Design Challenge Resource Collection

Module 3: Approaches to Exhibit Accessibility

This module is part of a Design Challenge Resource Collection, developed by a cross-functional team at the Oregon Museum of Science and Industry (OMSI) with decades of experience conceptualizing, developing and building museum exhibits. The collection is intended to support exhibit developers and designers as they work to create interactive design challenges.

These modules are designed for someone to read individually or facilitate with a team. There are great benefits derived from collaborating on the exhibit development process. Throughout the modules, activities for groups of individuals are called out in blue boxes.

> **Team Activity**
>
> Discussion prompts and other activities for groups are in blue boxes like this one.

Each module stands alone; there is no specific order to explore the modules, nor is there a need to read them all. However, in some cases, references are made between modules for opportunities to learn more. Finally, these resources are not meant to be prescriptive, but rather examples, tools and approaches the OMSI team has found valuable in the development of non-facilitated engineering design challenge exhibits for the museum floor that are accessible, relevant and engaging for visitors.

The entire set of resources can be found on the *Design Challenge Resource page*

1. Introduction to Design Challenges
2. Exploring Design Challenges
3. Approaches to Exhibit Accessibility
4. Testing a Design: Measures of Success.
5. Exhibit Design Sprints
6. Graphic Development for Design Challenges
7. Prototyping Design Challenge Exhibits
8. Participatory Co-development of a Bilingual Exhibit
9. Documenting Exhibits: The Exhibit Record Tool

Approaches to Exhibit Accessibility

Interactive design challenge exhibits provide focused experiences for practicing design thinking outside of books and in social groups; they are outstanding opportunities to broaden participation in engineering learning and design. Therefore, we understand the importance of creating design challenge exhibits that are accessible in ways that diverse members within a target audience have similar opportunities to engage in the activities. This requires considering the potential abilities and limitations of people within anticipated audiences and planning for how to integrate accessibility into the design throughout the development process.

This module explores the physical accessibility of design challenge exhibits. Included are several reference to existing resources, a description of how the *Creatividad silvestre | Wild Creativity* team used an Accessibility Design Matrix to support their process, and some example results in the *Creatividad silvestre | Wild Creativity* exhibition.

Before you begin, think about what accessibility means to you.

Team Activity

As individuals, take two minutes to consider the following questions—write down a few notes for your responses.

- What do you think of when you hear the term accessibility?
- Where have you seen examples of accessibility?
- Where have you seen a lack of accessibility?

Now share with others in the group. How are your ideas similar? How are they different?

Accessibility and Inclusion

Through your own work, you have probably observed that accessibility and inclusion are terms that are defined and used in many different ways depending upon the context. We understand that you and your project team will continue to champion accessibility and inclusion in the ways that make sense in your context. Because the topic of accessibility is infinite and this module is brief, we decided to present a few ideas that can apply to many situations. Therefore, for the purpose of this module, we focus on aspects of physical accessibility that support broadening participation and inclusion of an experience's target audience. This supports our aspiration that members of the target audience participate in the same experiences, not separate; that people with diverse physical characteristics and abilities have meaningful design challenge experiences . In this way, physical accessibility and inclusion are related—an environment must be physically accessible as part of larger efforts for inclusion.

Accessibility at Exhibits

Existing Resources

Several trusted and comprehensive resources on the topic of exhibit accessibility provide a strong foundation for promising practices and approaches . The *Ingenium Accessibility Standards for Exhibitions*[1], created by the organization responsible for overseeing Canada's national museums related to science and technology, and the *Smithsonian Guidelines for Accessible Exhibition Design*[2] describe, in detail, how to create exhibit spaces that are accessible for visitors with guidance on, among other things, how to place, light, display, and label exhibits. Consult these resources throughout the development process to ensure that the environments you are creating are as inclusive as possible for your visitors.

When it comes to creating new exhibits, universal design is one approach to accessibility and inclusion that works well. It focuses on inclusion by designing experiences that work for as many people as possible without the need for remediated adaptations. The *Universal Design Guidelines for NISE Network Exhibits*[3] is an excellent resource that provides guidance for ways to make exhibits that are accessible and inclusive for visitors.

Team Activity

Think about the audiences you want to serve. Brainstorm some conditions that might affect people's ability to engage with an exhibit. For example, visitors with low vision, people who use wheelchairs, very young/small visitors, or those with environmental sensitivities.

As a group, identify two or three visitor profiles that you want to focus on in this exercise.

Ask the group to brainstorm reasons why exhibits might be inaccessible for the visitors you identified. Write these on the board.

Now, ask the group to toss around ideas for solutions to expand exhibit accessibility (for the specific range of abilities in focus). Write these on the board.

Discuss how these solutions can be incorporated into the initial design of exhibits so that inclusion is integrated into your designs early in the process and not an afterthought

[1]https://accessibilitycanada.ca/wp-content/uploads/2019/07/Accessibility-Standards-for-Exhibitions.pdf
[2]https://www.sifacilities.si.edu/sites/default/files/Files/Accessibility/accessible-exhibition-design1.pdf
[3]https://www.nisenet.org/sites/default/files/catalog/uploads/2971/ud_guide_exhibits_10_23_print.pdf

Design Challenge Exhibits

Because design challenge exhibits have special experiential considerations, you will need to develop some of your own specific guidelines for accessibility and inclusion features, in addition to the general ones listed in the resources above. For instance, design challenges often need to communicate to visitors a problem that needs to be solved, provide materials to build and test designs, and offer visitors information about their designs' performance. Considering how exhibits will achieve these three processes for visitors with differing abilities will help guide the design of your exhibit.

- How is the challenge communicated to visitors? How will they know what they are trying to accomplish?
- Where will materials be located? Will everyone be able to find and reach them? Will visitors with low vision be able to distinguish between materials?
- How will visitors know how and where to test their designs?
- How will visitors know how well their designs performed? What information will they receive and how?

Intentions and limitations

Ideally, we could include a wide range of affordances that would make it possible for any visitor of any ability level to easily engage with our exhibits. However, limits on time, money, and other resources require us to make decisions about what features will be prioritized. Plan for the added time and expense required to strategically decide how to use your investments to create the most broadly accessible exhibits . Use your research, including the standards and guidelines linked in this Module, along with direct input from your partners, advisors, audiences, and consultants, and a tool like the Must/Should/Could Accessibility Design Matrix (see below) to help you identify and prioritize your strategies.

Example: Creatividad silvestre | Wild Creativity

Creatividad silvestre | Wild Creativity is a 2,500 square foot bilingual (Spanish/English) exhibition created by OMSI that invites visitors to explore the fundamental concepts of biomimicry and practice engineering through hands-on design challenges. The target audience for the exhibition is girls ages 9 to 14 and their families, and strives to be accessible for visitors in this audience. To broaden exhibit accessibility with the aim of broadening inclusion, the team created an Accessibility Design Matrix that considered four possible characteristics among some members of the target audience : visitors with limited hearing, vision, mobility, and dexterity.

Through our research and experiences, the project team articulated primary and potential audiences for each of the areas of consideration (these audiences are subsets of the target audience). They reviewed the Ingenium Accessibility Standards for Exhibitions, Smithsonian

Guidelines for Accessible Exhibition Design, the Universal Design Guidelines for NISE Network Exhibits to generate an initial list of ways to broaden the accessibility of the design challenges they were creating. The team also consulted with people with lived experiences, providers of tools and solutions, other exhibit teams, focal audiences through evaluation activities, project advisors, and project partners, all while continuing to do deeper online research in certain areas.

Throughout the process, the list was categorized into strategies that Must be employed, Should be, and that Could be, given adequate resources. We named this document the Accessibility Design Matrix. The matrix served as a tool throughout the exhibit development process and shaped decisions made around accessibility features. This was the first time a current OMSI exhibit team had explicitly created and used an Accessibility Design Matrix. While it can be improved and should be reconsidered for each specific exhibit, the team found it to be valuable for expanding our thinking early in the process, focusing our conversations, and making decisions.

The Accessibility Design Matrix for *Creatividad silvestre | Wild Creativity* is below.

Considerations for limited hearing

	Must	Should	Could

Primary Audience
 	
- People living with hearing impairments or deafness
 	
Potential Audience
 	
- Non-auditory Learners
- People with heightened senses
	- All buttons must be responsive.
	- All video must have open captions.
	- All text must avoid jargon.
		- All auditory feedback should include tactile sound transducers.
		- All video should provide assistive listening devices.
			- The exhibit could
			  - have assisted listening to reduce background noise.
			  - include FM receivers for specialized connection to hearing aids.

Considerations for limited vison

	Must	Should	Could

Primary Audience
 	
- People living with visual impairments or blindness
 	
Potential Audience
 	
- People living with color blindness
- Non-visual Learners
- People who are non-readers
	- All signage must adhere to font, size, style, contrast, and placement guidelines.
	- Environmentals must include multisensory cues and landmarks.
	- All buttons must be distinguishable.
	- All visual feedback must offer auditory descriptors.
	- All components must not be free floating.
	- All wayfinding signage must be logically placed.
	- All colors must be contrasting from floor to wall.
	- All flooring must be cane detectable.
		- All feedback should be haptic.
		- All labels should be in Braille
		- All components should
		  - not be sharp
		  - be a logical height
		- All hand manipulatives should be differentiated with color and shape.
			- All illustrations could be tactile.
			- All labels could be in Braille and bilingual.
			- All digital text could allow learner to customize color and size.

Considerations for limited mobility

	Must	Should	Could

Primary Audience
 	
- People who use wheelchairs
- People with physical impairment that affects mobility
 	
Potential Audience
 	
- Range of body shapes and sizes
- People with a temporary disability that affects mobility
	- All interactive components must consider the range of reachable heights
	- The layout must be spacious
	- All flooring gradient inclines must not exceed 6%
		- There should not be any steps	- All seating could:
			  - be mobile
			  - have a handle
			  - be in a bench format

Considerations for limited dexterity

	Must	Should	Could

Primary Audience
 	
- People with physical impairment that affects dexterity
- People with small hands
 	
Potential Audience
 	
- People with prosthetics that affect dexterity
- People with a temporary disability that affects dexterity
	- All hand manipulatives must
	  - be easy to grip
	  - require loose precision
	  - avoid heavy lifting.
	  - provide ambidextrous use
	  - not require great strength
	  - be visible
	- All interactive components must consider a range of reachable heights
		- All tasks should
		  - avoid heavy repetition
		  - avoid lateral wrist movements
		- The shape of manipulatives should enable a range of grip positions
		- The material of the manipulatives should be easy to grasp
		- Environmentals should remain consistent in temperature
		- All hand manipulatives should
		  - not require simultaneous movement
		  - not require extended duration of handling.
		  - be durable
		  - remain free of independent motion
		  - provide loops, handles, or sudden changes in surface contours
			- All hand manipulatives could
			  - be free of text
			  - provide feedback on the appropriateness of the forces generated
			- All components could
			  - avoid reaching above the head
			  - avoid using a pen

A Strategic Investment

One of the consulting groups for *Creatividad silvestre | Wild Creativity* was Oregon Commision for the Blind (OCB). Through discussions and focus groups with members of the OCB community, several strategies were identified that could improve accessibility of the exhibits. These included tactile illustrations, Braille, auditory descriptors, and visual interpretation services. While it could be beneficial to include all of these, limitations on resources meant that was impossible. The team had to decide where to invest the resources available for the broadest accessibility. Braille and auditory descriptions for each exhibit would require additional materials, space and/or electronics, and since the exhibition is bilingual, those requirements would be doubled. Input from focus groups also suggested that not all without vision read Braille.

Ultimately, the team decided to move forward with *Aira*[4], a subscription-based service that connects people with visual impairments, who choose to use the Aira smartphone app, with remote agents. Those who call Aira through the app can ask Aira agents any questions they want; agents could answer questions about navigating the exhibit, reading the labels,

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[4] https://aira.io/

describing an image or object, or engaging with interactives. A benefit for our bilingual exhibit is that Aira users can request agents who speak Spanish or English.

Exhibit Features

In *Creatividad silvestre | Wild Creativity* we worked to broaden design challenge accessibility using similar strategies across all exhibit components. We used some of the approaches in the Accessibility Design Matrix, plus some approaches not listed in the matrix. Below we illustrate a few exhibit features that supported accessibility; our illustrations focus on one area of accessibility that is particularly obvious in each component. Descriptions of the components can be found in the *Creatividad silvestre | Wild Creativity Exhibit Brief*[5].

Considerations for limited hearing

Some examples of features that are helpful when visitors have limited hearing can be found in the exhibit component *Vuela/Fly*. The exhibit has raised, responsive buttons with indicator lights. The exhibit also has multiple means of receiving feedback visually, such as seeing whether the kites successfully fly in the wind tube and seeing feedback on a screen that provides quantitative and qualitative information on the strength of the kite's lift.

The Vuela / Fly exhibit component.

[5] https://omsi.edu/wp-content/uploads/2022/11/CSWC_exhibit-brief_12.2022.pdf

Considerations for limited vision

The exhibit component Ventila/Ventilate has some features that are helpful when visitors have limited vision. The exhibit has raised, responsive buttons for turning on the wind. The exhibit also has auditory signals that indicate outcomes (e.g. when the visitors' design changes the wind speed in the challenge, the pitch of a sound changes). Some visitors with visual impairments have expressed appreciation for feeling the wind in the design challenge.

The Ventila/Ventilate exhibit component.

Some features that support accessibility for visitors with limited mobility are visible in the component, Protege/Protect. The seating can be moved around as needed. The component has adequate space for people who use wheelchairs. The materials in the bins and the space to lay out materials are easy to reach.

The exhibit component, Protege/Protect.

Considerations for limited dexterity

The digital exhibit component, Colabora/Collaborate, was designed so that it is accessible for visitors with limited dexterity; specifically, the touchscreen has large interaction points.

The exhibit component, Colabora/Collaborate.

Working towards increased inclusion at exhibits means striving to create experiences that visitors can participate in and enjoy easily without needing remediated adaptations. When accessibility is part of the exhibit development process, affordances for diverse visitors can be integrated into the design from the beginning.

Real world constraints—budget, time, resources—limit what can be included in an exhibit, so it is essential to plan early and often for accessibility considerations. Discuss with your team, audiences, partners, and advisors the priorities for inclusion and make strategic decisions that can support the broadest participation

Appendix A: Create an Accessibility Design Matrix

Exhibit design challenge teams can create an Accessibility Design Matrix to explicitly identify, research, discuss, and prioritize accessibility and inclusion considerations. Creating a matrix early in the project can guide general thinking about the exhibit characteristics as a whole. As individual components are being developed, revisit the matrix and identify specific strategies to be used with each.

The matrix below can be used to begin creating an Accessibility Design Matrix for each accessibility area you want to consider. Be sure to do your research; we provided a few possible, but not comprehensive, resources on page 3 of this module.

Accessibility area (What are key characteristics or obstacles to consider for accessibility?)

	Must	Should	Could
Identify the primary and secondary audiences for a given Accessibility area	List strategies and approaches that your team feels every exhibit component MUST include. These are the features that are non-negotiable.	List strategies and approaches that your team feels every exhibit component SHOULD include. These are features that are included whenever possible. They contribute to improved accessibility in merely every case.	List strategies and approaches that your team feels every exhibit component COULD include. These are features that would be included if resources are available and they would improve the accessibility of the specific experience.