

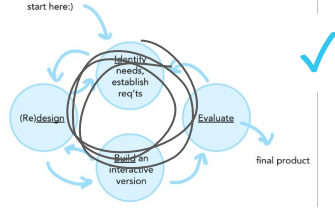
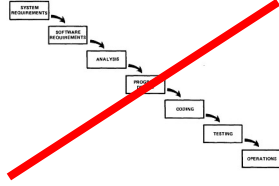
Human Computer Interaction

Taslima Akter

Inclusive Design and
Universal Usability

Housekeeping

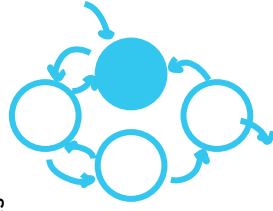
- › P3 is posted!
- › Grading Schema is updated according to Canvas grading scheme.
- › Rubric for class engagement is released!
- › All office hours and Thursday class will be online this week! Zoom link will be posted on Canvas.



Linear design processes lead to late, over-budget, unusable systems. In HCI, our design processes are cyclical and keep the user & stakeholders “in the loop”

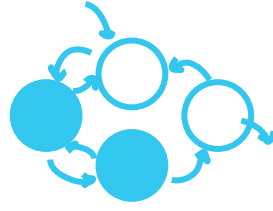
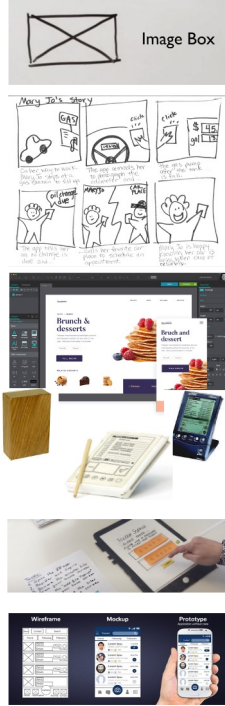
IDENTIFY

observations, interviews, focus groups, diary studies, cultural probes



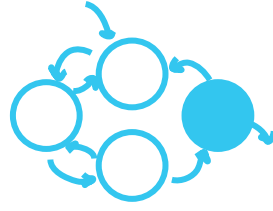
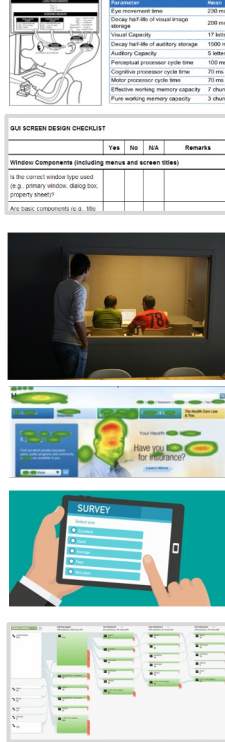
(RE)DESIGN & BUILD

sketching / wireframing, storyboarding, mockups, prototypes



EVALUATE

expert review, lab/controlled studies, user opinion, real-world use



Today

- › Universal Usability
- › Assistive / Accessible Tech for Blind Folks
- › Accessibility Hacks

Universal Usability



Access to digital technology matters

- › Daily living
- › Employment
- › Equality



Accessibility for whom? People with ___ disabilities.

vision

blind • low-vision • color blind

hearing

d/Deaf • hard of hearing

speech

ability to speak • speech impediments

mobility

ability to walk • dexterity of limbs

cognitive

memory loss • learning disabilities

psychological

emotional • behavioral



People with disabilities in the US

% US population with disability?
(2021 Census)



People with disabilities in the US

% US population with disability? **13%**
(2021 Census)



People with disabilities in the US

% US population with disability? **13%**
(2021 Census)

% age 75+ with disability?
(2021 Census)



People with disabilities in the US

% US population with disability? **13%**
(2021 Census)

% age 75+ with disability? **46%**
(2021 Census)



People with disabilities in the US

% US population with disability? **13%**
(2021 Census)







% age 75+ with disability? **46%**
(2021 Census)

“ You’re only just temporarily non-disabled.

Have you ever used one of these?



Temporary & situational impairments

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver



Accessibility for whom? **All of us.**

people who (*will*) have permanent disabilities

people who (*will*) have temporary disabilities

people who (*will*) have situational disabilities

Principles of Inclusive Design

Recognize exclusion

Learn from diversity

Solve for one, extend to many

Principles of Inclusive Design

Recognize exclusion

Learn from diversity

Solve for one, extend to many

Principle: Learn from diversity

HIGHLIGHT



| THIS IS US

Learn from
diversity:
Baby Jack

Principle: Solve for one, extend to many

An example of “solve for one, extend to many”

An example of “solve for one, extend to many”



OXO “Good Grips” kitchen tools

An example of “solve for one, extend to many”



OXO “Good Grips” kitchen tools



Designed by Sam Farber
for his wife, Betsey, who
experienced arthritis.

An example of “solve for one, extend to many”



OXO “Good Grips” kitchen tools



Designed by Sam Farber for his wife, Betsey, who experienced arthritis.

Extends to:

- Other individuals with arthritis
- People with wet/slippery hands (common in cooking)
- Children and others with weaker grip strength
- A more comfortable experience for many in general

Universal Design / Usability

design for everyone, regardless of age, disability, etc.

universal designs are often better for everyone

UX design: in search of “digital curb cuts”



Some Digital Examples

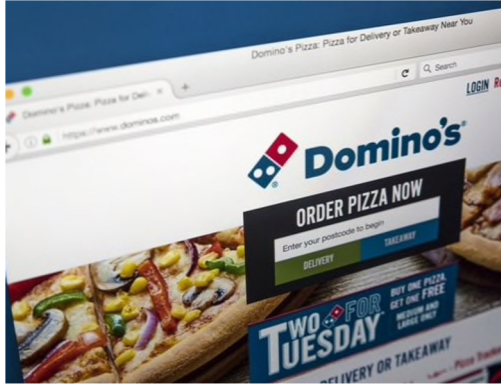


Some Digital Examples



(dark mode!)

Litigation on the rise



“...1,053 [ADA website lawsuits] filed in the first half of last year compared to 814 in all of 2017.”

<https://www.fastcompany.com/90293399/ninth-circuit-court-dominos-pizza-website-is-bound-by-ada>

<https://www.theguardian.com/music/2019/jan/04/beyonce-parkwood-entertainment-sued-over-website-accessibility>



Federal laws regulating accessibility

Section 508 of the Rehabilitation Act—covers all U.S. federal technology (web, sfw, hdw, public and internal)

Americans with Disabilities Act—covers state and local government, and the 12 categories of public accommodations (including universities, libraries, museums, stores, and hotels)

... and more



Why Design for Universal Usability?

- › Better products - easier to use, more efficient, and more pleasant in more situations
- › Increases market share - more customers for your products and services
- › Decreases inequality - provides greater access
- › It's the law! (thanks to disabled activists)



Undercurrent for Entire Course

- › “The User Is Not Like Me”
- › People are diverse!
 - Diversity of diversities
- › User representations all have own challenges
 - Personas: stereotypes, one-dimensional, static, simple
- › In designing for diversity,
 - **Universal Usability** is our goal
 - Consider diversity in early stages of design



Activity 17
15 minutes

A17: Exploring vignettes of disabled internet users

- read 4 vignettes (based on your last name)
- answer questions
- submit to Canvas

Assistive / Accessible Tech for Blind Folks

How many of you own a screen reader?

How many of you own a screen reader?



Turn on your mobile screen reader



Instructions:

- iOS: Settings > General > Accessibility > VoiceOver
- Android: Settings > Accessibility > Talkback

Input works differently now.

Tap now reads the screen and double-tap selects. Use two or three fingers to scroll by page. Play with it for a minute.



What do you think of screen readers?

- › screen readers should support more language
- › voice is annoying
- › takes a lot of time to learn
- › buttons are straightforward but the slider for the speed was tricky
- › doing things takes much longer, more steps



Screen readers need accessible content

- › if designers, developers don't add the proper markup / metadata, the screen reader is useless
 - e.g., websites w/o heading tags
- › PDF files are notorious for being inaccessible

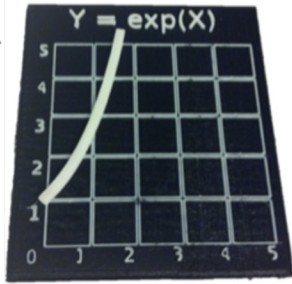
*Skipped headings were present on **40.4%** of all pages (up from 38.4% in 2021), and **9.9%** of pages had no headings present at all (down from 10.6% in 2021).*

WebAIM survey, 2022

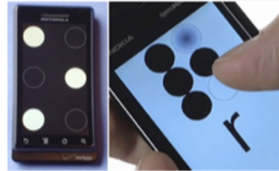


Nnvaccess

(McDonald et al., 2014)



Slide rule
(Kane et al., 2008)



V-Braille
(Jayant et al., 2010)

A brief intro to screen readers

Generate synthesized speech of text on the screen (or back-end equivalents, including ALT text, form labels, and table headers)

Controlled with keyboard shortcuts or touch screen gestures

Major vendors: JAWS, NVDA, VoiceOver, Talkback, Narrator





Blind users' screen reader behavior

Tend not to listen to the entire page or even label

Blind users tend to use active strategies:

- Browse through headings

- Listen to the links list

- Use keyword searching

Listen at very high rates of speed (up to 500 wpm!)

Tend to stick with sites they know are accessible

How Screen Readers work



https://www.youtube.com/watch?v=NY8pGT52zns&ab_channel=Ablr



Assistive vs. Accessible Tech

Assistive: specialized for a person with a disability

Accessible: able to be accessed by a person with a disability; usually regarding a mainstream technology

Accessibility Hacks of Phones

Hack 1: Screen Reader / Dark Screen

Dark Screen Hack for a Sighted Person



Alice dropped her iPhone and the screen started flickering green. To use the phone, she turned on the **screen reader** (triple click of the power button). Then, she turned on the screen curtain (aka **dark screen** for iPhones, triple finger triple tap gesture) to stop the bright flashing. She was able to access the serial number for the repair person.

Hack 2: Sound Amplifier / Live Listen

Hack 2 - Sound Amplifier / Live Listen



Parents can use live listen as an audio-only baby monitor.

https://www.youtube.com/watch?v=CIBCyTs5X6Y&ab_channel=AppleSupport

Hack 3: Lookout / Seeing AI

Lookout | Seeing AI



Android's Lookout



Microsoft's Seeing AI
app (works on iOS)

Allows users to point their camera and uses AI to identify **identify objects** in the env't.

Seeing AI Features



- Short text
- Document
- Product
- Person
- Currency
- Scene
- Color
- Handwriting
- Light

https://www.youtube.com/watch?v=IQneYgmwR3Y&ab_channel=VisuallyImpairedDesigner

Hack 4: Voice Dictation / Dictation

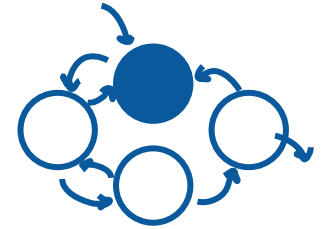
Hack 4 - Voice Dictation / Dictation

How to use Dictation in Notes



- What disability population might this be good for?
- How might a non-disabled person use this?

https://www.youtube.com/watch?v=PT7TFVByKel&ab_channel=AppleSupport



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Taslima Akter

Inclusive Design and
Universal Usability

Materials in this course were compiled from courses taught by: Matt Bietz, Stacy Branham, Tyler Fox, Elena Agapie, Nigini Oliveira, Katharina Reinecke, Andrew Davidson, Jennifer Tums, Daniel Epstein, Andrea Hartzler. Thank you to all.