# Introductions
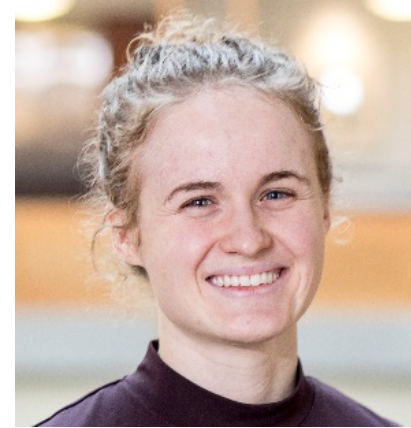
## You

### In the chat:

- What's your role?

- What is a project you're excited about and/or working on right now?

- How much do you know about accessibility for people with disabilities?

## Me



Annie Ross
PhD Candidate – University of Washington
Assistant Professor – Bucknell University (Fall '21)
https://homes.cs.washington.edu/~ansross/
ansross@cs.washington.edu
Twitter: @Anne_Spencer_
https://www.linkedin.com/in/anniesross/

# Interaction

Ask questions/make comments at any time

- Ask in chat
- Unmute yourself

# Toward Creating More Accessible Apps

# Vision

I envision a world in which

## accessibility is integrated into every facet of app creation

from the low-level design and implementation details
to organization-level structures, incentives, and resources.

# Toward That Vision

What is App Accessibility?

Thinking Broadly About Accessibility

What Contributes to Inaccessibility

Improving Individual Accessibility Practices

Accessibility as Collaboration

# Toward That Vision

**What is App Accessibility?**

Thinking Broadly About Accessibility

What Contributes to Inaccessibility

Improving Individual Accessibility Practices

Accessibility as Collaboration

# Why Mobile Apps?
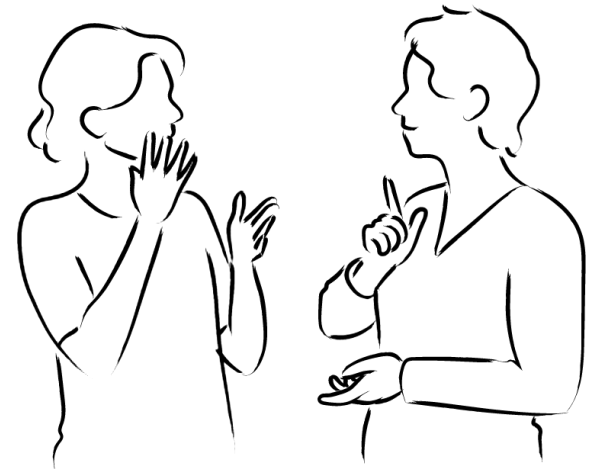
Apps are everywhere
Provide essential functionality

Not accessible to everyone

# Disability and Mobile Device Use

Disability

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

# Disability and 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

# Alternative Interactions

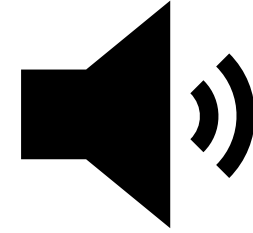How might someone who can't see the screen interact with a smartphone?

What about someone who can't touch the screen?

# Screen Readers

Turn visual information into audio

May be used by people who are blind, have low vision, or benefit from auditory feedback

Guess That App!

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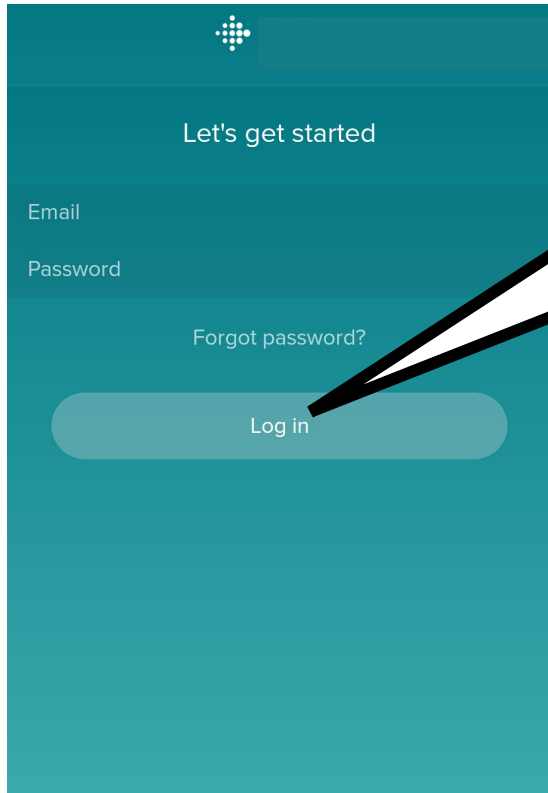
Log in, Button

# Fitbit



Let's get started
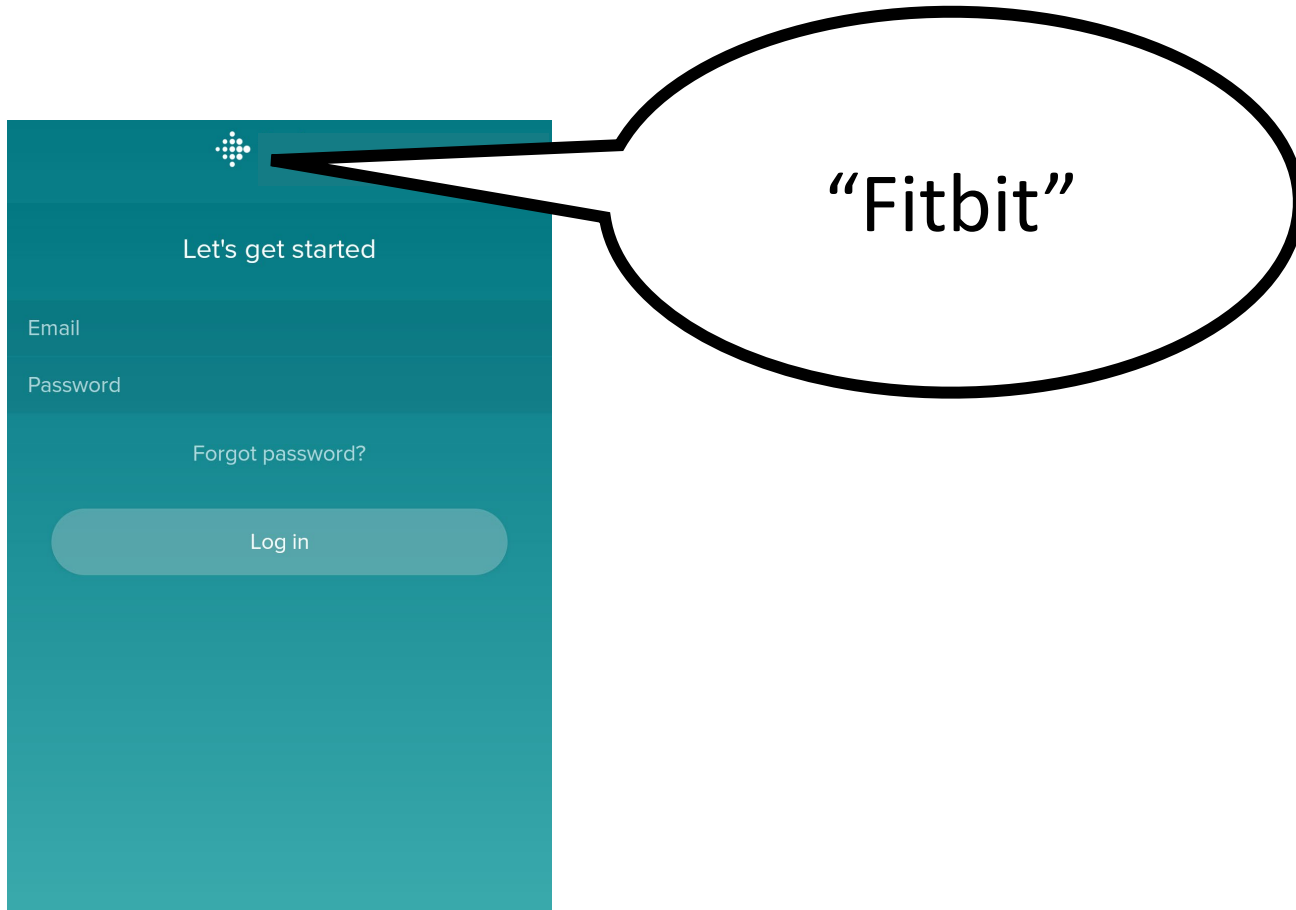
Email

Password

Forgot password?

Log in

# Fitbit

Let's get started

Email

Password

Forgot password?

Log in

"Log in"

*Labeled text-based element*

# Fitbit

Add to Wishlist  Unlabelled, Button  Add to Playlist  Download

# Freegal Music

PLAYING FROM
**Carol of the Bells**

**Carol of the Bells**

**Carol of the Bells (Choral)**
Carol Of the Bells

00:07                                    01:26

Add to Wishlist        Add to Playlist        Download

---

**Unlabeled Button**

PLAYING FROM
**Carol of the Bells**

**Unlabeled Button**

**Carol of the Bells (Choral)**
Carol Of the Bells

00:07                                    01:26

Seek control, 10%

| Unlabeled Button | Unlabeled Button | Unlabeled Button | Unlabeled Button | Unlabeled Button |

Add to Wishlist        Add to Playlist        Download
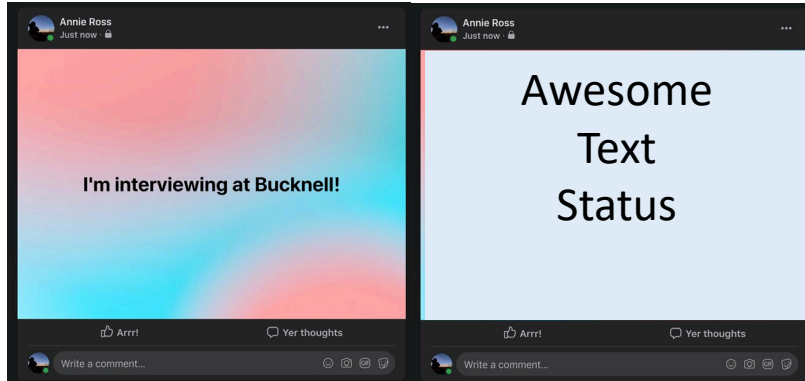
# Accessibility Failures in Apps
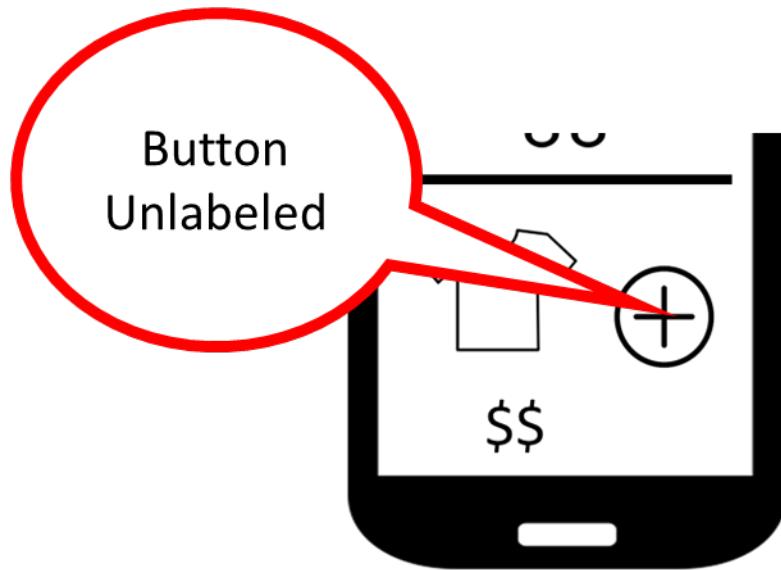


Missing Labels

Buttons Too Small

Unintuitive
Linear Navigation

# Inaccessibility Happens in Important Apps

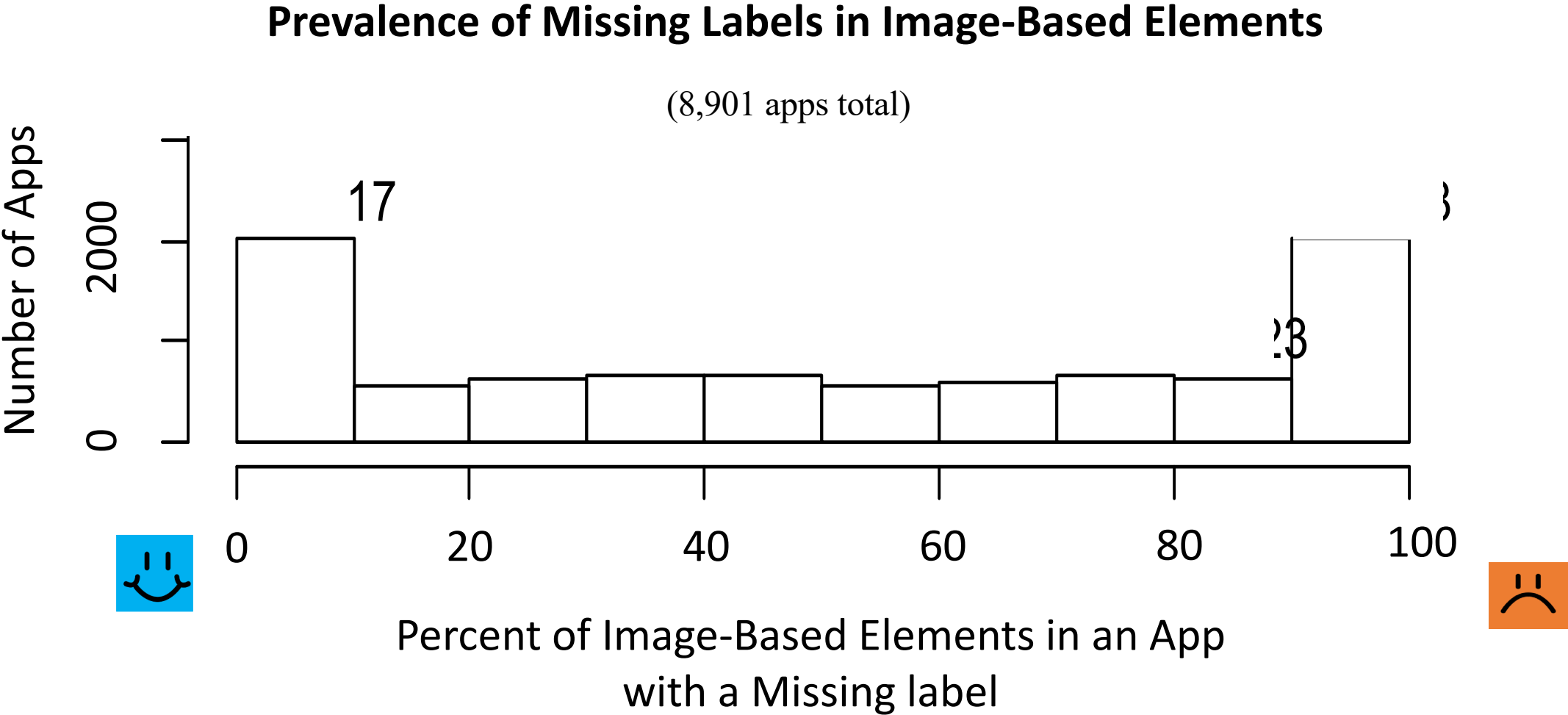**When Things Go Wrong for Blind Users on Facebook, They Go Really Wrong**

Annie Ross
Just now ·

I'm interviewing at Bucknell!

👍 Arrr!    💬 Yer thoughts

Write a comment...

Annie Ross
Just now ·

Awesome
Text
Status

👍 Arrr!    💬 Yer thoughts

Write a comment...

yelp

Start a review:

⭐ ⭐ ⭐ ⭐ ⭐

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

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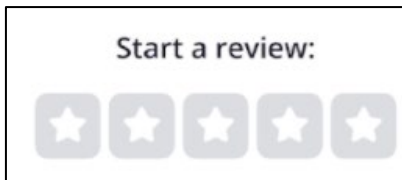
We're sorry about testing voice Tweets without support for people who are visually impaired, deaf, or hard of hearing. It was a miss to introduce this experiment without this support.

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

# Inaccessibility Happens Frequently

**Prevalence of Missing Labels in Image-Based Elements**

(8,901 apps total)



Percent of Image-Based Elements in an App
with a Missing label

# Inaccessibility Happens Frequently

**Prevalence of Missing Labels in Image-Based Elements**

(8,901 apps total)



**23%** 17

**23%** 3

23

Number of Apps

2000

0

0          20          40          60          80          100

Percent of Image-Based Elements in an App
with a Missing label
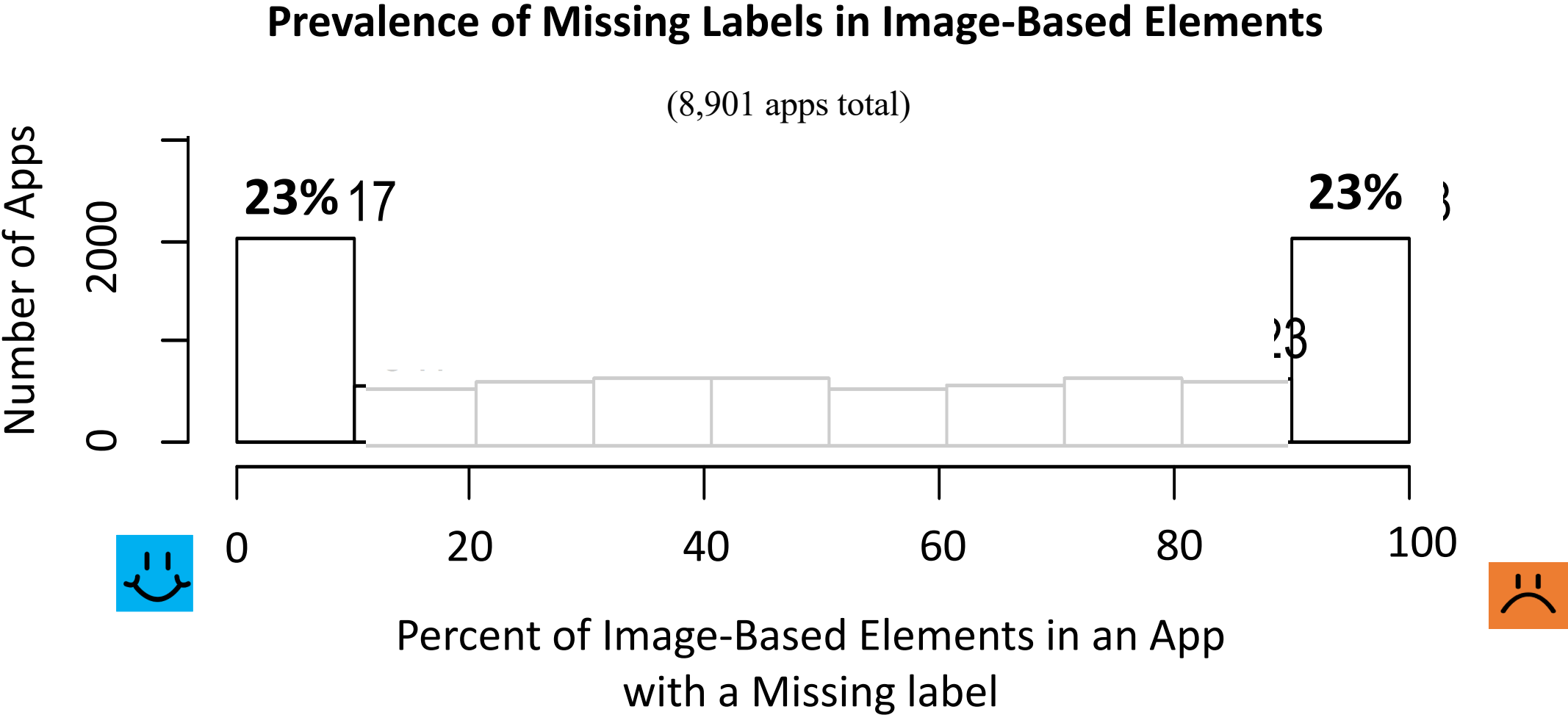
# Discussion Question : Accessibility

Do you think about and/or integrate accessibility into your work?

If so, how? If not, why?

# Toward That Vision

What is App Accessibility?

**Thinking Broadly About Accessibility**

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Accessibility as Collaboration

# Approaching App Accessibility
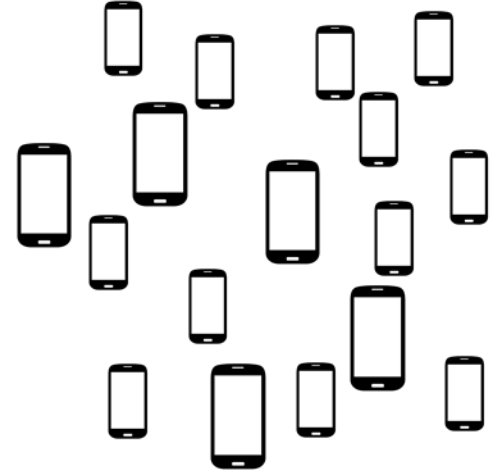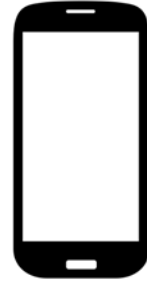
Population-Scale

# Approaching App Accessibility
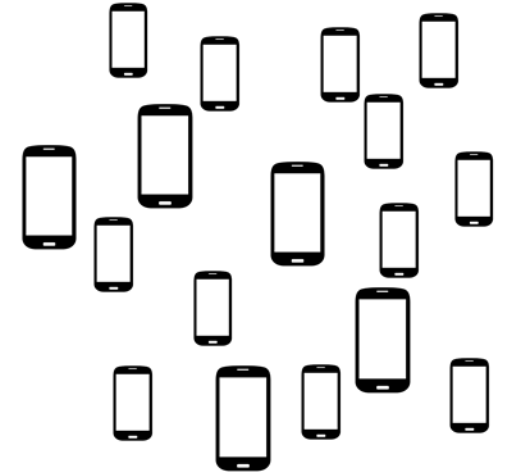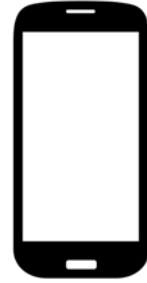
## Population-Scale
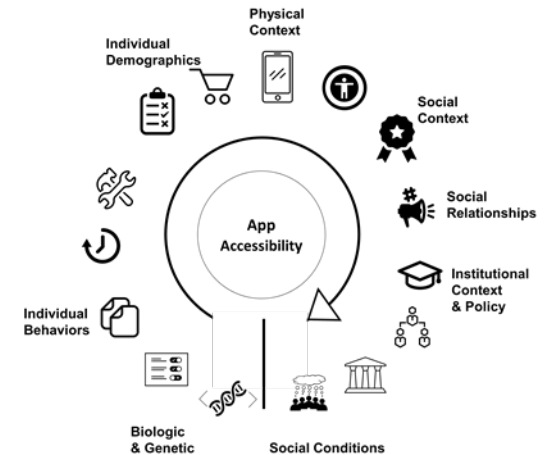
## Multi-Factor

# Epidemiology

**Population-Scale**

**Multi-Factor**



Ross, Zhang, Fogarty, Wobbrock. *Epidemiology as a Framework for Large-Scale Mobile Application Accessibility Assessment.* ASSETS 2017. Best Paper Nominee.

# Framework Terminology

# Note About Framework

## All About the Apps
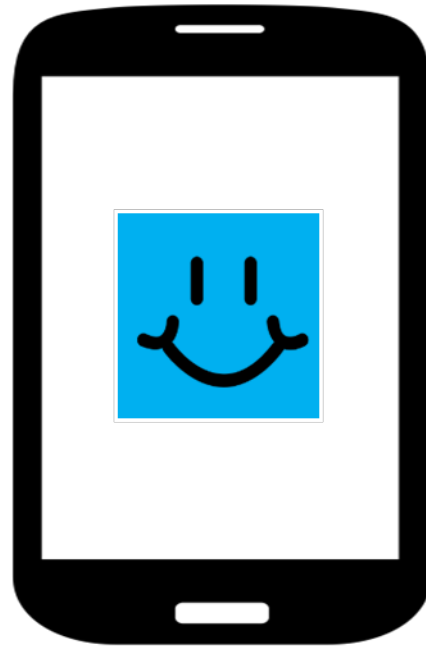
# Framework Terminology

**Population:**

a group of apps

**Disease:**

a specific accessibility barrier

**Health:**

a complete state of accessibility
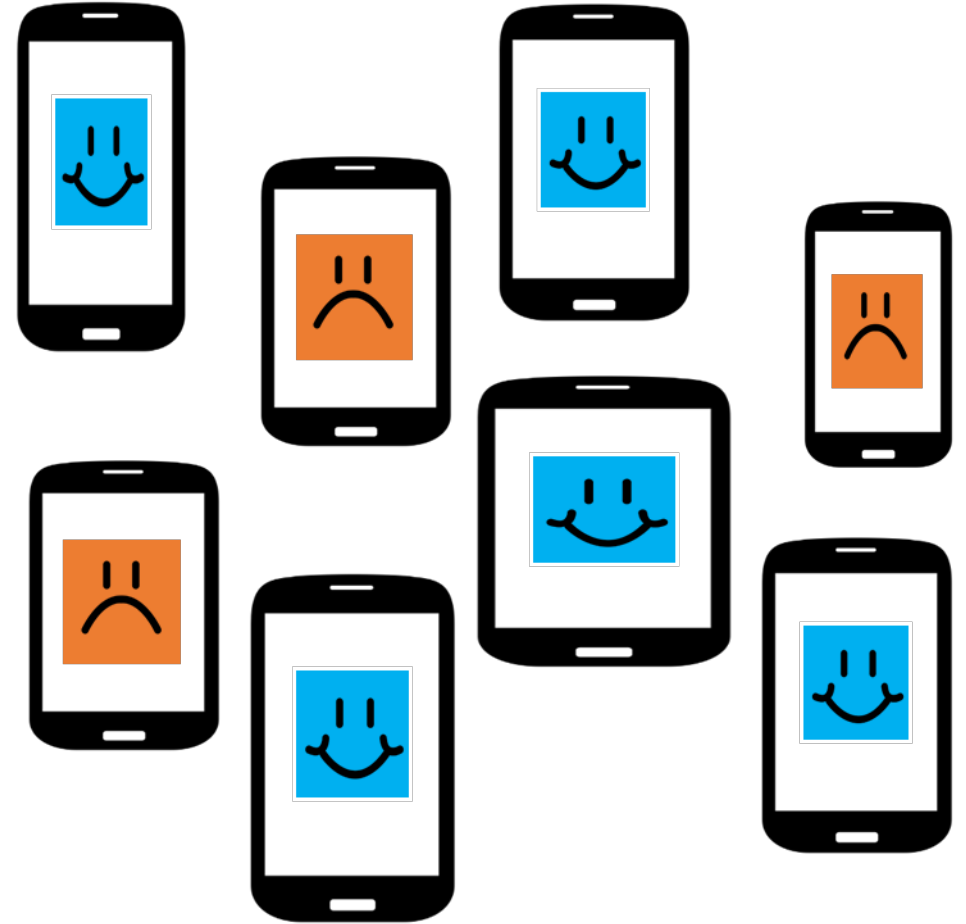
# Toward That Vision

What is App Accessibility?

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# Environmental Factors

**Factor:**

characteristic of an app
or ecosystem that impact the
likelihood of an app having
an accessibility barrier
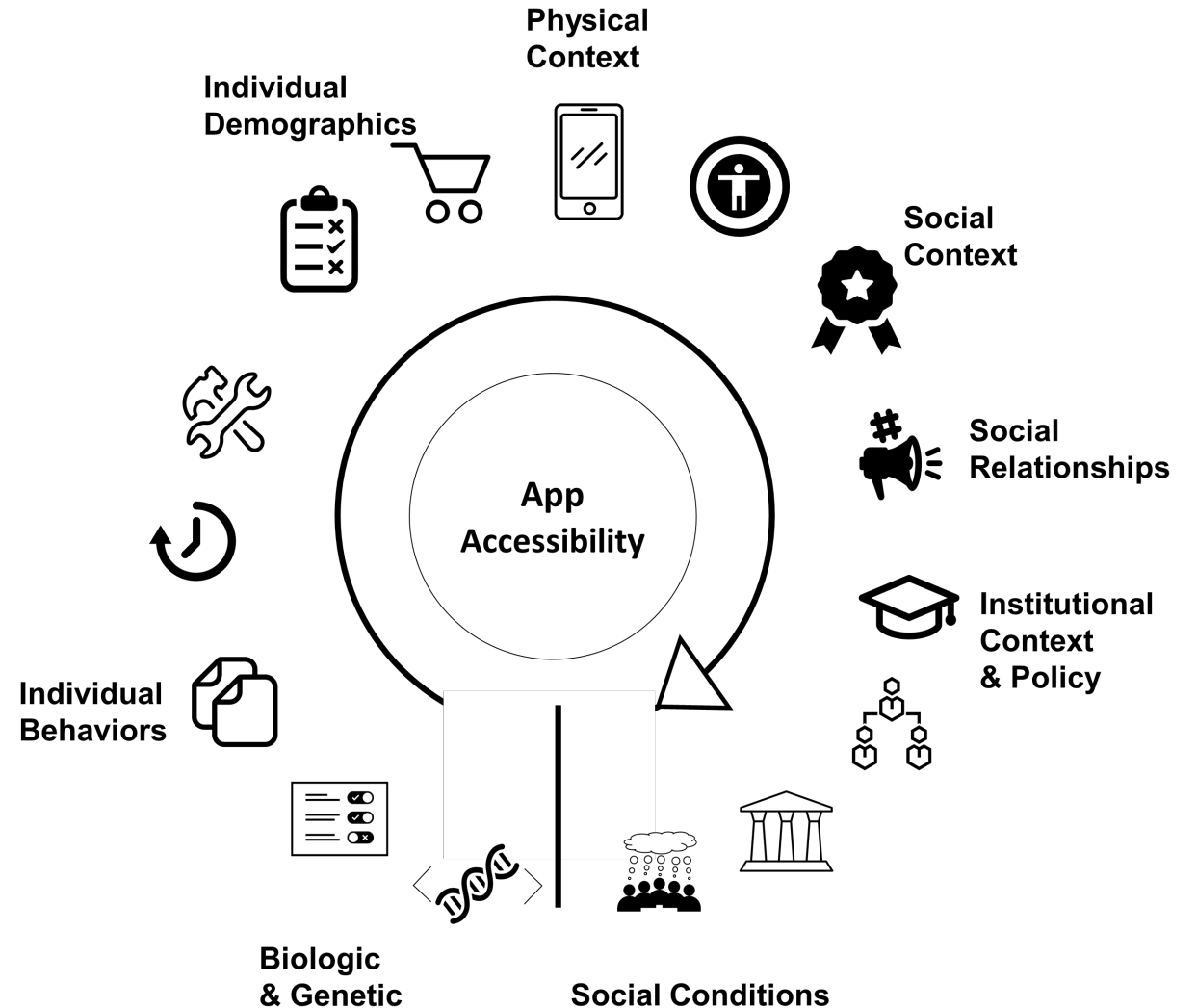
# What Goes Into Making an App?
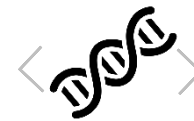


## Example Factors
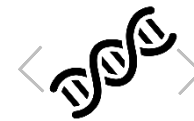
Source Code

```
<ImageButton
    ...
    contentDescription="Add To Cart"/>
```

App Accessibility

Intrinsic | Extrinsic

**Source Code**

# Where Does Code Come From?

**App Accessibility**

Intrinsic | Extrinsic

**Code Reuse**
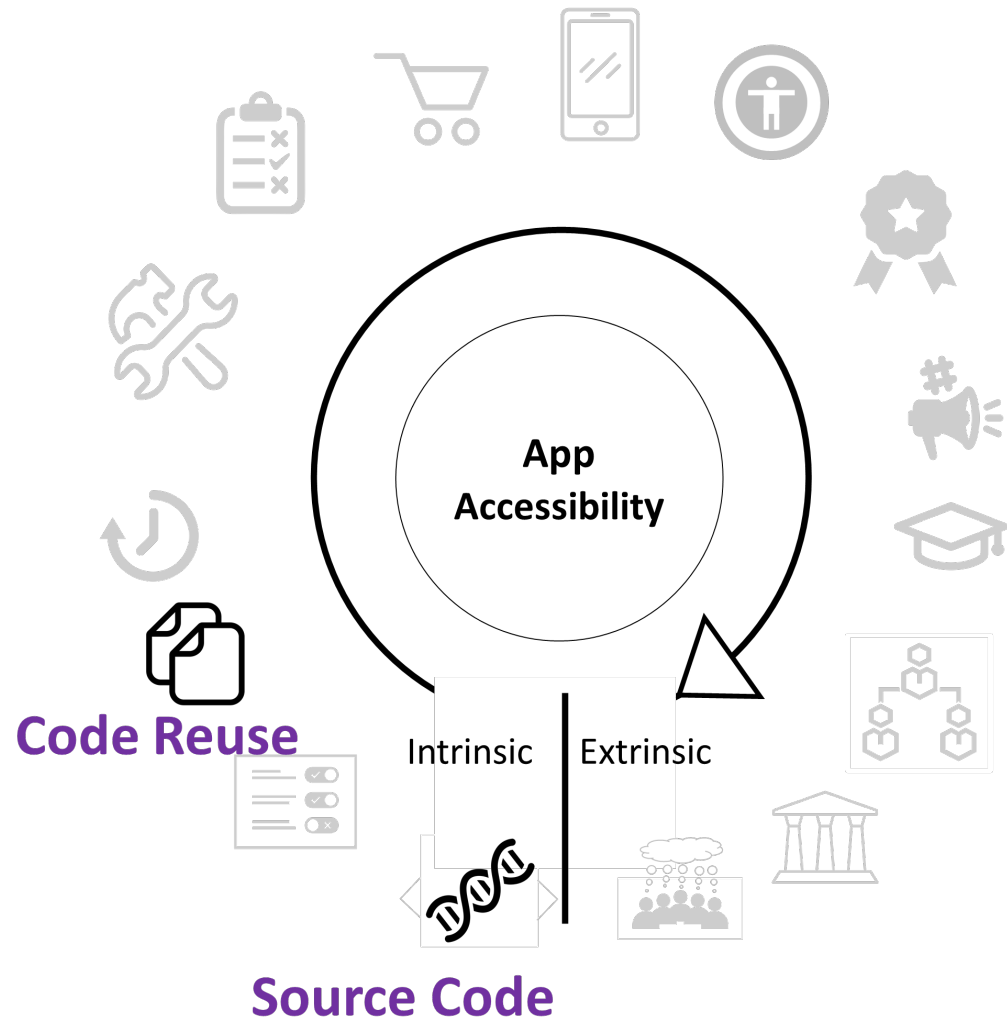
**Source Code**

## Example Factors

Source Code

Code Reuse

# Developer Guides

## General

- *Buttons*
- *Graphics*

With an icon, using the `ImageButton` class:

```
<ImageButton
    android:layout_width="wrap_content"
    android:layout_height="wr
    android:src="@drawable/bu
    ... />
```

The XML snippet below shows how to add a drawable resource to an `ImageView` in the XML layout:

```
<ImageView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:src="@drawable/my_image" />
```

# Developer Guides

## General

◦ *Buttons*

◦ *Graphics*

The following code shows how the `Float`

`<android.support.design.widget.Flo`
`    andr`
`    andr`
`    andr`

The XML snippet below shows how
an `ImageView` in the XML layout:
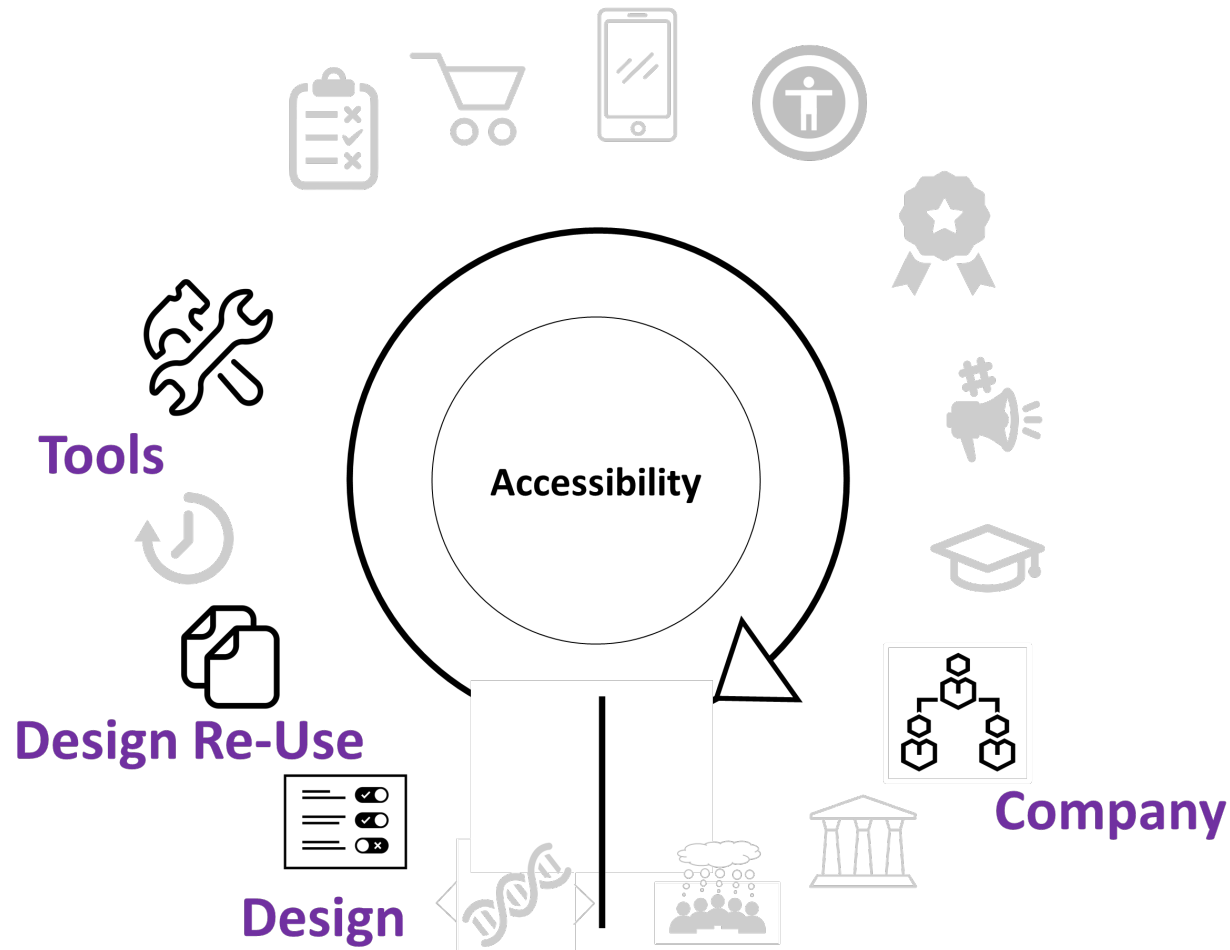
No Labels

# Discussion : Individual Practices

- What informs your work? Where do your designs come from?

# Where Do Designs Come From?

Accessibility

Tools

Design Re-Use

Design

Company

Design

Popular Designs
Inspiration
Consistency

Tools

Company

# Where Do Designs Come From?



Tools

Design Re-Use

Design

Accessibility

Company
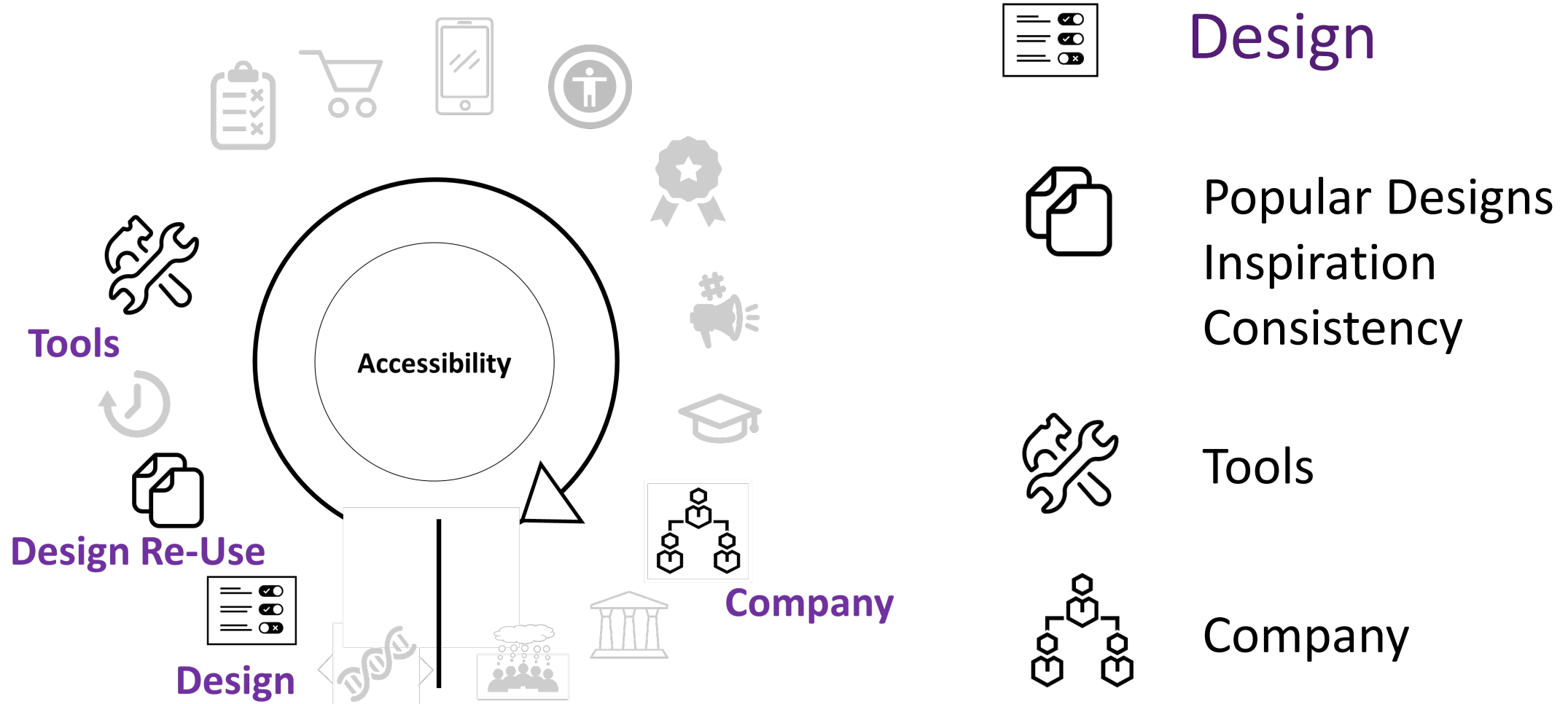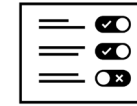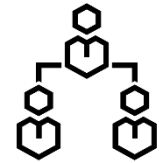
Design

Do your design sources promote accessibility?

# Environmental Factors

Context for accessibility problems

Beyond an individual's influence over their app

Inform effective intervention
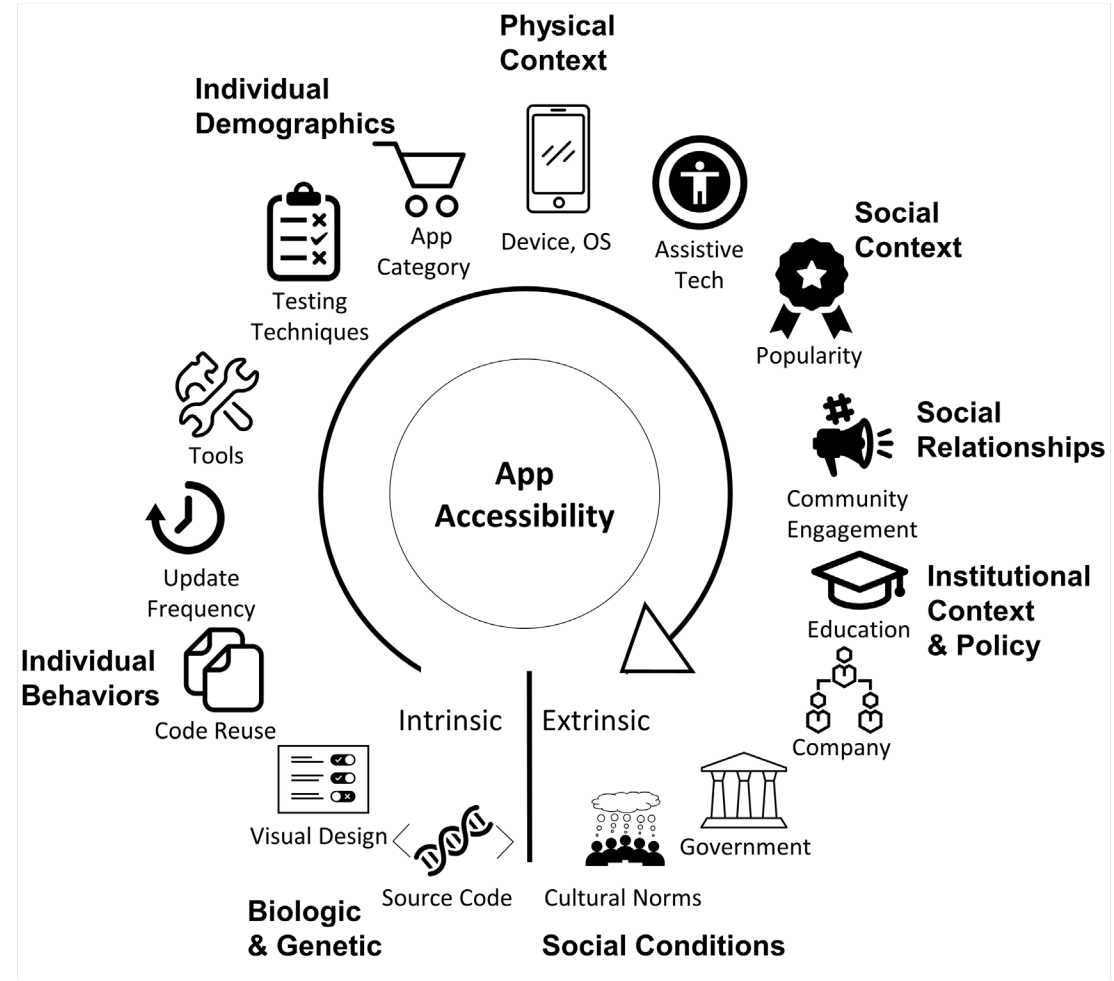
# Toward That Vision

## integrate accessibility into every facet of app creation

What is App Accessibility?

Thinking Broadly About Accessibility

What Contributes to Inaccessibility

**Improving Individual Accessibility Practices**

Accessibility as Collaboration
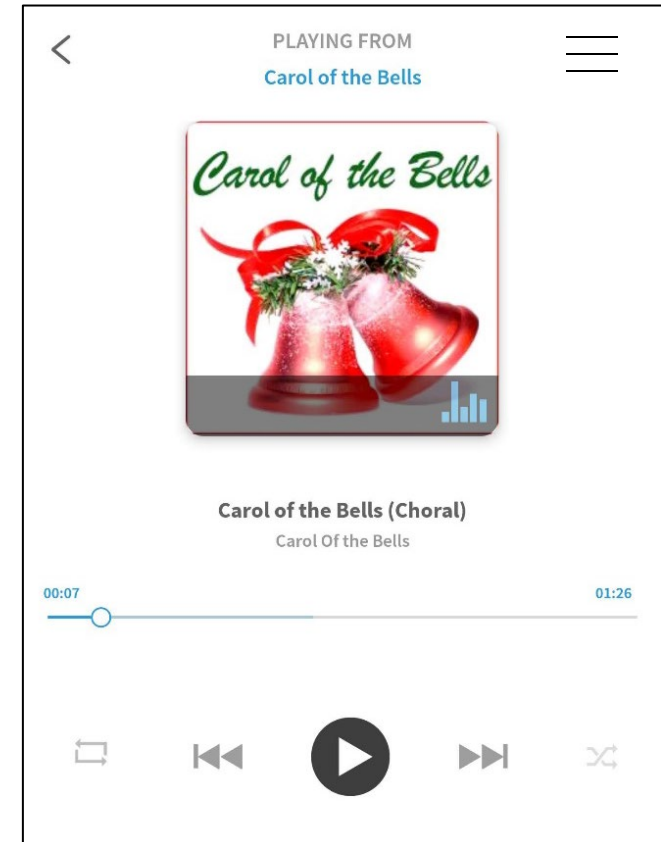
# Tools Goals

**Educational**

**Effective**
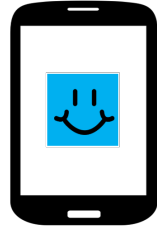
**Efficient**
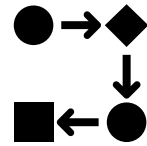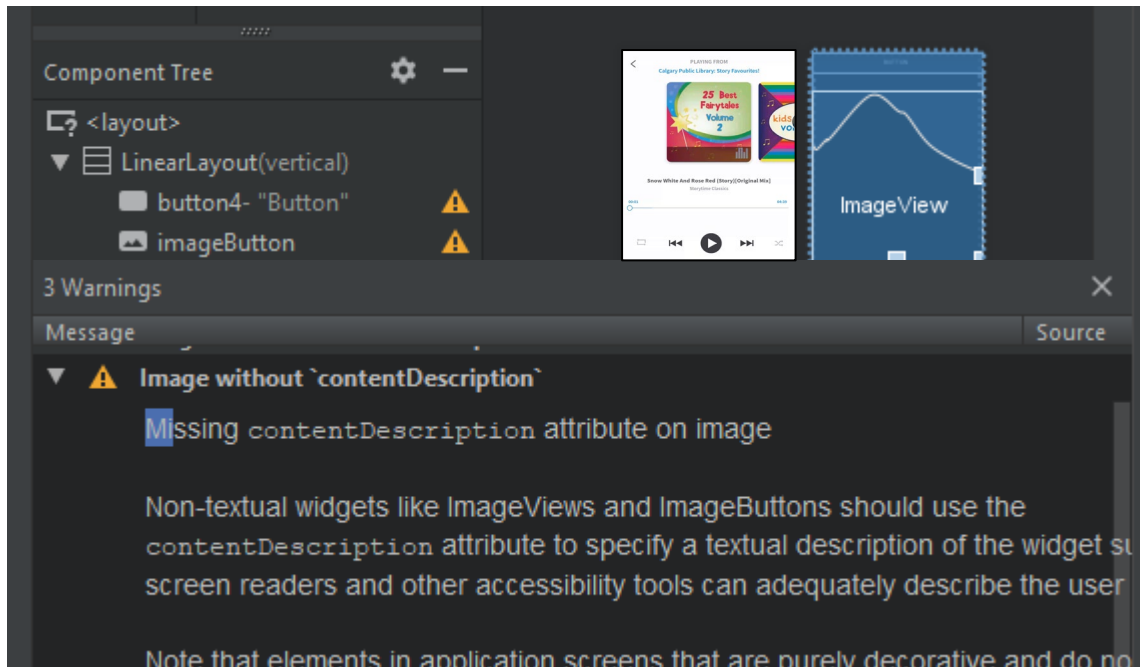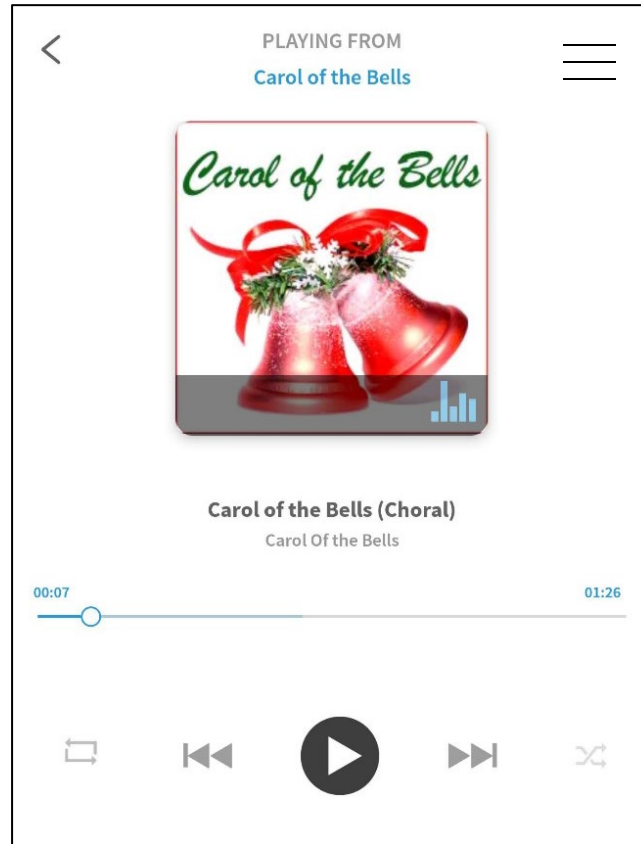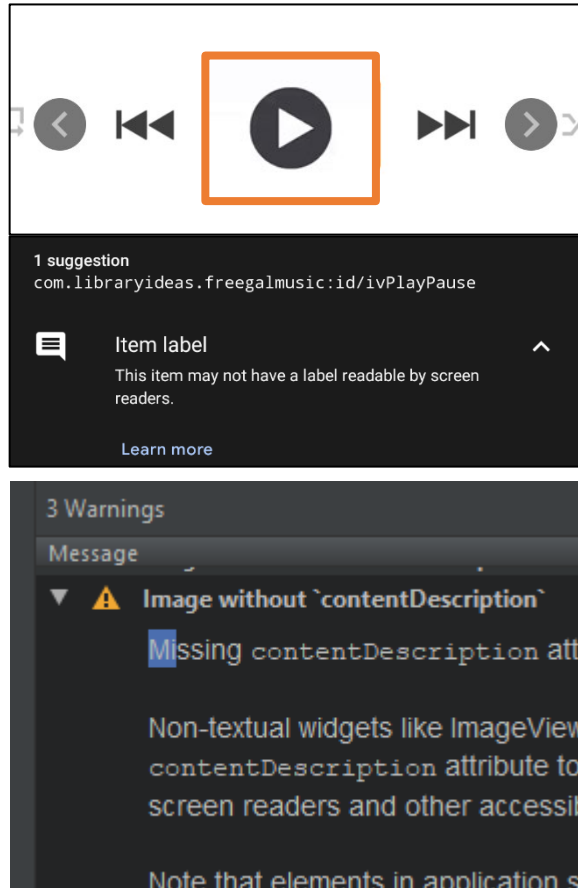
# Evaluating for Image Labels
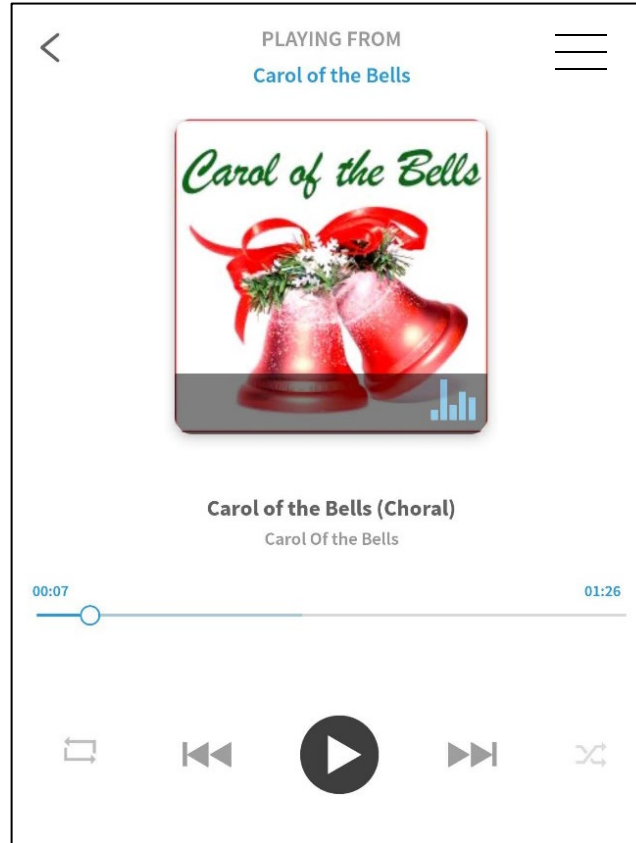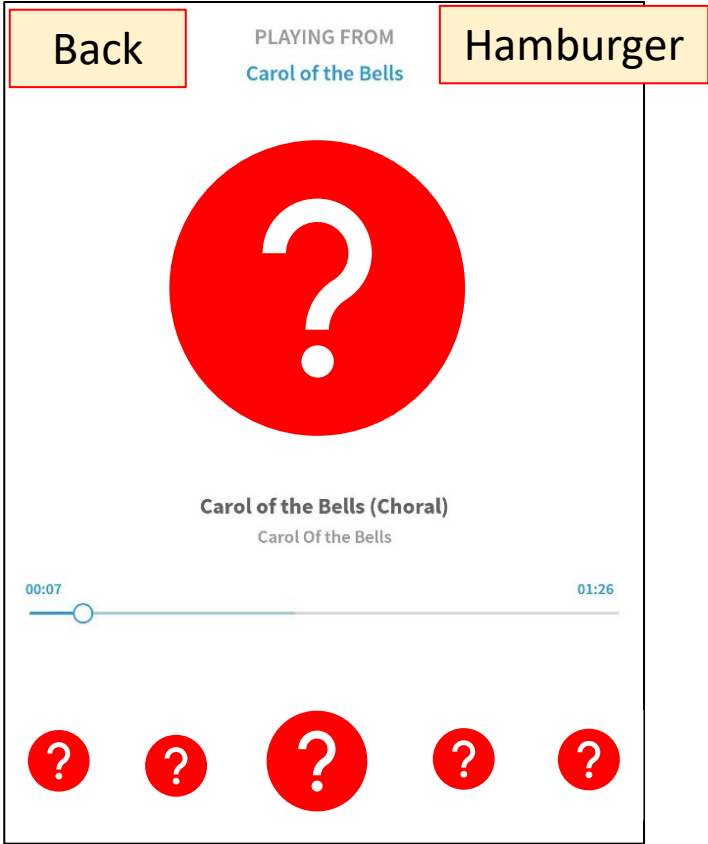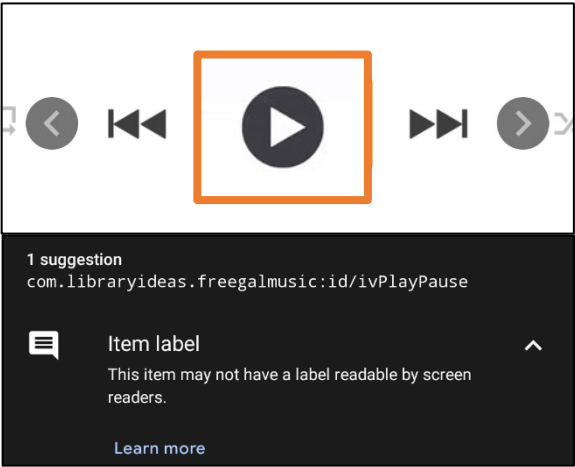
# Evaluating for Missing Labels with Current Tools



Automated Reports

# Beyond Text-Based Reports



Current Missing Labels Reports

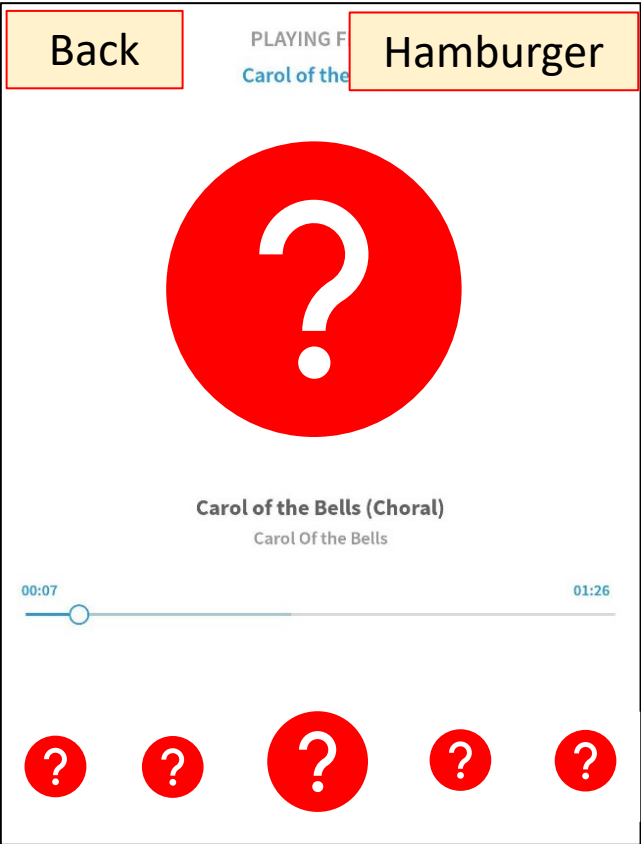# Designing New Tools



1 suggestion
com.libraryideas.freegalmusic:id/ivPlayPause

Item label
This item may not have a label readable by screen readers.

Learn more

PLAYING FROM
Carol of the Bells

Carol of the Bells (Choral)
Carol Of the Bells

00:07                                   01:26

Back          PLAYING FROM          Hamburger
              Carol of the Bells

Carol of the Bells (Choral)
Carol Of the Bells

00:07                                   01:26

# Identifying Accessibility Failures



| Element Labels |
|---|
| Back |
| Playing from … |
| Hamburger |
| UNLABELED |
| Carol of the Bells… |
| Seek control |
| UNLABELED |
| UNLABELED |

**Educational?**          **Effective?**          **Efficient?**

48
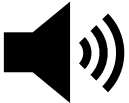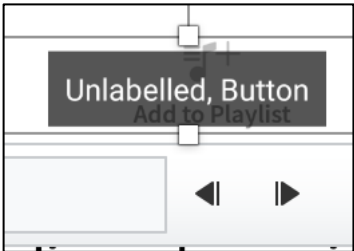
# Choosing Accessible Designs



IBM Equal Access Toolkit
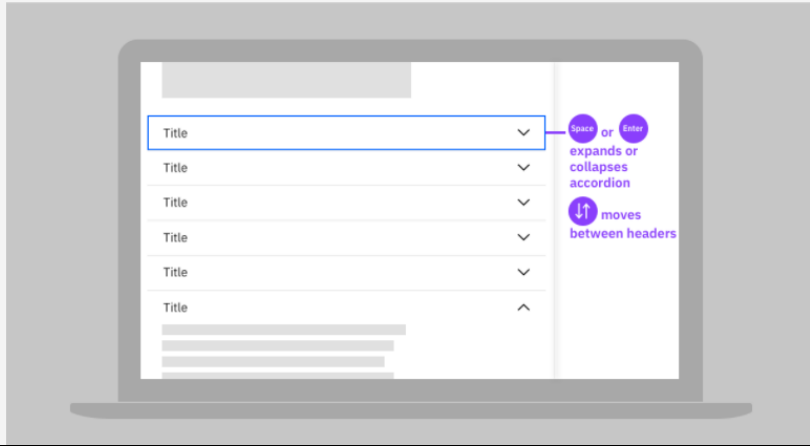
Beyond written guidelines
- Prompt designers to apply accessibility considerations to their existing design
- Suggest more accessible designs

# Toward That Vision

What is App Accessibility?

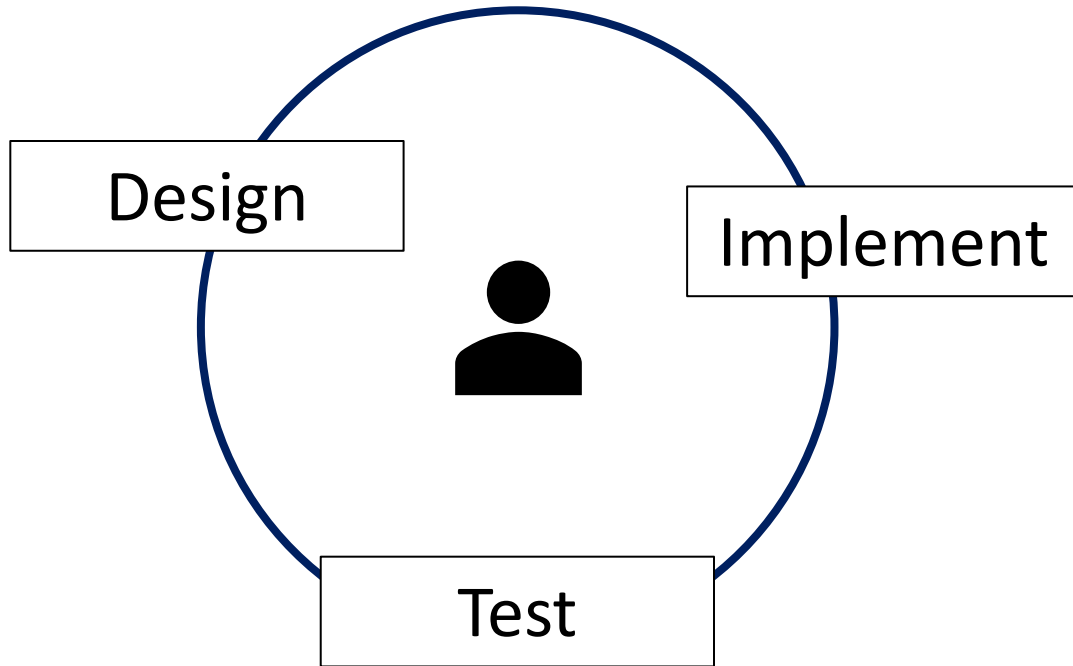Thinking Broadly About Accessibility

What Contributes to Inaccessibility

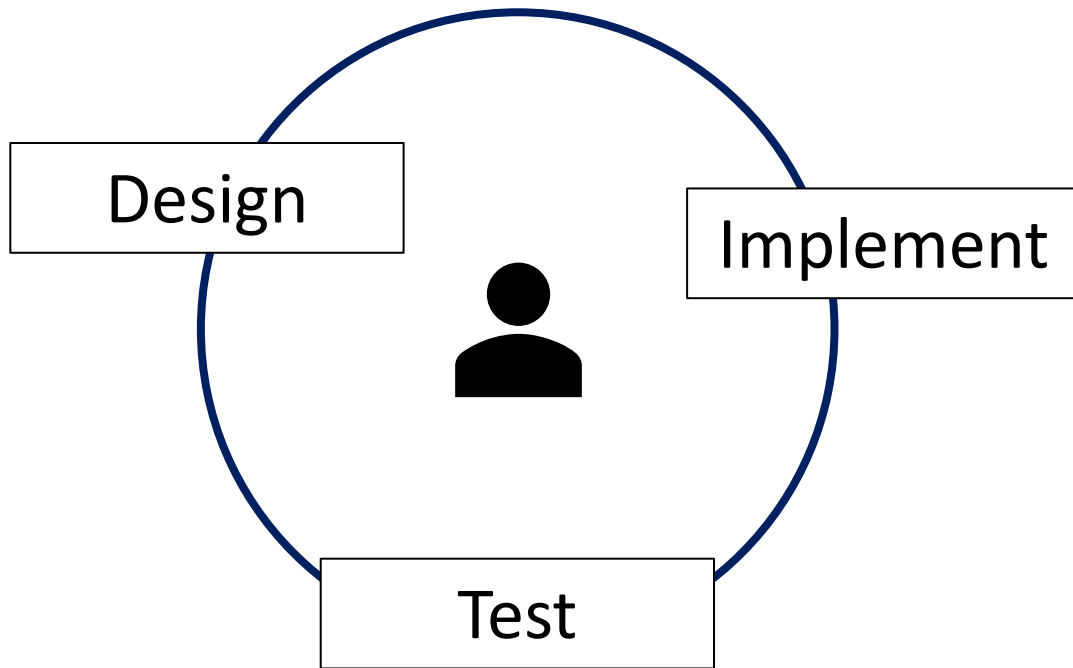Improving Individual Accessibility Practices

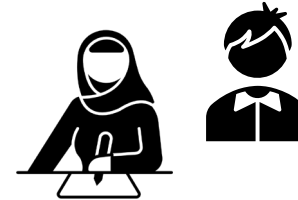**Accessibility as Collaboration**

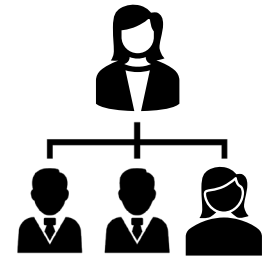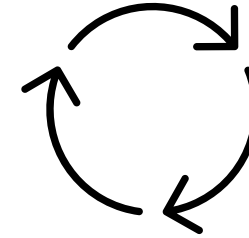# Accessibility As Collaboration

# Accessibility As Collaboration

# Discussion Question : Collaboration

- How do you collaborate and interact with other teams?
- What are challenges, strengths, and opportunities?

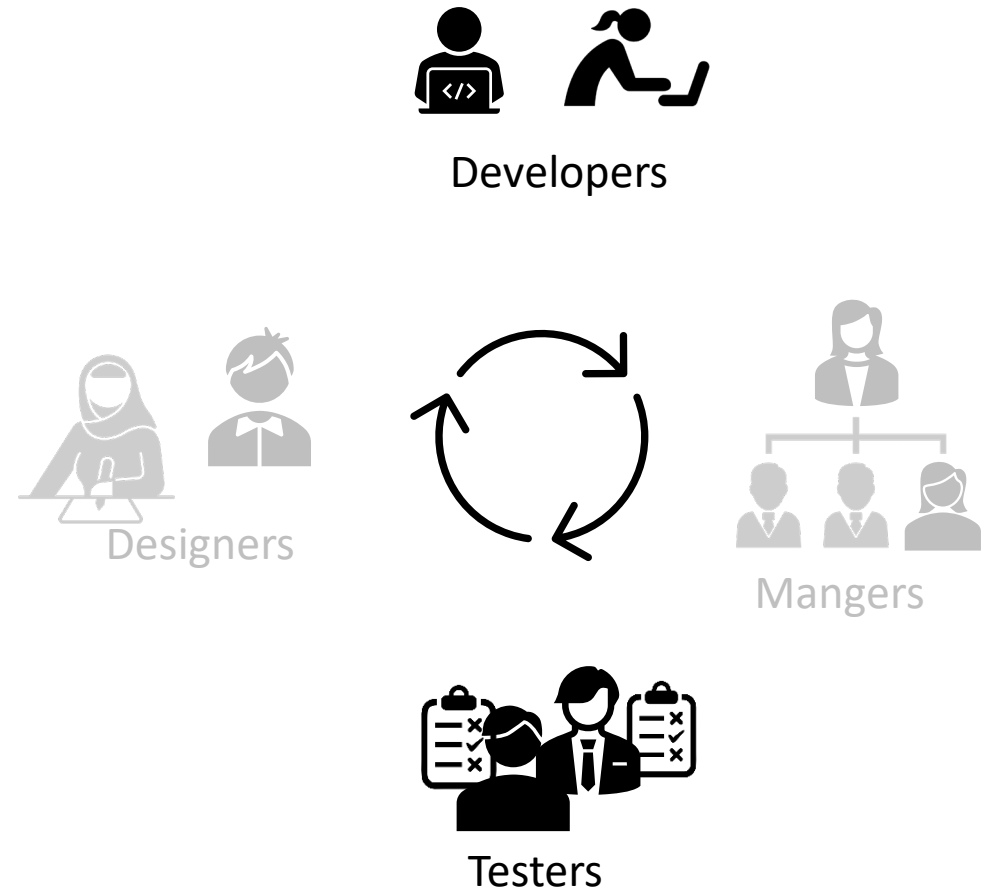# Accessibility As Collaboration

Separate testing and developer teams

### *Factors*

- Mixed expertise
- Power dynamics
- Information discrepancy
- Communication techniques
- Scope of work

Developers

Designers

Mangers

Testers

# Mixed Expertise + Communication

[Developers and testers] often **use different terminology/vocabulary**, both in terms of an accessibility defect and when referencing different components/UI within an application. This makes comprehension somewhat difficult when conveying information about a defect in written form.

- Developer

# Mixed Expertise + Communication

[Developers and testers] often **use different terminology/vocabulary**…This makes comprehension somewhat difficult.

- Developer

We should bridge the technical knowledge gap between testers and developers ... For testers who work on UI elements and surface components of applications or sites, we should have HTML training and resources.

For the app development teams, a lack of familiarity with a11y can hinder meaningful discussions with testers… development teams should also learn about the fine points of accessibility and what it all means"

- Tester

# Scope + Information Discrepancy

The most common reason for being unable to repair a contrast issue is because the **problem originates in UI not owned by the app**, but rather a shared component or library, or an embedded UI from another source (like web content owned by another team).

- Developer

# Scope + Information Discrepancy

The most common reason for being unable to repair a contrast issue is because the **problem originates in UI not owned by the app**, but rather a shared component or library, or an embedded UI from another source (like web content owned by another team).
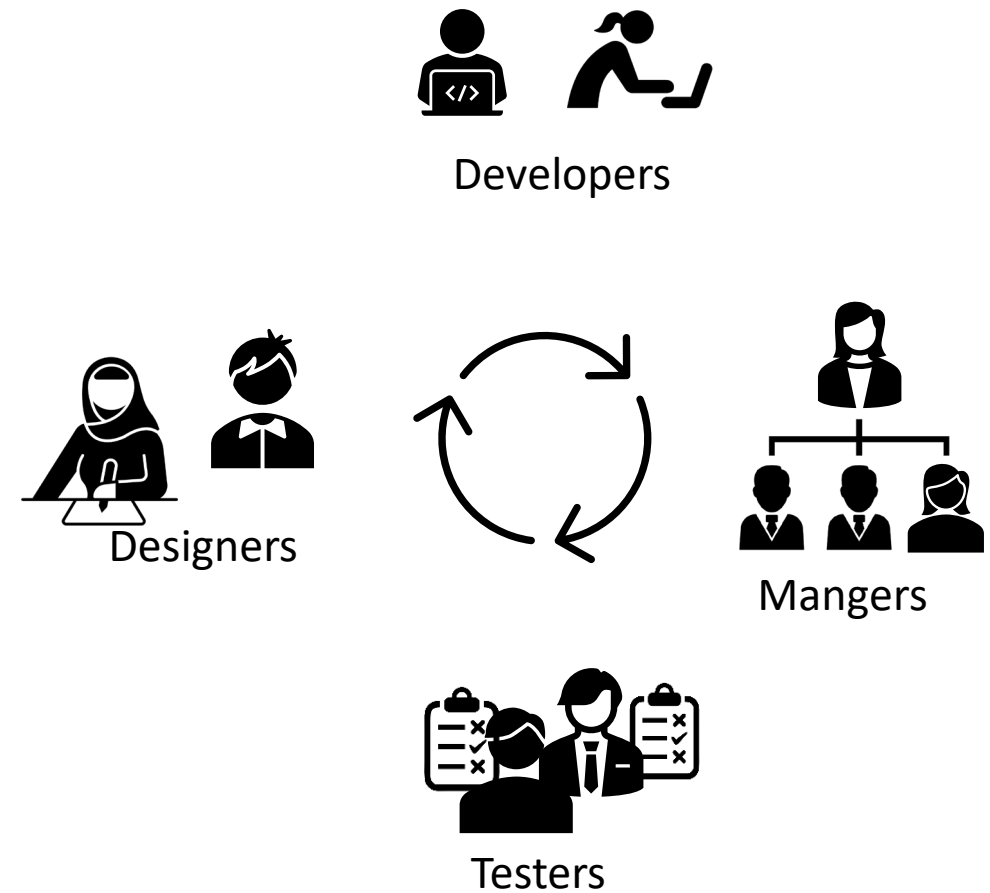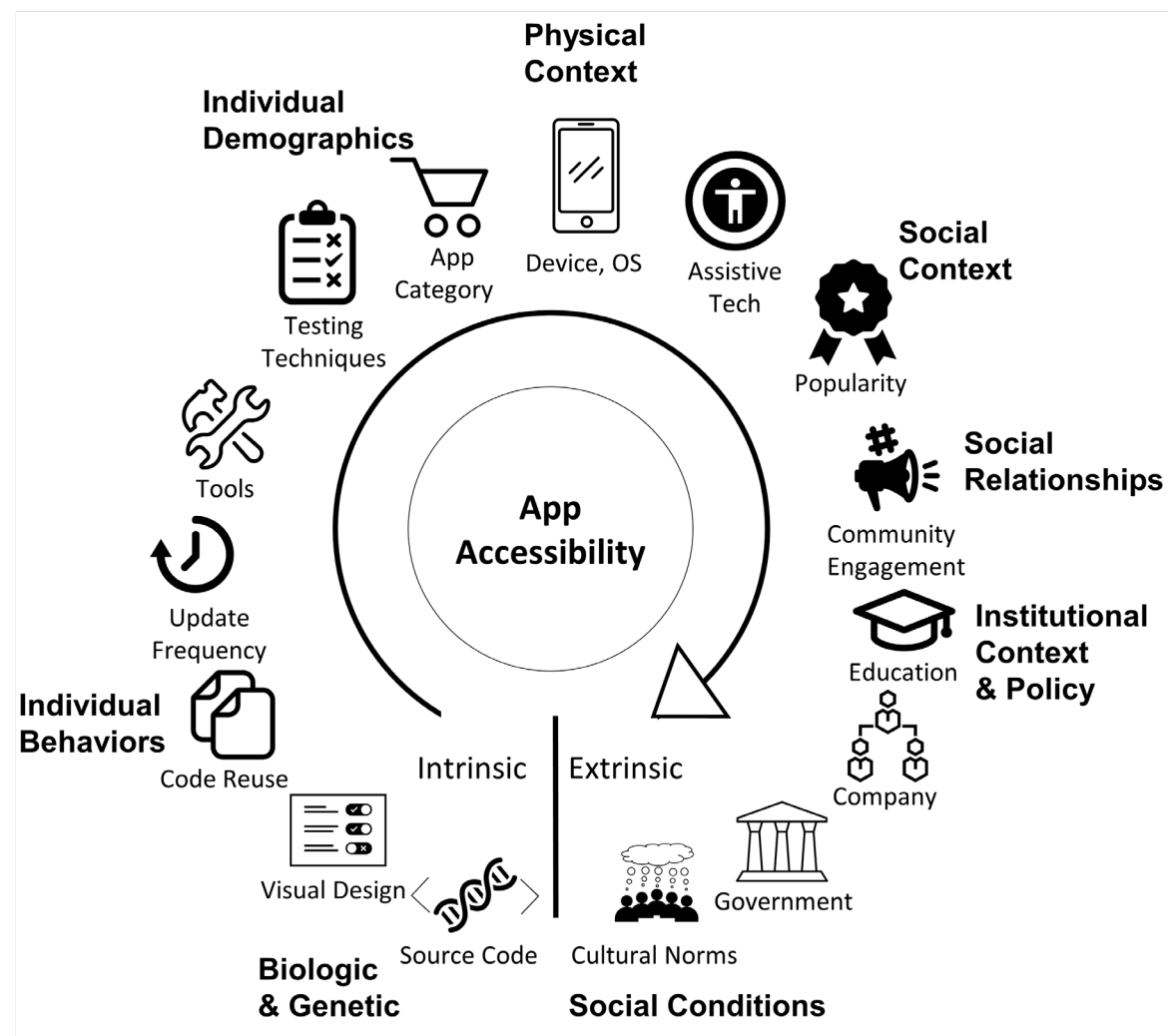
- Developer

Because I'm not on the team to which I'm submitting bugs and **don't know details**, many bugs are unfixable because of external dependencies, are obsolete, or something like that which makes the bug a waste of time.

- Tester

# Professional Testing Ecosystem
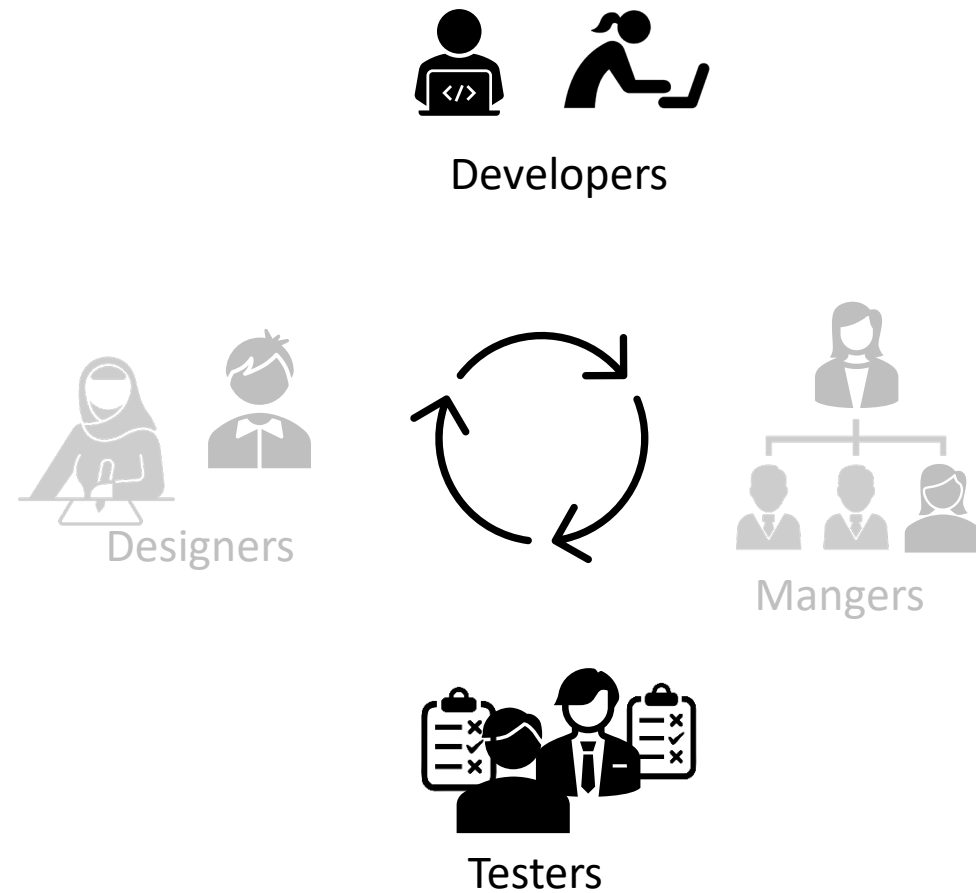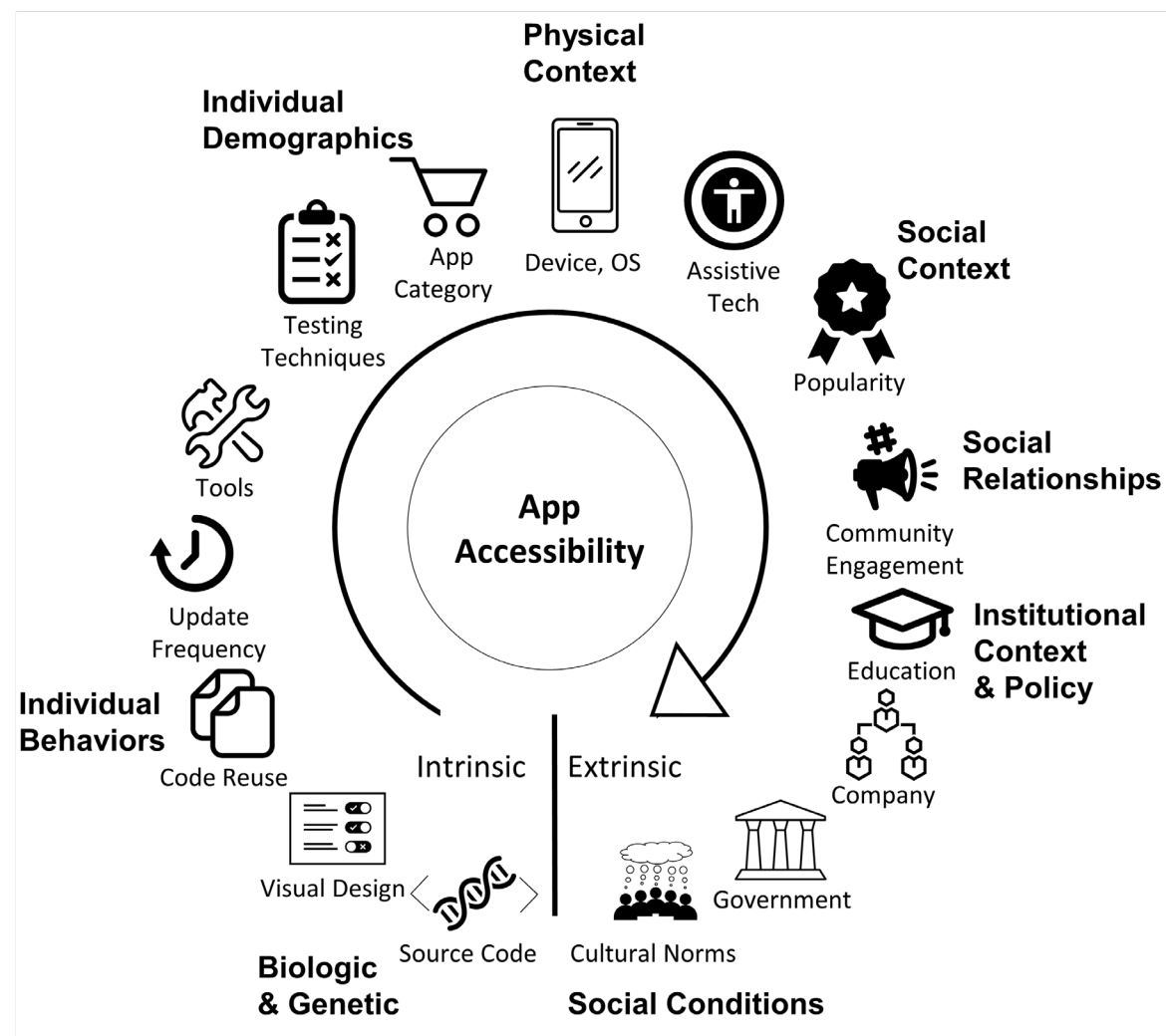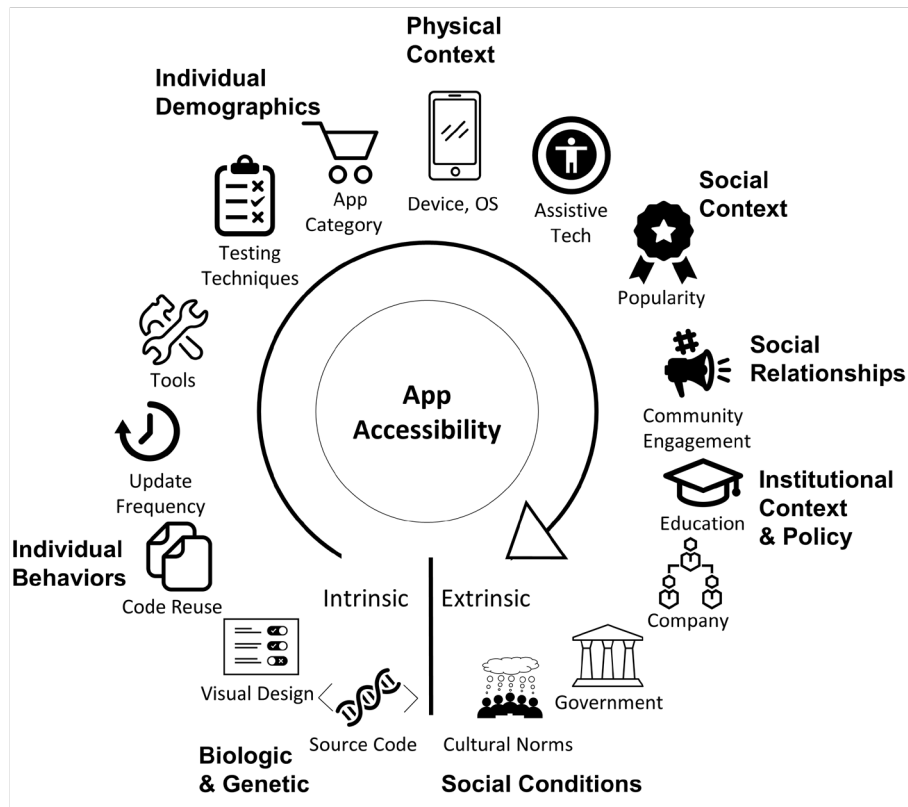
# Professional Testing Ecosystem

# Vision

I envision a world in which

## accessibility is integrated
## into every facet of app creation

from the low-level design and implementation details
to organization-level structures, incentives, and resources.

# Vision

## accessibility is integrated into every facet of app creation



Improve individual practices

Support collaboration

# Mobile App Accessibility: Building Apps that Work for Everyone

Anne Spencer Ross

https://homes.cs.washington.edu/~ansross/

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
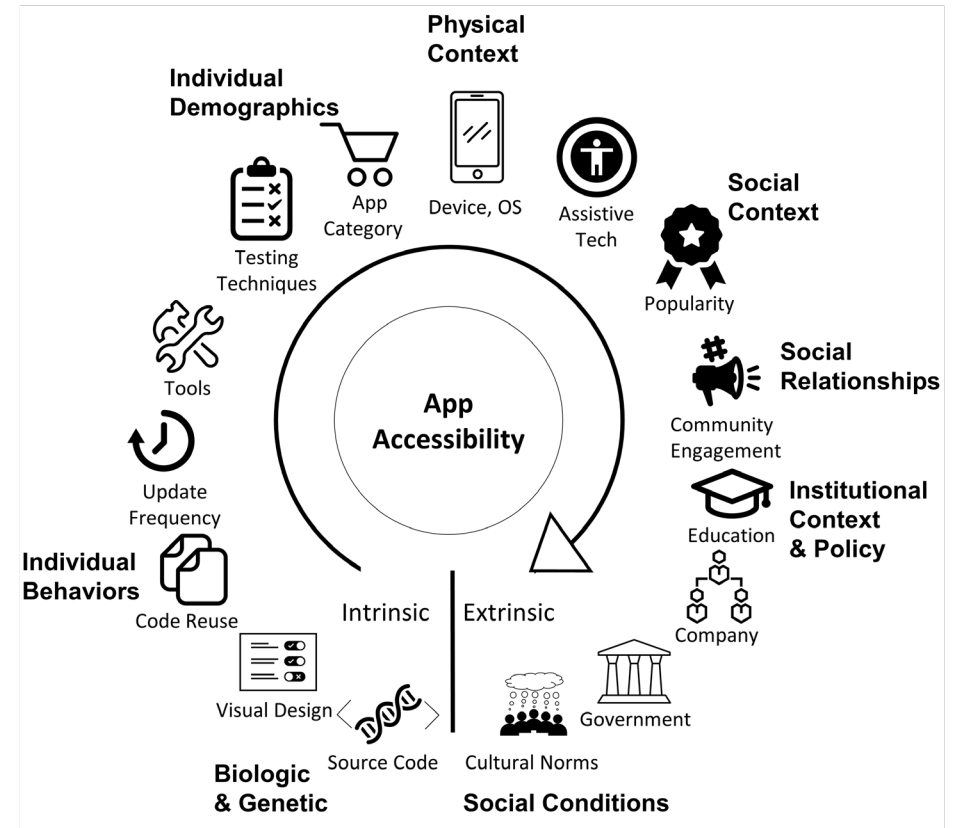
# Discussion Questions

**Individual Practices**

- What informs your work? Where do your designs come from?

**Collaboration**

- How do you collaborate with other teams?

**Accessibility Matters**

- What would help you in integrating accessibility practices in your work?