science, Boston partnerships drove the content for these early meetings. As more partnerships stabilized, scheduling meetings geographically was more efficient, resulting in regional meetings at the four hub sites and stipend awardee meetings on the east and west coasts. This strategy led to an agenda change, in which the hub leaders controlled and facilitated the content and discussions. In 2014, leadership determined that a cohort model better served the community than a regional model, leading to two types of meetings in 2014: A new and potential adopter cohort meeting, where new sites experienced the model at a hub site, and a stipend cohort meeting for adopters to discuss the model's impacts on museums and research organizations. Leadership added a community-wide national meeting to the cohort meetings in 2015. The structure of this event focused on shifting the ownership of the model and its sustainability to the community. Leadership's agenda addressed best practices, solutions to community challenges, and the future of the model. Additionally, community members acted as facilitators and presenters, further extending the invitation of ownership to attending adopters.

Early meetings exposed a strong community need for start-up funds to support protocol initiation, staff time and signage. Leadership responded by obtaining funds to disperse as stipends, initially granted to fully adopting partnerships. However, as supported by data in [Findings: Spread](#), not all invested sites could implement the full model. In response, leadership established educational assistance awards, which have been distributed to seven sites that do not have an active partnership but are implementing parts of the model. The parameters for these stipends evolved in accordance with community feedback. For example, stipends could not originally be used for transportation costs, but, for partnerships that did not have access to public transit, leadership approved this use of Living Laboratory funds.

Evaluators' observations of meeting discussions and analysis of resource development suggest that leadership has been responsive to the community's changing needs. Figure 54 lists concerns voiced at meetings, and the new resources developed to address them. For example, in Year 3, attendees requested more support in professional development. As a result, leadership created three new associated resources that year. Additionally, community members repeatedly voiced a need for evaluation, and in Year 5, leadership - in collaboration with project evaluators - released three new formative evaluation tools for community members' use at their sites. All resources are available to the community on the Living Laboratory website.

FINDINGS: SHIFT IN OWNERSHIP

Figure 54: Community needs and leadership response

	Year 1	Year 2	Year 3	Year 4	Year 5
<div></div> <div>MEETINGS & CONFERENCES</div> <div><div> Potential adopter meetings</div><div> Both potential and current adopter meetings</div><div> Current adopters or stipend recipient meetings</div></div> <div><i>Conferences attended by leadership:</i></div>					
	4	6	3	5	4
<div></div> <div>COMMUNITY NEEDS</div> <div>Pertinent topics at in-person meetings and conferences</div> <div><p>Note: Needs are color-coded by relevance to the resources listed below.</p><div><div><ul style="list-style-type: none">• Staff time & funding• Branding• Starting partnerships• Professional development (PD)• Evaluation</div><div><ul style="list-style-type: none">• Transportation costs, staff time, physical space• Strategic planning• PD• Research toys• Evaluation</div><div><ul style="list-style-type: none">• Funding & sustainability• PD• Evaluation</div></div></div>					
<div></div> <div>RESOURCES</div> <div>Additions to online toolkit</div> <div><div>Getting started</div><div>Logistics & funding</div><div>Professional development</div><div>Research toy tools</div><div>Caregiver education</div><div>Evaluation</div></div>	<div>3</div> <div>1</div> <div>1</div> <div>5</div> <div>1</div> <div>0</div>	<div>4</div> <div>0</div> <div>4</div> <div>7</div> <div>0</div> <div>0</div>	<div>2</div> <div>2</div> <div>3</div> <div>1</div> <div>2+</div> <div>1</div>	<div>2</div> <div>0</div> <div>0</div> <div>4</div> <div>4</div> <div>0</div>	<div>1</div> <div>1</div> <div>2</div> <div>4</div> <div>0</div> <div>3</div>
<div></div> <div>FUNDING</div> <div>Provided by National Living Laboratory to support local sites' needs</div>	<div>• 4 academic sub-award</div>	<div>• 4 academic sub-award</div>	<div>• 4 academic sub-award</div>	<div>• 18 partnership stipends</div>	<div>• 22 partnership stipends</div> <div>• 7 educational assistance awards</div>

To investigate where support is still underdeveloped, the community-wide interviews asked current non-adopters to share the types of materials they would find useful in establishing a Living Laboratory partnership. In this subsample of 14, 7 felt that they had enough support, while 7 voiced suggestions for further support. Suggestions included more guidance in adapting the model to different types of institutions (1), resources for sustaining partnerships (2), and training resources (3). Three respondents requested more support in negotiating and establishing a collaboration with potential partners. For example, one suggested “*more resources about making these connections between museums and researchers to help them see the benefits...Maybe I’m not speaking same language, we are not communicating effectively.*” The two others pointed to the guidance and outreach of leadership, saying:

[I] talked to [my hub leader] about ‘how do we get them on board, convince them it’s a cool idea, it’s a great place to do research, come do research on children.’ You know, I guess, just helping foster that conversation...It would be helpful if more researchers in the area were aware that the model exists, so it’s not just coming from us.

At the conclusion of funding, leadership roles can still find ways to provide this missing support. Furthermore, their role in the maintaining and expanding of the Living Laboratory model is ongoing. At the 2015 National meeting, the attendees brainstormed ideas to strengthen the model’s future. Some of the suggestions were as follows:

- **Multi-use permanent or semi-permanent exhibits** that can facilitate active research and informal education in cognitive and child development at informal learning centers
- **Pop up exhibits** for outreach and data collection purposes that travel with researchers among informal learning centers
- **Community member profiles** containing members’ research interests and populations, to strengthen community networking
- **Listserve**s that allow parties interested in pursuing the model to research community members
- **Discussion forums** as a platform for community members to continuously share, brainstorm, and discuss ideas, successes, challenges, or concerns (this is a current feature of the website but is under-utilized)
- **A comprehensive researcher training model** that includes agendas, strategies for orientations, and solving common problems
- Seek out **funding opportunities** as a regional or national program, as opposed to partnerships competing against each other for individual grants
- **Share current research** and articles as resources for the community
- Establish a **National Living Laboratory Day** for collecting data and increasing publicity
- Incorporate **high school student** participation into the model

Into the future, the community and program leadership will work in a collaborative effort to explore the feasibility, manifestation, and implementation of these ideas.

Implications

As more partnerships take ownership of the model in their local contexts, data suggest that the distribution of work is often balanced between partners. About half of all respondents assigned responsibilities to both parties to a similar extent, suggesting an understanding that a sustainable model needs input from each partner. This is a shift from initial planning of the model, when some parties felt the researchers should claim more responsibility, as they perceived the benefit of data collection as stronger than any gain the museum staff received. In partnerships where delegation is still imbalanced, the data suggests that museum staff and researchers see themselves as taking on more responsibility than the other with respect to certain components. This suggests a possible discrepancy in how individual parties perceive their level of responsibility in relation to their partners. These respondents see themselves as providing more input, suggesting that these partnerships may not fully value their partners' efforts. Additionally, these respondents still more frequently reported that researchers took on a larger load. Therefore, researchers may take more initiative in the model, which could be due to interest or some of the challenges museums face, such as limited staff time, as explained in [Findings: Spread](#).

Program leadership supports the community in a number of ways, and the evaluation suggests that it has been consistently responsive to community needs. Leadership has continued to create new resources and modify old ones in ways that correspond to issues expressed during in-person meetings. To maintain the integrity of the model, program leadership may consider continuing to focus its support in the area of mutual professional development, which is a concern that consistently resurfaces at meetings. Also, even in Year 5, the types of support requested from current non-adopters are similar to those expressed in earlier years, and have been already been addressed by program leadership in the form of resources and guidance. In Year 5, adopters at the national meeting also brainstormed new sustainability strategies for independent partnerships, which may require more structure and resource development. Therefore, as leadership continues to maintain the current resources and community, and helps sites strengthen Living Laboratory programs, it may also focus attention on raising awareness about the materials that are already available and investigating directions for model expansion that encourage the autonomy of interested parties and potential adopters.

Discussion

Overview

As described in the previous sections and summarized in Figure 55, the Living Laboratory project shows significant evidence of success, as well as some areas for growth and emergent findings in Coburn's domains of depth, spread, sustainability, and shift in ownership (2003):

Strengths: Across all four domains, Living Laboratory shows evidence of accomplishment in disseminating a lasting model. The notable depth of scale up is evidenced by the fact that all nine Essential Elements have been widely adopted. That adoption has spread robustly through the effective use of professional connections and online resources, reaching a diverse range of sites and a varied group of research and museum professionals. Living Laboratory has developed strategies for sustainability including diversified funding and adaptations for new contexts. Evidence of shift in ownership is especially strong; leadership has adeptly met changing needs and promoted sites' abilities to take ownership of the model at the local level.

Areas for growth: Amidst the model's successes in dissemination, there are some areas for continued development. In terms of depth, the mutual professional development aspects of the model are often less fully carried out. Strengthening partnerships through mutual development has the potential to improve many aspects of the model, including researchers' communication skills, museum personnel's integration of child development research into their work, and also the public's experience. For spread, some sites have difficulty finding and building relationships with suitable partners. Many sites are planning well for sustainability, but others demonstrate a tenuous future threatened by staff turnover and a lack of financial support.

Emergent considerations: Living Laboratory was initially started by a museum and university partnership, though its activities primarily took place in museums. Data show that adopters see the model as evenly balanced between museums and researchers, and in some cases there is evidence that participants see researchers as taking on more active roles than museum personnel. A contributing factor may be the way adopters understand the model, which often emphasizes researchers' data collection over museum professionals' roles. Another consideration is that individuals and organizations value Living Laboratory for different reasons. While initially the model was developed so museums could engage adult visitors and researchers could gather data, the community's motivations are now varied and numerous.

Figure 55: Strengths, areas for growth, and emergent considerations

Strengths	Areas for growth	Emergent considerations
<ul style="list-style-type: none"> • Depth of adoption • Wide, diverse reach • Professional connections and online resources • Sustainability efforts • Flexibility and adaptation 	<ul style="list-style-type: none"> • Mutual professional development • Finding compatible partners • Funding requirements and staff turnover 	<ul style="list-style-type: none"> • Balanced partnerships • Some researchers take on more responsibilities than museum personnel • Diverse motivations

Recommendations

As the National Living Laboratory looks forward, the evaluators raise a number of recommendations based on this study. These recommendations fall into three broad categories: (1) existing efforts that should be continued to ensure model sustainability (Figure 56), (2) changes to current practices that would provide added value (Figure 57), and (3) novel opportunities that could further strengthen the model (Figure 58).

Figure 56: Recommendations – efforts that should be continued

Recommendation	Supporting data
1 Continue to support professional networking: The model’s vocal spokespeople—including hub leaders and other supportive individuals—have been vital for spreading the model. Finding ways to continue supporting these people in their networking is likely a key factor for future growth.	Page 52
2 Continue matchmaking for local relationships: Strong Living Laboratory partnerships depend on local relationships between professionals and organizations with shared understandings, complementary goals, and a desire to learn from one another. Helping interested parties find the right partners has been a valuable role of hub leaders, and this matchmaking will continue to be important for ongoing spread. It will be valuable to recognize professionals’ motivations are diverse—researchers are not always primarily motivated by data and museum professionals are not always motivated by visitor engagement.	Pages 52, 57
3 Continue providing resources to meet financial needs: While many sites find Living Laboratory is an inexpensive model to maintain, data show that funds are essential for some sites to support staff, meet material needs, and cover transportation costs when initiating a new partnership. National Living Laboratory previously offered small (up to \$3,000) stipends for start-up costs. Leadership’s role in providing or helping sites find funding opportunities will continue to be valuable.	Page 65

Figure 57: Recommendations – adjustments to current practices

	<i>Recommendation</i>	<i>Supporting data</i>
4	Emphasize strong, balanced partnerships: The public components of the model are more widely implemented than the professional components, but the professional aspects are vital for a Living Laboratory site's success. It could be valuable for leadership to highlight the importance of deep partnership, especially among new sites. National Living Laboratory could provide resources to help advocates make the case that Living Laboratory's value to the public is worth the museum staff support it requires, addressing the data that show how in some cases researchers are more involved in the model than museum personnel. It could also be valuable to emphasize the fact that closer partnerships can help sites strengthen all Living Laboratory Elements and even identify mutually beneficial work outside of the Living Laboratory model.	Pages 27, 50, 73
5	Strengthen structures that support professional application of Living Laboratory skills and knowledge: The data show room for growth in promoting improvement of researchers' communication skills and museum staff's integration of child development research into their work. If this behavior change is to remain a core aspect of the model, leadership could enhance efforts in this area. This could include further study of Living Laboratory's efforts to improve researcher communication and sharing examples of how sites are successfully supporting professional development and applying their learning.	Pages 33, 42, 45
6	Further develop recommendations about what it means to be a Living Laboratory site: There is variation in implementation of the model. To promote visibility and consistency, it may be valuable for leadership to emphasize existing guidelines about logo usage and attributing the model in published work. While organizational protocols make enforcement difficult, additional guidelines about what it takes to be considered a Living Laboratory site would be valuable, as would written suggestions about who to contact when sites are seeking funding for Living Laboratory.	Page 50

Figure 58: Recommendations - New opportunities

Recommendation	Supporting data
<p>7 Promote redundant staffing patterns: Supporting sites in creating staffing redundancies can help promote longevity during turnover, which is common among museums and student researchers. While this can be difficult in very small organizations, codifying site policies and involving different levels of staff can be valuable.</p>	Page 67
<p>8 Explore new areas: Sites have shown that Living Laboratory can be valuable beyond its original contexts. Exploring new opportunities may provide value to additional audiences. Options might include:</p> <ul style="list-style-type: none"> ▪ New research fields beyond cognitive development ▪ Different informal learning organizations other than museums ▪ Living Laboratory in undergraduate curriculum ▪ Involving other audiences (i.e., high school students, targeted demographic groups) in the Living Laboratory model 	Page 75

Looking forward: Opportunities for future research and evaluation

As described in this study, National Living Laboratory is a large and diverse collection of organizations and professionals with similar interests at the intersection of scientific research and public engagement. The model and its community have both changed notably during the course of this evaluation, and promise to continue evolving after the end of the grant period. Moving forward, the evaluators identify several avenues for future research and evaluation

- **Longitudinal study of the National Living Laboratory community:** The time period studied in this report enabled evaluators to gather data that demonstrated the growth and development of the Living Laboratory model. However, as demonstrated throughout the findings sections, the community is a fluid system. New sites continue to initiate partnerships and grow the community. Additional data collection in the coming years could tell a richer story about sites' sustainability and the continued spread of the model.
- **Additional investigation of communication skill development for researchers:** Data from this evaluation showed that participants perceive improvement in researchers' communication skills. However, efforts to measure what had changed about the written content of researchers' communication and the extent to which it had changed were inconclusive. Future efforts to operationalize this topic (possibly including non-verbal aspects, active listening, and adapting messaging to different audiences) in a measurable way and to track researchers' skills throughout their participation in Living Laboratory could be valuable both for this model and for field-wide efforts to better understand the science of science communication.
- **Investigation of Living Laboratory in non-traditional contexts:** As Living Laboratory has spread, new types of organizations have become involved. This includes non-academic researchers, non-cognitive science researchers, zoos, botanical gardens, libraries, and others. To date, these numbers are small and were not a priority in this summative evaluation. However, as more non-traditional sites adopt the model, more could be known about Living Laboratory outside of museums and cognitive development research. Additional investigations based on institution and research type could provide valuable information about the characteristics that make the model viable in different settings.
- **Evaluation of future Living Laboratory opportunities:** The National Living Laboratory has begun developing plans for its future, including organizing a conference to explore models for working with high school students. Evaluation of this and other future efforts by the National Living Laboratory leadership will deepen the story about Living Laboratory and its impacts.
- **Synthesizing best-practices for evaluating informal education networks:** In addition to Living Laboratory, the informal science education field has supported a number of network projects in the past decade. This work includes the Nanoscale Informal Science Education Network, and the Multi-Site Public Engagement with Science, Space and Earth Informal STEM Education, Sustainability in Science Museums, and Transmedia

Museum projects. These projects have included a range of evaluation and research studies, and informal connections have been made between the investigators. A written document that synthesizes best-practices and lessons-learned could provide added insight as the field continues to pursue this type of work.

One of the emergent findings from this work was that Living Laboratory is attractive to a broader range of organizations and individuals than originally conceived. The authors of this report hope that likewise this document will be valuable to those who pick it up. Whether you are a practitioner, Living Laboratory community member, researcher, evaluator, or funder—the authors hope that you can find something valuable here that will enrich your work, the work of your professional collaborators, and the public audiences that you serve.

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Appendices

Evaluation questions

The evaluation questions for the summative evaluation will be:

1) Depth: To what degree and in what ways do professionals apply the Living Lab model?

- a) To what extent and in what ways have scientists and museum educators developed an understanding of the essential elements and overall type of “the model”?
 - i) How do academics and museum professionals categorize Living Laboratory? (Test the assumption that academics view Living Lab as a ‘lab extension’ and museum professionals see it as a program (and if so, what type of program?))
 - ii) What are the partners' attitudes towards the model?
- b) Which essential elements are adopted by participating professionals/institutions?
 - i) How does this model implementation compare to sites’ initial plans for adoption?
- c) To what extent and in what ways are academic participants’ communication skills with lay audiences changed by the program?
- d) To what extent and in what ways do museum educators integrate child development research into their own work?

2) Spread: Who is involved in the project and how do they come to be involved?

- a) How many and what types of participants are engaged in the project?
 - i) What kind of institution?
 - ii) What level of staff?
- b) Why/how do participants choose to adopt the model?
 - i) What is the interest and motivation of potential participants for involvement?
 - ii) How many deliverables are they using?
 - iii) What are the barriers that prevent participants from moving forward?
 - iv) What are the mechanisms by which professional participants get involved?
 - v) Who spreads the model?

3) Sustainability: To what extent and in what ways do professional participants sustain their collaborations when project support changes?

- a) How, if at all, do sites seek additional sources of support to sustain their collaboration?
- b) Who sustains the model and in what ways?

4) Shift in Ownership: How, if at all, do professionals make the model their own?

- a) How does each site adapt the essential elements of the program, and why?
 - i) Are there trends based on institution type?
- b) To what extent and in what ways do professionals advocate for the model both within and outside of their disciplines?
- c) How do the partners negotiate and describe ownership?
- d) As museum and research professionals take ownership, how do the Museum of Science and Tier I partners adapt to support the community of learners?

Case study instruments

National Living Laboratory Summative Evaluation Case Study Plan

Overview: The case study portion of the National Living Laboratory summative evaluation will consist of data collection from and site visits to four sites at various stages of implementation. The case studies will investigate the impacts of participating in Living Laboratory for professional audiences and will inform the way the project team discusses the project with the field and funders. Evaluators will visit sites that represent a diversity of geography, length of partnership, academic level of researchers, and size and type of museum.

Data collection will consist of:

- A 1-2 day site visit in the summer or fall of 2015 during which an evaluator observes the Living Laboratory and research toys (if applicable) in action
- An interview with museum staff, interns, and volunteers that will last no more than one hour per person
- An interview with academic researchers (from undergraduate RAs to PIs) that will last no more than one hour per person
- Document analysis of handouts, manuals, signs, promotional materials, etc.

Deliverables include a memo for each site that will summarize the data collected at that site, identify strengths, and provide recommendations for improvement.

Timeline:

- May, 2015: Draft instruments created
- June, 2015: Lorrie reviews draft instruments
- June, 2015: Site visits scheduled and travel arrangements confirmed
- June, 2015: Instruments finalized
- June-August, 2015: Finalize on-site schedules and logistics for interviews and observations
- July-November, 2015: Site visits
- 6 weeks after each site visit: Memo delivered to the site
- December, 2015: Final analysis from all sites
- January, 2016: Results written up

DATA COLLECTOR: _____ DATE: _____ SITE: _____ GROUP#: _____ START TIME: _____ END TIME: _____

National Living Laboratory Summative Evaluation Case Study Research Observation Form

	# Children	# Adults	Description of researcher (check all that apply):
Visitor group composition			<input type="checkbox"/> High school student <input type="checkbox"/> Undergraduate <input type="checkbox"/> Graduate student
			<input type="checkbox"/> Post-doctoral researcher <input type="checkbox"/> Professor <input type="checkbox"/> Other _____

Check off the following behaviors if they occur before, during, or after the study:

Caregiver behaviors:

Observes child's participation: ☐ Not at all ☐ 1-50% of the time ☐ 51%+ the time

☐ Makes comments or asks questions

☐ Caregiver asks about child's performance, or requests a diagnosis (e.g., Does this mean he's autistic?)
(write quotes)'

Why does the caregiver leave or end the interaction?

Researcher discusses:

☐ The consent form and details of participation

☐ Visitor is an educational opportunity only (i.e. not eligible as study data)

☐ Purpose of the study and/or research questions

☐ Scientific relevance or connection to previous studies

- ☐ Hypotheses (i.e. what participants or researchers think will happen and why)
- ☐ Description of methods
- ☐ Different conditions or groups (e.g., with or without instructions, differences between ages)
- ☐ Overall observations thus far (e.g., what trends has the researcher noted during the trial)
- ☐ Connection to everyday life or museum

Notes (conversations, questions, etc.) In your notes, use A to indicate the adult caregiver, C for the child, and R the researcher

DATA COLLECTOR: _____ DATE: _____ SITE: _____ GROUP#: _____ START TIME: _____ END TIME: _____

National Living Laboratory Summative Evaluation Case Study Research Toy Observation Form

Check off the following behaviors if they occur:

Educator discusses:

- ☐ Purpose of study and/or research questions
 - ☐ Scientific relevance or connection to previous studies
 - ☐ Hypotheses (i.e. what the participant thinks will happen and why)
 - ☐ Description of methods
 - ☐ Different conditions or groups (e.g., with or without instructions, differences between ages)
 - ☐ Findings
 - ☐ Connection to everyday life or museum
 - ☐ Cognitive science or child development research in general
 - ☐ Related activities to do at home or in the museum
-

Caregiver behaviors:

- ☐ Caregiver asks questions
- ☐ Caregiver facilitates child's interaction with research toys
- ☐ Caregiver observes child's behavior with toys
- ☐ Caregiver explains child's behavior (e.g., He always chooses red toys) (write quotes)

Open notes (conversations, observations, etc.): Use A to indicate the caregiver, C the child, and E the educator.

National Living Laboratory Summative Evaluation Case Study Museum Staff, Volunteer, and Intern Interview

Introduction

- **Thank you** so much for agreeing to talk to me today.
- **My name is** [introduce yourself].
- **Background:** This interview is part of a summative evaluation for the NSF-funded National Living Laboratory project. We are conducting a series of case studies about the different ways the model is being implemented across the country. These case studies investigate the impacts of participating in Living Laboratory on professionals like you and will inform the way we discuss the project with the field and funders.
- **Timing:** The interview should take less than one hour.
- **Audio recording:** [If agreed to be audio recorded] You have agreed to be audio recorded. The purpose of recording this interview is so that any quotes can be accurately portrayed for our analysis. Is that still ok with you?
- **Confidentiality:** While we will make every effort to keep your answers confidential, the small number of participants in this study means we cannot guarantee complete confidentiality.
- **Participant rights:** At any time, you may choose to not answer a question or to stop the interview completely.
- Do you have any **questions** so far?

[TURN ON AUDIORECORDING]

Interview Questions

1. What role do you play at [museum name]?

Probe:

- What is your job title?

2. What role do you play in Living Lab?

Probes:

- How do you interact with visitors and/or researchers as part of your site's Living Lab?
- How, if at all, have you been involved in interpreting active research studies or research toys?
- How, if at all, have you been involved in greeting researchers?
- How, if at all, have you participated in training researchers?
- How, if at all, do you contribute to project coordination or scheduling?

3. How often do you typically participate in Living Lab activities?
4. How did you first get involved in Living Lab?
Probe:
 - How long have you been involved in Living Lab?
 - How did you first hear about Living Lab?
5. What people or resources taught you about the Living Lab model and how to implement it?
Probes:
 - Have you learned about Living Lab from other people at [museum] or [college/university]?
 - Have you participated in any National Living Laboratory meetings or conference sessions?
 - Have you used any other materials like websites, handouts, or articles?
6. How would you describe Living Laboratory to someone who had never heard of it?
Probes:
 - What is the purpose of Living Lab?
 - What are the most important aspects of Living Lab?
7. If you were going to set up a Living Lab at a new site, what would you be sure to include?
Probes:
 - What types of partners would you want to be involved?
 - What type of space would you look for?
 - What would be important for museum educators to know?
 - What would be important for researchers to know?
 - How would you train researchers and educators to run the Living Lab?
8. Has there been a Living Lab study that you feel was an especially good fit for your museum setting?
[If yes]:
 - What was the study about?
 - What were the methods?
 - What made it a good fit for your setting?
9. Has there been a Living Lab study that was not such a good fit for your museum?
[If yes]:
 - What was the study about?
 - What were the methods?
 - What made it less of a good fit for your setting?
10. How, if at all, have you benefitted from your participation in Living Lab?
Probe:
 - Do you feel like you have learned anything or developed any skills?
11. How, if at all, do you feel like the researchers' studies are relevant to your work?
Probe:
 - How, if at all, have you integrated what you've learned from Living Lab into your work?
12. How, if at all, do you think researchers have benefitted from their participation in Living Lab?

Probes:

- Do you think they have learned anything or developed new skills?
- How, if at all, do you think scientists' communication skills with the public have changed based on their participation in the program?

13. Would you say the Living Lab at [site name] is led more by the museum, the researchers, or both?

Probes:

- Who do you think benefits the most from the project?
- Why do you feel that way?

14. What do you see as some of the challenges of your involvement with Living Lab?

Probe:

- Have any of these challenges prevented the project from moving forward at any point?

15. How has your experience thus far compared to the expectations you had about the project when you started?

-----This section for project leadership only-----

16. Aside from you, who else is involved in Living Laboratory at [site name], and in what ways?

17. How, if at all, have other staff at your site benefitted from Living Laboratory?

18. Were you involved in your site's decision to become involved in Living Lab?

[If yes]: What was your motivation for getting involved?

[If no]: What, if anything, do you know about why your institution initially chose to start a Living Laboratory?

19. How, if at all, have you adapted elements of the Living Lab model?

Probes:

- Is there anything about the Living Lab model that you think is not a good fit for your site? Why?
- Have you changed anything about the way you or your site does your Living Lab program, compared to your initial plans?

20. How, if at all, does your site monitor the program to ensure that goals and needs are met?

21. Are you involved in making plans for the program's ongoing sustainability?

[If yes]:

- How, if at all, have you or your researcher sought funding to support your Living Lab?
- Do you feel the museum or the researcher is more responsible for securing funding?

22. Have you been involved in any efforts to share the Living Lab model outside of your site?

[If yes]:

- What did these efforts entail?
- What was your motivation for these efforts?
- What reaction did you receive from those whom you talked to?
- Who, if anyone, was involved in these efforts with you?

----- End of leadership-only section -----

23. What, if any, are your personal goals as you continue to work with Living Lab?

Probe:

- Do you hope to learn anything in particular or develop any specific skills?

24. What, if any, are your goals for the Living Lab program at [site name]?

25. We've reached the end of the interview. Is there anything else you'd like to add about your experience with Living Laboratory?

Thank you so much for talking with me today. Your feedback will help us better understand the impacts of the Living Laboratory model. We truly appreciate your participation, and wish you all the best with your future involvement in Living Lab!

National Living Laboratory Summative Evaluation Case Study Researcher Interview

Introduction

- **Thank you** so much for agreeing to talk to me today.
- **My name is** [introduce yourself].
- **Background:** This interview is part of a summative evaluation for the NSF-funded National Living Laboratory project. We are conducting a series of case studies about the different ways the model is being implemented across the country. These case studies investigate the impacts of participating in Living Laboratory on professionals like you and will inform the way we discuss the project with the field and funders.
- **Timing:** The interview should take less than one hour.
- **Audio recording:** [If agreed to be audio recorded] You have agreed to be audio recorded. The purpose of recording this interview is so that any quotes can be accurately portrayed for our analysis. Is that still ok with you?
- **Confidentiality:** While we will make every effort to keep your answers confidential, the small number of participants in this study means we cannot guarantee complete confidentiality.
- **Participant rights:** At any time, you may choose to not answer a question or to stop the interview completely.
- Do you have any **questions** so far?

[TURN ON AUDIORECORDING]

Interview Questions

1. What role do you play at [college/university]?
Probe:
 - What is your job title?
2. What role do you play in Living Lab?
Probes:
 - How, if at all, do you interact with visitors and/or museum educators as part of your site's Living Lab?
 - How, if at all, are you involved in conducting research as part of your Living Lab?
3. How often do you typically go to the museum?
4. About how many studies have you run at the museum?

5. How did you first get involved in Living Lab?

Probe:

- How long have you been involved in Living Lab?
- How did you first hear about Living Lab?

6. What people or resources taught you about the Living Lab model and how to implement it?

Probes:

- Have you learned about Living Lab from other people at [museum] or [college/university]?
- Have you participated in any National Living Laboratory meetings or conference sessions?
- Have you used any other materials like websites, handouts, or articles?

7. How would you describe Living Laboratory to someone who had never heard of it?

Probes:

- What is the purpose of Living Lab?
- What are the most important aspects of Living Lab?

8. If you were going to set up a Living Lab at a new site, what would you be sure to include?

Probes:

- What types of partners would you want to be involved?
- What type of space would you look for?
- What would be important for museum educators to know?
- What would be important for researchers to know?
- How would you train researchers and educators to run the Living Lab?

9. [If interviewee has only run one study]: Could you tell me about the study you've been running?

Probes:

- What was the study about?
- What were the methods?
- What, if any, were the benefits of running this study in the museum setting?
- What, if any, were the challenges of running this study in the museum setting?
- How, if at all, did the study align with other programming, exhibitions, or elements of visitors' museum experience?

[If interviewee has run multiple studies]: Have you run a study that you feel was an especially good fit for the museum setting?

[If yes]:

- What was the study about?
- What were the methods?
- What made it a good fit for the setting?
- How, if at all, did it align with other programming, exhibitions, or elements of visitors' museum experience?

[If interviewee has run multiple studies]: Have you run a study that you feel was not such a good fit for the museum?

[If yes]:

- What was the study about?
- What were the methods?
- What made it less of a good fit for the setting?

10. How, if at all, have you benefitted from your participation in Living Lab?

Probes:

- Do you feel like you have learned anything or developed any skills?

11. How, if at all, has your participation with Living Lab had an impact on your research?

Probes:

- How, if at all, has Living Lab changed the way you communicate with the public about your research?
- How, if at all, have you integrated what you have learned from Living Lab into your research?

12. Have you conducted research at a site other than the museum?

[If yes]:

- How would you compare your experiences doing research at the museum to experiences doing research in a lab or other setting?
- About how long have you been conducting research outside the museum?
- About how many studies have you run outside of the museum?

13. What, if anything, do you think museum staff have gained from their participation in Living Lab?

Probes:

- Do you think they have learned anything or developed any skills?
- Do you think they have integrated anything they have learned from Living Lab into their work?

14. Have you received any training from museum educators about communication or education techniques?

[If yes]: What, if anything, did you find valuable about this training?

15. Would you say the Living Lab at [site name] is led more by the museum, the researchers, or both?

Probes:

- Who do you think benefits the most from the project?
- Why do you feel that way?

16. What do you see as some of the challenges of your involvement with Living Lab?

Probe:

- Have any of these challenges prevented the project from moving forward at any point?

17. How has your experience thus far compared to the expectations you had about the project when you started?

-----This section for project leadership only-----

18. Aside from you, who else is involved in Living Laboratory at [site name], and in what ways?
19. How, if at all, have other members of your lab benefitted from Living Laboratory?
20. Were you involved in your site's decision to become involved in Living Lab?
 [If yes]: What was your motivation for becoming involved?
 [If no]: What, if anything, do you know about why your institution initially chose to start a Living Laboratory?
21. How, if at all, have you adapted elements of the Living Lab model?
 Probes:
 - Is there anything about the Living Lab model that you think is not a good fit for your site? Why?
 - Have you changed anything about the way you or your site does your Living Lab program, compared to your initial plans?
22. How, if at all, does your site monitor the program to ensure that goals and needs are met?
23. Are you involved in making plans for the program's ongoing sustainability?
 [If yes]:
 - How, if at all, have you or your museum partner sought funding to support your Living Lab?
 - Do you feel the museum or the researcher is more responsible for securing funding?
24. Have you been involved in any efforts to share the Living Lab model outside of your site?
 [If yes]:
 - What did these efforts entail?
 - What was your motivation for these efforts?
 - What reaction did you receive from those whom you talked to?
 - Who, if anyone, was involved in these efforts with you?

----- End of leadership-only section -----

25. What, if any, are your personal goals as you continue to work with Living Lab?
 Probe:
 - Do you hope to learn anything in particular or develop any specific skills?
26. What, if any, are your goals for the Living Lab program at [site name]?
27. We've reached the end of the interview. Is there anything else you'd like to add about your experience with Living Laboratory?

Thank you so much for talking with me today. Your feedback will help us better understand the impacts of the Living Laboratory model. We truly appreciate your participation, and wish you all the best with your future involvement in Living Lab!

DATA COLLECTOR: _____

DATE(S): _____

SITE NAME: _____

National Living Laboratory Summative Evaluation Site Visit General Observation Form

Throughout your site visit, watch for evidence of the site's adoption of the essential elements and use these charts to record how the site meets, fails to meet, or adapts the essential elements.

Which essential elements for public audiences does the site adopt? (Check yes/no/adapted/unclear and provide evidence)

Public Essential Elements	Yes	No	Adapted	Unclear	Evidence
Visitors contribute to scientific discovery by participating in active studies					
Visitors engage in one-on-few educational interactions with researchers					
Studies occur in plain-view of the public, on the exhibit floor					
NOTE: Take pictures if possible.					

Public Essential Elements	Yes	No	Adapted	Unclear	Evidence
Museum staff train researchers in effective museum-style education					
Museum educators gain direct access to relevant, current science					
Visitor education focuses on the process of science , including questions and methods as well as results					

Which essential elements for professionals does the site adopt? (Check yes/no/adapted/unclear and give evidence)

Professional Essential Elements	Yes	No	Adapted	Unclear	Evidence
Non-participant visitors talk with researchers about on-going studies					
On-site research is an expected and predictable part of the visitor experience					NOTE: Take pictures if possible and applicable.
Museum educators and researchers communicate regularly , collaboratively monitoring the program to meet goals and fulfill needs					

Does the site display evidence of the following? (Check yes/no/adapted/unclear and give evidence)

Evaluation Criterion	Yes	No	Adapted	Unclear	Evidence
Museum educators integrate child development research into their work					

Open Field Notes:

National Living Laboratory Summative Evaluation Case Study Document Review Plan

Documents to collect and review:

- Handouts, flyers, and other materials for caregivers
- Internal documents for museum staff and academic researchers (manuals, training guides, policies, procedures, protocols, etc.)
- Signs, promotional materials, and other publically displayed materials
- Applications (these do not need to be collected on site)
- Quarterly reports (these do not need to be collected on site)
- Surveys from symposia (these have already been collected)

Process for collection:

- The evaluator should provide the lead museum contact and the lead academic contact with the list of requested materials.
- The lead museum contact and the lead academic contact should coordinate the collection of documents.
- Materials can be collected as hard copies, digital files, or, if necessary, a clear photo of the materials (i.e., a sign).
- When possible, digital files could be sent before the site visit.
- All materials should be collected by the end of the site visit.

Analysis will consist of:

- Mining documents for evidence of the site's implementation of essential elements.
- Reviewing quarterly reports to compile a list of museum and academic participants.
- Determining organization type based on quarterly reports and surveys from symposia, and using organization type to assess whether there are trends in the adaption of essential elements based on organization type.
- Comparing sites' current implementation to the goals they wrote in their applications.
- Reviewing all data to determine partners' attitudes towards the Living Lab model.

Community-wide data collection instruments

Community-wide survey

Thank you for your willingness to complete this online survey! This survey is part of a summative evaluation for the NSF-funded National Living Laboratory project. We are collecting data from sites that have participated in Living Laboratory events to learn more about the different ways the Living Laboratory model is implemented across the country, as well as the impacts of Living Laboratory on professionals like you. This data will inform the way we discuss the project with the field and funders.

How long will it take?

- The survey should take about 10 minutes to complete.
- The survey includes some questions about your site's Living Laboratory and your experiences with Living Laboratory materials.

Information about your participation:

- This survey is optional, and you can skip any questions or stop at any time.
- Your survey responses will be confidential, meaning that only staff evaluating the project will see your responses. Your responses will never be shared outside of the evaluation team.
- The information you provide will help us understand and communicate about the Living Lab model.

Please contact Katie Todd at ktodd@mos.org with any questions. Thank you for participating!

Your Experience with Living Laboratory

What organization are you currently affiliated with?

How would you describe your current role at this organization? (required)

- ☐ I am a researcher (research assistant, undergraduate or graduate student, professor, etc.)
- ☐ I am a staff member, volunteer, or intern at a museum or other informal education organization
- ☐ Other (please specify): _____

What is your position in your current research lab? (Please select all that apply)

- ☐ Undergraduate student
- ☐ Graduate student
- ☐ Postdoctoral researcher
- ☐ Professor
- ☐ Other faculty
- ☐ Administrator, program, or department manager
- ☐ Outreach coordinator
- ☐ Research assistant
- ☐ Other (please specify): _____

Have you ever been involved in Living Lab in another capacity (played a different role, worked at another site, etc.)?

- ☐ Yes
- ☐ No

Please briefly describe your other Living Lab involvement:

Have you attended any of the following Living Laboratory events?

	YES, I have attended one or more of these events	NO, I have not attended any of these events	I'm not sure
Living Lab session or table at a professional conference	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Living Lab symposium meeting or regional event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Have you used any of the following National Living Laboratory resources? (Please select all that apply)

	YES, I have used this resource	NO, I have not used this resource	I'm not sure
Partnership planning materials (tip sheets about the model, initiating a collaboration, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marketing materials (example handouts, branding, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evaluation and reporting tools (logs, surveys, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Livinglab.org member directory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional development resources (tips for communication, recruitment strategies)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sample materials (greeting forms, orientation guide, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research toys that were developed at another site	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resources for developing your own research toy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How, if at all, have you modified any of these resources for use at your own site?

Have you created any resources that you've shared with the Living Laboratory network?

- ☐ Yes
- ☐ No

Please briefly explain:

Have you interacted with a Living Lab Hub Leader (Marta Biarnes, Annie Douglass, Kia Karlen, or Stacey Prinzing)?

- ☐ Yes
- ☐ No
- ☐ I'm not sure

In what ways have you interacted with your Hub Leader? (Please select all that apply)

- ☐ By phone
- ☐ By email
- ☐ In person

How often have you been in contact with your Hub Leader?

What types of support, if any, have you received from your Hub Leader?

Are you currently part of a Living Laboratory that includes a partnership between an informal learning organization (museum, science center, zoo, botanical garden, etc.) and a college, university, or other research organization?

- ☐ Yes
- ☐ No

[The following section is ONLY for respondents who are part of a current partnership]

About how long have you been involved in Living Laboratory?

- ☐ 0-5 months
- ☐ 6 - 17 months
- ☐ 1.5 - 3.9 years
- ☐ 4 - 8 years
- ☐ More than 8 years

What is your current role with the Living Lab at your site? (Please select all that apply)

- ☐ Coordinate day to day logistics (scheduling, materials, etc.)
- ☐ Manage long-term vision of the program (goals, resources, finance, etc.)
- ☐ Participate in running active research
- ☐ Facilitate Research Toy activities (run through a past study without collecting data)
- ☐ Conduct professional development (could include greetings, trainings, etc.)
- ☐ Run orientations for new staff
- ☐ Write material for visitors/web/communication
- ☐ Other (please specify): _____

Have you been involved in any of the following activities?

	YES, I have done this activity	NO, I have not done this activity	I'm not sure
I was involved in my site's decision to start a Living Lab.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have helped spread the Living Lab model to a new location.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have told my colleagues why I value the Living Lab model.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have sought funding to support the sustainability of my Living Lab site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Your Living Lab

The following questions ask about aspects of the Living Lab model. We know that Living Lab operates in different ways in different partnerships, and that each site implements or modifies Living Lab in a way that best fits its own setting. We are interested in knowing what Living Lab looks like at your site.

How, if at all, does your site implement these aspects of the Living Laboratory model?

	We IMPLEMENT this aspect	We IMPLEMENT A MODIFIED VERSION of this aspect	We DO NOT YET IMPLEMENT this aspect, but we plan to	We DO NOT IMPLEMENT this aspect and we have no plans to	I'm not sure
Visitors (children) participate in active research studies. Example: Scientists collect data from consenting visitors and educate the public about research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDICES

	We IMPLEMENT this aspect	We IMPLEMENT A MODIFIED VERSION of this aspect	We DO NOT YET IMPLEMENT this aspect, but we plan to	We DO NOT IMPLEMENT this aspect and we have no plans to	I'm not sure
Visitors (caregivers) engage in one-on-few educational interactions with researchers. Example: Scientists and visitors have one-on-one or small group conversations that allow visitors to ask questions and scientists to discuss their research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visitor education focuses on the process of science, including questions and methods as well as results. Example: Visitors experience the methods of a study, and conversations with a researcher address research questions, previous research, hypotheses, and preliminary results.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Studies occur in plain-view of the public. Example: Researchers set up their study in a place that is visible and easily accessible to visitors (e.g. exhibit gallery, lobby).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDICES

	We IMPLEMENT this aspect	We IMPLEMENT A MODIFIED VERSION of this aspect	We DO NOT YET IMPLEMENT this aspect, but we plan to	We DO NOT IMPLEMENT this aspect and we have no plans to	I'm not sure
Non-participant visitors talk with researchers and learn about on-going studies in ways similar to participants. Example: Scientists may engage non-participants in a “mock” study and have a conversation without collecting data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
On-site research is an expected and predictable part of the visitor experience. Example: Scientists and museums agree on a set schedule when researchers interact with the public whether or not they are actively collecting data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The museum trains researchers in effective museum-style education techniques. Example: Museum staff train researchers about how to approach visitors, connect the study to a visitor’s experience, and general customer service (location of bathrooms, missing child procedures, etc.).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDICES

	We IMPLEMENT this aspect	We IMPLEMENT A MODIFIED VERSION of this aspect	We DO NOT YET IMPLEMENT this aspect, but we plan to	We DO NOT IMPLEMENT this aspect and we have no plans to	I'm not sure
Museum staff gain access to current science that is relevant to their work with the public. Example: Researchers provide museum staff with ongoing professional development that connects research to the museum staff's work with visitors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Museum staff and researchers communicate regularly, collaboratively ensuring goals and needs are met. Example: Regular meetings between museum staff and researchers promote collaboration in addressing challenges and creating a joint vision for the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have anything to add about these aspects of the Living Lab model?

At your site, who is PRIMARILY involved in the following components of your partnership?

	Primarily the museum	Both the museum and researchers to a similar extent	Primarily the researchers	I don't know
Who schedules Living Lab activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who manages the physical aspects of your Living Lab (materials, lighting, equipment, etc.)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who dedicates staff to carry out Living Lab activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who supervises researchers on site?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who trains new Living Lab researchers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who trains new Living Lab museum staff/volunteers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who evaluates the success of your Living Lab collaboration?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who is responsible for securing support to sustain your Living Lab?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What professional audience do you think benefits the most from your Living Lab?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much do you agree or disagree with the following statements about YOUR Living Lab site?

	Strongly disagree	Disagree	Agree	Strongly agree	Unsure
Living Lab has improved researchers' skills in communicating with the public (explaining research in an understandable way, etc.).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Museum staff have integrated child development research into their work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

You have reached the end of this survey. Thank you for your participation!

In spring 2016, we will be conducting phone interviews (lasting about half an hour) to learn more about how sites implement the Living Lab model. Would you be willing to be included in our sample? If so, please type your name and email address here:

[The following section is ONLY for respondents who are NOT part of a current partnership]

Have you ever been involved in a Living Lab partnership?

- ☐ Yes
- ☐ No

Please briefly describe your reasons for discontinuing your involvement with this Living Lab partnership.

Do you have any plans for involvement with Living Lab in the future?

- ☐ Yes
- ☐ No
- ☐ Unsure

Please briefly explain your response:

How much do you agree or disagree with the following statement?

	Strongly disagree	Disagree	Agree	Strongly agree
The Living Laboratory model is a good fit for my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please briefly explain your response:

You have reached the end of this survey. Thank you for your participation!

In spring 2016, we will be conducting phone interviews (lasting less than half an hour) to learn more about why the Living Lab model is or is not a good fit for different sites. Would you be willing to be included in our sample? If so, please type your name and email address here:

National Living Laboratory Summative Evaluation Overall Impacts Interview for Museum Respondents

Preparation guide:

Schedule at least 30 minutes to prepare for each interview, following these steps:

1. Review the interviewee's survey and note anything particularly interesting. You may want to print a copy to have with you during the interview.
2. Copy and paste the interview questions and introduction script into a new document.
3. Determine which questions/probes are appropriate, given survey responses (i.e., question 9 should ONLY be asked if the person was involved in starting Living Lab at her/his site).
4. Remove any inappropriate questions/probes.
5. Fill in highlighted information based on survey responses.
6. Select questions for the Essential Elements section based on the interviewee's survey responses. Aim to have 16 total interview questions. When selecting questions:
 - Focus on adaptations and non-adoptions first.
 - It's ok to ask the same probe multiple times about different Essential Elements.
 - Beyond that, tend to prioritize the questions in the order they're listed. HOWEVER, we will want to make sure we get some responses to each of those questions.
7. Read through the survey and make sure it makes sense given the survey responses. In particular, check that the term "museum" is appropriate.

Probing strategy:

When deciding whether or not to use a probe, use the following guidelines:

- *If a probe has one star next to it, ask it if the person has not touched on that topic in his or her response and you're doing alright for time.
- If a probe has no star, ask it if you're alright for time and the person's response is brief such that you want additional information.

Also feel free to use probes like the following when appropriate:

- Could you tell me more about that?
- Could you explain that a little bit more?
- Why do feel that way?
- Why is that?

If you're a half hour into your interview and you're still not done, say:

- It's now [X:XX]. I have X more questions (including probes) that I'd love to ask, but I want to be respectful of your time. Do you have a few more minutes, or should we wrap up now?

Introduction

- **Thank you** so much for agreeing to talk to me today.
- **My name is** [introduce yourself].
- **Background:** This interview is part of a summative evaluation for the NSF-funded National Living Laboratory project. We are collecting data from sites that have participated in Living Laboratory events to learn more about the different ways the Living Laboratory model is implemented across the country, as well as the impacts of Living Laboratory on professionals like you. This data will inform the way we discuss the project with the field and funders.
- **Timing:** The interview should take about half an hour.
- **Audio recording:** [If agreed to be audio recorded] You have agreed to be audio recorded. The purpose of recording this interview is so that any quotes can be accurately portrayed for our analysis. Is that still ok with you?
- **Confidentiality:** Everything you say in this interview is confidential. Data gathered from this interview will be analyzed and presented as aggregate findings, and your name will never be associated with specific responses.
- **Participant rights:** At any time, you may choose to not answer a question or to stop the interview completely.
- Do you have any **questions** so far?

[TURN ON AUDIORECORDING]

Interview Questions

Living Lab Overview

1. How did you first get involved in Living Lab?
2. What role do you currently play with Living Lab?
3. How, if at all, are other people at your museum involved with Living Lab?

4. How would you describe Living Laboratory to someone who had never heard of it?

Probes:

- What do you see as the core components of the Living Lab program?
- What would you say is the purpose of Living Lab?

Benefits and Challenges of Living Lab

5. How, if at all, do you think your organization has benefitted from Living Lab?

Probes:

- *How, if at all, have you personally benefitted from your participation in Living Lab? Do you feel like you have learned anything or developed any skills?
- *How, if at all, do you think others at your museum have benefitted from Living Lab?
- *On your survey, you (strongly) (dis)agreed that museum educators have integrated child development into their work. Could you explain why you felt this way?

6. How, if at all, do you think researchers have benefitted from their participation in Living Lab?

Probes:

- *On your survey, you (strongly) agreed/disagreed that participating in Living Lab has improved researchers' communication skills with the public. Could you explain why you felt that way?

7. What do you see as some of the challenges of Living Lab?

Probe:

- *Have any of these challenges prevented your project from moving forward at any point?

Essential Elements

8. [PREP QUESTIONS BEFORE INTERVIEW]: On the online survey you completed, you responded to a series of questions about various aspects of the Living Lab model, and I have a few follow-up questions for you.

- [If adapted]: One question asked whether [Essential element]. You responded that you implement a modified version of this aspect. How have you adapted this aspect? What were your motivations for making these modifications?
 - Probe: For example, [example from survey]
- [If haven't yet implemented]: One question asked whether [Essential element]. You responded that you do not implement this aspect but that you plan to. What, if any, are your plans to implement this aspect in the future?
 - Probe: For example, [example from survey]
- [If will not adopt]: One question asked whether [Essential element]. You responded that you do not implement this aspect. Why have you chosen not to implement this aspect?

- Probe: For example, [example from survey]
- [Mutual professional development]: Two of the survey questions focused on professional development. Could you tell me what, if anything, your site does to train researchers and museum educators who are involved in Living Lab?
 - Probe: How do you initially introduce new researchers and museum educators to Living Laboratory? *Are there ongoing training opportunities for museum educators or researchers? *Who leads these trainings? Does your site use the Living Laboratory greeting process?
- [Expected and predictable research]: One question asked whether on-site research is an expected and predictable part of the visitor experience. You responded that you [response]. What does it mean for research to be expected and predictable at your institution?
 - Probe: About how often do Living Lab activities take place at your site?
- [Regular communication]: On your survey you indicated that museum educators and researchers communicate regularly to collaboratively ensure that programmatic goals and needs are met. Could you tell me what this communication consists of at your site?
 - Probes: *Who is involved in this communication? *What topics do these conversations typically address?

Initial Involvement and Adaptation

9. [If involved in site's decision to become involved in LL]: What was your site's motivation for becoming involved in Living Lab?
10. How, if at all, have you changed anything about the way you or your site does your Living Lab program, compared to your initial plans?
11. On your survey, you noted that [description of ownership]. Could you tell me more about how the different partners share the ownership of your Living Laboratory?
Probes:
 - What, if anything, do you know about how these roles and responsibilities were established?
 - * Some sites ask Living Lab researchers to wear the same clothing as floor staff, some consider Living Lab researchers to be museum volunteers, and some emphasize the fact that researchers are visitors from a local college or university. How, if at all, does your site integrate Living Lab into existing staff or volunteer policies?

Sustainability

12. How would you describe the way other people at your museum view Living Lab?

Probes:

- *What, if anything, do you know about what your museum's leadership thinks of Living Lab?
- *How, if at all, has staff turnover impacted your site's involvement with Living Lab?
- [If involved in sustainability]: *How has your site been planning for the sustainability of the partnership?
- [If site has sought funding]: *How, if at all, have you or your museum partner sought funding to support your Living Lab?

13. We've reached the end of the interview. Is there anything else you'd like to add about your experience with Living Laboratory?

Thank you so much for talking with me today. Your feedback will help us better understand the impacts of the Living Laboratory model. We truly appreciate your participation, and wish you all the best with your future involvement in Living Lab!

National Living Laboratory Summative Evaluation Overall Impacts Researcher Interview

Preparation guide:

1. Schedule at least 30 minutes to prepare for each interview, following these steps:
2. Review the interviewee's survey and note anything particularly interesting. You may want to print a copy to have with you during the interview.
3. Copy and paste the interview questions and introduction script into a new document.
4. Determine which questions/probes are appropriate, given survey responses (i.e., question 9 should ONLY be asked if the person was involved in starting Living Lab at her/his site).
5. Remove any inappropriate questions/probes.
6. Fill in highlighted information based on survey responses.
7. Select questions for the Essential Elements section based on the interviewee's survey responses. Aim to have 16 total interview questions. When selecting questions:
8. Focus on adaptations and non-adoptions first.
9. It's ok to ask the same probe multiple times about different Essential Elements.
10. Beyond that, tend to prioritize the questions in the order they're listed. HOWEVER, we will want to make sure we get some responses to each of those questions.
11. Make the Essential Elements selected questions read smoothly by listing each separately and removing any questions you won't be using.
12. Read through the survey and make sure it makes sense given the survey responses. In particular, check that the term "lab" is appropriate.

Probing strategy:

When deciding whether or not to use a probe, use the following guidelines:

- *If a probe has one star next to it, ask it if the person has not touched on that topic in his or her response and you're doing alright for time.
- If a probe has no star, ask it if you're alright for time and the person's response is brief such that you want additional information.

Also feel free to use probes like the following when appropriate:

- Could you tell me more about that?
- Could you explain that a little bit more?
- Why do feel that way?
- Why is that?

If you're a half hour into your interview and you're still not done, say:

- It's now [X:XX]. I have X more questions (including probes) that I'd love to ask, but I want to be respectful of your time. Do you have a few more minutes, or should we wrap up now?

Introduction

- **Thank you** so much for agreeing to talk to me today.
- **My name is** [introduce yourself].
- **Background:** This interview is part of a summative evaluation for the NSF-funded National Living Laboratory project. We are collecting data about the impacts of Living Laboratory on professionals like you. This data will inform the way we discuss the project with the field and funders.
- **Timing:** The interview should take about half an hour.
- **Audio recording:** [If agreed to be audio recorded] You have agreed to be audio recorded. The purpose of recording this interview is so that any quotes can be accurately portrayed for our analysis. Is that still ok with you?
- **Confidentiality:** Everything you say in this interview is confidential. Data gathered from this interview will be analyzed and presented as aggregate findings, and your name will never be associated with specific responses.
- **Participant rights:** At any time, you may choose to not answer a question or to stop the interview completely.
- Do you have any **questions** so far?

[IF APPLICABLE, TURN ON AUDIORECORDING]

Interview Questions

Living Lab Overview

1. How did you first get involved in Living Lab?
 2. What role do you currently play with Living Lab?
 3. How, if at all, are other people from your lab involved with Living Lab?
 4. How would you describe Living Laboratory to someone who had never heard of it?
- Probes:
- What do you see as the core components of the Living Lab program?
 - What would you say is the purpose of Living Lab?

Benefits and Challenges of Living Lab

5. How, if at all, do you think your lab has benefitted from Living Laboratory?

Probes:

- *How, if at all, have you personally benefitted from your participation in Living Lab? Do you feel like you have learned anything or developed any skills?
- *How, if at all, do you think others at your lab have benefitted from Living Lab?
- *On your survey, you (strongly) (dis)agreed that participating in Living Lab has improved researchers' communication skills with the public. Could you explain why you felt that way?

6. What, if anything, do you think museum educators have gained from their participation in Living Lab?

Probe:

- *On your survey, you (strongly) (dis)agreed that museum educators have integrated child development research into their work. Could you explain what that looks like at your site?

7. What do you see as some of the challenges of Living Lab?

Probe:

- *Have any of these challenges prevented your project from moving forward at any point?

Essential Elements

[PREP QUESTIONS BEFORE INTERVIEW]: Now I'd like to hear a little about what Living Lab looks like at your site. On your survey, you responded to a series of questions about various aspects of the Living Lab model, and I have a few follow-up questions for you.

8. [If adapted]: One question asked whether [Essential element]. You responded that you implement a modified version of this aspect. How have you adapted this aspect? What were your motivations for making these modifications?

a. Probe: For example, [example from survey]

9. [If haven't yet implemented]: One question asked whether [Essential element]. You responded that you do not implement this aspect but that you plan to. What, if any, are your plans to implement this aspect in the future?

a. Probe: For example, [example from survey]

10. [If will not adopt]: One question asked whether [Essential element]. You responded that you do not implement this aspect. Why have you chosen not to implement this aspect?

a. Probe: For example, [example from survey]

11. [Mutual professional development]: Two of the survey questions focused on professional development. Could you tell me what, if anything, your site does to train researchers and museum educators who are involved in Living Lab?

- a. Probe: How do you initially introduce new researchers and museum educators to Living Laboratory? *Are there ongoing training opportunities for museum educators or researchers? *Who leads these trainings? Does your site use the Living Laboratory greeting process?
- 12. [Expected and predictable research]: One question asked whether on-site research is an expected and predictable part of the visitor experience. You responded that you [response]. What does it mean for research to be expected and predictable at your institution?
 - a. Probe: About how often do Living Lab activities take place at your site?
- 13. [Regular communication]: On your survey you indicated that museum educators and researchers communicate regularly to collaboratively ensure that programmatic goals and needs are met. Could you tell me what this communication consists of at your site?
 - a. Probes: *Who is involved in this communication? *What topics do these conversations typically address?

Initial Involvement and Adaptation

- 14. [If involved in site's decision to become involved in LL]: What was your site's motivation for becoming involved in Living Lab?
- 15. How, if at all, have you changed anything about the way you or your site does your Living Lab program, compared to your initial plans?
- 16. On your survey, you noted that [description of ownership]. Could you tell me more about how the different partners share the ownership of your Living Laboratory?

Probe:

 - What, if anything, do you know about how these roles and responsibilities were established?

Sustainability

- 17. How would you describe the way other people in your organization view Living Lab?

Probes:

 - *What do your superiors think of Living Lab?
 - *How, if at all, has staff turnover impacted your site's involvement with Living Lab?
- 18. [If involved in sustainability]: *How has your site been planning for the sustainability of the partnership?
 - a. [If site has sought funding]: *How, if at all, have you or your museum partner sought funding to support your Living Lab?
- 19. We've reached the end of the interview. Is there anything else you'd like to add about your experience with Living Laboratory?

Thank you so much for talking with me today. Your feedback will help us better understand the impacts of the Living Laboratory model. We truly appreciate your participation, and wish you all the best with your future involvement in Living Lab!

National Living Laboratory Summative Evaluation Non-Current Respondent Interview

Introduction

- **Thank you** so much for agreeing to talk to me today.
- **My name is** [introduce yourself].
- **Background:** This interview is part of a summative evaluation for the NSF-funded National Living Laboratory project. We are collecting data about how and why different sites have implemented or not implemented aspects of the Living Laboratory model. This data will inform the way we discuss the project with the field and funders.
- **Timing:** The interview should take less than half an hour.
- **Audio recording:** [If agreed to be audio recorded]: You have agreed to be audio recorded. The purpose of recording this interview is so that any quotes can be accurately portrayed for our analysis. Is that still ok with you?
- **Confidentiality:** Everything you say in this interview is confidential. Data gathered from this interview will be analyzed and presented as aggregate findings, and your name will never be associated with specific responses.
- **Participant rights:** At any time, you may choose to not answer a question or to stop the interview completely.
- Do you have any **questions** so far?

[TURN ON AUDIORECORDING]

1. How did you first hear about Living Laboratory?
Probe:
 - When was that?
2. What motivated you to learn about the Living Laboratory model?
Probes:
 - What did you find interesting about Living Lab?
 - What did you see as the potential benefits of the model?
3. What, if any, do you see as the strengths of the Living Lab model?
4. What, if any, do you see as the weaknesses of the Living Lab model?

5. How, if at all, has your site collaborated with local researchers/museums?
Probes:
 - What do you see as the difference between this interaction and Living Laboratory?
 - What, if any, have been the benefits of working together?
 - What, if any, have been the challenges of working together?
 - How would you describe the current status of the interaction?
 - What, if any, are your future plans for working together?
6. How, if at all, has your site implemented any aspects of the Living Laboratory model?
 - How, if at all, have you modified these aspects of the Living Lab model to better suit your needs?
 - How, if at all, have you found these aspects to be beneficial?
 - What challenges, if any, have you faced in implementing these aspects of the Living Lab model?
7. Which aspects of the Living Lab model, if any, have you chosen not to implement?
 - Why have you chosen not to implement these aspects?
8. How, if at all, could Living Laboratory provide resources or support that would strengthen your site's ability to foster collaboration between a museum and a researcher?
9. How, if at all, has anyone else at your organization been involved in Living Laboratory?
Probes:
 - How would you describe the way the leadership of your organization views Living Lab?
 - How, if at all, has staff turnover impacted your site's involvement with Living Lab?
10. [If incomplete explanation for survey number 11]: On your survey, you noted that the Living Lab model was (not) a good fit for your organization. Could you explain why you felt that way?
11. [If incomplete explanation for survey number 10]: On your survey, you noted that you do (not) have plans for future involvement with Living Lab.
[If yes]: Could you explain your plans to continue?
[If no]: What are the primary reasons why you do not plan to be involved with Living Lab in the future?
12. We've reached the end of the interview. Is there anything else you'd like to add about your experience with Living Laboratory?

Thank you so much for talking with me today. Your feedback will help us better understand the impacts of the Living Laboratory model. We truly appreciate your participation, and wish you all the best with your future involvement in Living Lab!

Supporting data collection instruments

National Living Laboratory Stipend Awardee Meetings Evaluation Guide

Overview: The National Living Laboratory will host two meetings for stipend awardees in April, 2015. This document outlines the evaluation tasks and provides data collection forms for the Boston meeting, which will take place from April 9 to April 10. At this Boston meeting, more than one data collector will participate. This guide serves to coordinate the efforts of these data collectors to ensure consistent evaluation methods. The Portland meeting, on April 23 and April 24, is expected to follow a similar agenda and data collection plan. However, only one data collector will be present for this meeting.

Boston Showcase Agenda

DAY ONE, April 9th 2015

8:30-9:00	Registration and Breakfast
9:00-9:15	Welcome and Meeting Logistics
9:15-9:30	Current Status of Living Laboratory <ul style="list-style-type: none"> • History, Goals, Growth of Living Laboratory • National Living Laboratory Community of Learners
9:30-12:00	National Living Laboratory Community <ul style="list-style-type: none"> • Museum and Academic Collaborators Present (10 Minutes each)
12:00-12:45	Lunch
12:45-1:15	Academic Poster Session
1:15-1:45	Challenges Discussion <ul style="list-style-type: none"> • Large group activity: brainstorming challenges Awardees have faced
1:45-2:45	Small Group Breakouts: Reflecting on Relationships <ul style="list-style-type: none"> • Participants break out into groups to discuss Living Laboratory partnerships, past successes and opportunities • Discussion continues as a large group
2:45-3:00	Break/snacks
3:00-4:30	Sustainability and Next Steps at Stipend sites

- Attendees will be asked to describe original proposal for sustaining Living Laboratory, then update on how that is going or what has changed.
- Large group discussion on common themes seen from the Quarterly Reports
- Dyad brainstorm of partnership-specific next steps once you return to your institution(s). Share out of ideas.

4:30-4:45 Evaluation, End of Day 1 ****COLLECT PAPER SURVEYS****

6:00 Dinner at The Similans

- 145 1st Street, Cambridge MA 02142
- If you would like to walk over together from the hotel, meet us at 5:45 at the lobby of the Sonesta

DAY TWO, April 10th 2015

9:00-9:30 Breakfast

9:30-9:45 Introduction to Shareouts

9:45-11:45 Share Out Showcase

- Awardees have 10-15 minutes to share on the products of your Award. What can be shared with other sites? What can be put into practice at other sites?

11:45-12:15 Sustainability form the Project Team

12:15-12:45 Discussion, Wrap-up, Next Steps

12:45-1:00 Evaluation and Concluding Thoughts

Please enjoy a local lunch and head over to the Museum of Science at 2:30 for an opportunity to explore the Discovery Center and the rest of the Museum. On Fridays it is open until 9:00. Ask the Project Team for (both) favorite eateries and exhibits!

National Living Laboratory Stipend Awardee Meeting
Field Note Form for Leadership Presentations (4/9 9:00-9:30, 4/10 9:30-9:45, 12:15-1:00)

How do presenters support sites in implementing a Living Lab model? Do they discuss the essential elements and/or deliverables?

Do presenters discuss options for spreading the model?

How do presenters discuss plans for sustainability?

How, if at all, do presenters adapt their plans to support the community of learners?

Notes:

**National Living Laboratory Stipend Awardee Meeting
Field Note Form for Presentations (4/9 9:30-12:00)**

ISE Presenter:

Academic Presenter:

Essential elements - Which essential elements does the site adopt? Yes No Unclear
(select yes/no/unclear)

1. Visitors contribute to scientific discovery through participation in active studies

Evidence:

2. Visitors engage in one-on-one educational interactions with researchers

Evidence:

3. Studies occur in plain-view of the public, on the exhibit floor

Evidence:

4. Museum staff train researchers in effective museum-style education techniques

Evidence:

5. Museum educators gain direct access to relevant, current science

Evidence:

6. Visitor education focuses on the process of science, increasing “questions and methods” as well as “results”

Evidence:

7. Non-participant visitors talk with researchers and learn about on-going studies

Evidence:

8. On-site research is an expected and predictable part of the visitor experience

Evidence:

9. Museum educators and researchers communicate regularly, collaboratively monitoring the program to meet goals and fulfill needs

Evidence:

Notes:

**National Living Laboratory Stipend Awardee Meeting
Field Note Form for Challenges Discussion (4/9 1:15-1:45)**

What barriers prevent participants from moving forward?

How have sites changed their initial plans after facing challenges?

Have the sites adapted the model and/or essential elements? How? Why?

How do MOS and Tier I partners adapt to support the community of learners?

Notes:

**National Living Laboratory Stipend Awardee Meeting
Field Note Form for Small Group Breakouts (4/9 1:45-2:45)**

Data collector: Try to rotate around small group discussions to hear from a range of sites.

Does it sound like educators and researchers communicate regularly (essential element 9)?

Does it sound like educators and researchers work together to meet goals and fulfil needs (essential element 9)?

Do partners discuss learning from one another (essential elements 7 and 8)?

Notes:

**National Living Laboratory Stipend Awardee Meeting
Field Note Form for Sustainability Discussions (4/9 3:00-4:30, 4/10 11:45-12:15)**

How, if at all, have sites' plans for implementation changed?

Have the sites adapted the model and/or essential elements? How? Why?

Are there plans for sustainability? Are there efforts to secure additional support?

Have partners made any plans to spread the model?

Are there barriers that prevent participants from moving forward?

Notes:

**National Living Laboratory Stipend Awardee Meeting
Field Note Form for Share Out Showcase (4/10 9:45-11:45)**

ISE Presenter:

Academic Presenter:

Notes (What products were produced? Who developed them? How do they support the Living Lab model?):

**National Living Laboratory Stipend Awardee Meeting
Summative Evaluation Survey**

Please help our summative evaluators learn what's happening at your site by filling out this brief survey.

1. Informal education site: _____

2. Academic partner site: _____

3. When did your partnership start? _____

4. How many staff members are there at your informal education site?

(Please circle): 1-10 11-50 51+

5. What academic level describes most researchers at your site?

(Please circle): Undergraduate Graduate Other

6. To the best of your knowledge, will your site's Living Laboratory be running over the summer?

(Please circle): Yes No Not sure

If yes, please explain the expected schedule (# days per week and hours per day):

7. To the best of your knowledge, will your site's Living Laboratory be running in fall 2015?

(Please circle): Yes No Not sure

If yes, please explain the expected schedule (# days per week and hours per day):

8. Are you planning to apply for another stipend?

(Please circle): Yes No Not sure

Hub Leader Focus Group – Facilitator Guide

May 4, 2016

- 3:30 Welcome and overview
- 3:35 Essential Element 1: Visitors contribute to the process of scientific discovery through participation in active studies
- 3:50 Essential Element 2: Visitors engage in one-on-one educational interactions with scientists conducting the research
- 4:05 Essential Element 3: Visitor education focuses on the process of science, increasing interest in and understanding of research "questions and methods" as well as "results"
- 4:20 Essential Element 4: Studies occur in plain-view of the public, on the exhibit floor (not behind closed doors)
- 4:35 Essential Element 5: Non-participant visitors talk with researchers and learn about on-going studies in ways similar to study participants
- 4:50 Essential Element 6: On-site research is an expected and predictable part of the visitor experience
- 5:05 Break
- 5:15 Essential Element 7: Researchers receive training from museum staff in effective museum-style education techniques, improving researchers' communication skills with public audiences
- 5:30 Essential Element 8: Museum educators gain direct access to current science that is relevant to their work with the public, improving educators' understanding of science and its potential application to their practice
- 5:45 Essential Element 9: Museum educators and researchers communicate regularly, collaboratively monitoring the program to ensure scientific and educational goals are met, and that programmatic needs (e.g. logistical, financial) are fulfilled
- 6:00 What is "Essential?"
- 6:20 Evaluation discussion

3:30 Welcome and overview

- [As people come in, gather consent forms for recording]
- Thanks for coming
- This conversation is part of the summative evaluation for the NSF-funded National Living Laboratory project.
- One of the themes of our summative evaluation is an investigation of how Living Lab sites demonstrate a shift in ownership of the model by making it their own and how they define the model at their own sites
- One of our evaluation questions also looks specifically at how the project leadership has changed its support of the community over time
- The purpose of this discussion is to gather information about your current understanding of the Essential Elements. Your responses will inform the way we discuss the project and frame our evaluation findings.
- There are no right and wrong answers today, nor does everyone need to agree. Everyone should feel comfortable sharing; all of your perspectives are valuable.
- We will be looking closely at the wording of the Essential Elements, but our discussion is not meant to be critical. Rather, it can demonstrate your shift in understanding as the model has grown to new contexts.
- We're not editing or worrying about wordsmithing the Elements but having a fluid conversation and trying to uncover current understandings
- We have a tight schedule for this conversation. We'll start by discussing each public-facing Essential Element individually, then we'll take a break, then we'll talk about each professional-facing Essential Element, and then we'll have the chance to reflect on the whole picture. At the end I have a few other evaluation questions. Then we'll wrap up by 6:30 so there will be time for food and festivities.
- This is a lot to cover in 3 hours. If I cut you off at any point, know that we'll have opportunities to revisit topics later on. I'll keep a Parking Lot where we can list discussion items for later.
- You have agreed to be audio recorded. The purpose of recording this discussion is so that any quotes can be accurately portrayed for our analysis. Is that still ok with you? Everything you say in this discussion is confidential. Data gathered from this conversation will be analyzed and presented as aggregate findings, and your name will never be associated with specific responses. At any time, you may choose to not answer a question or to stop the discussion completely.
- Does anyone have questions before we start?
- [Turn on recording]

For the following sections, use the bulleted questions as probes when needed. You will NOT be able to ask all of the questions. Start each section by reading the language of the Essential Element aloud. Initiate the discussion with a probe, and then direct the conversation to address different understandings of the Element. For terminology that comes up repeatedly, nudge the conversation along. Use the Parking Lot to note down topics to revisit later. Some Elements may have more to discuss than others, but try to keep moving along as there is not much leeway and the meeting may not start right on time.

3:35 Essential Element 1: Visitors contribute to the process of scientific discovery through participation in active studies

- How broadly are visitors defined? What types of informal education settings count?
- How many visitors need to be eligible for the active study?
- What disciplines of scientific discovery? Adult psychology? Biology? Chemistry? Education?
- Who can do scientific discovery? A private research firm? Industry? Trained educators?
- How do we define an active study? Prototyping or pilot testing? Researchers using research toys? Collecting comparison data?

3:50 Essential Element 2: Visitors engage in one-on-few educational interactions with scientists conducting the research

- What about a group briefing for a field trip class? A group research toy experience?
- What if people think one-on-few does not include one-on-one?
- What if the educational interaction is with an educator before or after the researcher runs the study?
- Can a high school student be a scientist? An undergraduate? A trained educator?
- Research toy run by a scientist? By an educator?

4:05 Essential Element 3: Visitor education focuses on the process of science, increasing interest in and understanding of research "questions and methods" as well as "results"

- What if this is entirely learning-by-doing?
- What if the emphasis is on relevance and application instead of the process?
- What are your thoughts about researchers recruiting for their lab?
- What about providing referrals to other resources (diagnostic, etc)?

- 4:20 Essential Element 4: Studies occur in plain-view of the public, on the exhibit floor (not behind closed doors)
- Is the cozy cottage approach an adapted version at this point?
 - Activity room?
 - TV streaming what's behind closed doors? TV behind a partial partition?
 - Closed room with a window?
 - Recruiting with research toys in public space but study in a closed room?
- 4:35 Essential Element 5: Non-participant visitors talk with researchers and learn about on-going studies in ways similar to study participants
- Research toy instead of study? What happens when the study simply isn't appropriate for all ages?
 - 60 second version of a 5-minute study? How short can it go?
 - Turning a single-person interaction into a family or group experience?
 - Educators leading a study or research toy instead of a scientist?
- 4:50 Essential Element 6: On-site research is an expected and predictable part of the visitor experience
- Do research toys count?
 - Expected and predictable on a college schedule?
 - What happens when there's a lull in the study?
 - Can it be too expected and predictable? What happens when regular visitors have already done it?
 - What about a model where regular visitors sign up ahead of time?
- 5:05 Break
- 5:15 Essential Element 7: Researchers receive training from museum staff in effective museum-style education techniques, improving researchers' communication skills with public audiences
- What if the training is from a PI or Lab Manager?
 - What if it's just an orientation at the beginning?
 - What if there's no orientation but ongoing PD?
 - What if it's learning-by-doing but nothing formal?
 - What if greetings are done by email or online form?
 - What if the greeting is the same two people each time?

5:30 Essential Element 8: Museum educators gain direct access to current science that is relevant to their work with the public, improving educators' understanding of science and its potential application to their practice

- What museum educators count? Board members? An ED? A Director of Exhibits or Education? Floor staff?
- What if it's collaboration around an exhibit? Label copy? Flyers?
- What if the Museum benefits from having the researchers there for the public, but staff don't directly learn from the scientists?
- What if this is entirely viewing and/or participating in the research?
- What if it's a researcher helping museum staff with Excel? Evaluation?

5:45 Essential Element 9: Museum educators and researchers communicate regularly, collaboratively monitoring the program to ensure scientific and educational goals are met, and that programmatic needs (e.g. logistical, financial) are fulfilled

- Who counts as a museum educator? Could it be an administrator? A Director of Research?
- Who counts as a researcher? A Lab Manager? Administrative Assistant?
- How often is regular? Once per semester?
- Does email count? Skype? Google docs?
- What if there are no educational goals (benefit of the program is the collaboration itself)?
- What if the researcher's goals are educational (for students or public) rather than scientific?

6:00 What is "Essential?"

- What is the minimum that needs to be done to be a Living Lab adopter? Are there key elements that are more vital than others?
- What's the difference between implementing and implementing a modified version?
- Are requirements different types of organizations? Large and small museums? Other informal education organizations? Large and small research organizations?
- Guidelines for using Living Lab branding?
- At what point is it just not a good fit? An undergraduate institution that doesn't do active research but is committed to education? A researcher with ideal research that isn't interested in education?
- The community vs. adopters: What do you see as the difference?

6:20 Evaluation

- What sites are doing Living Lab evaluation?
- What questions are they looking at?
- How are they studying those questions?

- Who is doing the evaluation
- What do other sites want to know?

Researcher Pre-/Post-Survey about Science Communication

Thank you for your willingness to complete this online survey! The purpose of this survey is to better understand and explain the impact of the Living Laboratory model. The evaluation consists of brief pre- and post-surveys at the beginning and end of your experience.

How long will it take?

- The entire survey should take about 10 minutes to complete.
- The survey includes some questions about your study, what you value about the Living Lab program, and your experience with Living Lab.

Information about your participation:

- This survey is optional, and you can skip any questions or stop at any time.
- Your survey responses will be anonymous, meaning that your name and email address will never be associated with your responses.
- The information you provide will be used for the purposes of improving and communicating about the Living Lab program.

Please contact Clara Cahill at ccahill@mos.org or Katie Todd at ktodd@mos.org with any questions about the survey.

Is this your first or second time taking this survey?

- ☐ First time (pre-survey)
- ☐ Second time (post-survey)

What is your position in your current research lab? Select all that apply.

- ☐ Undergraduate student
- ☐ Research assistant
- ☐ Graduate student
- ☐ Volunteer
- ☐ Other - Please specify: _____

Prior to participating in your current project, how often did you talk about your research to the general public? (e.g. participating in an outreach organization; writing a blog; talking with newspaper reporters; writing for a newsletter, etc.)

- ☐ Never--I had not talked about my research to the general public
- ☐ Rarely--Only once or twice before
- ☐ Sometimes--A couple of times per semester
- ☐ Often--About once a week
- ☐ All the time--More than once a week

How often do you talk about your research to the general public? (e.g. participating in an outreach organization; writing a blog; talking with newspaper reporters; writing for a newsletter, etc.)

- ☐ Never--I had not talked about my research to the general public
- ☐ Rarely--Only once or twice before
- ☐ Sometimes--A couple of times per semester
- ☐ Often--About once a week
- ☐ All the time--More than once a week

How long have you been involved in conducting behavioral science research?

- ☐ 3 months or less
- ☐ 4 - 6 months
- ☐ 7 - 9 months
- ☐ 10 - 12 months
- ☐ More than 1 year

How long have you been involved in conducting behavioral science research with your current research laboratory?

- ☐ 3 months or less
- ☐ 4 - 6 months
- ☐ 7 - 9 months
- ☐ 10 - 12 months
- ☐ More than 1 year

How would you respond to the following questions from the adult family members of a study participant:

What is your study about?

Tell me about your study methods: What are you measuring, and how are you measuring it?

Why do you think your study is important?

How valuable do you find the following aspects of doing research?

	Not valuable	Somewhat valuable	Valuable	Very valuable
Learning about the process of scientific research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interacting with study participants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interacting with the families or caretakers of study participants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contributing to scientific progress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaining research experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning about behavioral science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving my communication skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What, if anything, do you hope the participants or their family members get out of participating in your study and talking with you?

What, if anything, do you get out of the experience of running research studies and talking with family members?

Living Laboratory Researcher Pre-/Post-Survey: Coding Scheme for Open-Response Questions

Each of the following topics relates primarily to one of the qualitative responses in the survey. However, the coder should look across all three questions before assigning codes, as the respondent may have provided relevant information in another question.

Question	Code	Positive Example	Negative Example (if applicable)
What is this study about?	The respondent names a <u>construct</u> that will be studied. This is the topic of the study, or the dependent variable.	<u>Creativity and shape recognition</u> in children 2-4 years old. Whether kids' number knowledge affects their <u>concept of sharing</u> .	I have not started working in the lab yet, so I am unaware of the specifics about our study.
	The claim identifies one or more <u>independent variables</u> . This is what affects the construct. It might be different conditions or demographic factors.	Whether kids' <u>number knowledge</u> affects their concept of sharing.	It's about infants' understanding of social relationships.
What are your methods?	The respondent describes methods and/or data from the study that are <u>appropriate</u> to the study topic. The respondent must describe at least one method that is logically connected to the independent and/or dependent variables of interest.	[Claim]: We are studying how the authenticity of a work of art affects how people make judgments about how good the work of art is. [Evidence]: We are measuring people's judgments of how good two works of art are on a scale of 1 to 7, with 7 being the best. One is an original and the other is a perfect copy. We are comparing people's ratings of the two pieces to see the difference between people's perceptions of an original and forgery.	[Claim]: Our study is about the way in which children learn from different information sources [Evidence]: We used different snap circuit boards to show electricity and how things work. By timing the child and measuring the explanations of both the child and parent

APPENDICES

<p>The respondent describes methods that <u>sufficiently</u> address the topic.</p> <p>The methods must address every independent and dependent variable the respondent mentioned.</p>	<p>[Claim]: Creativity and shape recognition in children.</p> <p>[Evidence]: If the kids can correctly identify the four shapes, how long it takes them to put the four shapes in the sorter ball, how creative a picture they make on the paper. Pre test, make stamp picture on paper, post test.</p>	<p>[Claim]: this study is about how adults providing labels and explanations affect how children perceive information</p> <p>[Evidence]: We are doing an induction phase where in one case, the adults will hear the benefits of providing children with labels, and in another case the adults will hear the benefits of providing children with explanations.</p> <p>(there is no explanation of measuring how children perceive information)</p>
<p>Study <u>procedure/</u> protocol/instructions</p> <p>The respondent describes study stimuli and/or what participants do during the study.</p>	<p>In the study, children are asked to identify emotions based on photographs of facial expressions and stories read out loud to the child. Children are also asked to match stories to facial expressions.</p>	<p>we are measuring the child's response</p>
<p>Example of <u>what data are recorded</u>.</p> <p>The respondent describes what they measure and/or how.</p>	<p><u>We are measuring How long children continue looking inside the box</u> depending on if they think there are more ducks inside.</p>	<p>First we ask kids to divide toys evenly among 2 stuffed animals and then ask them to put a certain number of frogs in a pond to determine their number knowledge</p>
<p>Interpretation of <u>why the data are collected</u> with respect to the claim or variables.</p> <p>The respondent describes why the data collected is meaningful in light of the variables of interest.</p>	<p>We're looking at what parts of the toy the children play with when they interact with the toy. Do they play with the tool, the light, the wire, or do they do something else. If they do play with the tool we look for what's called an "expected look." In this case it would mean the child interacted with the tool and then looked at the box expecting the light to turn on. <u>This expected look tells us that the child thinks</u></p>	<p>We are measuring infants' expectation of social interactions by coding their looking time</p>

APPENDICES

		<u>the tool can produce an effect on the light.</u>	
Why do you think your study is important?	<p>The author situates the study among <u>existing knowledge</u>.</p> <p>This can be broad, like a mention of prior research or what is known before the study. It does NOT have to be scientific knowledge.</p>	<p><u>We already know from existing research</u> that two-year old children use causal reasoning. We do not, however, know how younger children think about what makes things happen.</p>	It is important to understand children's development.
	<p>The respondent connects the study to <u>everyday life</u>.</p> <p>This is a statement that connects to the respondent's or children's personal experiences.</p>	<p><u>There are several instances in our daily life in which children make causal reasoning</u>, such as using the remote control and playing with toys. We can better understand how, when, and why children reason this way.</p>	Our study is important because it determines at what age children can understand social norms and take on the perspectives of others.
	<p>The respondent notes that the study is important for <u>understanding</u> the topic generally.</p> <p>This is a comment about how the study gives us new knowledge.</p>	<p>This study is important in <u>understanding the cognitive ability of developing minds</u>.</p>	It allows for conversation of science and learning between the parent and child
	<p>Respondent notes that the study could inform a specific <u>application</u>.</p> <p>Respondent talks about how the research could</p>	<p>Knowing whether the quality of parental responses contributes to a child's development of critical thinking skills could shed insight into that process, which could hopefully <u>used in developing tools to help parents and</u></p>	It will help us understand the different insight and awareness children have when teaching others.

APPENDICES

	be applied in the real world.	<u>teachers foster these skills in their children.</u>	
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These topics apply to all three qualitative questions (What is your study about, tell me about your study methods, and why do you think your study is important).

Code	Positive Example	Negative Example (if applicable)
<p>Accessible: All language and grammar is understandable (5,000 word frequency), or the response provides a definition of jargon if used.</p> <p>Unless defined, any word that is jargon would give this respondent a 0. Definitions need to actually make sense to make jargon alright.</p>	<p>The study is about children's emotional development, how children understand emotions, and how children use process of elimination to understand facial expressions. We are recording how children identify facial expressions by showing them three photos. One photo that is a sad face, one that is happy, and one that has puffed cheeks.</p>	<p>Jargon terms (unless defined) include: stimuli, look time, shape recognition, predictive look</p>
<p>Relevant: All parts of the response connect logically to the claim, evidence, or reasoning.</p> <p>All information needs to make logical sense in response to the questions.</p>	<p>[Claim]: how children learn from teachers and from mothers.</p> <p>[Evidence]: we measure the beliefs children have about the knowledge mothers have vs. the knowledge teachers have.</p> <p>[Reasoning]: Because it provides information on the nuances of the belief children have about the knowledge other people have and how/when they form their beliefs about mothers and teachers.</p>	<p>[Claim]: When kids are able to differentiate large numbers from small number.</p> <p>[Evidence]: We are measuring how long children continue looking inside the box depending on if they think there are more ducks inside.</p>
<p>Examples: The respondent provides an example or draws an analogy.</p> <p>The response seeks to make the explanation more understandable by comparing to common ideas/knowledge.</p>	<p>For example, it's kind of like studying how children learn that a remote control can turn on the TV.</p>	

Other factors:

- Word count
- Each individual code above
- Total score

Supplemental case study data

The Essential Elements

1. Visitors contribute to the process of scientific discovery through participation in active research studies. All four case study sites had visitors participating in active research. Most studies were recruiting young children, but one was collecting data from all ages, making it particularly appealing for all visitors. Many researchers valued the fact that they could run participants efficiently in the museum. One shared, *“It’s cheap, it’s easy, and I get participants. So I mean, that’s huge.”* Across the four sites, the studies explored the sense of touch, sight, smell, and hearing. Several museum staff appreciated how relevant the studies were and the fact that they emphasized hands-on learning. One museum interviewee said Living Laboratory, *“Helped kind of create this identity with our visitors that we are very mindful about taking our play conditions seriously.”*
2. Visitors engage in one-on-few educational interactions with scientists conducting the research. Each of the case study sites successfully offered one-on-one or one-on-few interactions between scientists and museum visitors. In all cases, this was facilitated by having multiple researchers on site at any given time. Across the sites, 31 research observations were conducted, and the mean duration of these interactions was 5.11 minutes, with a standard deviation of 7.10. The ratio of visitors to researchers was 1.10, with a standard deviation of 0.36. Both museum staff and researchers indicated that they valued these interactions and felt that the public did, as well. One undergraduate researcher shared, *“I think I was surprised when I went in how excited the parents were about it and how interested they were.”* Factors that limited this Element included quotas for research subjects that left researchers feeling rushed, shy researchers who did not initiate conversations, and lengthy consent forms that distracted parents from conversation.
3. Visitor education focuses on the process of science, increasing interest in and understanding of research questions and methods as well as results. Every case study site showed evidence of focusing visitor education on the process of science beyond the results. The primary way of doing this was through participation in the actual study. In addition, conversations with participants and other group members discussed many aspects of the research process. In 31 observations of the research process, researchers discussed the purpose of the study 87% of the time, the methods 80% of the time, different study conditions 58% of the time, the scientific relevance of the study 39% of the time, preliminary observations 23% of the time, connections to everyday life or the museum 19% of the time, and hypotheses 3% of the time. When time was available, one researcher would encourage visitors to develop hypotheses and test them. For instance, she would ask if a visitor thought he would be faster at a research task if he used two

hands rather than one. He was able to make a guess, gather data to test it, and draw conclusions. The same factors that hindered one-on-few educational interactions threatened visitor education about the process of science.

4. **Studies occur in plain-view of the public, on the exhibit floor.** Three case study sites fully met this Element, and one modified it. At one site, researchers positioned their equipment at benches in an exhibit gallery. Another site set up a folding table in the one-room museum. One site utilized tables in a program room which had many activities throughout the room. The craft activities that were typically on the tables were removed when the researchers were present. The fourth site had an adjustable setup. Based on how busy the space was, the equipment could provide varying levels of privacy. During the site visit, it was configured such that there were three enclosed sides and one open side where participants entered and exited. Subjects were filmed for this study, and group members and other visitors were able to watch the participant in real time on a TV screen on the other side of the divider. This configuration was developed so researchers could limit distractions while still having a way for others to watch the research. One researcher at another site expressed concerns with such distractions, saying, *“It’s loud. That can be a problem. We regularly have to run block to make sure when someone is on [research equipment] with their eyes closed they’re not going to get knocked off.”*
5. **Non-participant visitors talk with researchers and learn about on-going studies in ways similar to study participants.** The site visits showed varying degrees of direct evidence for this Element, but representatives from all of the sites indicated that they valued this aspect of the model. At the site where all ages could participate in the study, there were few non-participants because almost everyone did the study. Some group members chose to watch rather than participate, and they engaged in conversations with the researchers during which they learned about the study. At another site, the evaluator saw researchers approach non-participants to invite them to learn more, but other than an initial introduction to the study those visitors did not choose to engage in deeper learning. Researchers at that site discussed the fact that they were now designing studies with broad eligibility criteria specifically so more museum visitors could participate. The other two sites did have evidence of non-participant visitors running through the study without having their data collected. Visitors who were ineligible or uninterested in participating were able to try out the stimuli and learn about the research even though they did not complete the full protocol.
6. **On-site research is an expected and predictable part of the visitor experience.** Of the six public-facing Essential Elements, this one is the least widely implemented. As the community-wide survey data show, 42% of respondents are implementing this Element and 16% are implementing a modified version. Similarly, the case study sites displayed mixed success in implementing this Element. Two had successfully made their Living Laboratory expected and predictable. Both had a regular schedule, supplemented research with educator-led research toy shifts, and used media including signs, social media, and newsletters to promote the program. One of these sites had trouble maintaining

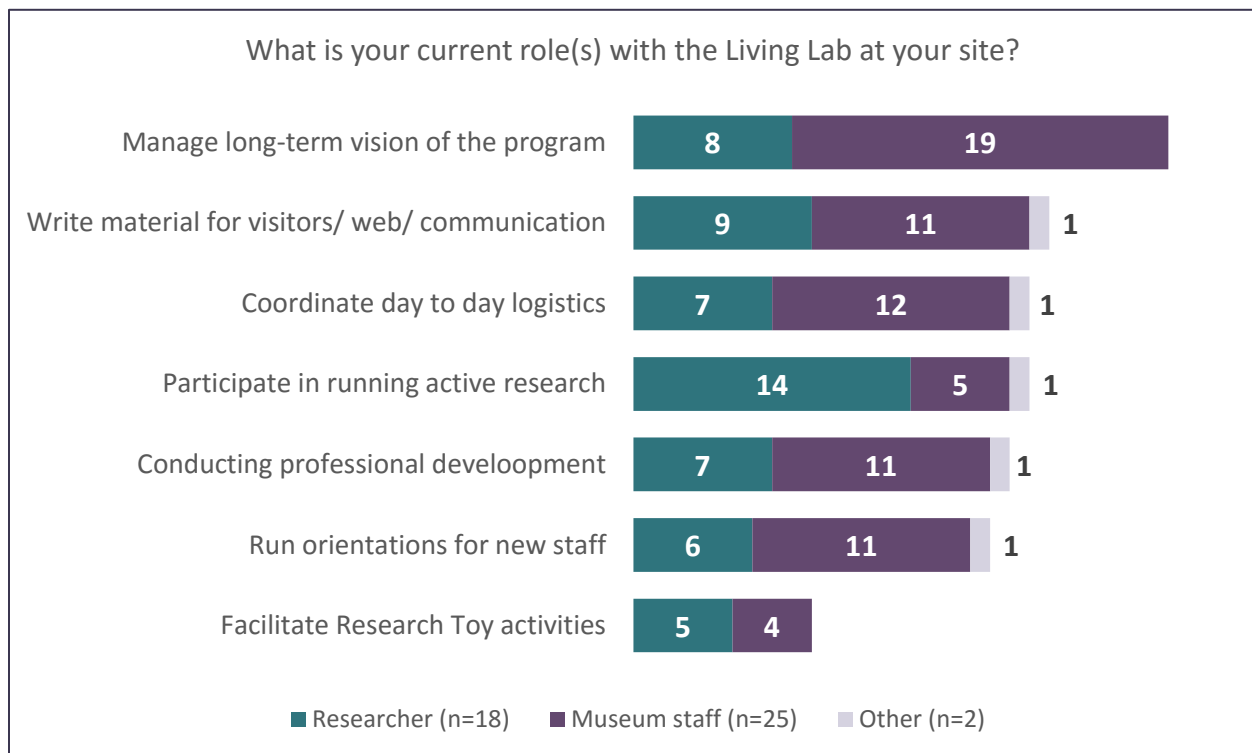
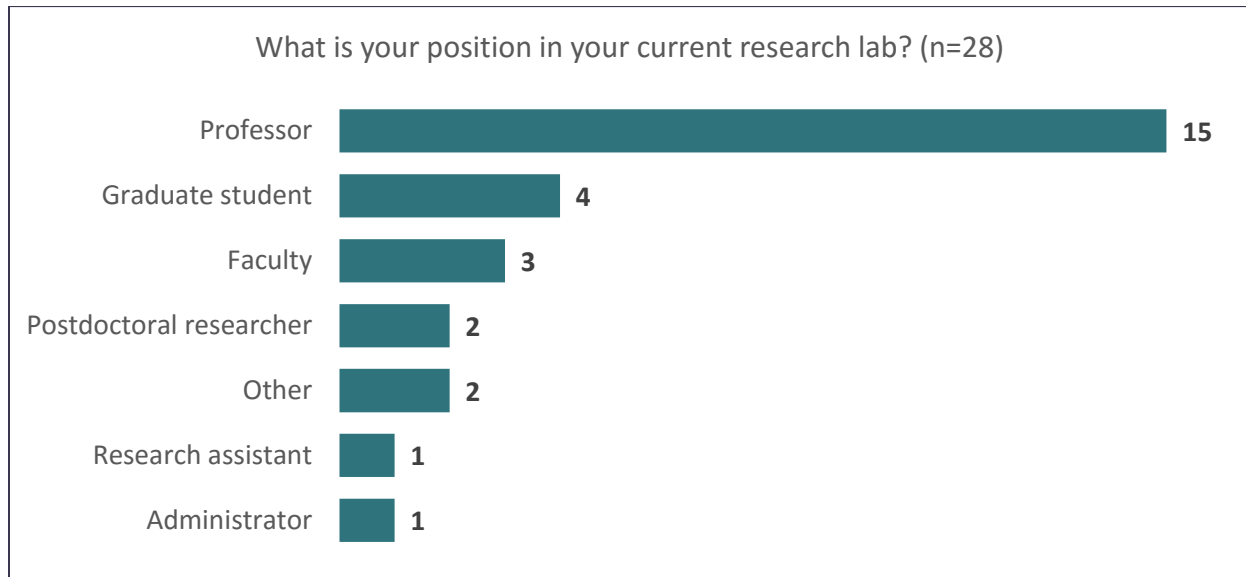
consistency when schedules shifted between academic semesters. The other site was a private research institution that had ongoing research. The third site's museum had recently opened a new space. A researcher reflected, *"It would be nice if we could get to a point where we had established shifts that could be advertised and marketed by the museum so it was more predictable for visitors, they knew when we were going to be there. That's been a bit more challenging than we thought it was going to be based on student schedules and the museum's getting a sense of their traffic at certain time points."* Both researchers and museum staff at the fourth site hope to reach a regular schedule. A museum representative shared, *"[Living Laboratory] has an impact when it's here but we can't leverage it or do anything with it in terms of promoting it or marketing it or anything because there's no set schedule."* When undergraduate students received grant funding to support their work during a summer break, the schedule was consistent for a period of time. Beyond that, though, consistency remains a challenge. The lead researcher describes that the struggle is, *"Time, really. Fitting it in. And, as you know, time and money are together. So if we were funded to do this and it were paying for a chunk of my salary, then I'd have more time."*

7. Researchers receive training from museum staff in effective museum-style education techniques, improving researchers' communication skills with public audiences. Case study sites showed mixed implementation of this Element. One site had a robust orientation curriculum that included recruitment and education techniques. Another site used role play activities to present recruitment techniques and encourage researchers to practice communication skills. At a third site, museum staff spoke in a college class to describe the informal learning environment, and researchers had engaged in the greeting process during museum staff meetings. Researchers at the fourth site had no training from the museum, but researchers benefitted from the expertise of their lead researcher, who had previously worked as a science communicator. Across all sites, researchers felt their participation in the program had improved their communication skills. One noted, *"I'm able to communicate our research in a friendly way, not use all these big words that they don't really understand. It's actually helped me be more comfortable talking about research."*
8. Museum educators gain direct access to current science that is relevant to their work with the public, improving educators' understanding of science and its potential application to their practice. Every case study interviewee felt the research was relevant. One museum interviewee described the research as, *"Absolutely relevant in the way that we design exhibit spaces, in the way we frame conversations to parents and families, in our approaches to play. Everything."* Beyond this sense of relevance, however, the extent to which museum staff engaged with the research was mixed. At one site, there was no ongoing way for staff to learn about research. Another site's staff saw the researchers regularly and were able to talk to the researchers informally when they were there. A researcher from this site said, *"We haven't really brought that back to use those data to change an exhibit or program yet. So it's still pending."* At two sites, the museum staff had a deep engagement with child development research through the research toy

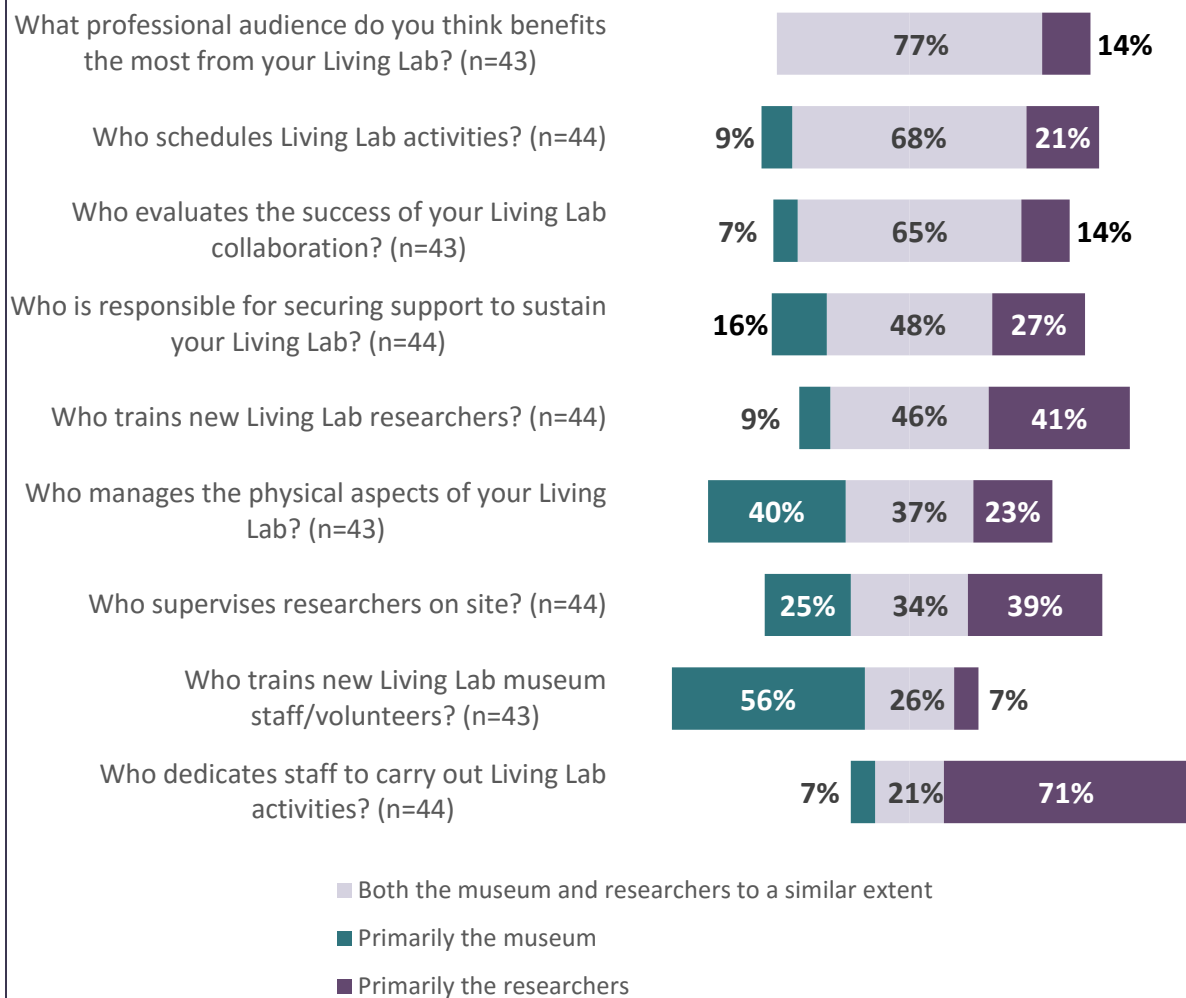
program. Staff at these sites had selected toys from the catalog, developed the materials, and implemented them with visitors. At one site, staff had worked with researchers to develop a new research toy. Another site had worked with researchers to develop parent handouts and museum signage.

9. Museum educators and researchers communicate regularly, collaboratively monitoring the program to ensure scientific and educational goals are met, and that programmatic needs are fulfilled. Each case study site had some regular communication, although the frequency varied, as did the extent to which the partnership was systematically monitored. In each case, the lead researcher communicated primarily with a management-level museum representative. One interviewee describes this Element by sharing, *“The communication between [the partners] is very clean; it’s very professional. It is kind of no nonsense. We know exactly what the goals are, we know the timing, and it’s just a clean process. There’s not a lot of ‘oh, could we or should we’ or questioning. It’s ‘this is what we’re doing. Let’s evaluate it, get some feedback, make some changes.’”* While this quotation portrays focused communication, all four sites had partnered outside of the Living Laboratory model as well as within it, and valued opportunities for mutual benefit that might be outside of the standard model. In terms of frequency of communication, two sites met at the beginning of each semester, while other sites’ meetings were scheduled on an ad hoc basis. Each research team and two museums had a written system of monitoring the program. For other sites, museums were not tracking regular progress.

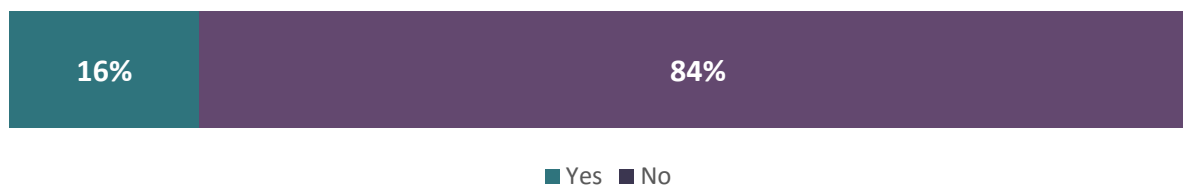
Community-wide survey supplemental data



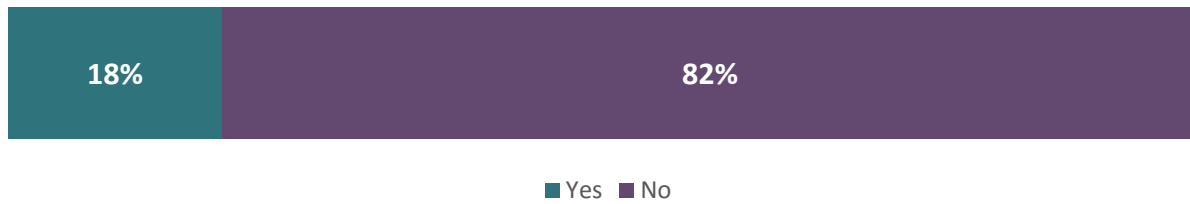
At your site, who is PRIMARILY involved in the following components of your partnership?



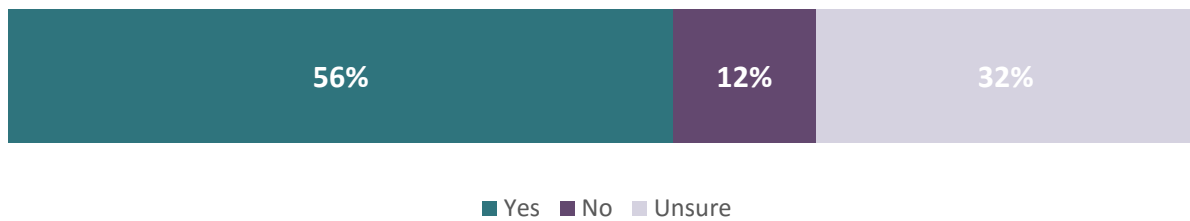
Have you created any resources that you've shared with the Living Laboratory network? (n=77)



[Current non-adopters]: Have you ever been involved in a Living Lab partnership? (n=34)



[Current non-adopters]: Do you have any plans for involvement with Living Lab in the future? (n=34)



Community-wide interview supplemental data

How, if at all, do you think your organization has benefited from Living Lab? (n=9)

How, if at all, do you think the museum has benefitted from participation in Living Lab? (n=7)

Code	Count, researcher responses	Count, museum responses	Example quotation
Professional development	3	7	<i>"I do think it has certainly helped in terms of professional development – just having a better understanding of children and parents and those interactions has really benefited me as professional in the field"</i>
Enhanced visitor experience	2	5	<i>"Our visitors have really liked the opportunity to be part of this research project and being able to actually participate in the research"</i>
Exposure to the research process	3	4	<i>"I've learned a lot about how the process of psychology research works"</i>
Access to child development research (general interest)	3	4	<i>"They also have fascinating information on current child development research"</i>
Strong partner relationship	1	3	<i>"I see [museum's small size] in many ways as a benefit because we can really get to know the museum staff"</i>
Increased credibility for institution	1	3	<i>"It gives them added credibility to you and the program and the work that you are doing"</i>
Networking within Living Laboratory community	1	2	<i>"Definitely networking I think has been big for me, getting to see what other museums do, and gaining from their experience with programs like this"</i>

How, if at all, do you think your organization has benefitted from Living Lab? (n=7)

How, if at all, do you think researchers have benefited from their participation in Living Lab? (n=9)

Code	Count, researcher responses	Count, museum responses	Example quotation
Access to study participants	7	5	<i>"The obvious benefit of having a new source of collecting data, one where we're not reliant on parents bringing their children all the way into the lab"</i>
Professional development	6	5	<i>"Helps with how we talk about our work and how we present and communicate it"</i>
Science outreach opportunity	5	1	<i>"Great way to inspire kids"</i>

Influences future research	3	0	<i>"Those interactions have often led to great ideas, great insight that I wouldn't have thought about"</i>
Fun and rewarding experience	2	4	<i>"More fun and interactive and rewarding"</i>
Networking within Living Laboratory community	1	0	<i>"Meeting other psych researchers, people from museums that were excited about having people there"</i>

What, if anything, do you see as the strengths of the Living Lab model? (n=14)

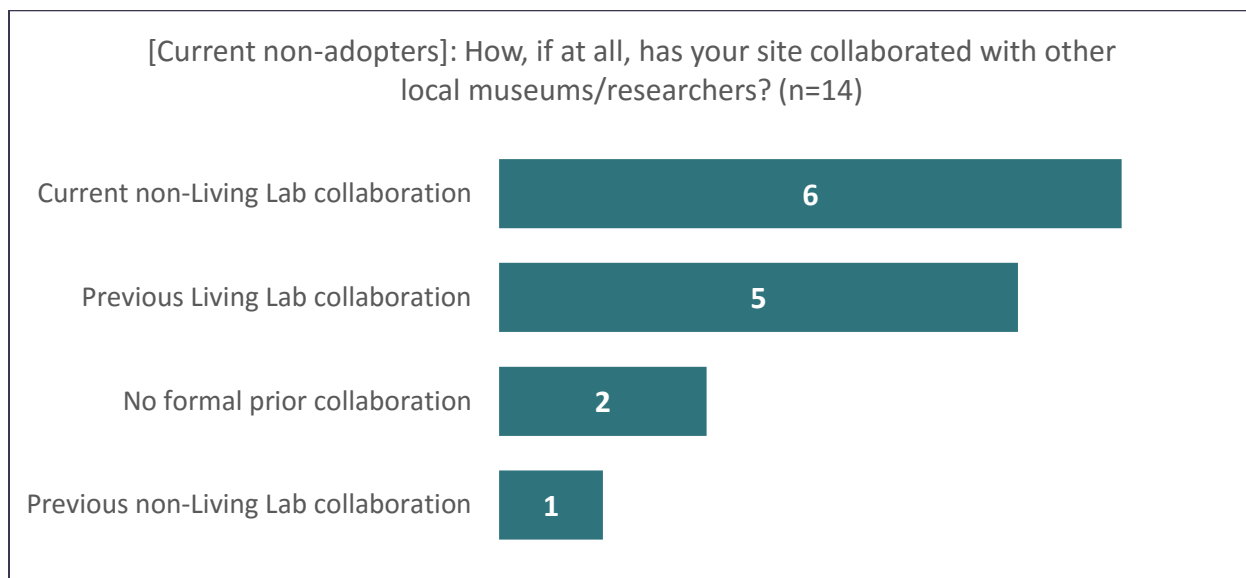
Code	Count	Example quotation
Opportunity to have a mutually-beneficial partnership	7	<i>"I appreciate the opportunity to have a collaboration with an academic institution, because that was something we hadn't been able to initiate ourselves"</i>
Public education and outreach components	7	<i>"Also, it's something that I think isn't a hard sell for parents or caregivers – a lot of parents are really interested in learning as much as they can about their children"</i>
Credible resources, model and network	5	<i>"At this point, the Living Lab brand is a strength in its own right. People know what it is. Other museums know what it is. It has become a respected model for working with researchers"</i>
Professional development for museum professionals	2	<i>"It really helps me with my interactions with kids, you know, just learning a lot more about how they think – that piece of it, the child development piece"</i>
Adaptability of model	2	<i>"That there are so many different varieties and ways to bring the research into the museum environment and it can scale up and down depending on the size of the museum"</i>
Supportive leadership	1	<i>"I think a lot of support was given by the team"</i>

What, if any, do you see as the weaknesses of the Living Lab model? (n=7)

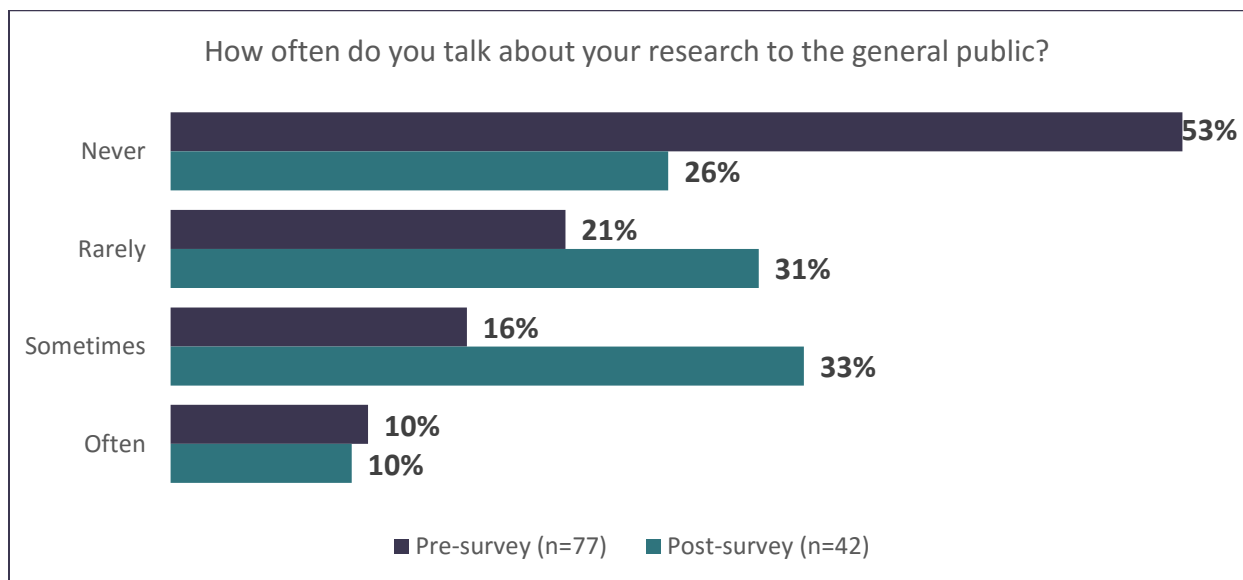
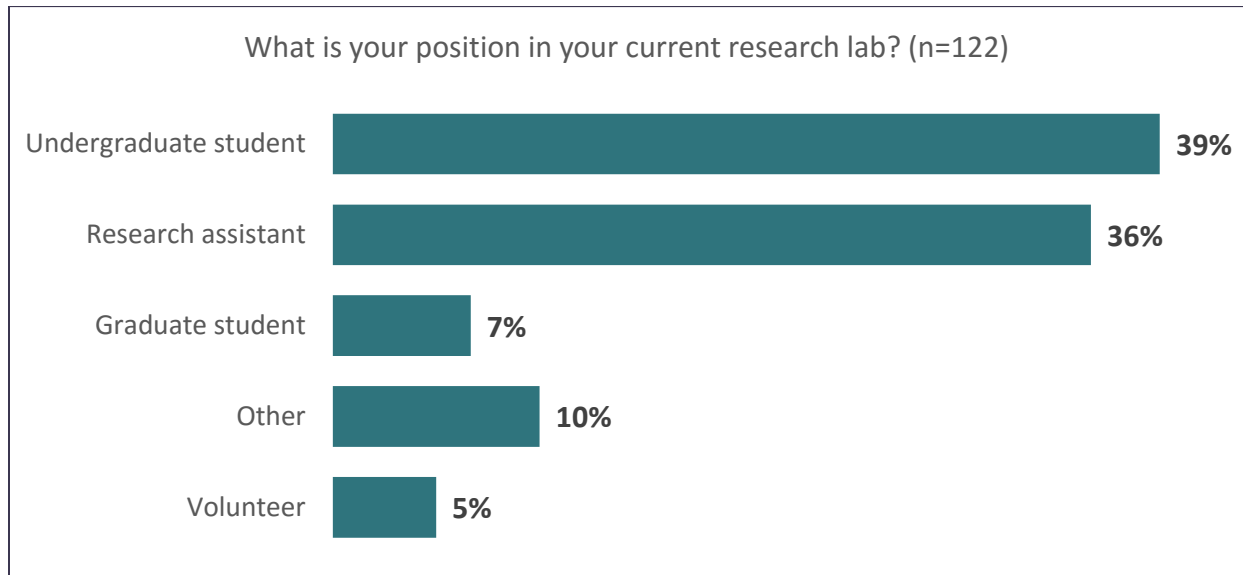
Code	Count	Example quotation
Too focused on museum experience	2	<i>"One of the things that Living Lab has emphasized is being out with the visitors and working on museum floor and I understand it from museum perspective but it's harder for researchers because it's not the best environment for collecting data"</i>
Time-consuming	2	<i>"When you don't have existing relationships with researchers it's our biggest hang up"</i>
Not enough support for sites without partners	1	<i>"A lot of it is catered to scientists... We originally started working with university staff – I love that model, and that's awesome, but unfortunately, we weren't able to continue with our university partner. Right now we don't have one, and a lot of the information and everything [from Living Lab is] catered to working with a university partner"</i>
Too fluid	1	<i>"That there are so many varieties that sometimes it's hard starting off knowing how you are going to start and structure your own program"</i>

APPENDICES

Funding	1	<i>"I'm thinking that all projects are probably running out of funding or wondering how to go to scale. I know you've gone to scale for a while, I don't know what the next steps are"</i>
Limited appropriate research studies	1	<i>"There are only certain kinds of projects that you can do in a museum setting"</i>



Researcher communication survey supplemental data





What, if anything, do you hope the participants or their family members get out of participating in your study and talking with you? (n=86)

Code	Percentage	Example quotation
Knowledge about the research	33%	<i>"I hope they learn about the concepts we're studying like theory of mind"</i>
Real-world applications of the research	28%	<i>"A parent might be influenced to analyze and alter their own behavior in order to provide a comfortable and preferable setting at home when interacting with their child"</i>
Interest in science	28%	<i>"Hopefully they become interested in science and especially psychology"</i>
Understanding of scientific process	26%	<i>"A better understanding of the processes involved in psychology research"</i>
Recognition that science is approachable	21%	<i>"Personally I hope they got out that research is multifaceted and does not always look like a man with a test tube and a lab coat, sometimes it can just be playing with toys"</i>
Appreciation for science	21%	<i>"A newfound appreciation for the research we do"</i>
Enjoyment	14%	<i>"I hope the children have fun"</i>
Sense of contribution	6%	<i>"Feeling like they contributed to research"</i>

APPENDICES

Desire to participate in future studies	5%	<i>"Maybe that they will be more interested in participating in other studies"</i>
Confidence in science ability	5%	<i>"Confidence in being able to do science"</i>
Other	2%	<i>"Learning about communicating and describing our research concisely"</i>