



A WEB FOR EVERYONE
Designing Accessible User Experiences
by Sarah Horton and Whitney Quesenbery
Foreword by Aaron Gustafson
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A Web For Everyone: Accessibility as a Design Challenge

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A Web for Everyone: Designing Accessible User Experiences

By Sarah Horton and Whitney Quesenbery

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(Music playing)

>> Hello, everybody. Thank you for joining us. My name is Audra and I'm with O'Reilly Media, and we will be your host for today's webcast. Today we have Whitney Quesenbery and she's going to talk to you about accessibility as a design challenge, and her goal of bringing user research to designing products where people matter. She's written three books, *storytelling for user experience*, *crafting stories for better design* and *global UX*, *design and research in a connected world* to help practitioners keep users in mind throughout the creative process, and her latest book *A Web for Everyone*, *designing accessible user experiences* as a collaboration with Sarah Horton.

She's also passionate about civic design and runs a center for civil design where they aim to improve the usability and design of ballots and everything else about elections. They work with elections officials, public officials. Before she was into software, usability and interface design, she was a theatrical lighting designer on and off broad way. As we get our webcast started I will like to go over housekeeping tips.

First, chat widget is where we will interact with each other during the event and you will submit your questions for Whitney. We find our audience usually has a lot of good knowledge to share. However, if you have questions for Whitney please be sure to press send with a capital letter Q so we know it's for her and we can make sure she sees it for Q and A. You can also open, move and resize the other widgets. If you would like to tweet, you may need to give it permission to access your account. Hash tag today is AUX and the Twitter widget will automatically append that to your tweet so you don't have to. If you have any problems we encourage to you look at the help widget. And if you continue to have problems, post in the chat room so one of our staff can help us. If you have choppy audio, please try refreshing your browser. The

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best thing you can do is close any apps that may be interfering. We are audio'ing the webcast and will have audio available within 48 hours. Hello, Whitney.

>> Hi. Really glad to be with you today. It's glad to be watching how many places from around the world you are. Those that are in nice sunny places, please don't tell us. Half of you are sitting in the snow. Today we are going to talk about accessibility. But I hope I'll be able to talk about it to you in a slightly new way. When most people think about accessibility, the way I was introduced to accessibility, it's a technical challenge. It's about meeting code requirements and filling out checklists and matching standards and laws, depending on what country you're in. But that's not a very satisfactory way to think about how we design. What we tend to do is design first and then kind of layer accessibility on. I love to get us all to think about a new way of thinking about it which is that what we are doing is trying to bring all the awesome apps and websites and wonderful goodness we are creating and design and create them in stay way that everyone can use them.

One other apology, I have a slight cold and may have to take a cough or water break in the middle. I will try not to cough directly into the microphone. If anyone needs captioning we have live CART running, put it in the chat window and they will text the URL to you. We better do it now.

>> I'll push it out right now.

>> Just to get us started thinking about what we mean when we talk about accessibility, I've got four pictures on the screen which I'll describe but I had like you to be thinking about as I do, which of those are just for people with disabilities? So we have a pair of eyeglasses, a keyboard with a microphone on it, kitchen tools and a postal cart. Eyeglasses seem pretty obvious, they're about, you know, improving your eyesight so you can function normally in the world. I wear pretty heavy glasses. The thing interesting about eyeglasses, even when I was young, they were pretty ugly. They were black medical devices you wore with thick lenses. And we got teased

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about them. Glasses have changed. They're now a fashion statement. They can be beautiful, they can be tied to your wardrobe, they can reflect your personality and they're now no longer just a medical device, they're part of how we express ourselves.

The text to speech on the keyboard or speech to text, speech input, much of the text to speech and speech to text research started out in disability research but now it's become mainstream. The keyboard here happens to be an Android keyboard, but they are available in most of the other platforms because we have integrated that technology into every day devices. I'll talk later about why that's important. The kitchen tools are from the grip line. They were designed for people gripping or holding small objects so they have big squishy handles that make them comfortable for everyone. They're not in a special section that says for people with disabilities, they're just in the kitchen tool section just like everyone else.

The postal cart was invented in the United States postal cart when women wanted to be postal carriers. There was worry that they would not be able to carry the large packages and backpacks of mail that postmen had to carry and they were told they couldn't be a postman until someone figured out if we put those big sacks of mail on wheels, not only could women do it but it removed part of the strength requirement and made it possible for many more people to have this job. That's part of what we are looking for is how can we do something in all of these cases that features that help people and help adapt -- help people with a wider range of capabilities use the product or the service or the website or the web app, how can we make that part of just how the thing works instead of something special? There is an international standard called the international classification of functions from the World Health Organization.

Until the late 20th century, disability was defined in medical terms; it was defined as a functioning part of the body. But there was a change and disability is now defined as the outcome of an interaction between a person and the environment or the attitudinal barriers they may face. So that means that disability isn't about the person,

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and it's not about the thing. It's about the interaction between those two things.

When I first heard this I got really excited because like many people I think I thought disability -- accessibility was a good thing. That we should all do it but I didn't know what I could do in my work as a user researcher. I didn't know how I can contribute to that. But when we define disability as the result of an interaction, well we are interaction designers, we design user experience, we create those things. So now all of a sudden I can do something about it.

So every time I think about a tiny little change putting a description on an image or just some small change that makes it more possible for more people to use what I create that removes those barriers, then I've done my little part that day for helping make the world more accessible. Stewart Brand came up with a concept he called pace layering. The concept is things move at different paces. If you think of an oval shaped tractor circular track, something on the outside of that track moves quickly in comparison to something on the inside of the track like an orbit.

So he drew a layer that has nature in the middle moving and changing very slowly. The next layer in his model of pace layering is culture. Then governance, then infrastructure then commerce and in outer ring moving very, very fast is fashion. The concept he was thinking about is thing move -- because things move at different paces when they get out of sync if fashion starts to move too fast it out paces culture. And we can think about this same concept but apply it to accessibility. So on the outside we have technology which these days is certainly moving very, very quickly, new products being introduced and things changing all the time. The next ring might be our habits, both our habits of how we use the web and habits of how we create the web. We can change those. Habits can change seemingly overnight when something new is adopted.

The next slower layer is work process because that involves coordinating between people it changes a little more slowly and so we have to give it time to catch

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up or we have to make sure that we work on making sure that it stays up so that the way we as teams create things can keep up with the new technologies. I put attitudes next because I think attitudes are kind of like culture, they are kind of core beliefs about what we do and why we do it and they change even more slowly. Below that we have laws, standards and regulations.

I was on the Section 508 Refresh Committee and we finished our work in about 2007, 2006, and we are still waiting for that standard to be updated as it goes through a slow regulatory process. So standards take longer, laws take even longer and I've left nature alone because I don't think anything we do is really changing nature. But when we think about this, we can see why it's easy for accessibility of products to get out of sync.

If we think about the pace of technology option, the telephone was introduced in 1876. And then we had a long stable period at least in terms of communication technologies until about the '80s when we started getting the fax machine, Apple I and Walkman. Started in the '90s it started getting fast. Jaws the screen reader was introduced in the early '90s. It seems like month by month things change. There's a picture on the screen of a woman Glenda Watson Hyatt. She writes a blog, The Do It Myself Blog. She has cerebral palsy and doesn't communicate well verbally. She says I feel like technology is finally catching up what I truly need.

We are finally getting to the point where technology can give her the tools she needs to not to have rely on specialized technology and to participate in daily life. So I think about her often and how full and rich and life she and everyone else can I have. I love the technology I work on. I bet you guys also love the technology you work on. Why wouldn't we want everyone to be able to use it?

So as I think about what we do, I think there are kind of steps. The first step is, is it accessibility? Have we gotten rid of the basic barriers? We can then think about is it useable and then we need to think about whether it's actually being used and we

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are not creating things that are in little ghettos that nobody knows b on the left is a sign which is the international cymbal of someone in a wheelchair. As opposed to being able to come into the polling place like everyone else they ring a bell and the pole worker brings the ballot out to the curb for them. This is nominally accessible but it's not as good as having a fully accessible polling place. The other picture shows three voting booths in a row, where you can stand at a table where someone can use that voting machine and then all three are in an equal row. Even if there are differences in how we interact, those differences are presented in an equitable way and easy for someone to make the choice of which one to use at the moment they need it. So thinking about all of this when Sarah and I thought about how to organize the book we thought about organizing it around the way we think about user experience in general and we called the principles accessible UX. There's ten of them. People first, clear purpose, solid structure, easy interaction, helpful wayfinding, clean presentation, plain language, accessible media and universal usability. It works from the inner core of the product out to some of the features and then wraps back around to make sure that the whole thing has come together.

So let's start with people first and think about what that might mean. First of all it means the designing for differences. Anybody who does user research thinks a lot about differences in similarities and different people in the audience. We want to think about their context, we want to think about how when and where they're doing the task, what they're thinking about, what their emotional connection is.

On the screen I have three quick profiles, imagine we are making some sort of app for average young web users. We might have Emily who is a high school graduate working on her college degree, lives with a group of friends, we might have Jacob who is a college graduate taking legal training courses where he works as a paralegal, also shares apartments with friends and he's a big lap-top and iPhone user.

Steven, graduated from an art institute, works as a graphic artist a small ad

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agency. Maybe pretty typical people. But let's take one more step and think about how -- what else might be behind those people.

So Emily who is modeled in part after Glenda Watson Hyatt has cerebral palsy. She uses a motorized wheelchair. All of a sudden we have layered on top of basic college student working in a community center; we have layered on top of that an element of their capabilities and ability. We can think about is she a power computer user or not a power computer user. What kind of input devices does she use and what is her attitude? She wants to do everything for herself and she can be a little impatient. She uses a communicator that has a speech generator. And she has her power wheelchair.

We might do the same thing with Jacob. Maybe Jacob is blind. Has some light perception but he's a really skilled technology user. Thinks of himself as a digital native, he's likely to hang in there until he gets it. Loves new tools and new gadgets. Helps basic computing technology is he uses a screen reader to read the screen and also uses a braille display. His basic attitude that is the right technology allows me to do anything. If you give him the tools he needs he will be delighted.

And Steven might be deaf. His attitude is he thinks his only disability is everyone doesn't sign. He can also speak and reads lips. He likes to use texting. Likes Skype. The picture shows him having a video chat on his mobile phone. He is good with graphic tools, but his spelling isn't that great so it makes task searching difficult for him. He can be annoyed when people rely on video and don't have captions. Uses CART a lot and captions and likes video chat. You can see how you can take any description of a user and add an element of ability or disability to them. We have actually created eight of them for the book; they are online and will be available to everybody. They range from Trevor, Vishnu who is bilingual and also has low vision. Lea and Carol. So just beginning to think about capabilities is the first step, thinking about not with people with disability as a separate class. We could have

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mixed them up anyway, we had to make choices and those are the choices we made.

But we attempted to think about how different kinds of technology people use and different capabilities that might affect the interaction design that we work on. So moving onto the next principle which is clear purpose. Clear purpose means that we have well designed goals. Why is this important to accessibility is the same reason it's important to any design. In 2009 Luke W talked about mobile first. He said maybe we should design for mobile first because mobile forces you to focus. The discipline of working on a tiny screen compared to a large lap-top screen forces you to think about what is really important, what are you going to fill that first view with, what order are you going to present things with, how are you going to organize that? Accessibility forces you to think not just about interaction or design for the small screen but variety of interactions for preferences. Maybe I prefer using a keyboard, maybe I need to use a keyboard.

Maybe I am working in a situation where I'm not allowed to have a mouse, medical software, for instance, you don't want to have a mouse or certain kinds of pointing devices in an environment where there might be liquid or blood. So again thinking about the purpose of the application and the audience gives you a great starting point for any design. But it is especially helpful when thinking about designing for a broad range of people. I know we often say let's start with a narrow audience and expand. But sometimes that means that things get left out. If we start designing for one screen and try to layer other screens onto the design, maybe we haven't thought about it carefully enough. Similarly if we just design for people like us however we define us or people like our target audience but don't think about other audiences it can be hard to expand the product later.

Even if you're doing a minimal viable product in a lean roll out, you want to think a little bit about the breath where it needs to go to accommodate a large audience as the product goes.

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The next principle is solid structure. And building to standards. The idea here is when something is built to our technical standards people can feel confident using it. We probably remember the browser wars and works best when seen in, and name a browser. This matters to accessibility because assistive technology, things like screen readers are essentially an alternative browser. They are representing that information, presenting it in a media appropriate for the needs for the person using that technology. So you have this layer of the operating system, the browser that's being used and then the technology being used to interact with that browser which might be a mouse and keyboard but it might be a screen reader and keyboard. The pictures on the screen are two versions of the 2010 word press template. I know they have different pictures on them and slightly different words. The one on the left is the base template and the one on the right is the accessible template that Sylvia Eggers designed. In terms of looking at it in terms of a design comp, there's really no difference between them that's because a lot of what happens under the cover is what makes accessibility happen and that's why standards are so important.

So two things are happening in the world that I think are kind of important. One is a group of people like accessibleJoe at word press, Steve Faulkner and many others are beginning to say let's not wait until the standard is formed and then add accessibility features. Let's get accessibility into the actual standard. I picked word press to show this because -- sorry, I forget the number this second but word press is the platform for a gigantic percentage of all the websites in the world.

So if you start from an accessible template that's built to standard and strong and robust, then the site you build on top of that is more likely to be accessible. If you're just someone who wants to start a blog and you're going to use an existing template and your focus is going to be on the content you've put into the blog, we have restricted the number of accessibility problems you can create and we made it easier by having good tools in that platform for what you do to also be the right thing to do. I

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want to show you a quick example of what an unfriendly structure looks like. I blocked out the name of the site because it doesn't matter, there's lots of them like that. It's a typical magazine site with an ad at the top of the page and featured articles and a menu and then finally we get to the name of the author and the opening picture and go past a couple ads. Even below the picture that I've shown on the screen we get to the head line, that is the thing we came to read when we got to that page.

When I look at that page with keyboard only and ticking through, going tab, tab, tab, through the screen, it took 41 key presses just to get to the head line because they're all the menu links and ad links and things going on and it's a long way down. So that's a structure that's unfriendly, that doesn't help people quickly do the same thing in linear attraction that we can do in a non-linear interaction. So that's the kind of thing that we are trying to avoid by using a good structure and building the standards.

A well-structured site would have given someone an option to say I've entered the page to read this article, let me jump down and start reading that article right away.

Okay.

I see that Mary has a question about investing time and energy in accessibility. I think this is the kind of thing that we always ask. I'm going to deal with this in a bit later because I think it is an important thing because as we saw in that pace layering, getting the team processes to work in sync with our goals is part of the challenge. But I want to think about all the things we are trying to ask the team to think about before we start thinking about how to make them.

So the next principle is making the interaction easy. When we think about mobile, we are thinking about how people use the products across a range of devices, like different kinds of tablets and phones and so on. When we think about accessibility we are adding a broader range of devices because we are thinking about modes of interaction and some specialized devices. You might be thinking about a site with a braille reader or one instead of a mouse has two large buttons, or one with enlarged

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text. One of the lovely things about IOS is developing an Android is screen readers and much of the accessibility features are built into the operating systems we use, even if they're not up front. IOS went a step further. They said it's there all the time, just turn it on and you can zoom the size of the text, you can have the text speak to you. You can change the mouse interaction. And all of that is really important because not only does it provide a solid instructor for us to build on, it provides a solid structure for users who need it.

There are two pictures, one in the lower right is Glenda again using her iPad. She's using a piece of regular every day consumer hardware, the reason why it's important is because so many of the tools she needs that used to be separate are now combined into a regular every day piece that you can go down to the mall and buy. The other one is a picture of three screens with a hand on it and this was something that TD ramen at Google came up with. He was trying to deal with a question of how do I dial a phone when the phone is on a glass screen with no touch points and you can't just feel where the buttons are. He thought what we have been thinking business how do we get the finger to button. So thinking about which direction you move your finger, he's begun to combine the system responding to the person and gesture to be able to dial a phone on a glass keyboard. It's pretty cool and I can do it quite fast.

So when we think about accessibility features we want to think about whether we built it in or added in on. In the United States there's a train system called Amtrak and there's a kiosk. There's a touch screen with a key pad for numbers about it also has an audio plug for speech and a specialized key pad that let's you navigate the screen. It's built in. It's just there. One of the things I love about it is the number of people I know who think about accessibility and have probably ridden Amtrak and have never noticed that, it's there when you need it. It's just waiting for you. The contrasting image is a Kindle that's been broken apart and has a special set of buttons attached to it. This was a do it yourself hacker who's sister couldn't manage the tiny

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keys on a Kindle so he broke it open, built a custom electronics board to connect custom keys to it. That's going a little far. But it's a nice metaphor for the hoops we have to jump through. It has to connect right.

Hardware and software has to interact. We have added lots more opportunities for failure between the user and their interaction.

The next principle is helpful wayfinding. We can think about guiding users. And the goal here is that people can navigate around a site, around a feature, around a page with self-explanatory guideposts. Steve, you're right, they are using the easy access key pad from trace on the Amtrak kiosk. I bet a lot of us have used some sort of match feature where you can get directions and it will give you a display or printout of how to get from one place to another. This screen happens to be a version of Google maps. What I didn't know was that the original design for Google maps was entirely visual. The idea was it would be an electronic version of taking a paper map and putting highlighters on it. And again TD ramen started experimenting with the text instructions.

I can't imagine trying to use Google maps without the text instructions especially if I'm printing it out to take with me and I'm driving. Here is an example of wayfinding in the physical world projected to wayfinding in the digital world. I want to talk a little bit about one of the ways you might navigate around a page using digital sign posting. So, we have on the screen a picture of a very simple website, a blog with a banner at the top, a main part in the middle of the screen. It has auxiliary information and footer navigation at the bottom.

In HTML five we can identify the elements at the bottom of the screen. We can do the same thing with ARIA, stands for Accessible Reach Internet Applications. There's been a lot of very hard work to done to line these up so it matches up. So in HTML five they're called elements; in ARIA they are called roles. If I'm navigating use are aria roles and I come to this page and all I want to do is read the article, I can jump

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over the banner and the links and get right to the content. I can jump down to footer or to complimentary. And so you can jump down to the specific type of information you're looking for making it easier to find your way around the screen. It provides a map in code that reflects the visual map but more importantly it reflects the logical organization of the information on the screen.

This comes all the way back to clear purpose because if you haven't thought clearly about your purpose, then your screen design probably isn't clear and it's hard to code, hard to explain and therefore it's hard for people to navigate. I had an occasion to work with a project that was using an online innovation platform; it was a very complicated screen, lots of pieces and parts to it. We suddenly realized it had to be very difficult to navigate. We also worry worried about navigation. We did not have time to rebuild the entire site so we did something that's kind of a work around but it was always the first stage work of rebuilding the site which is we thought about what the parts of the screen were. We had at the top there's a title, a timeline bar that shows the phases of the work. There's an activity section that shows the chatter feed. There's the main content and statistics about the site, about the idea and so on.

We put a set of skip links at the top. This is definitely a bit of a Band-Aid but the point is that that Band-Aid made it possible for people to work and it did the design work that we hope will end up with the site being rebuilt into proper code. It took about seven links for people to get around the page. In the name of the text of the link we were able to explain the meaning of the sections in a way that people found quite helpful. Just because you got an old site built in older technology, don't despair that you can't do this. You certainly can.

We will talk about getting down into the content in a minute because at all levels we need to have people oriented and navigate. The next principle is presentation. This is about presentation that supports meaning. Obviously we worry about the aesthetics and emotional impact of the design but I'm thinking about how the

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presentation and the visual design actually helps people perceive and understand elements in the page. The picture on the screen is simply here because it's an example of visual hierarchy. It's the front and back of the target pharmacy labels which were redesigned in an academic project and which target adopted. One of the things about medicine bottle labeling is the most important stuff wasn't always the biggest. When she redesigned it the name of the drug is the biggest thing, how do I take it, much more important things than the number of the refills or the prescribing doctor. Even the yellow ring at the bottom of the cap is personalizable. If there's two people in the house they can each have their own color. There's a quick visual presentation for those that can perceive color of the color of the ring. Flexible presentation allows and supports user needs. There's three screen captures on here and they're from a project called CSS Zen Garden that was based on work that Molly did with her partner David. They built a site and challenged people to come up with different CSS that would change the presentation. And there are hundreds of them out there that are just different organizations. The screens are rearranged differently, different styles, different colors, different fonts, all done in the CSS layer without touching the HTML. You can use that flexible presentation for branding but you can also use it to accommodate needs and preferences. If I needed large text, we can fix that in the CSS without having to go into the code. We can do it by having our own style sheet, personal style sheet or by having a style sheet that was flexible enough to respond to things that was able to change the text size in the browser.

Next I want to get to a question of language and the actual language we use and how websites and web apps create a conversation -- the goal is -- thank you for David Shea, the person who did Zen Garden. The goal of plain language is to make sure that people can read, understand the use the information. The picture on the screen is from a really wonderful talk on YouTube. It's in Portuguese with English subtitles. She was talking about how she discovered plain language. She was looking

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at statistics about literacy rates in Portugal and in Sweden. The two graphs on the screen compared the two. There's a number of people in red, yellow, light green and dark green showing various degrees of literacy. Where Portugal half the people did not read well, only about ten percent of the -- 20 percent of the people have that problem in Sweden. She began to think about all the information that people simply couldn't use because they couldn't read it. The example in her talk is someone who received a notice about a medical operation he was waiting for and didn't understand it, thought that it meant that he wasn't going to get the operation, when it actually meant that he could.

So just that we think this -- lest we think this is some sort of third world problem, this is a general global problem. In the US the national assessment of adult literacy estimate that in if United States 14 percent read at below basic levels, that means they have only the most simple and concrete reading skills. They can sound out words, they can read labels and simple sentences but that's about all. 29 percent are what they call basic; they can manage everyday tasks, filling in a few forms, maybe reading a simple newspaper. But maybe reading bus signs. But not challenging activities. The great bulk are intermediate. Only 13 percent are proficient who can draw inferences from texts and compare few viewpoints. That means when you add it up, 43 to 44 percent of the audience for anything we do doesn't read very well. When we make things confusing and complicated we are slowing down people who do read well and creating a barrier for people who don't. 43 percent is a big hunk of the country and it's a large audience. That might be because -- this is looking simply at literacy. It doesn't look at people who have low English proficiency. And I want to show you an example of what that might mean. We worked on a project that the national cancer institute had released a set of questions that were researched to help people run through a self-assessment about their risk of getting colon cancer. And because this is government public information, many different people can use it and make actually

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websites and incorporate this. We were able to test two or three and compare them. The first one we tested, people went through the questions, had no problem with the questions. It got to end and said your score is 63. We said to the people we are working with and said what does that mean? I have a 63? Okay. What are you going to do next if you had a 63? I don't know. I guess I'll ask my doctor n medical figures that's the only thing you do. If you don't know what to do, you ask your doctor. That wasn't a good outcome because the goal was to get people to change their behavior to reduce their risk.

Then we found another version and they went through the same set of questions. In the end it said a page, not a very beautiful page but nonetheless, it said colon cancer compared to a typical woman your age, your risk is much below average. And it defined what much below average mean and it showed it in a graph. It showed the lowest level of risk you can reach and your current. Here is the opportunity for you to improve your health.

And then over on the right it invites action. It says watch your risk drop. You have three things you can do to reduce your risk. Below that it said keep up the good work. Here are three things you are already doing that are improving your health. And when people went through this one and we asked what they were going to do, they said well it says right here I'm kind of doing okay but I can do better. Okay?

And I might do one of those two things, I might try it out. Let's see if I can eat fewer servings of red meat or exercise more. Because we had this combination of clearly stated language that didn't accept you to draw inferences, a reasonable communication in both visuals and words, all of a sudden people understood what that was about. It might be as simple as how to use your app. Same principles apply.

I just want to show you one other example about how we might support different reading styles and perceptions. Working on a site used in government career centers and they have lots of information to help people who are out of work get work.

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And one of them is a chart that shows the payoff for more education and training. And it was just in one big graphic. They said what are we going to do to make this accessible? And our answer was to keep the chart but to add some words around it. So we started with a good title that didn't say education and training, it said more education means more money. We had a short summary in text that summarized the key points in the data. And then we had the graph. The graph, the alternate text on the graph said it was a graph and mentioned there was data below and went right to the data below and the same information in the graph was presented in readable text form.

I notice the comment that says the examples are hard to read. If you download it, they're quite large on PowerPoint and you can expand it to actually read the examples if you want to be able to read the full screens.

So if you're coming to this page and basically a visual learner the first thing you see is this big visual. If you're coming to this page as a screen reader you hear just the text. If you want to see both the change in the chart but also get down and look at the actual data, it's there in a nice tabular form that's easy to look at and easy to read. Now, of course we also had to make sure that table was coded so people can tell what the header row was, we had to make sure what the graph had good colors so people with poor color perception could see it. You might think, red and blue, isn't red a problem? Red can be a problem because ten percent of the country is red-green colorblind, others are blue-yellow. So we chose a red that converts to a middle gray if you look at it in gray scale and chose a blue that is dark enough to look black. Even in gray scale there's contrasts between the two sets of lines. The next is about accessible media and supporting all senses. This is so people can use information contained in media, audio, video. By making sure that we accommodate all different senses. This is the moment when we just have to say yes, sometimes do you have to do more work. It's not just about doing the same work you're going to do and doing it

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better but tough take the time to do the captions, to put in the text and do it meaningfully. The pictures on the screen or a variety of stop signs from different countries. And the department of transportation and the international standards groups that do these things are aware of this so signs have multiple cues. They have a shape, a color and words on it.

Even if you couldn't read the words on the screen you might know as a driver that the red octagon with white words on it means stop and you will be able to obey at least in some way that sign.

The picture on the screen is a fox of some kind, standing on some rocks. The question of what an appropriate alternative for that information is depends on how you're using the picture. It is a journalistic or context strategy question. If you're trying to show any old fox it might just say photo of fox or fox. Maybe you want to show it's a red fox and not a gray fox in which case you need to say a few more words, red fox. Maybe this fox was photographed in a particular national wildlife fox and maybe it's a rare fox. You want to say it was a fox photographed at particular park. Maybe the point of this article is about the fox itself and it might say a fox standing on rocks looks back over his shoulder at the camera. What you describe in an image depends on how you are using the impact. If there are a lot of words in the image we want to briefly repeat the words and then point to a longer description where someone with read it or we want to make sure that the key points in the image even if there's words in it are repeated in the base text. So some combination is what we are after.

When we think about video or anything animated we want to think about synchronized audio text. This man was doing a talk that was recorded for the web and there are three windows. There's a video of him, there's the pictures of his slides, and there's a transcript that synchronizes to the whole thing so you can click on the words in the transcript, jump to that point in the presentation or you can move the slider bar at the bottom and jump to that point in the presentation. You can resize the windows

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so the ones you are most interested in or visual. We could have done a plain video with closed captions on it. But there are three things going on life for the people in the room, Graham talking and the words he's saying and we want those three things to be communicated clearly. Three can be next to each other that is we can have non-synchronized audio text, we can have a transcript and the video and that's good, but the next step is to go up a level and synchronize them.

So moving onto the last section, the goal is not just to remove barriers, but actually go a step further and create delight so people with focus on the thing they're there to do, experience their own goals, because the product anticipates their needs.

The image I've chosen is a screen shot of signing up for a banking service. We have more and more of these. And they cross time and they cross devices. You go onto the web, sign up for a service, create an account. About a week later a credit card arrives in the mail. It's a lot of steps. And they have done it beautifully.

One of the things they did is the entire process is laid out but some of the text is grayed out things that you finished have a check box next to them that's shows that you've finished them but actions that they're not ready for to you take are disabled so you can't jump ahead of themselves and get yourself in trouble. They do things like if you have to type in a number, they show it to you superimposed over the artifact you have to look at. So if you have to read a number off the card they show you where to find it. And they made a process that I thought was going to be incredibly difficult into one that was smooth and maybe even delightful. How do we make all this happen which is Mary's question? And that's the 10th principle. In practice it has to be an integrated process. People in organize situations have to consider it an integral part of their work. There are two pictures on the screen. One is a man in a wheelchair in the middle of the street holding a sign that says cut the crap and cut the curbs.

When you step off a curb there's almost always a little ramp so you can wheel down into the street next to you. But most of us don't know that it took protests to get

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people to think it was a good idea. And I like this to remind us the change is hard, that we are changing attitudes and we are changing processes and we have to think about the pace layers and how we keep them together because maybe processes are a little easier to change than attitudes. Understanding that people with disabilities are part of our audience. Not just people with disabilities. That our audience includes a wide and diverse range of capabilities and we need to design for that is the first thing. Changing the attitude. Once we have changed the attitude, changing the work process doesn't become that hard.

The other picture is a shot from the control room of a place where a paper prototype test was going on. There are two things hidden in this picture. One is that it was a ballot design that the University of Baltimore did that we are now just working on. And they were working on clear language and clearly communicating what do you on the ballot. So they chose to work with people who had low literacy. So the first thing that we as UX'ers might want to think about is how do we make sure that people with a broader range of capabilities are included in our work process. The other thing they did was thought about how to change that testing. They wanted something fluid and that was not technology. They didn't want it to feel uncomfortable or that they didn't know how to do it.

So their first round of testing was done with paper prototypes. They had a little clipboard and they would put a picture of a screen on the thing and let people talk and interact with that and talk about what they would do. That was possible because of the disability they were dealing with did not have to deal with electronic communication. But thinking about how we vary our research process and our design process to make sure that we can include people. I like to think about this as changing the question. If we think about designing and researching for extremes, sometimes we come up with something that's even better for the middle. These are both pictures from a project I've been working on called the accessible voting

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technology initiative in which we start asking the question how can we make voting more accessible.

The first picture is a man testing a joy stick. The researchers at Michigan state university discovered that the number of key presses if you're using linear interaction to get through a ballot is a lot of key presses and the people who use single switches, a switch to get through the interaction, are often people who have limited use of their hands and often pain associated with the use of their hands. So when they got to 100, 200, 300, 400 key presses to get through a ballot, they started thinking about how much work that was and they noticed that people were using joy sticks on their wheelchair and joy sticks can be adjusted for light or aggressive touch. They began working on designing a joy stick that can be used to interact with a ballot. A joy stick is a pretty robust device. The other picture is someone working with a tablet-based ballot. They were thinking about people using just two switches, no direct interaction. They designed a ballot where you can do the entire ballot with your thumbs just by going yes, no, as an answer to each question heard through an audio stream and they layered on top of that more direct enter action, being able to skip around the ballot. What they ended up with is a ballot eloquent to use and equally good to use in a linear stream.

So changing the question and designing for extremes ended up with something that was not disabled looking, it was not ugly, didn't look dumbed down and medical but it was beautiful and rather elegant and solved the problem for many people. Now instead of having to have two ballots, we can have one ballot. Instead of people taking a really long time, we can think about how to equalize the experience. I'm continuing with pictures from that project. I think the other thing we need to do is to find a better way to collaborate. One of the things we did was run sign workshops with election officials, people with disabilities, designers of all kinds, policy makers, so on. And I think great ideas came out of the workshop but that's not what I want to talk to

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you about. The thing I felt was really interesting was that some of the people in a group were registered lobbyists and said it was great to get out of our echo chamber and to be able to sit down and collaborate. We heard the same thing from election officials who said usually when I sit down with people it's a pretty confrontational sort of way and it was great to be able to work through the problems. We had everyone in the room. The other thing we did was we thought about the fact that not even thinking about disability but not everyone is comfortable drawing. Certainly people who work in words and policy may not be comfortable drawing.

So we had industrial design students and graphic design students in the room and working and being their scribes so the table could talk and they were doing their visualizations. We had people read the material for people who needed that and we had everything from sign language interpreters to wheelchairs. And it was great. I was afraid it wouldn't work. I was afraid it would be so confusing but instead it became a real spark of collaboration that was great. One more thing we could think about doing is opening up our recruiting. Instead of recruiting for a narrow band of people we might think of recruiting for a much broader audience. You may find if you don't restrict you're recruiting too much you will get people with various disabilities just because they're part of the audience. I was doing a project for an engineering organization and we were using social media to try to recruit engineers. And it was also about remote testing. And I sent him an e-mail with the link and time of his session and he wrote back and said will that work with my screen reader? I kind of gulped because I never thought of it. I didn't think about that player. I said look we are both sitting at our desks, let's try it out. It turned out it worked.

He was one of our best participants in terms of efficiency and effectiveness. He was really good at finding answers and had good strategies. He was one of the fastest people navigating because the site was built on a really good template and he figured out that the third heading on everyone page, he can jump down to the exact

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paragraph he needed often on the first try. So that for us really confirmed the power of a solid structure but it also meant we had seen -- we didn't know it was perfectly accessible but we had seen one user from the audience recruited using the site in a perfectly natural and normal way.

The other thing I think is a real problem for us is our tools are often not accessible. I want to give a little call out to Luke who has done a lot to make their platform accessible and working on billing a database for people with disabilities to be test participants.

So I think we are right at a time for questions. I just want to say that when you think about accessibility, you can be a UX super hero. You can be the spark that creates a new perspective in your company. One of the things when we think about the UX perspective, I want to come back to the idea of eyeglasses and what is a fashion statement and medical device. Amy Mullens, a paraplegic, uses two prosthetic legs, the kind you see in the Olympics for running, she has great talks if you Google her, she said she wasn't going to hide her legs, they're fashion. The ones on the screen are a picture of her wearing legs, an entire outfit designed for her. The legs are wooden and ornately and beautifully caved. Instead of it being something to hide it became something that is part of who she is. We have can do that, too. We can make accessibility part of what our products are. Just something that we are naturally going to do that he we are going to think about people who might prefer to use audio or keyboards or need to use a certain kind of technology and thinking about it as we design. And it is a chance to be a super hero. With that I wonder, Audra, if there's any questions. Anybody have any questions they haven't asked yet?

>> We do have quite a few questions here. If you can click the refresh button, you'll see them but I'll read them. However is Android behind IOS?

>> Alberto I'm not that much of a technical expert. I know their behind. I know they're also struggling to catch up fast. I think I'm going to defer that question because

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I don't know that I can give an authoritative answer to it.

>> All right. And Dom wants to know can you recommend any application development frameworks that may all make -- sorry, are make all of this accessibility easier?

>> Ha, ha, don't we wish. I think there are some frameworks that are getting better. Again I'm not a programmer so I'm not probably the right person to ask. I know that there's a lot of work -- there's a lot of work done on both some of the existing frame works and on accessible versions of query. I don't think there's anything you can't make accessible. We always start with the perspective that it's not whether you can make it accessible but how you can make it accessible. Even flash can be made accessible. But you have to think about it, you have to think about accessibility from the beginning. If you think about something entirely visually without any sort of tech support, then you get something that is not designed to be accessible. If you think about something that is designed for different forms of input and output then you're more likely to get something. I'm sorry I can't rattle off a bunch of programming languages but I see people chatting and maybe they can weigh in there.

>> Not a problem. We will move onto a question. With connect like technologies do you sigh there will be different approaches to motion related accessibility?

>> I know that people can use eye tracking as a way to control the computer and we are seeing things in connection like using gestures. I think that we will see a lot more of this and I think that some of the work being done in games is a good test bed. But imagine if you can control your television not by finding a piece of hardware and finding the right button but putting and opening it or swiping your hand left to right to change channels, I think we are going to see more of that as computer vision gets better and as the technology to do that gets better. So I do think we are going to see again more things moving this time maybe from mainstream gaming into mainstream

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capabilities on the platforms that will expand the range of capabilities who can use things. It seems crazy to think that the ultimate way to type is with two fingers or a little tiny keyboard can't be the final word on how we do quick messages.

>> All right. And Alberto wants to know can you recommend any profiling tools that make take a URL and render a report of its relative accessibility?

>> Oh, there's a whole lot of tools that do this. If you go to the WAI, the Web Accessibility Initiative they have some. A few I use -- there's several accessibility tool bars from various organizations. I think there's one for pretty much every browser. Some work in more than one browser. Web aim which is a great project at the University of Utah has a tool called wave that will look at a web page and show you all the problems on that page, both actual violations of standards but also warnings. There's a number of commercial tools that will do that.

There's little widgets that look at things specifically like alt text. Firefox has an accessibility built in. All this can do as Ryan is pointing out in the chat is look at whether the codes accurate. It can't look at whether the interaction is smooth and that's why we had that 9th principle about useable accessibility is because it can't tell you if the alt text is good or the interaction is fluid. At least it can tell you if you've got some horrible mistakes. There are things it's useful for which is checking to see if you have alt text on every image and helping you find gaps in your work. Which every one of the tools you choose, they are a good sort of -- they're like spell or grammar check. They can help you identify problems but they don't necessarily give you the solutions accept technical solutions.

>> Philip wants to know, would the various CSS layouts with available in the different views from the browser.

>> The CSS Zen Garden it was alternative CSS sheets. There's a lot of ways to do it. You can have a personal style sheet. But that's not always easy to install. You can have alternatives within the style sheet that are invoked by interaction with

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the inter space. There's an objection called raising the floor. It's got a couple other names, depending on the funding organization. It's working on the idea of personalization in the cloud. So instead of the device being personalized, it's actually your log on that's personalized. So you can say I need a screen reader and this is the one I like or I like enlarged text and here's the percentage I like and here is the contrast I like. And your preference file can then talk to the website and ask the website to render itself appropriately. I think that's really a move to get away from personalization being done at a very individual basis. I think someone asked a question about consistency among keyboards. Wouldn't it be nice if you can say I like this keyboard to be laid out using XYZ layout? And it would adjust the key press coding so that that all worked.

So I think we are really at a moment when we are about to change our view of how and where we provide personalization so that people can use things well. And indeed that might be contextual. You might say today I'm running around on my little tiny screen and I would like to have slightly larger texts and higher contrasts because I'm out in the sun but tomorrow I'm going to be sitting at my desk with a large screen and I want things to be displayed appropriately for that so we begin to get a little smarter. On adjusting to the different device sizes is helping to understand how to do it.

>> All right. We have a few more questions here. How much time would you like to dedicate to the rest of these?

>> I'm happy to keep going.

>> Excellent. AJ wants to know can we ask computer manufacturers to standardize keyboard layouts? I work with visually impaired children. Any work on that front industry collaboration? I'm sure there is and I don't know about it much so again I'm going to defer. But I think this is one of those consistency things about wanting to be able to have all of the technology I used relate to the way I've chosen to

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use it rather than to my adjust each and every device. I can just urge you to speak up loudly. You might look at organizations like RESNA (phonetic) or even the new AT professionals' organization. Cloud for all is also called raising the floor.

>> Okay. And Michael wants to know what public institutions or corporations stand out as making good use of UX and accessibility?

>> Well, often, oddly enough, government agencies are leaders because in many countries the first accessibility laws applied to government information. And I have to say that this stuff changes from time to time. And the world is very uneven. In any government no matter what the laws there are some agencies that are very good and some that are not good. The CDC does a pretty good job. The BBC in the UK is really a leader. Their accessibility principles are excellent. Gov.UK is adopting total leadership in thinking about usability and customizability of their sites. So I think we are beginning to see some moves towards not just an isolated team doing something good that might last as long as that team there is but really beginning to build into the public infrastructure and this is I think where we go to have it and thinking again back to pace layering that if we get used to seeing things that are easy to read and interact with, then things that aren't easy or accessible will look even more behind the times.

>> John wants to know is there an accessibility certification or any others that you may recommend.

>> I don't know about SEC. But there are -- certification is problematic because of how changeable the web is. But there are certainly schemes to help companies assert that they have met either the national legislative guidelines or -- and there are some organizations that are beginning to think about certifying sites but those are all private certifications and I don't know much about them.

And there are some certifications for people being skilled professionals in areas of rehab or in understanding certain kinds of technologies but again those are not very widespread. And thanks. There's a link in there for new accessibility organization

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being formed. The idea is to have better training available so people with fill in their knowledge gaps and both understand the needs of people with different disabilities and also how to address them.

>> All right, Rebecca wants to know do you have any recommendations for mobile accessibility testing?

>> I don't have a lot of tips. I think about wanting to do a quick check to make sure that the site or the device isn't completely inaccessibility. And I want to see people use them. I want to see people interacting on their own devices set up on the way they want them set up. I guess I do have a piece of advice, if you're doing mobile testing it's good to let people bring in their own device that's set up for them and where you can watch them using it, you learn a lot about the ways people have approached adapting and the style of interactions they prefer and things that work for them.

>> We just have a couple more questions here. David wants to know without experience in using screen readers, how can development teams ensure their website or web applications are easy to use on these devices?

>> This is one of those challenges, how do you learn to use a new platform to be able to test on it? The first thing I would do, the very first thing to test is throw away your mouse and try to use your application with a keyboard only. So many assistive technology devices emulate the keyboard as part of the interaction. The second thing I would do is really work hard on building to standards because that will get us there.

There is a screen reader for non-visual desk top access which you can use to play around with and if you have a Mac, voiceover is built in. You may not become an expert user but you can use basic navigation use it and make sure you haven't gotten horrible barriers. How do you reach out and collaborate better? Maybe you need to think about including people who are screen reader users in your usability testing or user research, or maybe you build a customer council of people who use different technologies so you can ask them to try it out in a kind of technical way even before

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you go out to look at the range of actual experience. And maybe you think about hiring people on your team who have disabilities because having that knowledge inside your team is better than having to reach out to get it outside of your team.

>> All right. And so we are just going to take one more question and it's from Mary. I pushed for accessibility on a government site but in the end per 508 there was a loophole and we were required to do what we were capable of doing which encouraged a minimal effort towards accessibility. When will 508 be updated?

>> Your guess is as good as mine but we are hoping to see the next step taken this year which will mean it might get passed the new regulation might be announced this year and go into effect in '15. Honestly, I don't have any real insight into it, what I do know that is the current proposal for the 508 version two is for websites is that it will use web content accessibility guidelines, version 2.0, level AA as its standard.

So if I was pushing an organization now as I actually am, I would be pushing them to think about that and not current 508 because there's a big loophole, do the best you can, get as far as you can. I think the other thing to think about is how we help organizations we work with take the first steps. Which things are the most important for our kind of product?

If you've got a site that is large bodies of information, maybe the most important thing you can do first is make sure the information is well structured. If it's got forms, look at the forms. I was working with an organization whose site wasn't very accessible at all. It was an e commerce side. The size widget where you pick the size of clothes you wanted was completely inaccessible. Get that fixed. While you're doing that let's think about the other things that are in between your audience who wants to buy things from you and their ability to do so. As we get in there -- I think we often push for people to go from 0 to 60 in one step. Instead of saying let's get that car moving, let's have goals for each Sprint or quarter so you keep moving that bar but don't ask everyone to take that whole step from legal to technology in one bound but

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you have to keep the pressure on them, you can't just get to step one and stop.

>> All right. Well, that's it for the questions and that's it for the webcast. Did you want to leave the audience with anything before we go today, Whitney?

>> Well, I hope that this has been helpful. I hope that its helped change some of your attitudes or reinforce some of your attitudes and that you will be able to take it back and do awesome things in your companies.

>> Thank you so much Whitney, this was fantastic and well-received by the audience. We will have the archive up within 48 hours for you all and we will send that link to you via e-mail. And we did push out a link to Whitney's book, storytelling for user experience which is our deal of the day. So that is the book that gets code deal, D-E-A-L, and also for her e-book A Web For Everyone. I'll push those out in the chat for you. Thanks again for joining us and thanks again Whitney. We hope to see you at future events. Have a good day.

>> Thank you. Bye.

>> Bye-bye.

(Webinar concludes at 2:30 p.m.)