

GDC[®]

Sources of Inspiration for Accessibility in VR

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Lucasfilm ILMxLAB

Agenda

- Trials on Tatooine
- Accessibility before VR
- New Inspiration
 - Architecture
 - Theme Parks
 - Set Design
- VR Accessibility Survey



Hannah Gillis

- Producer, Lucasfilm
- Advanced Development Group | ILMxLAB
 - Star Wars Real-time Cinema
 - Star Wars Virtual Reality
 - Star Wars Theme Parks, and more!
- Background
 - Game-Engine R&D at Sandia Labs
 - BA, Digital Media | MBA, Innovation





Ben Peck

- Engineer, Lucasfilm
- Advanced Development Group | ILMxLAB
- Background
 - Pipeline & tools programming at Pixar
 - Gameplay programmer at Double Fine
 - BSc Comp Sci (minor Cog Sci)





Trials on Tatooine



Trials on Tatooine

- Room-scale
- ~7-minutes
- Interactivity:
 - Repair the Millennium Falcon
 - Defend it from Stormtroopers
 - Wield a Lightsaber



STAR WARS

ILM **X** LAB

T R I A L S O N T A T O O I N E



Star Wars Celebration 2016

- 3 days
- 20 booths
- 2500+ participants



Trials Release Plans

- Initially a tech demo, grew into a public experiment
- Release to general public after the convention
- Playtesting limited to internal Lucasfilm employees
 - Non-comprehensive





What Could Go Wrong?



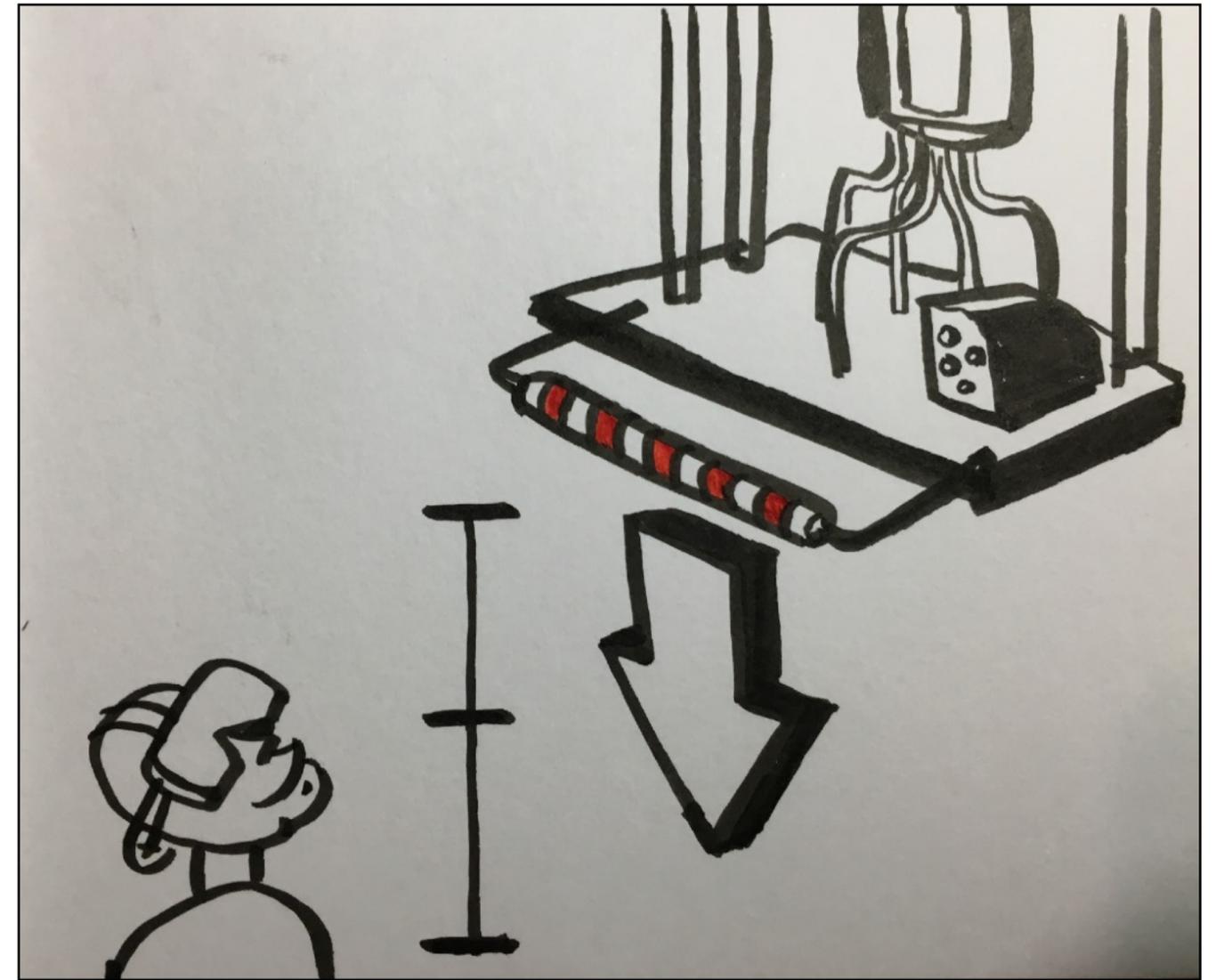


Accessibility Issues Addressed





Varying Adult Standing Heights





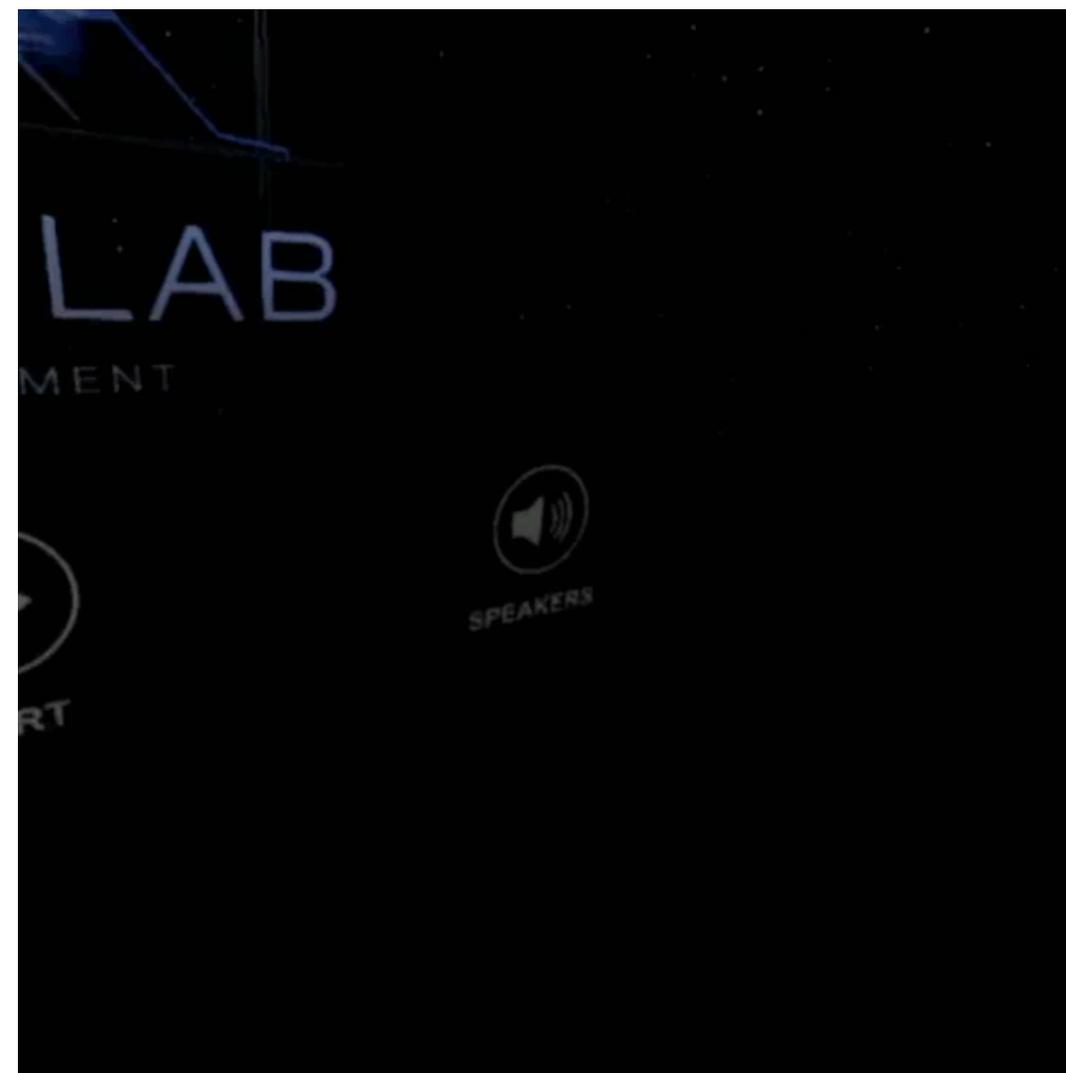
Deuteranopia

- Members of team called this out
- Additional signal beyond just color



Speakers / Headphones Toggle

- Spatial audio treated differently
- We enjoy using large speaker setups



One-Handed Controls

- Designed for first time VR users
- No required button presses
- Two handed lightsaber is good form





Accessibility Issues Missed



"A guest in a wheelchair is waiting in line to go. That's ok, right?"

ADMIT ONE (1)

(Not Valid for Admission to Star Wars Celebration)

BOOTH S2000

ATTENTION:

- Must be able to engage in experience without assistance or supervision.
- Not for use by children under 13 years of age.
- For safety reasons, you should be in good health to participate in experience.
- Stop use if you experience any discomfort or motion sickness.
- **Wheelchair accessible.**
- Early or Late Arrivals Will Not be Accommodated.
- Not For Sale.

We didn't
consider
accessibility
outside our own
internal bias.





Seated Reach Height & Depth

- Solved easily by playtesting or cursory research





Seated Sight Lines



Email & Aftermath

Hi Ben,

It was wonderful to meet yourself and your team at SWCE.

I would like to thank your team for enabling X to enjoy the Game.

X has [...] which is why he spends so much time in a wheelchair as he is unable to steadily stand for long periods [...]. This generally means that even though he is N years old, he misses out on so much. He is truly staunch Star Wars fan, having introducing it to him when he was only two. He was unable at this time to be mobile and had to sit still for long periods, I immersed him into a world that would take him away from all the tribulations he would go through on a daily basis! We would watch the original movies daily and interestingly when he eventually went to school they thought he would have difficulty with speech and spelling and yet he would spell out planets and names within the Star Wars universe that even the teachers had to check!

In any case, we owe a great deal to both Lucas film and the world that is Star Wars.

X enjoyed the game so much. He was able to enjoy it within the confines of his wheelchair and with the demo being one handed, he managed very well. He was in awe of the immersive aspect of the game and technology and has firmly placed it on his Christmas list! Some things were still a little out of his reach but that didn't stop him enjoying the game, we simply helped him where required. The wires trailing from behind also didn't prove an obstacle because as I was his support, I was aware of them throughout.

The amazing thing about this experience is that X has to spend time standing and moving around each day, a tiresome exercise that most would find tedious if they were made to do it as opposed to choosing too. This game although designed for entertainment will also prove to be a supportive tool to allow X to exercise without realising or even being forced to do it.

We cannot thank you enough, the experience we both had and the enjoyment he experienced will remain with us.

(personal info removed)

- Transportive properties are SO powerful
- "supportive tool to allow X to exercise without realizing or even being forced to do it"



Accessibility before VR





Universal Design

- GDC Vault Resources
 - Accessibility: Lessons Learned from Designing for Gamers with Disabilities
 - <http://www.gdcvault.com/play/1020377/Accessibility-Lessons-Learned-from-Designing>
 - Building a Manifesto for Game Accessibility
 - <http://www.gdcvault.com/play/1021849/Building-a-Manifesto-for-Game>
 - No More Excuses, Your Guide to Accessible Design
 - <http://www.gdcvault.com/play/1022172/No-More-Excuses-Your-Guide>



Universal Design

- Large wealth of research, such as:
- Game Accessibility Guidelines
 - <http://gameaccessibilityguidelines.com/>
 - Motor, Cognitive, Vision, Hearing, Speech
 - Basic, Intermediate, Advanced





New Inspiration

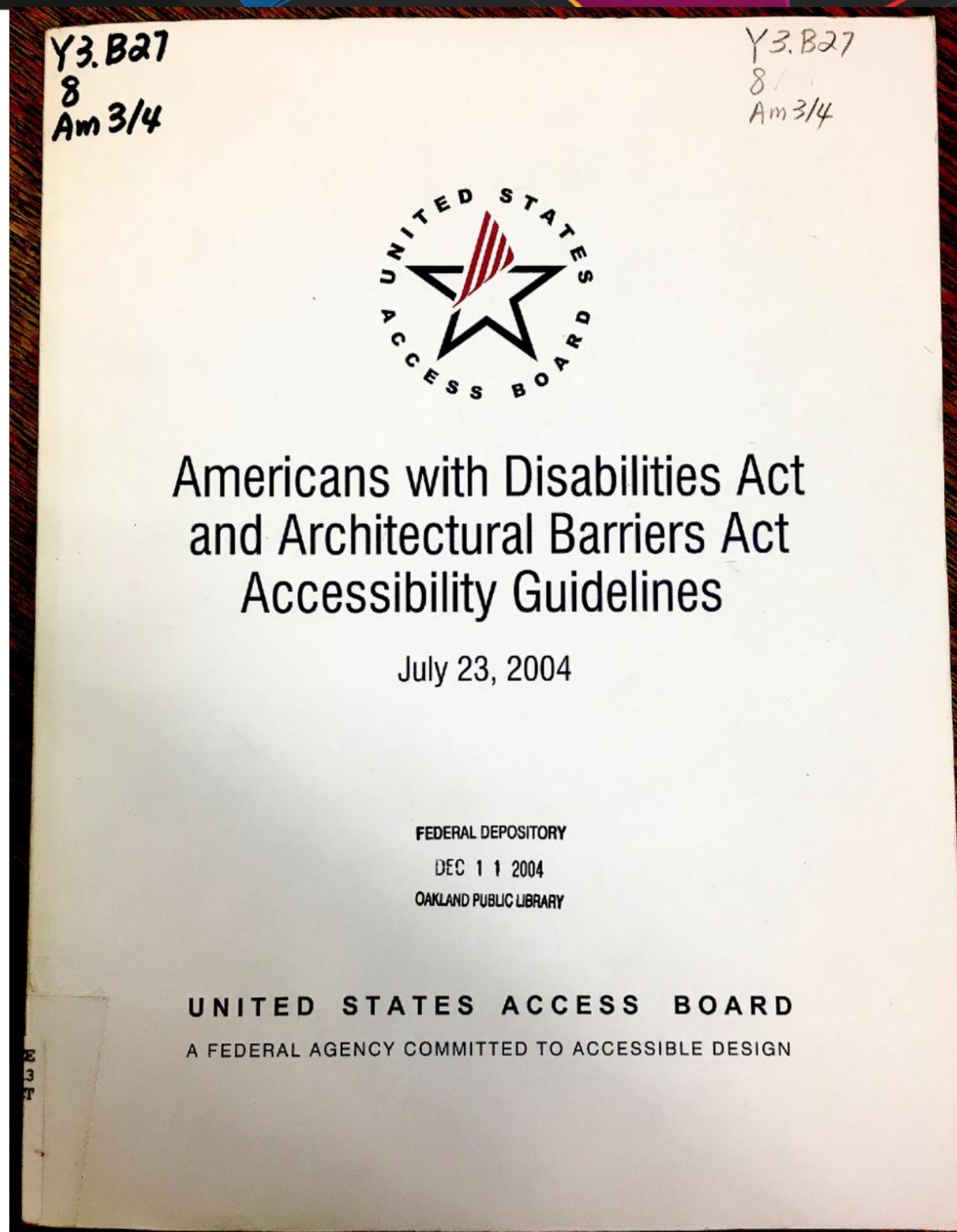




Architecture: Spatial Planning



- SAY IT WITH ME:
- ADA ABA AG!!



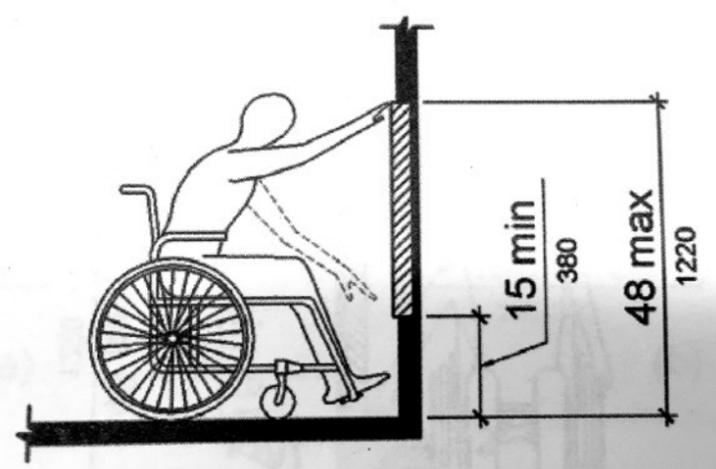


Figure 308.2.1
Unobstructed Forward Reach

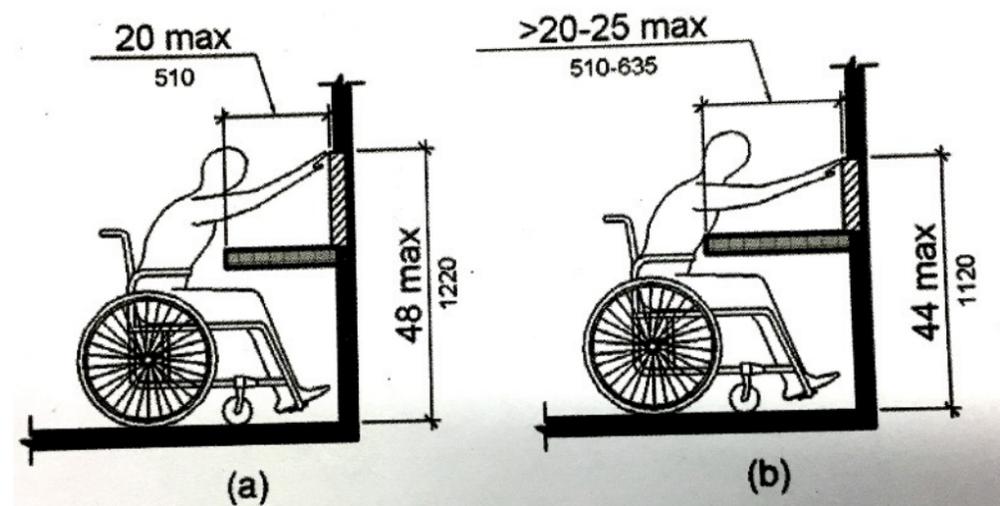


Figure 308.2.2
Obstructed High Forward Reach

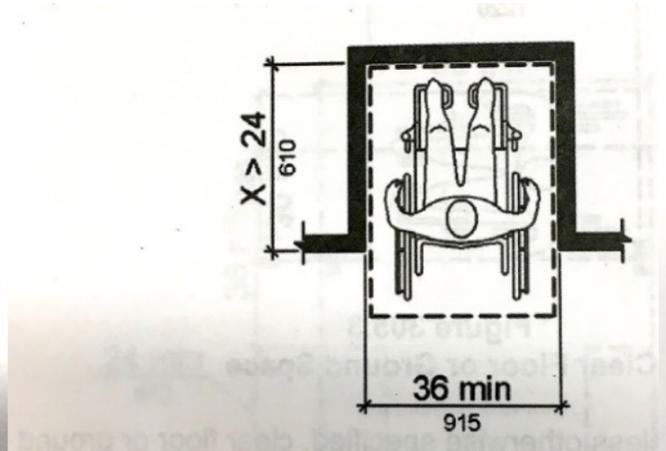
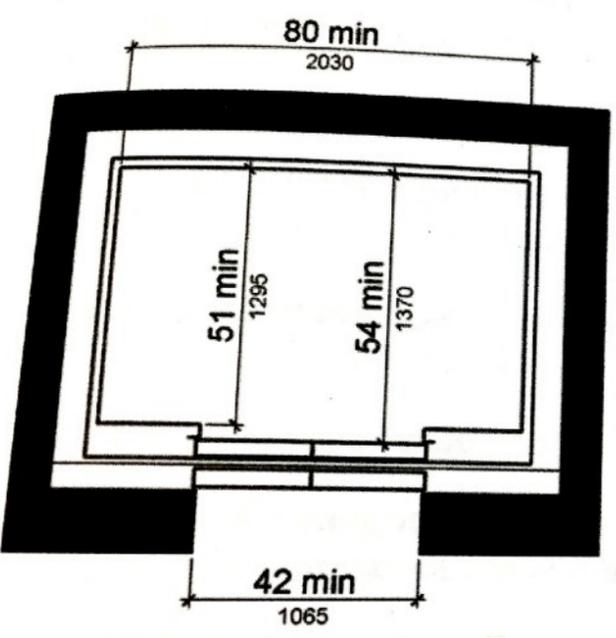
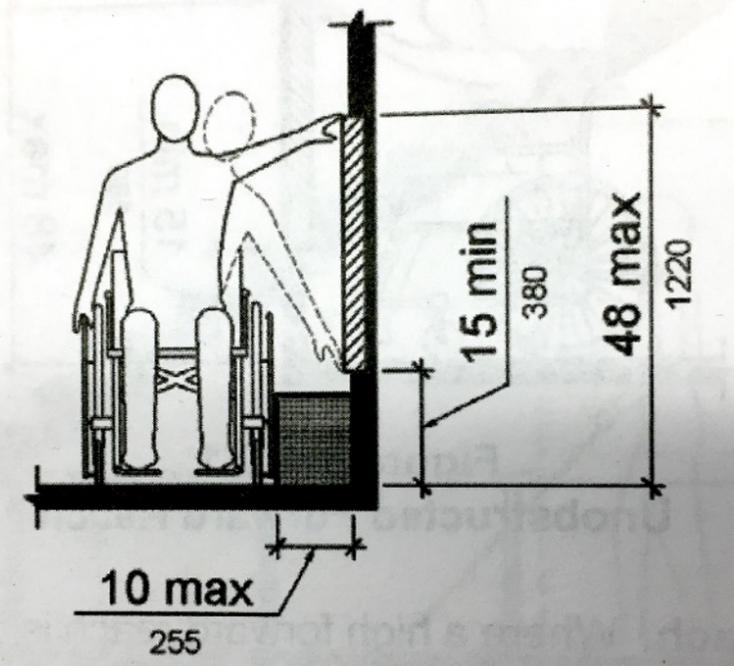
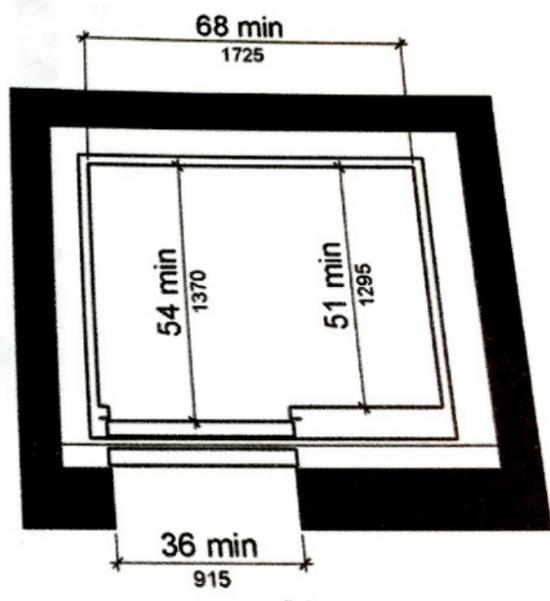


Figure 305.7.1
Maneuvering Clearance in an Alcove, Forward Approach



(a)
centered door



(b)
side (off-centered) door

Figure 407.4.1
Elevator Car Dimensions

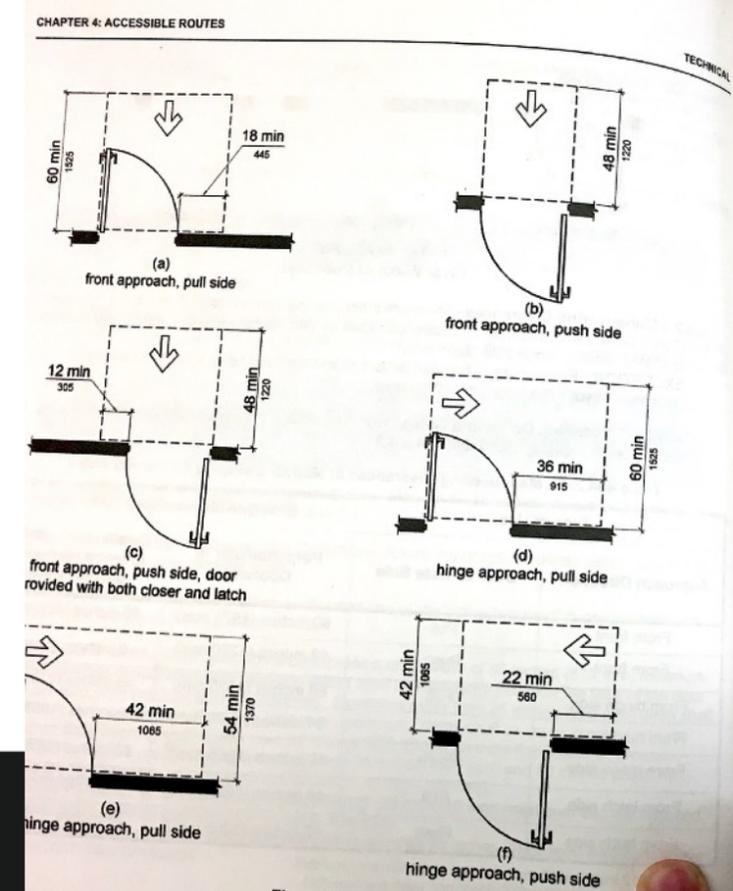


Figure 404.2.4.1
Maneuvering Clearances at Manual Swinging Doors and Gates

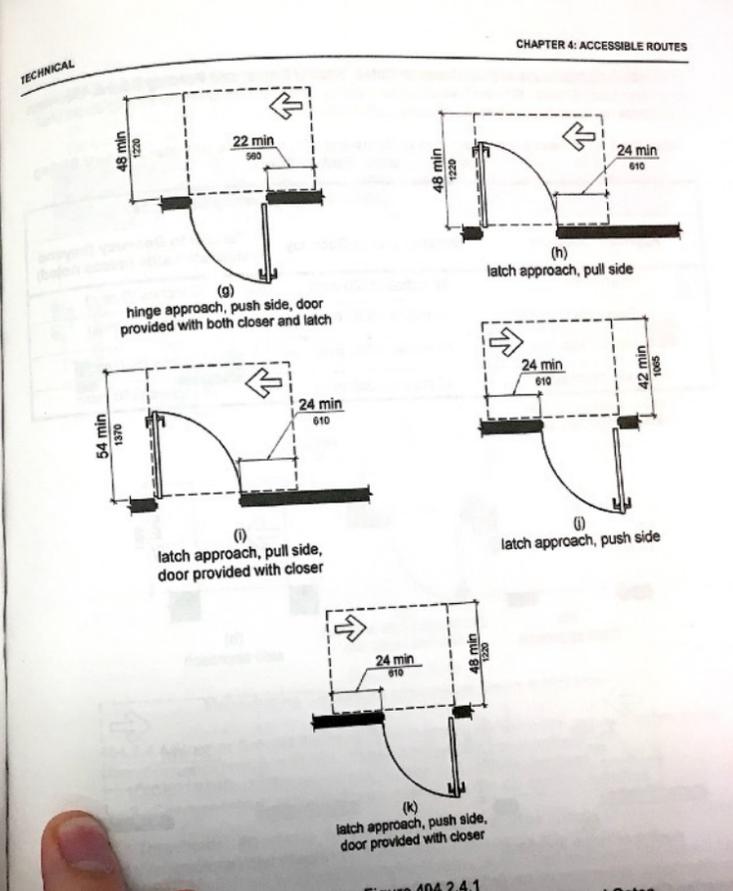


Figure 404.2.4.1
Maneuvering Clearances at Manual Swinging Doors and Gates

Residential Remodeling and Universal Design

- Another great resource
- More contextual than ADA
- Example-based



Residential Remodeling and
Universal Design: Making Homes
More Comfortable and Accessible

U.S. Dept of Housing and Urban Development,
Barrier Free Environments, Inc., Anonymous

Case:

Common Barriers at Entrances

knob handle is difficult for people who have trouble grasping and turning and inconvenient for people carrying packages or young children

number signs with low color contrast and small letters or numbers are hard to read

security "peep" hole is too high for some people to use

doors requiring a force greater than 8 lbs. to open are difficult

door is too narrow to permit passage of a range of people and items

doorbell activation button is not lighted or contrasted making it difficult to see

step at door and door threshold can be difficult for people who use mobility devices

entrance area lacks adequate lighting

lack of handrails is uncomfortable

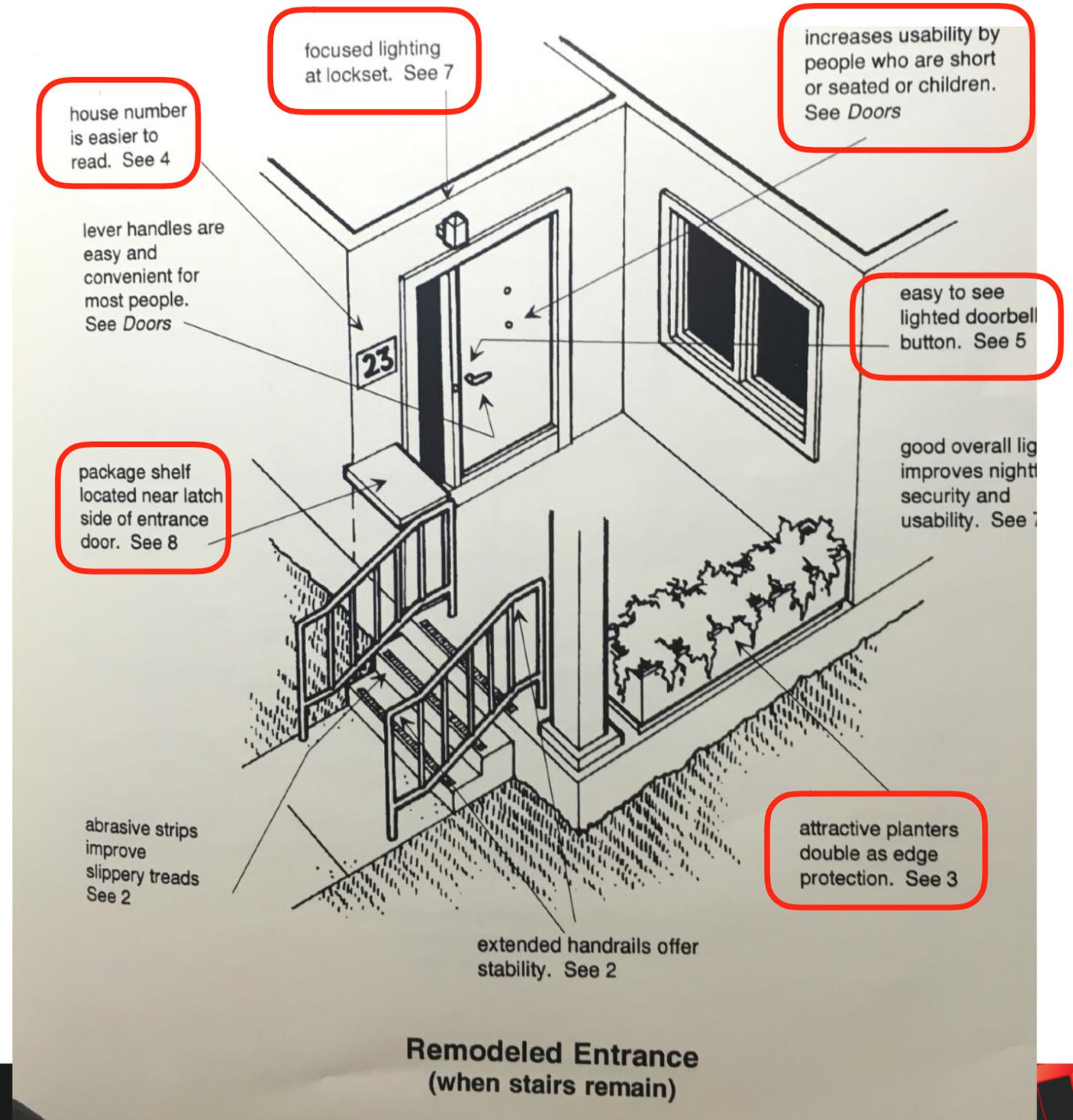
unprotected drop-offs area

steps are a barrier to people who use wheelchairs

Common Barriers at Entrances

Case:

Common Barriers at Entrances



Chris Downey

- Multiplicity of senses
 - Spread the cognitive load
 - Relying on one is bad UD

See also: TED & 99% Invisible talks in resources



Photo by Ryan Lash



Set Design: Observe & Respond



Zootopia

- Citizens of different scales
- Natural evolution over time
- Limitations with ensuring accessibility for everyone





Research

- Widest spread range was from a mouse to a giraffe
- Study city design and planning
- **KEY TAKEAWAY: Observe and respond**





Theme Parks: Communication & Agency



Theme Parks

- *"Disney Parks have an unwavering commitment to providing a welcoming and inclusive environment and accessible experiences for guests"*



Communication

- Disneyworld.com
- Exhaustive FAQs
- Social Networking - community word of mouth, blogs, forums etc
- Mobile Apps Onsite



Agency

- Opportunity to practice
- Establish level of comfort
 - Rides may be dark, indoors, or otherwise difficult to anticipate without line commitment
- Employee community



Self-Selection

- Important for the guest to have agency in the experience

- **KEY TAKEAWAY:**
Empowering Decisions by Supplying Information

HEARING DISABILITIES

Guests with hearing loss or sign language can be identified with the appropriate language pin at their seating. Sign language interpreters are available at Guest Relations that offer specific information on times and locations.

The Walt Disney World Resort provides sign language interpretation for our theatrical events like Theatre Park Shows or a meeting with an Artist.

Disney Broadway Shows™ - Saturday, Wednesday, Monday, Thursday, Friday, Saturday, Sunday
Disney Animation Shows™ Theatre Park - Saturday

For those who do, you should request confirmation of an interpreted performance schedule a minimum of 7 days in advance by calling Walt Disney World Resort Information at (407) 824-6221 (voice) or (407) 824-6222 (TDD). We will be contacted prior to your visit with an appropriate show schedule that lists the names, dates, and times of an interpreted performance.

Sign language interpretation can also be requested for other special events and shows, with a minimum of 14 days advance notice. These requests can be made by calling Walt Disney World Resort Information at (407) 824-6221 (voice) or (407) 824-6222 (TDD). You will be contacted prior to your visit to verify arrangements.

Assistive Listening Devices Walt Disney World Resort offers assistive listening devices or induction loops at special attractions. Devices are recommended for guests with hearing loss. Devices at Walt Disney World Resort require a \$25 refundable deposit (cash or check) on the same day for return.

Relaxation Seating Relaxation seating is available at many Disney's Animal Kingdom attractions, allowing guests to enjoy the projected content without the physical exertion of the ride. Comfortable seating at the attraction is not the option. Not all portions of an attraction may be captured.

Headset Captioning Headset Captioning is available to display text in locations such as viewing attractions, walk-through and boat features and requires a \$25 refundable deposit (cash or check) on the same day for return. Not all portions of an attraction may be captured.

Video Captioning Custom made features are equipped with a "CC" symbol and can only be accessed from the main menu. Video Captioning is also included in the Disney's Animal Kingdom Service which requires a \$25 refundable deposit (cash or check) on the same day for return. Not all portions of an attraction may be captured.

Written Aids Guest Assistance Passes containing dialogue, directions, flight times, and pins and passes are available at or near the performance area or entrance for most shows and theatrical events. Contact a Cast Member at the attraction for assistance.

Teletext The shows equipped with Teletext (TTY) are available at designated locations throughout Disney's Animal Kingdom Theatre Park.

SERVICE ANIMALS

Trained service animals are welcome in most locations throughout the Disney's Animal Kingdom Theatre Park. All service animals must remain on a leash or in a harness at all times. Guests with service animals should follow the same attraction entrance procedures as located for guests using wheelchairs. Due to the nature of some attractions, service animals may not be permitted to ride. In these instances, a member of the guest's party must remain with the animal.

Service Animal Restrictions Due to the nature of the experience, service animals are not permitted at the following attractions:

- Expedition Everest™
- Expedition Everest™
- Primeval Whirl™
- Dinosaur™

Due to the nature of the experience, guests with service animals should check with a host for attraction and location information at the following attractions:

- It's Tough to Be a Hero™
- Kilimanjaro Safaris™
- The Aviany area of Pangloss Power Spectacular™
- The Aviany area of Mufasa's Jungle Book™

Designated "Break" Areas for Guests with Service Animals Contact a host near the following backstage areas for directions and assistance:

- Behind the gate near Renaissance
- Behind the gate near Kingdom of the Sun
- Behind the gate near Kingdom of the Sun

Designated "Break" Areas for Guests with Service Animals

This guide provides an overview of services and facilities available for guests with disabilities who are visiting the Disney's Animal Kingdom Theatre Park.

GUIDE FOR GUESTS WITH DISABILITIES

Disney's ANIMAL KINGDOM. ADVENTURE AWAITS.

FASTPASS

Get the wait time in 3 easy steps

1. Line up to use the FASTPASS system.
2. Each member of your party inserts their or her FASTPASS ticket into the FASTPASS kiosk.
3. You'll receive a FASTPASS ticket with a return time so you can go play in the Park without standing in line.

Guests with any mobility- or queue-related assistance needs are encouraged to use the Disney's FASTPASS™ option whenever possible.

ADDITIONAL

Resort/Special Reservations Walt Disney World Resort offers special equipment and facilities for guests with disabilities. You may be eligible for special equipment and facilities for guests with disabilities. You may be eligible for special equipment and facilities for guests with disabilities. You may be eligible for special equipment and facilities for guests with disabilities.

Water Parks Information about water park accessibility and accommodations for guests with disabilities is available at the Guest Services locations at Disney's Typhoon Lagoon and Disney's Blizzard Beach.

Overseas Guests Information about fast pass and services, including wheelchair and ECV rentals, is available at our Overseas locations at Downtown Disney, Hollywood and Downtown Disney.

ACCESSIBILITY AND MORE

Accessible Parking Designated parking areas for guests with disabilities are available throughout the Walt Disney World Resort. A valid disability parking permit is required.

Theme Park Parking (Disney's Animal Kingdom) If you have the ability to walk short distances and step up onto the curbside ramp, you should park in the main parking lot. The curbside ramp will transport you to the entrance complex.

Parking for Guests with Mobility Disabilities or who are traveling with personal wheelchairs, is available adjacent to the Entrance Complex. There is an extra number from this parking area. Inquiries at the Auto Pass for information and parking options.

Excess Wheelchairs Complimentary wheelchairs are available for guests with limited ability to travel to and from the accessible parking lot and the nearest wheelchair rental location. These wheelchairs can be easily identified by their blue seats, seatbelts and blue flags. Courtesy wheelchairs are not permitted for use inside the Theme Parks.

Restrooms Multi-stories throughout the Walt Disney World Resort have restrooms designed for access by guests using wheelchairs. Companion-assisted restroom facilities are also available.

Auxiliary Entrance Locations Some attractions have auxiliary entrances for guests with disabilities. These are intended to offer guests in wheelchairs or with service animals a more convenient entrance to the attraction. Auxiliary entrances are not intended to replace walking lines. Guests with disabilities and up to the members of their party may enter through these entrances. The rest of the party should use the main entrance.

Staircase or Elevation Concerns If you are concerned that you do not have the stamina to walk in our queues, we strongly suggest you consider using a wheelchair or ECV at the distance between our attractions is much greater than the length of our queues.

OrlandoInformer.com



Virtual Reality Accessibility Survey



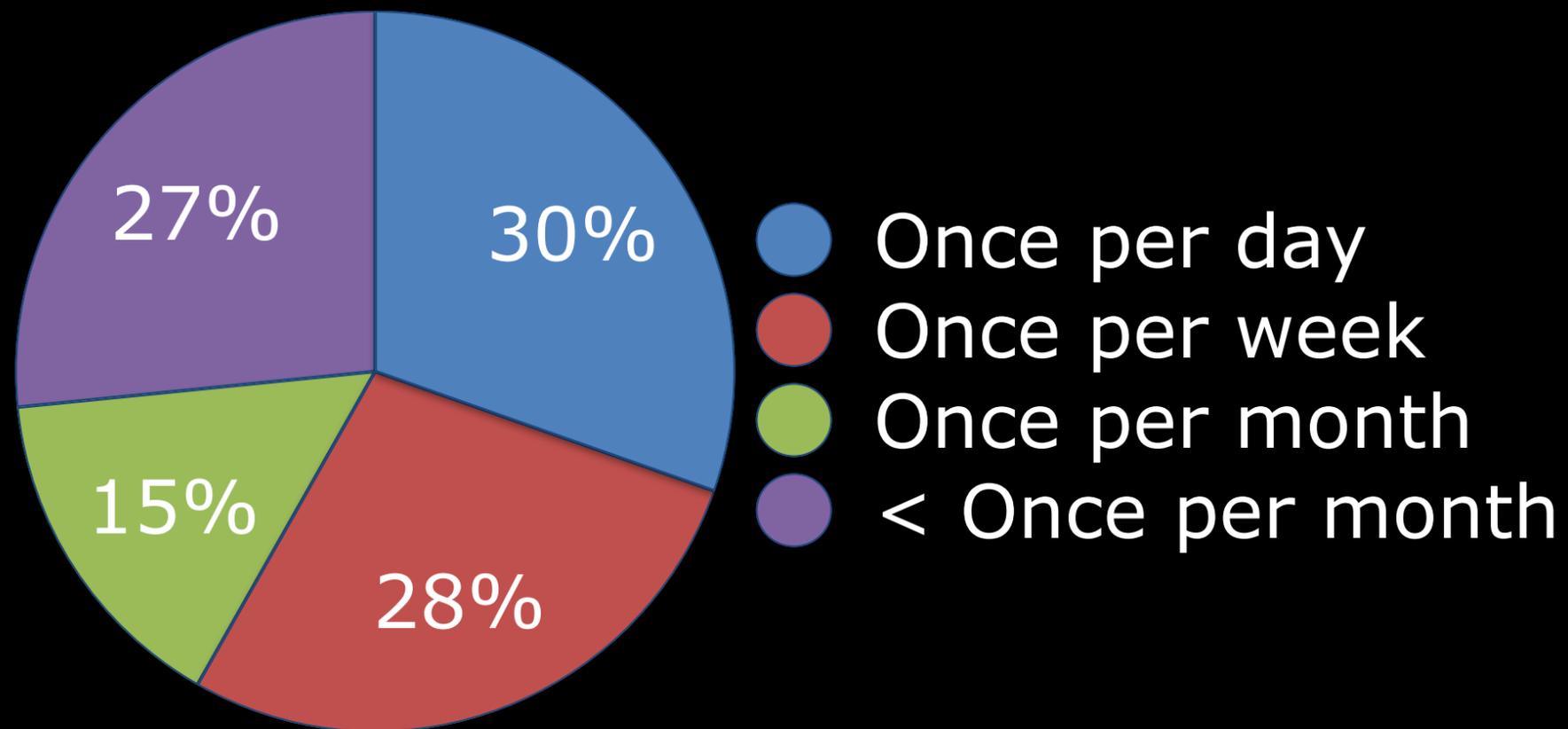
Survey Goal

- Partnered with the Disability Visibility Project™, headed by Alice Wong
- Survey covered following topics:
 - User experiences of VR
 - Accessibility issues with VR
 - Ideas/thoughts about VR for people with disabilities
 - Questions about Trials on Tatooine

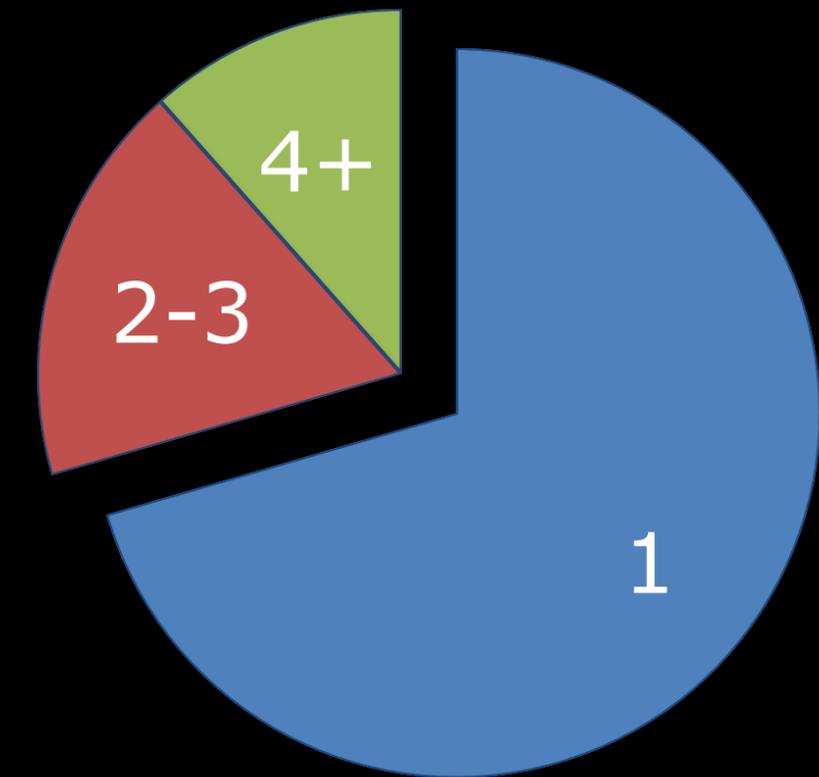


Survey Results - 79 Participants

Frequency of VR Usage



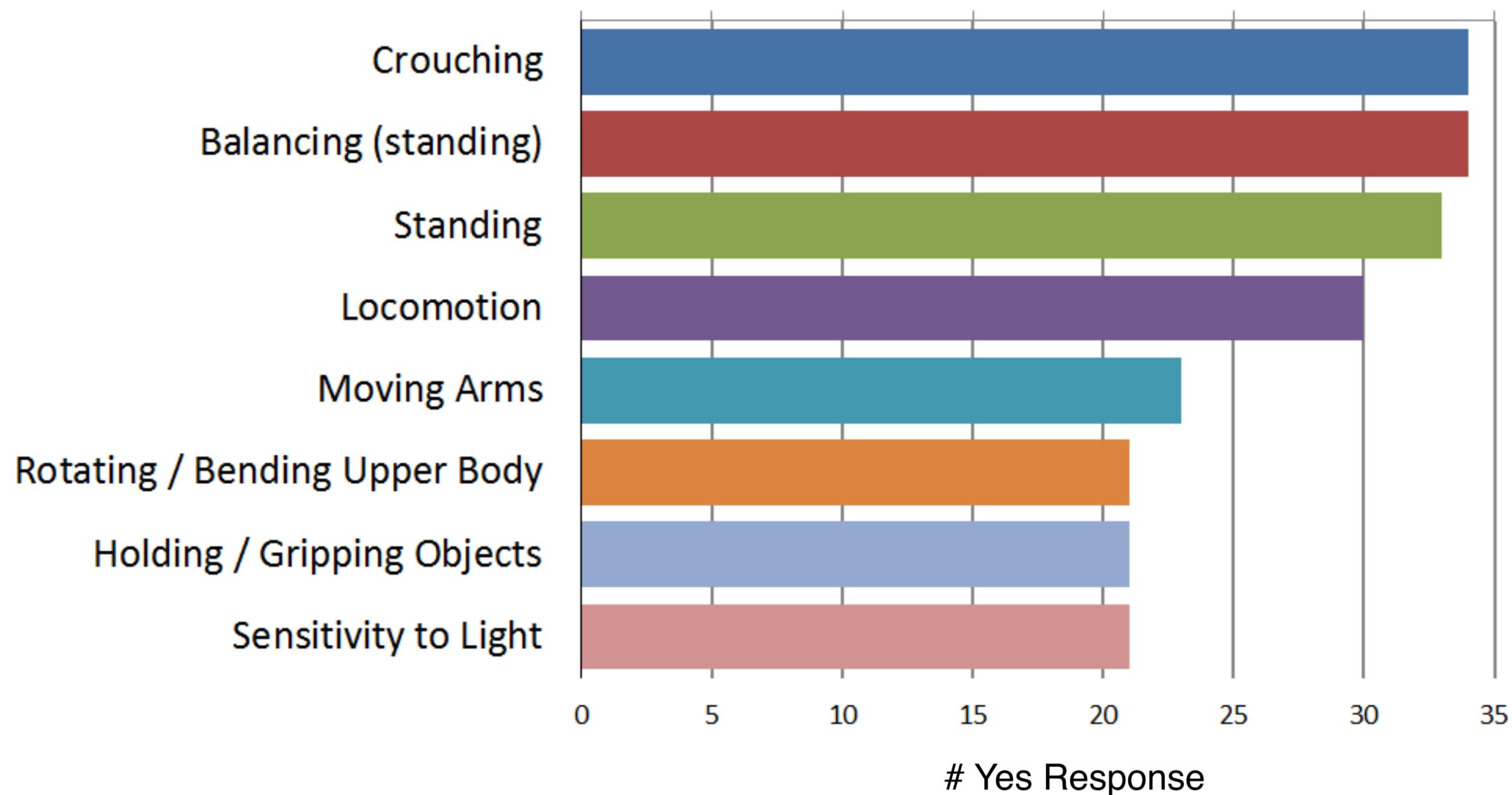
Reported Disabilities



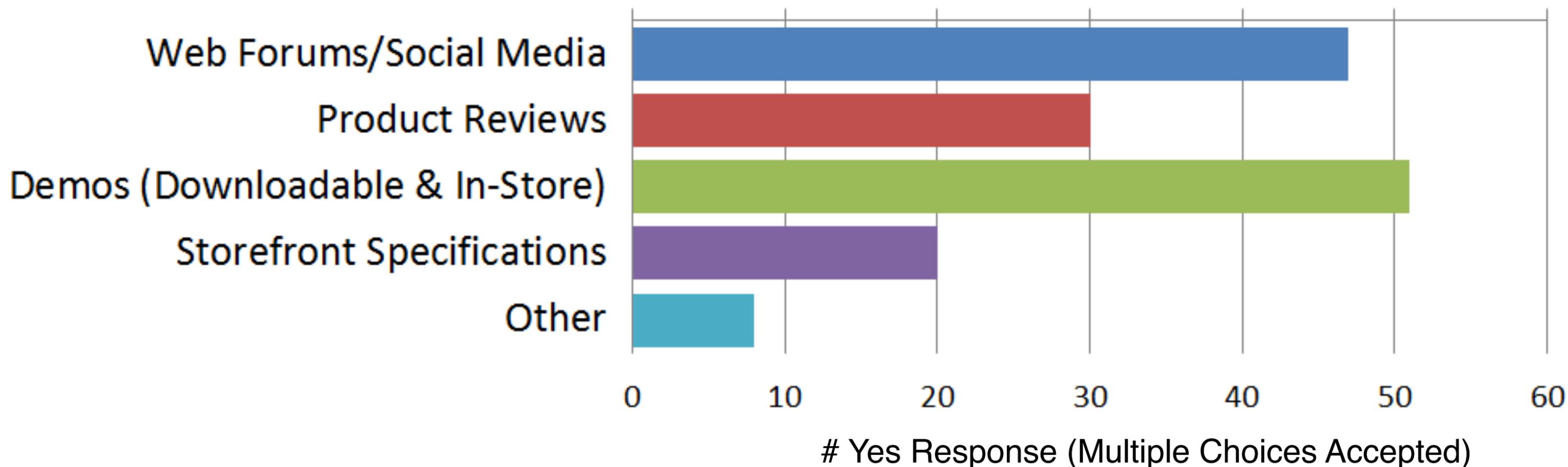
- 98 different disabilities reported
- Here are the 7 most common
 - Deaf (5)
 - Arthritis (5)
 - Scoliosis (4)
 - Cerebral Palsy (4)
 - Autism (4)
 - Asthma (4)
 - PTSD (3)



Activities that are Difficult to Perform



Preferred Method of Determining Accessibility of a VR Product



Standing

!! Room-scale VR experience makers don't always design for seated users; even seated experiences in VR don't take reach differences into account.

Locomotion

- ! ! The vive is hard to use because I have to hold the controllers and push my wheelchair around at the same time. Hard to turn. Easy to bump into walls even with chaperone because my radius is wider.

Seeing



I use Windows Magnifier to read some mirrored VR content on my computer screen when I can't read text or see something in game. This helps, but also has its problems.

Requests & Suggestions

- Alternatives to motion controls
- Adjustable UI / text size
- Tourism modes with no blockers or fail states
- Don't lock out adaptive software & hardware

Survey Results

- Much more to cover
- We will post more detailed reporting online at a later date. Stay tuned!
- Follow ILMxLAB on twitter and facebook :)



In Conclusion...



Conclusion

- New Inspiration
 - Architecture: Spatial Planning
 - Theme Parks: Communication & Agency
 - Set Design: Observe & Respond
- Let's keep continuing the accessibility evolution!



Resources

- <http://99percentinvisible.org/episode/episode-10-99-sound-and-feel/>
- <http://www.arch4blind.com/index.html>
- <http://www.gdcvault.com/play/1020377/Accessibility-Lessons-Learned-from-Designing>
- <http://www.gdcvault.com/play/1021849/Building-a-Manifesto-for-Game>
- <http://www.gdcvault.com/play/1022172/No-More-Excuses-Your-Guide>
- <https://www.ada.gov/index.html>
- <http://gameaccessibilityguidelines.com/>



Thank You!

- Alice Wong, Disability Visibility Project
- Chris Downey
- Ellie Ratcliffe
- Brad Simonsen, Disney Animation
- Jacob Kahla, Disney Parks
- Mark Jones, Disney Parks
- Rex Bellar, Disney Parks
- Jay Cardinali, Disney Parks
- Joey Fritsche, Disney Parks
- Alex Smale, Tribe Mix
- Brian Van Burren, Tomorrow Labs
- Shawn Wiora, Mynd VR
- Chris Brickler, Mynd VR
- Mick Morris, Special Effect
- Bill Donegan, Special Effect
- Mick Donegan, Special Effect
- Adam Gazalley, UCSF
- Chet Faliszek, Valve
- Adam Klaff, Valve
- All of Lucasfilm LTD and ILMxLAB