## Lessons learned from mobile app accessibility testing

Rachele DiTullio, Senior Accessibility Engineer, Citizens



## Rachele DiTullio (she/they)

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- Web developer for many years
- Graduate school for Information Studies (UXD)
- Learned accessibility and became a Certified Professional in Web Accessibility (CPWA)
- Progressed from software engineering to accessibility engineering in 2021





# Testing methodology

## What we found

What we learned







## What we tested

- Android and iOS and versions of the Citizens Core mobile app (QA) against WCAG 2.1 AA success criteria
- Scoped 17 tasks/screens for testing
  - Logging into the app
  - Viewing the details of each account
  - Transferring money between accounts
  - Depositing checks

Citiz MADE REA	ens to		Citize MADE READV
User ID			User ID
Password			
Remember u	iser ID		Password
	Log In		Remember
Forgot	your user ID or pas	sword?	
🗾 Enroll No	w		Forgot your
C	Â		
Contact Us	Locations	Feedback	🗾 Enroll No
logging in, you ac iderstand, and agr inditions that now	knowledge that you ha ee to the Citizens Onli include Mobile Bankir	ive read, ne Terms and ng. Citizens is a	e
			Contact Us



#### **Devices we tested with**

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## Why we test with a wireless keyboard

- Most alternative navigational devices function in the same way a keyboard does to interact with the user interface without touch.
- Keyboard-only users benefit as do people who use assistive technology like sip and puff devices, eye tracking software, switches, joysticks, speech input, <u>MouthPad</u>.



- We test to make sure that every interactive piece of the user interface can be controlled with a keyboard only, e.g. all interactive elements can be reached using the TAB key.
- We check for UI controls that require gestures or mouse dragging and ensure that a keyboard-only control is also provided.

## Full keyboard access

- Must enable Full Keyboard Access to test with a keyboard on iOS
- Settings > Accessibility > Keyboards > Full Keyboard Access: On
- Keyboard commands:

Command	Keystroke
Move focus between groups	TAB / SHIFT TAB
Move focus between items in a pane	CTRL TAB / CTRL SHIFT TAB
Move focus to the next focusable item	ARROW keys
Select/activate a control	SPACE
Home screen	ESC

Keyboards	
HARDWARE KEYBOARDS	
Full Keyboard Access	On >
Use an external keyboard to control your iPhone.	
Key Repeat	On >
Sticky Keys	Off >
Slow Keys	Off >
Customize the typing experience whe an external keyboard.	n using
SOFTWARE KEYBOARDS	
Show Lowercase Keys	
This affects keyboards that use the SI switch between uppercase and lowerd letters.	hift key to case

## iOS accessibility settings





	Accessibility Shortcut			
Config o tog RIPL	gure and then triple-click the side bu gle accessibility features on or off. E-CLICK THE SIDE BUTTON FOR:	tton		
~	VoiceOver			
	AssistiveTouch			
	Background Sounds			
	Classic Invert			
	Color Filters			
	Control Nearby Devices			
	Detection Mode			
	Full Keyboard Access			
	Increase Contrast			
	Left/Right Balance			
	Live Captions			

## **VoiceOver settings**



K Back	VoiceOver		
Commands			
Activities			
Rotor			
Rotor Action	S		
Typing			
Quick Settin	gs		
Quick settings a settings at any two finger quad	allows you to acce time. Access quic iruple tap.	ess VoiceOve k settings wi	r th
Navigation S	style	Flat	
Navigate Ima	ages	Always	
Large Curso	r		
Caption Pan	el		
Double-tap Caption Panel,	Timeout on, Double tap to <u>t</u>	0.25s oggle setting	



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## Why we test with screen readers

- Some people use screen reading software to have the structure of the screen and its contents read aloud by a synthesized voice; this is often people who cannot fully see the user interface.
- Not all screen reader users are blind.
- Other assistive technology users, like people with refreshable Braille displays, benefit from this testing.
- We test to make sure that all controls—like buttons and form fields—have an accessible name that is announced by the screen reader.
- We test to make sure all interactive controls have an appropriate role that is announced by the screen reader, e.g. link or dialog.
- We test to make sure all dynamic content in the UI is conveyed to screen readers users through status messages, e.g. success and error messages.

## Android accessibility settings





## TalkBack settings

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TalkBack	
TalkBack provides spoken feedback so your device without looking at the scre helpful for people who have difficulty s	that you can use en. TalkBack can be seeing the screen.
Use TalkBack	
Options	
TalkBack shortcut Hold volume keys	
Settings	
<u> </u>	





## **Accessibility Scanner**







## Accessibility audit spreadsheet

A		В	С	D	Е	F	<u> </u>
1 X Citiz	ens™	Accessibility Audit					
2 Project Name	Q	A - Core mobile iOS app					
3 Date	S	eptember 6, 2023					
4 Tester	R	achele DiTullio					
5 WCAG Violation	is:	120					
6 WCAG Version	M	VCAG 2.1 Level AA					
8	A	Accessibility Support					·
9 Environment	iC	DS with VoiceOver					
10 Device	iF	Phone 13 Pro with iOS 16.6					
12 ▲ → Overview	Scope 01	02 03 04 05 06 07 08 09 10 11 12	13 14 🕂 🚦 📢				•







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Customers - January 2024

OS	# of users	Percentage
Android	501,874	27.9%
iOS	1,268,797	70.6%

Total unique customers: 1,797,829



## Core mobile app customer feedback

- New format is ridiculously small print. Preferred the prior edition.
- Your mobile app is not accessibility compliant. My husband is color blind and can not see his account information. Please become compliant.
- Some of the buttons are not labeled in order for a blind person to use a screen reader on the phone.
- Print on page hard to read. Needs more contrast. As people age visual acuity declines.

## How did our apps fare?

## Web Content Accessibility Guideline failures

OS	Total
Android	123
iOS	120

Average of 7 failures per component/screen tested



## Android screens with the most issues

≡		Account	s	
Good	Morni	ng!		
Personal b	anking acco	unts	\$4	33,027.08
Circle ( Checki	Gold w/ ng Interest		<b>\$10,</b> 8 Available	8 <b>99.20</b> e balance
<b>Circle (</b> 9442	iold Saving	şs	\$422 Available	<b>,127.88</b> e balance
Stater	nents	Anage Card	ds Explore	Products
Chan Ment <sub>Read</sub>	npionir tal Heå	g		
Accounts	<del>,</del> Transfer	\$ Send	eay Bills	<b>D</b> eposit

Accounts - 10

← Profile & Settings			
Login & Security			
Enable Fingerprint Login			
Remember My User ID			
Personal Information			
Email Address subramaniya.p@infosys.com	>		
Phone Numbers	>		
Address	>		
Accounts Page			
Show Insights on Accounts Page			
Documents			
Paperless Settings > Get documents online only.			
Accounts Transfer Send Pay Bills	• Deposit		

Profile & Settings - 10



Make a Deposit - 9

## iOS screens with the most issues

≡	Account	s		
Good	Morning!			
Personal b accounts	anking	\$429,555.74		
Circle C Checkin 9336	Gold w/ ng Interest	<b>\$7,362.86</b> Available balance		
Circle C Savings 9442	Gold S	<b>\$422,192.88</b> Available balance		
Statement	s Manage Cards	Explore Prod		
Championing Mental Health Read Article				
đ	Your Financial Sn	apshot 🔨		
Accounts Tr		🎫 🂽 Pay Bills Deposit		

Accounts - 12

😑 🛛 Profile & Set	tings
Login & Security	
Remember User ID	
Enable Face ID®	
Personal Information	
Email Address	>
subramaniya.p@infosys.coi	n
Phone Numbers	>
Address	>
Documents	
Paperless Settings	>
Get documents online only.	
Accounts Transfer Send Money	Pay Bills Deposit

Profile & Settings - 10



4 screens tied - 9

## Top issue: App just logs you out

- Effects both the Android and iOS apps
- A message displays warning the user that they will be logged out in 45 seconds
- No option to extend the session
- Message not conveyed to screen reader users (iOS)
- Logged me out 15 times during one testing session when I was active, not idle

#### Recommendation

Allow the user to extend the session.





## Most impactful issue: No support for text resizing on iOS

- Small text is one of the most reported issues in customer feedback
- Text can be hard to read, especially when paired with low contrast
- Many users adjust the font size in their OS
- Easy to support

#### Recommendation

Support font scaling based on the user's iOS settings by enabling <u>Dynamic Type</u> of all text.

test	
Password	
Remember user ID	
Log In	
Forstat your year ID	er naesuerd?

User ID test	
Password	
Remember user ID	
Log In	
Forgot your user ID or pass	word?

## Some controls don't work with a keyboard

Some functionality in the app cannot be reached with alternative navigation methods like a wireless keyboard

- Viewing account details
- Selecting the year for viewing account documents
- Switch control for making a transfer recurring
- Accessing FAQs

#### Recommendation

Ensure all controls can be activated with SPACE key (iOS) and ENTER key (Android).



## Some functionality only works with touch or gestures

Some functionality cannot be reached by people using a screen reader or keyboard

- Loading the latest account overview data
- Closing the app navigation menu
- Refreshing the latest transactions for an account

#### Recommendation

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Ensure all functionality is available to keyboard and screen reader users. Provide functionality with a single keyboard/touch accessible control.



## Some controls don't have accessible names

- Multiple controls do not contain the visible text of the control as part of the control's accessible name making it hard to use speech input
- These same controls do not announce an accessible name to screen reader users

#### Recommendation

Ensure controls have an accessible name (accessibility label) that match their visible label



## Some controls don't convey their role

- Multiple controls that act like buttons are not announced as buttons by assistive technology.
- Screen reader users may have a difficult time understanding what text within the application is interactive.
- Some screen reader users will turn off hints, e.g. double-tap to see details.

#### Recommendation

Ensure that controls that act like buttons convey the button role. Use native UI buttons when possible.



## Some status messages are not announced

When dynamic content appears on screen, the screen reader is sometimes silent. Screen reader uses won't know the content changed.

- Loading icons
- Error messages
- Success messages
- Application timeout

#### Recommendation

Ensure dynamically added content is automatically announced by assistive technology.





## Some content is not available to screen readers

- On iOS, the 3<sup>rd</sup> party Financial Insights content cannot be swiped to using VoiceOver. This content is effectively hidden from screen reader users.
- On Android, the PDF documents for statements and taxes cannot be reached with the screen reader.

#### Recommendation

Ensure all content, even 3<sup>rd</sup> party content and documents like PDFs, are accessible to screen reader users.



### Some text and controls have poor color contrast

- Low contrast text makes smaller text harder to read as the perceived contrast can be lower.
- Low text contrast is low hanging fruit and can be identified with color contrast tools and automated accessibility testing.
- Some native UI controls have low contrast and are exempt, e.g. toggle switch on iOS

#### Recommendation

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Ensure text has at least 4.5:1 contrast ratio with the background color. Controls have 3:1 contrast.



## Some visual headings are not conveyed as headings

- Affects screen titles at the top as well as headings within the content of the screen.
- If it looks like a heading, it should be coded as a heading.
- Screen reader users can navigate a screen's content by headings using gestures if the headings can be programmatically identified.

#### Recommendation

Ensure that visual headings are announced as headings by the screen reader.

Profile & Settings	
Login & Security	
Remember User ID	
Enable Face ID®	
Personal Information	
Email Address subramaniya.p@infosys.com	>
Phone Numbers	>
Address	>
Documents	
Paperless Settings Get documents online only.	>
<b>↑</b> ≓ \$ ⊠	C
Accounts Transfer Send Money Pay Bills	Deposit

## Apps don't support landscape orientation

- Some users have their device fixed in a certain orientation and cannot easily rotate it to view your app.
- New apps support both orientations by default.

#### Recommendation

Ensure apps work in both landscape and portrait orientations. Don't restrict users to one orientation or the other.



# What we learned

## Considerations

- <u>Mobile apps do have to be accessible</u> per Title III of the Americans with Disabilities Act (ADA) as "places of public accommodations".
- As much as possible, use native UI controls because they have accessibility support included by default.
- We're responsible for 3<sup>rd</sup> party app integrations. Make sure procurement contracts include a specified WCAG level for support. Ask for a VPAT/ACR.
- Documents must be accessible too. Identify owners of PDFs (statements, tax documents) to ensure source documents are created accessibly.
- Avoid cognitive tests like CAPTCHAs. Don't disable password managers.
- Make sure your app is adaptable and responds to a user's OS accessibility preferences, e.g. text resize, smart invert.

### WCAG 2.1 AA is a start

# But WCAG is the floor of supporting accessibility

- There are all those AAA requirements
- Target size—mobile best practices suggest larger touch target areas than WCAG 2.2 AAA
- Reduce animations and motion
- Dark mode

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• What are your users asking for?



## We need more experience in accessibility

- We need to convey expected interactions more clearly and provide annotations in Figma to denote UI elements like buttons and headings.
- We need a better understanding of how disabled people use mobile apps and then apply accessibility best practices to our coding and testing processes.
- We need to hire mobile developers who know about accessibility.
- We need training on how to implement accessible mobile coding practices.
- We need accessibility expertise available to development teams until the SDLC appropriately integrates accessibility best practices.
- We need to better understand how to apply the Web Content Accessibility Guidelines to native mobile apps.
- We need to conduct usability testing with people who use assistive technology to get feedback about how well our solutions work.

Digital accessibility is not a technical problem to be solved

# It's a human one.

- We must understand the ways disabled people access and use digital information.
- Disabled people will try to use your mobile application.
- Who are you willing to exclude?

## Native mobile resources

- <u>Val1ydette</u> Audit grid to assess the level of compliance of a mobile application with WCAG
  2.2 A and AA criteria
- <u>MagentaA11y</u> Native app accessibility checklist; Choose components to define your accessibility success criteria
- <u>SwiftUI A11y</u> iOS mobile app that provides examples of how to create accessible components
- <u>The Ultimate Mobile Accessibility Resource</u> <u>Guide</u>

iOS SwiftUI Accessibi	lity
Headings	>
<b>Images</b> Informative, Decorative, or Functional	>
<b>UI Controls</b> Accordions, Buttons, Pickers, TextFields, Toggles, etc.	>
Page Titles	>
Announcements Accessibility Notifications, Error Validation	>
Reading Order	>
Focus Management	>
Accessibility UX Enhanc <u>ements</u>	>

## Thank you

Rachele DiTullio, Senior Accessibility Engineer, Citizens

Email: <u>rachele.ditullio@protonmail.com</u> LinkedIn: <u>https://www.linkedin.com/in/racheleditullio/</u> Twitter: @RacheleDiTullio

Mastodon: @racheled@mastodon.social

Slides: <u>https://racheleditullio.com/</u>

