

Reducing Player Barriers with Accessible Design

Chad Elstad
Chief Shooter



Introduction

Who the heck am I?

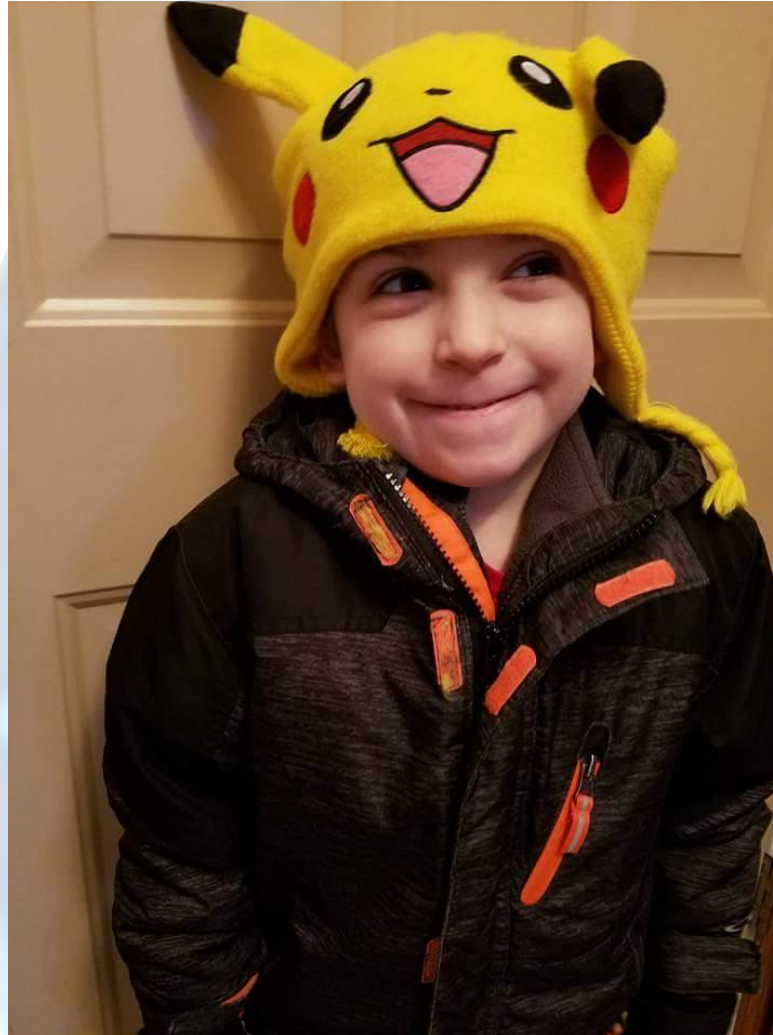
- ① Wrote first game at the age of 9 on an Apple][
- ① 22 years of professional enterprise experience
- ① Technical Lead
 - ① Driver for Technology Change for ~200 developers
 - ① Focus on UX/CX, Usability and Accessibility



Journey So Far

Who doesn't like an adventure?

- Ⓜ My son, age 7
- Ⓜ AKA: The Pikachu Kid
- Ⓜ AKA: PikaBren
- Ⓜ FKA: Brendan
- Ⓜ Disabilities
 - Ⓜ Autism
 - Ⓜ ADHD
 - Ⓜ Anxiety
 - Ⓜ Dysgraphia



Negative Identity

Dumb

Crippled

Bad

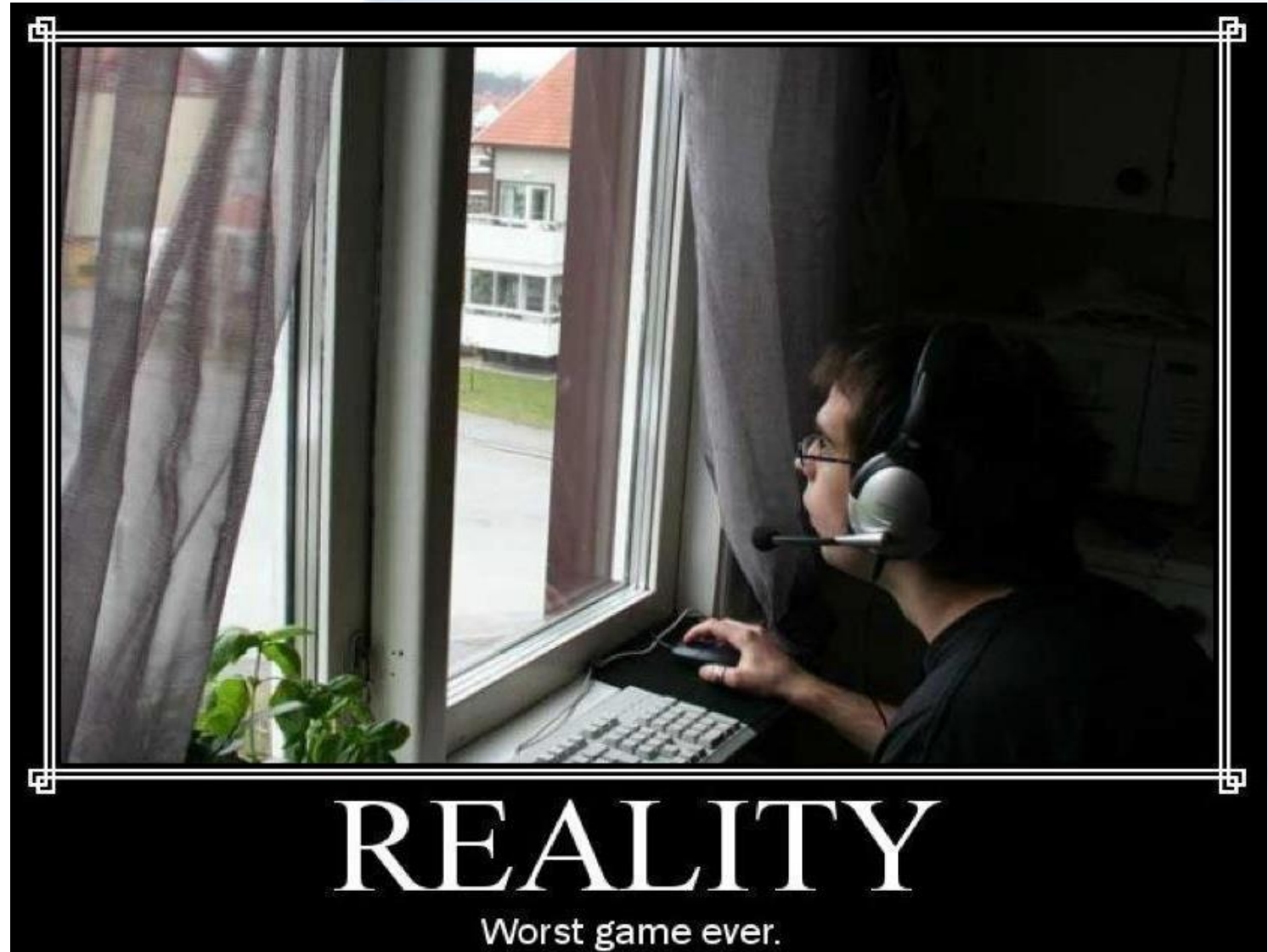
Horrible

Failure



Reality Bites

I mean really



Housekeeping

Fluff your pillow?

Ⓜ Please hold questions until prompted, or email/tweet me

Ⓜ Presentation Online

Ⓜ <http://bit.ly/2pSpL7W>

Ⓜ Contact Information

Ⓜ Take a Business card or

Ⓜ ✉ chad@smartmarbles.com

Ⓜ 🐦 @cjadelstad

Ⓜ Resources Slides

Agenda

I've got a plan, Stan

- ① Design
- ① Defining Success
- ① Disabilities Discourse
 - ① Medical
 - ① Neurological
 - ① Psychological
 - ① Auditory
 - ① Cognitive
 - ① Mobility
 - ① Visual
- ① Developer Exercises

Design Du Jour

Wha, huh?

🧑‍🦯 **Inclusive Design**

🧑‍🦯 Make things work for people, including those with disabilities.

🧑‍🦯 **Universal Design**

🧑‍🦯 Similar to **Inclusive Design**, but carries connotation that it must work for *everyone in the universe*.

🧑‍🦯 **Accessibility**

🧑‍🦯 Make sure things work for those with clinically recognized disabilities.

🧑‍🦯 **Inclusive Design** is the means (and more), **Accessibility** is the ends.



Design Truths

These are the hard truths

- ⌚ It is difficult to make a game 100% accessible.
- ⌚ Some games cannot be made very accessible?
 - ⌚ Not an excuse not to try.
 - ⌚ The majority of games can be very accessible with not too much effort.
 - ⌚ iOS games are likely 80% of the way there if you allow OS tools to work
- ⌚ Your games should be as accessible as you can make them.
- ⌚ Thinking inclusively from planning through production will open you to a wider market. That means more, and happier players.

Definitions of Success

Indie gamers

⌚ Key indicators:

- ⌚ Total Downloads
- ⌚ Total Active Players
- ⌚ Total Play Time (of a player)



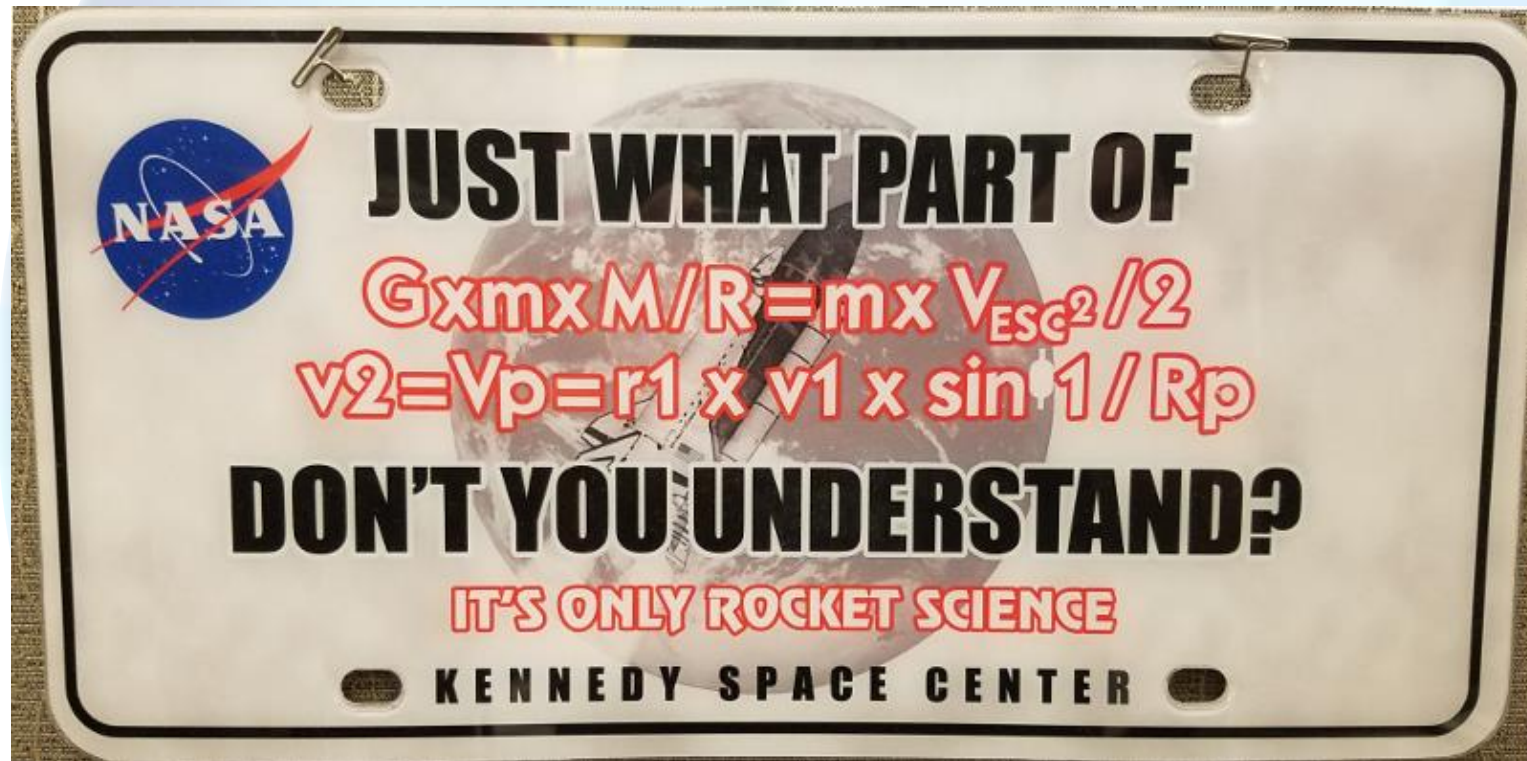
Game Accessibility.com, “Mobile devices, disabled gamers and more at GDC 2016”

- ⌚ 20% of gamers worldwide have some form of disability. (source: PopGap 2008)
 - ⌚ Will only increase with aging Baby boomers and First “Gamerationals” hitting middle age (ie: Space Invader Generation)
- ⌚ Study determined that 57% of computer users are likely or very likely to benefit from the use of accessible technology. (Source: Forrester Research, Inc. 2003)

Not Rocket Science

This is Rocket Science →

- ① Supply and Demand
- ① Hungry Market
- ① Early Adopter Reward
 - ① Mobile saturation
 - ① Top dogs take pie



Accessibility may Feel Like a Puzzle

But once solved is easy



Define Terms

Disability

- Ⓢ According to the Americans with Disabilities Act (ADA), a **disability** is *"a physical or mental impairment that substantially limits one or more major life activities."*
- Ⓢ Disabilities highlight barriers to access when they are introduced into places and events.
- Ⓢ Temporary injuries/disabilities



Incoming Information Alert

Don't forget to breathe



Disability Classifications

Categories

⌚ Categories of Note

- ⌚ Medical
- ⌚ Neurological
- ⌚ Psychological

⌚ Typical Categories

- ⌚ Auditory
- ⌚ Cognitive
- ⌚ Mobility
- ⌚ Visual

Medical

Not typically covered

- ⌚ Medical disabilities can cause restricted endurance, attention, or mobility, various levels of pain, and fatigue.
 - ⌚ Typical symptoms include shortness of breath, low endurance in activity or sitting, or sudden weakness or pain.
 - ⌚ Medical impairments can be caused by musculoskeletal injuries, cardiovascular conditions, respiratory illnesses, immune system disorders, and digestive tract problems.
- ⌚ Examples
 - ⌚ Allergies, Asthma, Cancer, Cerebral Palsy, Crohn's Disease, Cystic Fibrosis, Epilepsy, Fibromyalgia, Irritable Bowel Syndrome, Lupus, Migraine Headaches, Multiple Sclerosis, Rheumatoid Arthritis, Sickle Cell Anemia, Spina bifida, Ulcerative Colitis, RSI (Repetitive Stress Injury), also called Cumulative Trauma Disorder (CTD), and Carpal Tunnel Syndrome (CTS)

** Information from Indiana University. Please see link in reference section.*

Neurological

Not typically covered

- ① Neurological disabilities can cause restricted sensory perceptions, mental processes, or motor functions.
- ① Examples
 - ① Typical symptoms include paralysis, tremors, memory loss, and cognitive malfunctions.
 - ① Neurological impairments can be caused by genetic disorders affecting the brain or nervous system such as muscular dystrophy, degenerative diseases such as Alzheimer's disease, and seizure disorders such as epilepsy.

** Information from Indiana University. Please see link in reference section.*

Psychological

Not typically covered

- ⊗ Psychological disabilities can cause impaired intellectual processes, decision rationale, emotional maturity, or perception of reality.
- ⊗ Examples
 - ⊗ Typical symptoms include extreme emotional states or sudden outbursts, inability to comprehend information, mental disconnection from immediate circumstances, or violent acts toward self or others.
 - ⊗ Psychological impairments can be caused by poor mental health, emotional disorders, addiction disorders, and bipolar disorders.

** Information from Indiana University. Please see link in reference section.*

General Boosts

Power level your games

- ⌚ Provide details of accessibility in packaging/website/Steam/etc
- ⌚ Contact Accessibility review sites
 - ⌚ AbleGamers, D.A.G.E.R System, Game Accessibility, Unstoppablegamer and many more.
- ⌚ Include people with impairments in your play testing
 - ⌚ Audyssey, Audiogames and Applevis
- ⌚ Ensure all settings can be saved/remembered
- ⌚ Allow Difficulty level to be changed
- ⌚ Include assist modes such as auto-aim and assisted steering
- ⌚ Provide Auto/Manual save features
- ⌚ Provide means to skip gameplay elements that are not core mechanics
- ⌚ Supporting Screen Readers is a very cost effective technique

Auditory

Definition

- ① Auditory disabilities can cause partial or total inability to perceive sounds and access audio-based information presented in media.
- ① Symptoms include total deafness or varying degrees of hearing loss.
- ① Auditory impairments can be caused by inner-ear nerve malformation or damage, neurological disorders, or physical trauma to the brain.

** Information from Indiana University. Please see link in reference section.*



Auditory

Challenges

- ⦿ Video content with no captioning
- ⦿ Audio content or signals with no captioning
- ⦿ Background Noises too loud
- ⦿ Very complex and/or obscure language



Auditory

Solutions

- ① Make sure you are handling all issues from Challenges slide
- ① Visible alerts that accompany any audio alerts
- ① Closed Captions / Subtitles
 - ① A visual text view of audio in a sound byte or video clip
 - ① For hearing impaired as well as non-native speakers
- ① Speech-To-Text system
 - ① Voice Recognition system useful for text entry, command entry, especially for those with hearing impairment, and motor impairments.
- ① Allow sounds to be turned off
 - ① High anxiety, and cognitive disabilities may be overwhelmed



Auditory

Fail

Mario Kart 8

Ⓜ Lack of Sound Controls

Ⓜ Bonus

Ⓜ Elder Scrolls Online – lack of text chat



Cognitive

Definition

- ① Cognitive disabilities can cause loss of memory, reduced attention span, restricted intellectual development, underdeveloped maturity and judgment, or limited of problem-solving and logic skills.
- ① Typical symptoms include forgetfulness, extreme emotional changes, intellectual underdevelopment, and inappropriate decisions.
- ① Cognitive impairments can be caused by developmental disabilities and learning disabilities.
- ① Examples
 - ① ADHD, Autism, Dyslexia, hyper/hypo-sensitivity with senses

** Information from Indiana University. Please see link in reference section.*



Cognitive

Challenges

This is what Cognitive disabilities can feel like.



Cognitive

Challenges

- ⌚ Using Wide columns of text or large blocks of text
- ⌚ Justified text or text that has uneven gaps between words
- ⌚ Pure white page backgrounds (Dyslexia)
- ⌚ Text Styles featuring Serifs – ie: Times New Roman
- ⌚ Italic Text or very small text
- ⌚ Moving or flickering images/effects
- ⌚ Requiring quick response
- ⌚ Insufficient instructions on how to use functionality



Cognitive

Solutions

- ① Make sure you are handling all issues from Challenges slide
- ① Minimize load on Working Memory
 - ① Include Icon with Text
 - ① Minimize word count on labels - 1-2 words
- ① Simplify Tasks (single/smallest function)
- ① Allow user to undo mistakes
- ① Organize interfaces to minimize error
- ① Reminder System (alert user of important items on a schedule)
- ① Slow Game Time
- ① Do not limit time for reading or actions
- ① Use Affordances



Cognitive

Affordance

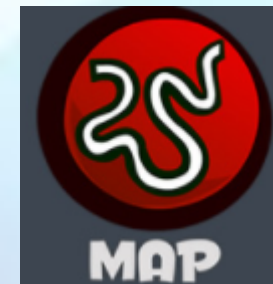
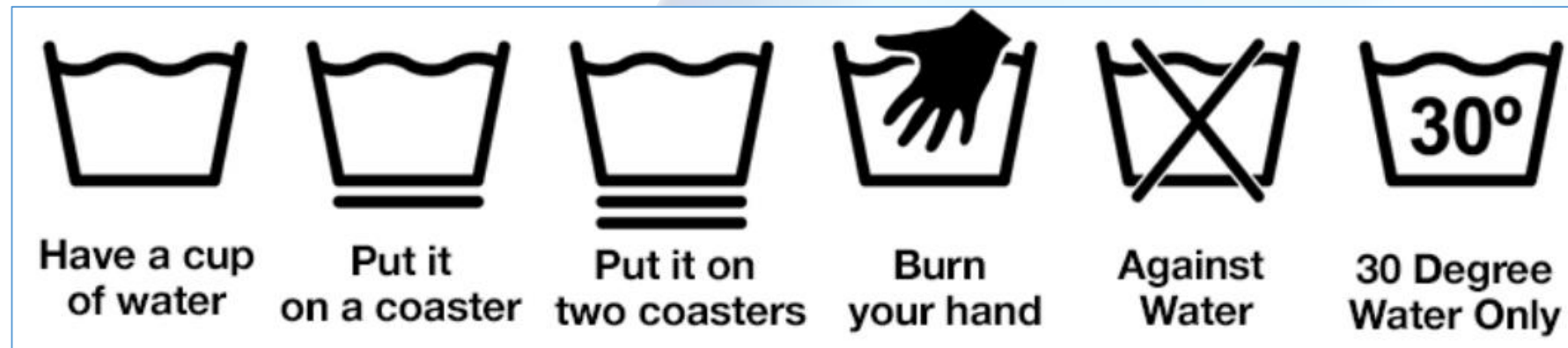
“A situation where an object’s sensory characteristics intuitively imply its functionality and use.” — Crowdcube



Cognitive

Affordance Fails

Laundry Instructions



Cognitive

Fail

Steep (Ubisoft)

- Ⓜ Account Setup Nightmare
 - Ⓜ Restrictive/Forced Training Missions
 - Ⓜ Poor Menu System
 - Ⓜ Unskippable Content
-
- Ⓜ Bonus
 - Ⓜ For Honor – lack of control remap



Mobility

Definition

- ⦿ Mobile disabilities can cause difficulty with, or inability to use, the hands, feet, arms, or legs.
- ⦿ Typical symptoms include tremors, muscle slowness, loss of fine muscle control, or paralysis.
- ⦿ These impairments can be caused by conditions such as Parkinson's Disease, muscular dystrophy, cerebral palsy, or stroke.



** Information from Indiana University. Please see link in reference section.*

Mobility

Challenges

- ⊗ Functionality cannot be operated by Adaptive controls
- ⊗ Not allowing control remapping
- ⊗ Small Target Area
- ⊗ Absence of Visual Links
- ⊗ Requiring quick responses
- ⊗ Not being able to scan through sets of options quickly or automatically



Mobility

Solutions

- ① Make sure you are handling all issues from Challenges slide
- ① Control Remapping (**Rewired, Incontrol, cInput, Fbinput** Unity Assets)
- ① Sensitivity Controls
- ① Slow Time
- ① Variety of Difficulty Levels
- ① Simplify Controls/Co-location
 - ① At least provide option to simplify controls
 - ① Do not require multiple, simultaneous actions
 - ① Allow on-screen interfaces to be re-arranged
- ① Adaptive controls
 - ① Head-Mounted input devices/Eye-Tracking
 - ① Mouth-Stick
 - ① Blow-Suck Tube
 - ① Tongue Activated Joystick
 - ① Track Balls
- ① Sticky/Slow Keys
- ① Voice Recognition Software
- ① On-Screen Keyboards

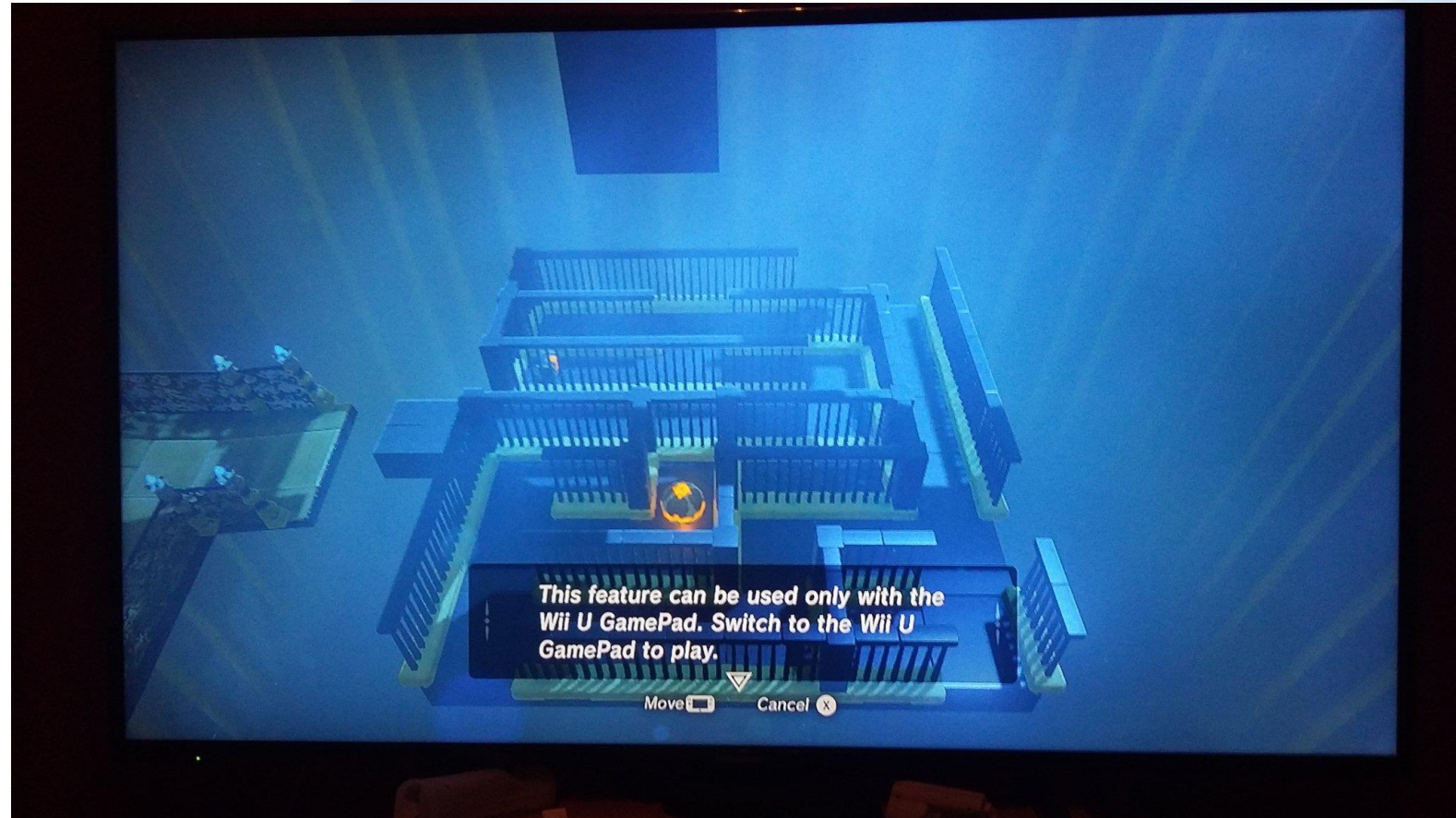


Mobility

Fail

Zelda Breath of the Wild

- Ⓐ Shrines: Require very precise and unique movements
- Ⓐ Lack of alternative controls



Mobility

Fail

Freebie



Visual

Definition

- ⦿ Visual disabilities can cause an inability to see objects, perceive light or color, correctly judge distances, or access information in visual media like print, images, or video.
- ⦿ Typical vision symptoms include total blindness, low vision, and color blindness.
- ⦿ These impairments can be caused by genetic disorders such as retinitis pigmentosa, degenerative diseases like macular degeneration, or physical damage to the eye or brain.



** Information from Indiana University. Please see link in reference section.*

Color Blindness

Examples



Normal



Protanomaly (Red Weak)



Achromatopsia (Monochromacy)



Deuteranopia (Green Blind)



Protanopia (Red Blind)



Tritanopia (Blue Blind)

Visual

Challenges

- ⊗ Consistent layout and flows
- ⊗ Fixed Height text that cannot be resized
- ⊗ Poorly Worded Text
- ⊗ Semantically connected items too far apart (label/data)
- ⊗ Insufficient color contrast
- ⊗ Busy backgrounds
- ⊗ Use color ONLY to convey meaning
- ⊗ Lack of audio feedback
- ⊗ Flashing content can cause seizures



Visual

Color Contrast Ratio

⦿ 21:1 This is 21:1 example text

⦿ 8.6:1 This is 8.6:1 example text

AAA → ⦿ 7:1 This is 7:1 example text

AA → ⦿ 4.5:1 This is 4.5:1 example text

⦿ 4:1

This is 4:1 example text

⦿ 3:1 This is 3:1 example text

This is 3:1 example text

⦿ 2:1 This is 2:1 example text

This is 2:1 example text

⦿ 1.37:1

This is 1.37:1 example text

⦿ 1:1 This is 1:1 example text

This is 1:1 example text

This is 1:1 example text

Normal Text 16px

Large Text 18pt

Large Text 14pt (Bold)



Visual

Solutions

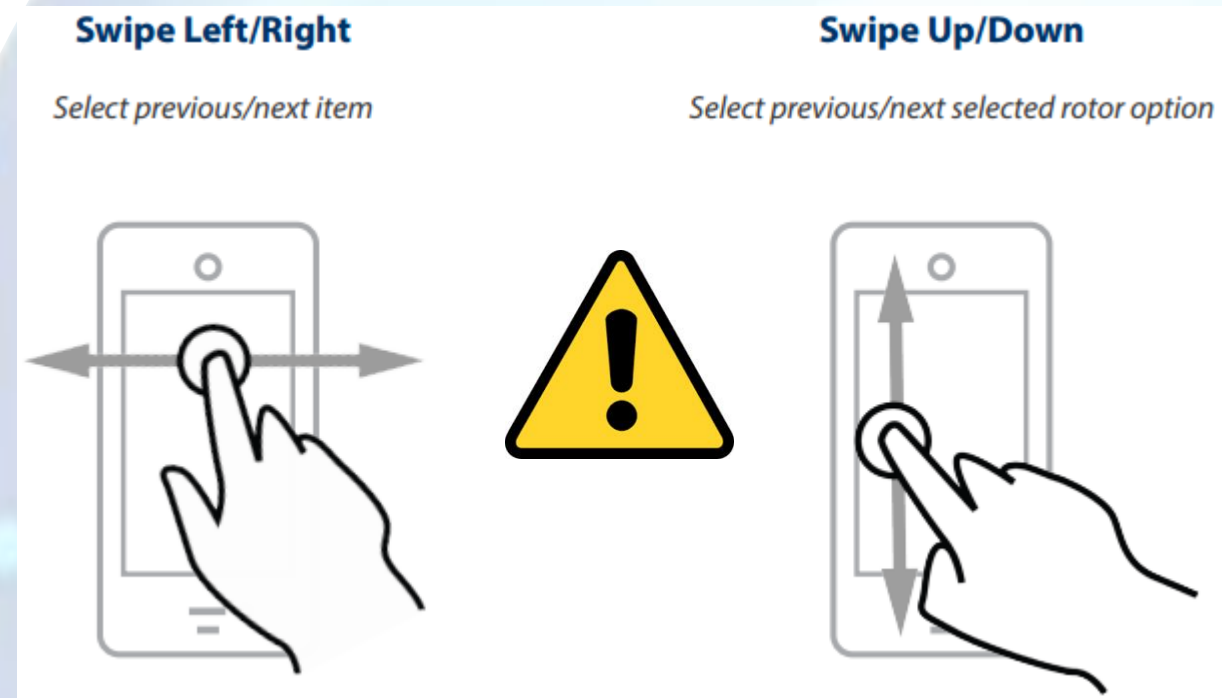
- ① Make sure you are handling all issues from Challenges slide
- ① Use easy to read fonts/size (or allow option)
- ① Avoid any difference between controller movement and camera movement (or allow option)
- ① Provide High color contrast (or allow option)
- ① Clear indication for interacted objects
- ① Allow interfaces to be resized/re-arranged
- ① Ensure sound cues are distinctive
- ① Ensure Screen Reader support (Tolk)
- ① Google TalkBack and iOS VoiceOver
- ① Explore By Touch
- ① UAP (Unity UI Accessibility Plugin) – Released 5/3/17



Visual

Surprise: Blind users have interface conventions, too!

- ④ Mobile accessibility conventions established by Apple
- ④ VoiceOver has set the gold standard
- ④ Blind users are already using an interface to start your app.
- ④ If you follow the same convention(s) as the OS, you won't even need instructions
- ④ Notice conventions use single swipe for navigation



iOS VoiceOver Gesture Reference

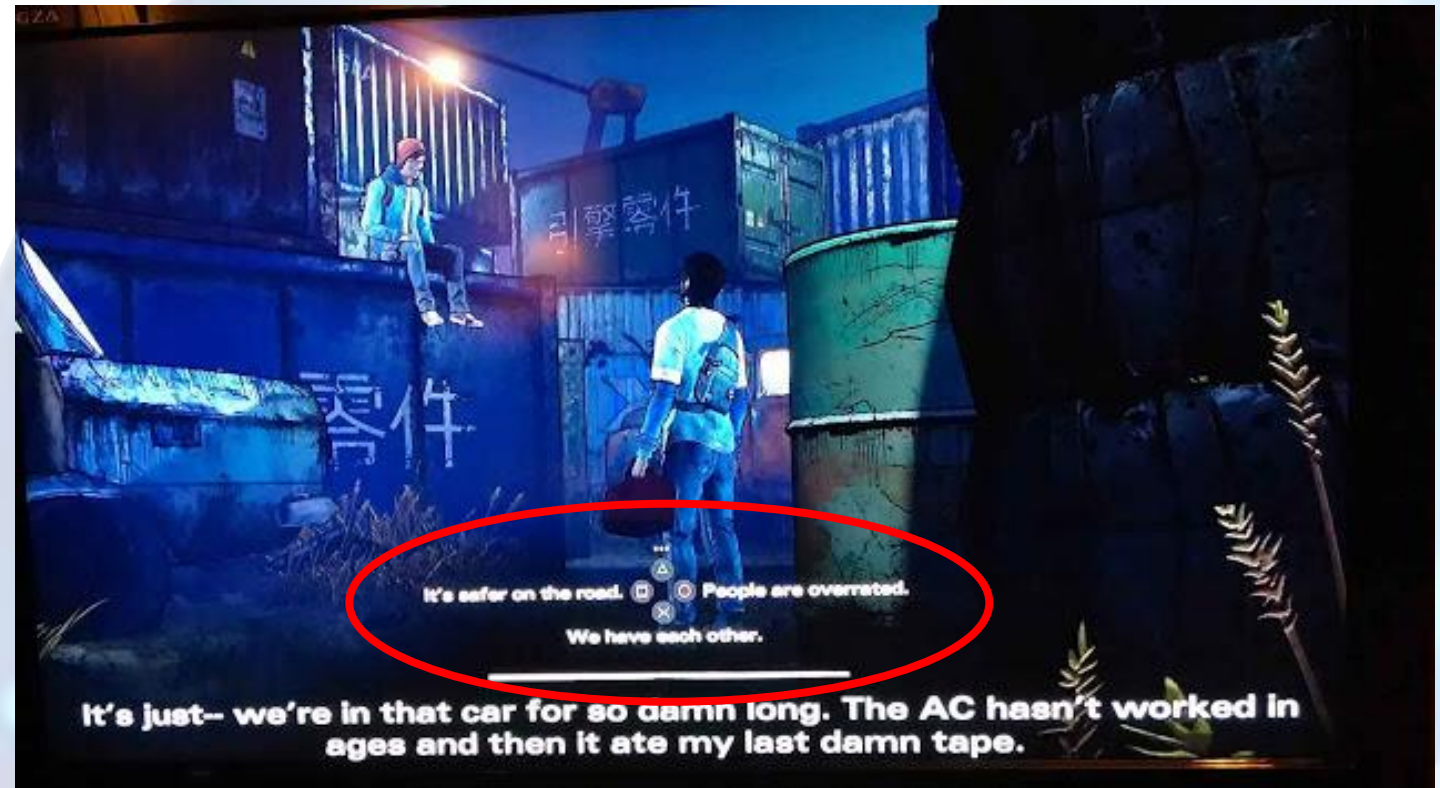


Visual

Fail

Walking Dead (Telltale)

- Ⓢ Small Text and icons for dialog options renders captioning useless
- Ⓢ Not enough Time
- Ⓢ Requires Button Mashing
- Ⓢ Bonus
 - Ⓢ Mass Effect: Andromeda – text size



Achievement Unlocked!

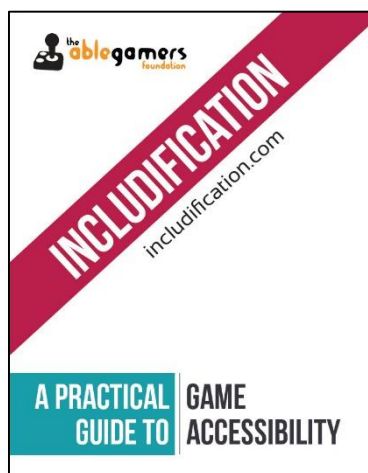
We Made It



Developer Exercise

Remappable Controls

- ① Imagine you have a difficult time reaching certain keys.
- ① Are there any keys your game absolutely needs?
- ① What if it was tiring pushing the same button repeatedly?
- ① What if you had to use your face, mouth, chin or feet to push the buttons...
 - ① Play a game using a stylus



Developer Exercise

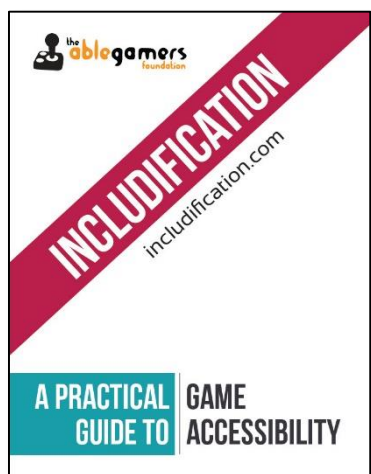
UI Setup

- ① Take the current setup of your default UI.
 - ① If you were someone who fatigues easily, would you be forced to move the cursor to opposite sides of the screen repeatedly to access commonly used game features?
 - ① What if you could not use the shortcuts and you could only use the mouse or thumbstick?
 - ① If you're forced to move the cursor all over the UI, it's highly possible those with disabilities that suffer from fatigue will be unable to play your game for any length of time.
 - ① Consider allowing key elements of the screen to be positioned wherever the easiest for the disabled gamer.

Developer Exercise

Color Blindness

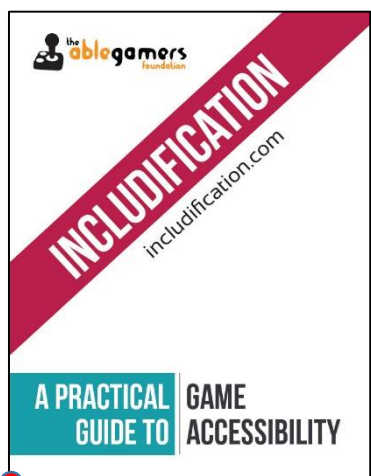
- ① Take a look at the game you are working on now.
- ① Would you be able to play your game if it were played on a black and white display?
- ① Take some screenshots and see how a person who has a color deficiency sees your game.
 - ① <http://www.color-blindness.com/coblis-color-blindness-simulator/>



Developer Exercise

Limited/Simplified Controls

- ① Try playing your game using only a mouse? Is it possible?
- ① What about using just a keyboard?
- ① How about with one handed?
 - ① Right or left hand?
- ① Could your game be made more fun or less frustrating?



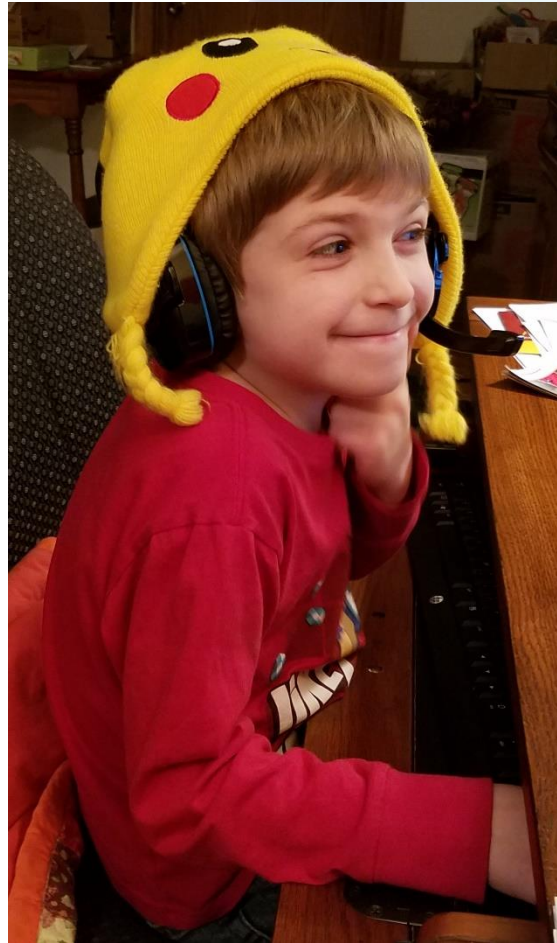
Proverbial Fork in the Road

Which Path will you take?



My choice

PikaBren



Thank You!

Chad Elstad

Chief Shooter



chad@smartmarbles.com

@cjadelstad

Resources

All your resources are belong to us

① <http://AbleGamers.org>

① Includification PDF

① <http://GameAccessibilityGuidelines.com/>

① Indiana University

① <https://accessibility.iu.edu/understanding-accessibility/types-of-disabilities.html>

① Excellent Article (Myths About Visually Impaired Users)

① <http://mattgemmell.com/accessibility-for-iphone-and-ipad-apps/>

① Screen Reader Gesture Cheat sheets

① http://www.interactiveaccessibility.com/blog/mobile-screen-reader-gestures#.WQiN9_nyuUk

① Thomas Westin used to curate a list of tools

① <http://web.archive.org/web/20150217234039/http://gameaccessibilitycode.com:80/?>

① New Xbox API's

① <https://channel9.msdn.com/Events/GDC/GDC-2017/GDC2017-009>

① Crafting Kingdom

① <https://itunes.apple.com/us/app/crafting-kingdom/id1190611967?ls=1&mt=8>

① <https://play.google.com/store/apps/details?id=com.MetalPop.CraftingKingdom>

Resources

All your tools are belong to us

🧑‍🦯 Tools

🧑‍🦯 Color Blindness Simulator

🧑‍🦯 <http://www.color-blindness.com/coblis-color-blindness-simulator/>

🧑‍🦯 Color Contrast Checker

🧑‍🦯 <http://webaim.org/resources/contrastchecker/>

🧑‍🦯 Color Oracle is a free color blindness simulator for Window, Mac and Linux (Executable)

🧑‍🦯 <http://colororacle.org/>

🧑‍🦯 Tolk (Screen Reader Abstraction Library)

🧑‍🦯 Control Remappers (Rewired, Incontrol, cInput, Fbinput Unity Assets)

🧑‍🦯 Easy Subtitles And Closed Captions System (Unity Asset)

🧑‍🦯 Unity UI Accessibility Plugin (Unity Asset released 5/3/17)

🧑‍🦯 <http://metalphogames.com/assetstore/accessibility/doc/SupportAndRoadmap.html>

Please take *60-seconds* and tell us
about your experience in this
session!



bit.ly/gc17survey

