

Accessibility is Usability – Inclusive Design in Radio Technology

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Good morning and let me begin by saying that I am honored to be contributing to the third World Electronic Media Forum - thank you so much for allowing me to participate. My name is Kyle Evans, and I'm a project manager at National Public Radio in Washington DC. The title of my presentation is *Accessibility is Usability - Inclusive Design in Radio Technology* - which is a very lofty title - but what do I mean? I mean that the accessible technologies we design today, if they're made elegant and inclusive, will become the broadly usable technologies of tomorrow. Accessibility is on the lips of many people in the US and around the world - it's a feel good cause. But so frequently, when it comes to actually integrating the technology, concerns over accessibility are often trumped by money or time.

What I want to talk about is how accessibility can be incentivized for consumer electronics manufacturers and other broadcasters. First, I'm going to give a little historical perspective, and then then I'm going to talk about how we're integrating accessibility-related concerns at National Public Radio.

I have three stories.

<Picture of Typewriter> I'm sure everyone recognizes this device. It was invented by a man named Pellegrino Turri, who lived in Italy in the late 18th and early 19th centuries. He was an inventor, and he had a problem - he had fallen deeply in love with the Countess Carolina Fantoni, who was blind. His problem amounted to one of communication. You see, writing in the 1800's was a significantly more complicated task than it is today. This type of writing was an elaborate process - you used delicate quills that had to be inked and re-inked. The writing had to be light and consistent, or the ink would pool on the parchment and you'd have to start over again. This was a real problem for the visually impaired. Without a visual reference, there was no way of knowing if they were writing in a straight line, or even if they had any ink left on their quill. The simple act of writing was completely inaccessible. So Turri had no way of interacting with his lover - a situation that was quite unacceptable to him.

So, being an industrious man, he invented the typewriter (and carbon paper). It was later described in an English paper like this: "Newly invented writing machine which everybody can write without light! In every language! And regardless of one's handwriting generate essays and bills. The blind too can write unlike with previous writing tablets not only with greater ease, but read their writing afterwards." It's mostly there.

When Thomas Edison filed his patent for the phonograph in 1877, he listed 10 uses for the machine. The first four read like this:

1. Letter writing and all kinds of dictation without the aid of a stenographer
2. Phonographic books, which will speak to blind people without effort on their part.
3. The teaching of elocution.
4. Reproduction of music.

Of all the disabilities, it is blindness that has led to the most technological innovations that have later migrated to the general population. How about a more contemporary example?

In 1974, Ray Kurzweil sat down on a plane next to a blind person. The man told him that the only real handicap for blind people was their complete lack of access to print. So Ray used his expertise to create the Kurzweil reader, which was the first practical implementation of optical character recognition software and text-to-speech voice synthesis. The device took up an entire tabletop, but functioned exactly as described - and it made a pretty big splash. When it was presented on the Today Show, musician Stevie Wonder called Kurzweil and personally ordered the first production version of the machine, beginning a lifelong friendship with the inventor (which also led to significant advancements in keyboards)

The lesson we can learn from all of these stories: we can invent the mechanisms, but the future invents their applications. I want to repeat this because it's so important - we can invent the mechanisms, but the future will invent their applications. If we accept this, what does that mean for the structure of these mechanisms we invent? It means, a device will have infinitely more applicability to the future if it is flexible, if it is extensible, and if it is modular. This applies as much to computer code as it does to product and user interface design.

We're attempting to apply this lesson at National Public Radio through our work on accessibility related media. I work for a division of National Public Radio called NPR Labs, where we work to research and develop new technologies that allow public radio stations to get content out to their listeners more effectively. As we've seen, the accessible content of today becomes the usable content of tomorrow, so we focus a fair share of our resources on accessibility. We're currently working on two accessibility-related projects:

Our first grant is called the accessible digital radio services grant, funded by the National Institute for Disability and Rehabilitation Research, which is under the Department of Education. Our goal with this grant is to make radios that visually impaired and hearing impaired people can actually use. To this end, we are working on five avenues:

1 - Mainstream audio information services

We do a lot of work with developing accessible media services, specifically through audio information services. Audio information services are stations where a narrator reads books, newspapers and magazines aloud for the benefit of the blind and visually-impaired in the listening area. They're usually found on a subcarrier, and are heard using special receivers that are permanently tuned to a given station in the area. By moving these services onto HD Radio, the digital broadcast standard in the US, as well as getting better quality, we gain a degree of flexibility for enriched experiences, that I'll go into a bit later.

2 - Live video description sync'd to broadcast

Video description is a term for a type of additional narration added to video between the normal dialogue. This narration helps visually impaired people better understand the visual cues that help sighted people fully experience video. For example, a video description track would include a narrator in a TV show saying, "Dan walks across the room." In addition to making video significantly easier to understand, this type of technology can make a big difference in emergency situations - something we saw during September 11th. Many visually impaired consumers felt completely out of the loop without any type of visual description - the best they got were reporters saying, "I can't believe what we're seeing here."

3 - Buffering for rewind/replay/catch-up functionality

Radio has long been governed by the consequences of its medium - analog radio means linear, sequential access. But migrating audio information services to a digital framework enables content to be accessed non-linearly, and enables a more nuanced set of controls. I'll go into this a little more later as well.

4 - Accessible controls, displays, and menu options.

We want radios to be intuitive. We want menu structures to make sense and be consistent. We want buttons to feel sturdy and click when you turn them. In a nutshell - we want radios that are easy to set up and easy to use. And although we're looking at these problems through an accessibility grant, these fundamentally are not issues of accessibility - they are issues of usability. Usable radios are universal.

5 - Caption displays on receivers or ancillary displays

While NPR is considered the radio "daily news of record," as of now our broadcasts are only available to people who are deaf or hearing impaired via delayed transcripts, typically two-to-three days after initial broadcast, after accuracy checking and processing. To achieve equitable access for all, this has to be improved.

So that summarizes our first accessibility grant. We decided to apply again to NIDRR for a more application-oriented project using information we learned in our previous grant. We found in our research that the overwhelming thing visually impaired consumers wanted was flexibility - they wanted a wide variety of content on-demand, wherever they were. Flexibility was king. We saw a wide variety of devices, both portable and not portable that were available to blind consumers - but the vast majority of them are extremely specific. Visually impaired people had to cobble together the media world we take for granted from, frequently, up to 5 or 6 specific, different media devices. And because the community wanted a flexible experience, we found they were shying away from the scheduled listening of radio reading services. A huge amount of infrastructure, and a lot of fantastic content was being significantly underutilized, primarily because it was inconvenient.

I designed and manage a project called P.A.I.S. that tries to address this problem. PAIS stands for Personalized Audio Information Service. The PAIS project aims to augment audio information service broadcasts by providing users on-demand access to personally customized content deliveries, distributed through both the HD Radio platform and a conditionally accessed online download system. For a user, this is equivalent to a TiVO-Radio. A user sets up a listening profile that specifies areas of content they are specifically interested in. Audio information service content (for example books, magazine articles, or newspaper stories) are encoded with metadata identifying each segment's subject matter. Content that fits a user's profile will automatically be stored in a buffer as the radio detects it, to be retrieved by the listener at their convenience.

We're currently in the first year of this project. In our first accessible radio services grant we'd looked at WHAT media devices people use - now primary focus right now is characterizing HOW people use those devices. To do that, we're conducting two large surveys. The first will survey over 400 visually impaired people to determine what features of interfaces they like and dislike, and why. This allows us to get a BOTTOM-UP look at devices that are currently in the marketplace, and a clearer picture of what works and what doesn't. Our second survey will be an in-depth, individual task analysis where we will watch, record, and analyze visually impaired people doing specific tasks with devices. This will allow us a TOP-DOWN look at human-machine interfaces where we will be able to define sort of an accessible design stylesheet. From these two surveys, we will design, prototype, and test the physical and virtual interfaces for the PAIS project.

The broad strokes – The first year will focus on developing the interface. The second year will work on implementing the interface along with simple broadcast, including store and retrieve. The third year will integrate preference functionality and will culminate in a best practice document and implementation roadmap.

In the future, NPR Labs hopes to pursue radio braille and additional research on effective emergency notification. And we want to reach out to the international community to foster a global consciousness on accessibility and usability. But the primary thing to remember is that the devices and interfaces we will create and perfect with this grant will have widespread, inclusive application to other technologies. We have no idea where the future of technology is going - but if we design our accessible devices and services as broadly as possible, the accessible tools we design today will become the usable tools of tomorrow, and our technologies will have longer and more usable lives.

Thanks!