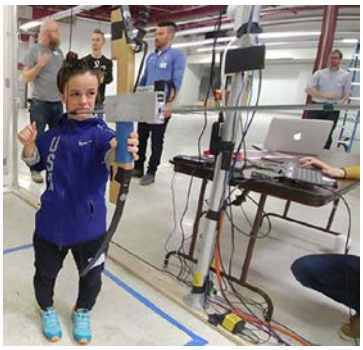
Inclusive Digital Interactives

Best Practices + Research



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Inclusive Digital Interactives

Best Practices + Research

Chapter 9

Pushing Forward Together: From Failures to Feats Through Increasingly Inclusive Design

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Inclusive Digital Interactives: Best Practices + Research
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Introduction

The first time I tried to test audio description in our research team's prototype mobile app, I couldn't figure out how to get the app to work in my phone's VoiceOver-like mode. I then spent about a half-hour frantically just trying to get *out* of that accessibility setting, which seemed to have turned my device into an unusable brick. I eventually found a way back from this dark and mysterious audio-oriented interface, with the help of internet searches and guides, but I did not return from the experience unchanged.

The type of frustration I struggled with — for just a moment — is an everyday, all-the-time, and enduring part of life for people who are blind or visually impaired. Only there is no simple online hack for it. When roles are reversed, and a blind person tries to explore a sight-oriented environment such as a museum, an exhibition hall, or a visitor center, through its ocularcentric interfaces, the media ecosystem can turn hostile quickly and in surprising ways, too. All types of media (videos, photographs, illustrations, timelines, charts, tables, maps, etc.) require significant audible augmentation to speak to this audience. Best practices for doing such work are scarce. Not surprisingly, audio versions of visual media often aren't readily available.

What can be done about that? This paper, aligned with the theme of this publication, argues for an inclusive design approach.

Certain stakeholders rarely get seats at the design table. Therefore, their perspectives on design choices don't get heard, sometimes ever, sometimes not loudly enough, or sometimes just too late to do anything about it.

A remedy for that is a dedication to more inclusive design processes that provide agency early and often to key stakeholders of all types. Working together provided, for our research team, many benefits at few costs. In addition, an emphasis on this approach has raised innovative ideas and extended communicative possibilities for media accessibility beyond any individual team member's abilities, expertise, and experiences.

When I left my comfort zone of visual smartphone interfaces, for example, I was shocked to discover how unprepared I was for working within an audio interface. The sooner I had learned this lesson, the better, because I already had been making important design decisions about a media ecosystem based on unfounded assumptions (and some of these decisions then had to be redone at significant cost).

This misstep was probably the most fundamental mistake I could have made in starting any design project, but here I was, making that focus-group-of-one mistake again.

This time, though, the product wouldn't work for anyone, let alone intended users. In turn, I recommend that you begin any design process by thoroughly investigating your assumptions and biases, acknowledging them openly as contested knowledge before getting to know your audience, in-depth, which includes understanding the rich diversity of your audience's abilities, needs, motivations, obstacles to participation, and possible contexts, especially those involving inflexible communication infrastructure. Then, remove the clutter and noise and make your design process truly reflective of the findings of that investigation.

These are not added complications to your design. These are not problems to overcome. These are proven approaches to improving design. Team members, collaborators, and reviewers from your intended audience are a source of diversity and strength that will elevate your designs above those without such active and engaged participation. Such openness and outreach are not a divergence from your design plans. This is the plan, providing the best path forward.

The insights you identify in an inclusive design process can become novel opportunities to serve people in ways that they might never have been served before. I came to many of the ideas shared here only after missing them in the beginning and by being abruptly grounded by them later. This is an easy mistake not to make. Be inclusive from the beginning.

To further set the stage for this discussion, though, some necessary background: audio description for interactive exhibits, when in place, generally focuses on video, with descriptions stuffed into slight pauses in soundtracks and delivered through special equipment. Inaccessible visual media of other kinds, though, is rampant as well throughout these same museums and public spaces, including some of the most basic orientation materials, such as signage, wall texts, and brochures. Audio description is needed for those, too. Picking up a brochure and getting oriented to a place through that silent piece of paper, for example, is the most common activity at U.S. National Park Service (NPS) visitor centers and exhibition spaces (NPS, 2011). Yet, when we started our research project in this particular vein, only a few of the more than 400 NPS sites offered such a fundamental accessibility option. We should also acknowledge that all sorts of accessibility issues appear throughout public-learning environments, indiscriminately and pervasively, from inaudible panoramic views of presentation spaces to the silence of gift shop offerings, such as t-shirts and keychains, to inaudible aesthetic flourishes on interactive exhibits.

From a Box of Brochures to The Descriptathon Way

For scope, and structure, I start this account at the inception of the project in the Fall of 2014 and unfold its findings roughly in chronological order through the completion of our fifth Descriptathon in the Fall of 2019. My perspective comes as a sighted technical communication researcher and designer of digital tools who typically addresses information-gathering challenges at place-oriented public attractions. In this case, my primary audiences were people who are blind or visually impaired, but this work also clearly could benefit learners of all types. Our cross-disciplinary research team, of which I serve as the Principal Investigator (PI), included scholars and consultants in the fields of disability studies, education, and computer science. This work was intended to foster and support inclusive and interactive discourse in museum and museum-like contexts, but it also inherently illustrates systemic problems that routinely arise in the development of assistive technologies, and systems for creating assistive technologies, offering other potential insights for this larger area of study as well.

As an autoethnographic case study, it documents some of the factors that led us astray in the beginning and also key adaptations we made that allowed us to gain traction, establish a footing, and improve media accessibility. Since that initial setback, The UniDescription Project (https://www.unidescription.org/) increased its inclusionary tactics and correspondingly improved accessibility at a sizable scale, including through partnerships with American Council of the Blind (ACB) chapters in about 20 states and through producing audio-described orientation media at more than 75 U.S. NPS sites across the country. By detailing these lessons learned, we will recap and help readers cogitate about key moments in the processes of building webtools, mobile apps, training programs, and an audio description network, guided by an audio description research agenda.

As a part of the many twists and turns during this project and during this time period, like the nonfunctional-prototype surprise, The UniDescription Project spawned a spin-off idea called a Descriptathon, which is like a hackathon for making more inclusive media. The Descriptathon concept, which also will be described in more depth later in this paper, was born as a way to address a multitude of overlapping and foundational issues.

From an academic perspective, audio description generally lacks best-practices guidelines that have been put to any sort of stringent empirical tests, leaving practitioners and scholars to debate anecdotes and preferences without much scientific study about the topic.

There are no vetted professional certification programs for audio description in the United States. Before we began our project, there also was no easy (and cost-free) way to make and distribute audio description. As researchers, we did not just want to engage in one-off service work, producing limited effects by crafting and testing model descriptions for a few NPS sites and then leaving it at that. So we started building something bigger.

We decided to first construct the critical communication infrastructure we needed, supporting the processes of making and sharing audio description. The Descriptathon way of doing that — inspired by the intensity, enthusiasm, and playfulness typical of hackathons — grew out of those efforts. It was designed as a pop-up training program that connects people — across the spectrum of sight,

and throughout the country — via conference calls, desktop computers, and smartphones. A Descriptathon complements our other free and open-source resources, such as our online training programs, through verbal training over conference calls as well as verbal and mediated forms of encouragement (such as feedback from listeners posted to participants' online projects). A Descriptathon also has clear research objectives, such as determining best practices for describing a map (Conway, Oppegaard, & Hayes, in press). A Descriptathon integrates description games and contests — staged like a sports tournament and fueled by fun Hawaiian-themed prizes — with practical goals of completing useful pieces of public description, ready for use. For a larger and more abstract goal, it also intends to bring people together at all levels (administrators, patrons, staff, volunteers, academics, advocates, etc.) in common cause to improve and audio-describe the world.

Our most-recent Descriptathon, for example, attracted teams (of one to five people) from 28 NPS sites, mostly in the Southeast region, spanning Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, and Florida. In addition to those NPS staff members, providing in-kind labor, we welcomed about 20 volunteer judges from the ACB to the mix for the three-day virtual event, all of whom generously shared insights and provided important quality-control functions, plus another half-dozen consultants who also contributed significantly to elevating the event's discourse and energy. Combined with our research team, based in Hawaii, this dispersed but united group, numbering about 100, both learned about and produced professional-quality audio description, much of which quickly then became available for public use. At this point, all of these critical parts of the project work intricately in unison (the Descriptathon, the field tests, the ACB partnership, the grant support, the mobile apps, the webtools, and the website). They are an interlinked operation. The vibrancy of these activities around the recent Descriptathon provides a dramatic contrast to where we began, five years earlier, with just a cardboard box filled with several hundred printed NPS brochures. The latest Descriptathon showed just how far we had come but also illuminated the key steps that were necessary to get here, fueled primarily by increasingly inclusionary design practices.

The Origin Story

I had worked with the NPS on several complex mobile-media projects before, including my dissertation, various studies in non-visual and interactive mediation, and even on a temporal recalibration experiment at the world's first national park, Yellowstone, in which we used mobile devices to reconceptualize time for users around geyser eruptions, rather than through relations to Greenwich Mean Time (GMT). Those experiences in mobile media, and the trust the NPS developed in my work with them, therefore, had been built over many years before the box of brochures even arrived.

So for this new media accessibility project, I was asked if I could help to develop a system for converting visual media into audible media through digital means, mobile technologies, and the translation technique of audio description. My source material was the UniGrid brochures offered in visitor centers, as a fundamental way to orient a visitor to a site. I somehow had to transform the information in those silent brochures into information that could be efficiently and effectively accessed through listening.

Intrigued by this technical-communication challenge, I recruited a couple of colleagues in the Center on Disability Studies at the University of Hawaii, who were experts in creating media accessible to people who are blind or visually impaired. I also brought on board a scholar at another university who specialized in the development of closed captioning. Then the box arrived. It was a plain cardboard box, about a foot wide and two feet long; maybe six inches tall. I opened it to find hundreds of brochures inside, spanning the country, from Acadia National Park in Maine to Zion National Park in Utah. At that point, I think I realized how monumental the task ahead of us was.

On the positive side, the layout of these brochures was orderly, based on the UniGrid system, created in the late 1970s by Massimo Vignelli, who was renowned for his design of the New York City Subway map. The UniGrid system standardized these brochures in ways that improved production and printing efficiencies. With that heralded system as an inspiration and a guiding force, we named our project UniDescription, with a goal of bringing unity (or, as we

started calling it, UniD) to the small and relatively fragmented audio description community.

From Literature Review to Laws

As academics tend to do, we started this process by determining what is already known about this field, with a thorough literature review of audio description in general, including best practices, and any label variants, such as verbal description. We found paltry amounts of established scholarship. There is no academic journal devoted to it. Many books that include research on audio description also include other types of media-accessibility issues, such as captioning, sign language, braille, etc. (Cintas, Orero, & Remael, 2007; Cintas, Neves, & Matamala, 2010; Meloncon, 2014). So we didn't have much to start with.

Audio description originated as a formal translation technique in the 1970s, decades earlier than the debut of the smartphone, as a way to augment television, movies, and theater (Snyder, 2014). The few best-practices guidelines available, usually from advocacy associations around the world, mostly focus on standards for live events and pay little attention to static media, including illustrations, tables, and graphics. They generally offer tips on tried-and-true writing techniques (such as using active voice, subject-verb-object construction, short sentences, etc.) but offer little guidance about what to say when, for example, one is describing a map, which has no central focus, no clear use-case, and thousands of details of relatively equal importance.

Besides digging into the foundations of audio description, we also had to deconstruct the particular media artifact that we were translating at first (a brochure), as a way to determine what exactly a "brochure" was, in essence, and then also to provide quality-control measures for its output after the translation. We especially needed to ensure equivalence in richness and scope.

In quick summary of that work, which we conducted over about a year, our content analysis determined that the brochure was a communicative act that operated both in holistic and in modular manners. In a holistic sense, the brochure was an introduction and orientation to the park site, including its

justification for existence, its highlights, and its boundaries in terms of characters, settings, and timelines. In modular ways, though, the brochure also communicated useful information outside of the larger narrative, such as what activities people might undertake at this place (hiking, biking, boating, etc.), where the restrooms are located, and even what the mailing address is. Our mandate, from the NPS staff, was to not edit the material but to convert every part of that brochure, from the most complex — including collages that show a site's ecosystem, complete with all plants, animals, and geology — to the smallest of details, such as a gray-screened signature overlaid on a background image. In the end, all of it needed to be heard.

For more than 40 years, since the passage of such legislation as Sections 504 and 508 of the Rehabilitation Act, the NPS has been grappling with how to realistically address federal mandates that require such availability of equivalent learning media. While NPS sites offer much visual media, in many forms — including videos, visitor-center exhibits, and wayside signs — this research project focused on the interactions that visitors had with the foundational media provided in the brochure. How did it help them to navigate and experience the site? We initially thought we could use a third-party system to build, test, and deliver our descriptions. Instead, like with the scant academic literature and best-practices guidelines, few options existed, and the ones that did could not meet our needs.

With grant support from the NPS, and later Google, to cover programming and research costs, we started to develop our webtools and app prototypes based on earlier experiences of how this process likely should go, rather than collaborating immediately with end users and fostering organic solutions arising from those interactions. That was a crucial mistake. Creating audio description, we learned, really was not like our other projects, despite how similar these seemed on the surface. And delivering audio description to a listener also was more foreign than expected, from content creation demands to device controls. Audio description is not just a variant of audio books, audio tours, radio theater, play-by-play sports broadcasts, using wireless earbuds to listen to music, etc. We found that audio description — due to the specific needs of its audiences — instead is a unique media ecosystem that demands solutions tailored to its particular quirks and audiences, many of which have not been addressed or even explored in

existing academic or industry literature. That assertion is especially evident in static media in public settings, such as at museums and parks. For our part, we therefore had to quickly acclimate to this ecosystem, build tools for production and dissemination within it, and test our assumptions as they developed. We iterated often, sometimes radically. We identified various practical and technical communication issues at play. But we also began to conceptualize this type of inclusive design work as a form of establishing, reclaiming, and extending social justice. From that critical cultural perspective, the label of disability is just a social construct that masks deeper problems in design practices that privilege some people and disenfranchise others.

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Starting a Training Program, Finding the Descriptathon Way

After the initial UniDescription webtool was built through an admittedly insular design process — primarily based on our team's collective ideas about what it should be, and how it should work — we collaborated with park staff at three NPS sites (one in Hawaii, one in California, and one in the Washington, D.C., area) in February 2016 to try these ideas for the first time in the wild. For this initial pilot, we offered just a one-hour introductory phone call with the park staff, a call that had to cover all of the orientation about the project, and everything we wanted the person to know about audio description, plus training on the software. Yes, you read that right, in one hour. Without any additional guidance about audio description best practices, we then let the park staff loose to work on the webtool and describe at will, for roughly a day (we asked them to spend about eight hours of work on it, but we did not track the actual effort), before bringing everyone back together for another one-hour phone call. There was no real synergy among the participants. They worked mostly independently. The time frame, in hindsight, was absurdly short. Most of that second call was spent on tallying technical glitches with the webtool and sharing basic

information we realized should have been in our orientation, such as explaining simple best practice guidelines for common audio description tasks, including how to describe images of people, places, and artifacts. The staff worked for another half of a workday (about four hours), then we wrapped up the pilot with what we had completed at that point. The results were better than nothing but with much room for improvement.

Aside from webtool usability issues, which were many, we also realized we still had a lot of work to do to prepare sighted people for the craft of audio description. It was sort of like teaching and learning a new writing genre, only in hyper-speed. While these park staff members already knew a tremendous amount about their parks and knew how to interact with visitors in clear ways, and some were good writers, they were mostly unpracticed and generally unaware of the nuances of translating visual knowledge into acoustic knowledge for this purpose. So we generated as a product from this initial process mostly a reflection of existing skills, in which a California park staff member, seasoned by earlier audio description projects at the site, produced a solid final version, ready to share with the public. The park staff at the other sites, who had no experience in audio description before this project, struggled to understand the genre, including the translation process and technologies affording it. Some of the problems in the process could be attributed to the rough state of the webtool and its glitches, which at times took a high degree of technical skill (and patience) to overcome. But the California park's staff member could do it, and do it well, forcing us to look beyond just technological obstacles as excuses for the uneven results.

At a national park in Hawaii, the one person working on this project immediately became overwhelmed by the process and essentially dropped out (only to return to it months later via one-on-one tutoring). At a national monument in Washington, D.C., we had asked three different staff members to independently work on the same brochure, in separate project files, as a way to compare how this process worked with the same content, in the same artifact, within the same organizational culture, with people of three different skillsets, in different types of positions. We found that these variables, such as organizational position, really didn't affect the experiment much, though, because none of the three ended up understanding (likely due to our thin orientation) what we were asking them to do and why. Instead of describing visual elements of the brochure, for

example, the three spent most of their time engaged in just retyping text on the brochure and writing a few alt-text-like descriptions, akin to “This photo shows the (monument) on a sunny day.”

If we would have thought about all of the low-hanging transcription tasks beforehand, we could have copied and pasted the texts into the webtool and eliminated that straightforward but time-consuming part of the job (which we have done since). From that lesson, we also became determined in future collaborations to do everything we possibly could to prep our project files with whatever rote production work could be done beforehand. Ideally, we wanted new audio describers to have nothing to do to take their focus away from describing visual elements. So we created a new type of prepping system in response, including a template and transcription checklist, to put the focus of the Descriptathon on only the audio description. That said, even with the focus on descriptions, we realized that doing this work was not an innate ability in most people. We needed a more robust training system as well.

The Descriptathon: Blending a Hackathon, Conference Call, and Online Training

As mobile, web, and other digital technologies converged in the mid-2000s, people were trying to figure out how to harness these emerging powers in various situations, transcending education and business (Bogost, 2016; McGonigal, 2011; Nacke & Deterding, 2016; Walz & Deterding, 2015). Gameplay could drive intriguing behaviors in many situations, even in serious contexts, through increased engagement and efficiency, which also could spur innovation (Rauch, 2013). Hackathons, Irani (2015) found,

> manufacture urgency and an optimism that bursts of doing, and making can change the world. Participants in hackathons imagine themselves as agents of social progress through software, and these middle-class efforts to remake culture draw legitimacy from the global prestige of technology industry work practices.

Such gamification also overlaps with iterative design processes, making gameplay and user experience studies sometimes difficult to tell apart, when they both incorporate forms of iterative design, rapid prototyping, and user testing in real life situations (deWinter & Vie, 2016; Porras, et al., 2018). Few argue anymore that gamification techniques can work, and work well, in the right circumstances. More interesting discussions exist now around precisely which ones work and how (Deterding, et al., 2013; Deterding, 2014; Nacke & Deterding, 2016). Some people have tried issue-oriented structuration, born from the immediate needs of a particular public to confront a particular concern (Ladato & DiSalvo, 2016). Hackathons also have morphed from their origins of strictly technical activities oriented toward programming prototypes into more expansive systems of issue response and support, including subject-matter training, extensions of services, and social networking (Porter, et al., 2017). They have especially been helpful as systems for bringing volunteers together quickly around an important societal design problem, for articulating the most pertinent issues, and then for immediately starting work on solving core problems (Easterday, et al., 2018; Lodato, & DiSalvo, 2016).

Our research team gravitated toward these more expansive hackathon ideas as a way to make media accessibility more aligned with a community of practice in which people came together to do this type of work in a fun and engaging environment as a societal calling of the masses rather than as a checklist task to complete. Technical communication as a field also has taken a turn toward social justice issues, particularly at the intersection of disability studies (Meloncon, 2013; Moore 2017). The timing, therefore, was right to try this approach, as motivating factors converged in terms of societal interest and technological capabilities.

At the debut of this new Descriptathon approach — which we launched from the national design hub for the NPS, at the Harpers Ferry Center Interpretive Center, in September 2016 — staff members from eight NPS sites across the country participated via an online and web-based conferencing system and a conference call (including Yellowstone, as well as sites in Alaska, California, Florida, Hawaii, New Jersey, and Washington state). They were invited via correspondence that contained, among other information, such aspirational rhetoric as:

> By participating, we hope you will become an advocate for audio description and help to spread it and the importance of accessible media to the rest of the world. … We also have higher goals, hoping to kickstart a national conversation about media accessibility and the value of including more people in our societal conversations.

At that point, our research team included six people (me, two co-PIs in disability studies, two research assistants, and a subcontracted web and mobile app programmer). We also had major logistical help and guidance from our devoted NPS liaison. Park participants, usually volunteers rather than conscripts, were first given an overview of audio description, as a process, as well as introduced to the prototype webtool and then asked to use that tool to create descriptions for their site brochure. We spent much more time on this training activity than before, about nine hours together. But this still turned out to be a lot of new information to share at once, including introducing a new genre of writing and a new piece of software, with a heavy production expectation by the end of two days. The hackathon part of the event was straightforward and utilitarian; basically designed as a way to get together with like-minded others and finish descriptions of your brochure, through discussion and guidance by the group. This event was much more successful than the pilot, in terms of the quality and quantity of the descriptions produced, but it also opened our minds to the potential of expanding these activities even further. We definitely needed to do more. More what, exactly, we weren't quite sure. But definitely more.

Descriptathon 2: Gamification Through a Tournament

For Descriptathon 2, in February 2017, we dramatically increased the size and scope of the event, working with park staff at 28 NPS sites across the country. We cut the online conversation channel and focused on the audio only, via conference call, with captioning. We brought in two prominent external consultants in the industry, to bolster the quality and scope of the audio description training we offered. We increased the event from two days to three days, with more built-in time for independent description, and we made a significant shift in the tone of the proceedings. In short, we thought we were

missing the “fun” of a hackathon, and the NCAA “March Madness” basketball tournament was coming up. I had been involved in a couple of unconferences, with a hacker-like vibe, and many thrilling sporting tournaments, and wondered if the excitement of sports and a hackathon could be combined within a bootstrapping and time-constrained, get-the-job-done environment. We asked participants to do more prep than before, including filling out a survey that described their audio description experiences to date and completing exercises to practice description beforehand, such as describing an image on a brochure and calling a friend to read the description over the phone as a way to practice hearing how such description sounds aloud and works without visuals.

Unlike earlier training exercises with other parks, this group was organized by sites into a tournament bracket, in which pairs of parks competed against each other in exercises and semi-competitive games designed to create comparable audio description, around themes such as “the portrait,” “the landscape,” “the cultural artifact,” “the collage,” and “the map.” We gave a bit of orientation and training for each theme, gave the participants a timed exercise to complete, and then judged with the consultants, one of whom is blind while the other has low vision, and our researcher who is blind, serving as the review panel. They determined which description of each pair was better and why. After the judging period, the reviewers talked about what they liked and what they didn’t like in the various descriptions. They gave illustrations of excellent descriptions in the contests and also noted faux pas. There was a prize for the participant who completed the most brochure descriptions on their park project in a day. There was a prize for the description each of our four research assistants liked best, which they read and explained. We had participants self-nominate descriptions they wrote that they liked best and had a competition among those. We tried a lot of different dynamics.

The winners of each round, as determined by the reviewers, advanced to the next round, spurred by promises of Hawaiian-themed prizes at each stage (touristy items that were gathered and mailed to them afterward). The gamification strategy appeared to clearly generate more data, and more research-focused data, in terms of quantity and lengths of descriptions, than the previous training exercises, per user. Several participants also commented about how much fun they were having or how exciting (or stressful) the training was.

But we noticed that this approach also seemed to somehow disenfranchise a few of the participants as well, four of whom dropped out of this voluntary training, which might or might not be attributable to the perception of an "electronic whip." Everything considered, good and bad, we concluded afterward that this approach was a major improvement from Descripthathon 1, yet it still lacked significant inclusion of the intended audience beyond a few hand-picked representatives. We wondered how a more-inclusive system, from Descriptathon to field test, would affect the process and products. Then, we received some great news.

Descriptathon 3-5: Much More Support, Much More Inclusion

Two interconnected and important developments followed the second Descriptathon. First, Google's accessibility group decided to invest in this project with a significant grant. In addition, as a part of those grant discussions, our research team was introduced to leaders in the ACB, a leading advocacy group for people who are blind and visually impaired. This is where the mostly disparate parts of the Descriptathon structure and the underlying drive for better integration and evaluation of inclusive design finally came together.

With the new grant support, I was able to hire two student research assistants. One of them was blind, and the other had worked in the Hawaii Library for the Blind, both bringing helpful and diverse experiences directly to our research team. The connection we created with the ACB in this process started strong as well, with commitments from their members to field test our generated descriptions at NPS sites. I have had synergies develop before with research partners in other projects, and this partnership quickly became one of those most precious collaborations, in which what we decided to do at first became quickly dwarfed by our common-ground ambitions that propelled us both to unforeseen benefits, heights, and side projects.

For example, our field research outings also morphed into community-building events, bringing together NPS staff and ACB members living in a localized area,

by introducing real people and their accessibility concerns directly to the nearby park, instead of just strictly conducting tests and calling it a day. These events, which included a focus group and a field experiment with new audio description generated through this research project, also featured some important downtime for informal discussion, mingling, and park exploration.

In turn, these events often developed a lasting bond between the federal agency and representatives of the nearby community of people who are blind and visually impaired, who then typically became more active park supporters and patrons.

When we conducted a field test at Morristown National Historical Park in 2018, for example, the New Jersey site of several American Revolutionary War landmarks had some proprietary audio description equipment for its videos. But the staff could not get the equipment to work. We did our focus group and field tests, and during one of the breaks, our group of five ventured into a small and nearby historic structure, the Wick House. Escaping the sun, we went into the house primarily for the shade it offered on the hot day but were greeted by a costumed interpreter inside spinning yarn. She told the group of ACB members about the knitting process, allowed them to touch the yarn and the spinning wheel, and suddenly our group was diverted into a full-blown exploration of the house.

These ACB members circulated throughout the small building in ways that I was unaccustomed to witnessing at national parks. They did not breeze through by glancing around and walking rapidly from room to room. Instead, they took their time and deeply explored every touchable object and architectural feature available, as the costumed interpreter and the Morristown park ranger described verbally what they were encountering. In the entryway, for example, this group found the fireplace and felt around all of the edges on the hearth. They felt the different cooking instruments hanging nearby, item by item, and even knelt down to touch the fireplace rack, where the wood would be placed. We spent well over an hour inside, and a lesson learned from that experience was that quantity of information provided is not necessarily a barrier to interpretation.

As long as the information is of high quality and can be navigated and stopped when interest saturation is reached, the idea to “write short” in audio description seems in conflict with this audience’s potential interest in deep learning.

Instead, we found through various other experiments and discussions with ACB members, listeners want to know what they are getting into before they get into it. They also generally want to have the ability to stop and move on, when they want, similar to scanning a learning environment visually. They do not want to be held captive by a long, winding, and multipronged recording. But they might very well listen to a long audio piece, if it is interesting. In response, we redesigned our audio description products to start with a linked table of contents that allows the user to learn about the information highlights and structure of a set of descriptions before choosing where to dive down into it.

Benefits of Inclusive Design Blossom

The increasingly inclusionary design and evaluation practices that developed out of this partnership involved dozens of ACB members from around the country and led to countless adjustments and adaptations of our technologies, from locating show-stopping bugs in our programming to major oversights in the design that simply weren’t picked up in any other way through our research team’s normal review processes. For example, we exported audio description through our mobile apps in three formats: text only (marked up digitally, for screen readers), audio only (with MP3 files that could be listened to on any device), and a combination format that provided both. We had a three-tab button system for selecting and changing this format at the bottom of the smartphone screen, where it seemed to be out of the way but also easy to find and use. Only, when a blind person listened to this page, those tabs actually were so far down the list and out of the way, from an audio-oriented and linear sense, located after even the park’s contact phone number, that none of the people who used our app in these tests even recognized that it was there and that changing formats was an option. The simple fix was to move the buttons to the top of the page, so they could be found and adjusted easily before listening to the audio description. What seems obvious now as a design choice was veiled

then, because we didn't have enough people in our intended audience participating directly in the design and testing process.

As another example of the benefits of this partnership, when we kept uncovering various accessibility issues of different sizes and scopes in our field visits, ACB members volunteered to conduct a Section 508 and Web Content Accessibility Guidelines (WCAG) 2.1 AA comprehensive accessibility evaluation of our website, our webtools, and our mobile apps using the WebAIM's WCAG 2 checklist. Through that review, we were able to meet Level AA conformance. Through our partnership with ACB, we learned exactly what type of compliance was important and valued by this particular audience, which represented our larger intended audience as well, and then we were able to focus our efforts on achieving that specific standard.

For Descriptathon 3, our research team asked ACB for volunteers who could judge and provide feedback about descriptions, and 14 people from ACB chapters around the country jumped into this important information loop. We worked with a dozen park sites in Descriptathon 3 (September 2017), two dozen in Descriptathon 4 (March 2019), and 28 in Descriptathon 5 (August 2019), with dozens of ACB volunteers bolstering this expansion by serving as judges, consultants, and first-draft reviewers of content. In addition to enriching the Descriptathons, these ACB members and others also volunteered to conduct field visits to each of the sites afterward, as another critical form of quality control. Most of these field visits gather five to 10 ACB volunteers, who live near a park site. Our field visit to Yosemite National Park, in November 2017, for example, was so popular that we chartered a bus to transport the dozens of interested ACB members (and four service animals). An ACB Facebook post about the trip afterward attracted more than 100,000 views, setting a record for the organization in terms of social media engagement.

From a curatorial perspective, NPS staff were able to shape, vet, and control all content shared with the public as they deemed appropriate, aligning with their interpretive goals, objectives, and tactics. They had final say in whatever was published, and, through the free and accessible UniD tools, were able to instantaneously update and add content as often as desired. That said, these staff members also had a universal desire to collaborate and learn from their

audiences about how to create and deliver better and more useful information. At no point, and in no park so far, has this process turned contentious or devolved into issues of control. Instead, park staff members involved in this project have been eager to adjust their approaches, or make accommodations, to improve the end-user experience. At this point, and with these overwhelmingly positive results, it's become difficult to imagine this project even functioning without the integration of ACB members in it, and without their evaluations of the end products as endorsements. In retrospect, we only wish we had started such collaborations sooner.

Seeking a Connection Between People Rather Than Building a Product

Upon reflection, and aligned with sentiments found throughout this publication, I think my research team and I were too focused at first on making the tool and its products while not being attentive enough to the establishment of our intended audience as a meaningful part of our design processes. On less-than-sound footing, we thereby stretched toward our core research question: in what ways can we improve audio description in America's most precious places, such as at NPS sites? We were operating at times both out of context and balance. We did not consult thoroughly enough at first with important stakeholders in our research area's community, and many of us on the team did not live these experiences daily. For the most part, we were studying these issues from a detached scientific distance. In turn, instead of divining systemic solutions in an efficient manner, with the help of the people most affected, we stumbled into rookie mistakes in predictable places.

How could I have forecast these issues? How would I address these problems? Those were not just straightforward design, production, or programming concerns, so the answer was less technical and more philosophical. When I started this project, my design concepts were entrenched in an ocularcentric paradigm. I didn't realize that, of course, but I was looking for answers, rather than seeking them through all available sensory means. This article outlined some of the crucial developmental steps of a technological system designed

for improving inclusion. It extended beyond a report about a particular app, though, or a webtool, into details that can be examined in a variety of ways, such as through the use of the products, and exploring our extensive project website which includes access to the open-source code. In this article I've shared some of the larger lessons learned, essentially what I know now that I wish I knew years ago.

In my effort to efficiently create a successful design, I realized, I inefficiently skipped many of the most important parts of the process. I rushed to *see* the most visible solutions rather than patiently working to discover them. When I realized this misperception, I knew I needed to change my approach. I knew I needed to get more first-hand knowledge. I also needed to enlist more help, well beyond my usual circles of collaborators, including reaching out and developing an extensive partnership with everyday users of audio description through an active national advocacy organization, the American Council of the Blind. So I refocused on applied fieldwork, studying user experiences, and conducting usability experiments, as ways to seek further assistance, guidance, and real-world feedback. I also turned to people who are not just experimenting with acoustic interfaces as an intellectual exercise, but who use them every day, even in quotidian ways, as powerful instruments of social and public engagement. Such use is definitive of expertise. So why wouldn't a design team want to include it?

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