

Mobile App Accessibility

Building Apps that Work for Everyone

Anne Spencer Ross
Bucknell University, Fall 2020



Logistics

Access

Captions are available

Identify yourself when you speak

- Name
- Student/Faculty

Interaction

Posed questions

- Answer in chat
- Raise your Zoom hand

Comments throughout

- Post in chat
- Un-mute and voice your questions

Fitting Into Curriculum

Accessibility as foundational to introductory computer science courses (e.g., ethics modules)

Accessibility in design (e.g., CSCI 479)

Open research questions for student projects

Objectives

Why does mobile app accessibility matter?

What does mobile app accessibility mean?

How often do accessibility failures happen?

What tools can you use to make more accessible apps?

What, beyond developers, goes into app accessibility?

What are open research questions in app accessibility?

How can you apply accessibility in your learning and professional experiences?

Objectives

Why does mobile app accessibility matter?

What does mobile app accessibility mean?

How often do accessibility failures happen?

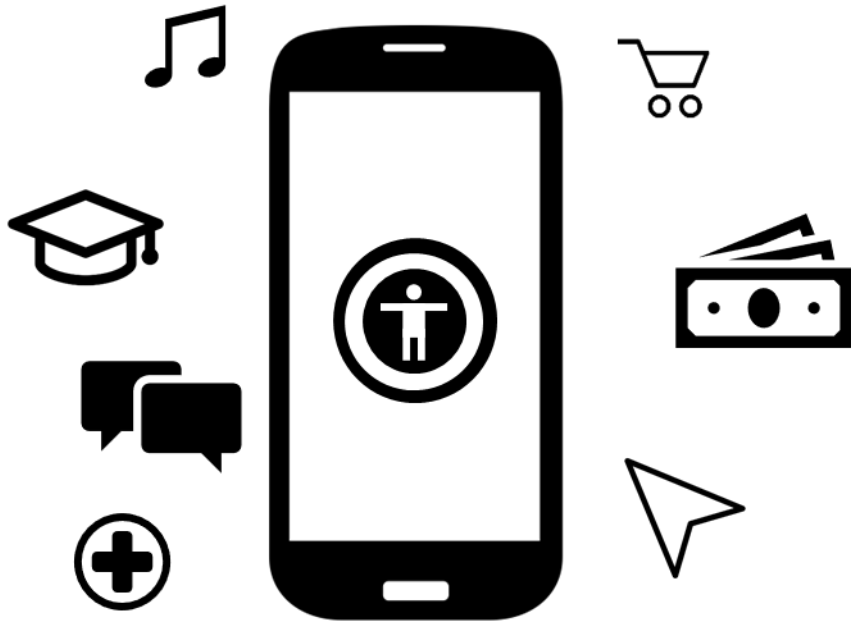
What tools can you use to make more accessible apps?

What, beyond developers, goes into app accessibility?

What are open research questions in app accessibility?

How can you apply accessibility in your life?

Mobile Apps



Who uses a smartphone daily?

What do you use apps for?

Why Mobile Apps?



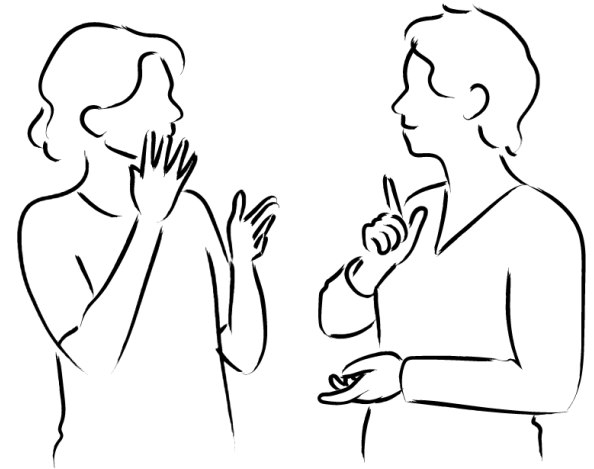
Apps are everywhere
Provide essential functionality

Not accessible to everyone

Rise in Mobile Device Use

Disability

- interaction between features of a person's body and features of society



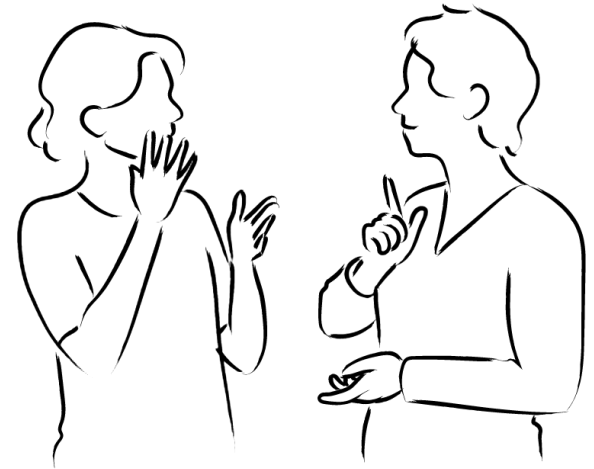
Rise in Mobile Device Use

Disability

- interaction between features of a person's body and features of society

In 2015 in the US:

- 68% of adults in the used smartphones
- 72% of people with disabilities used smartphones



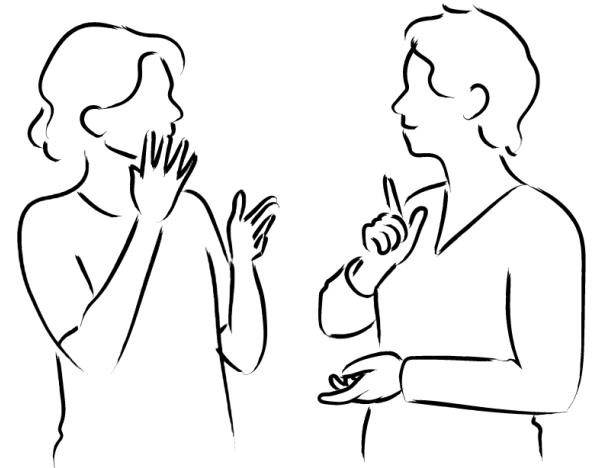
Rise in Mobile Device Use

Disability

- interaction between features of a person's body and features of society

Smartphone use in 2015:

- 68% of adults in the US
- 72% of people with disabilities in the US



Accessibility Matters

Objectives

Why does app accessibility matter?

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How can you apply accessibility in your life?

Alternative Interaction



How might someone who can't see the screen interact with a smartphone?




What about someone who can't touch the screen?

Screen Readers

- Turn visual information into audio
- May be used by people who are blind or who have low vision




Based on the audio-only experience, what app am I using?



Log in, Button

Fitbit



Let's get started

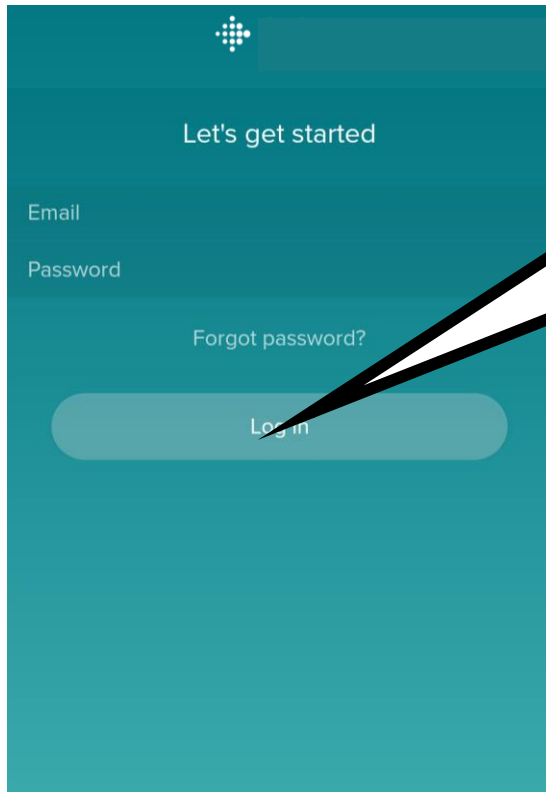
Email

Password

[Forgot password?](#)

Log in

Fitbit

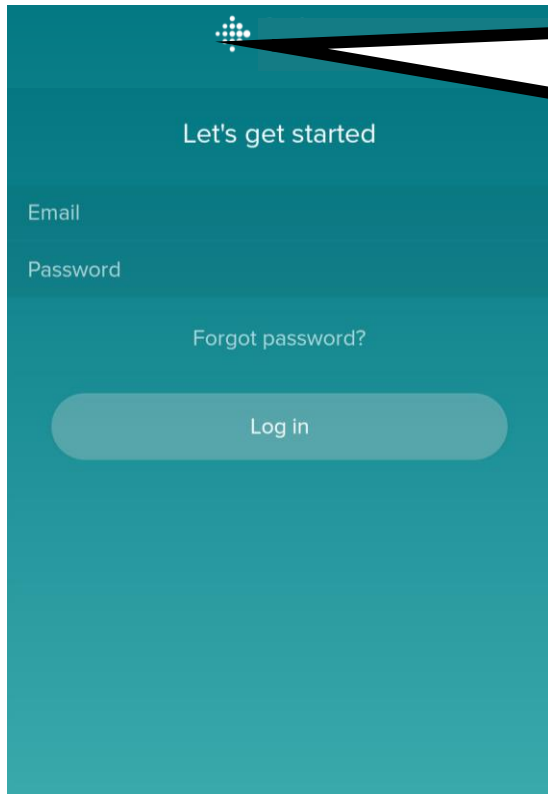


"Log in"

Labeled text-based element

```
<Button  
  ...  
  text="Log in"/>
```

Fitbit



"Fitbit"

Labeled image-based element

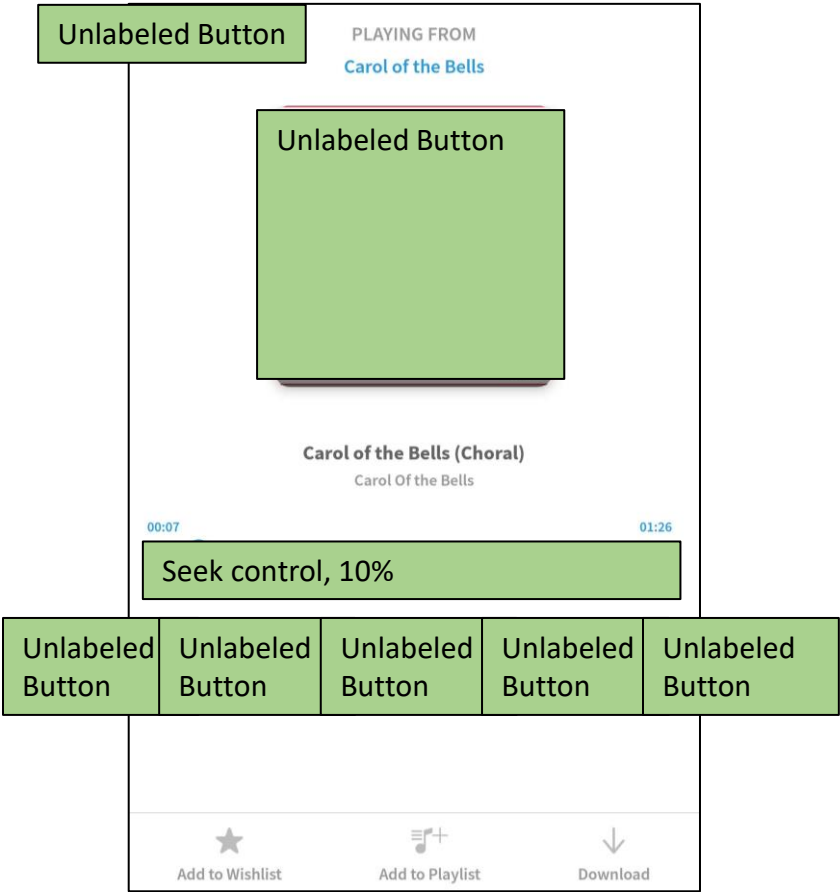
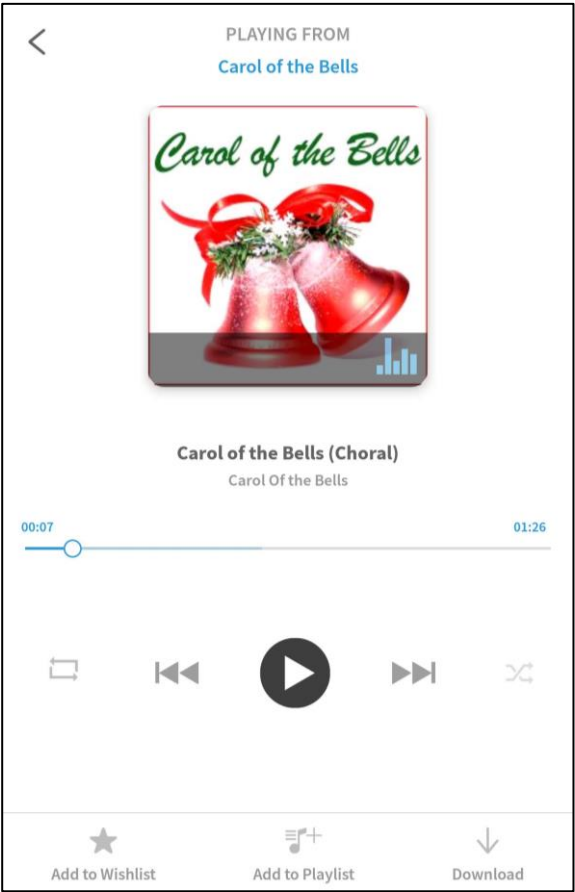
```
<ImageView  
  ...  
  contentDescription="Fitbit"/>
```


Unlabelled, Button
Add to Wishlist

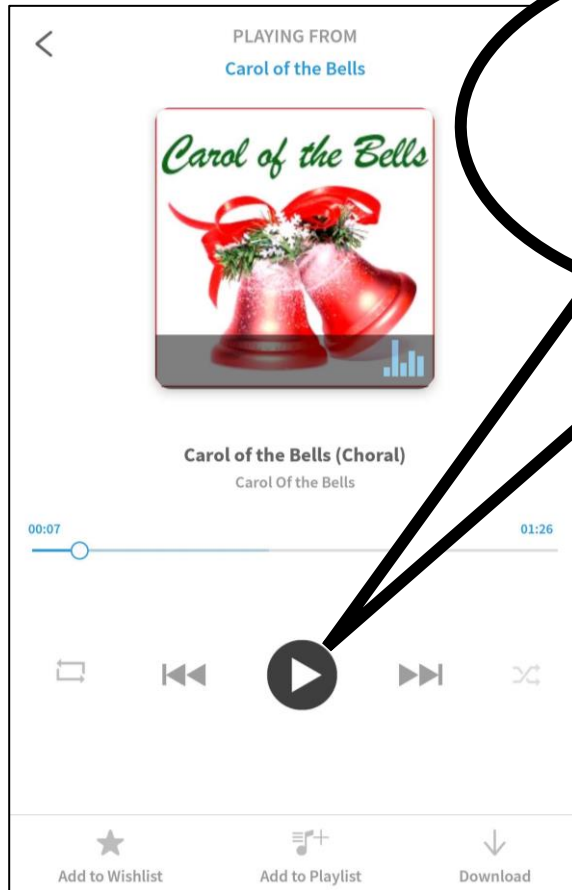

Add to Playlist


Download

Freegal Music



Freegal Music



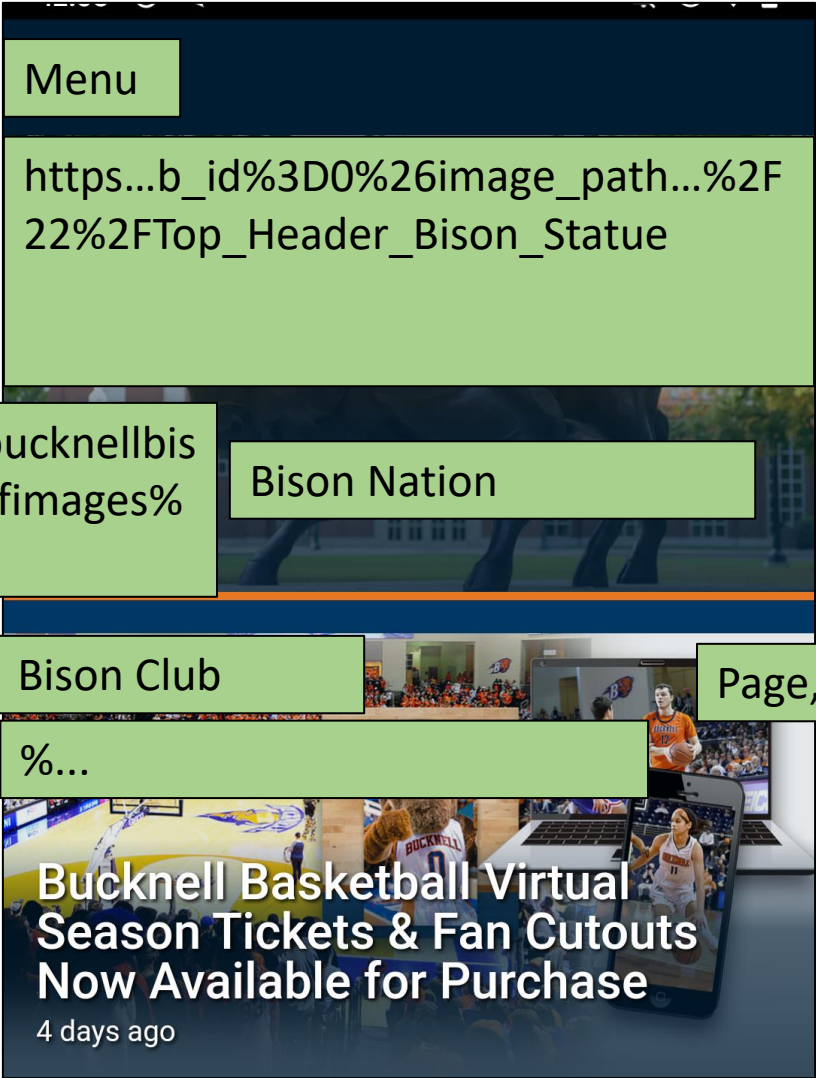
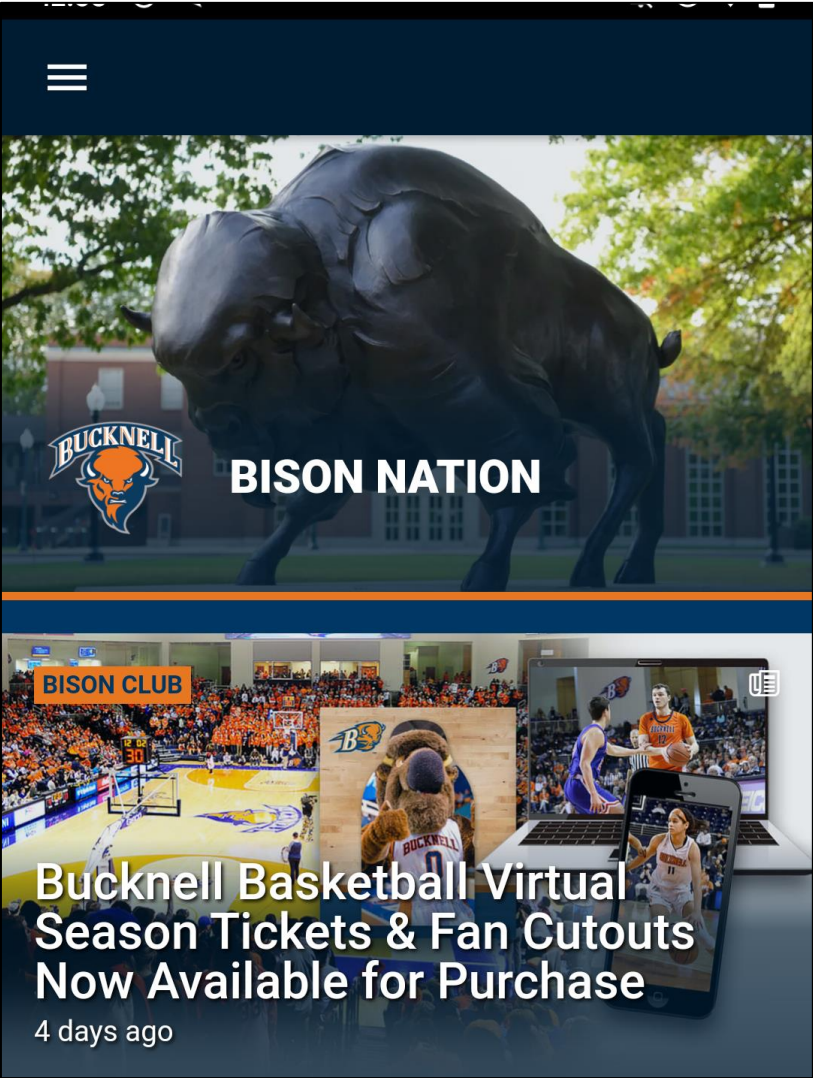
"Unlabeled Button"

Labeled image-based element

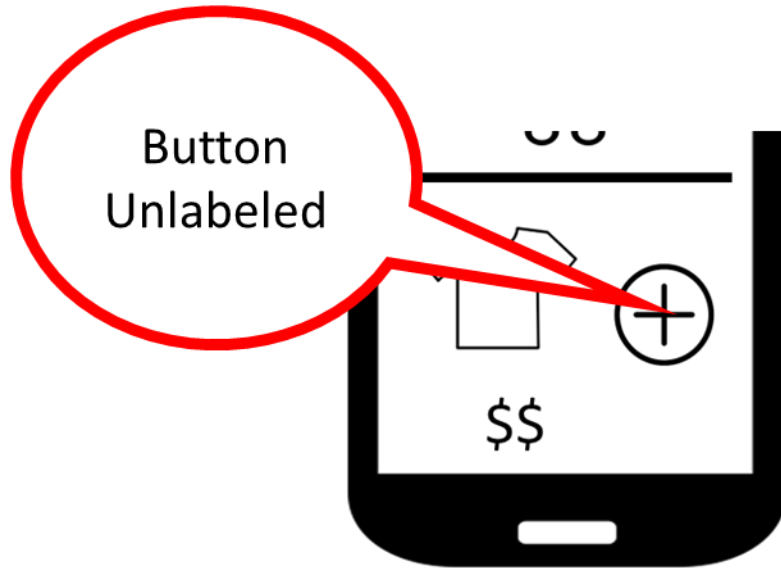
```
<ImageButton  
...  
contentDescription="Play"/>
```



Bison Nation



Accessibility Failures in Apps



Missing Labels



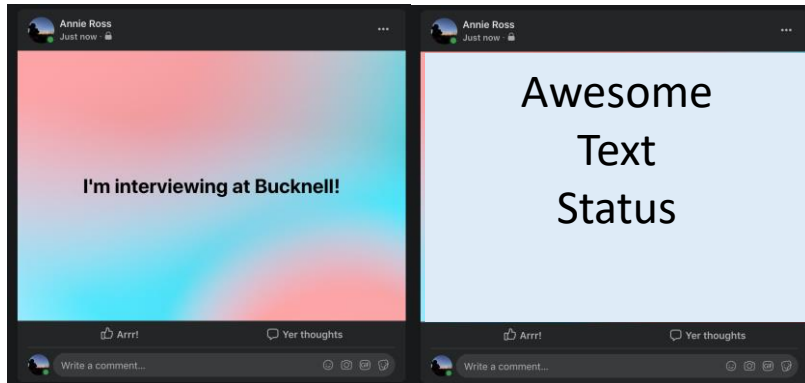
Buttons Too Small



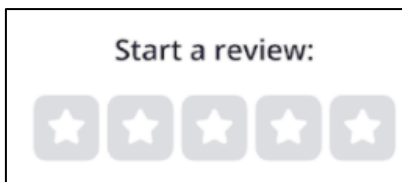
Screen
Completely
Inaccessilbe

We Know Inaccessibility Happens

When Things Go Wrong for Blind Users on Facebook, They Go Really Wrong



Blind Californians and Advocates Sue Greyhound to Make Website and Mobile App Accessible



Twitter Support 
@TwitterSupport



We're sorry about testing voice Tweets without support for people who are visually impaired, deaf, or hard of hearing. It was a miss to introduce this experiment without this support.

Accessibility should not be an afterthought. (1/3)

Objectives

Why does app accessibility matter?

What does app accessibility mean?

How often do accessibility failures happen?

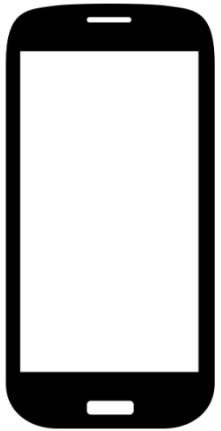
What tools can you use to make more accessible apps?

What, beyond developers, goes into app accessibility?

What are open research questions in app accessibility?

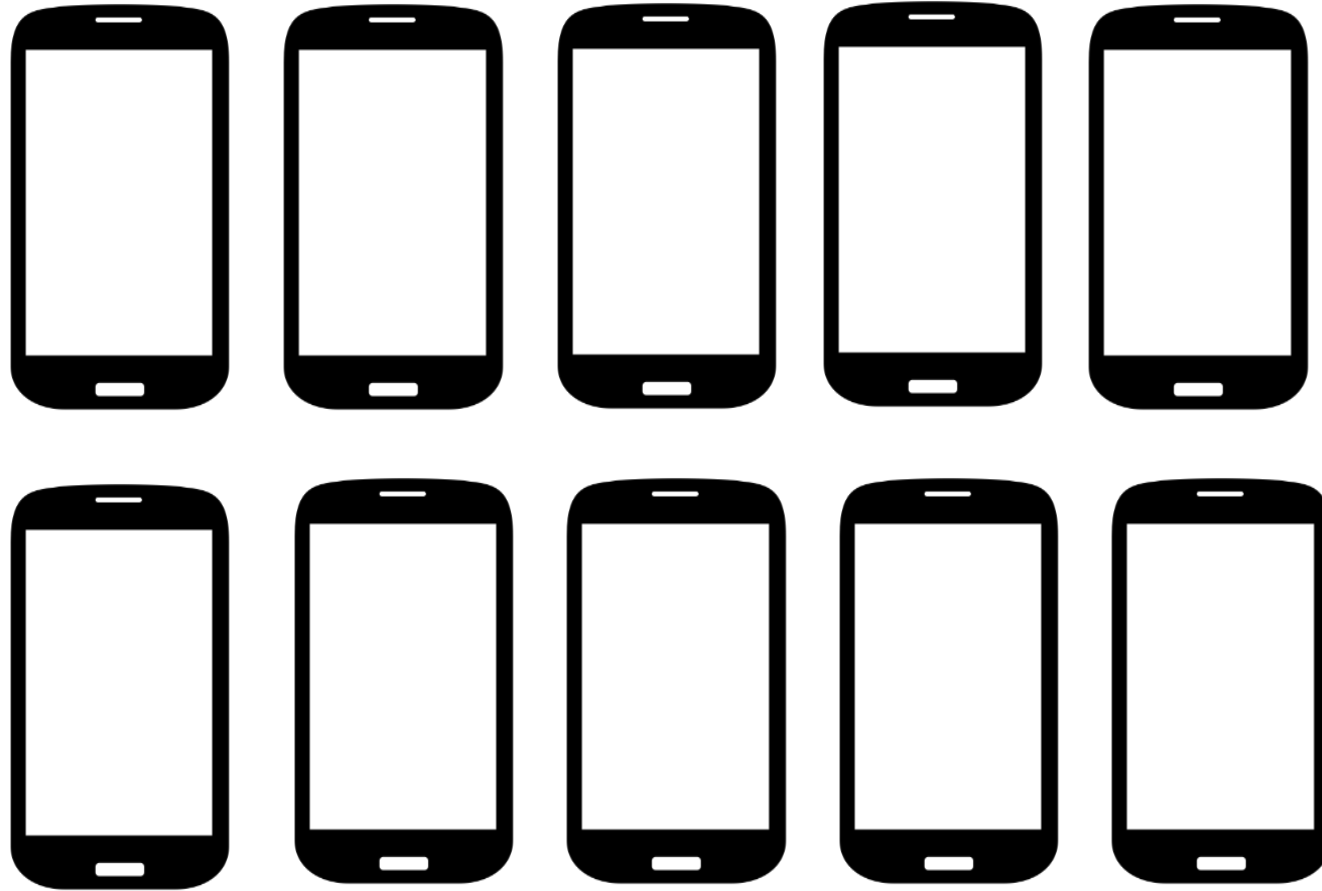
How can you apply accessibility in your life?

Approaching App Accessibility

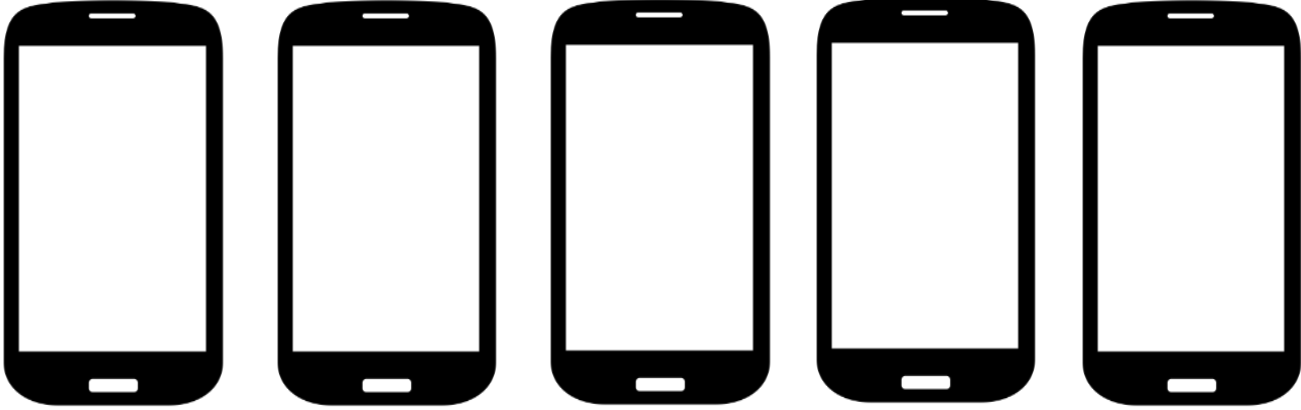


Individual Apps

What can we learn by testing many apps for accessibility?

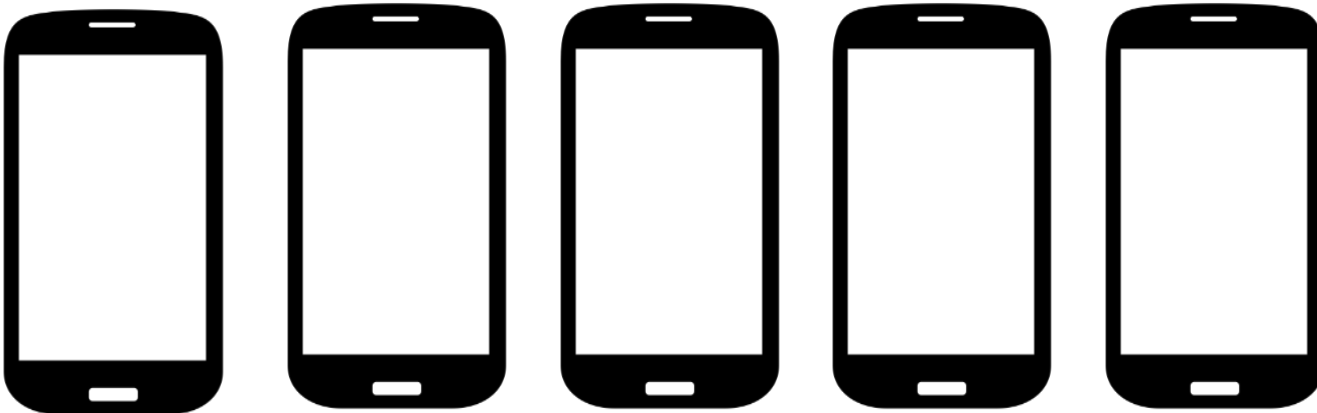


What can we learn by testing many apps for accessibility?



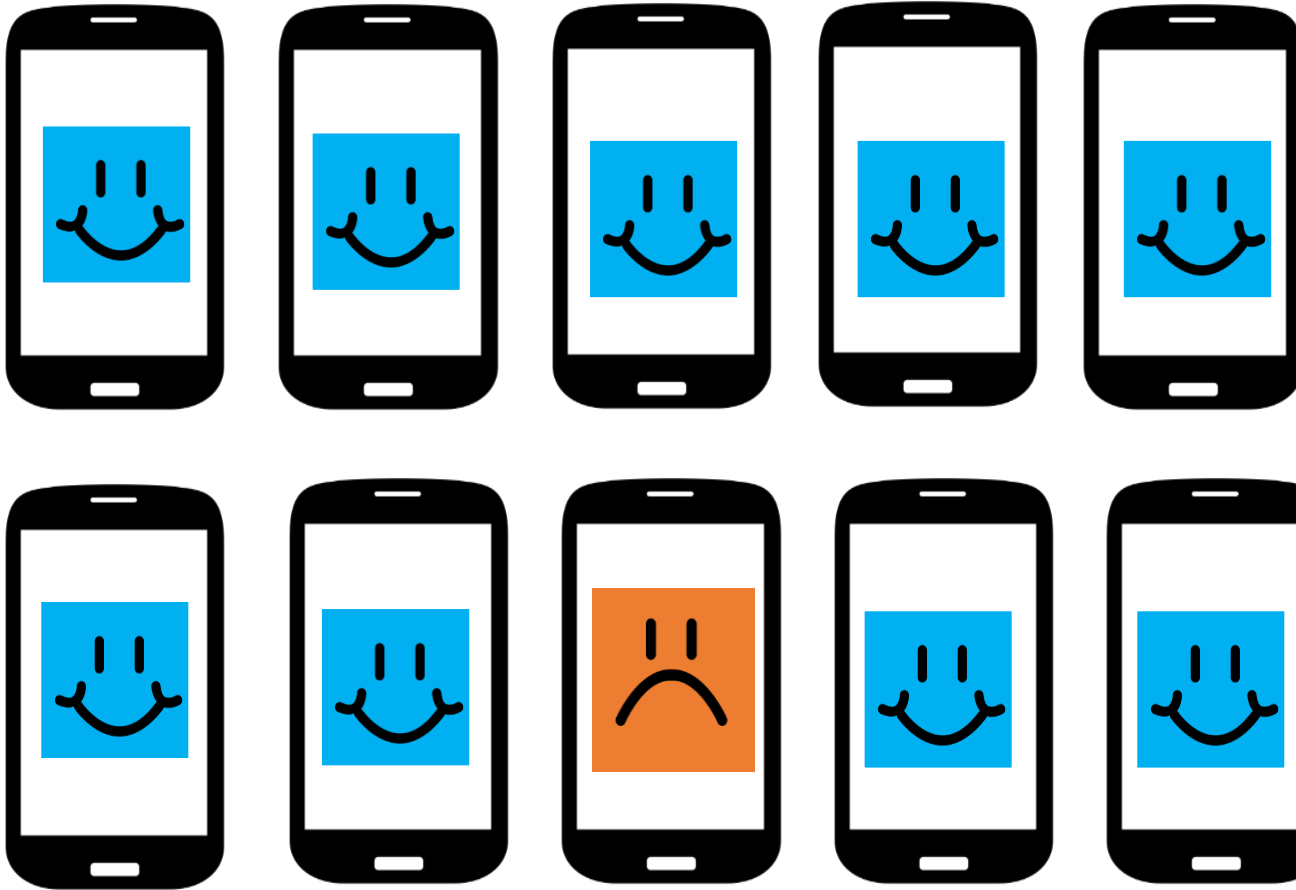
What might you think caused the problem?

What might you do to fix the app?



What might you do to prevent this problem in the future?

What can we learn by testing many apps for accessibility?

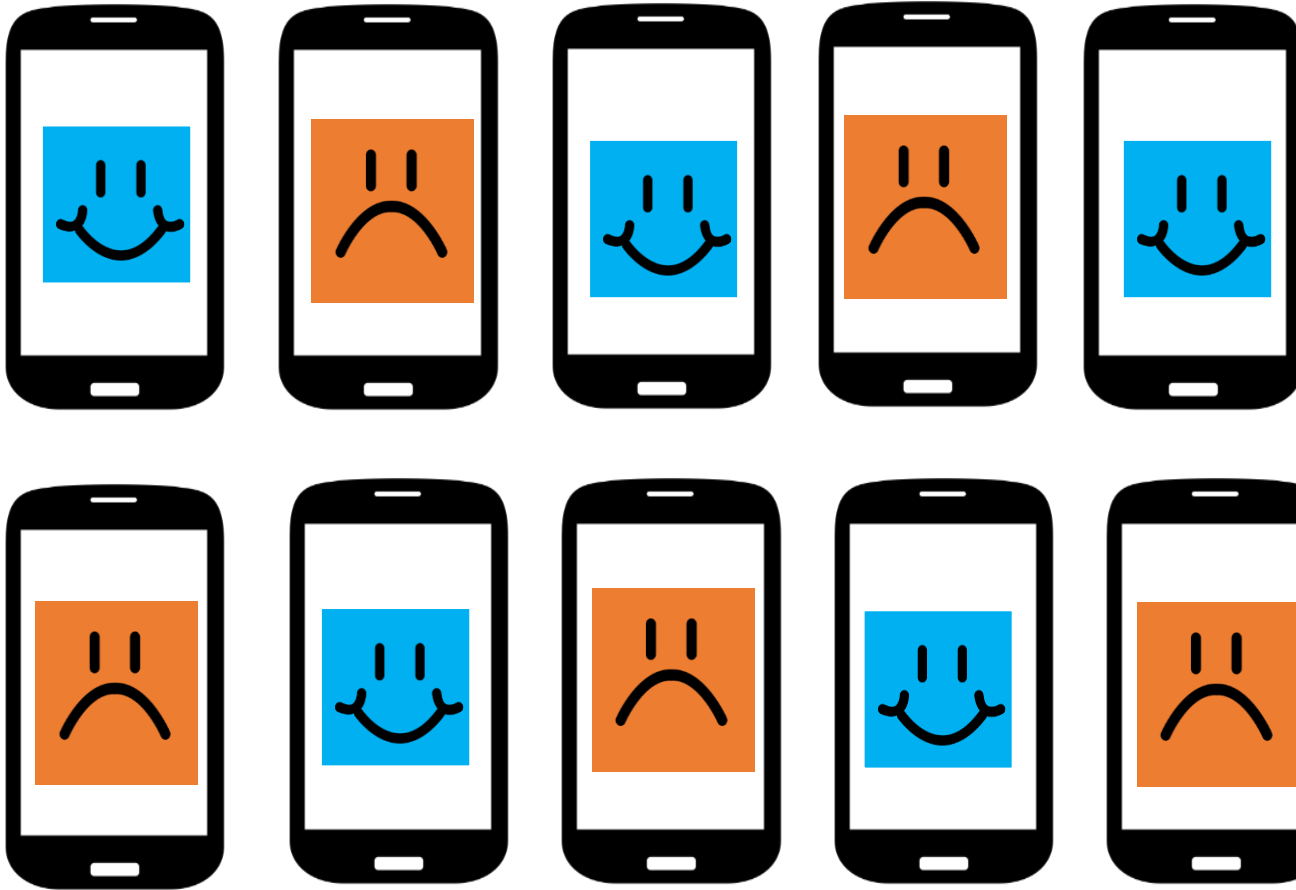


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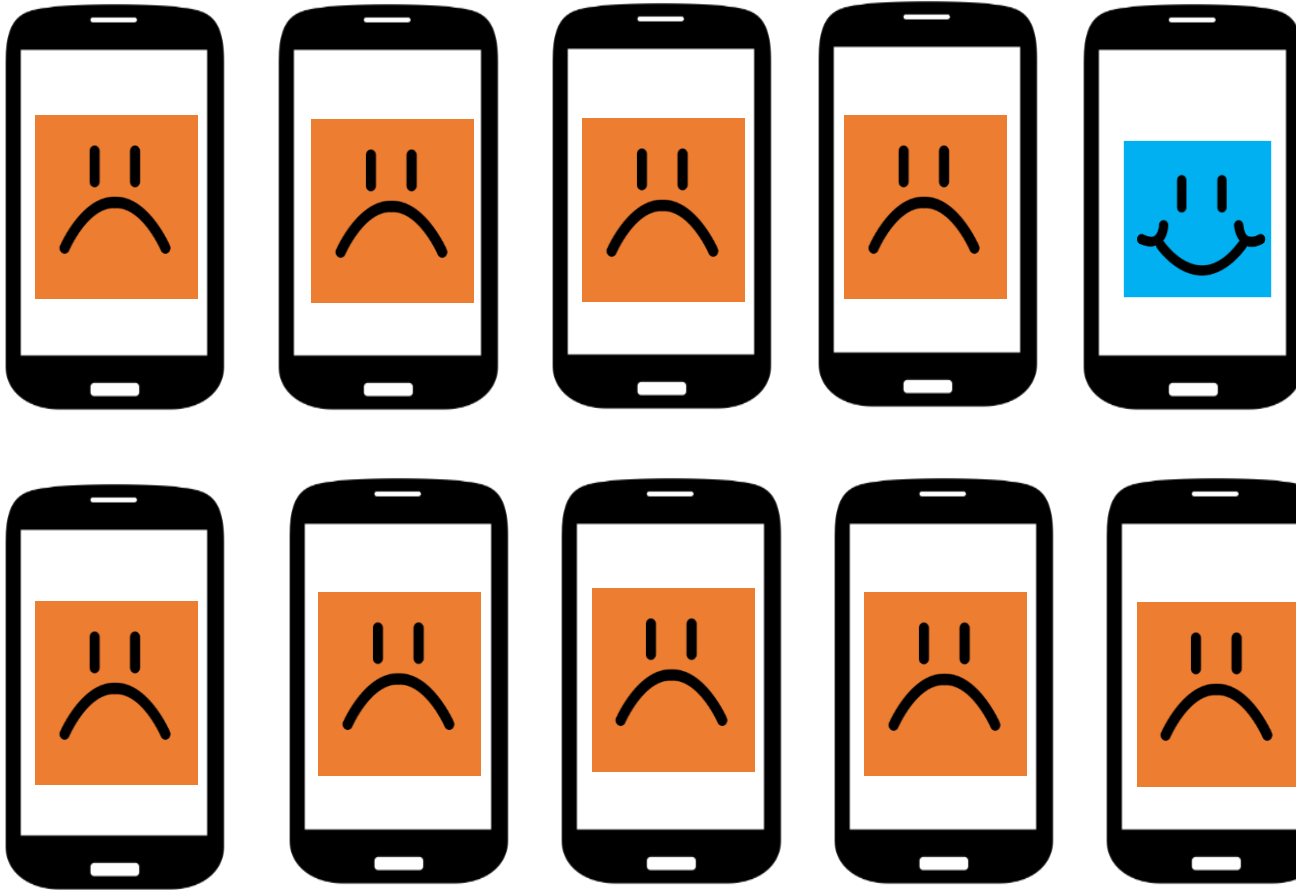


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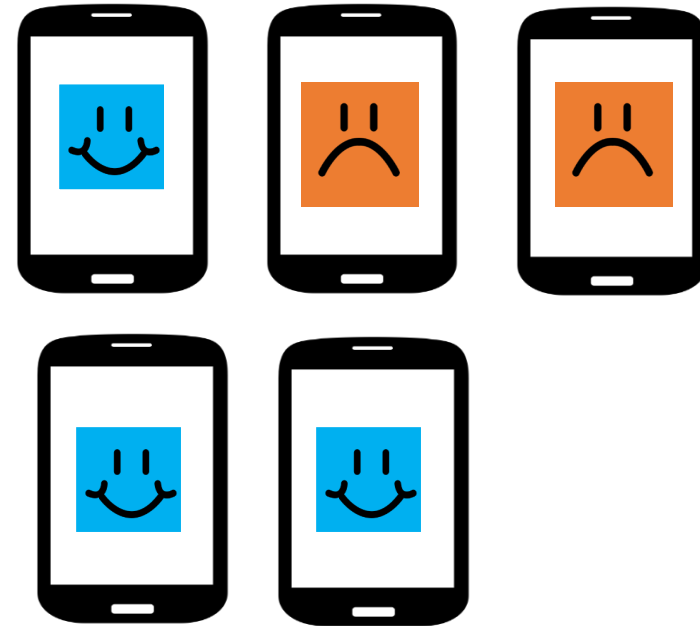
What might you do to prevent this problem in the future?

How often do accessibility failures happen?

10,000 free Android apps

Seven accessibility failures

- Missing labels
- Uninformative labels
- Elements too small
- Completely inaccessible with assistive technology

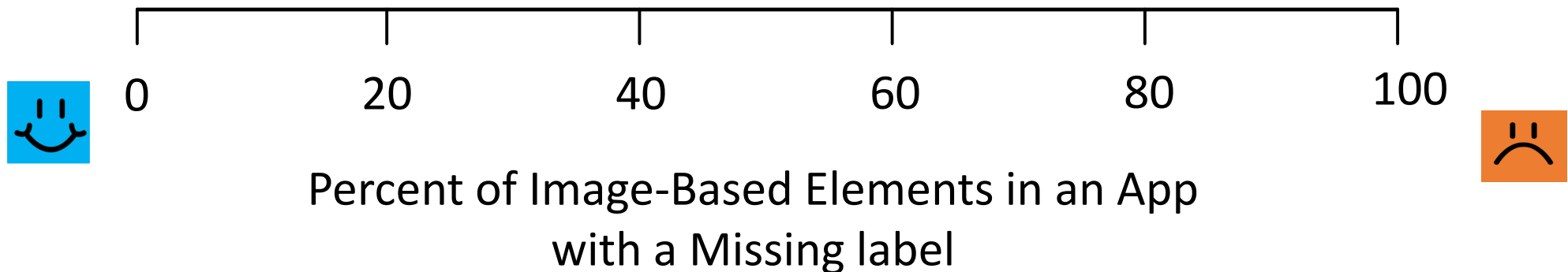


Ross, Zhang, Wobbrock, Fogarty. *An Epidemiology-Inspired Large-Scale Analysis of Android App Accessibility*. TACCESS 2020.

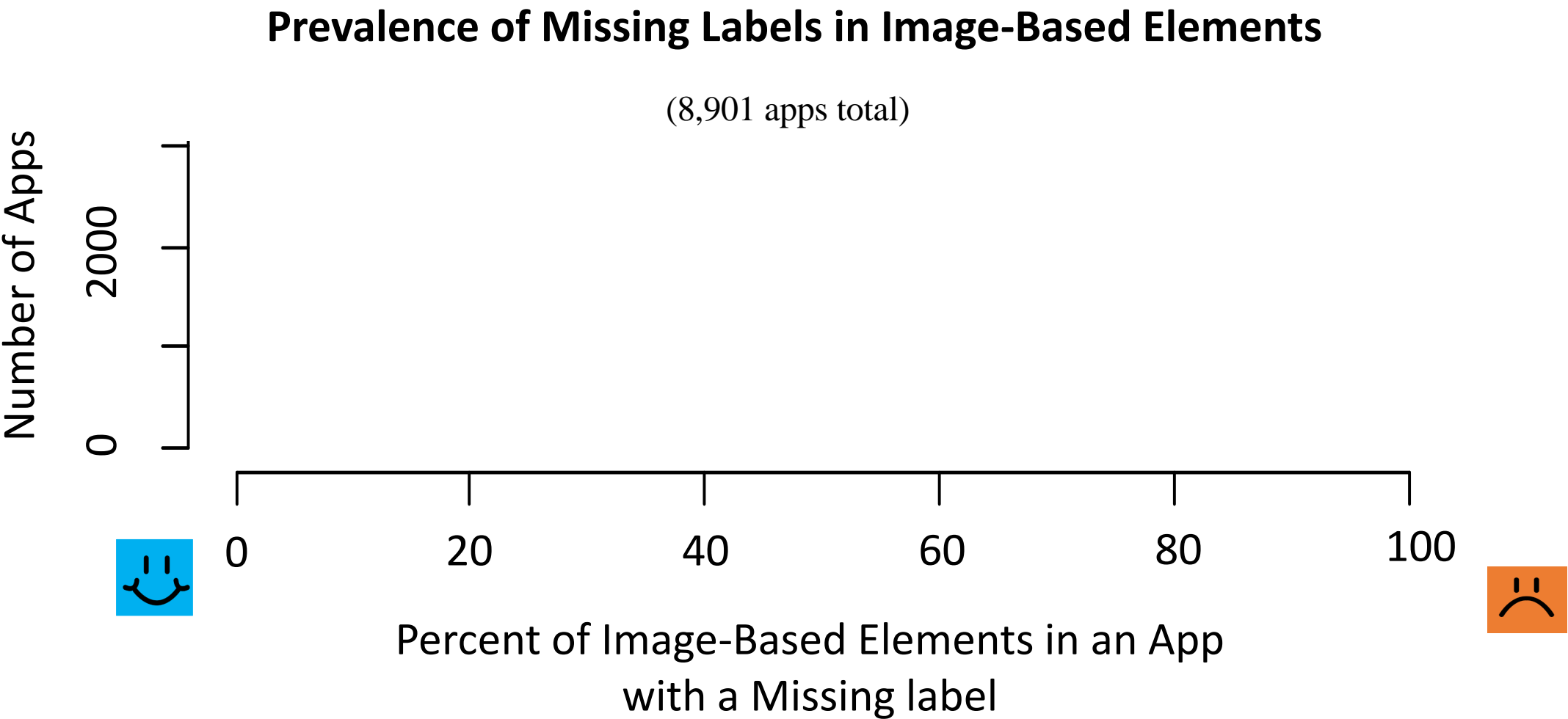
Ross, Zhang, Fogarty, Wobbrock. *Examining Image-Based Button Labeling for Accessibility in Android Apps through Large-Scale Analysis*. ASSETS 2018. Best Paper Nominee.

Prevalence of Missing Labels (1/6)

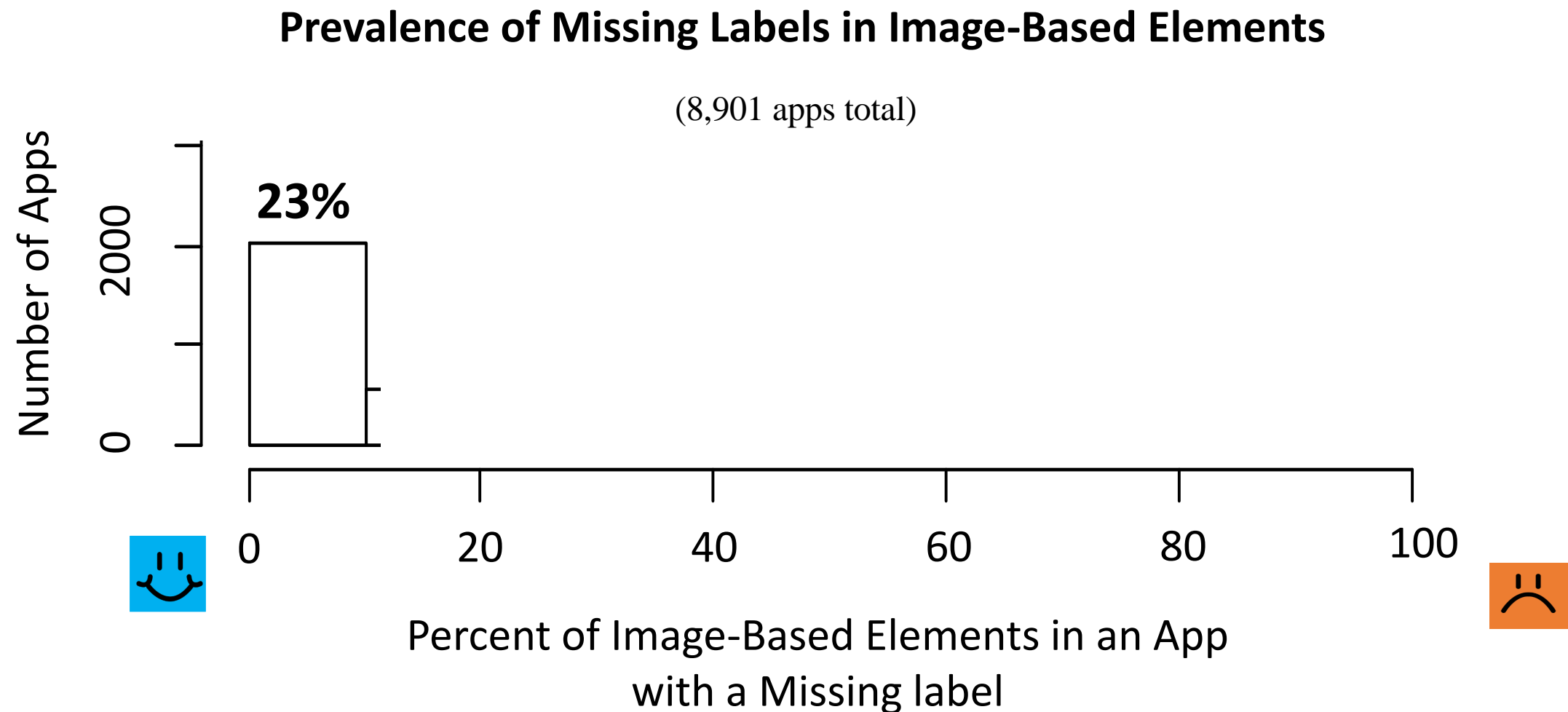
Prevalence of Missing Labels in Image-Based Elements



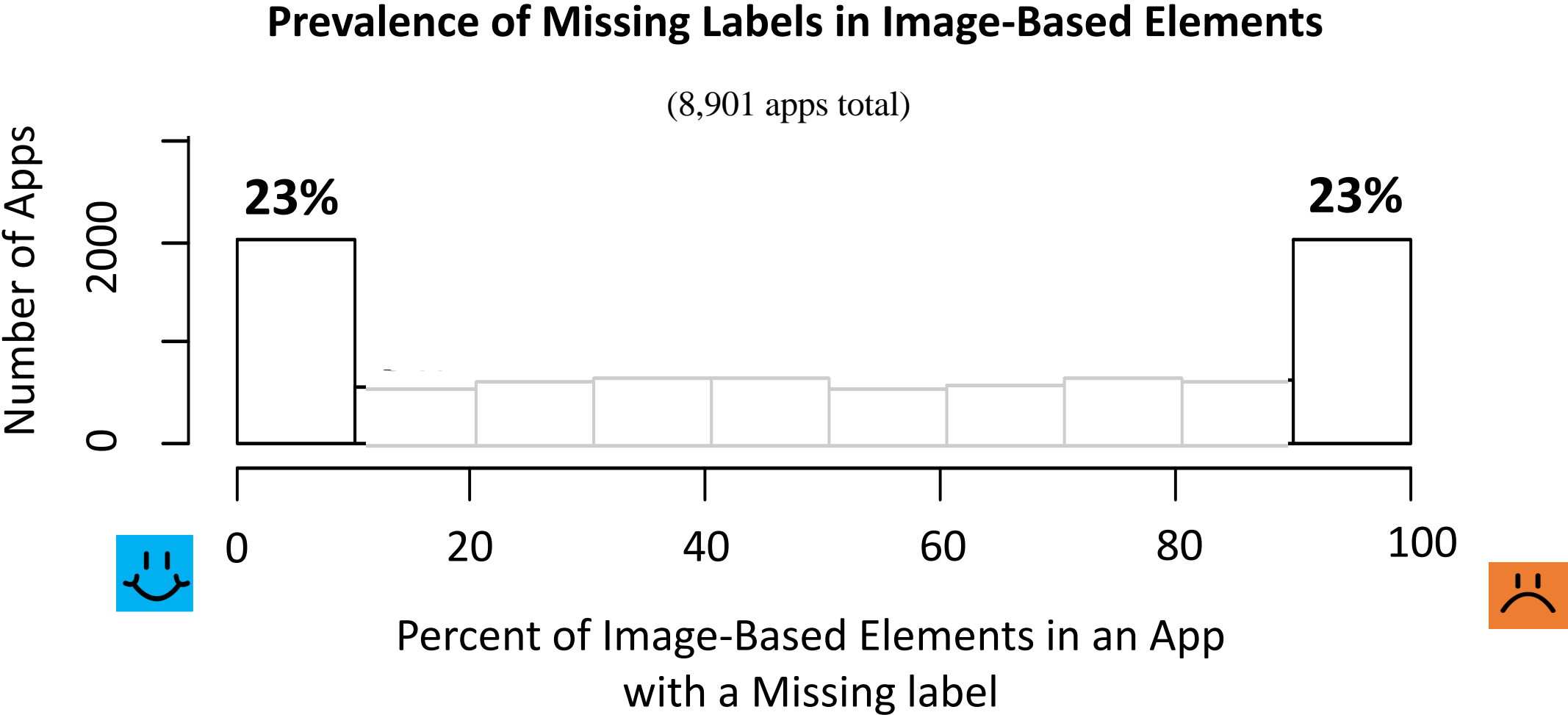
Prevalence of Missing Labels (2/6)



Prevalence of Missing Labels (3/6)



Prevalence of Missing Labels (5/6)



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Documentation

Resources

iOS: <https://developer.apple.com/accessibility/>


Android:

<https://developer.android.com/guide/topics/ui/accessibility>

IBM: <https://www.ibm.com/able/>

Web Content Accessibility Guidelines (WCAG):


<https://www.w3.org/WAI/standards-guidelines/wcag/>

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Build more accessible apps

Accessibility is an important part of any app. Whether you're developing a new app or improving an existing one, consider the accessibility of your app's components.

By integrating accessibility features and services, you can improve your app's usability, particularly for users with disabilities.



Accessibility for Developers

Apple devices come standard with award-winning accessibility features that let people experience everything Mac, iPhone, iPad, Apple Watch, and Apple TV have to offer. And with accessibility APIs on all Apple platforms, you can make your apps seamlessly functional for a broad range of users.

Scanners

Runs on your phone

Identifies accessibility failures

Points to documentation to help fix

Resources

Google Accessibility Scanner (on Play Store)

axe: <https://www.deque.com/axe/>



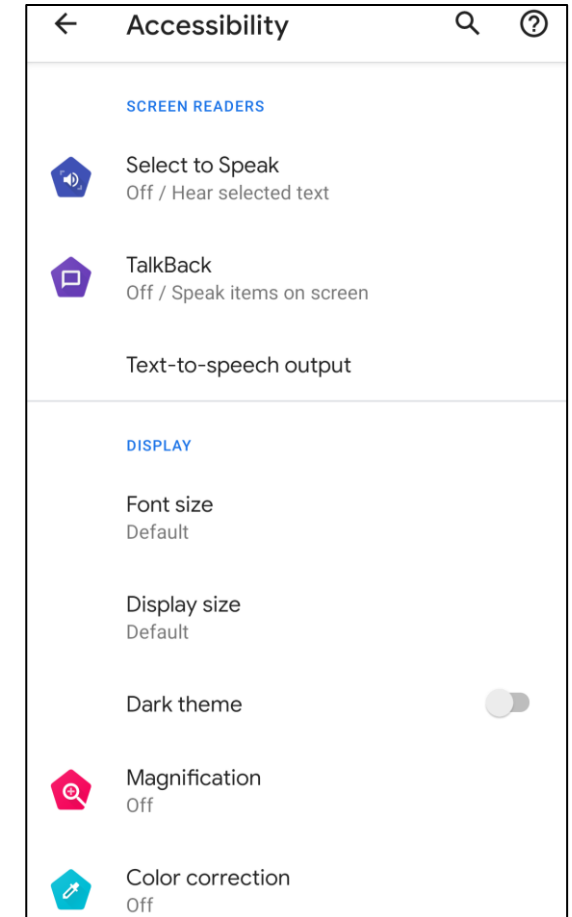
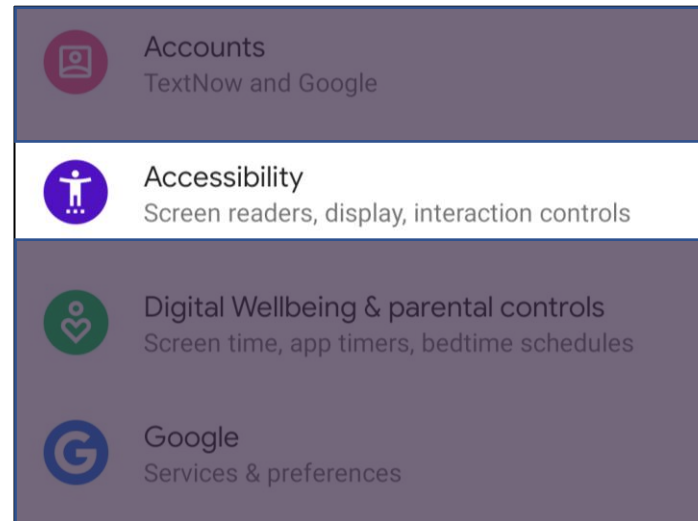
Learn to Use Assistive Technology

Screen Reader

- iOS: VoiceOver
- Android: TalkBack

Switch Access

Voice Access

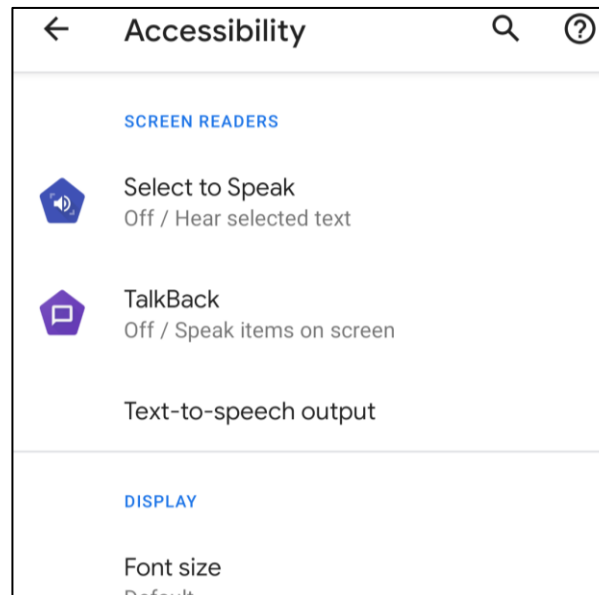
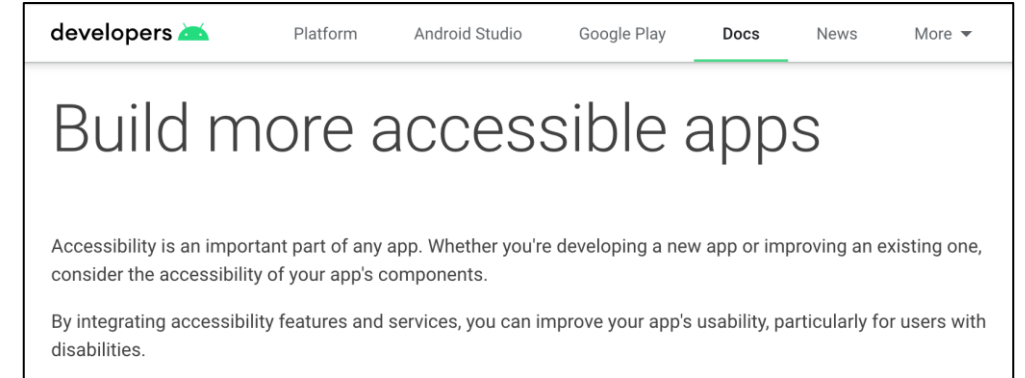
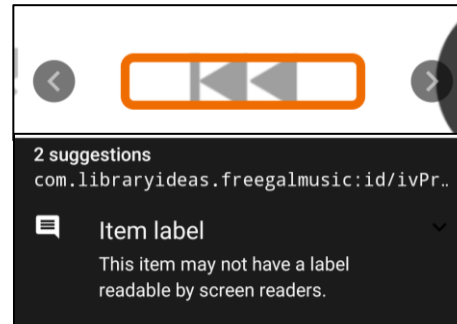


Diversify Your Testing Group



Tools to Improve App Accessibility

Add accessibility practices to your work at all stages



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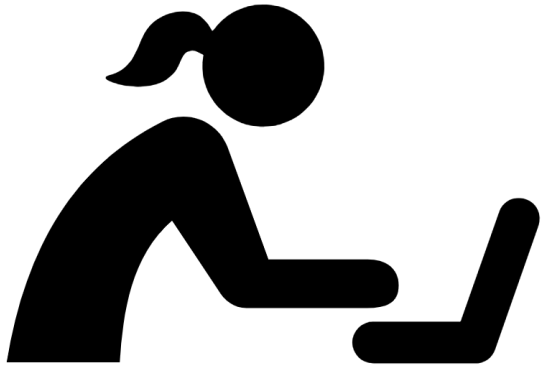
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Where Does Code Come From?



Your assignment is to make
a program that does...

Where does code come from?



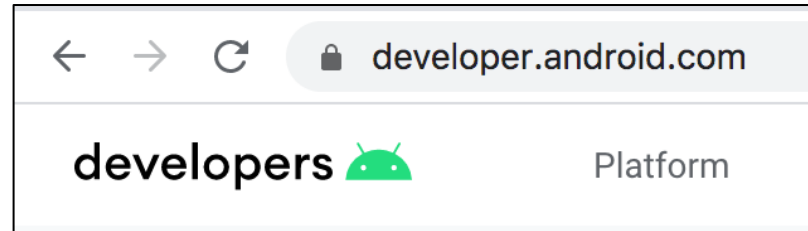
What tools and resources do you use when writing code?

Where does code come from?

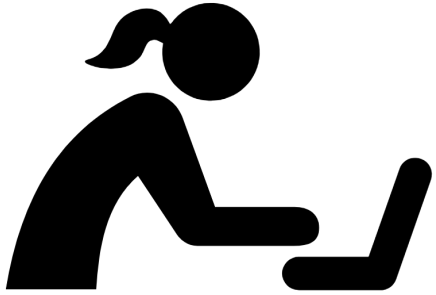


What tools and resources do you use when writing code?

Java
Python
C++
HTML



Where does code come from?



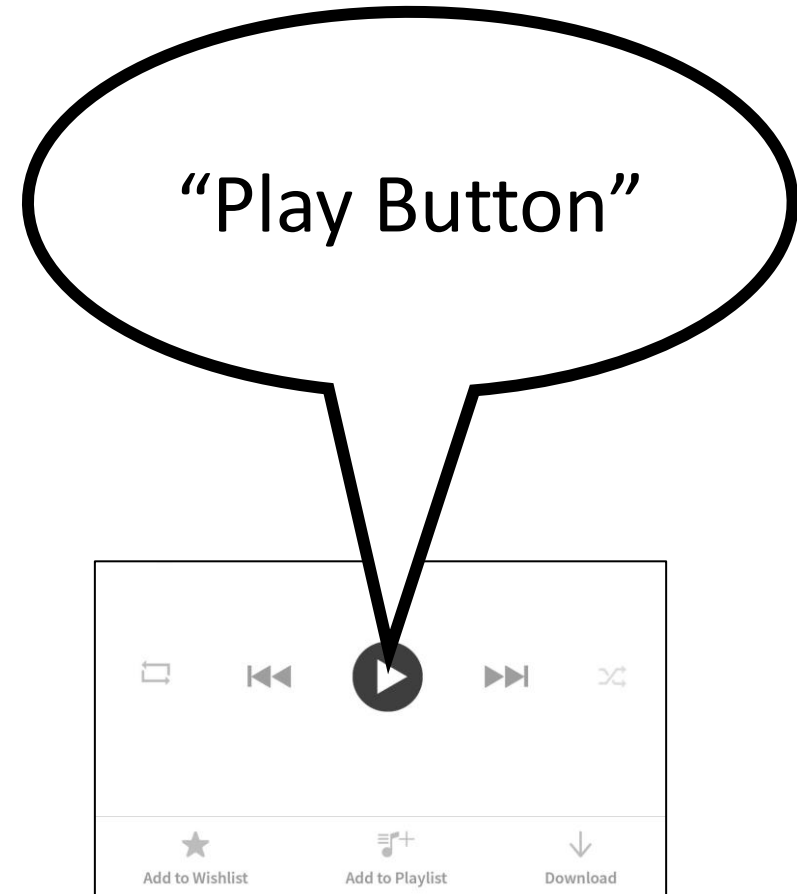
What tools and resources do you use when writing code?

Do you think those resources have accessible code?

Google example code vs paid online classes vs
StackOverflow code?

Examples

```
<ImageView  
  ...  
  contentDescription="Play" />
```



SCHOOL OF

Programming and Development

Build a cloud-connected Android app, and learn the tools, principles, and best practices of mobile and Android development that you'll apply to your own projects.

SAMPLE NANODEGREE PROGRAMS

- Introduction to Cybersecurity
- Intermediate JavaScript
- Front End Web Developer

THIS COURSE

FREE COURSE

Developing Android Apps

- ✓ Industry-relevant content
- ✗ Project reviews
- ✗ Mentorship
- ✗ Certification
- ✗ Career Services / Job Assistance

RELATED NANODEGREE

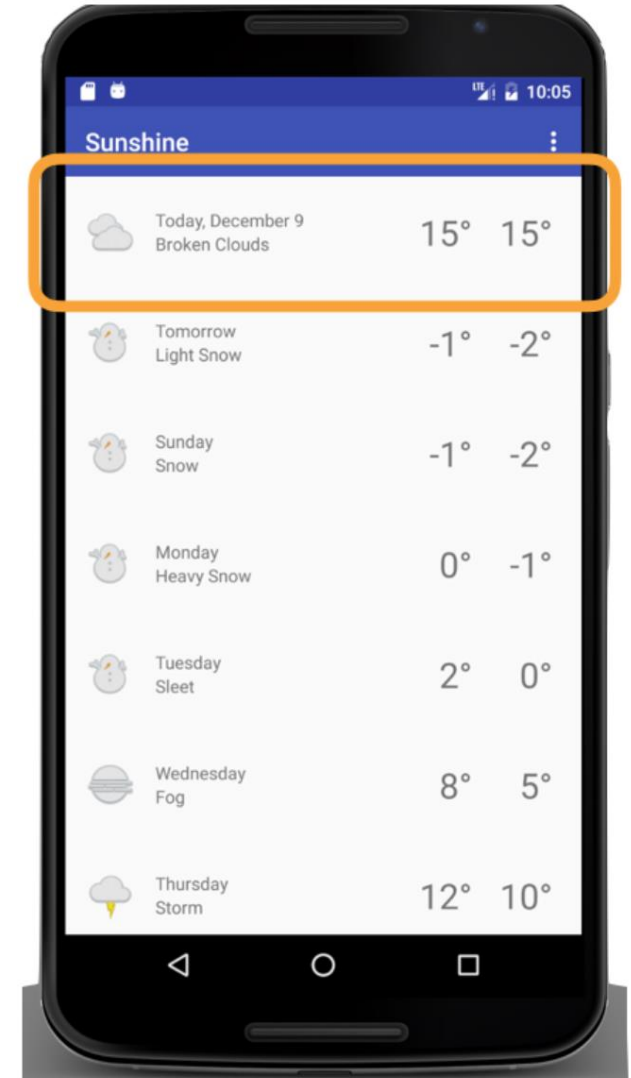
NANODEGREE PROGRAM

Android Developer

- ✓ Industry-relevant content
- ✓ Project reviews
- ✓ Mentorship
- ✓ Certification
- ✓ Career Services / Job Assistance

```
29 <ImageView
30     android:id="@+id/weather_icon"
31     android:layout_width="40dp"
32     android:layout_height="40dp"
33     app:layout_constraintBottom_toTopOf="@+id/guideline"
34     app:layout_constraintLeft_toLeftOf="parent"
35     app:layout_constraintTop_toTopOf="@+id/guideline"
36     tools:src="@drawable/art_clouds"/>
```

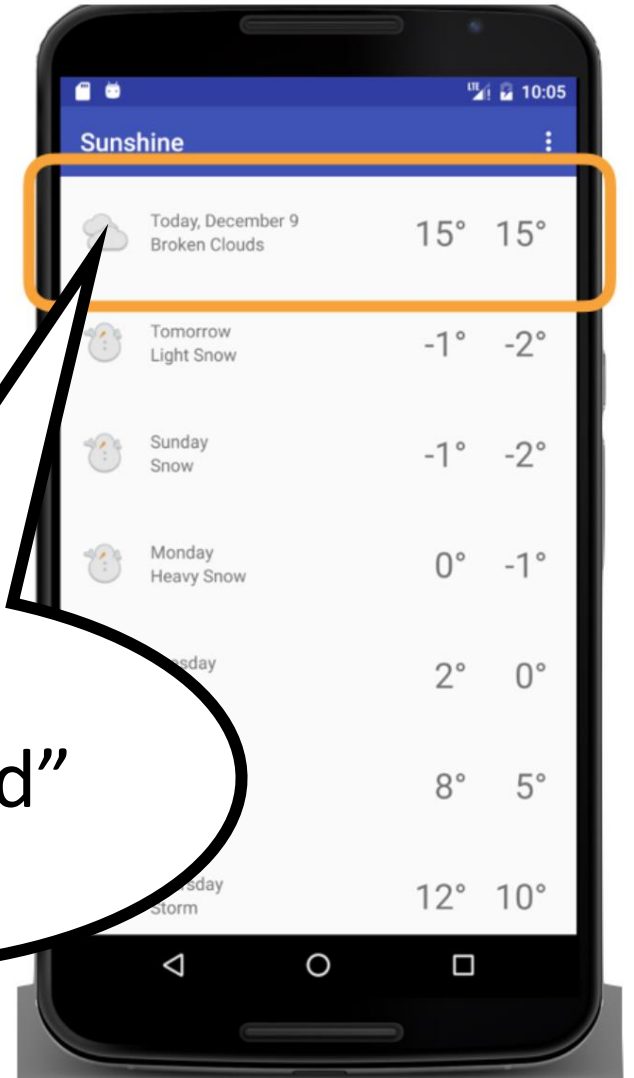
```
37
38 <TextView
39     android:id="@+id/date"
40     android:layout_width="wrap_content"
41     android:layout_height="wrap_content"
42     android:layout_marginLeft="16dp"
43     android:layout_marginStart="16dp"
44     app:layout_constraintBottom_toTopOf="@+id/guideline"
45     app:layout_constraintLeft_toRightOf="@+id/weather_icon"
46     tools:text="Today, April 03"/>
```



```
29 <ImageView
30     android:id="@+id/weather_icon"
31     android:layout_width="40dp"
32     android:layout_height="40dp"
33     app:layout_constraintBottom_toTopOf="@+id/guideline"
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44     app:layout_constraintBottom_toTopOf="@+id/guideline"
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46     tools:text="Today, April 03"/>
```

“Unlabeled”



Android Documentation

← → ↺ 🏠

🔒 https://developer.android.com/reference/android/widget/ImageView

📄 ⋮ 📌 ⭐

📖 📄 👤 ☰

developers 🤖

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SIGN IN

Android API Reference

Overview

Android Platform

▾ Packages

API level

REL ▾

Class Index

Package Index

▶ android

▶ android.accessibilityservice

▶ android.accounts

▶ android.animation

▶ android.annotation

▶ android.app

▶ android.app.admin

▶ android.app assist

Android Developers > Docs > Reference

☆☆☆☆☆

Added in API level 1

ImageView

[Kotlin](#) | **Java**

```
public class ImageView
    extends View
```

[java.lang.Object](#)
↳ [android.view.View](#)
↳ android.widget.ImageView

▾ [Known direct subclasses](#)
[ImageButton](#), [QuickContactBadge](#)

▾ [Known indirect subclasses](#)
[ZoomButton](#)

Table of contents

[Summary](#)

Nested classes

XML attributes

Inherited XML attributes

Inherited constants

Inherited fields

Public constructors

Public methods

Protected methods

Inherited methods

XML attributes

android:adjustViewBounds

55

The following XML snippet is a common example of using an ImageView to display an image resource:



```
<LinearLayout
  xmlns:android="http://schemas.android.com/apk/res/android"
  android:layout_width="match_parent"
  android:layout_height="match_parent">
  <ImageView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:src="@drawable/my_image"
    android:contentDescription="@string/my_image_description"
  />
</LinearLayout>
```



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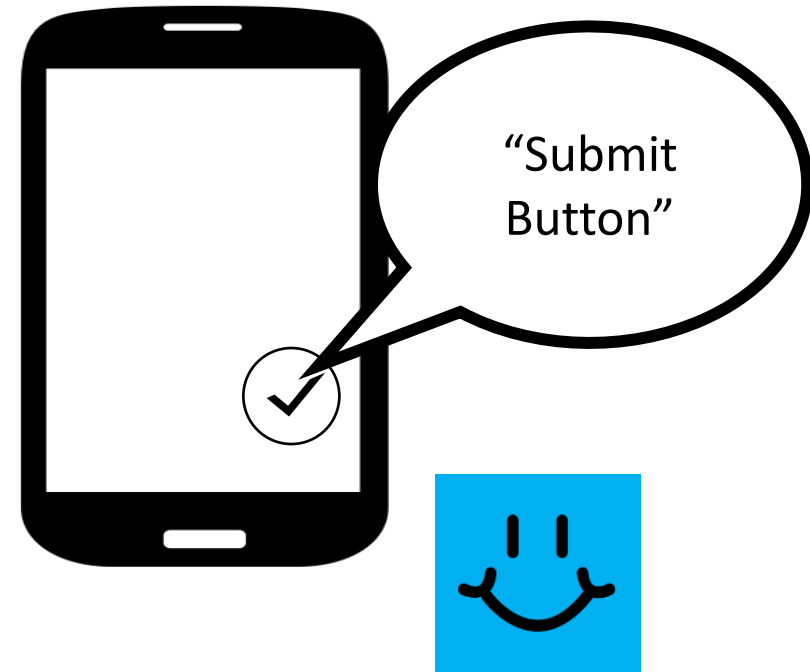
Developer Guides – 2019 Update



Add the floating action button to your layout

The following code shows how the `FloatingActionButton` should appear

```
<android.support.design.widget.FloatingActionButton
    android:id="@+id/fab"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_gravity="end|bottom"
    android:src="@drawable/ic_my_icon"
    android:contentDescription="@string/submit"
    android:layout_margin="16dp" />
```



Objectives

Why does app accessibility matter?

What does app accessibility mean?

How often do accessibility failures happen?

What tools can you use to make more accessible apps?

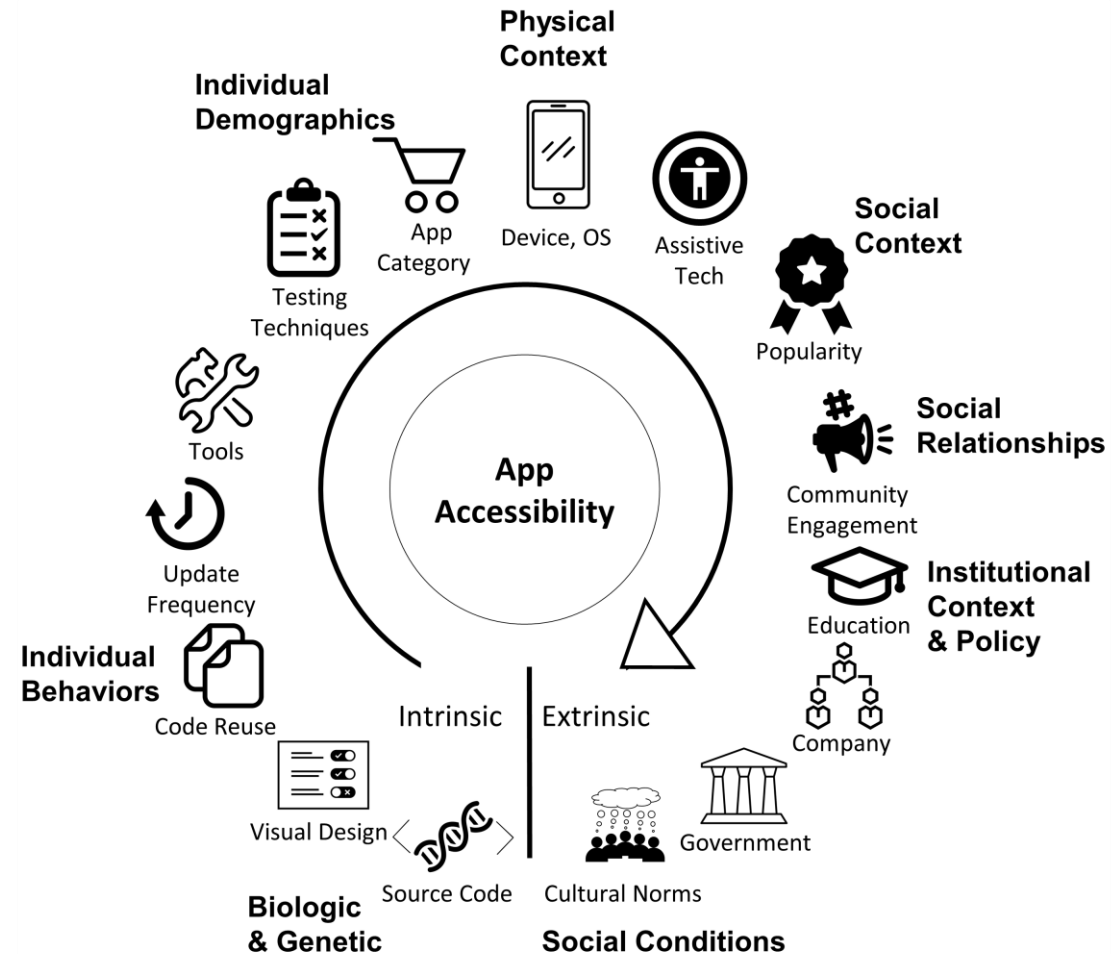
How do the tools we use impact app accessibility?

What are open research questions in app accessibility?

How can you apply accessibility in your life?

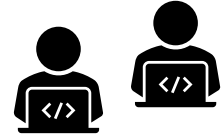
My Research Questions

- What impacts app accessibility?



My Research Questions

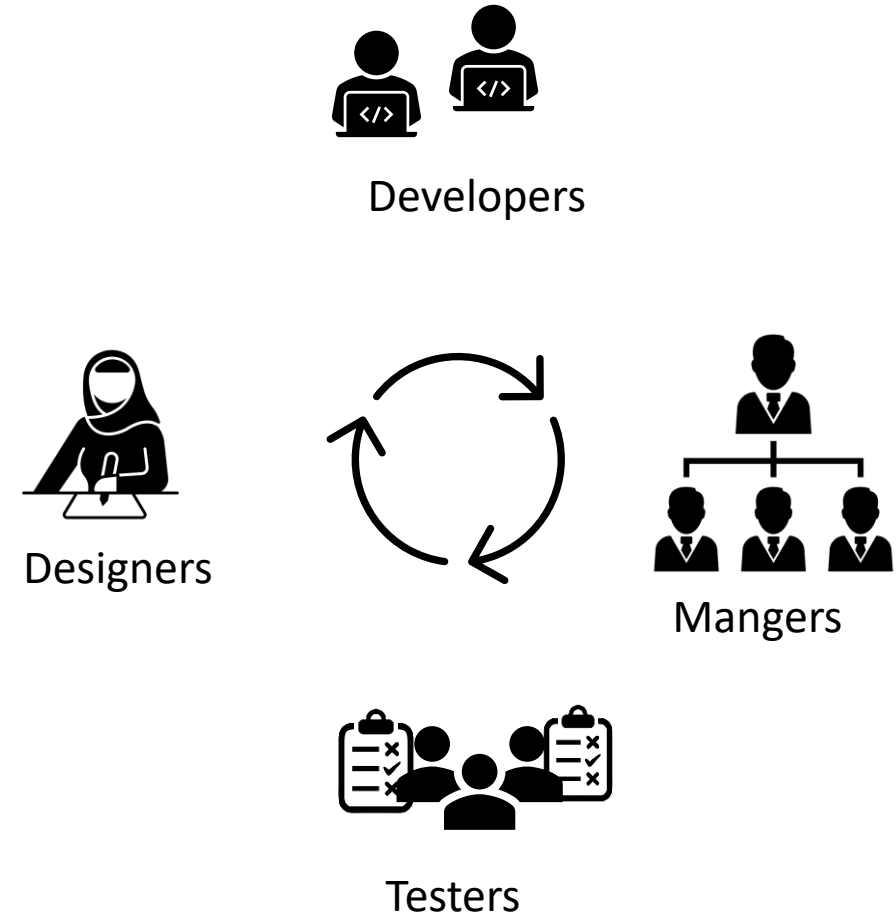
- What impacts app accessibility?
- Can we build more effective, efficient developer tools?



Developers

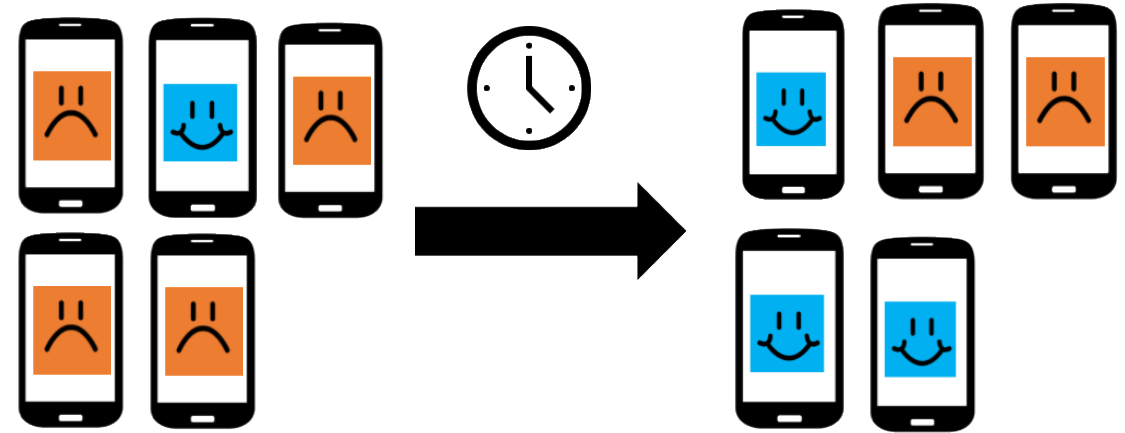
My Research Questions

- What impacts app accessibility?
- Can we build more effective, efficient developer tools?
- What does it look like to help many people *collaborate* on making accessible apps?



My Research Questions

- What impacts app accessibility?
- Can we build more effective, efficient developer tools?
- What does it look like to help many people *collaborate* on making accessible apps?
- How might accessibility change over time?



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Taking Accessibility Forward

Accessibility matters!

Champion accessibility

- You don't need to be an expert to make an impact

Mobile App Accessibility: Building Apps that Work for Everyone



Anne Spencer Ross

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ansross@cs.washington.edu

[Twitter: @Anne_Spencer_](#)

<https://www.linkedin.com/in/anniesross/>

Collaborators



James
Fogarty



Jacob
Wobbrock



Casey
Burkhardt



Anat Caspi



Xiaoyi Zhang

Funding



Mani Charitable
Foundation
Google

Wilma Bradley Endowed
Fellowship in Computer
Science & Engineering

