

# **IN4MATX 133: User Interface Software**

Lecture 20:  
Wrap-Up

# Today's goals

**By the end of today, you should be able to...**

- Describe how concepts from IN4MATX 133 can integrate into research and practice
- Summarize what you learned in IN4MATX 133
- Describe the relevance of the topics to different disciplines in industry
- Fill out the course evaluation!

**Every interface you implement is  
encoding a set of design choices.**

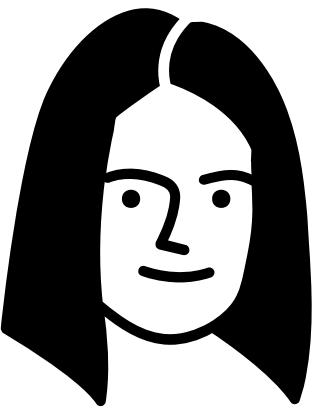
**These choices then influence not only  
how people use your interface,  
but also how they experience  
and perceive the world.**

**Your choices can exclude people**

# Common impairments

- Vision
  - Blind, low vision, colorblind
- Motor impairments
  - Arthritis, cerebral palsy, tremors, paralysis
- Cognitive impairments
  - Autism, dyslexia, language barriers
- Much more

# Meet Tracy

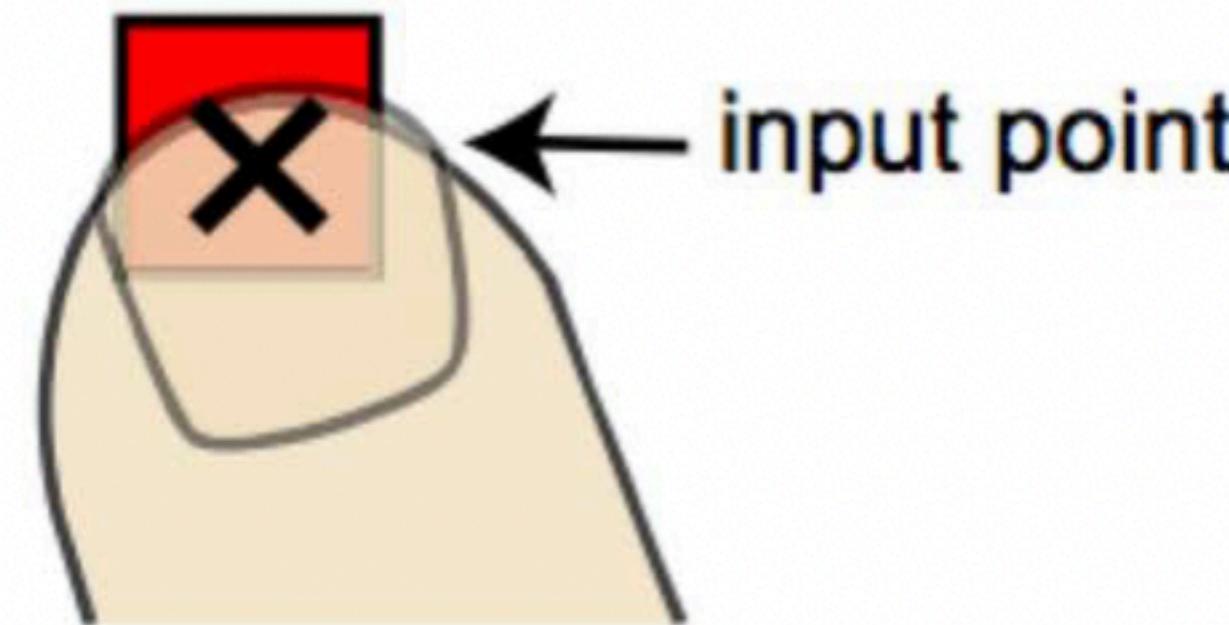


Tracy Young is 28 years old and was born blind. She did well in school, getting support from audio tapes and books and the support of tutors. She never bothered really to learn Braille. She holds a college degree in English literature and is very fond of writing poems and short stories. When using her computer for work, she uses the JAWS software, which reads out aloud the content of the computer screen in an artificial voice (screen reader). JAWS runs only on Internet Explorer, which is the standard browser in Tracy's company.

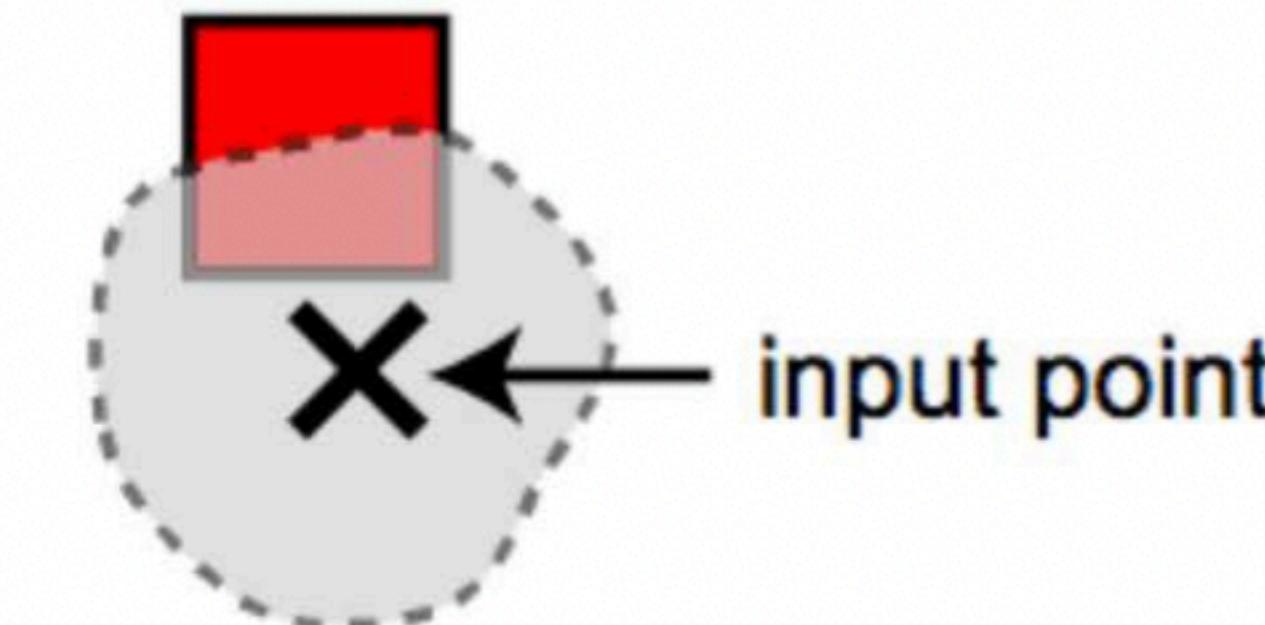
- Adapted from [https://publikationen.sulb.uni-saarland.de/bitstream/20.500.11880/25641/1/personas\\_access.pdf](https://publikationen.sulb.uni-saarland.de/bitstream/20.500.11880/25641/1/personas_access.pdf)

# Modeling touch position

(a) user view

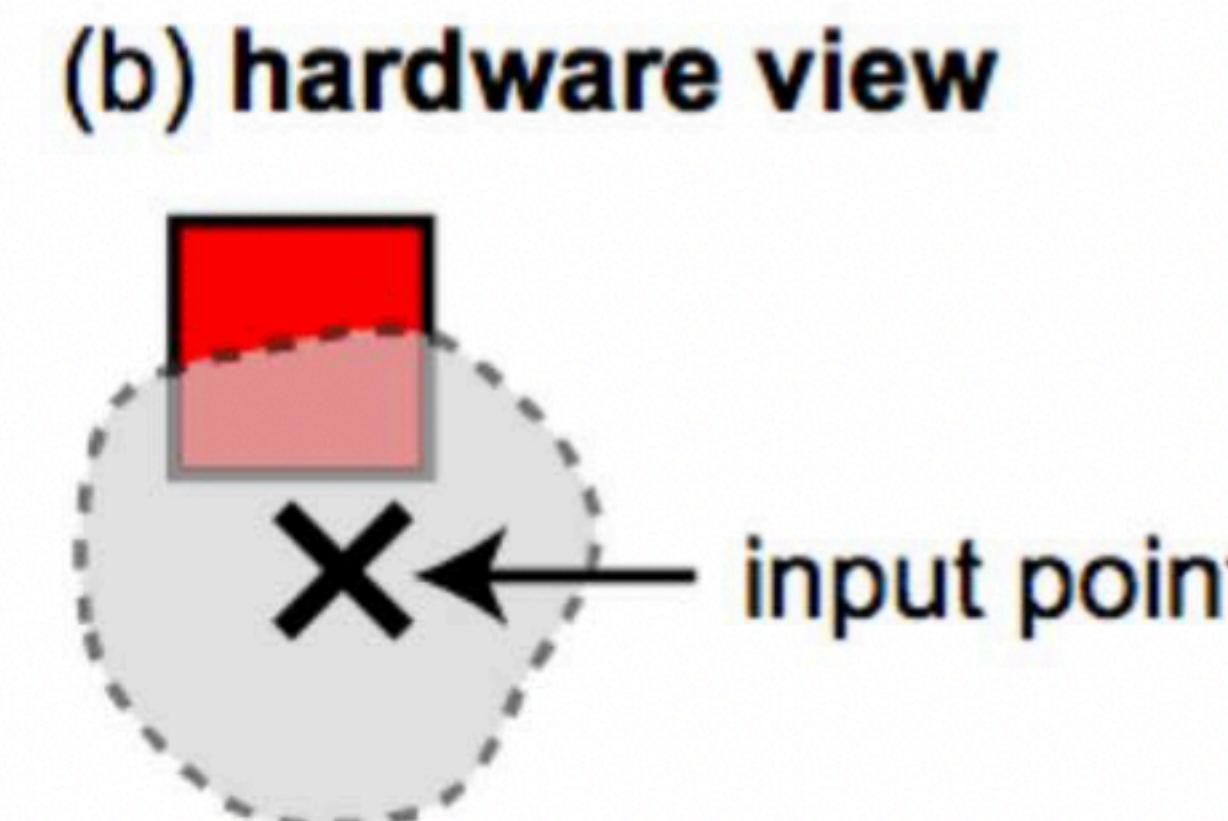
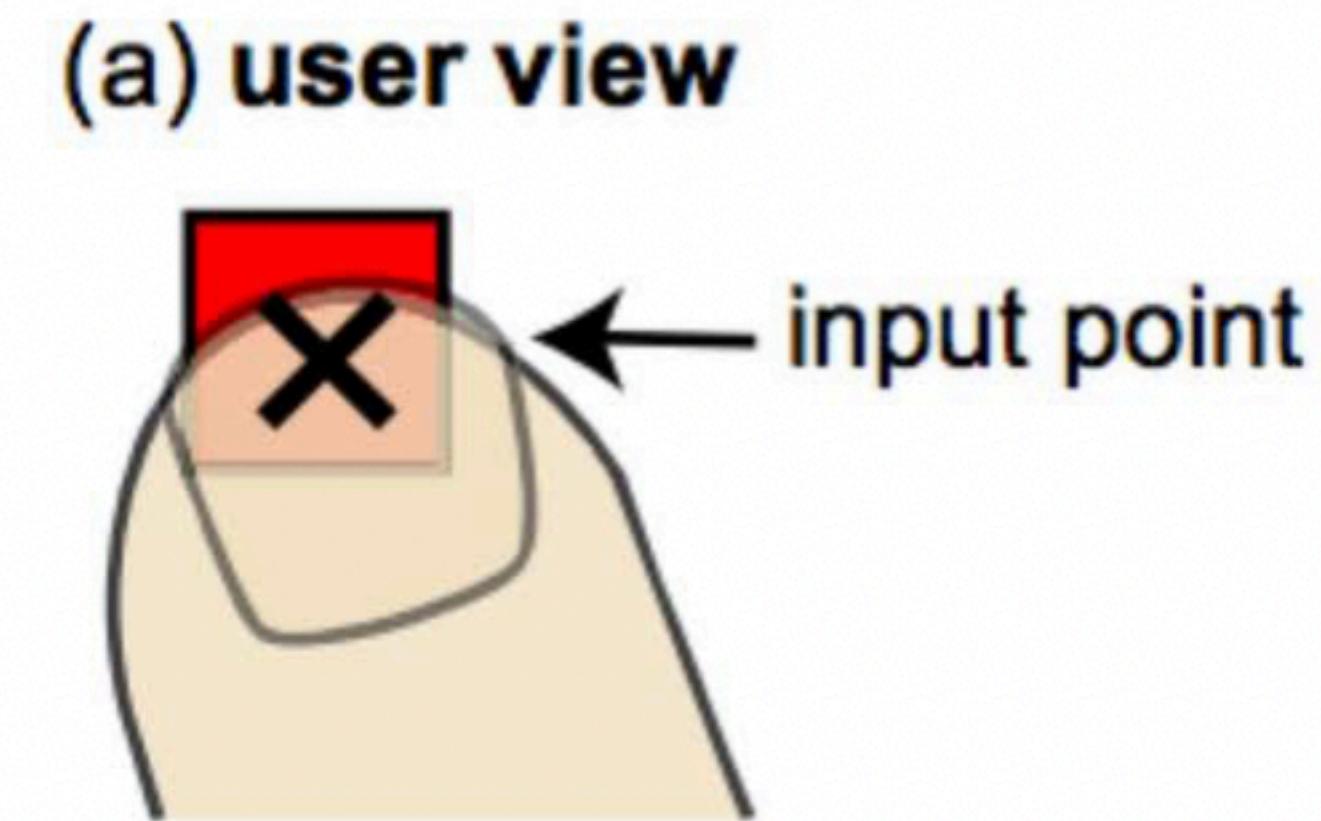


(b) hardware view



# Modeling touch position

- You can choose to space buttons out or make larger buttons to help someone with motor impairments interact with your interface
- In fact, regulatory agencies require some aspects of accessibility

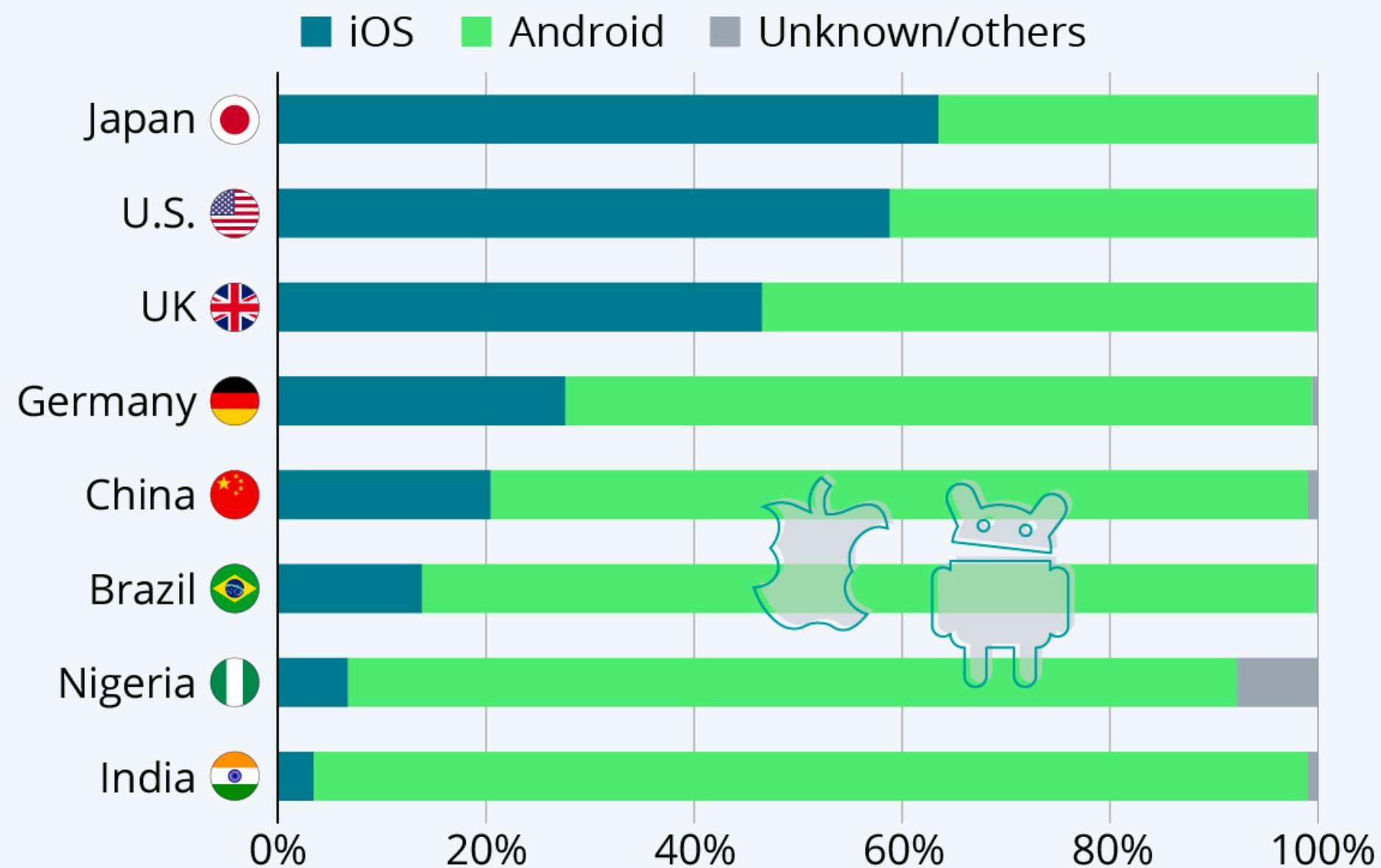


# Platform choice

- Phone operating system preference varies significantly by country
- Designing apps or features for one platform excludes much of the world

## Apple or Android Nation?

Mobile operating systems market share in selected countries (as of July 2020)



Source: StatCounter

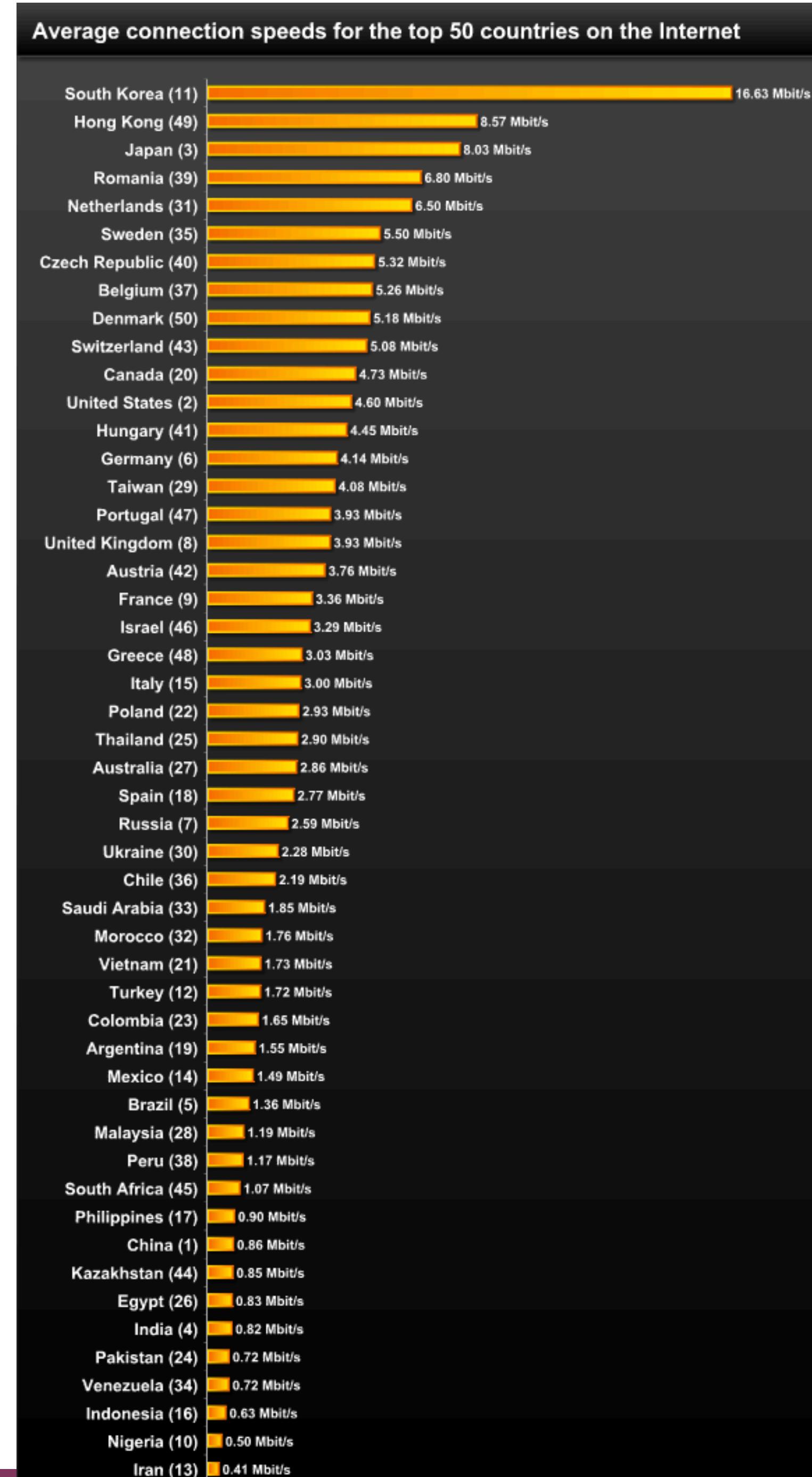


<https://www.statista.com/chart/22702/android-ios-market-share-selected-countries/>

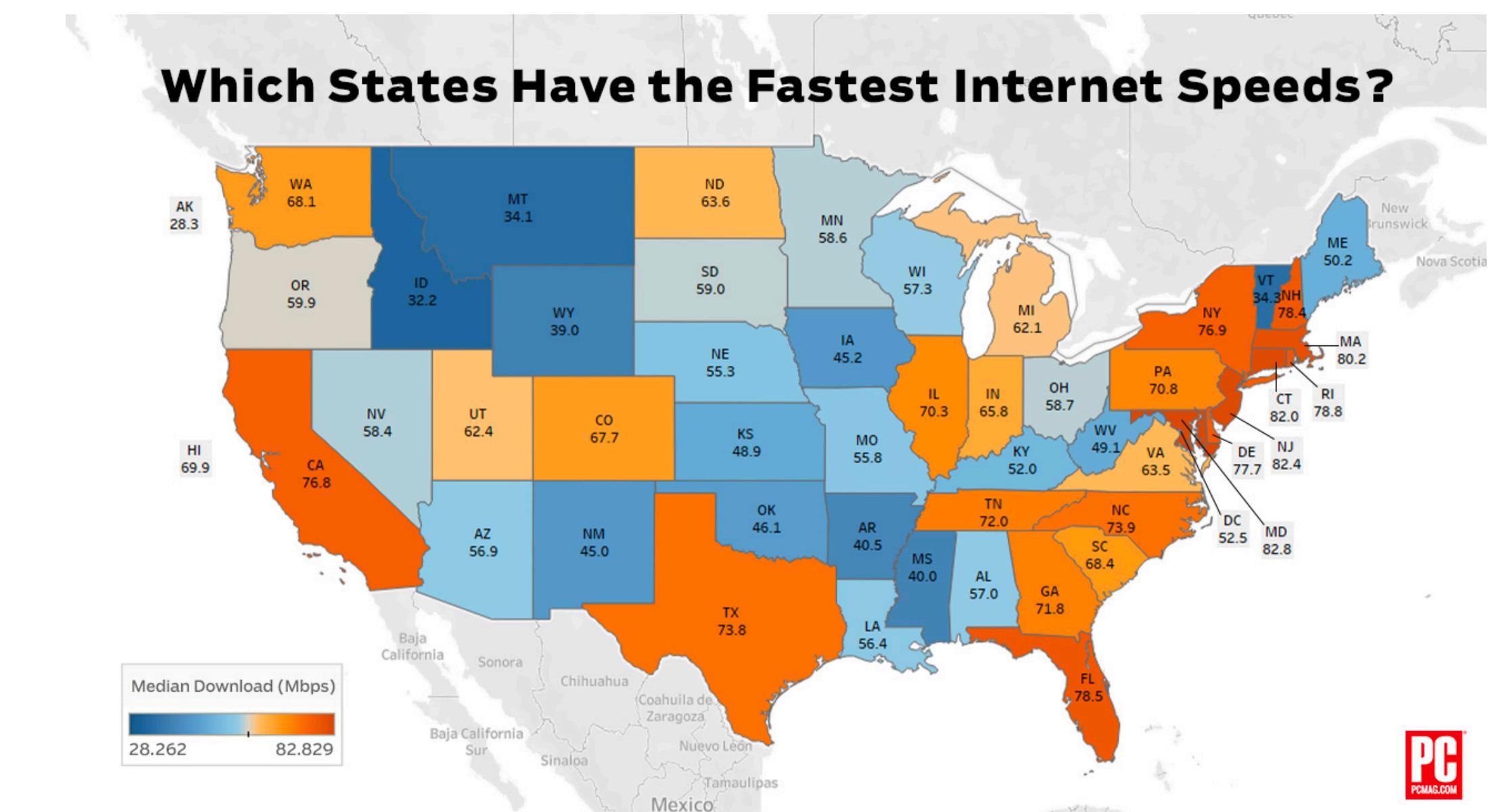
# Internet speed

- Internet speed also varies significantly by country
- It's not as correlated with level of development as you might think
- Applications reliant on large internet traffic similarly exclude different people

<https://www.pingdom.com/blog/real-connection-speeds-for-internet-users-across-the-world/>



# Platform choice



<https://www.pcmag.com/news/mapping-state-by-state-tech-trends-android-vs-ios>  
<https://www.pcmag.com/news/state-by-state-the-fastest-and-slowest-us-internet>

# **One example: menstrual tracking apps**

“With [Apple] Health, you can monitor  
all of your metrics that you’re most interested in.”

*Craig Federighi*

WWDC Keynote, 2014

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Apple HealthKit (2014)

The Atlantic: "How Self-Tracking Apps Exclude Women" by Jessica Pixel (@liftedpixel) - Am I missing it, or does the new iOS 8 Health app not have a period tracker? Seems like a no-brainer addition to me.

TC: "Apple Stops Ignoring Women: HealthKit Update, Now Features Period Tracker" by Sarah Perez (@sarahintampa) - "Self-knowledge through numbers" seems like a genderless goal, yet the actual products out there are anything but.

THE VERGE: "Apple promised an expansive health app, so why can't I track menstruation?" by Arielle Duhaime-Ross - "ClueΔ" would like to access and update your Health data in Health.

Natalie Podrazik (@nataliepo) - Wait, wait, wait -- HealthKit doesn't have a period tracker?

sara mchenry (@yellowcardigan) - What's fucked up about Apple's Health Kit not containing a period tracker is that I NEVER NOTICED HOW FUCKED UP THAT IS UNTIL TODAY

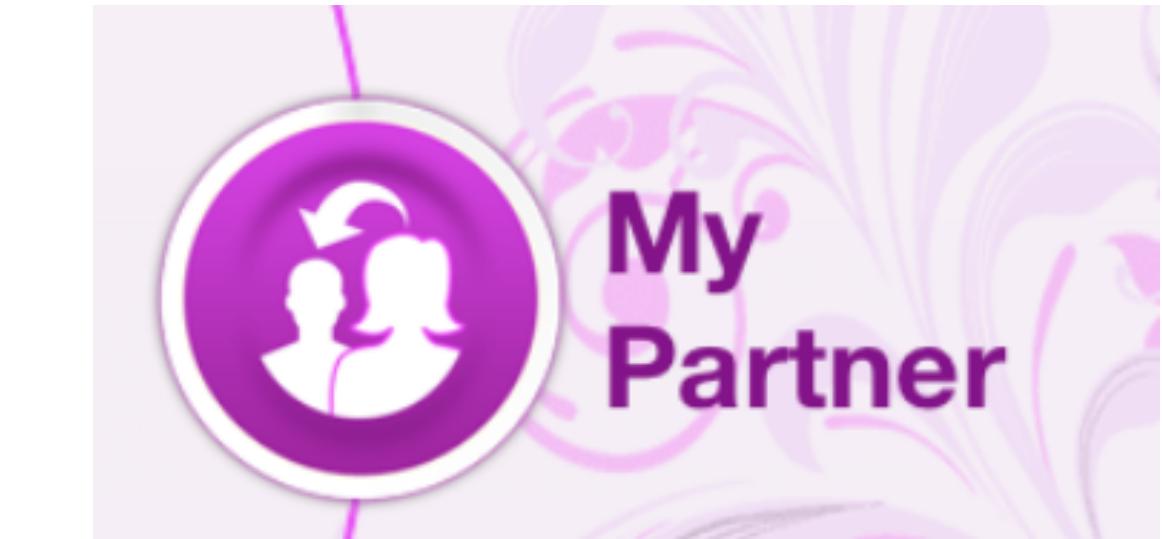
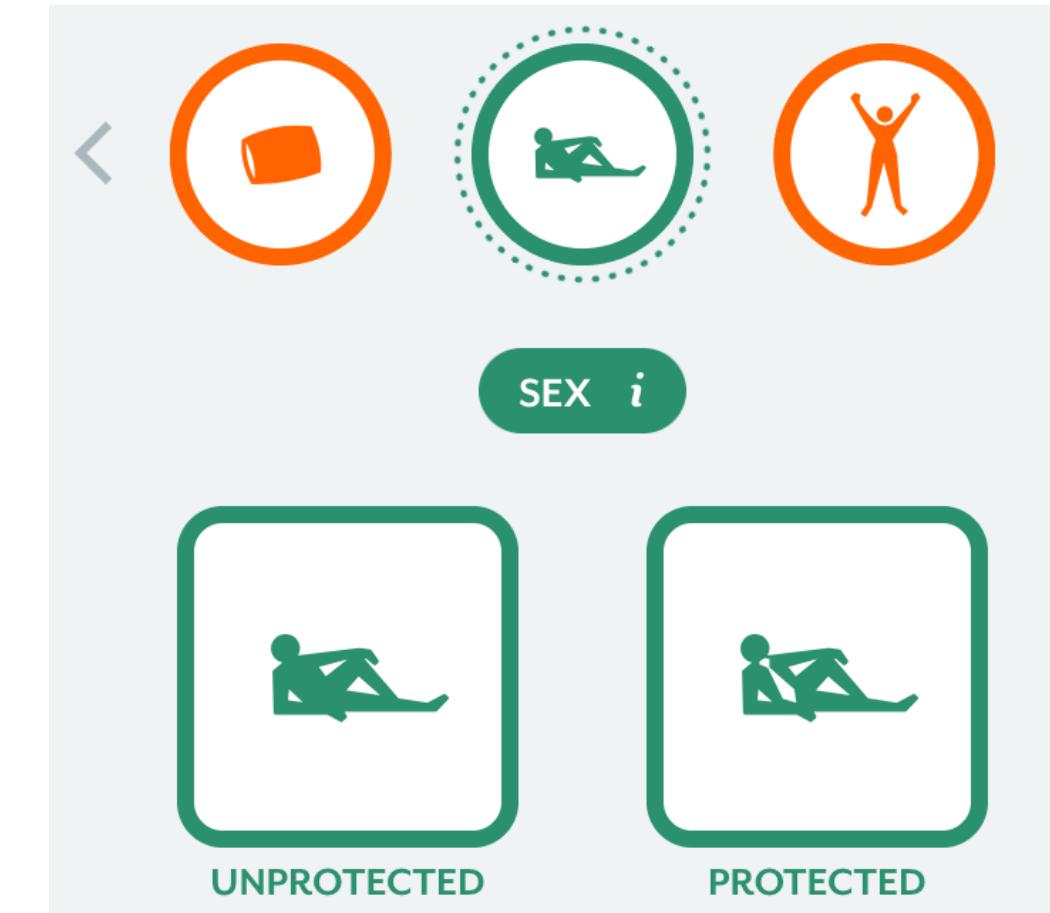
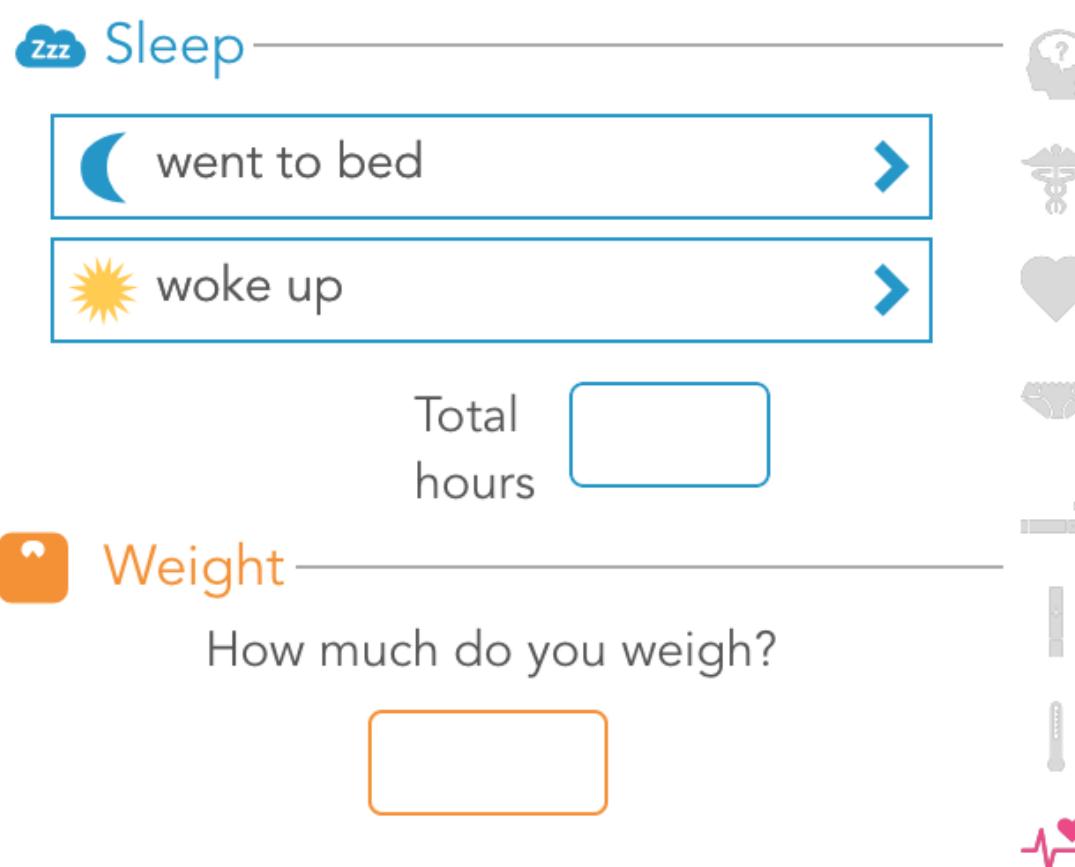
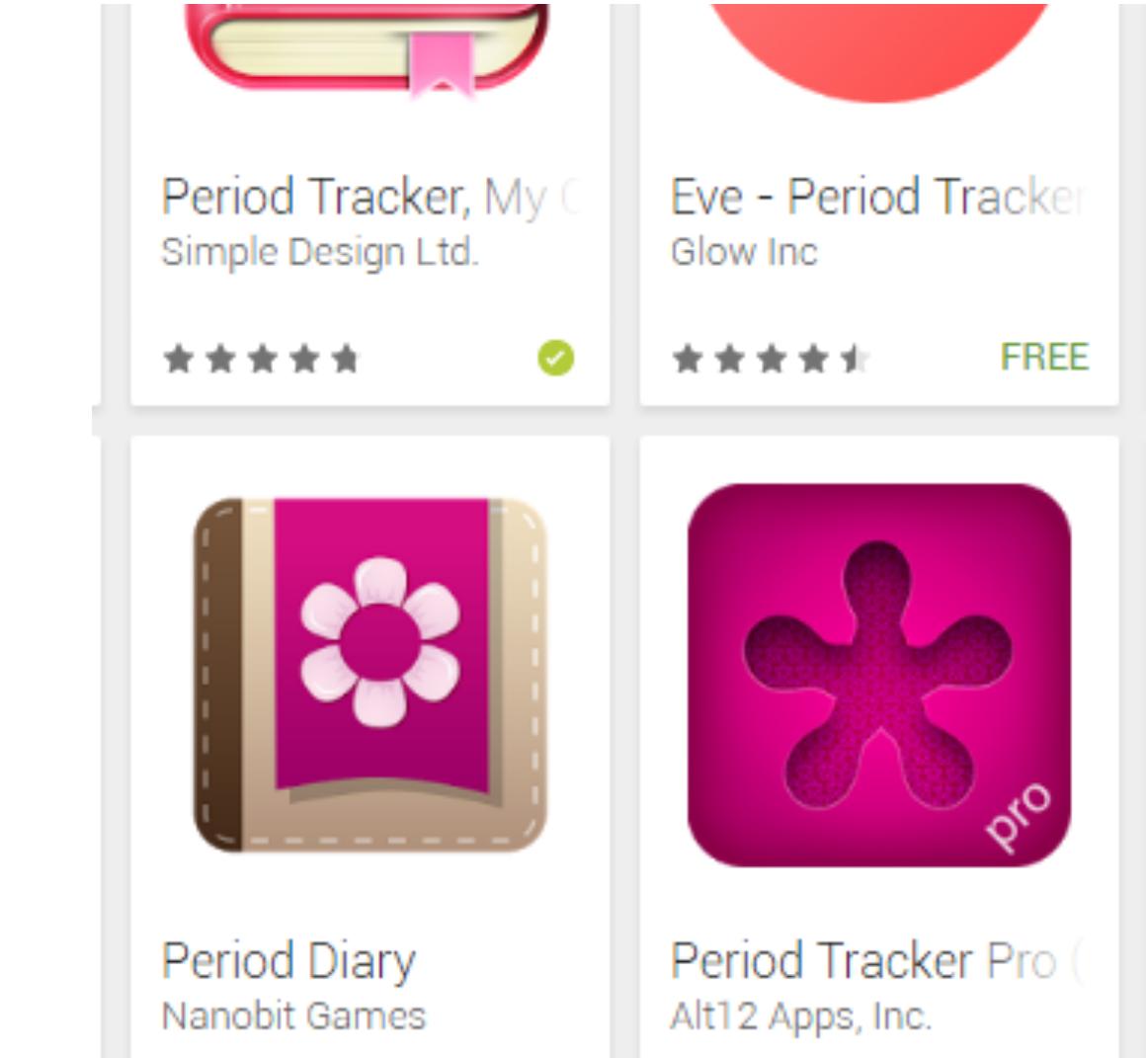
Tony Webster (@webster) - HealthKit period tracker – it's almost as if Apple just realized that women exist. #WWDC15

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# **What are the design challenges and concerns in digital tools for menstrual tracking?**

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# How are apps designed now?



Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

- Prediction Accuracy
- Aesthetics
- Gender Identity
- Sex and Ovulation

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Prediction accuracy

*“The whole reason I need a period app is due to my extremely irregular periods... For someone whose days vary it’s hard to use.”*

(A1638)

## Assumption: a regular cycle

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Prediction accuracy

*“I was very faithful at keeping track of my periods up until I got pregnant. A pregnancy, baby, and a year and a half of breastfeeding later, the app thinks my normal length is about every 700 days!”*

(A81)

## Assumption: no cycle disruption

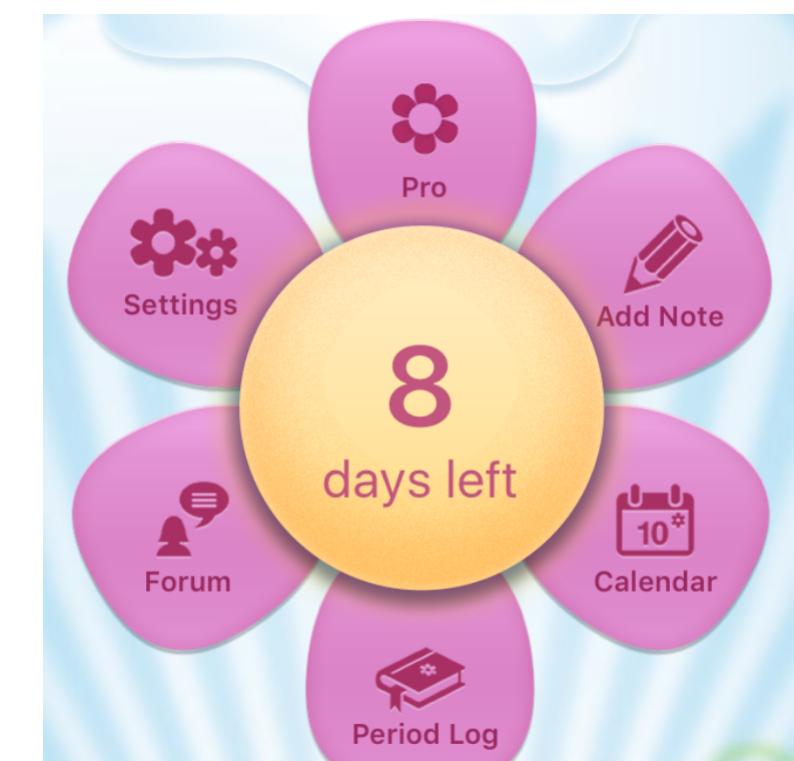
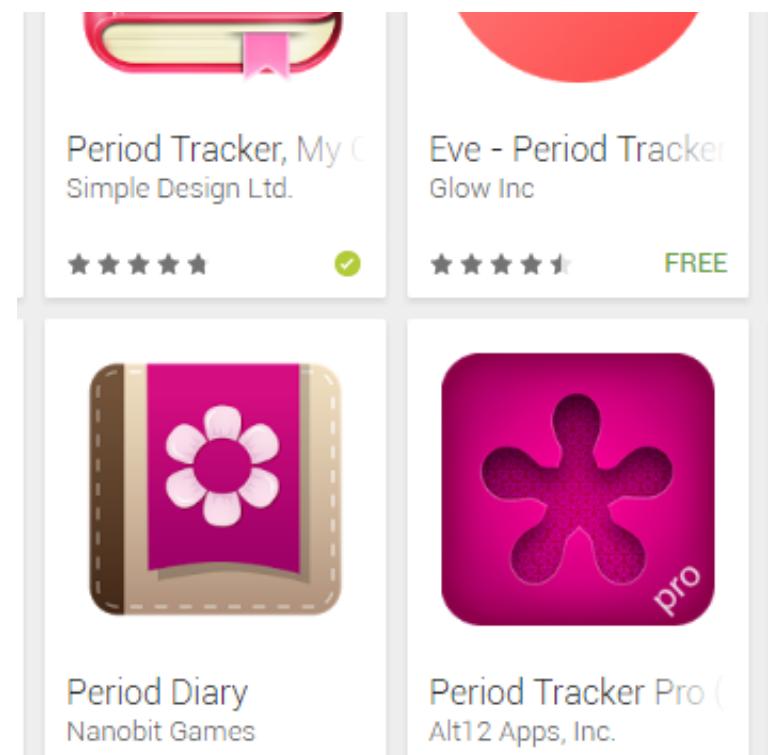
Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Aesthetics

*“I love the way it includes necessary info in a fashionably girly way. :-)”*

(A914)



Period Diary  
app

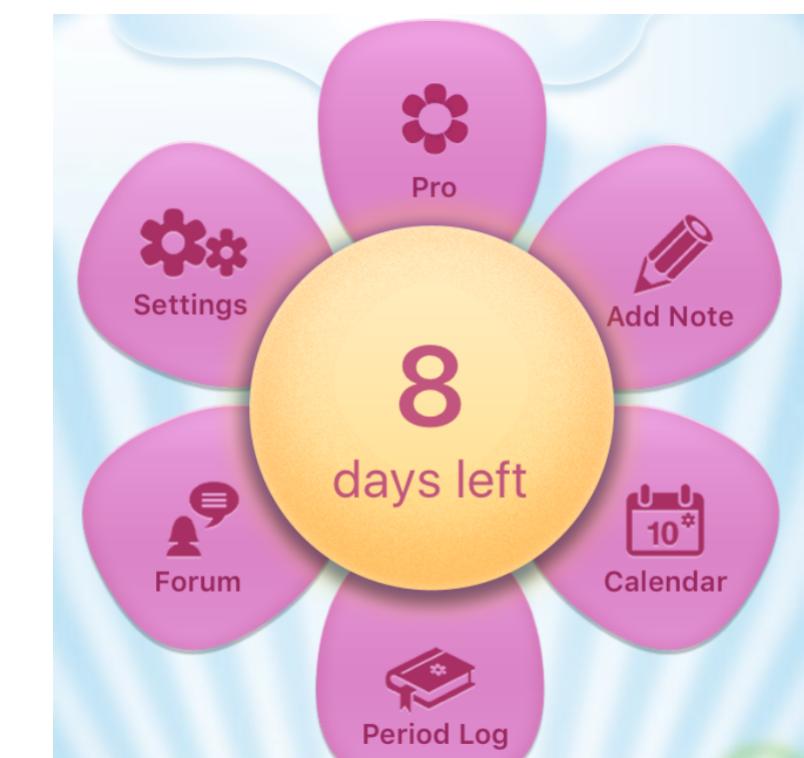
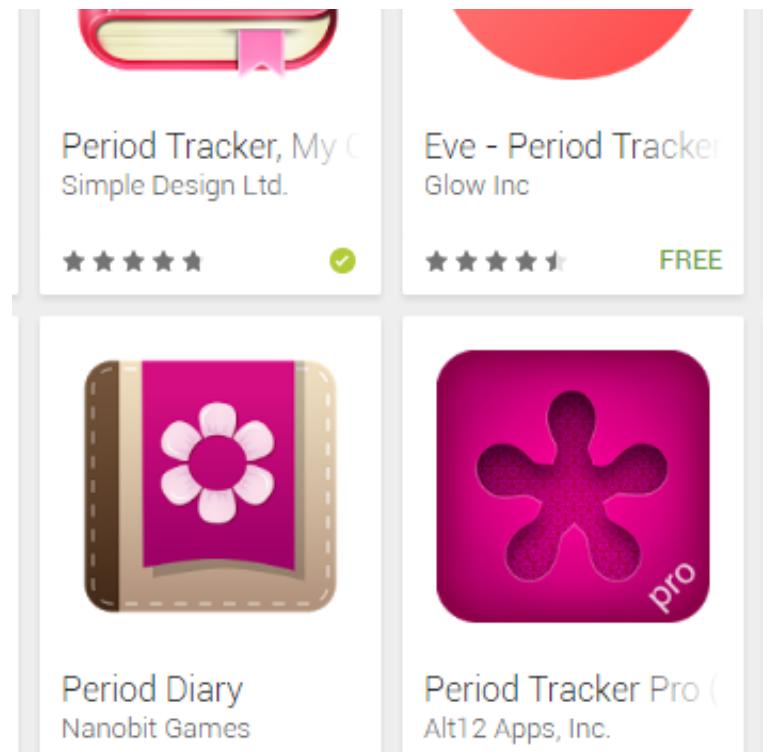
Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Aesthetics

*“They have tried to make it ‘feminine’ by adding flowers...  
It makes me feel like you are trying to ‘dumb it down’ for me.  
Why can’t keeping track of my menstruation be a professional  
and organized task?”*

(S98)



Period Diary  
app

## Assumption: aesthetic preference

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Gender identity

*“Had to find a period tracker that  
didn’t misgender me. Only found two”*

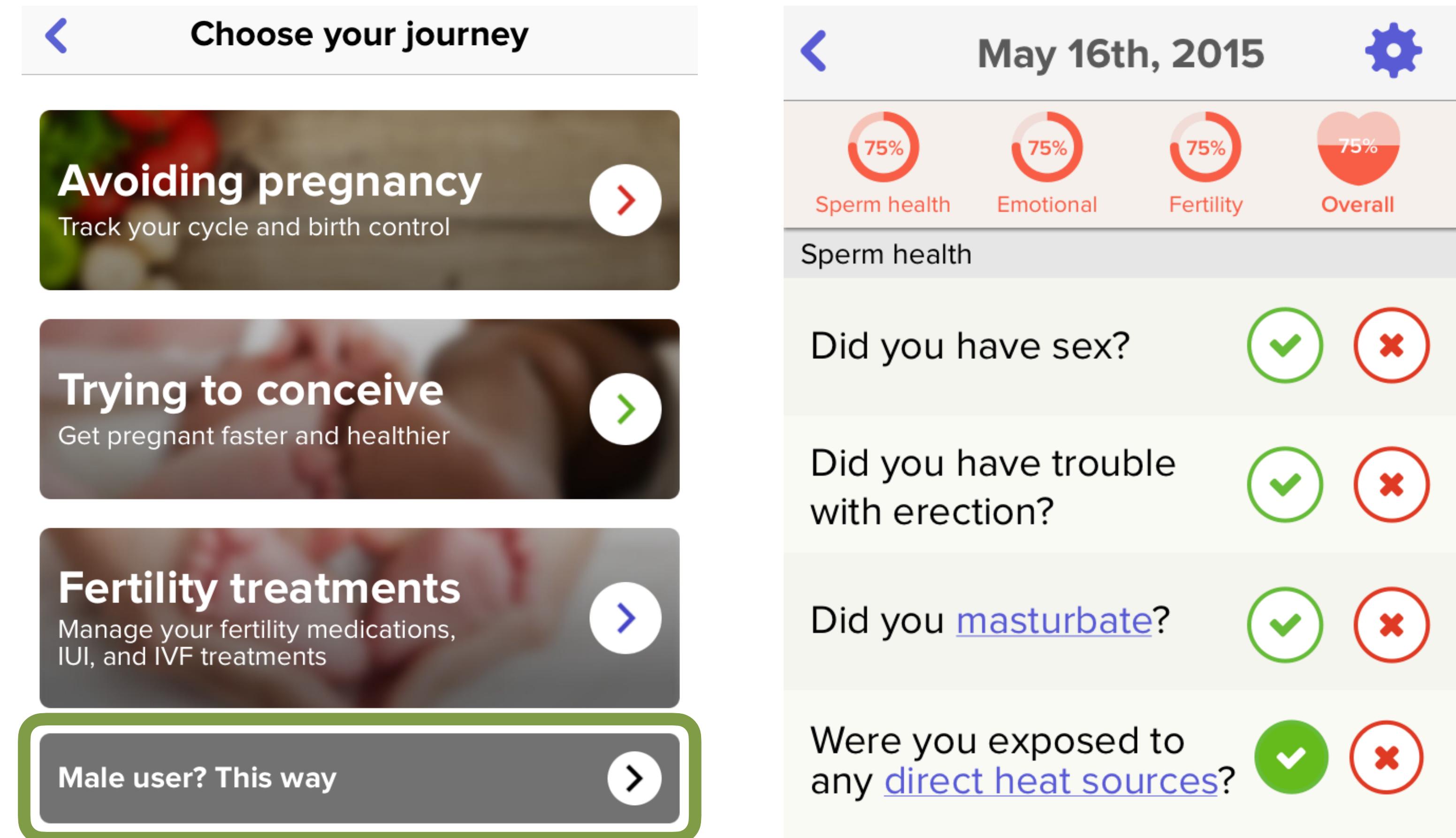
(A841)

## Assumption: female identity

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Gender identity



Glow app

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Sex and ovulation

*“[My app is] clearly trying to support my getting pregnant (which is not my intent) and not just agnostically for tracking”*

(S467)

## Assumption: trying to conceive

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Sex and ovulation

*“I would like if if they made a kid’s version because  
idc [I don’t care] about fertile!! I’m too young!!”*

(A1936)

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Sex and ovulation

*“I wish it were less catered to birth  
and family planning... I suppose  
I’m in the minority since I’m asexual.”*

(A1086)

## Assumption: sexually active

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

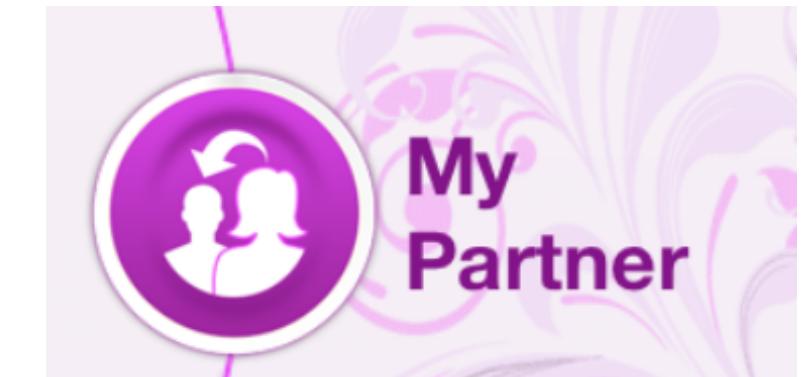
## Sex and ovulation

*“Sex options assume sex with a man...  
[it] reminds me I am not a ‘normal’ woman  
whenever I use the app.”*

(S240)



Clue app



My Period Tracker app

## Assumption: male partner

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Design challenges and concerns

## Sex and ovulation

*“My app shows predicted ovulation. I wish it didn’t.  
We dealt with infertility and extensive treatments for 6 years.  
I am no longer trying to get pregnant and I don’t like the reminder  
of TTC [trying to conceive] or the tiny glimmer of hope that  
maybe by magic this will be the month when a miracle happens.”*

(S104)

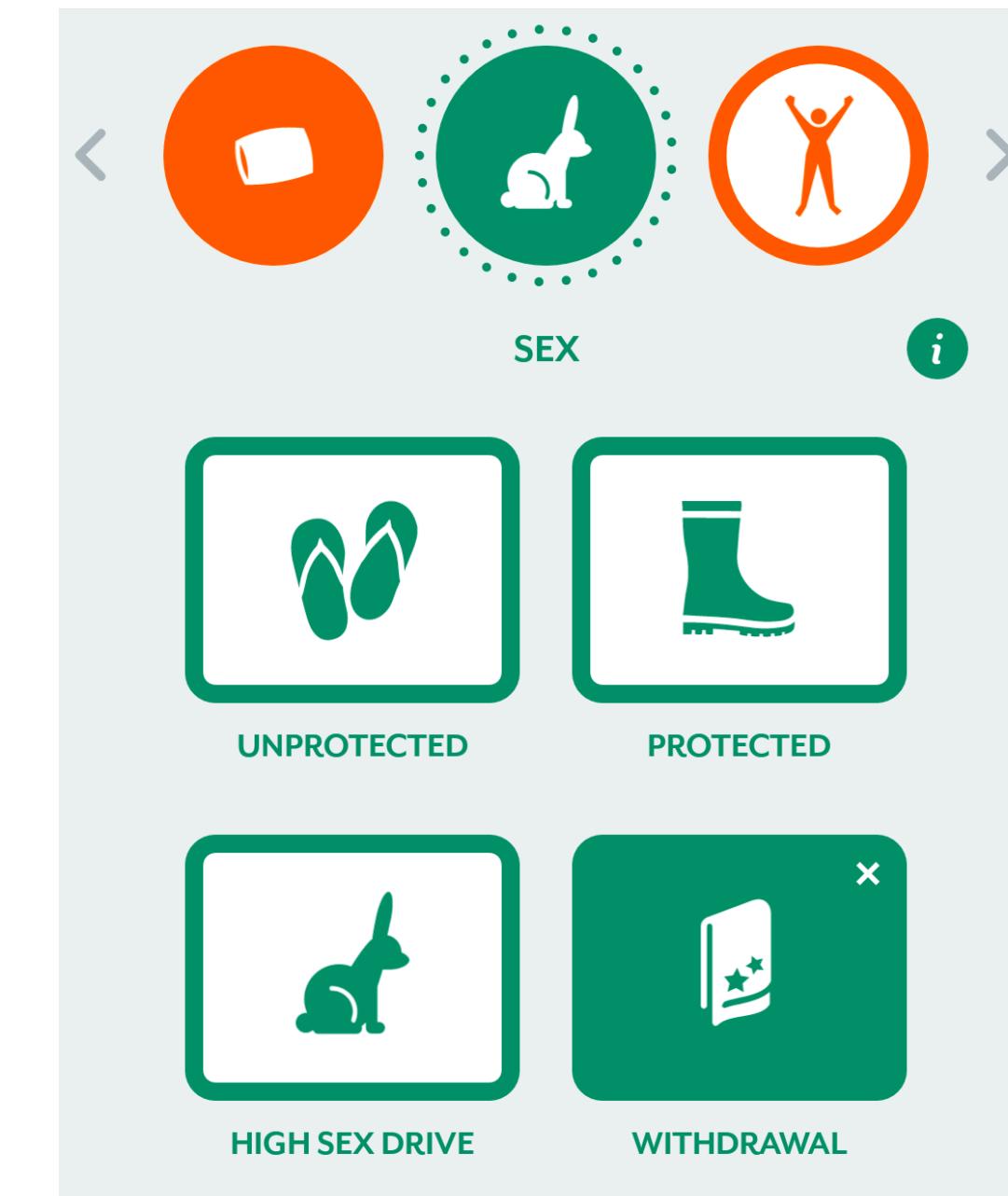
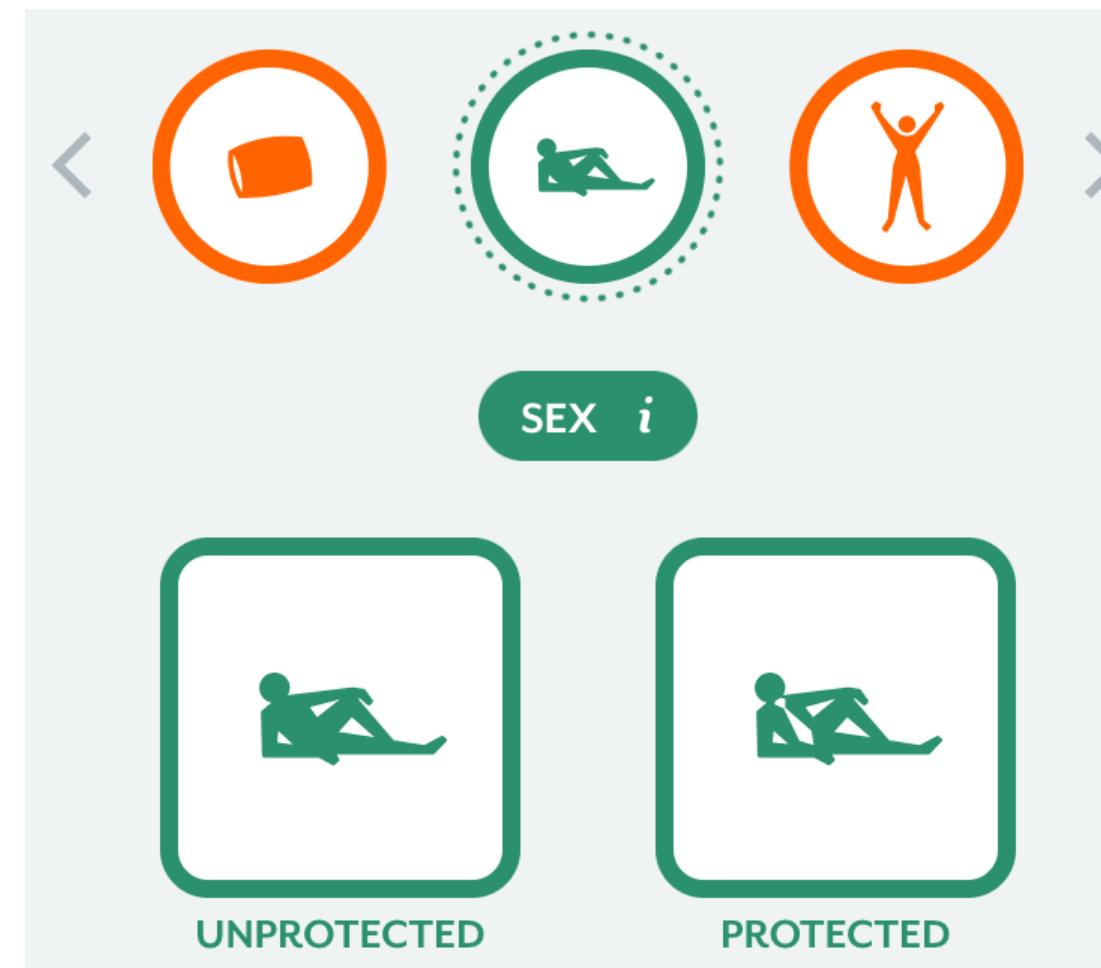
Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

# Inclusive design

- Use terms, icons, etc. which are inclusive whenever possible
  - Representations of sex and gender
- Support customization when neutral terminology is not possible
  - What information is included in homepages
  - Data people enter
- People will customize when it's important to their identities & emotions

Epstein, Lee, Kang, Agapie, Schroeder, Pina, Fogarty, Kientz, Munson. Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools. CHI 2017

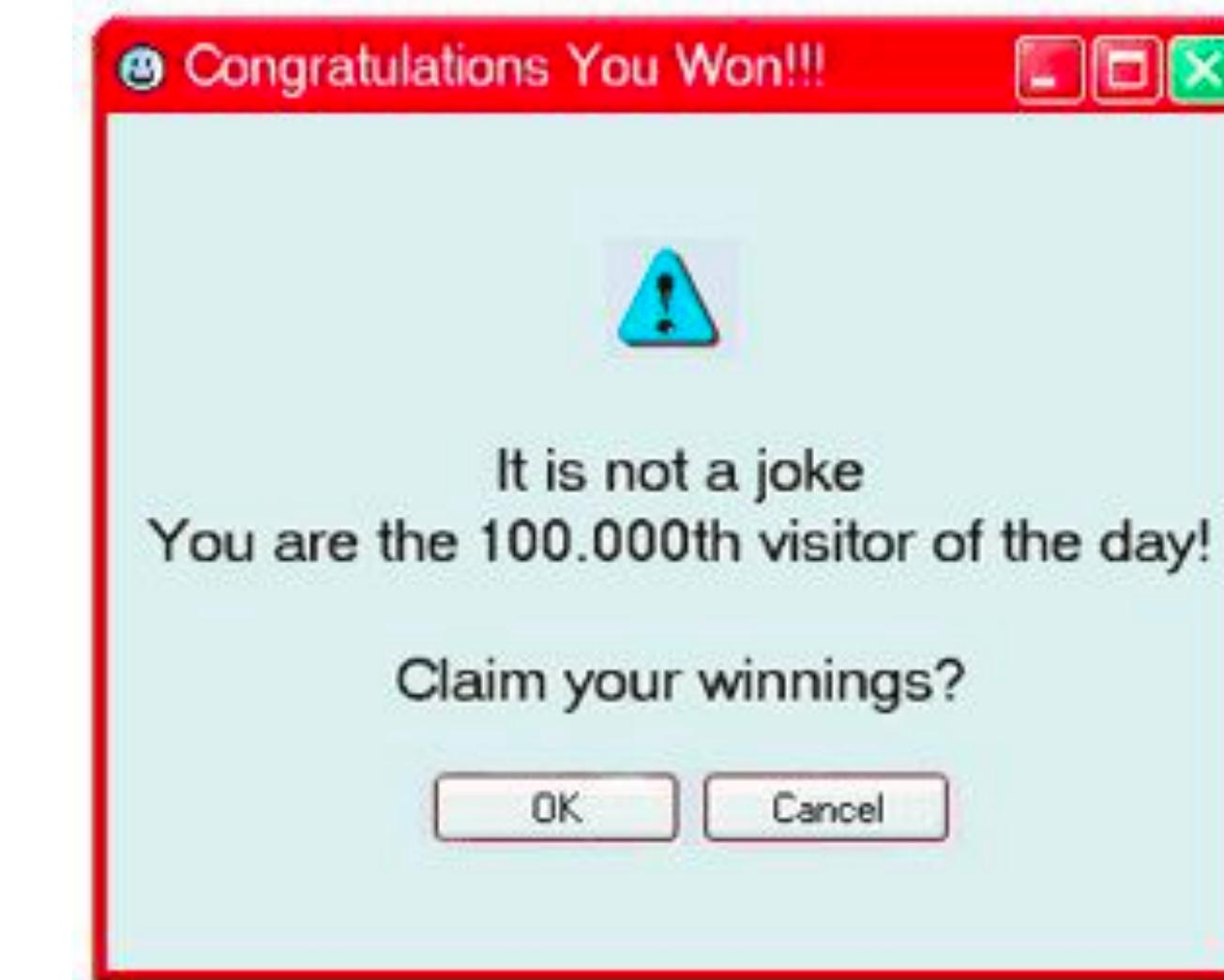
# Inclusive design



**Your choices can deceive people**

# “Dark” interface design patterns

- Patterns designed to mislead or trick people into doing something they don't want to do
- They have been around forever
- They have become more subtle and complex over time

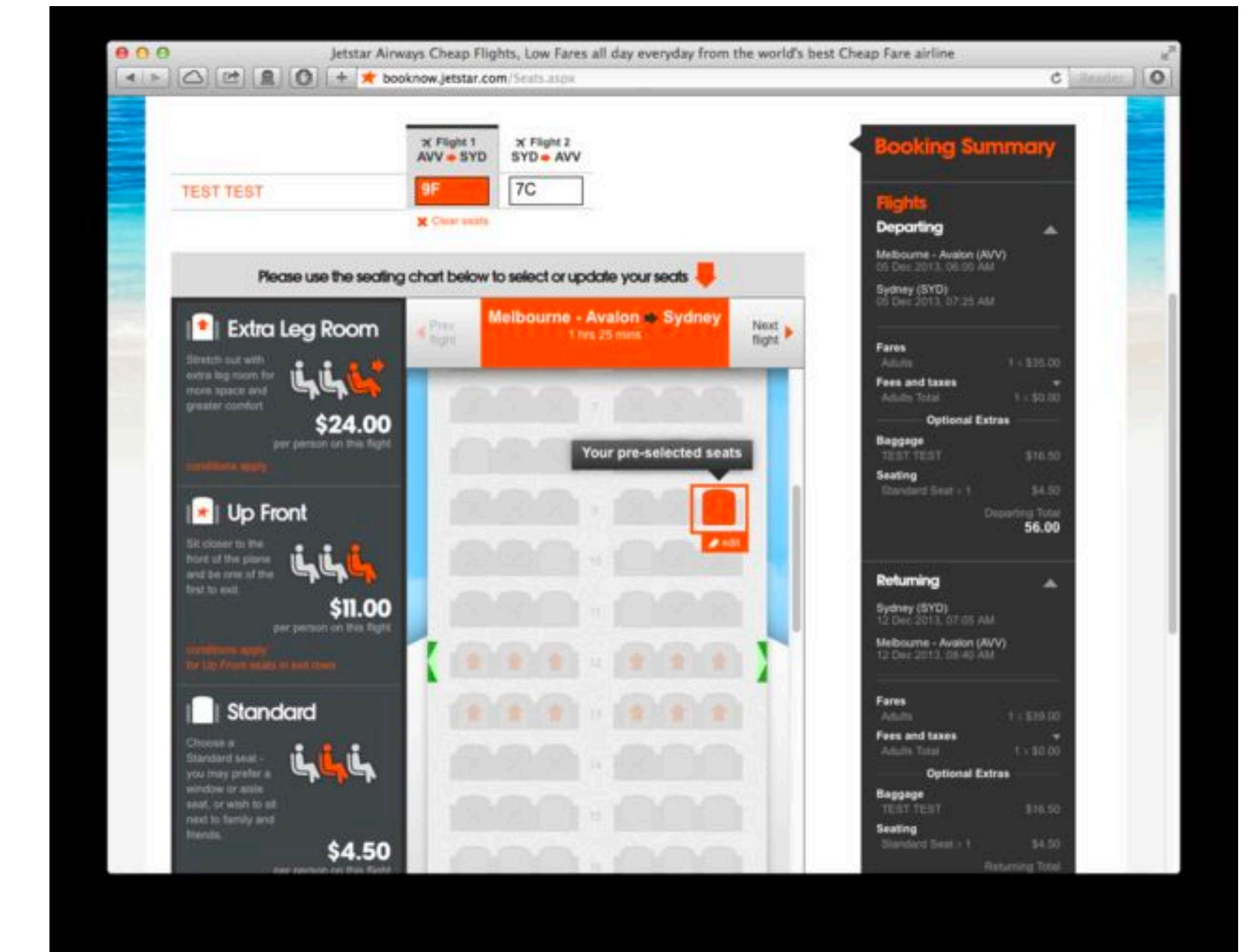


<https://uxdesign.cc/dark-patterns-in-ux-design-7009a83b233c>

# “Dark” interface design patterns

## Misdirection

- Interface focuses your attention on one thing to distract you from another
  - Making more expensive options larger or more colorful
- Generalizable technique used in a lot of other dark patterns



<https://uxdesign.cc/dark-patterns-in-ux-design-7009a83b233c>

# “Dark” interface design patterns

## Bait and switch

- Take a design pattern people know, and reverse the effect
  - The “X” button scheduled a Windows 10 upgrade anyways



<https://uxdesign.cc/dark-patterns-in-ux-design-7009a83b233c>

# “Dark” interface design patterns

## Trick questions

- Use unusual wording in questions to promote unintended actions
- “Required opt-out” (unchecked a box) is a more benign alternative

Please enter your details to reserve your item(s)

Title : Mr. ▾

First name \* : First name

Last name \* : Last name

Email \* : Email

Phone number \* : Phone number

Please do not send me details of products and offers from Currys.co.uk

Please send me details of products and offers from third party organisations recommended by Currys.co.uk

**Reserve items**

<https://uxdesign.cc/dark-patterns-in-ux-design-7009a83b233c>

# “Dark” interface design patterns

## Confirmshaming

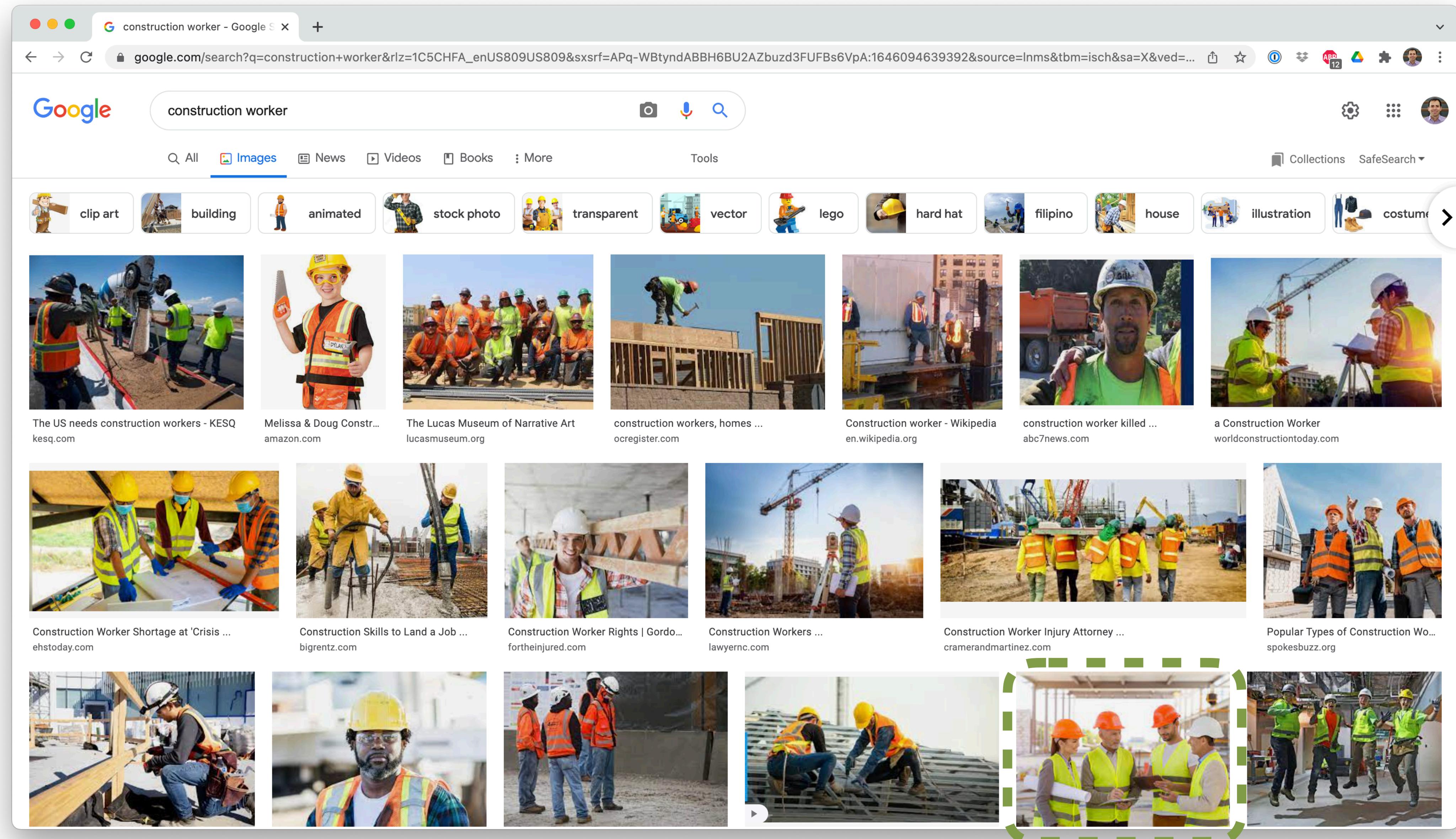
- Guilt a person into opting in to something
- Usually done through wording



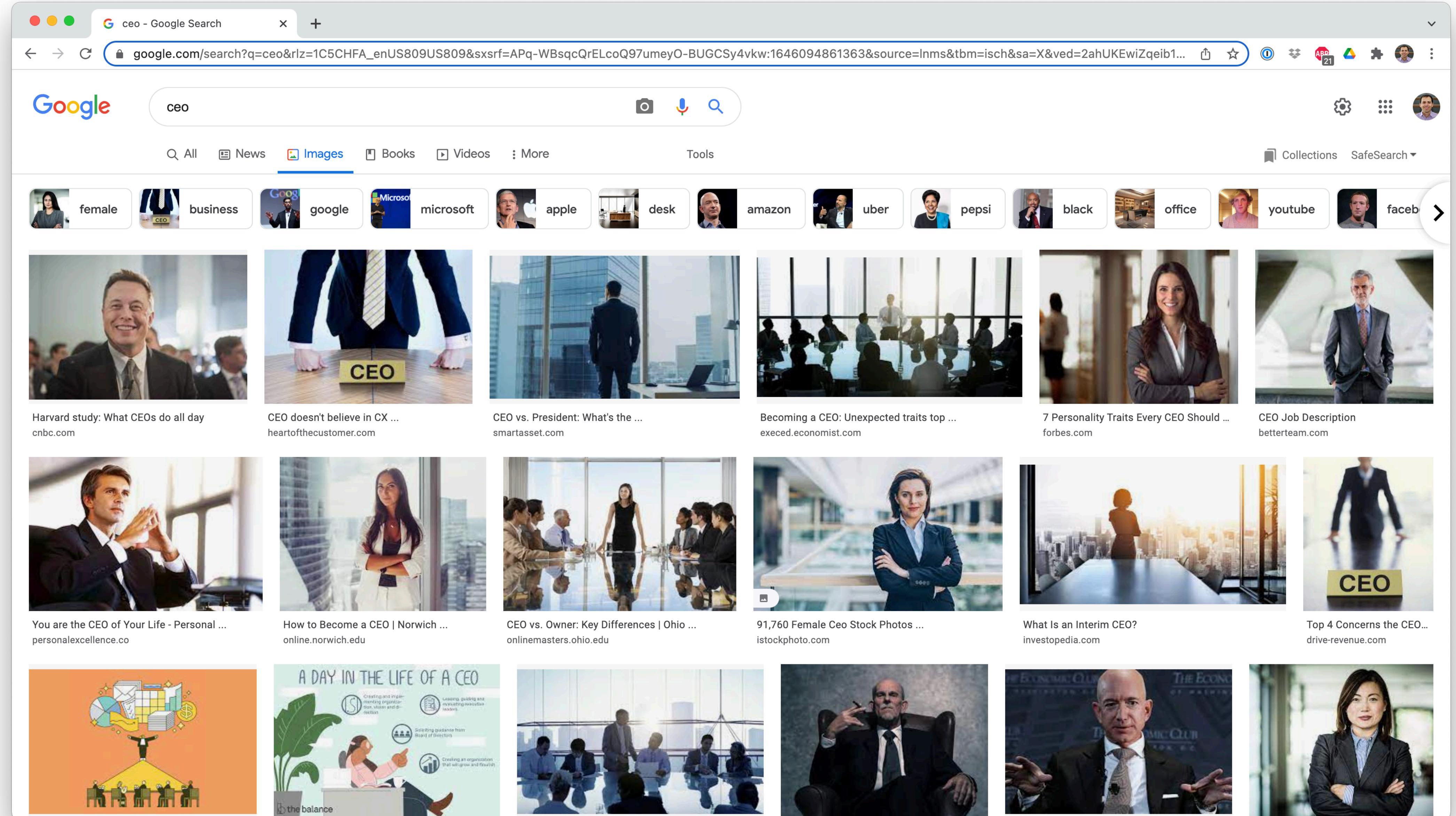
# “Dark” interface design patterns

- In these cases, the person implementing the interface usually knows exactly what they are doing
- Intent is to mislead or persuade in order to profit, increase reach, etc.
- But more often, design choices are more subtle

**Your choices can influence people**



Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015



Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015

NEWS

# The first woman CEO to appear in a Google Images search is ... CEO Barbie



By Zach Miners

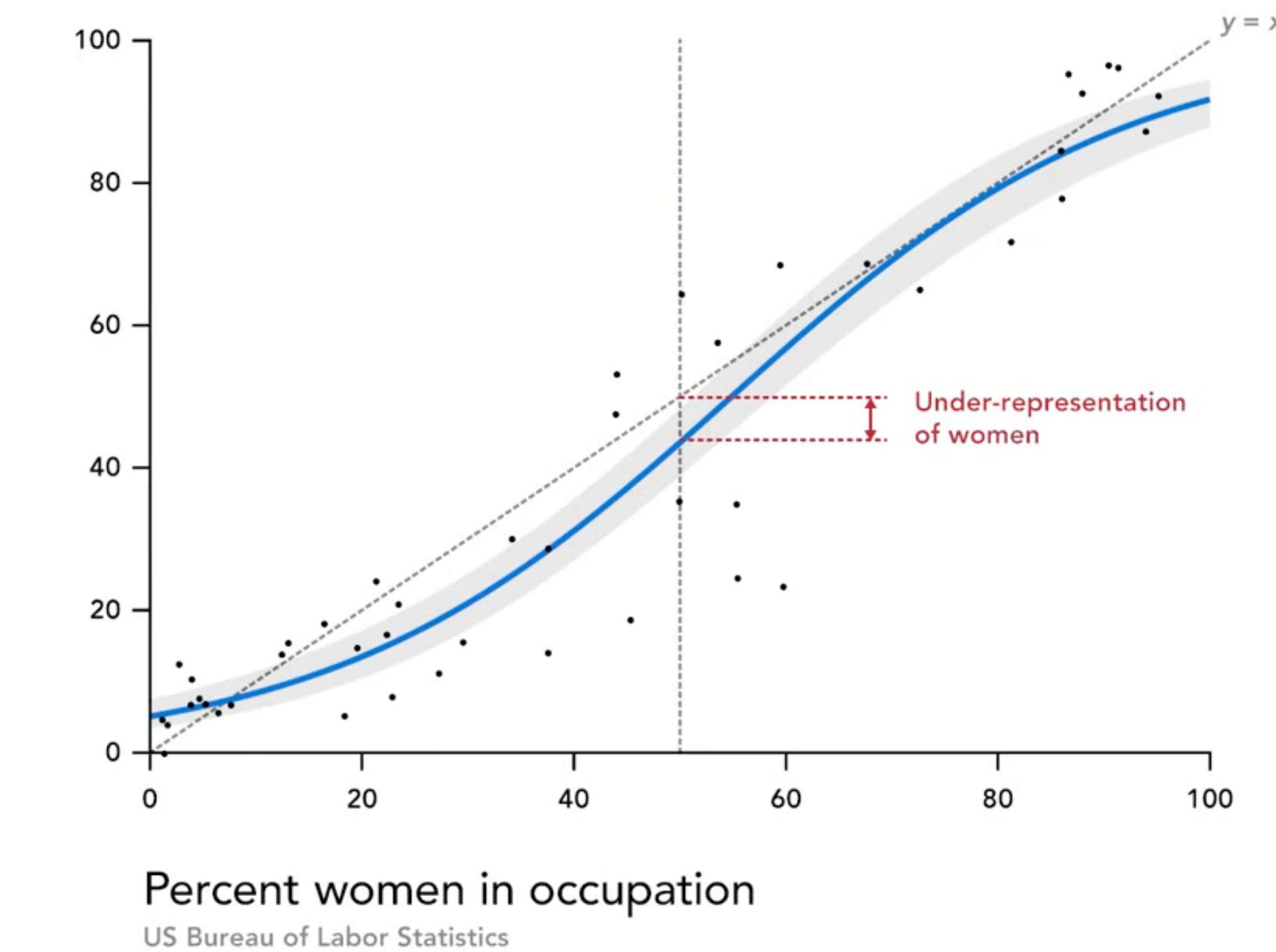
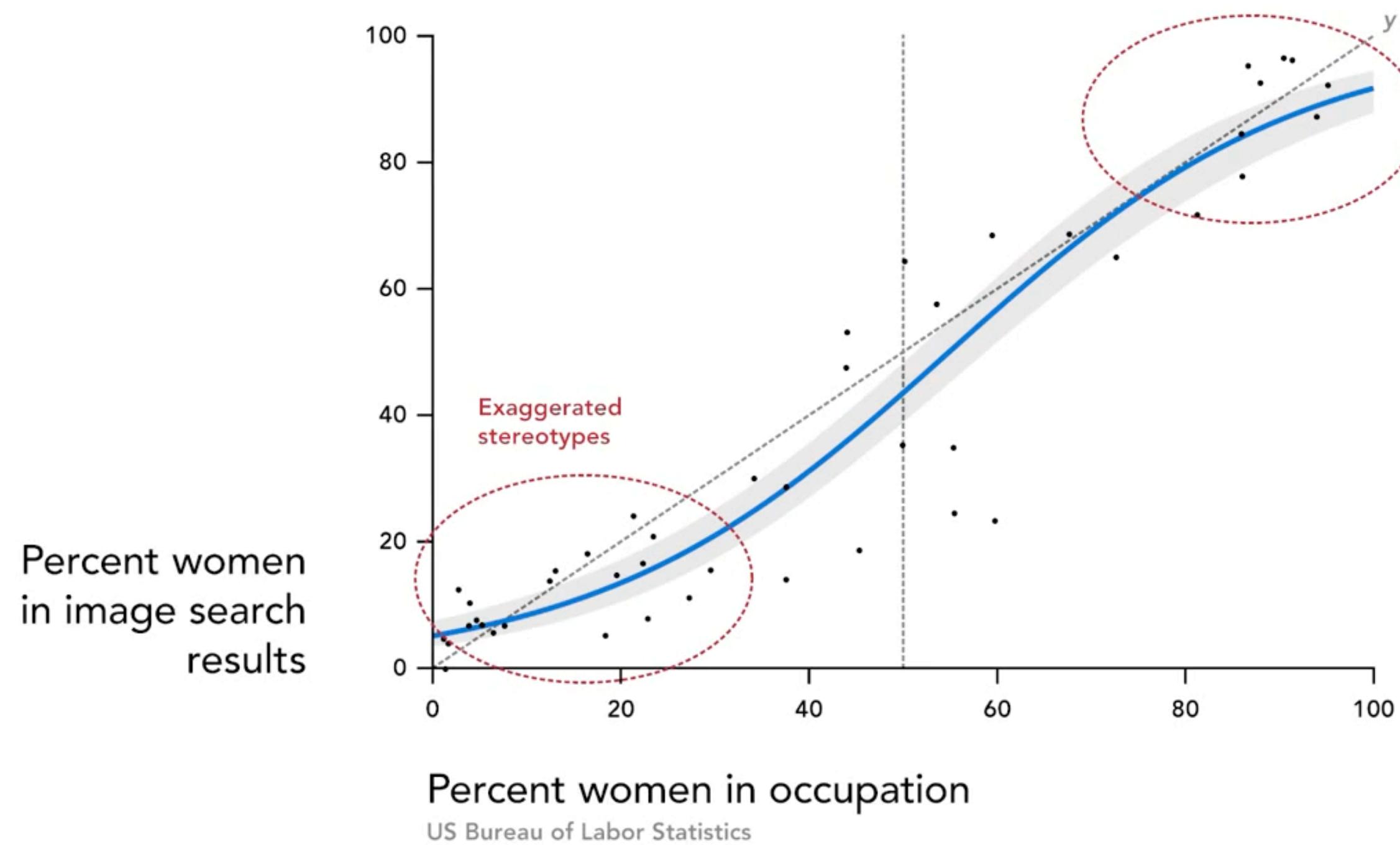
PCWorld | APR 9, 2015 3:00 PM PDT

The [Ellen Pao-Kleiner Perkins trial](#) shone a light on discrimination in the tech industry, but for a more immediate look at the challenges women face in corporate America, look no further than a Google Images search.

Doing a search at the site for "CEO" reveals just one female face in the top results: CEO Barbie. The doll (which [may not even be](#) a real Barbie product) appears way down in the results, under a sea of male, mostly white faces.

It's not really the fault of Google, whose algorithms in many ways reflect the pervasive culture: Most of the top images labeled CEO at popular sites apparently are men. But it's an indication of how under-represented women are at the top of the corporate ladder.

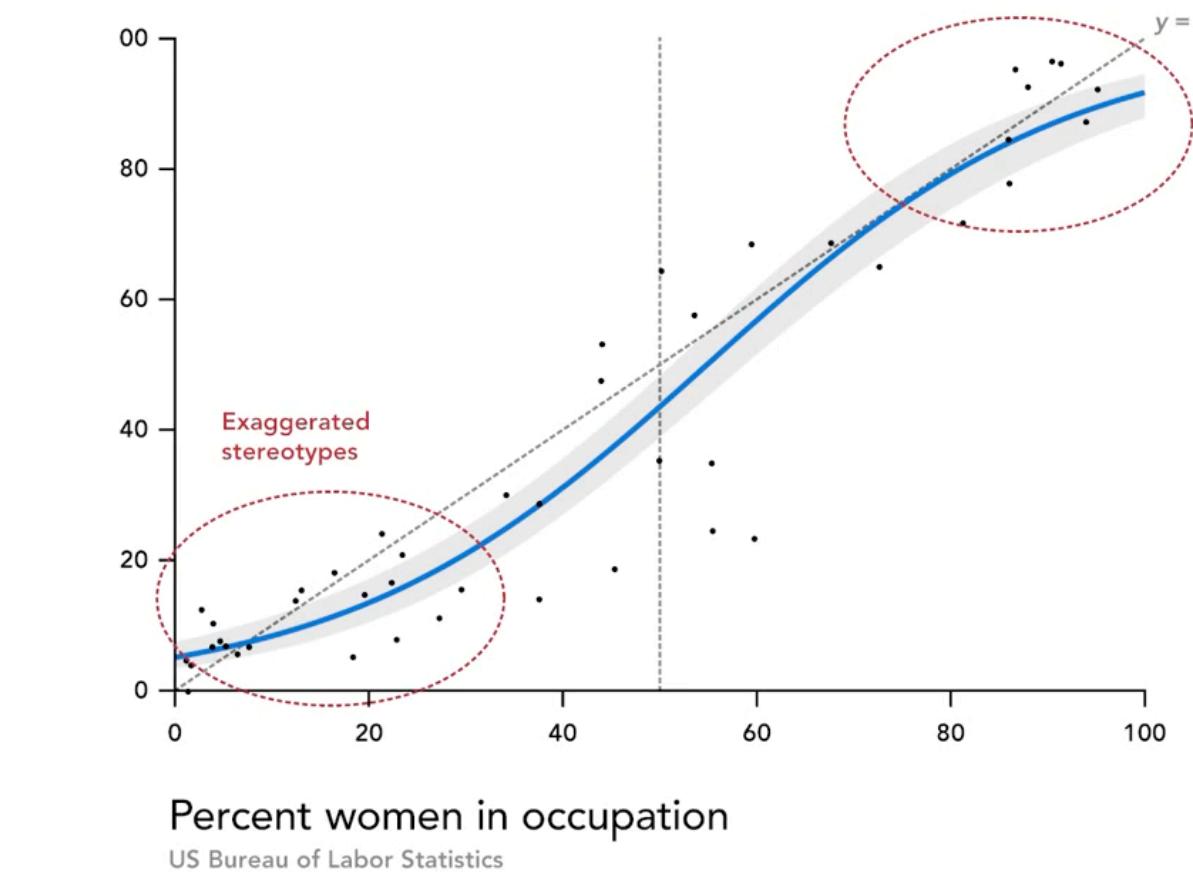
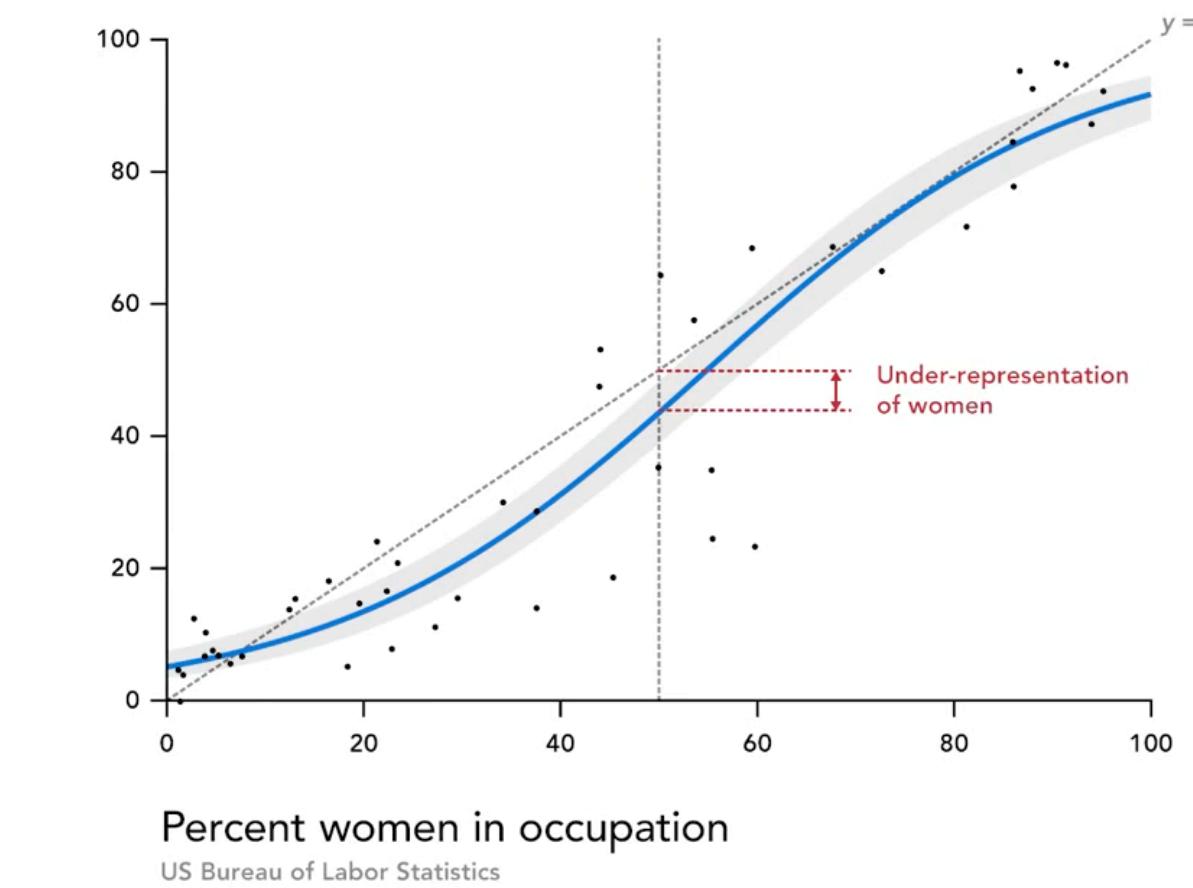
Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015



Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015

# Stereotypes

- Why might the stereotypes be exaggerated?
- Why might women be underrepresented?



Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015

# Question



Which search result will people prefer for “software developer”?

A



a software engineer  
theladders.com



Software Engineering Jobs Dominat...  
spectrum.ieee.org



Senior Software Engineer ...  
elearnerresources.com

B



Software Engineer? - TryEngineering.org ...  
tryengineering.org



Female Software Engineer Pictures ...  
unsplash.com



Software Engineering is the Hottest Job ...  
blog.hackbrightacademy.com



Hiring Software Engineers ...  
addthis.com



Famous Software Engineers & Their ...  
allengineeringschools.com



Software engineer stock photo. Image ...  
dreamstime.com



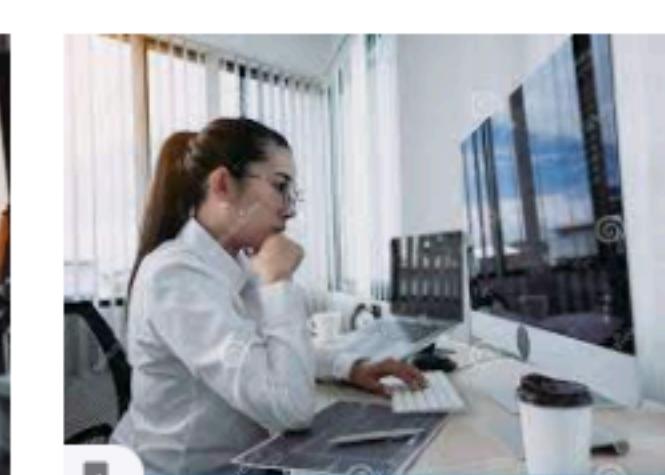
Softw...  
medi...



work for if you're a woman in tech ...  
geekwire.com



114,153 Software Engineer Stock Photos ...  
istockphoto.com



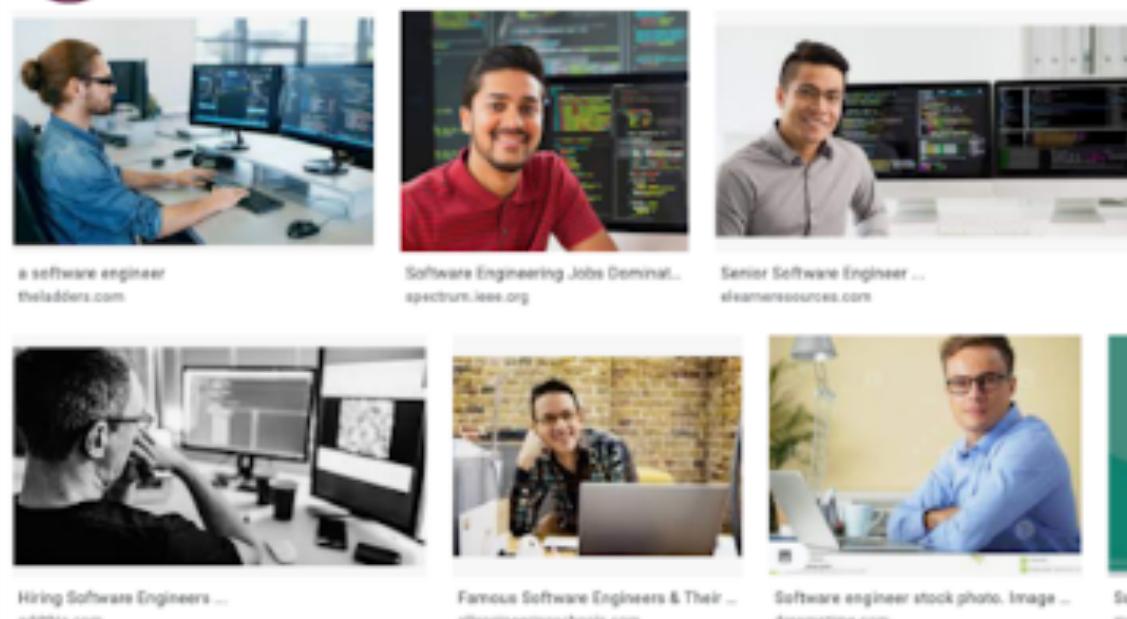
1,112 Female Software Engineer Photo...  
dreamstime.com

0%

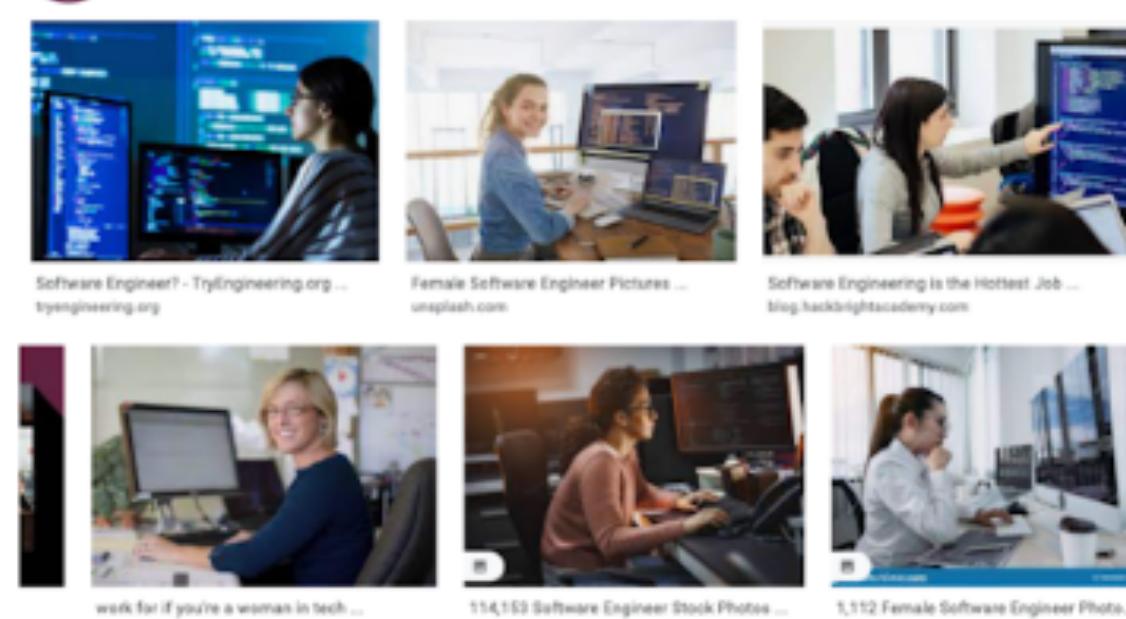
A

## Which search result will people prefer for “software developer”?

A



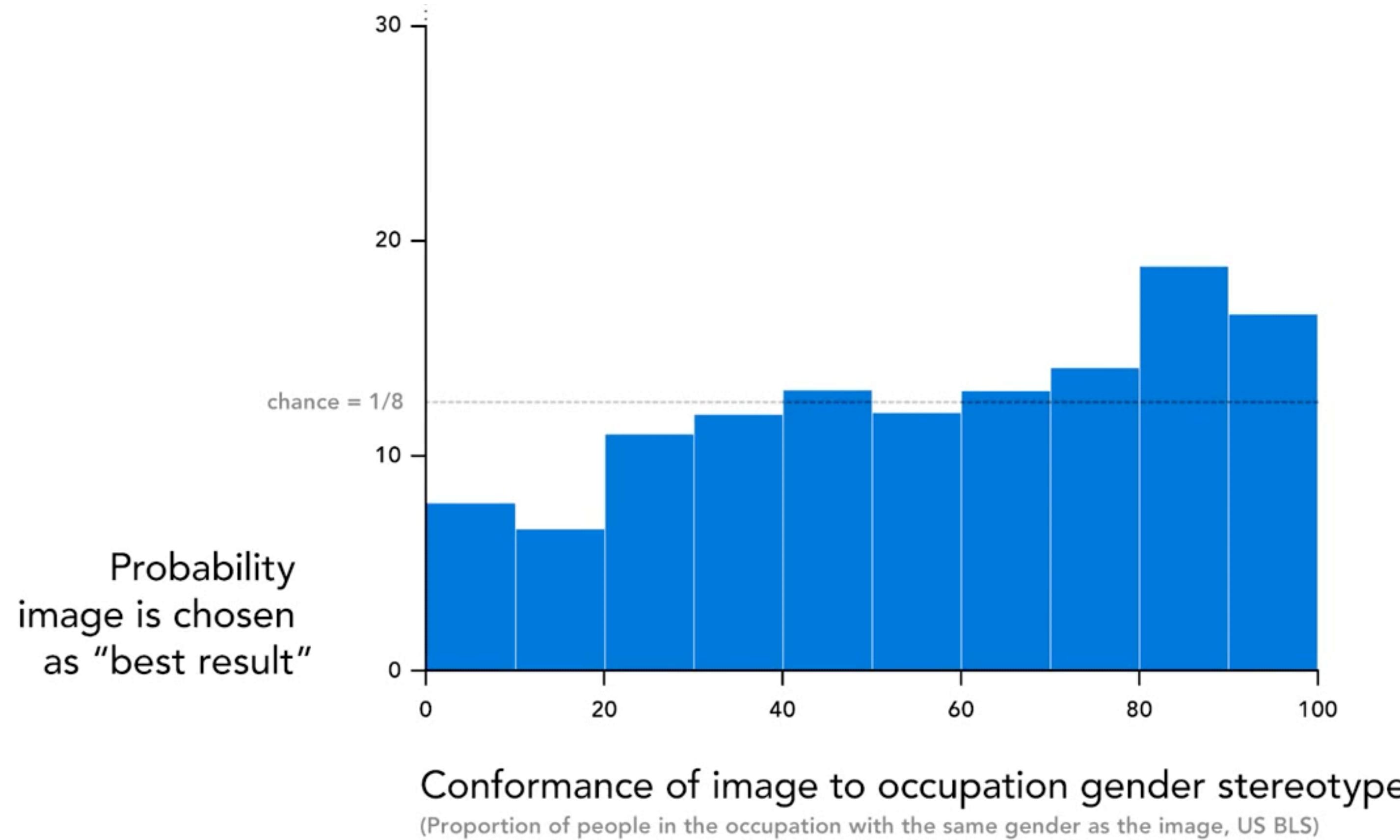
B



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B

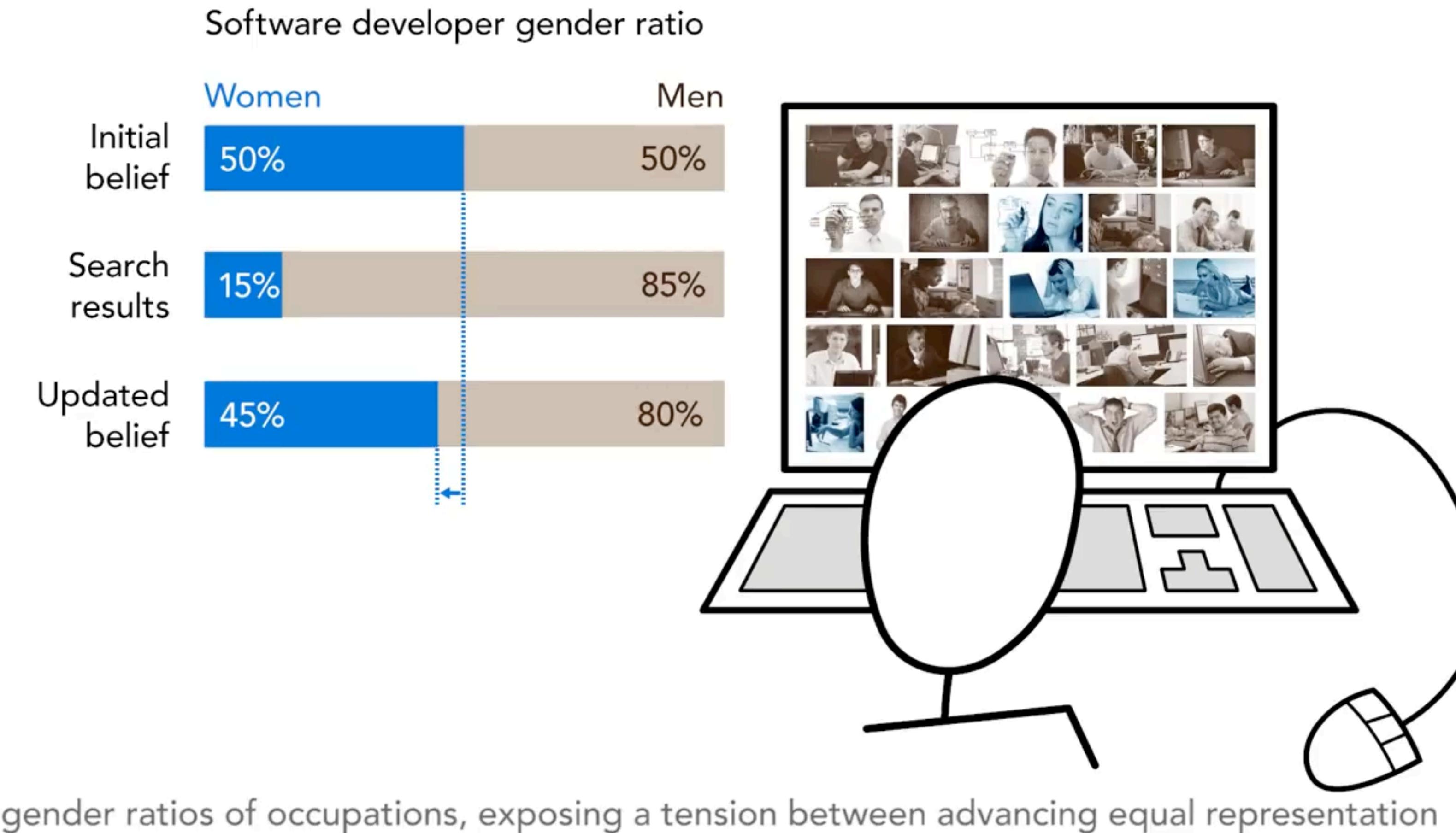
# Giving people what they want



We found that people tend to prefer results matching occupational gender stereotypes

Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015

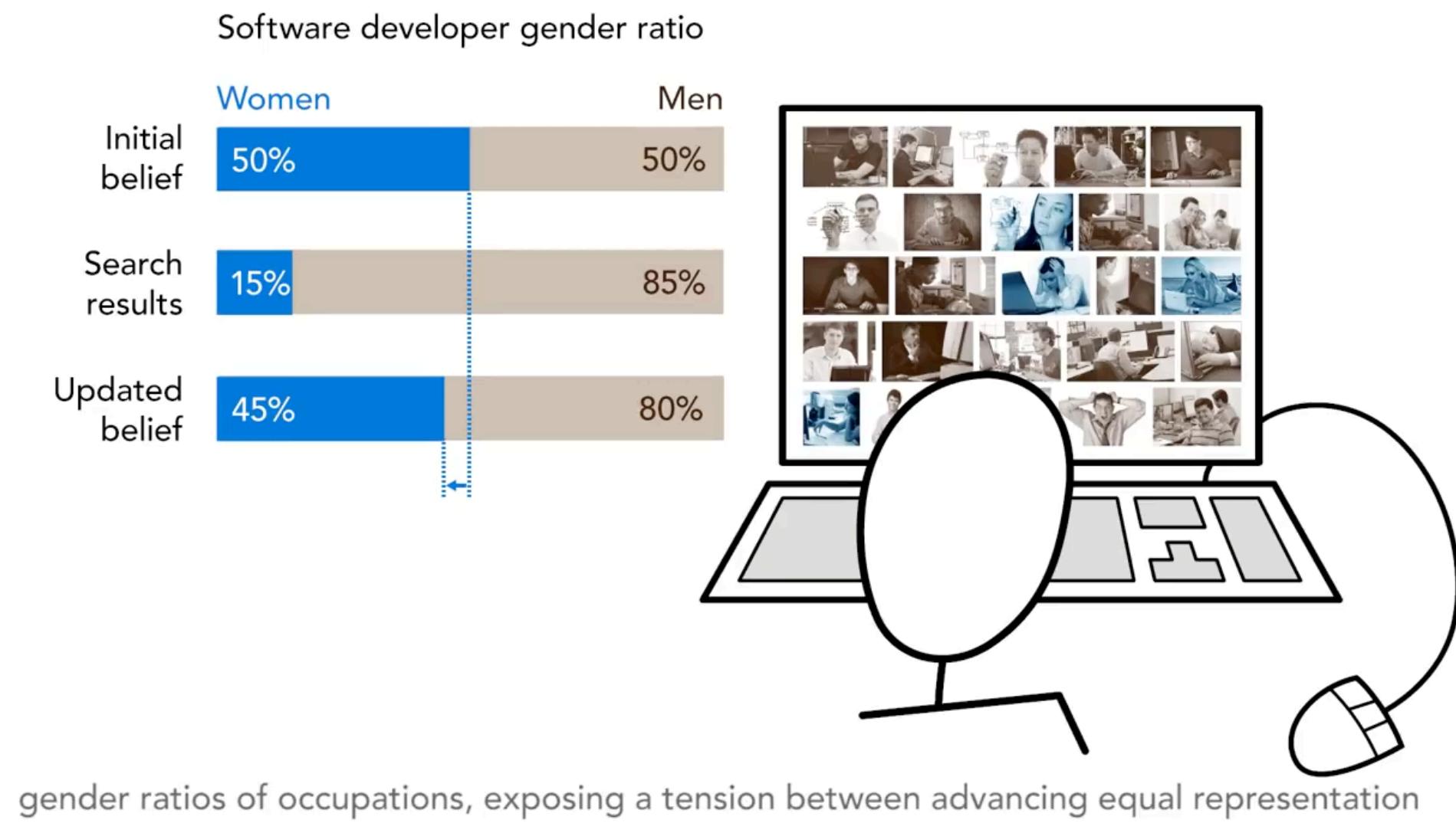
# Design tension



Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015

# Design tension

- Search result choices influence people's perceptions
- As a designer, you have a choice:
  - Do you give people what they want?
  - Do you try to influence what they find acceptable?
- Saying “the algorithm” decided is weak; we know what traits algorithms are reinforcing

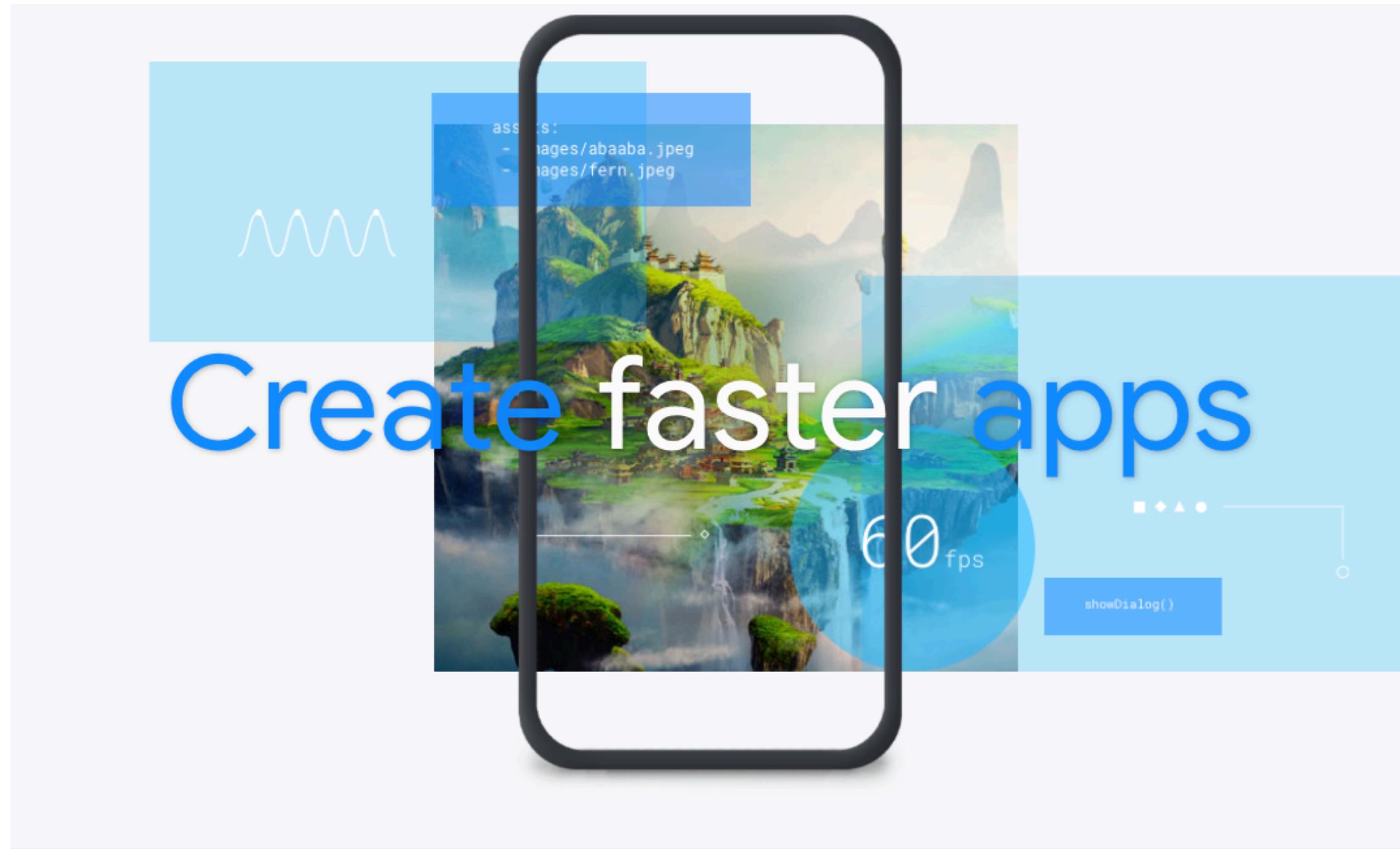


Matthew Kay, Cynthia Matuszek, Sean A. Munson. Unequal Representation and Gender Stereotypes in Image Search Results for Occupations. CHI 2015

# Reflecting on 133

Technology changes quickly

# Technology changes quickly



Made by [Google](#)

Flutter is Google's UI toolkit for building beautiful, natively compiled applications for [mobile](#), [web](#), and [desktop](#) from a single codebase.

[Get started](#)

[Watch video](#)

<https://flutter.dev/>

# **Take away messages from the course**

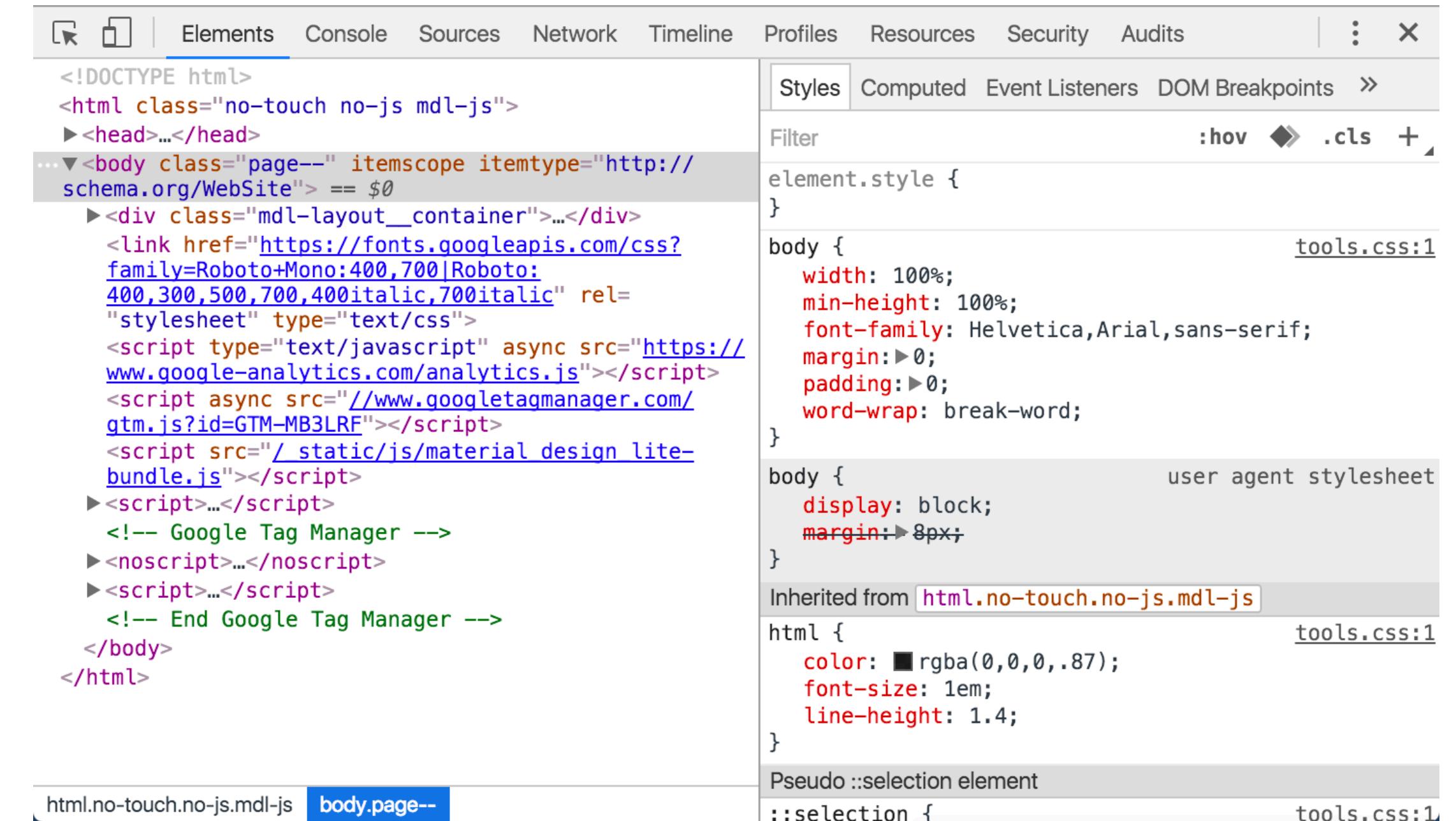
# Search before you build

- Do not reinvent the wheel!
- Use interfaces, algorithms, animations, etc. that have been created by other people



# Build by example

- Learn from others
- Read source code on webpages, GitHub, StackOverflow
- Use the element inspector in your browser to see someone's design or implementation



The screenshot shows the 'Elements' tab of a browser's developer tools. The DOM tree on the left displays the HTML structure of a page, including the head and body sections with various scripts and links. On the right, the 'Styles' panel shows the applied CSS for different elements. A specific rule for the body element is highlighted, which includes styling from 'tools.css:1' and the 'user agent stylesheet'. The rule defines a width of 100%, a height of 100%, a sans-serif font-family (Helvetica, Arial), and sets margins and padding to 0. It also includes a word-wrap property. The 'Inherited from' section shows styles from 'html.no-touch.no-js.mdl-js' and 'body.page--'. At the bottom, there is a note about the Pseudo ::selection element.

```
<!DOCTYPE html>
<html class="no-touch no-js mdl-js">
  <head>...</head>
  ...<body class="page-- itemscope itemtype="http://schema.org/WebSite"> == $0
    <div class="mdl-layout__container">...</div>
    <link href="https://fonts.googleapis.com/css?family=Roboto+Mono:400,700|Roboto:400,300,500,700,400italic,700italic" rel="stylesheet" type="text/css">
    <script type="text/javascript" async src="https://www.google-analytics.com/analytics.js"></script>
    <script async src="//www.googletagmanager.com/gtm.js?id=GTM-MB3LRF"></script>
    <script src="/static/js/material_design_lite_bundle.js"></script>
    <script>...</script>
    <!-- Google Tag Manager -->
    <noscript>...</noscript>
    <script>...</script>
    <!-- End Google Tag Manager -->
  </body>
</html>
```

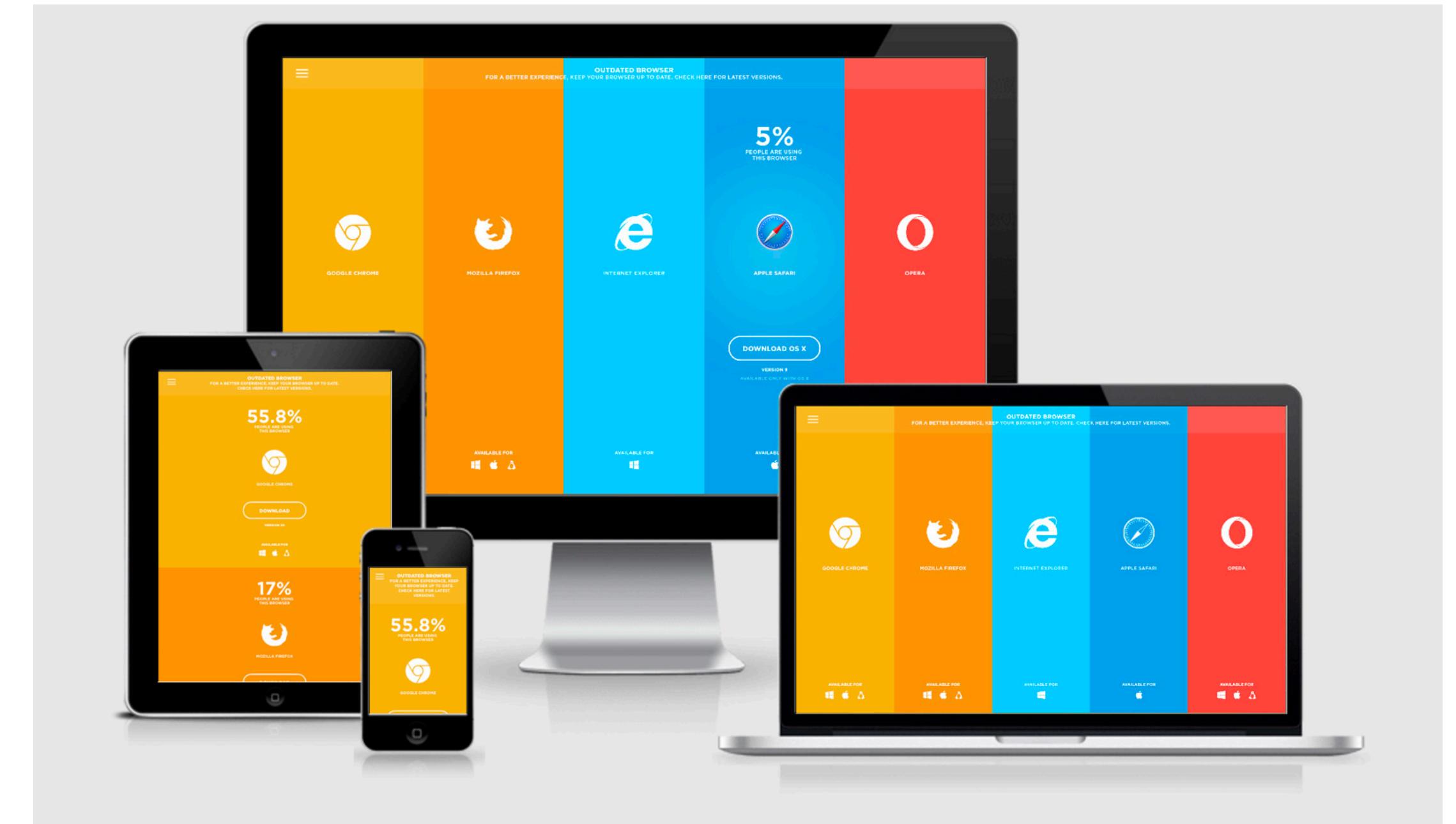
html.no-touch.no-js.mdl-js    body.page--

element.style {  
}

body {  
 width: 100%;  
 min-height: 100%;  
 font-family: Helvetica, Arial, sans-serif;  
 margin: 0;  
 padding: 0;  
 word-wrap: break-word;  
}  
body {  
 display: block;  
 margin: 8px;  
}  
Inherited from html.no-touch.no-js.mdl-js  
html {  
 color: #rgba(0,0,0,.87);  
 font-size: 1em;  
 line-height: 1.4;  
}  
Pseudo ::selection element  
::selection {

# Build for accessibility

- Keep in mind who you are designing for!
- Make sure your app works for:
  - All users
  - All browsers
  - All devices



# Build with caution

- Use version control!
- Test while you build
- Iteratively refine and debug



**GitHub**

# Build on a solid foundation

- A new framework will come out next year
  - Or next month or next week
- But some fundamental principles unite them all
  - Separating interface from data and interaction, for example

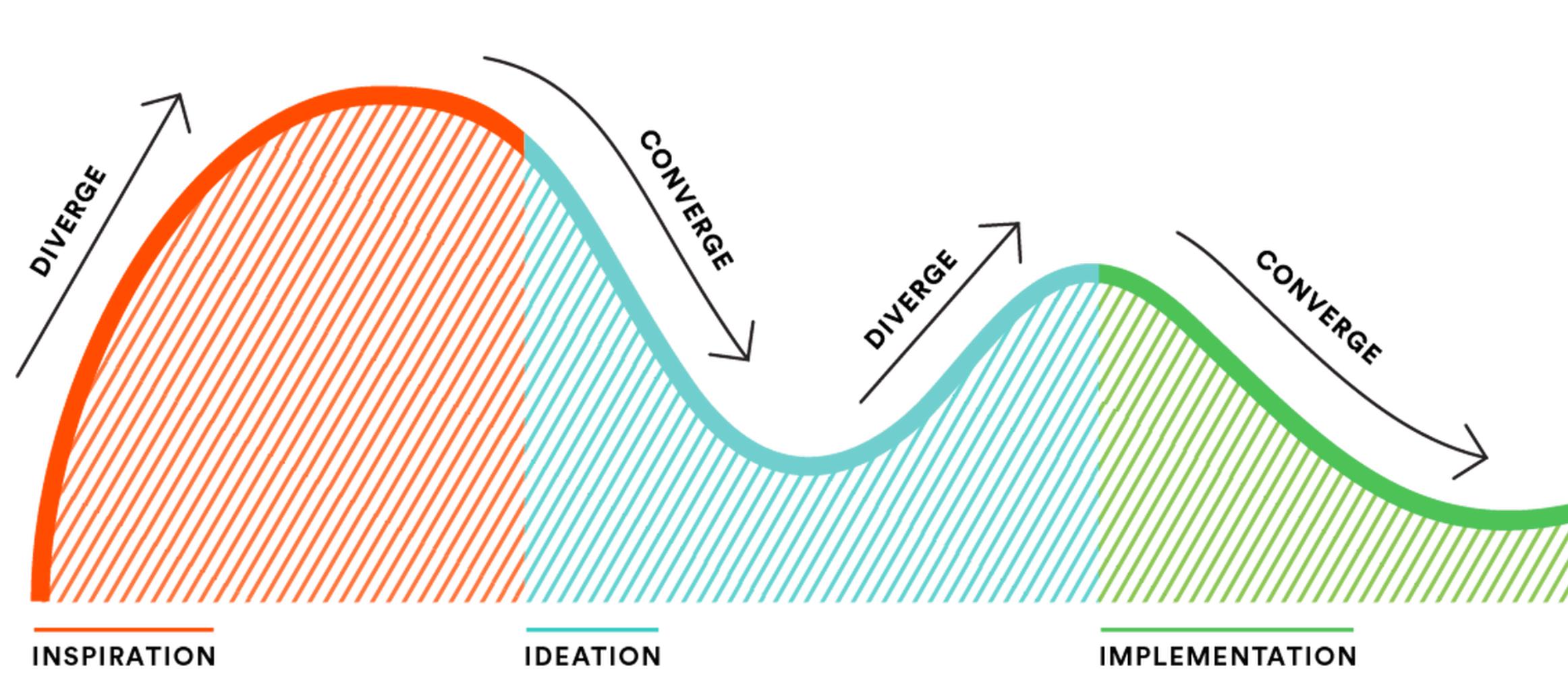


# Take away messages

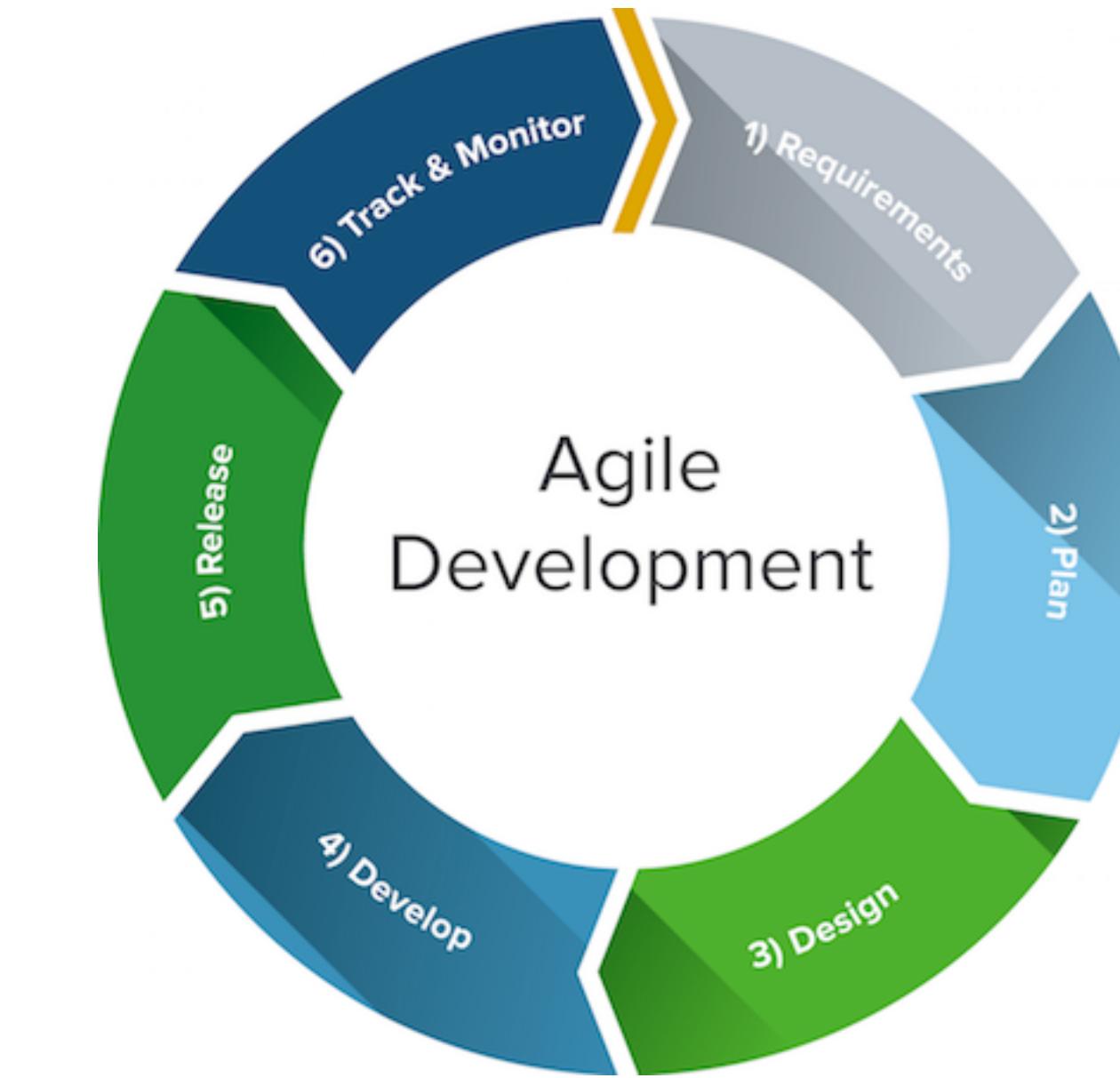
- Search before you build
- Build by example
- Build for accessibility
- Build with caution
- Build on a solid foundation

# **Applying this course in practice**

# Product design process

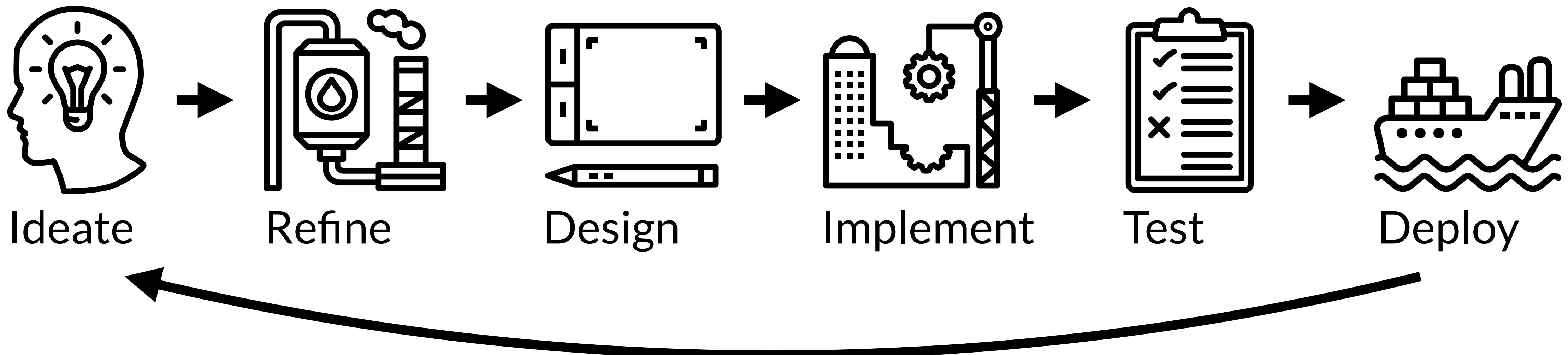


Human-Centered Design, IDEO



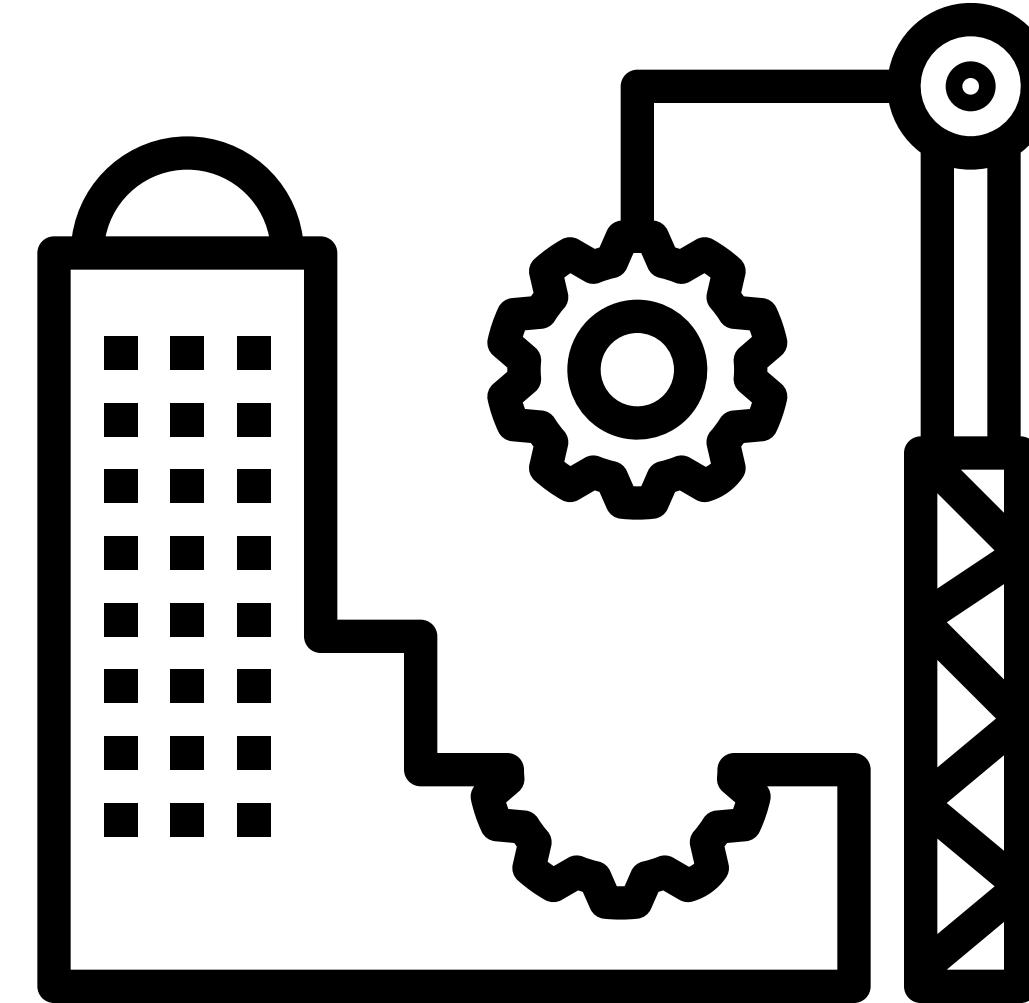
Agile Development, Agile Manifesto

# Product design process, simplified



# User interface implementation

- Has the power to turn ideas into reality
- Often dictates design decisions and timelines, for better or for worse
- Either you will be implementing, or you will need to communicate with your colleagues who are



**What job might you get  
when you graduate?**

# Some job options

- User experience designer
- User experience researcher
- Front-end software engineer
- Back-end software engineer
- Academic researcher (graduate student)
- Software consultant
- Something unrelated to technology
- ... others?

# If you're going into UX, you can now...

- Follow principles of web, mobile, AR design
  - Responsive design! Error prevention! Give clear instruction!
- Be conversational in web and mobile programming
  - Be able to understand what tasks are easy and what are hard
  - And understand when a developer is BSing you about how long something will take
- Style a webpage
  - Use CSS and SASS to change a design and even add animations

# Front-end software engineering...

- Build a webpage in plain HTML
  - Make it responsive with Bootstrap
- Use a framework to build a richer application
  - Angular for a web frontend
  - Ionic for a mobile frontend
- Style a webpage
  - Use CSS and SASS to change a design and even add animations

# Back-end software engineering...

- Build a web server
  - Allow it to respond to requests from a front-end interface
  - Allow it to make requests to APIs made by other developers
- Follow authentication and authorization protocols
  - Enable users to sign on
- Use a database
  - Data can persist between sessions

# Academic research...

- Explain some key problems in a couple of areas
  - Ubiquitous computing
  - Human performance
  - Conversational interfaces
  - Wearable computing
  - Augmented and virtual reality

# Software consultancy...

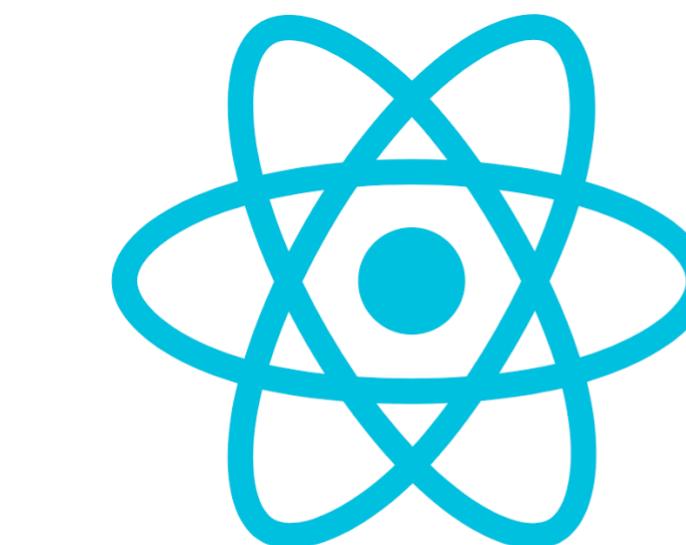
- Process and analyze data
  - Retrieve it from an API
  - Parse and process it to answer your question
- Visualize data
  - Use an appropriate tool for the task

# Something unrelated...

- Make a portfolio to show off your skills
  - Selling yourself is key
- Judge new devices and apps that come along
  - Is this solving a real problem?
  - Is this well designed?

# What is interface implementation today?

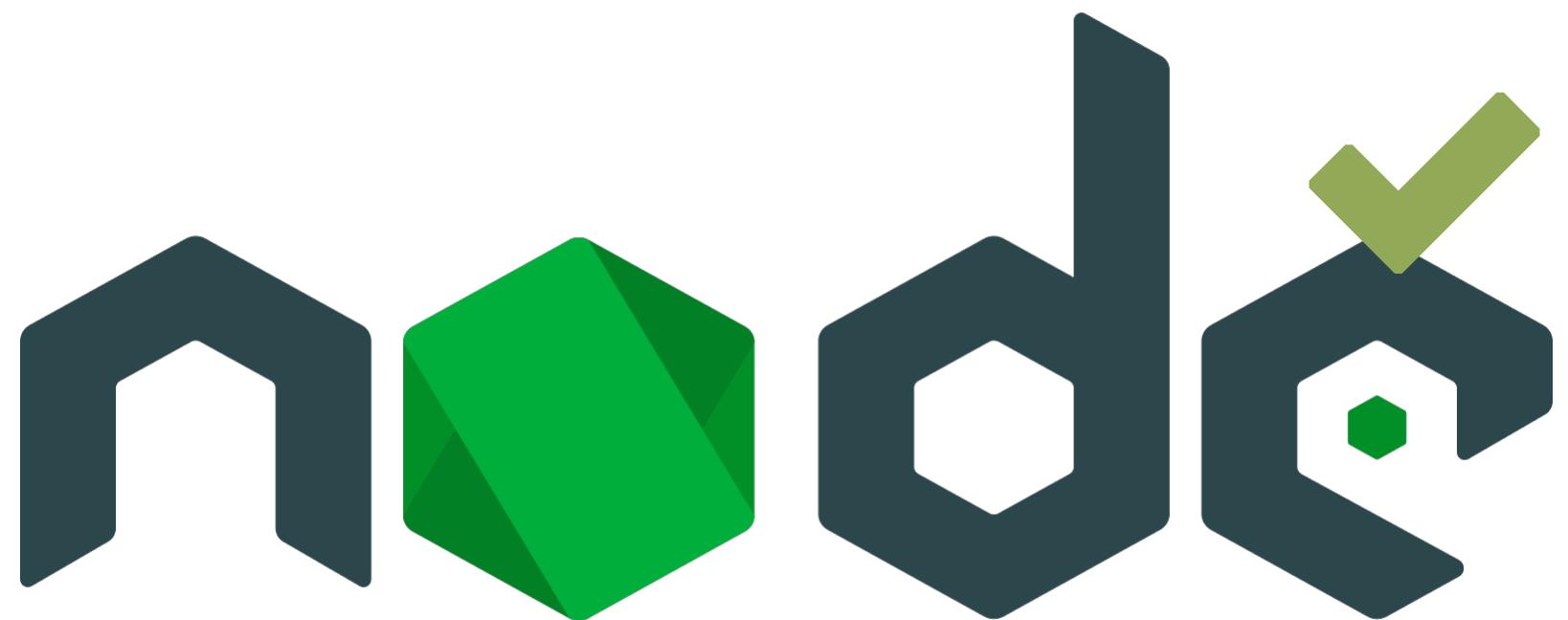
Often HTML, CSS, and JavaScript



React JS



Bootstrap



Vue.js



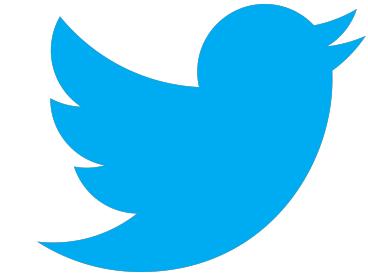
ionic  
ember

# Assignments

- A1: Personal web portfolio



- A2: Programming on the web



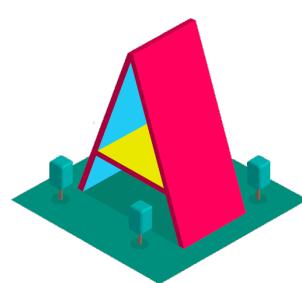
- A3: Web frameworks



- A4: Mobile development



- A5: Beyond Web & Mobile



# Other skills

- Git and GitHub
- Package management in npm
- SASS
- Visualization in Vega-Lite

# Question



What framework or language did you find the most challenging to pick up?

- A HTML and CSS
- B JavaScript and TypeScript
- C Angular
- D Ionic
- E Platforms beyond web & mobile

## What framework or language did you find the most challenging to pick up?

- A HTML and CSS
- B JavaScript and TypeScript
- C Angular
- D Ionic
- E Platforms beyond web & mobile

A

0%

B

0%

C

0%

D

0%

E

0%

# Question



**What framework or language did you find the most rewarding to learn to use?**

- A HTML and CSS
- B JavaScript and TypeScript
- C Angular
- D Ionic
- E Platforms beyond web & mobile

## What framework or language did you find the most rewarding to learn to use?

- A HTML and CSS
- B JavaScript and TypeScript
- C Angular
- D Ionic
- E Platforms beyond web & mobile

A

0%

B

0%

C

0%

D

0%

E

0%

# Congratulations!

- We said this class would be challenging
- You have risen to the challenge and worked hard (and still are)
- You have created impressive work as a result

**It's been an honor  
to be able to teach you.**

**I look forward to seeing  
what you do next!**

# Today's goals

By the end of today, you should be able to...

- Describe how concepts from IN4MATX 133 can integrate into research and practice
- Summarize what you learned in IN4MATX 133
- Describe the relevance of the topics to different disciplines in industry
- Fill out the course evaluation!

# **IN4MATX 133: User Interface Software**

Lecture 20:  
Wrap-Up