



## Museums for America

Sample Application MA-10-18-0388-18  
Project Category: Learning Experiences

### Oregon Museum of Science and Industry

Amount awarded by IMLS:	\$249,775
Amount of cost share:	\$250,669

Attached are the following components excerpted from the original application.

- Abstract
- Narrative
- Schedule of Completion

Please note that the instructions for preparing applications for the FY2019 Museums for America grant program differ from those that guided the preparation of FY2018 applications. Be sure to use the instructions in the FY2019 Notice of Funding Opportunity for the grant program and project category to which you are applying.

**Abstract*****Evolving the Museum Experience: Human-centered design to inspire creative community-based solutions***

The three-year project titled *Evolving the Museum Experience: Human-centered design to inspire creative community-based solutions (EM-X)* has the goal of creating hands-on Design Challenges that inspire diverse youth and families to use 21st Century Skills to imagine and test solutions to real-world problems. The Design Challenges allow OMSI to integrate dynamic experiences based on community input into our Center for Innovation (C4I—an exhibition hall) and Statewide Outreach strategic initiatives. To accomplish this goal, OMSI will work closely with Oregon MESA (MESA)—an organization that uses human-centered Design Challenges to teach STEM, invention, and 21st Century Skills to middle and high school students historically underrepresented in STEM fields. (MESA defines underrepresented students as students of color, girls, recent immigrants and refugees, impoverished populations, and first generation college students.)

The *EM-X* project addresses two integrated community needs. First, expanding participation taps into individual and community-held Funds of Knowledge—“historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and well-being”—that can lead to nuanced, creative, and transformative solutions to community-identified problems. Second, we need to create a more integrated, equitable system of “trails” through the STEAM-learning ecosystem in our region. The vision to develop the C4I with Design Challenges, expand Statewide Outreach, and use Human-Centered design to engage diverse families in project development emerged from the 2014 strategic planning process, research in informal science education, and our conversations with MESA staff.

*Project deliverables will include:* (1) **Three Design Challenges for the C4I and Outreach Program;** (2) **A Design Challenge Collaboration Playbook** outlining how to develop Design Challenges using HCD in collaboration with MESA youth, families, and staff; (3) **A MESA-OMSI Collaboration Sustainability Plan** that lays out how to continue the partnership and programs beyond the grant.

*EM-X* will begin October 1, 2018. Grant Year (GY) 1 will contain the build of the Design Bay (a flexible exhibit space for Design Challenges in the C4I) and complete the development cycle for one co-developed Design Challenge. Near the end of GY 1, OMSI and MESA staff will apply lessons learned to GY 2 and the development cycle of the second Design Challenge. Lessons learned from the first two years will inform development of the third Design Challenge in GY 3. In GY 3, OMSI and MESA, with input from advisors, will also use lessons learned and evaluation data to inform the Design Challenge Collaboration Playbook, MESA-OMSI Collaboration Sustainability Plan, and summative evaluation.

The *EM-X* project will benefit three audiences: (1) families experiencing the Design Challenges through the C4I and Outreach programs; (2) MESA and OMSI staff, and (3) youth in MESA and OMSI programs.

*Families will:* (1) see themselves as problem solvers capable of using their skills, knowledge, and experiences to address personally relevant challenges; (2) demonstrate 21st Century Learning and Innovation Skills; (3) recognize the value and personal relevance of multidisciplinary learning and design thinking processes for solving complex problems.

*OMSI and MESA staff will:* (1) feel confident, competent, and skilled in using HCD as a means of creating flexible, dynamic content with target audiences and partners; (2) improve skills and confidence in building sustainable, reciprocally beneficial partnerships; (3) recognize new opportunities to utilize HCD approaches.

*Youth participants will:* (1) feel confident in engaging in HCD and engineering experiences; (2) feel that they have contributed to the development and revision of Design Challenges that are presented to the public; (3) feel confident, knowledgeable, and prepared to pursue related opportunities.

As the primary focus of this project, the impacts on families will be explored during front-end, formative, and summative evaluation activities. Results for OMSI and MESA staff will be captured through the Performance Measure Statements survey, professional inquiry, and reflection activities during HCD activities. MESA and OMSI staff will collect information on the impacts on youth through existing program evaluation tools including MESA’s program participant evaluation surveys and OMSI’s intern exit interviews and surveys.

***Evolving the Museum Experience: Human-centered design to inspire creative community-based solutions*****1. Project Justification****A. What do you propose to do?**

The Oregon Museum of Science and Industry (OMSI) requests funds from the Institute for Museum and Library Services for a Museums for America, Learning Experiences grant titled *Evolving the Museum Experience: Human-centered design to inspire creative community-based solutions (EM-X)*. The goal is to create hands-on Design Challenges that inspire diverse youth and families to use 21st Century Skills (IMLS, 2016<sup>1</sup>) to imagine and test solutions to real-world problems. The Design Challenges allow OMSI to integrate dynamic experiences based on community input into our Center for Innovation (C4I—an exhibition hall) and Statewide Outreach strategic initiatives. To accomplish this goal, OMSI will work closely with Oregon MESA (MESA)—the local branch of a national organization that uses human-centered Design Challenges to teach STEM, invention, and 21st Century Skills to middle and high school students historically underrepresented in STEM fields. (Underrepresented students, here, are defined as students of color, girls, recent immigrants and refugees, impoverished populations, and first generation college students.) By collaborating, OMSI and MESA will be able to create clearer, more meaningful paths through the Oregon STEAM-learning ecosystem for youth and families. National advisors will also support and enrich the project (see Supportingdoc2.)

OMSI is committed to creating experiences where participants can see themselves as problem solvers of 21st Century Grand Challenges—“initiatives fostering innovation to solve key global health and development problems” (Grand Challenges, 2017). Grand Challenges focus on providing food, clean water, healthcare, safety, and energy for all, while sustaining a healthy environment (NAE, 2016; Grand Challenges, 2017; OSU, 2015). Solutions to Grand Challenges require scientific, social, economic, and artistic ingenuity. OMSI will frame the C4I Design Challenges under the overarching Grand Challenge of “How can we create healthy communities?”

OMSI has a strong commitment to and expertise in engaging audiences in the project development process through partnerships, audience research, and evaluation. But, we believe that we can continue to improve our products by integrating MESA families, youth, and human-centered design (HCD) approach into our process. The goal of HCD is to “design with communities, to deeply understand the people [you are] looking to serve, to dream up scores of ideas, and to create innovative new solutions rooted in people’s actual needs” (IDEO.org, 2015). MESA uses HCD as the basis for their free afterschool invention-based programs at over 25 Oregon middle and high schools reaching over 400 students each school year. MESA staff train teachers and students to use their HCD-based Invention Toolkit to design, build, evaluate, and present a usable product designed for a particular client based on the challenge or theme for the year. Teams present their projects and compete at Demo Day in the winter and again at MESA Day in May with the top teams advancing to the MESA National Competition. The whole family is also invited to participate in bilingual family nights at their local schools during the school year. The Invention Toolkit presents HDC using the acronym **INVENT**: Interviewing and empathizing with your clients—**N**aming and defining the problem—**V**isioning and inspiring ideation for solutions—**E**xperimenting and making prototypes—**eN**gaging client feedback—**T**elling the world about your products and process. (See SupportingDoc3 for more about MESA.)

*Project deliverables will include:*

**Three Design Challenges for C4I Design Bay and Outreach Program:** Design Challenges are hands-on activities that encourage families to build and test solutions to real-world problems. In the C4I, challenges will be able to stand alone as unfacilitated activities or be facilitated by a staff member. OMSI will build a Design Bay to provide the environment, tools, and infrastructure for Design Challenges. The Outreach team will adapt two Design Challenges into a one-hour classroom program delivered at schools. Teachers and students will continue to work on the Design Challenges until OMSI returns a few weeks later for an evening Family

<sup>1</sup> References cited in the narrative are listed in Supportingdoc1 as part of the Evaluation Plan.

Science Festival where students can share and test their innovations with their families. *An example could include the following: (On the theme of health and safety for the differently abled) Through copy panels or a short video, museum visitors/Outreach students learn about their client: Rudel, a woman in a wheelchair. Rudel is very independent, but gets worried when she cannot pick things up when they fall to the floor. Visitors/students use the materials provided to design and test a mechanism to pick up the three things that she worries about the most—a heavy purse, keys, and pillbox—while in a wheelchair.*

**Design Challenge Collaboration Playbook:** The Collaboration Playbook will build on a Playbook currently in development at OMSI to develop Design Challenges. The Collaboration Playbook will add sections on incorporating HCD into the development process and best practices for working with MESA, underrepresented audiences, and other community stakeholders.

**MESA-OMSI Collaboration Sustainability Plan:** The intention of the project is to build a strong, sustainable, mutually beneficial partnership that can survive beyond this grant. To support this goal, OMSI and MESA will create a clear Collaboration Sustainability Plan that lays out (1) how we integrate OMSI and MESA experiences to provide the maximum collective impact; (2) a sustainable funding plan; and (3) an outline of roles and responsibilities for each organization that integrate into operational workflow.

#### *B. What community need/problem/challenge will your project address? How was it identified?*

The *EM-X* project addresses two integrated community needs. First, while communities of color and low-income communities bear the brunt of our region’s most challenging problems, they are underrepresented in Portland-area government, civic institutions, and STEM professions that influence decision making (Curry-Stevens et al., 2010). If we want to address the Grand Challenge of creating a healthy community, people of color and people experiencing poverty must play a central role in both identifying priority issues and finding potential solutions (Curry-Stevens et al., 2010; IDEO.org, 2015). Expanding participation taps into individual and community-held Funds of Knowledge—defined as “historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and well-being by Moll et al. (1992)—that can lead to nuanced, creative, and transformative solutions to community-identified problems (Civil, 2016; Moll et al., 1992; Rahm, 2016; Razfar, 2012).

Second, we need to create a more integrated, equitable system of “trails” through the STEAM-learning ecosystem in our region. Falk and Dierking note that, “Historically, many minorities, recent immigrants, and the economic underclass have had fewer opportunities than the more affluent majority population to visit museums with their families as children” (2000, as cited in Weiland, 2015). OMSI strives to be more inclusive and promote equity by building our capacity to create *culturally sustaining* educational opportunities. Culturally sustaining pedagogy supports learners from underrepresented communities by “sustaining the cultural and linguistic competence of their communities while simultaneously offering access to dominant cultural competence” (Paris, 2012). To do this work in the C4I and Outreach initiatives, OMSI will 1) use HCD to build empathy with our desired audiences, understand what topics/approaches resonate with them, and remove barriers to their participation; 2) work closely with partners that already have deep relationships in underrepresented communities (like MESA); 3) go to audiences first; and 4) create welcoming opportunities to invite families to the museum (Borun, Garelik, & Kelly, 2011; Norton & Dowdall, 2016; Simon, 2016).

The vision to redevelop OMSI’s Turbine Hall into the C4I with Design Challenges emerged from the 2014 strategic planning process and research in informal science education. The planning process included three community salons and many meetings with stakeholders from different communities and perspectives. Participants requested that museum content change more often and that OMSI integrate itself more into the evolving STEAM-learning ecosystem. Research also highlighted the need for youth to build the 21st Century Skills (e.g., critical thinking, problem-solving, collaboration, and communication) and the value of engaging in real-world problem solving to enhance learning, understanding, and persistence (NSF, 2016; Burns, 2011).

MESA staff underscored a need for a more integrated, culturally-sustaining system of trails through the STEAM ecosystem including 1) exposure to careers that use HCD and career development pathways; 2) ways

to engage the whole family, including younger siblings and parents, at their family nights and celebrations; 3) mechanisms for creating community-informed challenges and themes for their annual competitions; and 4) opportunities to share their MESA project work and the Invention Toolkit with larger audiences.

### *C. Who or what will benefit from your project?*

OMSI and MESA aim to benefit the community through *EM-X* in multiple ways. The project will impact youth in MESA and OMSI programs, the families of MESA participants, and families around the region who participate in OMSI experiences. Oregon MESA serves over 400 students and their families annually. MESA students are 65% low-income (free/reduced lunch), 71% first-generation college bound, and 50% girls.

We aim to support MESA youth by helping them see how their work with Design Challenges and HCD can impact their lives and their community, exposing them to STEAM-learning opportunities and careers, and building the 21st Century Skills needed for careers and citizenship. OMSI and MESA will offer these opportunities through a series of events including Family Science Nights hosted at their schools and at OMSI, MESA team presentations at OMSI, introducing MESA youth to staff at OMSI and our industry partners, and mentoring them through paid summer internships (details provided in Project Work Plan).

MESA families will benefit from the project by both experiencing and influencing the richness of our region's STEAM-learning ecosystem. Like the youth, parents and siblings will have the opportunity to participate in OMSI and MESA programs at their schools and the museum. By participating in the HCD process, they will also become the "clients" we are designing for in the MESA design competition and for OMSI's museum and outreach experiences. The goal is that this process will lead to more meaningful, integrated, culturally-sustaining learning experiences. All participants, especially MESA and OMSI staff, will also deepen their understanding of the Funds of Knowledge that families hold that can address community issues.

Finally, families throughout the region will benefit from participating in the Design Challenges at OMSI and through Outreach programs. Youth and parents will also be introduced to the MESA program through the Design Challenges, MESA student presentations at OMSI, and MESA/OMSI intern outreach in the community. Partnering with MESA will allow OMSI to better reflect the diversity of our community through the images, voices, and issues shared in Design Challenge text, graphics, activities, topics, and examples.

### *D. How will your project advance your institution's strategic plan?*

OMSI's mission is to "inspire curiosity through engaging science learning experiences, foster experimentation and the exchange of ideas, and stimulate informed action." OMSI's 5-year strategic plan calls for the C4I and Statewide Outreach initiatives to support this mission by creating experiences that encourage families to explore multidisciplinary STEAM topics, practice 21st Century Skills, and apply their knowledge and skills to real-world problems. The strategic plan also prioritizes "improving employee experience" and reaching underrepresented audiences. By integrating HCD-based rotating Design Challenges to the C4I, OMSI intends to (1) make OMSI experiences more welcoming, relevant, and accessible to underrepresented audiences; (2) create clearer trails through the STEM-learning ecosystem for youth and families; (3) provide professional development experiences for staff; (4) reduce OMSI's reliance on temporary traveling exhibits to refresh the museum experience; and (5) reduce the costs associated with changing exhibit experiences.

OMSI created a C4I Master Plan in 2015-2016 that calls for Design Bays—flexible exhibit platforms that will house the Design Challenges (see SupportingDoc4). One Design Bay will be built during the first 3 months of the *EM-X* project. OMSI began conceptual development for programming in the Design Bays in early 2017 and is also currently prototyping early versions of Design Challenges to identify what types of materials, communication, and infrastructure work well. The *EM-X* project will allow OMSI to strengthen the process by (1) integrating community partners, stakeholders, and audiences into the Design Challenge development process; (2) integrating HCD into the development and evaluation of exhibits and programs; and (3) building a sustainable, mutually beneficial relationship with MESA to increase our collective reach and impact.

### *E. How will your project address the goals of the MFA program and the Learning Experiences project category?*

The *EM-X* project will allow OMSI to serve diverse family and youth audiences by: (1) developing Design Challenges that allow for dynamic, engaging, inquiry-based experiences about relevant, meaningful issues; (2) collaborating closely with and learning from community-based stakeholders and audiences to create accessible, relevant learning experiences; (3) focusing on multidisciplinary learning experiences that integrate STEM with the arts and design; (4) incorporating front-end, formative, and summative evaluation strategies that incorporate cross-departmental use of HCD; (5) investing in the professional development of museum staff and volunteers by creating training opportunities related to HCD, Design Challenges, facilitation strategies, and community collaboration; and (6) strengthening opportunities for families with children of different ages to engage in social, cross-generational learning.

## **2. Project Work Plan**

### *A. What activities, including evaluation and performance measurements, will you carry out?*

**Center for Innovation:** Constructing the Design Bay

**HCD training:** Training of OMSI staff by MESA using the Invention Toolkit and the INVENT framework

**Design Challenges for C4I:** Co-developing three Design Challenges using the INVENT framework

- **Interviewing & Empathizing:** Conducting interviews with students and families in their communities at MESA Family Nights to build empathy with and gain insight on this audience
- **Naming & Defining the Problem:** Synthesizing insights from Interviewing and Empathizing step of the process; outlining client and content goals of Design Challenges
- **Visioning & Inspiring Ideation:** Developing concepts for possible Design Challenges
- **Experimenting & Making Prototypes:** Designing and fabricating prototypes of Design Challenges
- **eNgaging Client Feedback:** Sharing Design Challenge prototypes and gathering feedback during Family Science Night at OMSI, on the museum floor, and in the community using the team-based inquiry process as a model (Pattison, Cohn, & Kollmann, 2014)
- **Telling the World:** Sharing resulting Design Challenges with families at MESA Family Nights; installing Design Challenges in the Design Bay; developing and begin delivering two new OMSI outreach programs based on the Design Challenges

**Summer internship for teens:** Developing and carrying out a paid internship program for teens made up of MESA students and members of OMSI's volunteer Teen Science Alliance (see below)

**MESA programs:** Co-hosting Demo Day at OMSI; co-developing a 6-week challenge; determining theme for upcoming school year based on insights from the Interviewing & Empathizing step (see above)

**Partnership:** Project visioning and relationship stewardship; reflecting upon lessons learned from the project; co-developing the MESA-OMSI Collaboration Sustainability Plan

**Design Challenge Collaboration Playbook:** Synthesizing lessons learned to create additions to C4I Playbook

**Evaluation:** Conducting front-end evaluation in support of Design Challenges; conducting summative evaluation of Design Challenges and OMSI-MESA collaboration (see Supportingdoc1)

In addition to creating C4I Design Challenges, the collaboration will engage youth in STEAM learning and career development. The summer internship program will be an extension of OMSI's existing Teen Science Alliance (TSA) program that MESA and TSA teens may apply for. Like MESA students, teens in the TSA learn a version of the invention process. The internship will be an avenue for teens to stretch their invention process skills by working with the OMSI team in "eNgaging Client Feedback" from museum visitors and community members via pre-existing TSA outreach at Portland community centers.

### *B. What are the risks to the project and are they accounted for in the work plan?*

A number of fundamental challenges adhere to our approach to co-create and integrate Design Challenges into our strategic initiatives. First, we recognize that co-developing exhibit experiences with partners takes time and sensitivity, which can be in conflict with a desire to be nimble and fast. To address this

risk, OMSI will draw on the experience leading several collaborative projects including *Roots of Wisdom* (NSF; partners: multiple Native tribes and communities), *Lenses on the Sky* (NASA; partners: multiple cultural organizations and advisors), and *Designing Our World* (NSF; partners: local Hispanic and girl-serving organizations). We have incorporated lessons from these projects into our project plan including building time in the front-end to establish relationships, including funding for MESA staff to participate in meetings and to conduct programs directly related to the proposed project, incorporating time for MESA to review ideas internally, ensuring MESA and its constituents are clearly benefiting from project activities, and sharing project results with the communities that contributed.

The second risk relates to using a common platform (the Design Bay) to integrate rotating Design Challenges into the exhibit hall. This idea grew out of OMSI's experience in a smaller facilitated "Design Lab" where visitors create projects using STEAM topics. Shifting Design Challenges into a larger, open space may be difficult. To address this, we will build on previous projects at OMSI and other institutions. For example, we have advisors from the New York Hall of Science's *Design Lab* and the Museum of Science Boston *Tech Studio*. OMSI also has extensive experience creating Design Challenge-based exhibits and programs including NSF-funded projects *Design Zone*, *Human Plus*, *Engineer It*, and *Designing Our World*. We have also started a robust proof-of-concept testing process for the C4I to answer the following questions: *How do we manage loose parts/materials in an open space? How do we help people understand where to start, test, and take apart their creations? What easily updatable communication approaches work best? What encourages families to engage with the challenge successfully? What does the space need to support a wide variety of different challenges?* The process started in spring of fiscal year '18 and will be completed in winter of FY'19.

#### **C. Who will plan, implement, and manage your project?**

An experienced team at OMSI will develop *EM-X* in collaboration with MESA and national advisors. Andrew Haight, director of guest engagement, will act as project director and oversee project vision, partnerships, timelines, contracts, and budgets. He will also align the project with OMSI's strategic initiatives. Marcie Benne, PhD, director of Research and Evaluation at OMSI, will oversee evaluation activities. A project team consisting of project leadership and staff from museum education, program development, exhibit development, exhibit design, and evaluation will implement project activities. Mike Wilson, assistant manager of OMSI's Teen Science Alliance, will develop and manage the summer internship program. Brian Berry, director of classes and statewide outreach, will oversee outreach programming at MESA schools and the adaptation of C4I Design Challenges to create new Outreach programs.

MESA will co-develop and implement the project with OMSI. Executive director Tong Zhang, PhD, will oversee relationship management, project vision, and alignment with MESA mission and initiatives. Tamara DePue, program manager, will oversee MESA programs, *EM-X* project development, program implementation, and HCD trainings for OMSI staff. Advisors Peggy Monahan (New York Hall of Science) and Christine Reich (Museum of Science, Boston) will bring expertise in creating Design Challenges into museum settings. Nelda Reyes, principal consultant of AB Cultural Drivers, will advise on culturally responsive evaluation.

#### **D. When and in what sequence will your activities occur?**

*EM-X* will begin October 1, 2018. Grant Year (GY) 1 will contain the build of the Design Bay and complete development cycle for one co-developed Design Challenge. MESA's initial HCD training with OMSI staff and front-end evaluation will occur in first quarter of that year. Project activities leading to the Design Challenge deliverables will align with MESA programming and the academic school year. The *Interviewing and Empathizing* step of developing Design Challenges will coincide with MESA's school Family Nights in November-December of each year. The *Naming and Defining* step will occur in January after MESA teams interview clients and submit their design briefs. The *Visioning and Ideating* step will occur from February through April, which will coincide with Demo Day in February, the 6-week "bonus" MESA challenge for teams whose HCD challenge did not qualify for the next competition, and MESA Day in May. *Experimenting and*

*Prototyping* will occur during the spring, and *Engaging Client Feedback* will start at the year-end celebration at OMSI's Family Science Night in May, around the same time as MESA Day. Engaging Client Feedback for the Design Challenge, creating facilitation strategies, and testing the Design Challenge as an Outreach activities will continue iteratively as part of the summer teen internship program. Over the summer, the OMSI team will also use the feedback to finalize the content for Design Challenge 1 and fabricate any specialized components and materials. For the *Telling the World* step, OMSI will: 1) install the Design Challenge in the C4I in October, the beginning of GY 2; 2) begin delivering the new Outreach program to schools in the region; and 3) share back with MESA students and families at the MESA Family Nights held in the first quarter of GY 2.

Near the end of GY 1, OMSI and MESA staff will reflect on accomplishments and challenges of the collaboration. Lessons learned will inform planning for GY 2 and the development cycle of the second Design Challenge. Lessons learned from the first two years of the grant will inform development of the third Design Challenge in GY 3. In the last year of the project, OMSI and MESA, with input from advisors, will reflect upon lessons learned from the project and evaluation data to inform the Design Challenge Collaboration Playbook, MESA-OMSI Collaboration Sustainability Plan, and summative evaluation. Evaluation activities are described in more detail in Section 3 and the Evaluation Plan (Supportingdoc1).

#### *E. What time, financial, personnel, and other resources will you need to carry out the activities?*

*EM-X* is part of a the \$3.2 million Center for Innovation initiative supported by multiple federal, foundation, corporate, and individual donors. IMLS funds for *three years* are needed to support project-specific personnel, purchase/create Design Challenge materials, pay participant support costs, and compensate MESA and project advisors. The funds will support the Design Challenges resulting from the project. OMSI's cost share will cover additional project personnel, building the Design Bay, and complimentary exhibit elements in the Center for Innovation. (See budget justification and Supportingdoc4 for details.)

#### *F. How will you track your progress toward achieving your intended results?*

Evaluators from OMSI's internal team will track project progress by documenting HCD and evaluation studies outlined in section 2A and Evaluation Plan, supported by evaluation advisor, Nelda Reyes. The OMSI project team will also maintain documentation to facilitate creation of the Playbook and Sustainability Plan. MESA and OMSI will use existing program evaluation tools to track impacts for youth participants.

#### *G. How and with whom will you share your project's results?*

All project findings will first be shared with MESA and advisors via meetings or email. The Design Challenges will be available to OMSI visitors and Outreach audiences once completed. The project team will share results from the previous year with MESA students and families during the fall Family Nights in GY 2 and GY 3. OMSI and MESA will also share Design Challenges with existing and potential partners and funders. Project findings and the Playbook will be shared with the OMSI community through All Staff Meetings, the annual Educator and Volunteer Summits, and emails. Professional development workshops will train staff at OMSI and MESA in how to use the Playbook. OMSI will also share the Playbook with other industry, government, and community partners involved in the C4I. All evaluation reports will be provided to IMLS and disseminated widely via the OMSI project site and on [informal.science.org](http://informal.science.org). OMSI will share relevant deliverables via museum listservs (ASTC, ACM, AAM, etc.) and submit proposals to present at AAM and/or ASTC conferences. Oregon MESA will also share relevant findings with other MESA affiliates and at youth development conferences.

### **3. Project Results**

#### *A. Choose one or more Performance Measure Statement(s) appropriate for your project and describe how you will collect and report the corresponding data.*

The summative evaluation will assess the extent to which the project is meeting two IMLS Learning Performance Goals: "Train and develop museum and library professionals," and "Develop and provide

inclusive and accessible learning opportunities.” Observations and post-use surveys will be used to collect data from visitor groups engaging with the Design Challenges. Observation protocols will explore the extent to which participants are engaged in 21st century learning and innovation skills and aspects of HCD. Following their interaction with the challenges, visitor groups may elect to complete a short survey that asks about interest in, understanding of, and relevance of the Design Challenge topics. Project staff from OMSI and MESA will answer surveys twice throughout the project—once prior to the HCD training and once after the second challenge has been presented to the public. Survey questions will explore knowledge, interest, and opportunities regarding HCD, perspectives on the project and processes, identification of successes and challenges, and perceived benefit and costs of the collaboration.

***B. Referring to your Project Justification, describe your project’s intended results.***

Summative evaluation activities will examine the project’s achievement of relevant performance goals and intended impacts on target audiences. *EM-X* is designed to benefit multiple stakeholders, including youth, families from a variety of backgrounds, and OMSI and MESA staff. As the primary focus of this project, the impacts on families will be explored during formal front-end, formative, and summative evaluation activities. Results for OMSI and MESA staff will be captured through the Performance Measure Statements survey, professional inquiry, and reflection activities during HCD activities. MESA and OMSI staff will collect information on the impacts on youth through existing program evaluation tools: MESA conducts program evaluation surveys with participants and OMSI conducts exit interviews and surveys with interns.

The intended impacts for participating *families* that engage with C4I Design Challenges—*Participants will*: (1) see themselves as problem solvers capable of using their skills, knowledge, and experiences to address personally relevant challenges (Attitude); (2) demonstrate 21st Century Learning and Innovation Skills (Skills); (3) recognize the value and personal relevance of multidisciplinary learning and design thinking processes for solving complex problems (Awareness; Knowledge; Understanding; Attitude).

The intended impacts for the *project team*—*OMSI and MESA staff will*: (1) feel confident, competent, and skilled in using HCD as a means of creating flexible, dynamic content with target audiences and partners (Attitude); (2) improve skills and confidence in building sustainable, reciprocally beneficial partnerships (Attitude and Knowledge); (3) recognize new opportunities to utilize HCD approaches (Awareness).

The intended impacts for MESA and OMSI youth—*Youth participants will*: (1) feel confident in engaging in HCD and engineering experiences (Attitude); (2) feel that they have contributed to the development and revision of Design Challenges that are presented to the public (Attitude); (3) feel confident, knowledgeable, and prepared to pursue related opportunities (Attitude).

***C. How will the knowledge/skills/behaviors/attitudes of the audience change as a result of your project?***

The intended impacts on knowledge, skills, behaviors, and attitudes are included in sections 3A–3C and discussed in more detail in the included Evaluation Plan (Supportingdoc1).

***D. What tangible products will result from your project?***

*EM-X* will result in the following tangible products: (1) three Design Challenges that have been adapted for both the C4I and OMSI’s Outreach program; (2) the Design Challenge Collaboration Playbook; (3) the MESA/OMSI Collaboration Sustainability Plan; and (4) two summative evaluation reports.

***E. How will you sustain the benefit(s) of your project?***

As part of the 20-year vision, the Design Bay—where Design Challenges will be situated—will be a central, permanent fixture in the Center for Innovation for 10–15 years and will be replicated in other parts of the hall. The Collaboration Playbook will provide a structure for using HCD to collaboratively create future Design Challenges for OMSI and MESA. The Collaboration Sustainability Plan will outline the workflow and funding requirements to allow OMSI and MESA to continue the partnership beyond the grant.

Schedule of Completion	Grant Year 1									Grant Year 2									Grant Year 3																	
	2018			2019						2020			2021			2020			2021																	
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Center for Innovation	Grand Challenge Wall and Design Bay construction																																			
	Create Design Challenge with industry partner 1																																			
	Test bed fabrication																																			
	Create Design Challenge with industry partner 2																																			
	Create Design Challenge with industry partner 3																																			
MESA Program	Family Nights																																			
	Students do user research and create Design Briefs																																			
	Student teams create inventions and pitch videos																																			
	Demo Day																																			
	Co-develop 6-wk Interrim Challenge																																			
	6-wk Interrim Challenge																																			
	Decide coming year's theme based on insights gleaned from Family Nights																																			
	MESA Day																																			
	Announce coming year's theme @ MESA Day																																			
HCD Design Challenges	HCD training for OMSI staff																																			
	Interview & Empathy: Project team attends MESA Family Nights																																			
	OMSI outreach educators run science festival activities at MESA Family Nights																																			
	Name/Define the Problem: Use insights from Family Night interviews and MESA student design briefs to identify client and goal of Design Challenge																																			
	Vision & Ideation: Concepts for design challenges																																			
	Experiment & Prototype: Design and fabricate proof-of-concept prototypes of Design Challenge																																			
	Co-develop 6-wk Interim Challenge																																			
	Experiment & Prototype / Engage Client Feedback: Share Design Challenge prototypes and gather feedback during Family Science Night @ OMSI																																			
	Develop summer internship program																																			
	Implement summer teen internship program																																			
	Experiment & Prototype / Engage Client Feedback: Project team and summer interns test Design Challenge on museum floor and iterate																																			
	Gather feedback on internship program to improve for next year																																			
	Finalize 2D/3D design and copy for C4I Design Challenge as needed																																			
	Fabrication and printing for C4I Design Challenge as needed																																			
	Train C4I education staff on facilitation of new Design Challenge																																			
	Adapt design challenge for OMSI outreach programs																																			
	Tell the World: Share resulting C4I Design Challenge with families at MESA Family Nights																																			
	Tell the World: Install Design Challenge in C4I Design Bay																																			
	Tell the World: Start delivering new Design Challenge outreach program																																			
Collaboration	Project visioning																																			
	Reflect on past year of project and plan next year (reflect on whole project Year 3)																																			
	Create Design Challenge Collaboration Playbook																																			
	OMSI-MESA collaboration sustainability plan																																			
Evaluation	Front-end, design challenges																																			
	Formative, design challenges																																			
	Summative, design challenges																																			
	Summative, professional developmnt																																			

Grant starts 10/1/2018

Grant ends 9/31/2021

Oregon MESA human-centered design process:  
**I** INTERVIEWING & Empathizing  
**N** NAMING & Defining the Problem  
**V** VISIONING & Inspiring Ideation  
**E** EXPERIMENTING & Making a Prototype  
**N** ENGAGING Client Feedback  
**T** TELLING the World