



Shifting the Conversation: Improving Access with Universal Design

by Michele Hartley

Michele Hartley is Media
Accessibility Coordinator, Harpers
Ferry Center, National Park Service.
She may be contacted at
michele_hartley@nps.gov.

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To address requirements and identify solutions that make exhibitions accessible, planners, designers, and fabricators must cobble together government-mandated standards from somewhat unrelated categories, such as amplified meeting rooms, dining areas, and bathrooms. As a result, access can be viewed as frustrating or unattainable, especially with regard to programmatic access. Fortunately, using the concept and philosophy of Universal Design in conjunction with legal standards can shift the conversation from burdensome requirements to effective exhibition experiences that benefit all visitors, regardless of disability.

By the 1970s, Congress had passed numerous access-related laws for federal agencies, including the National Park Service (NPS). They included the 1968 Architectural Barriers Act and 1973 Rehabilitation Act as amended. Standards followed, such as the Uniform Federal Accessibility Standards, which were published in the *Federal Register* in 1984. Throughout this time and until his death in 1998, Ronald L. Mace—architect, wheelchair user, and founder and program director of the Center for Universal Design at North Carolina State University—helped shift the conversation from one about meeting legally mandated requirements in the design of products and environments to one about designing products and environments that benefit everyone. Mace coined a new term for this more expansive approach: “Universal Design.”

Universal Design is broadly defined as “the design of products and environments to be usable by all people, to the greatest

extent possible, without the need for adaptation or specialized design.”¹ In 1997, Mace and the Center for Universal Design convened a group of architects and like-minded multidisciplinary professionals to define this concept further and communicate it more effectively. The group developed what is now known as “the Seven Principles of Universal Design” so that consumers and professionals could educate and guide themselves in the design and evaluation of “more usable” products and environments. The group’s work resulted in a short publication that named, defined, and provided key guidelines for each principle. The intent was to keep the names and definitions brief so that people could remember them easily. The seven principles and their definitions are:

1. **Equitable Use:** The design is useful and marketable to people with diverse abilities.
2. **Flexibility in Use:** The design accommodates a wide range of individual preferences and abilities.
3. **Simple and Intuitive Use:** Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.
4. **Perceptible Information:** The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.
5. **Tolerance for Error:** The design minimizes hazards and the adverse consequences of accidental or unintended actions.

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6. Low Physical Effort: The design can be used efficiently and comfortably and with a minimum of fatigue.
7. Size and Space for Approach and Use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user’s body size, posture, or mobility.²

In addition to legal mandates, National Park Service leadership supports the use of Universal Design. Policies, such as Director’s Order 42: Accessibility for Visitors with Disabilities in National Park Service Programs and Services, published in 2000, and the NPS Management Policies, published in 2006, reflect this support. Three National Park Service exhibitions developed using these principles and guidelines illustrate that Universal Design can direct design decisions about accessibility that have the potential to improve all visitors’ experiences.

The exhibition teams for these projects were distinct collections of staff from the parks and the National Park Service’s Harpers Ferry Center, other parts of the service, and contractors. Each team included at least one person who had experience and knowledge of accessible media. A Harpers Ferry Center video producer who sat on the center’s accessibility committee and helped revise the audiovisual section of their accessibility guidelines was a team member on the first project. For the second project, a National Park Service accessibility specialist who is also a person with a disability actively participated from the beginning of the exhibition planning

process and continued to be involved through conversation and the review of prototypes. The team for the third exhibit included a contracted audio description writer who was instrumental in the development of a delivery system for audio description. Fundamental to all three is the application of the overarching concept and definition of Universal Design.

The Tuskegee Airmen National Historical Site (NHS) Hangar One Exhibition, Tuskegee, Alabama

The exhibition in Hangar One of this site commemorates the history and people involved in the training program for Tuskegee Airmen, who famously flew in the United States military during World War II. Oral histories with airmen and staff, collected in the early 2000s, were a powerful primary resource featured throughout the exhibition. If these recordings were not accessible to visitors who were deaf or hard of hearing, this population would be excluded from a core programmatic exhibition experience.

Exhibition designers had two options to meet accessibility requirements. They could provide scripts of the featured oral histories or produce synchronized electronic captions. The first option was less complicated and expensive. The second was a new approach within the NPS. It was more costly and complicated, requiring the development, installation, and maintenance of electronic equipment. After debating the advantages and disadvantages of both options, the team used both approaches based on an analysis of what they considered to be the most effective way to communicate and engage with visitors.

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Fig. 1. The box to the right of the phone houses a small monitor. It delivers synchronized captions of the audio programs presented at this oral history station for the Tusgee Airmen National Historical Site (NHS) Hangar One exhibition. Courtesy of NPS



Fig. 2. A printed script and handset provide access to the ambient audio program for the historically furnished "Maintenance Record Room" in the Tusgee Airmen NHS Hangar One exhibition. Courtesy of NPS

visitor could conceivably view the captions at the same time, and all visitors would be able to use the reproduction phones to initiate the program, which was one of the exhibition's interactive experiences (fig. 1).

Historically furnished rooms located around the perimeter of the hangar and exhibition also included audio experiences. When visitors walked up to each room, a sensor triggered an audio program that combined narration and oral histories about the room and its activities (fig. 2). Due to already completed electrical wiring, we had few options for installing monitors that could deliver captions at the entrance to each room. Because there was only one audio program for each room, we realized that we could fit a printed script on the front and back of one to two pages at most, which would not be cumbersome. In addition, we could install a handset for visitors with hearing loss. Any visitor, though, could pick up the handset or script and take it to the viewing area to look into the rooms as they read or listened to the audio program.

Contracted media developers faced challenges when they began to work with the oral history recordings. These interviews were recorded in less than ideal environments and included everyday ambient sounds of traffic, air conditioners, and home appliances. The airmen's diverse regional accents were also sometimes hard to understand. By making captions and scripts available to all visitors at the location of the exhibit, visitors without hearing loss could follow along. Had the team been solely interested in meeting minimum requirements for these exhibit components, they might have made scripts

Many of the oral histories were delivered through 1940s reproduction telephones that sat on top of reproduction, period desks placed in front of exhibit panels. These stations had anywhere from two to five oral history segments and introductions to the station's theme and content. Transcripts would require visitors to leaf through a notebook of pages. The team decided that synchronized captions would provide the most benefit. While screens would be small, more than one

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available to visitors with hearing loss upon request and/or at all of the oral history stations. The concept of Universal Design pushed the team to consider how to enhance access within the exhibit itself. As a result, the initial conversation about required access for people with disabilities shifted to a conversation about how all visitors could potentially benefit from these accessibility approaches.

In typical history exhibitions, creating access to audiovisual components, such as video and audio programs, is relatively straightforward. Audio programs and videos with sound must be captioned for people who are deaf or hard of hearing, and assistive listening should be made available for people who have hearing loss. Videos with and without sound should be audio described for people who are blind or have low vision. Other common exhibit components, however, such as graphic panels with text and images and unreachable or untouchable models, do not have these same ready-made formulas. This was the challenge we faced at the next site.

The Pearl Harbor Exhibit Galleries for World War II Valor in the Pacific National Monument, Honolulu, Hawaii

The Pearl Harbor Exhibit Galleries present the history of events leading to the December 7, 1941, attack on Pearl Harbor and its aftermath. The exhibition includes graphic panels, audiovisual programs, memorabilia, artifacts, photographs, and oral histories. A model behind glass of the USS *Arizona* and its memorial and a wall-sized mural of the attack help tell these stories. These and other visually rich types of content are inaccessible to people who are blind or have low vision.

National Park Service Accessibility Specialist Ray Bloomer was involved from the beginning of the exhibition process, when the exhibition's themes and stories were developed. The team wanted to present the many ships and planes that played a role in this story. As a result, Bloomer proposed that they include a rich collection of tactile experiences. The team agreed and recommended the use of models cast in bronze, one solution for giving visitors who are blind or have low vision a more effective, meaningful experience within the exhibition. Because these models were known components from the beginning, they were included in the production budget early in the process. As important, the team persisted in its commitment to accessibility. If concerns about the budget were brought up later in the process, the exhibit components that had an accessibility benefit were nonnegotiable. They were an integral part of the exhibit experience that the team had committed to from the earliest stages of the planning as opposed to an afterthought that could, by its nature, be more easily discarded.³

The original intent of these models was to provide better opportunities for access to visitors who are blind or have low vision. But everyone can touch them, as people are often apt to do. The USS *Arizona* model in particular offers the potential for all visitors to connect to the sacredness of how we memorialize this significant event through a tangible, tactile experience. After observing the number of people who often gather around the tactile model of the memorial and USS *Arizona*, the chief of interpretation shared with Bloomer that



Fig. 3. The “Attack” exhibit at Pearl Harbor Exhibit Galleries for World War II Valor in the Pacific National Monument features multisensory and redundant exhibit components so that visitors can access the story in multiple ways. Courtesy of NPS

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she thought it was one of the most popular stops for visitors in the galleries.⁴

The “Attack” exhibit gallery includes a wall-sized mural of a Japanese plane descending upon Pearl Harbor. To convey the impact for all visitors, the team created a multisensory approach that drew on the principles of Universal Design (fig. 3). The mural with the attack route was reproduced in a smaller reader-rail version that anyone can examine more closely. A tactile complement of the attack routes in the reader-rail version provides additional interpretation and guidance for visitors who are blind or have low vision. In the center of this space, the plane depicted on the mural is suspended from the ceiling; it is also reproduced as a tactile model for all to examine visually and tactilely. An ambient soundtrack finishes off the exhibit by providing an audio layer to the story. This approach allows people to access and re-access the same story in multiple ways with multiple senses. While the components, such as the model plane and the reader rail, have specific accessibility functions,

the redundancy punctuates the critical pieces of this event while simultaneously broadening access to the exhibit.

Sitka National Historical Park, Sitka, Alaska

When the broad concept of Universal Design is incorporated as a design philosophy in exhibition development, access for visitors with disabilities is vastly improved. This, however, does not mean that the exhibition will be fully accessible to all visitors with disabilities. The added commitment to integrate necessary accessibility components results in truly inclusive design that marries the principles of Universal Design with accessible design.

A wayside exhibit along a trail in Sitka National Historical Park is an example of this. This particular wayside addresses the life cycle of salmon. Depicting this lifecycle through illustrations and text would have been an easy and obvious choice. The tactile model of a salmon, though, brought the story to life and invites all visitors to make a visual and tactile connection with the story (fig. 4).

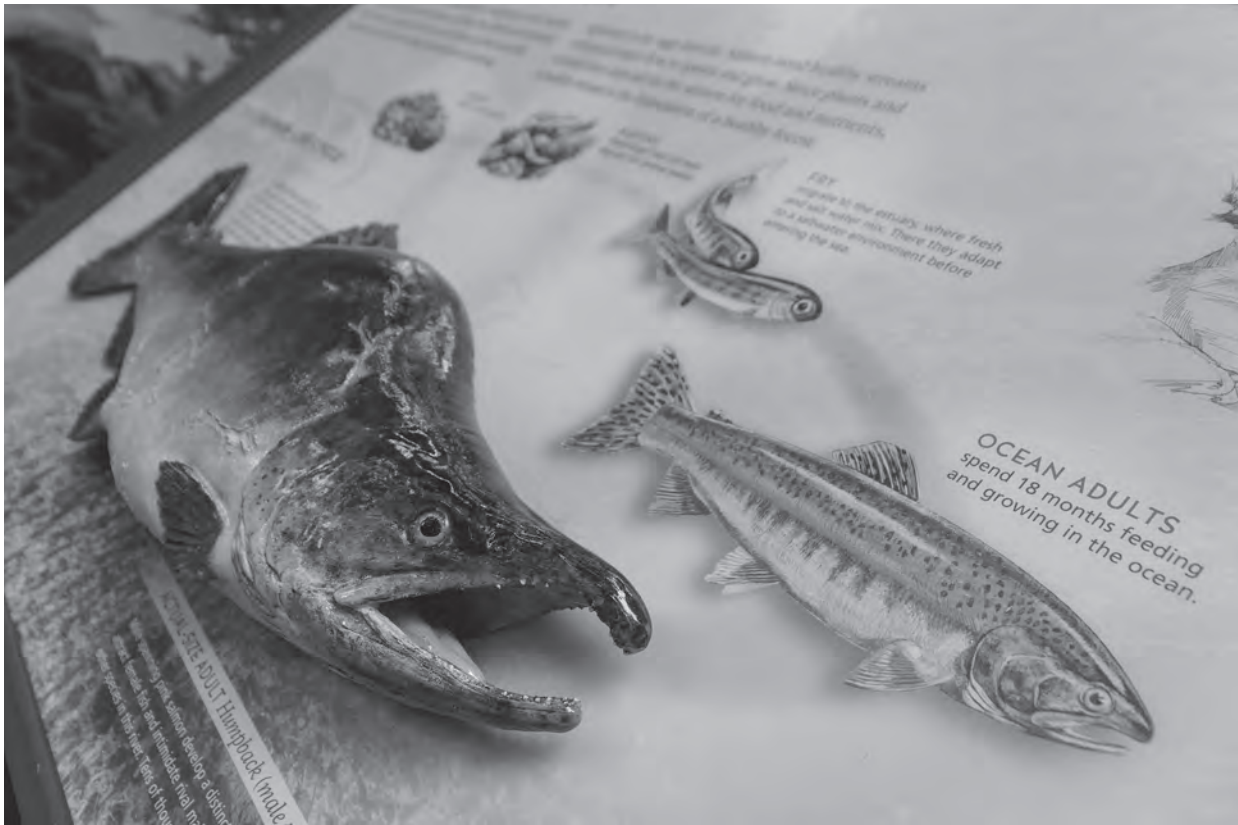


Fig. 4. By adding a 3D model of a salmon to this outdoor wayside exhibit, we added a dynamic tactile dimension to an otherwise typical, 2D experience. Courtesy of NPS

Some research indicates that tactile experiences without audio description may limit their effectiveness.⁵ Audio description is produced specifically for people who are blind or have low vision to provide orientation and verbal descriptions of the text and visuals that are critical to understanding what is being presented. Audio description may also help people with other disabilities, such as dyslexia. While a specific audience uses audio description, it can still be integrated into the exhibition so that it becomes part and parcel of the design.

Designing audio description within exhibitions can be complicated and costly. Providing audio description in outdoor exhibitions can lead to further issues, such as how to access power and how to distribute devices. Luckily, more and more people are interested in finding solutions to deliver audio description in both environments.

For this project, the Harpers Ferry Center designer worked with a contractor who had already researched and modified

off-the-shelf equipment designed for people who are blind or have low vision to make audio labels (fig. 5). This technology requires no outdoor wiring, and is inexpensive and easy to use. The trail is close to the visitor center, where a visitor can pick up an audio pen. Visitors trigger it by touching it to a consistently placed medallion with an embedded microdot pattern on the waysides. It then audibly provides visitors who are blind or have low vision with the content and orientation needed to access the full experience.

Conclusion

Universal Design principles can help exhibition practitioners make thoughtful, informed design decisions that include issues of access. They can also be used to help analyze if and to what extent accessibility is being addressed. For example, in looking at the three projects I've described, it's clear that by providing multiple ways to access the same content in the "Attack" exhibit, designers had articulated Principle Two: Flexibility in Use; by creating compatibility of use for

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Endnotes:

¹Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, and Gregg Vanderheiden, "The Principles of Universal Design," North Carolina State University, The Center for Universal Design: Environments for all People, Version 2.0, March 27, 1997, accessed September 13, 2015, http://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciplestext.htm.

²Ibid.

³Ray Bloomer (National Park Service Accessibility Specialist), conversation with author, August 21, 2015.

⁴Ibid.

⁵Rebecca Fuller and William R. Watkins, "Research on Effective Use of Tactile Exhibits with Touch Activated Audio Description for the Blind and Low Vision Audience" (White Paper), 2010, National Center on Accessibility, accessed September 13, 2015, http://www.ncaonline.org/docs/tactile_exhibits-fuller_watkins.pdf.

⁶Bettye Rose Connell et al., "The Principles of Universal Design."

⁷Ronald L. Mace, ed. Jan Reagan, "A Perspective on Universal Design," North Carolina State University, The Center for Universal Design: Environments for all People, last modified August 1998, accessed September 13, 2015, http://www.ncsu.edu/ncsu/design/cud/about_us/usronmacespeech.htm.



Figure 5. An "audio pen" delivers audio description for these outdoor waysides. Courtesy of NPS

visitors with hearing loss in Hangar One, they had incorporated a guideline of Principle Four: Perceptible Information; and by generally ensuring access for all, they had satisfied Principle One: Equitable Use.⁶

What cannot be emphasized enough is the need to apply the concept and principles as soon as a project begins. Universal Design gives exhibition teams a philosophy to rally around and provides a framework for the team to work within as they begin the planning and design process. The concept and its principles also help shift the conversation from sometimes ill-defined and required legal minimums that must be met for a particular population to maximum goals that, if achieved, have the potential to benefit multiple audiences. It is a creative design challenge to meet rather than an unclear requirement to address.

In his last known public speech, Ron Mace stated that if you could

separate barrier-free, universal, and assistive technology distinctly, they would look like this: assistive technology is devices and equipment we need to be functional in the environment; barrier-free, ADA, and building codes are disability mandates; and Universal Design is design for the built environment and consumer products for a very broad definition of user that encourages attractive, marketable products that are more usable by everyone. The reality, however, is that the three blend and move into each other.⁷

Universal Design in and of itself may not meet accessibility standards if accessibility requirements, such as captions and audio description, are not included. But when exhibition teams embrace Universal Design, they provide themselves with a framework and direction to talk about and realize requirements. Even more exciting, the results can lead to multisensory, multidimensional opportunities that may not have otherwise been predicted or achieved. As we move into the future, teams that apply the principles of Universal Design will inevitably create dynamic opportunities for wide-ranging audiences to engage with and enjoy. In turn, exhibition design teams will have an even larger body of concrete examples to learn and draw from to foster inclusive experiences for all. ✨