The “Secret Sauce” for Developing Accessible Software Products

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# Introduction

User-centered design (UCD) and standards-aligned technologies can streamline new product development for accessible software in higher education. Yet many software companies struggle to provide solutions that meet the needs of students and faculty with disabilities. In large part, this is due to the approach that has been taken to “bolt-on” accessibility features.

Greater awareness and simple changes in the existing product development lifecycle can make a significant difference in the quality, effectiveness, and cost of accessible software, especially if taken into account early in the research, design and development phases.

Through the lens of web-based applications for higher education, we will explore the key elements to consider when planning for “Born Accessible” product development:

* User-Centered design
* Personas
* Standards
* Content
* Navigation and interaction
* Data collection
* Analytics
* Testing

A common thread throughout is the need to initiate these activities early in the design and development process. The earlier these key elements are considered, the better the outcome.

# User-Centered Design

User-Centered Design (UCD) is all about making the needs of the target user the primary focus of your design effort. This sounds simple, but it has proven to be one of the most challenging parts of new product development.

People do things – they perform tasks to get things done. When the tasks are made easy by a product or service, people want to use those products. This is the engine of technology improvement – better ways, cheaper ways, or more efficient ways to do what we do.

## Why is this important?

User-Centered design is the way you determine which tasks are important to a user and how they think about those tasks. The frame of reference for the user to connect the tasks they can perform in a piece of software to their everyday life is the secret to success, “the secret sauce” for creating great software products. Unfortunately, not many products rise to this level of greatness.

## What’s the connection to Accessibility?

Interestingly, UCD is all about accessibility. In fact, it is quite easy to connect the concept of usability to accessibility and back again. If a product is to be accessible to a group of users who need accommodation for disability, the constraints on the design should ensure that any usable design is also accessible. Making it clear that usability includes accessibility also avoids the trap of a beautiful design needing to be completely re-engineered. So it is a highly efficient way of designing and avoiding additional development costs and end user dissatisfaction associated with addressing disability as an after thought.

## How do you do this?

It takes a number of elements to get this right. This is a framework to consider when designing new products. The following seven elements, when mixed with UCD, are essential to developing highly usable/accessible products:

1. Personas
2. Standards
3. Content
4. Navigation and interaction
5. Data collection
6. Analytics
7. Testing

Each of these elements is discussed below in greater detail.

# 1. Personas

Who is the user? All successful products are designed specifically for a group of people with something in common. It would not be reasonable to design a different product for each user. By combining the attributes of a large group of users into a model, we can create a substitute to design to – a Persona.

Most products can provide value for multiple personas. By modeling each of the personas that you intend to serve, your UCD projects can group tasks that are important to each persona and come up with designs that allow those tasks to flow nicely. It is just as important to know what to make available to a persona as it is to understand how to get things out of their way that are not important.

## Why is this important?

Personas help to provide a model of the user to drive the design process. User-Centered Design uses Personas to help organize and sequence the tasks so they will resonate with users who have different goals. These “model people” encompass the traits of large subsets of the users of a product based on similarity in the collections of tasks they might need to perform and their attitudes, likes/dislikes, technology affinity, and biggest problems.

## What’s the connection to Accessibility?

Personas are not disability types. Most Personas can have any combination of abilities. But each Persona will have a specific work sequence. One of the design goals is to make that sequence of tasks as adaptable to appropriate accommodations as possible. In some cases, the tasks may need to change as part of the adaptation. But by putting a Persona lens on discovery and design activity from day 1, you are maximizing the possibilities that will work and designing out the ones that won’t.

## How do you do this?

Persona development is best left to the experts. Hire a seasoned UX person with a background in Human Factors for best results. Lacking that, there are some wonderful contract resources out there to help kick start your effort.

Here are some examples of persona names and descriptions;

* Vanessa - Traditional Student
* George - Non-Traditional Student
* Phillip - Tenured Faculty
* Amanda - Graduate Assistant
* Susan - Contract Instructor
* Trent - Curriculum Developer
* Barbara – Administrator

# 2. Standards

Standards create a foundation for engineering your product correctly, but following the standards without good design will lead to unusable product that passes certifications but people don’t want to actually use. This type of product is great for the buyer who wants protection from the risks of non-conformance, but it does very little for the users of that product except frustrate them.

## Why is this important?

Standards create a common set of rules for creating products and measuring their fitness for use. By adopting standards in engineering, these rules can be followed routinely and reduce the cost of product development dramatically.

## What’s the connection to accessibility?

Software used in higher education today requires compliance with a number of accessibility standards, guidelines, and regulations.

## How do you do this?

It starts by setting a “minimum compliance bar” in your engineering organization. This is the level of standards compliance you want to see every design meet and every development project satisfy before release. This becomes the floor of your technical design and creates constraints for your designers to live within. In effect, you are saying that no new product will be released without passing a variety of basic tests.

Section 508 and WCAG 2.0 provide a good framework for this today and there are many resources to support third party evaluation of products. This is not the forum for a technical discussion about these standards, but it is important to note that there are changing interpretations of them and as the technology ecosystem evolves, you may need to adjust your minimum compliance bar.

Another key consideration is developer and designer training. While many of the requirements are clear, possible solutions and the pros and cons of each are constantly changing. As new operating systems, browsers, assistive technologies, and software libraries emerge, the need to understand the best way to achieve accessibility will continue.

# 3. Content

Content for web applications is the text, images, audio, and video assets that are arranged on pages.

## Why is this important?

All of the information conveyed by web applications is in content. Some content is part of the application like menus, buttons, labels, and forms. Some content is for User Assistance – help and support resources to allow users to learn about how to use the application. Some content is media – books, documents, photos, graphical images, videos, blogs, podcasts, music tracks, etc… Without content, applications have nothing to offer users.

## What’s the connection to accessibility?

The ultimate goal of any web application is to deliver content to the user – so making content accessible is a critical requirement for success.

## How do you do this?

Each piece of content must be designed to allow for accommodation for various disabilities – visual, auditory, learning, mobility, and cognitive. The techniques for accomplishing this are well documented but most content today is not “born accessible”.

Again, it is important to understand the user’s needs. Disabled users of computing technology have learned to use specific assistive technologies. They have invested enormous amounts of time, energy, and money to become efficient using their chosen methods. It is important to be able to adapt content to be compatible with these technologies as much as possible.

As content innovations emerge, more and more adaptations will become possible. New approaches to semantic content with alternative representations and adaptive media formats are beginning to become available. HTML5, EPUB3, and other formats will provide the opportunity to package all content types together and build in accommodations like alternate text for images, transcripts for audio and video, recorded audio or synthesized speech for text and more.

# 4. Navigation and Interaction

What are the key tasks the user wants to perform? Combining the personas that come from your user research and UCD you will arrive at a set of functions that combine to help the user accomplish these key tasks. Navigation provides users a way to find the functions and information they need. Interactions are the tools that people use to put information in and get information out of a system.

## Why is this important?

Navigation and interaction are how content is organized so it is optimized to meet the needs of a group of users. Sometimes called Information Architecture, the goal is to provide an information space that seems familiar to that group of users where everything they need is “within reach” and easily recognized. Of course there is more to good design than this, but without it design is compromised.

## What’s the connection to accessibility?

As the doorway to access the functions a user needs, Navigation and Interaction are critical to accessibility. Most of the standards and guidelines language is concentrated on making these tools mechanically consistent to improve interoperability with assistive technologies. But there is another dimension that must be considered beyond compliance. Familiarity, convenience, and discoverability are important elements of design that must be considered for all users.

## How do you do this?

User Research. The techniques for designing good user interfaces are well understood and there is a vast community of designers and UI developers in place to create beautiful products. The key is to understand what is beautiful from a variety of perspectives.

For each persona you will support, find users or potential users who need accommodations and interview them, watch them use their assistive technology to perform general tasks, determine how they think about the tasks you are planning to support with your application. Applying these findings back into your discovery process will help designers and engineers determine the best way to combine or switch between navigational techniques and interaction techniques to meet that persona’s needs across all accommodations required by your market.

# 5. Data Collection

Collecting data within your application is a valuable technique for understanding how users are engaging with the navigation, interaction, and content under a variety of conditions.

## Why is this important?

User research gets your development team to an initial design that is well-informed based on concepts and thinking models. Once the design is realized, it is important to understand the real experience users have with that design. Data collection within the application can measure user behavior directly.

## What’s the connection to accessibility?

Clearly the behavior of users with different accommodations or using different assistive technologies will vary, sometimes widely.

## How do you do this?

For cloud-based applications the concept of user behavioral data collection is well understood and a common practice. The important new factor for accessibility is to have context for the data, including the preferences of the user and any accommodations that are present within the application. If it is technically feasible to detect the presence of assistive technologies, that provides even further context that would be of value in interpreting the data.

# 6. Analytics

Behavioral Analytics has been largely the domain of the marketer with a goal of understanding consumer behavior enough to predict the outcome of various offers, communication channels, and messages. Educational Analytics is the use of these same tools to provide insight into the relationship between learning outcomes and various pedagogical elements.

## Why is this important?

What changes can be made to content, sequencing, the use of media, and other variables to increase engagement and improve learning? Analytics can help answer these questions.

## What’s the connection to accessibility?

Accessibility Analytics will change the questions a little. How do we accommodate every student’s learning abilities to achieve the best outcome?

## How do you do this?

Again, the good news is that behavioral analytics has been maturing for decades and newer techniques are being applied in the higher education community to perform research in this area.

Once data collection is in place, perform studies to determine the independent variables and provide analytics to your user research team to consider in their designs. Consider making the data available to researchers to use in enriching the body of knowledge about digital education. Finally, provide simple analytics back to users to give them the information to improve.

Accessibility Analytics is a new area that is starved for data. As standardized approaches like Access for All emerge, having a common ontology for context description will make data sets and analytics far more interoperable.

# 7. Testing

All of these steps set the conditions for successful products to be created and improved. To verify that the result is actually usable/accessible you must do 3 things:

1. Test Concepts with users
2. Test Designs with users
3. Test Products with users

## Why is this important?

Nothing is right the first time. All of the steps from Concept to Launch require validation from users to ensure that you are on the right track and have good information to inform decisions.

## What’s the connection to accessibility?

By now, you have detected the pattern that EVERYTHING is connected to accessibility. This is no exception. Testing with users means testing with users of all abilities to ensure that you know as early as possible how to adapt your product to all of your potential users’ needs.

## How do you do this?

Test planning for finished code is a well-defined practice. The same techniques should be used for Concept Testing and Design Testing but with a twist. In these phases it is often the case that you will be comparing multiple options with the user to determine which meet the goals of familiarity, convenience, and discoverability.

With formal test plans in place, recruit testers from the disabled community you serve. It is a good idea for your product team to have some experience with assistive technologies that are popular with your users. Do not substitute that for real user testing however. There is nothing that can replace user testing – and you should never stop since the target is always moving.

# Bringing it All Together

We have established the need for accessibility to be woven into the development process using UCD and incorporating accessibility as a common thread throughout. The most important concept is to make the small changes needed in the early stages of product planning and design to ensure that accessibility is built-in to a web-based product – that it is “Born Accessible”.

One final word on working within the higher education market: There are a number of stakeholders available to assist and they are eager to engage product companies with the organizational will to address usable accessibility. Work with the Disabled Student Services organizations to create opportunities to recruit testers from their staff, faculty, and students with disabilities. Build strong relationships with accessibility consultants, advocacy organizations, and the schools. This approach also ensures that all stakeholders have a part in shaping usability/accessibility features in the final product and its success.

No single player in the market will solve these problems, but together we can make a real difference in access to education for all.

Not sure what to do with this – should it be in the paper?

Courseload will present on this topic during the upcoming Accessing Higher Ground …. This presentation will include examples of how Courseload is working with various DSS organizations, end-users and leadership groups to implement the UCD approach to create highly usable/accessible products.