XR ASSOCIATION DEVELOPERS GUIDE:
AN INDUSTRY-WIDE COLLABORATION FOR BETTER XR

CHAPTER THREE: ACCESSIBILITY & INCLUSIVE DESIGN IN IMMERSIVE EXPERIENCES

XR ASSOCIATION

www.xra.org

OCTOBER 2020

CHAPTER THREE

ACCESSIBILITY & INCLUSIVE DESIGN IN IMMERSIVE EXPERIENCES

THIS NEW CHAPTER OF THE DEVELOPERS' GUIDE CONTINUES TO FOCUS ON those developing platforms and applications for XR through establishment of an evolving set of best practices — this time with an emphasis on the importance and necessity of creating programs that are accessible to people with disabilities.

XR hardware is evolving rapidly, and while there are facets of XR hardware that are unique to each manufacturer, all are working to maximize accessibility in conjunction with software development partners. As software developers look to develop platforms for XR and/or create programs across multiple platforms, the concepts of inclusive and ergonomic design are helping to provide a strong, guiding principle for that software development. Both hardware and software developers have a shared interest in and commitment to incorporating iterative practices and to working closely with people with disabilities to test out advancements at each stage of development.

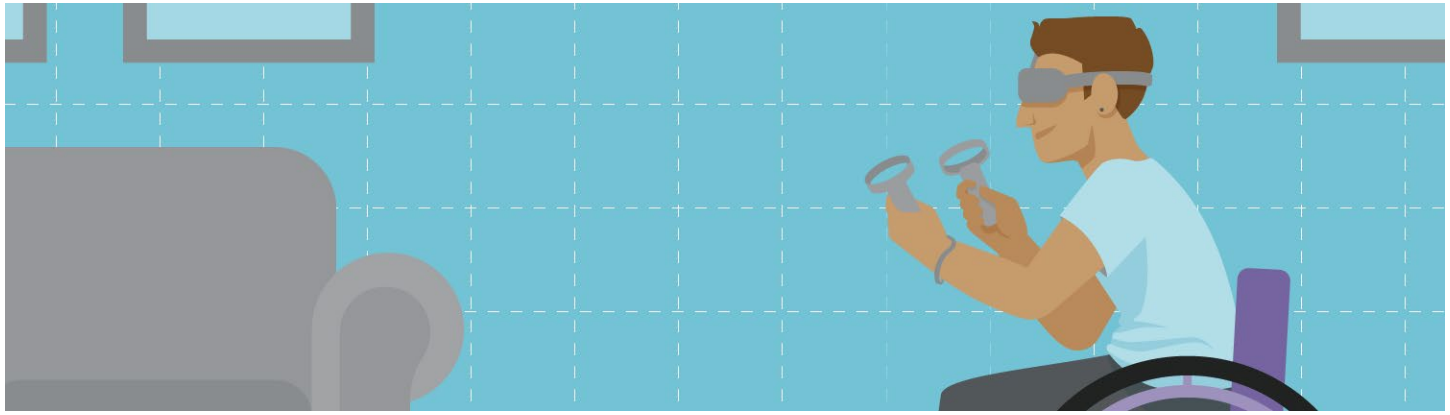
This update is intended as a baseline of best practices for accessibility and as a compilation of guidance for platform and application developers for consideration during the development process. It was created through contributions of member company representatives with expertise in the XR space as well as input from disability advocacy groups and members of the disabled community. This guide is not meant as an exhaustive source on designing for accessibility and inclusivity, and we recognize that these best practices must continually evolve and will require ongoing input from relevant stakeholders, including standards setting bodies who are also working to establish industry standards in the area of accessibility for people with disabilities.

Additionally, many countries around the world have established laws governing accessibility for software, and we urge software developers to follow all disability and accessibility laws and regulations in their applicable jurisdictions as they create innovative designs for XR.

CHAPTER OVERVIEW

An essential component of ensuring safe and comfortable navigation of virtual or augmented spaces is the inclusion of accessibility features for people with disabilities. If a device or an experience is not accessible, having a disability can significantly impact not just how someone uses XR technology, but *if they can use it at all.*

A man in a wheelchair is enjoying himself while wearing a virtual reality head-mounted display and holding controllers in both hands.



USING INCLUSIVE DESIGNS TO ENSURE ALL USERS CAN BENEFIT FROM XR

The most effective way to ensure that all users, including those with disabilities, can easily navigate XR environments is to create inclusive and ergonomic designs which take into consideration the differences many users may have in their abilities to experience different aspects of the technology. Those differences may include permanent disabilities — such as vision and hearing loss, mental, cognitive, and intellectual disabilities, or physical disabilities — as well as temporary or situational limitations, such as a broken or sprained limb, muscle soreness, or sun glare.

Designing for an "average" user can lead to designs that are inflexible and constraining for all, while inclusive designs often produce technology that is more adaptable and flexible. Inclusive design goes beyond simply making technology accessible to people with disabilities. Rather than creating a separate experience, tool, or plug-in specifically aimed at a particular disability, inclusive design aims to create a universal XR experience that integrates tools that all users can enjoy. Because of that, inclusive design should be a goal from the outset, during the platform and app development stage, to ensure a consistent experience across the different applications being used on the platform or app.

Inclusive features, such as vibration alerts, voicemail transcription, voice recognition, and haptic feedback solutions, have become common smartphone features used by everyone, not just people with hearing or vision loss for whom such functions are vital. Designs that allow users to control how they want to accomplish tasks and how they experience the platform or application should be built in from the beginning — a process that often results in cutting-edge innovations that improve the experience for everyone.

While this guide endeavors to provide developers with suggestions for how to ensure their designs are accessible and inclusive, it is also vital to solicit input from people with disabilities during both the development and testing phases of new platforms and/or applications. Ensuring inclusive design necessitates that people with disabilities be involved in various stages of the design phase as much as possible, given it is much more resource intensive to attempt to build in a major user interface feature after the fact. Once an accessible platform or app feature has been developed, it is equally important to engage disability advocacy groups in the testing phase to work out any bugs or difficulties in using the software. When engaging disabilities' groups for feedback, developer companies should appropriately compensate and give credit to the group and/or individuals for their time and input. Incorporating the feedback and input from people with disabilities is the only way to ensure the design and final product are truly inclusive and will go a long way to helping developers fine tune their software in a way that provides the best experience for all users.

BEST PRACTICES FOR INCLUSIVE DESIGN

Provide comparable experience for all users.

Give users control of their experience by providing them with various options for how to complete tasks and/or how to alter their XR environment to fit their needs or desires.

Solicit and incorporate the input of people with disabilities during both the development and the testing phases of your platform and/or application designs.

IMPORTANCE OF INCLUSIVITY AND ACCESSIBILITY IN THE ENTERPRISE SPACE

XR WORKPLACE APPLICATIONS ARE RAPIDLY BEING DEVELOPED

and used for industrial, educational, medical, marketing, communication and other business uses. This includes immersive experiential job training programs, headsets that augment the information a worker can access while doing their job, VR market research, immersive or augmented school and university learning applications, and virtual medical treatments, diagnoses, and therapies, to name but a few.

The need for enterprise applications to be accessible to all workers or users in such settings is paramount to ensure equal opportunity employment and advancement, and so that enterprises receive the efficiencies and benefits of such technology. In addition to the fact that many companies want broadly accessible designs to accommodate a diverse workforce, many countries also require employers to provide accommodations for employees with disabilities, including in the technology they use. Because many companies have a multi-country or global presence, it is imperative that an enterprise XR application meet accessibility standards in order to be considered for use by companies around the world. Developers should consult those standards when working on enterprise apps to ensure they meet minimum standards for the companies, industries, and jurisdictions for which they are designed.

A woman with one leg sits on top of her desk, crutches leaning next to her. She is talking to a woman wearing a hearing aid standing in front of her.

GENERAL ACCESSIBILITY

Accessibility in XR requires the creation of a flexible environment in which users can control the way they experience a platform or application. Later in this chapter we will discuss some suggested options that are specific to common types of disability, but it's also important to remember that some users may have disabilities in more than one category. Below are some software solutions to help make interfaces more inclusive and accessible to users across disability types.

REMOVING OR REDUCING BACKGROUND DETAILS AND AUDIO

Those who are visually-impaired or have cognitive or intellectual disabilities may have difficulty discerning the most important experience options or tasks amidst rich background visuals. Similarly, for people with hearing loss or those with cognitive or intellectual disabilities, background audio that is not essential to the experience could be confusing or disorienting. By providing users the option to remove or reduce background visual and audio detail, users may better distinguish the most important activities or tasks in the application. As discussed in the Visual Accessibility portion of this chapter, allowing users to turn on audio captioning features should also be an option.

UNDO/REDO FUNCTIONS

Regardless of disability, all people make mistakes when using XR platforms and apps. Allowing users to undo or redo actions they've made in error or because of imprecision would aid all users, but is especially helpful to improve the experience for users with physical, cognitive, visual or auditory disabilities. For example, users who have physical dexterity disabilities, perhaps tremors or a broken finger, may be more likely to inadvertently make imprecise choices when using certain hardware. Additionally, users with disabilities may also benefit from a function that requires them to confirm an action before it happens, so they can correct an error that otherwise would be irreversible.

REDUCING SPEED AND SETTING UP ACTION SEQUENCES

Users may at times have difficulty quickly and accurately reacting to prompts, experience options, and/or physical or reflex challenges due to mobility, vision, auditory or cognitive disabilities. To enable user progress, it may be helpful to allow users to reduce the speed of the app or to increase the time allotted for making decisions or completing challenges.

A woman with her back to the viewer taps a layers bar projected in front of her, turning off visibility on the background VR information.

Similarly, allowing users to pause the app or game to set up action sequences for tasks that require several steps may aid them in ensuring they can accurately respond to each challenge.

BYPASS FUNCTIONS

XR experiences that include physical or reflex challenges and/or complex puzzles or other decision-making tasks may be taxing for some users with physical or cognitive disabilities. Additionally, timed tasks put pressure on users who cannot move or make decisions quickly. Adding a bypass function would permit users to skip challenging or timed experiences while still allowing them to progress in the app. Other users with visual or hearing loss may too want to bypass tasks that prove frustrating or time-consuming.

SAVE PROGRESS

Users benefit from being allowed to save their progress in an XR experience for a variety of reasons, such as unexpected real world interruptions, difficulty completing tasks in the app, or just because they are ready to end the experience. For users with disabilities, having to end the experience and restart later may require them to repeat experiences that may have been challenging for them to complete in the first instance. Therefore, it is recommended that platform and app developers include a function that allows users to save their progress at any time to avoid the need to repeat challenging actions or simply to allow them to pick up where they left off on the experience. Developers also should allow users to skip challenging actions or reduce the difficulty of challenging tasks.

VISUAL ACCESSIBILITY

According to the World Health Organization (WHO), as many as 1.2 billion people globally may have vision impairment or blindness that cannot be corrected with medical intervention. The types of vision loss or low vision that may affect a user's ability to experience XR apps include blurred vision, loss of peripheral vision, light sensitivity, monocular vision (loss of vision in one eye), blindspots created by a loss of central vision, eye injuries, and color blindness, among others.

For those with low vision, text that is overlaid onto an image, object or other element in an XR app may be difficult to read. Similarly, rich visual backgrounds may make it difficult for users to discern the most important information being communicated in the app. For those with reduced peripheral vision, objects, text or other important elements that are outside the user's central field of vision may go unnoticed if the user is not prompted to look for them.

However, vision loss need not be a barrier to utilizing or experiencing XR if tools are provided to adjust visual elements and text in the app.

ALTERING THE SIZE OF OBJECTS, ELEMENTS AND TEXT

There are a number of ways developers can allow users to control the visual elements in an app that would aid low vision users in completing tasks and/or enhancing their experience. These include:

- Allowing users to magnify or reduce objects and text to make them larger or smaller
- Allowing users to change fonts for more easily readable text
- Allowing users to add contrasts or edge enhancements to highlight objects and text
- Allowing users to change foreground or background colors of text
- Allowing users to change the brightness levels in the app
- Allowing users to employ peripheral maps to show objects outside of the field of vision

AUDIO AUGMENTATION AND TEXT-TO-SPEECH

Audio augmentation is an important feature that should be available to users with vision loss. Text-to-speech (TTS), also known as "read aloud," programs may work especially well to ensure that users who otherwise cannot read text instructions, labels, or other written elements in an app are able to understand and interact with the app effectively. TTS is already a built in feature of operating systems for computers, smartphones and tablets, and developers should consult existing software solutions when designing their own XR TTS technology and/or build their platform to natively support an existing TTS technology. Developers also should include optical character recognition as a feature of TTS, so that words included in images that may be used in XR apps can be deciphered by low vision users.

In addition to TTS, audio augmentation elements should include labeling objects or elements and allowing users to have those objects audibly identified as they encounter or explore those objects in the platform or app.

COLOR FILTERS AND SYMBOLS

To support users that cannot discern color, developers should either allow users to recolor the interface and objects, provide shapes or symbols alongside meaningful colors, or provide textures on objects or elements to help distinguish information in app. These methods allow users to comprehend information in the app communicated by color.

SCRIM OR SCRIM-LIKE OVERLAYS

A scrim is a translucent gradient layer that aids in making text more readable against background pictures, colors, objects and other elements that might affect a user's ability to read it. Where other methods of making text more readable — such as blurring underlying images or using text boxes — can obscure background information and elements, a scrim's semi-transparent layer still allows the user to see the image or object behind it, while providing text that is readable.

For programs that require readable texts and/or captioning for deaf or hard of hearing users, using a scrim-like overlay is a potential solution for developers to help ensure all users can read and understand the text display. However, it is important to also ensure that scrims or scrim-like overlays do not introduce color gradients that may make the text unreadable by users with vision loss, create other difficulties in reading the text, or prevent the user from otherwise experiencing the virtual environment.

A mug sits on the left of the table, and a vase on the right. Overlaid on the image is a subtitle that says [Narration: Pick up the mug.]

DEAF AND HARD OF HEARING

Auditory disabilities occur in 5 percent of people worldwide, according to the WHO. It may be the result of aging, prolonged exposure to loud noises, congenital deafness, illnesses that affect the ears, and even temporary factors, such as excess fluid in the ear, among other things. To ensure that users who are deaf or hard of hearing can utilize XR technology, developers should provide multiple ways for users to understand and control the audio features of XR platforms and apps.

CAPTIONING AUDIO FEATURES

One of the most common ways to make XR accessible to the deaf and hard of hearing is by providing captions or subtitles for audio features. However, there are several considerations developers should take into account when providing captions to ensure the captions are readable given the dynamism of XR technology.

For example, developers may want to consider allowing users to choose where to place captions and allow users to move them to ensure other visual aspects of the app are observable. Developers also should allow users to change the font as well as the colors of captions and their background to make them easier to read, if the background colors in the interface dynamically change.

If a feature in the app involves more than one speaker, the captions should clearly indicate or label which speaker is talking.

In addition to the above recommendations, there are many useful guides that are publicly available for how to assure high-quality captions that meet industry standards, which have been developed over decades for captioning of television audio. While there are no standard captioning guidelines specifically for XR, television broadcast captioning guidelines may prove helpful to XR developers. As a starting point, developers should consult captioning guidelines, which provide information on the recommended number of characters per line, characters per second, and standards for punctuation, among other things. Some government agencies, such as the U.S. Federal Communications Commission, have published specific recommendations for broadcast captioning, and the WCAG 2.1 has guidelines and resources for online accessibility and captioning that may be helpful in developing captioning for XR.

While standard two-dimensional captioning for media is relatively straightforward, developing three-dimensional captioning for XR poses an added challenge, given the difficulty in predicting where a user may look or turn at any given moment.

USING ICONS TO IDENTIFY AUDIO FEATURES

Developers should use icons or other indicators to identify for users how they should move their heads or reorient their focus to ensure they are able to see the direction from which verbal and non-verbal audio features are emanating.

Additionally, developers may want to use icons or captions to indicate background sounds or other non-speech indicators, but they should ensure such indicators specify the source or direction from which the sound is coming. In gaming, for example, this may include indicating the direction of incoming gunfire or approaching characters.

When creating icons for XR, however, it's important to remember that there is no standardized iconography across geographic regions or cultures. Developers should ensure when creating icons that those icons are culturally and geographically sensitive and do not evoke different, or even offensive, connotations in different cultures and regions of the world.

SIGN LANGUAGE

Developers may want to consider augmenting their captions with an option to persistently display sign language interpretation within the app. Just as with captioning, developers should allow users to control the placement of the sign language visual to ensure other visual information is not obscured.

Whatever features developers include, they also should provide a way for users to turn these various features on or off — such as captions, sign language, background noise icons, etc., so that users can customize their experience and choose the information that best suits their needs.

A woman in a virtual reality head-mounted display and hearing aid, holding a controller, turns her head in the direction of an arrow projected in front of her.

MONO AUDIO

Users with hearing loss in only one ear may not be able to hear everything in a stereo recording, which splits audio into left and right channels, particularly when using headphones. Platform developers should include a feature that allows users to switch from stereo to mono audio so both stereo channels can be heard in either ear. Keep in mind mono audio will no longer contain information on the directionality of an audio source so the directionality will need to be communicated using other methods, such as with icons or other indicators. For reference, a "mono audio" feature is already included on most smartphones as an accessibility feature.

MOBILITY DISABILITIES

Mobility disabilities may be permanent or temporary and affect a person's physical ability to walk, stand, move comfortably, use their hands and arms to grip, hold, lift, and interact with objects, or generally use and control their extremities and body movements. A person may have a mobility disability because of accident or injury, disease, or congenital or neuromuscular disorders. Mobility disabilities include paralysis, tremors, loss of one or more limbs or digits, recurrent seizures, loss of motor control or poor motor control, muscle weakness, and movement tics, among other things.

A study in 2017 by the Disability Visibility Project found that users of all studied disabilities listed mobility challenges as one of the most difficult barriers to using virtual reality programs, including activities such as standing, crouching, arm movements, and general locomotion and/or rotation of the body. The following are some options for platform and app developers to help improve access to XR programs for users with mobility disabilities.

SETTINGS AND MENU OPTIONS

Being able to configure usability preferences when initially setting up their XR experience is an important feature for those with mobility disabilities, as is allowing users to save those preferences for future interactions with the program. Some of those preferences should include:

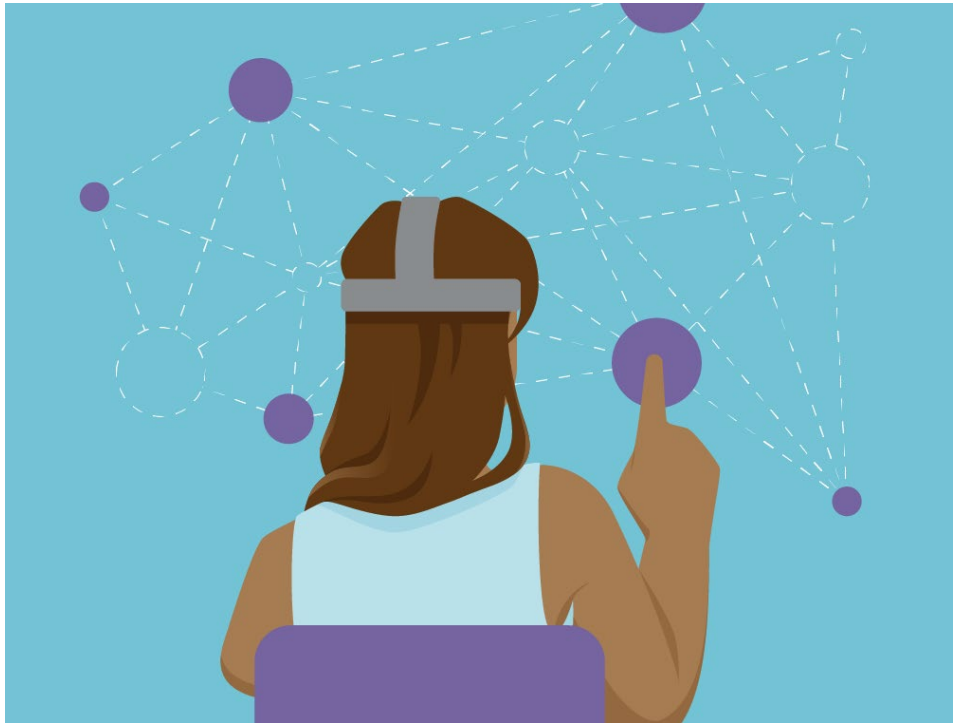
Allowing users to choose to have the app assist them in navigating the interface and in helping them to complete any tasks, such as might occur in workplace training programs or in gaming.

Allowing users to receive assistance in some aspects of the program by enabling a separate controller or sensor.

Allowing users to access the experience from a seated, reclining, or stationary position, if the application otherwise would require standing or body movements to access its full content.

Other recommendations for increasing the accessibility of XR platforms and apps include allowing users to slow down various aspects of a game or app, such as slower cursors to allow more precise movements to more accurately target menu options, objects, or other features in an interface. The ability to slow down camera movements and/or zoom options is also recommended.

A woman in a wheelchair with one arm wears a virtual reality head-mounted display and selects a point on an abstract map of the virtual reality controls.



For reference, these options are similar to software that has already been developed for use with a computer mouse that freezes the cursor during clicking to reduce errors for people with tremors or impaired fine motor precision. Other software has been developed to ignore multiple clicks or taps when they occur too close together.

If the XR design requires users to use multiple buttons or controllers to navigate through the program, there are several ways a developer can make it easier for those with mobility issues to experience the application:

Allowing users to automate some actions to reduce the number of physical actions they must make within an app.

Allowing users to map several actions to a single controller button or action to be able to complete complex multi-step actions or choices in a sequence.

Allowing remapping of controls onto alternate controllers, sensors, or keyboards.

Allowing remapping of controls on the standard controller to ensure the user can reach the necessary controls.

MOBILITY DISABILITIES

DYNAMIC FOVEATED RENDERING AND EYE TRACKING

Some XR hardware developers are working to incorporate eye tracking and dynamic foveated rendering features into their products in order to improve the performance of the hardware as well as the user's experience. Foveated rendering reduces the image quality in a user's peripheral vision while providing clear and detailed images at the eyes' focal point. Dynamic foveated rendering uses eye tracking to move the user's field of vision as the user's eyes move.

When developing apps or platforms for such hardware, software developers can use the built-in eye-tracking and foveated rendering features to create an option for users with significant mobility disabilities, such as paralysis or severe tremors, to select eye-tracking as their primary way of manipulating the interface and progressing through the app.

Eye tracking and foveated rendering techniques developers can use to increase accessibility include:

Interface Navigation

Input Selection

Automatic Scrolling

Aim Assistance

Object Selection

Text and Fine Details Rendering Quality

Analytics and User Research

CONTROLLER-FREE HAND-TRACKING

With the advent of controller-free hand-tracking hardware, developers have the opportunity to design software to match the technology. This important accessibility feature can help address the difficulty in handling controllers that users with impairments to fine motor skills or the ability to grasp and press buttons may have.

A key design component of hand tracking software will be in allowing the user to have both absolute and relative interactions with the app to ensure that the user can both directly "touch" an object nearby (absolute) and control or manipulate objects farther away (relative). Some hardware developers with hand-tracking functionality have published guides for software developers to use when designing apps for such hardware.

COGNITIVE DISABILITIES

Cognitive and intellectual disabilities encompass a broad spectrum of conditions, including autism, learning disabilities such as attention deficit disorder and dyslexia, Down Syndrome, brain injury, and dementia, among others.

INTERSECTIONALITY OF SOLUTIONS

Many times a single solution will positively impact users with different disabilities. For example, people who live with auditory issues may not choose to speak. So having alternatives for speech command-and-control systems and in-game speech communications will help this community but will also be impactful for people living with cognitive disabilities who may have significant speech impairments or are non-speaking.

Many of the suggestions already included in this guide for allowing users to adapt content displays, to opt for subtitling or audio commands, to turn off background audio, and to highlight important information in apps also would aid many cognitively impaired individuals. It is important to allow these users to control their experience with the content on the platform or app to prevent sensory or information overload.

Just as with mobility disabilities, those with cognitive disabilities may want to save their settings and preferences for future use of the platform. Additional settings that would aid users with cognitive disabilities include:

Providing on-demand functions that allow the user to receive assistance in orienting themselves in the experience or to receive more context about their progression in the app. Such options should provide information to users about where they are in the virtual space, what they can or should do next, what their current progress in the app is, etc.

Providing in-app prompts, such as reminders, help topics, introductions to new features, among other things, to assist the user in progressing through the experience.

Providing training opportunities for users to experiment with the interface and control configurations so they can learn the potential challenges they may face and choose their settings accordingly.

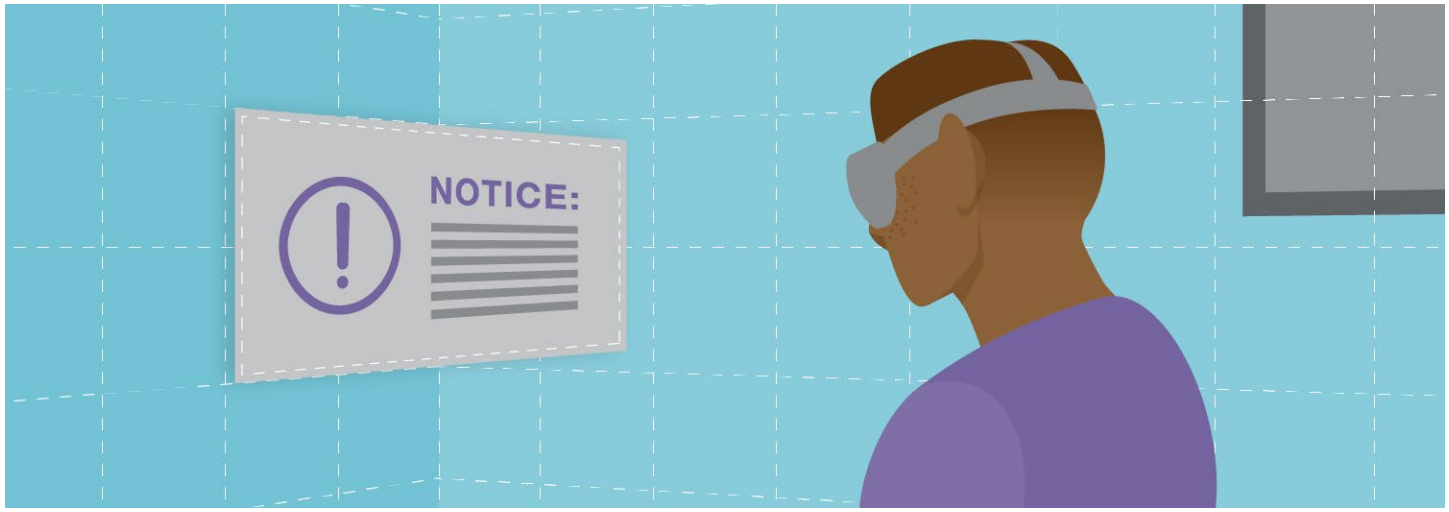
If an app includes challenges or tasks that must be completed, allowing users to review their objectives — both completed and future — to reorient them in the application and ensure they can progress in the app effectively.

Allowing users to hide distracting or non-critical interface components, including visual, audio and/or animated components, to ensure they are able to focus on the most essential information being communicated to them.

If the design requires users to use separate controllers to accomplish tasks, allowing users to create control reviews for the interface to help the user navigate the controllers more accurately, and allowing users to reduce the number of controls in order to limit the number of things they have to do to accurately complete any objectives contained in the program.

EXPLORE WORLD OPTIONS

Allowing users to familiarize themselves with the app and its various interfaces and input needs may help users with cognitive disabilities to feel more comfortable taking an active part in the program and help them to understand and experiment with the interface and the environment prior to utilizing the app, and to set preferences. For apps that include challenge, puzzle or gaming features, this option also would allow users to simply experience the app and its virtual world without having to take on challenges that may prove difficult or frustrating.



A man in a virtual reality head-mounted display looks at an in-app notice prompt projected in front of him.

ACKNOWLEDGMENTS

ON BEHALF OF ITS BOARD AND MEMBER COMPANIES,

The XR Association wishes to extend its sincere thanks to the following individuals and organizations for their assistance, contributions, and leadership in the development of the "Accessibility & Inclusive Design in Immersive Experiences" chapter for the *XR Association's Developers Guide: An Industry-Wide Collaboration for Better XR:*

Elaine Dai
Facebook Reality Labs

Andrew Eiche
Owlchemy Labs, Co-Chair of XRA's Accessibility Working Group

Debbie Girolamo
Facebook Reality Labs, Member, XRA Board of Directors

John Kim
Sony Interactive Entertainment — PlayStation, Co-Chair of XRA's Accessibility Working Group

Elka Looks
Facebook Reality Labs

Christopher Patnoe
Google, Co-Chair of XRA's Accessibility Working Group

Ben Rickert
Microsoft Corporation

Mike Shebanek
Facebook

And other member company representatives on XRA's Accessibility Working Group

Jesse Anderson
IllegallySighted and XR Access Initiative Volunteer

Dr. Shiri Azenkot
Assistant Professor, Information Science, Director, Connective Media Program, Jacobs Technion-Cornell Institute and Co-Founder, XR Access Initiative

Mark Barlet
Founder and Executive Director, The AbleGamers Charity

Bill Curtis-Davidson
Senior Consultant, Emerging Tech Accessibility, Partnership on Employment & Accessible Technology (PEAT) and Leader, XR Access Initiative

Wendy Dannels
Research Associate Professor, Director, XR Accessibility Solutions Laboratory, National Technical Institute for the Deaf, Rochester Institute Technology and XR Access Initiative Volunteer

Triskal deHaven
User Experience Researcher, The AbleGamers Charity

Larry Goldberg
Senior Director and Head of Accessibility, Verizon Media and Co-Founder, XR Access Initiative

Greg Haynes
Lead Games User Researcher, The AbleGamers Charity

Emily Pierce
Freelancer

The XR Association is interested in your feedback about the "Accessibility & Inclusive Design in Immersive Experiences" chapter for the *XR Association's Developers Guide: An Industry-Wide Collaboration for Better XR.* Please share your thoughts with XRA by emailing info@xra.org.

The XR Association promotes the dynamic global growth of the XR industry, which includes virtual reality, augmented reality, mixed-reality, and future immersive technology. XRA is leading the way for the responsible development and adoption of XR by convening stakeholders, developing best practices and research, and advocating on behalf of our members and the greater XR industry.

Association members represent the headset and technology manufacturers across the broad XR industry, including Google, HTC Vive, Facebook and Oculus, Microsoft, and Sony Interactive Entertainment.

www.xra.org | @xrassociation | October 2020

XR ACCESSIBILITY AND INCLUSIVE DESIGN QUICK REFERENCE GUIDE

XR technologies are still new and will continue to rapidly advance. New thinking and new solutions to meet the needs of all XR users will be required. The XR Association is committed to keeping this chapter and corresponding quick reference guide up-to-date as XR technologies and capabilities evolve.

ACCESSIBILITY TECHNIQUES	Sight Disabilities	Auditory Disabilities	Non-Speaking/ Speech Impairments	Mobility Disabilities	Cognitive Disabilities
Removing or Reducing Background Details and Audio	•	•			•
Undo/Redo Functions	•	•		•	•
Reducing Speed and Setting Up Action Sequences	•			•	•
Bypass Functions	•	•		•	•
Save Progress	•	•		•	•
Altering the Size of Objects, Elements and Text	•			•	•
Audio Augmentation and Text-to-Speech	•		•		•
Color Filters and Symbols	•				•
Scrim or Scrim-Like Overlays	•	•			•
Captioning Audio Features		•			•
Using Icons to Identify Audio Features		•			•
Sign Language		•	•		
Mono Audio		•			
Settings and Menu Options	•	•		•	•
Dynamic Foveated Rendering and Eye Tracking				•	
Controller-Free Hand-Tracking		•	•	•	
Explore World Options	•			•	•