A WEB FOR EVERYONE

Designing Accessible User Experiences

by Sarah Horton and Whitney Quesenbery

Foreword by Aaron Gustafson

Rosenfeld

CONTENTS

How to Use This Book iv
Frequently Asked Questions vi
Foreword xvii

CHAPTER 1
A Web for Everyone 1
Understanding the Accessibility Equation 2
Accessibility 3
Inclusive design 4
Building a Framework for Accessible User Experience 4
Web Content Accessibility Guidelines 6
Principles of Universal Design 7
Design Thinking 8
Using Design Thinking for Accessibility 9
Summary 10

CHAPTER 2
People First: Designing for Differences 11
Know Your Audience 12
About Personas 14
What's in the Personas? 15
Meet the Personas 15
Summary 34

CHAPTER 3
Clear Purpose: Well-Defined Goals 35
How Clear Purpose Supports Accessibility 37
How to Design for a Clear Purpose 38
Start with purpose and goals 38
Design for clarity and simplicity 39
Think "accessibility first" 39
Make templates accessible, too 41
Choose an accessibility strategy 43

Who Is Responsible for Clear Purpose 43
Summary 46
Profile: Simple and Usable with Giles Colborne 47

CHAPTER 4
Solid Structure: Built to Standards 49
How Solid Structure Supports Accessibility 51
How to Create a Solid Structure 53
Code content to be machine-readable 53
Code to standards 53
Use standard web technologies 55
Organize code for clarity and flow 56
Use stylesheets to separate content and presentation 58
Use semantic markup for content 58
Who Is Responsible for a Solid Structure? 61
WCAG 2.0 and Solid Structure 61
Summary 62
Profile: Accessibility Standards with Mike Paciello 63

CHAPTER 5
Easy Interaction: Everything Works 65
How Easy Interaction Supports Accessibility 67
Designing for Easy Interaction 69
Identify and describe interactive elements 69
Use basic HTML codes correctly 69
Use WAI-ARIA for complex elements 70
Use features of the technology platform 71
Provide accessible instructions and feedback 72
Support keyboard interaction 75
Make controls large enough to operate easily 78
Let users control the operation of the interface 80

Design for contingencies 80
Allow users to request more time 82
Who Is Responsible for Easy Interaction? 82
WCAG 2.0 and Easy Interaction 83
Summary 84
Profile: Accessible Interaction with Derek Featherstone 85

CHAPTER 6
Helpful Wayfinding: Guides Users 87
How Helpful Wayfinding Supports Accessibility 90
How to Design Helpful Wayfinding 91
Create consistent cues for orientation and navigation 91
Present things that are the same in the same way 91
Differentiate things that are different 92
Provide orientation cues 93
Provide clear landmarks within the page 94
Provide alternative ways to navigate 96
Who Is Responsible for Wayfinding? 98
WCAG 2.0 and Helpful Wayfinding 98
Summary 99
Profile: Coding Accessibility with Steve Faulkner 100

CHAPTER 7
Clean Presentation: Supports Meaning 103
How Clean Presentation Supports Accessibility 105
How to Design for Clean Presentation 106
Design simply 107
Minimize distracting clutter 107
Design for customization of the display 108
Support customization through the browser 112

Design content for easy comprehension 114
Use color contrast to separate foreground from background 115
Use visual and semantic space 117
Provide enough space between lines of text 118
Use clean typography 119
Who Is Responsible for Clean Presentation? 120
WCAG 2.0 and Clean Presentation 120
Summary 122
Profile: Responsive Design with Ethan Marcotte 123

CHAPTER 8
Plain Language: Creates a Conversation 125
How Plain Language Supports Accessibility 127
How to Design for Plain Language 130
Write for your audience 130
Follow plain language guidelines for writing content 130
Support users through their tasks 133
Structure the whole page for scanning and understanding 134
Write sentences and paragraphs for easy scanning 136
Write helpful links 138
Use language your audience is familiar with or provide definitions 140
Provide plain language summaries of complex content 140
Don't rely on readability formulas 141
Usability test your content 144
Who Is Responsible for Plain Language 144
WCAG 2.0 and Plain Language 145

Summary 146
Profile: Universal Plain Language with Ginny Redish 147

CHAPTER 9
Accessible Media: Supports All Senses 149
How Accessible Media Supports Accessibility 151
How to Design for Accessible Media 152
Don't use *only* color to communicate meaning 153
Provide instructions without relying on visual cues 154
Describe the content or meaning of images 155
Provide captions and descriptions for video 157
Format captions to enhance meaning 161
Provide alternatives to time-based media 163
Use dynamic elements carefully 164
Make presentations accessible 166
Who Is Responsible for Accessible Media? 167
WCAG 2.0 and Accessible Media 167
Summary 169
Profile: Accessible Media with Larry Goldberg 170

CHAPTER 10
Universal Usability: Creates Delight 173
How Universal Usability Supports Web Accessibility 175
How to Design for Universal Usability 176
Design for exploration and discovery 177
Create a conversation 181
Be informative and helpful 183
Practice usability for accessibility 185
Who Is Responsible for Universal Usability? 187
Summary 187
Profile: Toward Universal Usability with Ben Shneiderman 188

CHAPTER 11
In Practice: An Integrated Process 191
Making Accessibility the Way You Do Business 193
Making a Commitment to Accessibility 194
Assessing What's Needed for an Integrated Practice 195
Evaluate the current site 196
Identify ways to allocate resources 197
Identify opportunities to integrate accessibility into current processes 197
Assess current knowledge and readiness 198
Supporting an Integrated Practice 198
Set policies and develop training 199
Choose content and development tools that support accessibility 199
Create a style guide and media library 201
Include people with disabilities 202
Provide tools and assistive technology for ongoing evaluation 203
Make accessibility part of site maintenance 205
Summary 205
Profile: Design Education with Valerie Fletcher 206

CHAPTER 12
The Future: Design for All 209
What a Web for Everyone Looks Like 211
What We Need to Do to Get There 212
Get out in front with web accessibility 212
Build awareness and understanding of more diverse people 213
Get support for accessibility into mainstream products 214

Make accessibility part of how we think 215
Don't launch until it's accessible 216
Now, to the Future 217

APPENDIX A
Accessible UX Principles and Guidelines 219

APPENDIX B
WCAG 2.0 Cross-Reference 225
People First: Designing for Differences 227
Clear Purpose: Well-Defined Goals 227
Solid Structure: Built to Standards 227
Easy Interaction: Everything Works 229
Helpful Wayfinding: Guides Users 232
Clean Presentation: Supports Meaning 234
Plain Language: Creates a Conversation 236
Accessible Media: Supports All Senses 237
Universal Usability: Creates Delight 241
Summary: WCAG Requirements in Order 242

APPENDIX C
More Reading 245
Chapter 1: A Web for Everyone 246
Design Principles 246
Books on Web Accessibility 246
Chapter 2: People First 246
User Research and Personas 246
Disability Demographics and User Research 247
About Assistive Technology 247
Personas of People with Disabilities 247
Chapter 3: Clear Purpose 247

Chapter 4: Solid Structure 247
Web and Accessibility Standards 247
Code Validators 248
Chapter 5: Easy Interaction 248
Chapter 6: Helpful Wayfinding 248
Chapter 7: Clean Presentation 248
Chapter 8: Plain Language 249
Plain Language Guidelines 249
Writing for Different Audiences 249
Chapter 9: Accessible Media 249
Writing Alternative Text 249
Captions and Multimedia Accessibility 250
Chapter 10: Universal Usability 250
Usability Testing 250
Chapter 11: Integrated Process 251
Planning and Project Management 251
Accessibility Evaluation 251
Toolbars to Check Accessibility 251
Screen Readers and Screen Magnifiers for Windows 252
Tools to Evaluate Flash and Other Rich Internet Applications 252
Chapter 12: The Future 252

Index 253

Acknowledgments 266

About the Authors 268

CHAPTER 1

A Web for Everyone

Understanding the Accessibility Equation 2
- Accessibility 3
- Inclusive design 4

Building a Framework for Accessible User Experience 4
- Web Content Accessibility Guidelines 5
- Principles of Universal Design 6
- Design Thinking 8

Using Design Thinking for Accessibility 9

Summary 10

The web is making the world a smaller and more connected place, but there is still much work to be done to make the web an inclusive place that everyone can use. As web professionals, our decisions define and shape the web landscape. They can create barriers, and they can remove them. Guided by an understanding of people's needs, it's also possible to avoid barriers altogether, right from the start. The approach you take defines whether the web is, indeed, for everyone.

In this book, we will present a design approach that begins and ends with people. We believe that great design starts by thinking about how to make products work for everyone. We will take a broad view, looking beyond the idea of an average user in a typical setting to explore the widest range of user abilities and contexts that we can imagine. Expanding "design thinking" to include all people, we might call it "accessibility thinking," which is using design thinking for accessibility.

Diversity is part of the richness of life. There's even evidence that differences in human brains and how we perceive the world are as essential as biodiversity is to the rich ecosystem of plants and animals.

> Instead of pretending that hidden away in a vault somewhere is a perfectly "normal" brain, to which all other brains must be compared … we need to admit that there is no standard brain, just as there is no standard flower, or standard cultural or racial group, and that, in fact, diversity among brains is just as wonderfully enriching as biodiversity and the diversity among cultures and races.
>
> Thomas Armstrong, The New Field of Neurodiversity
> **www.alternet.org/story/147107/**

We know that by seeking answers to complex and even singular challenges, we will discover solutions that benefit everyone.

When we have a web for everyone, **people with diverse abilities and contexts can use the web successfully and enjoyably.**

Understanding the Accessibility Equation

Design isn't simply about how something looks. A good design is visually appealing but also meets real needs, has substance and depth, and works well and intuitively.

Designing is an activity. When you make decisions about a product, and your decisions impact the lives of its users, you are *designing*—whether you think of yourself as a *designer* or not. The strategist defines the purpose and goals, the interaction designer focuses on how users will interact with the product, the visual designer creates the look, the content strategist gives the product a voice, and the developer makes everything work. Whatever the title and task, all of these roles are engaged in the activity of design.

When we talk about design, we mean it in this larger sense: the umbrella over all the skills and disciplines that contribute to the user experience.

No matter what your roles or skills are, it's important that you—that all of us—own the term "design" because it comes with incumbent responsibilities, which we need to own as well. Design has the capacity to improve lives. When we wield such a powerful tool, we need to appreciate its power so we are able to use it for good.

Accessibility

Like usability, accessibility is a quality—in this case, it means how easily and effectively a product or service can be accessed and used. Physical and cognitive ability occur along a spectrum. Everyone has a limit as to what they can physically accomplish and intellectually comprehend. Good accessibility is designed for the full range of capabilities, as well as for the context of use or environmental constraints.

As Ben Shneiderman put it in his book, *Leonardo's Laptop*, technology must be designed to include people with "new or old computers, fast or slow network connections, and small or large screens, ... young and old, novice and expert, able and disabled, ... those yearning for literacy, overcoming insecurities, and coping with varied limitations."

When websites and applications are badly designed, they create barriers that exclude people from using the web as it was intended. Poor accessibility creates a disabling environment where the design does not consider the wide variation in human ability and experience. In other words, *disability* is a conflict between someone's *functional* capability and the world we have constructed. In this social view of disability, it is the *product* that creates the barrier, not the *person*, just as design is at fault when a site has poor usability.

We could write this as an equation:

Ability + Barrier = Disability

The question, then, is how to avoid creating barriers and thus maximize the accessibility of a product? The answer: by adopting a practice of accessibility.

When people come first, designers think about real people with real needs. In Chapter 2, "People First," we'll introduce eight mini-portraits of people who use the web and who also happen to have disabilities. Starting with personas like these, you can make sure to design in the necessary features so that everyone has what they need to be successful with your websites and applications.

Think about a building. Public buildings do not generally provide wheelchairs for users with limited mobility. However, they are constructed so that visitors using wheelchairs can get around. Similarly, designers need to anticipate the needs of visitors to their websites and web applications and make sure that the necessary features are available to those who need them.

Inclusive design

Let's go further and think about what it takes to design a great user experience for everyone. We can aim to reverse the equation from one that ends in a barrier to one that includes everyone.

Design + Accessibility = Inclusive Design

A universal web is designed for all, inclusive of geography, language, and culture. It's a place that is available for people of all abilities, aptitudes, and attitudes. In short, design has the power to not only remove barriers but also not to create them in the first place.

The terms *universal design, inclusive design, barrier-free design, human-centered design,* and *design-for-all* are all concepts that strive toward a common goal: to make the user experience the first concern in making design decisions and to expand the description of users to include a wide range of human ability.

Building a Framework for Accessible User Experience

Our goal with this book is an approach that encourages design for everyone, where accessibility is not approached as a last-minute checklist of additions that are piled onto the product, but rather a set of features that are designed in place from the start.

We created a framework, based on established design principles, to identify guidelines and strategies for incorporating accessibility into any website or application throughout the design and development process. The nine principles are:

- **People First: Designing for Differences**

  People are the first consideration, and sites are designed with the needs of everyone in the audience in mind.

- **Clear Purpose: Well-Defined Goals**

  People enjoy products that are designed for the audience and guided by a defined purpose and goals.

- **Solid Structure: Built to Standards**

  People feel confident using the design because it is stable, robust, and secure.

- **Easy Interaction: Everything Works**

  People can use the product across all modes of interaction and operating with a broad range of devices.

- **Helpful Wayfinding: Guides Users**

  People can navigate a site, feature, or page following self-explanatory signposts.

- **Clean Presentation: Supports Meaning**

  People can perceive and understand elements in the design.

- **Plain Language: Creates a Conversation**

  People can read, understand, and use the information.

- **Accessible Media: Supports All Senses**

  People can understand and use information contained in media, such as images, audio, video, animation, and presentations.

- **Universal Usability: Creates Delight**

  People can focus on the experience and their own goals because the product anticipates their needs.

Each principle has a set of guidelines, which we will cover in detail in the following chapters.

To construct this framework, we stand on the shoulders of giants, building on three important bodies of work: the *Web Content Accessibility Guidelines*, the *Principles of Universal Design*, and design thinking.

Web Content Accessibility Guidelines

The Worldwide Web Consortium (W3C) sponsors many efforts in support of accessibility, which is not surprising given the commitment of its founder:

> The power of the web is in its universality. Access by everyone regardless of disability is an essential aspect.
>
> Tim Berners-Lee
> W3C Director and inventor of the World Wide Web

The W3C Web Accessibility Initiative (WAI) develops web accessibility standards and guidelines for web and software developers. The two most important are the Web Content Accessibility Guidelines (WCAG 2.0) and the Accessible Rich Internet Applications (WAI-ARIA) standard. The WAI also provides guidelines for developing web authoring tools (ATAG) and software, like browsers and media players (UAAG).

In addition to standards that are specifically about accessibility, the WAI works with other W3C standards projects, including the HTML5 standard, the next version of the basic language of the web. This standard is critical to making a web for everyone, because there, at the core, is where the basic structures make it easier—or harder—to make a site or application accessible.

The WAI also hosts a great number of educational resources, including the very helpful document, "How People with Disabilities Use the Web" (www.w3.org/WAI/intro/people-use-web/).

The Web Content Accessibility Guidelines (WCAG 2.0) are organized under four foundational principles, which conveniently form the acronym POUR:

- **Perceivable:** Information and user interface components must be presented to users in ways they can see or hear.
- **Operable:** User interface components and navigation must be designed so that users can interact with them and they can support assistive technologies such as screen readers.
- **Understandable:** Information and the operation of user interface must communicate clearly and consistently so that the content is readable.
- **Robust:** Content must be written so that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

Having principles as part of WCAG 2.0 is an important step toward incorporating accessibility into design. Rather than simply following

the technical guidelines as a checklist, the principles offer designers an approach to meeting user goals. The principles articulate the "why," and the guidelines articulate the "how" of web accessibility.

We used the POUR principles to think broadly about user needs and WCAG 2.0 to identify the accessible features that must be present in the design. In Appendix B, "WCAG 2.0 Cross-Reference," we map the principles and guidelines to our framework.

Principles of Universal Design

In 1996, a group of designers, architects, and rehabilitation engineers developed a set of principles to support the universal design approach. The approach was based on a philosophy articulated by Ron Mace, an architect, disability rights advocate, and founder of the Center for Universal Design at North Carolina State University.

> Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.
>
> Ron Mace

The Principles of Universal Design start from the premise that there is no typical, average, or normal user. Rather there is a basic understanding that user context will vary widely based on circumstances. With variance as the norm, the principles support a design process that makes sure that any needs arising from differences are met by the design.

- **Equitable Use:** The design does not disadvantage or stigmatize any group of users.
- **Flexibility in Use:** The design accommodates a wide range of individual preferences and abilities.
- **Simple, Intuitive Use:** Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
- **Perceptible Information:** The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
- **Tolerance for Error:** The design minimizes hazards and the adverse consequences of accidental or unintended actions.
- **Low Physical Effort:** The design can be used efficiently, comfortably, and with a minimum of fatigue.

- **Size and Space for Approach and Use:** Appropriate size and space is provided for approach, reach, manipulation, and use, regardless of the user's body size, posture, or mobility.

Universal design is appealing because it provides an intentional, designed approach—aesthetic and elegant—while creating products that are often beneficial to everyone. Even though the Principles of Universal Design were written in the early days of the web, the principles and associated guidelines map well to the web environment. As authors, we used these principles to guide our work in the direction of universal access.

You can read the complete universal design principles and supporting guidelines at the Center for Universal Design at http://tinyurl.com/the-principle-of-universal-des. You can learn more about universal design in our profile of Valerie Fletcher in Chapter 11, "In Practice."

Design Thinking

Design thinking is an approach to problem solving popularized by Tim Brown from the design firm IDEO. It's based on the idea that the types of thinking and methods behind what we call user experience design benefit all types of decision making processes, and that applying design thinking broadly to challenges and opportunities will produce more successful outcomes.

> Thinking like a designer can transform the way you develop products, services, processes—and even strategy.
>
> Tim Brown

The philosophy behind design thinking goes something like this: If you think about technology, you get technological products that don't meet human needs. But if you think more broadly—about the social environment the product will be used in and the people in that setting—you will get products that are truly designed for people.

Several aspects of the design thinking approach are particularly helpful in thinking about designing for accessibility.

- **Integration and iteration:** The full range of design is considered throughout the project, rather than focusing only on the surface layer to make an already conceived product appealing. The entire product is designed by imagining an array of possible approaches; and then, through an iterative process of prototyping and testing, homing in on the best approach based on feedback about the effectiveness of the design.

- **Divergent thinking:** Imagine possibilities without constraints. All too often, accessibility solutions come down to code, without consideration of whether the overall design approach is the right one. Divergent thinking in the early phases of a project, exploring options for accessible designs, yields innovative designs that are also accessible.
- **Convergent thinking:** Choose from all the ideas the ones that are most likely to work, given the environment. This is also important for accessibility: choosing among options the ones that best suit the web environment and meet diverse needs.
- **Human centered:** Design thinking is powered by an understanding of people's wants, needs, and behaviors, which set the direction for a project, as well as feedback from people that helps refine solutions throughout the process.
- **Insight:** To gain human centered insights, you need to understand what works best for people who access and operate the web in different ways. Ideally, this means observing people in their context, watching what they do, and hearing what they say. Stories also generate empathy, which feeds insight. In the next chapter, we'll present personas that we believe will provide the information needed for empathy and insight, and that will inspire creative, divergent thinking about ways to provide accessible solutions.

Using Design Thinking for Accessibility

Design thinking could transform the practice of web accessibility. To date, much of the work on accessibility has focused mainly on modifying code to comply with guidelines and specifications. This approach can only achieve incremental improvements. But applying design thinking to the challenge of accessibility shifts to an innovative approach that could yield substantive new ideas—for example, holistic approaches that incorporate accessibility into design.

In many cases, accessibility is often considered only at the end of the development process, typically during quality assurance or even after launch. Resolving accessibility issues on a finished product often yields unsatisfying solutions, for the designer and the user—the digital equivalent of a wooden ramp stuck on the side of a beautiful building.

A design thinking approach includes accessibility throughout the process. Design thinking also requires going broad and thinking about many different kinds of people in the environment. Instead of designing for a few and then bolting on accommodations for people with

disabilities, you can include them in your thinking from the beginning. And with design thinking, you can use your designer's toolkit—exploration, prototyping, and testing—to integrate accessibility into elegant, accessible products.

WCAG + Universal Design + Design Thinking = A Web for Everyone

We'd like to suggest a radical idea: How much more innovative could the web be if everyone used design thinking for accessibility? Instead of limiting creativity, accessibility opens up new avenues for exploration and results in even more awesome products.

Summary

Designing a web for everyone combines good design and usability with accessibility to create inclusive design.

The principles in this book are built on:

- The World Wide Web Consortium's *Web Content Accessibility Guidelines* (WCAG) 2.0, a standard for coding accessible websites. WCAG 2.0 is also the basis for national regulations in the U.S., the U.K., the European Union, and elsewhere. WCAG 2.0's POUR principles provide the foundation for web accessibility guidelines and best practices.
- The *Principles of Universal Design,* seven principles for creating architectural spaces, industrial design, and digital products that work for the widest range of human abilities.
- Design thinking, an approach to solving any kind of design problem that emphasizes grounding the process in understanding the human needs, rather than starting from a technology.

By combining the WCAG guidelines and POUR principles, universal design, and design thinking, and starting from the user experience, you can create websites and web applications that work for everyone—including people with disabilities.