



The 2017 Accessibility Conference:
**Becoming a Catalyst
for Inclusion**
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Beyond Guidelines – Developing Media in the Spirit of WCAG and Universal Design

Transcript from the 2017 Accessibility Conference

Shalin Banjara & Daniel Szabo, Pearson Canada

For more information, contact:

Email: Shalin.Banjara@pearson.com

Website: <https://banjarashalin.github.io/website/>

Email: Daniel.Szabo@pearsoncanada.com

Website: <http://www.sentientdesigns.com>



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SPEAKER:

OK, we will get started. You should be here for the session titled *Beyond Guidelines: Developing Media in the Spirit of WCAG and Universal Design*. These two people are from Pearson Canada, the education company:

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- Shalin is an experienced technical analyst and developer with specialization in full stack development. He holds a wide range of experience and education including MSc in 3D Animation & Visual Effects, BSc in Information Technology and an Associate Degree in Software Engineering for Interactive Media Development. At Pearson Canada he has been deeply involved in developing user interfaces and providing accessible user experiences. He sets high standards for the work he does and is always eager to devise solutions when presented with obstacles and challenges. He is very passionate about emerging technologies and has a keen eye for details.

- To my left, Daniel integrates content, applications, process and innovation, enabling rich and effective media. The past five years, he has focused on the cutting edge at Pearson Canada, driving technology-based initiatives built on principles such as usability, scalability, reliability, accessibility, and extensibility. Previously, Daniel worked at Seneca College as Application System Administrator and Technical eLearning Specialist, and founded iAxis Inc., a company that provided web development and accessibility verification services for corporate clients. Daniel is a proud alumnus of the University of Guelph and Seneca College. He was born in the wilds of northwestern Alberta and is a honey bee advocate.

DANIEL SZABO:

You may know of Pearson as a textbook publisher. We have undergone a massive technology transformation in the past few years. We work on a broad range of digital products. Our user base spans the gamut from students in kindergarten, elementary school, middle school, high school, college, university and beyond. We have a very diverse group of users with very diverse needs.

What I am going to say next is little bit controversial and may not reflect the opinion of Pearson, but it is what we believe: **We do not build websites or Web content for people with disabilities.**

That is not what we do. In this presentation, we are not going to talk much about disabilities. We build websites and content for people who have the ability to access it, using whatever assistive technology tools and devices and settings they prefer, whatever they have.

We believe in this quote by Debra Rah: *“The only disability is when people cannot see human potential.”*

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Accessibility is not a feature, not an endpoint. There is no such thing as something being fully accessible. But what it really is a social trend – about people being included.

I told you what we are not going to talk about – what we don't do, but what we are going to talk about are lessons learned from developing rich and accessible media over the past 20 years.

- I'm going to start off discussing Universal Design, what it is and how it enables all users.
- Then I'm going to go as quickly as I can through a short history of Web accessibility.
- From there, Shalin will deep dive into some of the current challenges we face. He will evaluate some content that we produced very recently and talk about how we resolve accessibility issues with those products.
- We will have some time for Q&A at the end.

Universal Design is not about websites. It is broader than that. It is about simplifying life for everyone by making products, communications and the built environment more usable by as many people as possible. It benefits people of all ages and all abilities.

There are seven principles of Universal Design, and these seven principles do relate to user interfaces and technology. I will go through the principles and show you where each fits with user interfaces.

1. The first principle is that the design must be usable and marketable to people with diverse abilities. That means we want equitable use, no matter how you're accessing the product, be it with a mobile phone or NVDA, we want you to access all of its features.
2. The design should accommodate a wide range of individual preferences and abilities. That means there should be flexibility in the user interface, you can access it with multiple ways with multiple modes of access.
3. The design should be easy to understand, regardless of the user's experience, language skills, and current concentration levels. We try to make our interface simple and intuitive. That is more challenging than it sounds – it is actually very difficult. We also look at things like personalised learning, so when you are interacting with the interface of our products, your path is defined by what you do.

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4. Design communicates necessary information effectively to the user regardless of ambient conditions or sensory abilities. You shouldn't have to read a manual to get to accessible content.

5. Design should minimise hazards and adverse consequences of accidental or unintended actions. So there should be a tolerance of error. One click purchasing is probably not a good idea. Maybe you want a confirmation screen. Forms should use colour to tell you when there is an error, but also have a description of what the error is. It should be in a place that the user can get to.

6. The design can be used effectively and comfortably with a minimum of fatigue. So you shouldn't have to go through much effort to use digital products. We consider that our users may be sitting in front of the computer for eight hours or more in a day. We don't want them to have to scroll through long pages. Keep it easy, keep it simple.

7. Appropriate size in space is provided for approach, reach, manipulation and use regardless of user's body size, posture or mobility. We are looking at designs that are responsive and adaptive, working with multiple devices and that there is appropriate amount of space and form within our interfaces.

Those are the seven principles of Universal Design.

Next I have a quote from famous Canadian Marshall McLuhan. I really wanted to use, "*The medium is the message,*" but it is overused.

This is something we think about where we are designing our interfaces: "*Each of our senses makes its own space, but no sense can function in isolation. Only as sight relates the touch, or kinaesthesia, or sound, can the eye see.*"

Sometimes you don't want a sense to be used on its own. Senses in combination offer something special to the user experience – a kinaesthesia. But really, the medium is the message. That is what I want to talk about right now. Let's talk about the medium of the World Wide Web.

- In 1989, not that long ago for me, Sir Tim Berners-Lee proposed something called the World Wide Web. He was working for the European Centre for Nuclear Research, the acronym is CERN because it is French. Two years later, he came up with the very first World Wide Web page. I will pop that up for us. Yes, you can still get to the very first page that was published.

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- The internet has been around since the 1960s, but the World Wide Web - [this is the first page right there](#) - appeared in 1991. You can see it complete with grammatical/spacing inconsistencies. It talks about “a wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents.” Tim’s intent was to share information, to allow collaboration across geographical regions, and to provide access to opportunities. The keywords for me in this sentence are 'universal access'.
- In 1993, the Mosaic web browser was made public, assistive technology that enabled users to access the World Wide Web.
- In 1994, Tim went on to found the World Wide Web Consortium, W3C. The vision was to standardise protocols and technologies used to build the web so that content will be available to as wide a population as possible. Netscape Navigator came out the same year.
- In 1995, JavaScript was developed by two guys in 10 days. The MP3 format was developed. Internet Explorer was released as well as the HTML 2.0 specification. The HTML 2.0 specification described how semantic content should be marked up to convey meaning. Content could be displayed, but in 1996 we had CSS so we could style it.
- 1997 - ECMAScript 1.0 was developed. Macromedia Flash was released as well. When people hear Flash, they think: inaccessible! But it was the first piece of software that enabled video streaming. So it paved the way for things like YouTube and Netflix.
- In 1998, the first blogs appeared. These enabled the general public to become Publishers. Blogs also enabled a lot of mistakes and sloppy code. I made my first web sites that year with Microsoft’s Frontpage. 1998 was the same year we had Internet Explorer 4 and Netscape 4. We were basically in the midst of browser wars. You could create a webpage and depending on the browser you viewed it in, it would look and work and play very differently.
A subgroup of the W3C proposed that their specifications become standards and not recommendations. It was a really hard argument with IE aiming to set de facto standards of its own, but it was a really good idea.
- In 1999, HTML 4.01 specification was released. The W3C introduced our very first web content accessibility guidelines (WCAG 1.0). These guidelines were drafted specifically to address the errors that users were creating generating their own content.

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Individuals were really creating content just for themselves, not thinking about everyone, not being inclusive.

A group of publishers got together and came up with the OEBPS ebook format. This format evolved into ePub, a standard format the publishers like Pearson convert their book content to for online usage.

To give you a sense of where the world was technology-wise, 1999 is the year that the BlackBerry pager was released. It was not a phone and not web enabled, it was simply a pager that could send messages.

- The next year, the W3C came out with something called XHTML 1.0. I loved it! The majority of people hated it because it was really, really strict. What I liked about XHTML was that it made our webpages machine-readable. It was actually XML that we were producing and that meant that we now had an even bigger audience. It wasn't just for people that we could produce this content, it was also for machines.

- In 2001, Apple exploded into the device market with the iPod. The first iPod was just an MP3 player, no colour, not web enabled.

In 2001 countries, provinces, and states started creating laws to help people with disabilities. Ontario's had the Ontarians and the Disabilities Act, which meant that we became obligated to produce web content that was accessible. How did we do that? By following WCAG 1.0 guidelines.

- The next year, Research in Motion released their first mobile phone with the web browser. It did not have a colour display and the screen resolution was very low.

- In 2003, we had better mobile devices with better web browsers, more pixels, colour displays. Welcome the device wars. Where I was working at the time we had a big Compaq iPaq initiative – everyone got an iPaq. The only way to make web content work on them was to follow W3C, XHTML specifications and the WCAG guidelines. The sites we built back then, those sites still work and are accessible today. We had to do a lot of testing including things like turning off CSS and JavaScript and making sure the sites still worked as plain semantic markup.

- In 2005, we had new legislation in Ontario...and technology changed right away. AJAX came into being. When AJAX arrived, I first thought “big deal – this is just DHTML”, but it really was a big deal. A simple concept, and that is loading content dynamically in the page without sending a full-page request back to the server.

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AJAX enabled the single page web applications we see today. It also threw out accessibility. Content was not semantically structured any more. You now had a disrupted reading order – content that appeared and disappeared. The WCAG guidelines were no longer up to par.

- Two years later, Apple introduced the iPhone and that paved the way for other smartphones like HTC, Samsung, and Google phones.
- In 2008, the W3C recommended new accessibility guidelines (WCAG 2.0). These were a little better than the previous, but did not fully address AJAX.
- In 2010, Apple released the iPad. The iPhone and iPad together killed Flash because Flash was not accessible on those devices.
- 2011 - IDPF released its EPUB3 specification. To simplify what it is, it is a website that is zipped up and packaged. All of the rules that had been created by the W3C, all of the specifications for HTML, CSS, JavaScript, they all apply to ePub. The idea behind the specification is to foster an open, accessible, interoperable digital publishing ecosystem that enables innovation.
- In 2012, Pearson published 42 accessibility guidelines. They are tied very closely to WCAG. They just use “human language” to describe what needs to be done to make websites accessible, with examples. Why did Pearson do that? We wanted to improve accessibility of our media products as a practical way, in a way we can communicate and made sense.
- In 2014, W3C recommended ARIA. I am a fan because it fixes that AJAX problem, allowing dynamic content to notify assistive technologies of its presence.
- In 2017, IDPF and the EPUB specifications are now wholly maintained by the W3C, IDPF is now called Publishing@W3C. It makes a lot of sense.

That was a really quick history and I missed a lot, but what I wanted you to get out of it is that throughout the history of the World Wide Web, which is actually a very short history, change has been constant and quick and drastic. Every step of the way, we had different challenges to make our websites accessible. We have the browser wars, device wars, and now we have screen reader wars.

Now Shalin will talk about issues that we are facing today in products.

SHALIN BANJARA:

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Thanks, Daniel. I will be talking about what goes on behind the scenes at Pearson, how we are building products that are accessible.

First of all, we had to modify our QA process for accessibility.

First and foremost, accessibility QA is performed by the users who rely on assistive technology as a primary means of communication and interaction with web pages. Based on Google Analytics data gathered from our products, a proper device, browser and screen reader matrix was provided to the Q&A team so they could test our web pages on the appropriate browsers and technologies.

A detailed analysis was done based on the QA feedback. There were multiple rounds between the developers and QA team. Each time we had to revisit the accessibility guidelines (WCAG 2.0 AA), and try to have a deeper understanding of what the guidelines are and how they affect the user experience.

We identified and analysed multiple solutions and went back to the QA team for their feedback. They tested multiple solutions provided by us in terms of user experience along with ease of use. The best solution was selected and implemented in a product.

While going through this QA process, what we realised is that as developers or user interface designers, there are three questions we need to ask ourselves when we want to create user interfaces.

1. The first is how does the user navigate?
2. The second is how does the user interact with the digital medium in terms of assistive technologies?
3. And how does the user search for any sort of information in the digital medium using the assistive technologies?

But unfortunately, without going back to the users, all we do is interpret. So we just interpret that this is the way a user is going to use the technology and that is the only way available to the user for an assistive technology. That is where we fail.

Based on this, we realised there were some common oversights that were performed. These were in terms of colour contrast ratio, multiple ways of navigation, consistent navigation, user interface – not properly defining UI controls such as role, name, state and options using ARIA

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specifications, hidden or dimmed content read by the screen reader application, text resize on browsers and supporting in-page navigation.

Let's have a look at the QA report. Based on our past analysis, we provided a device, a web browser, operating system, and assistive technology matrix to our QA Team for Testing.

Now we will take a look at one issue for example, the focus is not visible. This issue was only found on Windows 7 desktop, Mozilla Firefox with the NVDA screen reader application.

So the browser war is still ongoing.

Another issue is the **device wars**. We found out there was inaccurate reading order on our website, but that was only occurring on desktop and laptop devices. It was not occurring on any phones or tablet devices. So that directly correlates to what Daniel explained. We have multiple devices and we need to make sure that our website is accessible across all of the devices.

In terms of colour contrast analysers, we tend to rely on automated tools.

Here is an example where the color contrast test passes on the Luminosity Tab, but when we analysed the color contrast ratio in the color deficiency tab we see that the color contrast ratio fails for a specific type of color deficiency.

This is one of the common oversights that happens when we use automated testing for analysing color contrast ratio.

Now I will go through two of our website products that are specifically built for grade one students.

DANIEL SZABO:

These students are learning about religion. The website is for grade one students, but it is also for their teachers, parents and grandparents, and maybe their priest and bishop. These are a lot of different users with diverse abilities and that's what we are targeting here.

SHALIN BANJARA:

You can see the website was fully responsive on tablet and mobile devices. Website also support keyboard navigation and all items of the website are accessible through keyboard.

Now I would demonstrate the same website over a Mac.

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MAC VOICEOVER:

Welcome to (inaudible)...

SHALIN BANJARA:

While we were testing, one of the most common feedback from our QA team was that the users who rely on the assisted technology as their primary means of interaction with the website tend to navigate the website using shortcut keys provided by the assistive technology used by them.

You are able to navigate multiple items on this page using the List shortcut key (x or X) provided by Mac Voiceover Utility.

MAC VOICEOVER:

You are currently on the list. To begin interacting with the list...

SHALIN BANJARA:

On the this page you can navigate to top menu, breadcrumbs menu, main content and footer using the shortcut list key of mac voiceover utility.

MAC VOICEOVER:

Five items inside it.

SHALIN BANJARA:

You can quickly navigate through these items using your list key of mac voiceover.

SHALIN BANJARA:

Next item is tab items and accordion on the page. You can navigate to any tab items on the page and the mac voiceover would just not read the current tab in focus but would also read the state of the tab along with the tab position number in the tab group. This is achieved by using proper aria roles and aria-attributes.

MAC VOICEOVER:

Unit 1, select tab, 1 of 5...

MAC VOICEOVER:

Videos for unit five expanded, button...

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SHALIN BANJARA:

Another thing Daniel talked about is AJAX. So let's talk about what are the key issues we ran into while using AJAX calls on this website. For sighted users, it was one of the mandatory requirements by our team that they wanted to have a calendar with a weekly grid view.

But what we did along with that is to provide the same selection information in a dropdown list which would be useful to people who rely on assistive technologies. Select any of the week from this list. As soon as you select it, the screen starts reading dynamically update content below that. Again you are using ARIA polite attributes to deliver this functionality.

Another website I would like to present is based on the previous website, but with a different user experience model. This website was targeted to audiences who need to download the content material for grade one students in different downloadable packages.

The targeted audience for this website was adult users. We found during this process that you do not need to have too much content on the same page and overwhelm a user with a lot of information on a single page. You can really keep your website very simple in structure. Follow the principles of Universal Design explained by Daniel earlier.

In a similar fashion as on the previous website, you can quickly navigate through different navigation items using your List shortcut key. What we did different over here is that we included more landmarks on the pages. This was achieved by using article and section HTML tags. Assistive technologies are able to recognise an article and sections inside an article.

For people who are not familiar with assistive technologies, they want to use a Web Rotor functionality to access a specific sections of the webpage.

The last pieces I would like to demonstrate is that the text resizes on the web page when you change the browser text if coded properly through CSS. So I will change my default browser text to be very large through my Chrome settings. Now if I visit the first website, the text on the page has not resized, but here on the second website the text has resized and the content has overflowed appropriately and also that the user is not missing any visual information.

Again, this was achieved by making the font size of the body tag to percentage or em through CSS. This issue is simple to fix but most of the time all the modern CSS frameworks available have defined the font size in pixel by default while the font size of the preceding nested tags inside the body tag are set with relative unit of percentage or em. This creates a lot of confusion for the developer as they tend to look for a solution by changing the CSS attribute for

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the current HTML tag as **h1** or **p** or **a**, but what is limiting the font from resizing is the absolute font size defined for the body tag.

So when we went through these processes, we learned a few lessons. These lessons were in terms of accessibility guidelines, production planning for building accessible products, what is the true meaning of building accessible interface, and what is the true meaning of an accessible product.

Following accessibility guidelines and WCAG 2.0 compliance does result in an accessible compliant product, but does not ensure accessible user friendliness. Another important lesson is in terms of production - that we can't keep accessibility QA process at the end of the product development because sometimes in doing so, you might end up rewriting the code for the whole product. It is important to plan for accessibility at each different phase of the production life cycle.

Creating accessible user interface means creating a visual experience at a non visual manner. It is not just about complying with the guidelines and checking off boxes. A true accessible product is not just about coding or designing as per the WCAG 2.0 guidelines, but it's about creating a parallel mode of user experience in multiple ways.

I would like to summarise our presentation.

- Yes, building accessible products comes with its own set of challenges. The first and foremost is a **production challenge** in terms of increased production cost. The reason behind this is there are no currently available JavaScript or CSS frameworks available in the market that allows you to build accessible products without any limitations. Each framework comes with its own sort of limitations and challenges.
- On top of this, now you have an **additional QA process** at each phase of your development life cycle that increases your resources in terms of time and development costs. Also, as explained previously by the color contrast analyser example, automated testing process are not very accurate nor completely reliable. So there needs to be more emphasis on manual testing which results in increase development time and resources. This is again additional QA cost.
- On top of all these, we have **changing landscape**. We have multiple devices, multiple browsers, and you have options of selecting multiple JavaScript or CS frameworks for your development. It is a combination of all four of these things together that creates more challenges for you.

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But again, how we can we overcome these challenges is by...

- Having proper planning at each stage of production
- Secondly, follow the principles of Universal Design. If you deviate from that, you are likely to result in a situation that would lead to an inaccessible products.
- Keep you user interface simple. This is one of the key points. As soon as you go into building complex structures, it leads to increased production costs and time.
- And last but not the least is to select the appropriate technology to build a product based on your budget. You don't want to go over budget.

Accessibility is all about removing barriers faced by users who rely on assistive technology as their primary means of communication and learning. As me and Daniel both believe, accessibility is not just about providing equality, it is also about equity, and when both are matched together in right proportion it would result in a user friendly accessible product.

So as we always say at Pearson, we are Always Learning! Thank you.

(Applause)

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