

 @rorypreddy

## Programing for Accessibility

*Making our world more inclusive*



<http://aka.ms/linuxconf>

# Microsoft ❤️ Open Source

**2012**

Typescript released

Git added to TFS and Visual Studio

**2014**

Satya "Microsoft loves Linux"

Microsoft org on GitHub created

.NET foundation created

**2015**

VS Code released

HDInsight (Hadoop/Ubuntu) announced

Microsoft jointly forms Node.js foundation

**2016**

.NET Core 1.0

PowerShell Core

Windows Subsystem for Linux in Windows 10

Microsoft joins Linux foundation

GitHub recognizes Microsoft as a top open source contributor

Acquisition of Xamarin and open sourced

**2017**

Microsoft Azure Kubernetes Service launched

Draft, Brigade, Kashti projects submitted to Kubernetes community

Microsoft joins Cloud Native Computing & Cloud Foundry Foundations

SQL 2017 on Linux

Windows source code moved to Git

Azure Databricks (Apache Spark) announced

**2018**

VS Code ranked #1 developer tool

Service Fabric Open Sourced

Azure Sphere with Linux kernel

Intent to acquire GitHub announced

~5,000 Microsoft employees committing to open source projects on GitHub

Azure trending to 50% Linux

Microsoft continues as largest contributor to OSS on GitHub

South Africa IDC cloud jobs / 165k jobs/ 53k in MS ecosystem

**2019**

Mar 2019 - announced first hyperscale Enterprise DC on the African continent

June 2019 Windows 10 o/s with Linux

EY report / \$1.6B spent on IOT in the last 10 years / 76% of companies expecting AI to be an important part of their journey

Announced Office 365 in local SA Hyperscale Datacentres

July 2019 Microsoft is investing \$1 billion in OpenAI

D365 to be launched in Q4 2019 in SA DC

2012

2014

2015

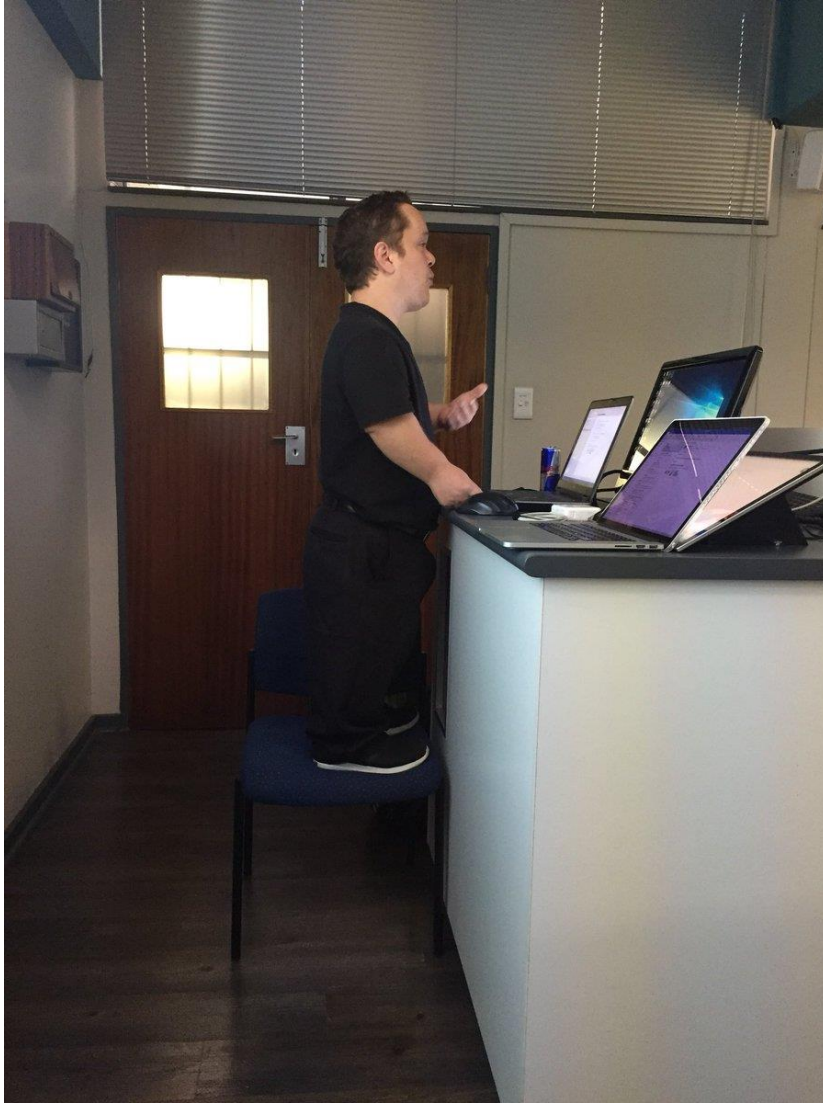
2016

2017

2017

2019





# Assistive Technologies – Limited Movement



Sip and Puff Switch



Keyless Keyboard



# Assistive Technologies – Vision Impairments



Refreshable Braille Display



Nvaccess

Screen Reader Software







A close-up, low-angle shot of Thanos in his full black armor, looking down with a serious expression. The background is a blurred, industrial-looking environment with some blue and grey tones.

***I'LL DO IT MYSELF***

# Agenda

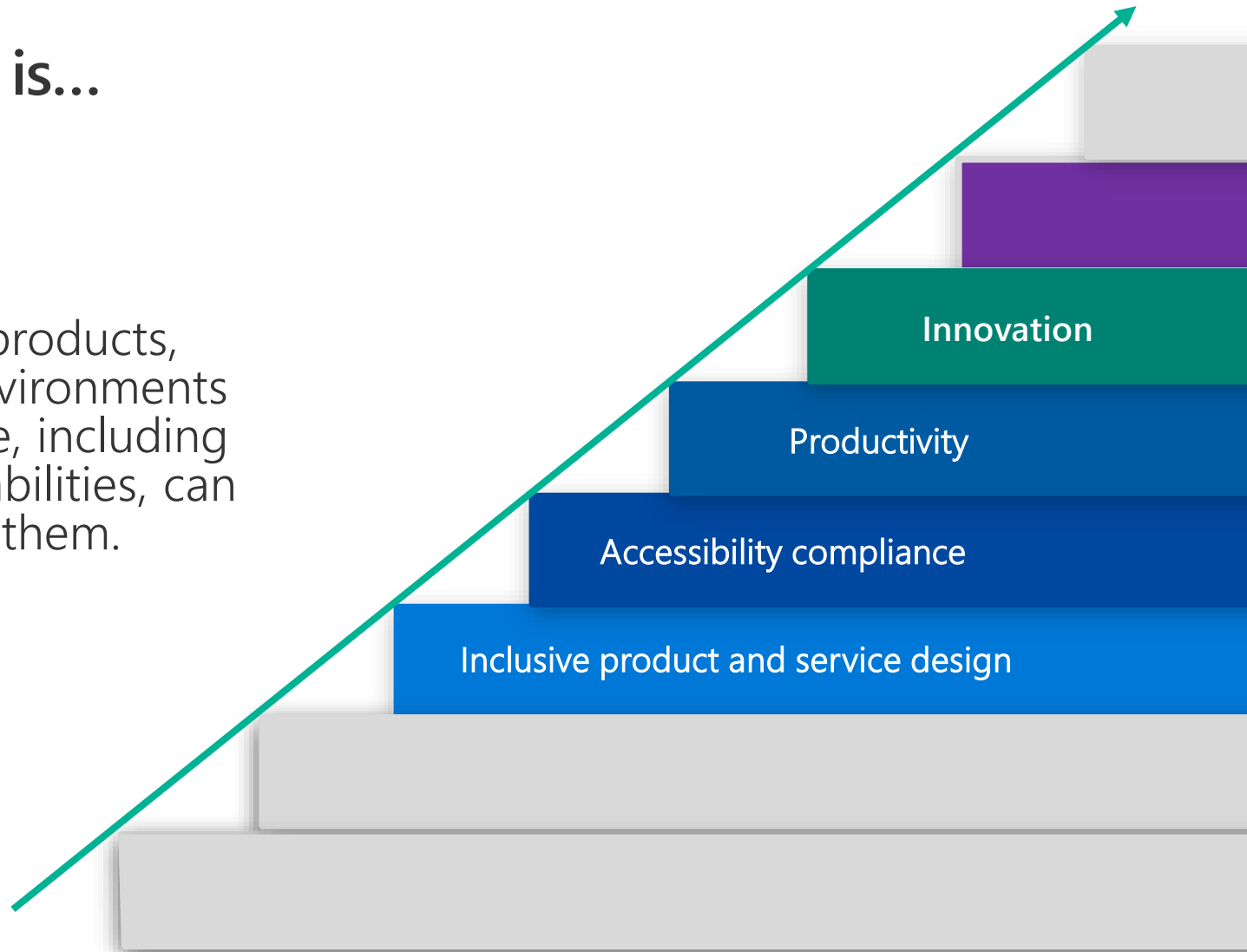
1. Inclusive design
2. Website Standards
3. AI



# Inclusive Design

# Accessibility is...

...the design of products, services, and environments so that everyone, including people with disabilities, can fully experience them.





Disability



Personal  
Health  
Condition

Disability



Mismatched  
Human  
Interactions

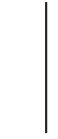
# Inclusive design steps

1. Recognise exclusion
2. Solve for one, extend to many
3. Learn from diversity

# Persona Spectrum



One arm



Arm injury



New parent



Permanent **26K**



Temporary **13M**

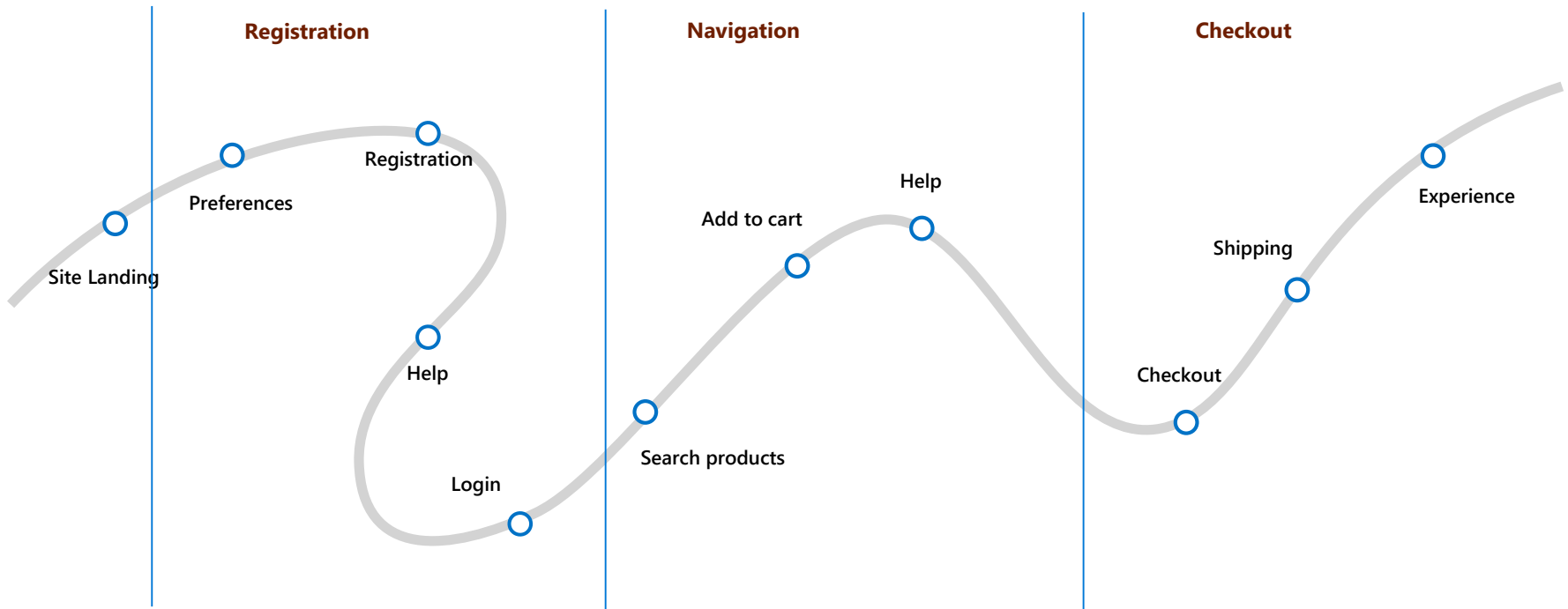


Situational **8M**

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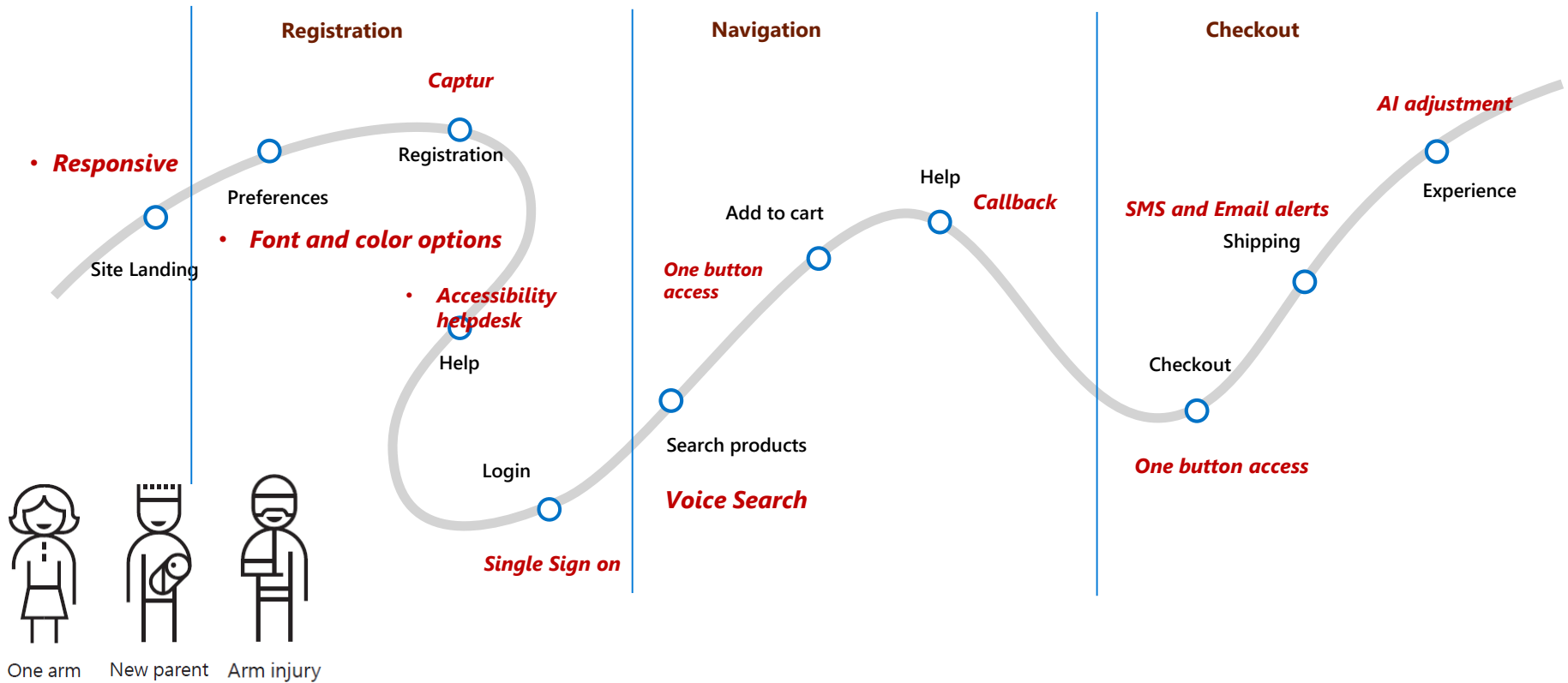
Total: **21M+**

# Website shopping cart scenario





# Apply Personas





# Website Accessibility

For most of human history, we've put our innovative capacity into improving the quantity of life. Because we're living longer, our focus is starting to shift toward improving our quality of life

--Bill Gates



# Legislation

One Hundred Fifteenth Congress  
of the  
United States of America



US 21st Century Integrated Digital Experience Act

EU parliament directive on digital accessibility





# WCAG

- WCAG 1.0
  - Released 1999
  - 14 guidelines and 62 checkpoints
- WCAG 2.0
  - Released 2008
  - 4 principles, 12 guidelines, and 61 success criteria
- WCAG 2.1
  - Release June 2018
  - New Criteria for:
    - Mobile
    - Low-visibility
    - Learning disabilities



# WCAG – Compliance levels

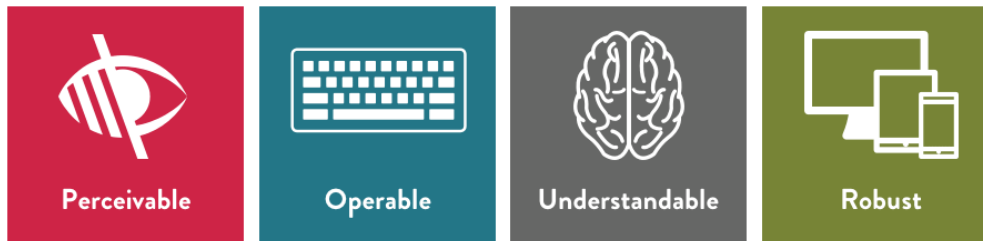
**Level A**—deals with the most basic web accessibility features

**Level AA**—signifies the biggest and most common barriers for disabled users

**Level AAA**—addresses the highest (and most complex) level of web accessibility

# WCAG - 4 main accessibility principles

- Perceivable – *can you see it*
- Operable – *can you use it*
- Understandable – *can you understand it*
- Robust – *it won't break future technologies*



A close-up photograph of an orange tabby cat's face. The cat is looking through a chain-link fence, with its right paw visible on the mesh. The cat has green eyes and a pink nose. A green rectangular box with white text is overlaid on the center of the image.

alt="Cute cat."



First Name

John

Last Name

Doe

Email

john@email

Password

\* \* \* \*

Submit

First Name

John

Last Name

Doe

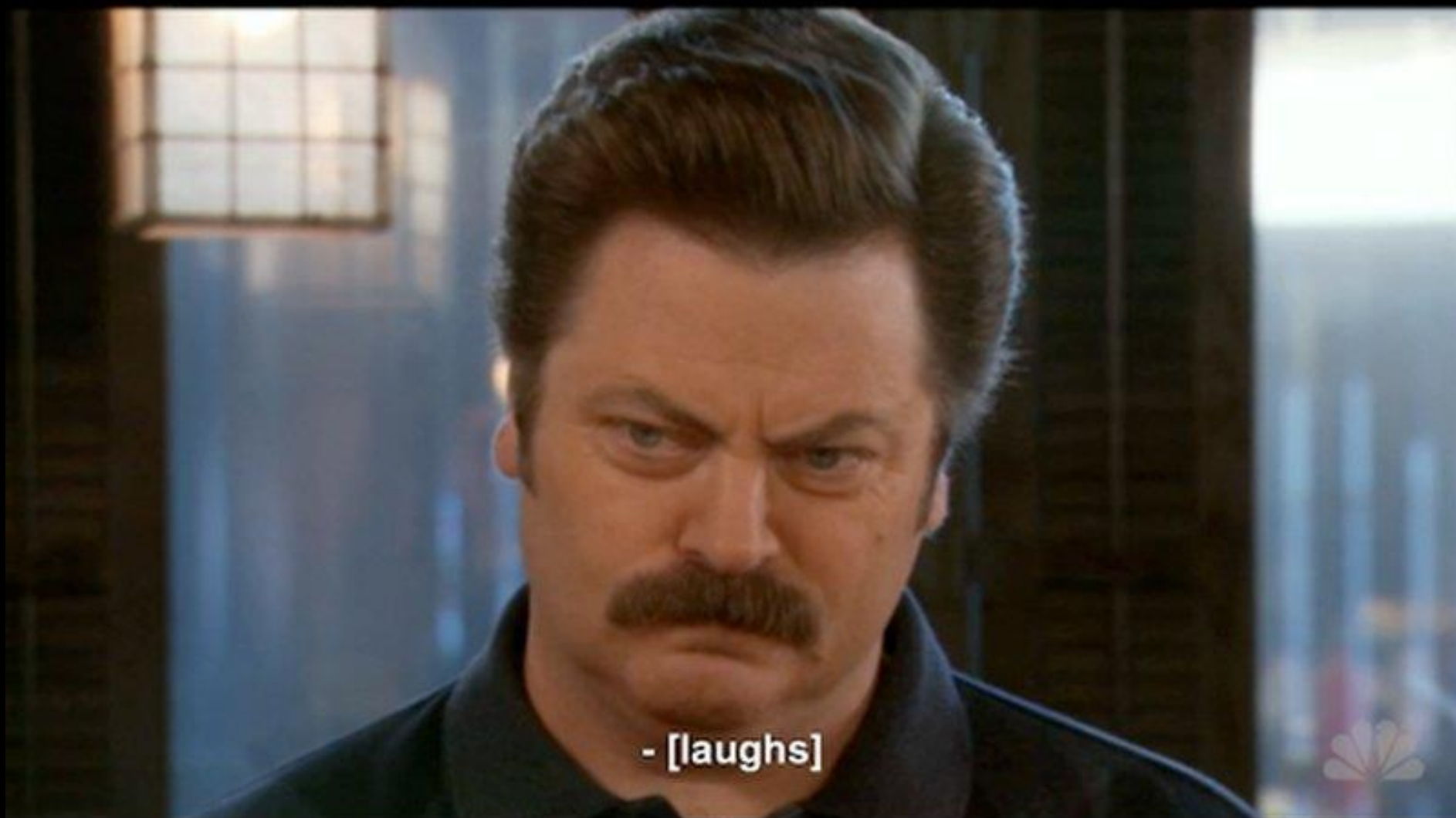
Email

john@email

Password

\* \* \* \*

Submit



- [laughs]



**BAD HYPERLINKS**

ulu Advertiser  
Advertiser.com

published every  
Sunday in The

get a little more European automatic transmission, the front-wheel-drive Fiesta sedan comes as a sedan or hatchback. Sedan trims comprise the S, SE or SEL; the hatchback comes as an SE or SES. Click here to compare them.

### Kinetic Styling

Another automaker, another buzzword. Hyundai calls its

**IN REAL LIFE**

design ethos "fluidic sculp-  
es a big deal



# Operable - Structure

```
<h1>My heading</h1>
```

```
<p>This is the first section of my document.</p>
```

```
<p>I'll add another paragraph here too.</p>
```

```
<ol>
```

```
  <li>Here is</li>
```

```
  <li>a list for</li>
```

```
  <li>you to read</li>
```

```
</ol>
```

# Operable – Structure (Bad)

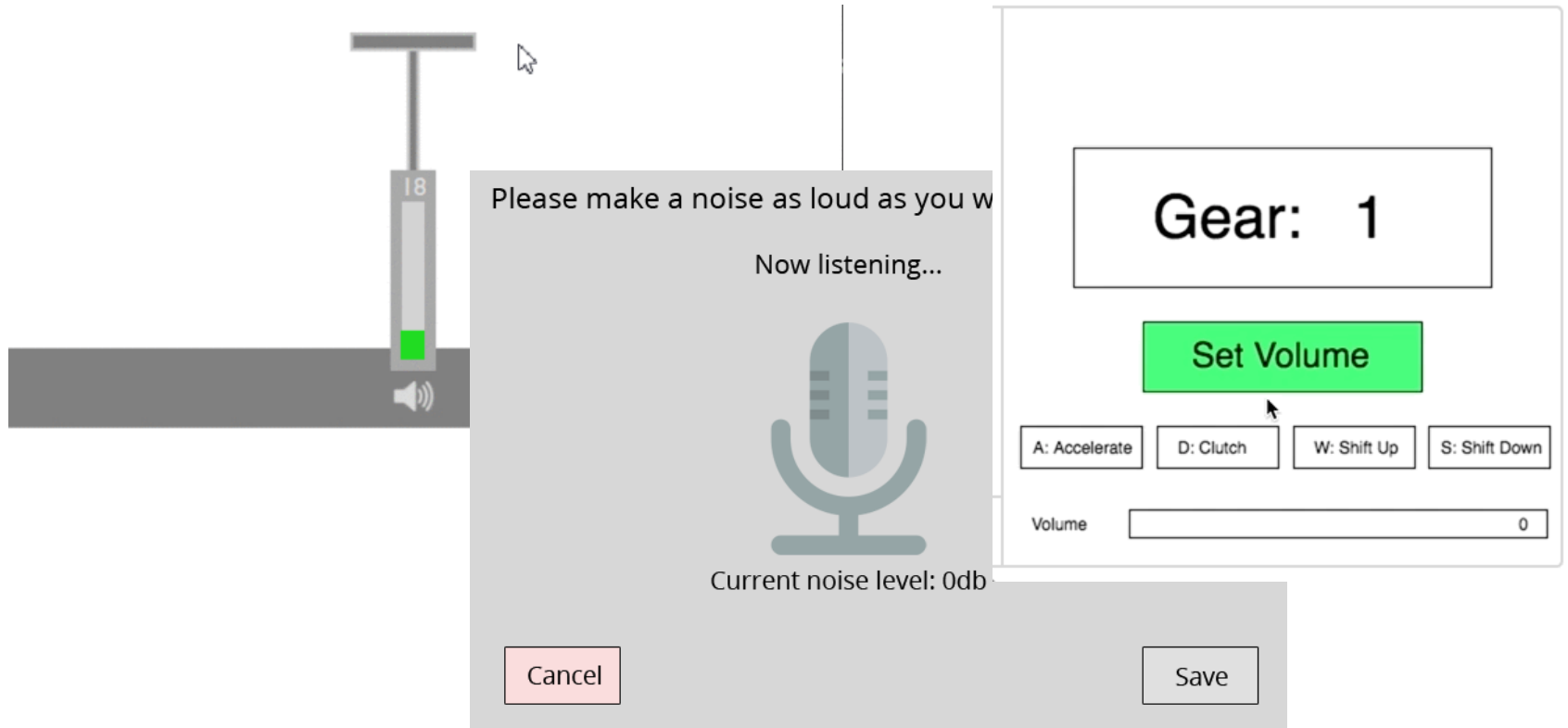
```
<font size="7">My heading</font>
```

```
<br><br> This is the first section of my  
document.
```

```
<br><br> I'll add another paragraph here too.
```

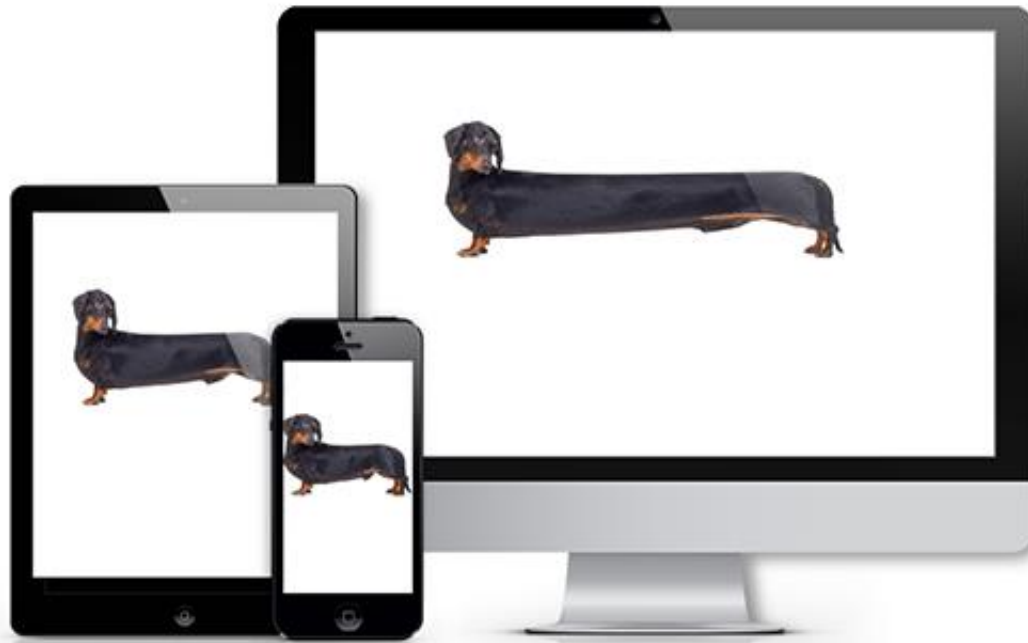
```
<br><br> 1. Here is  
<br><br> 2. a list for  
<br><br> 3. you to read  
<br><br>
```

# Understandable





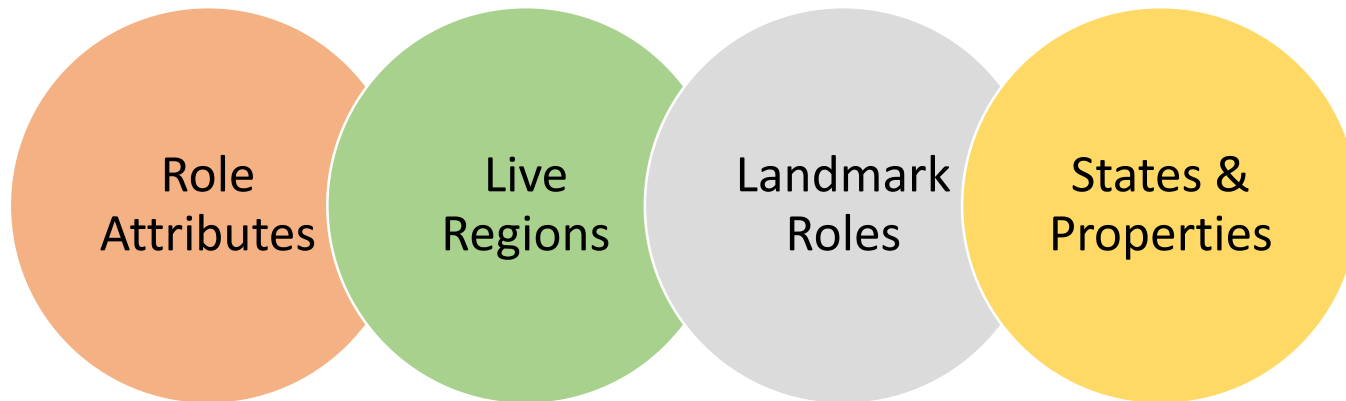
# Robust - Scalable





# WAI-ARIA

(Web Accessibility Initiative –  
Accessible Rich Internet Applications)



# ARIA is markup

Markup	Example
role	<code>&lt;main role="main"&gt;</code>
state	<code>&lt;input aria-invalid="true"&gt;</code>
property	<code>&lt;input id="firstName" type="text" aria-required="true" /&gt;</code>

# ARIA is HTML5

ARIA	HTML5
article	<article>
header	<header>
navigation	<nav>
complementary	<aside>



# The First Rule of ARIA

No ARIA is better than bad ARIA!

# The Second Rule of ARIA

Do NOT use ARIA if existing HTML tags already provide the same functionality!!!

# WAI-ARIA

## Principle 1: A role is a promise

```
<button aria-pressed="false">Mute</button>
```

## Principle 2: ARIA Can Both Cloak and Enhance, Creating Both Power and Danger

```
<a role="menuitem">Assistive tech users perceive  
this element as an item in a menu, not a link.</a>
```

```
<a aria-label="Assistive tech users can only perceive  
the contents of this aria-label, not the link text">Link  
Text</a>
```



**KEEP  
CALM  
IT IS  
DEMO  
TIME**

<https://github.com/microsoft/axe-pipelines-samples>





# AI for Accessibility

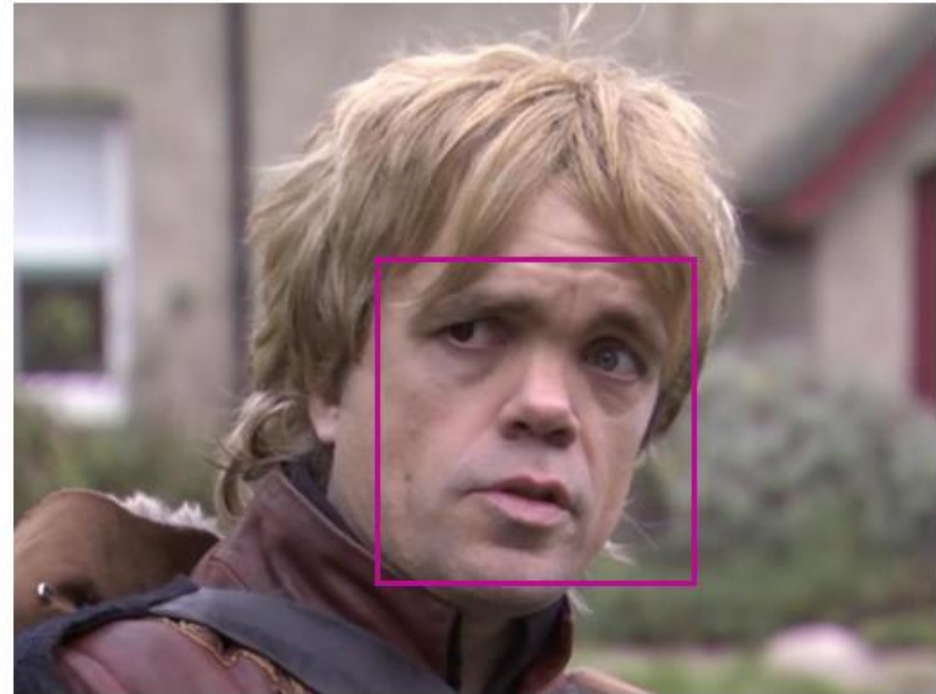
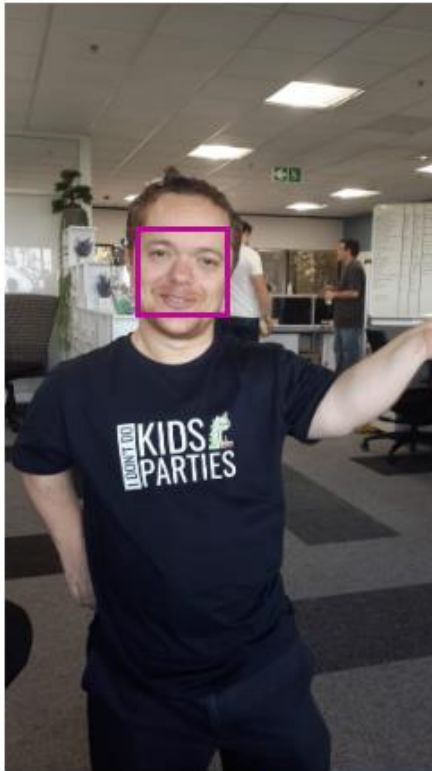


Image URL

Submit

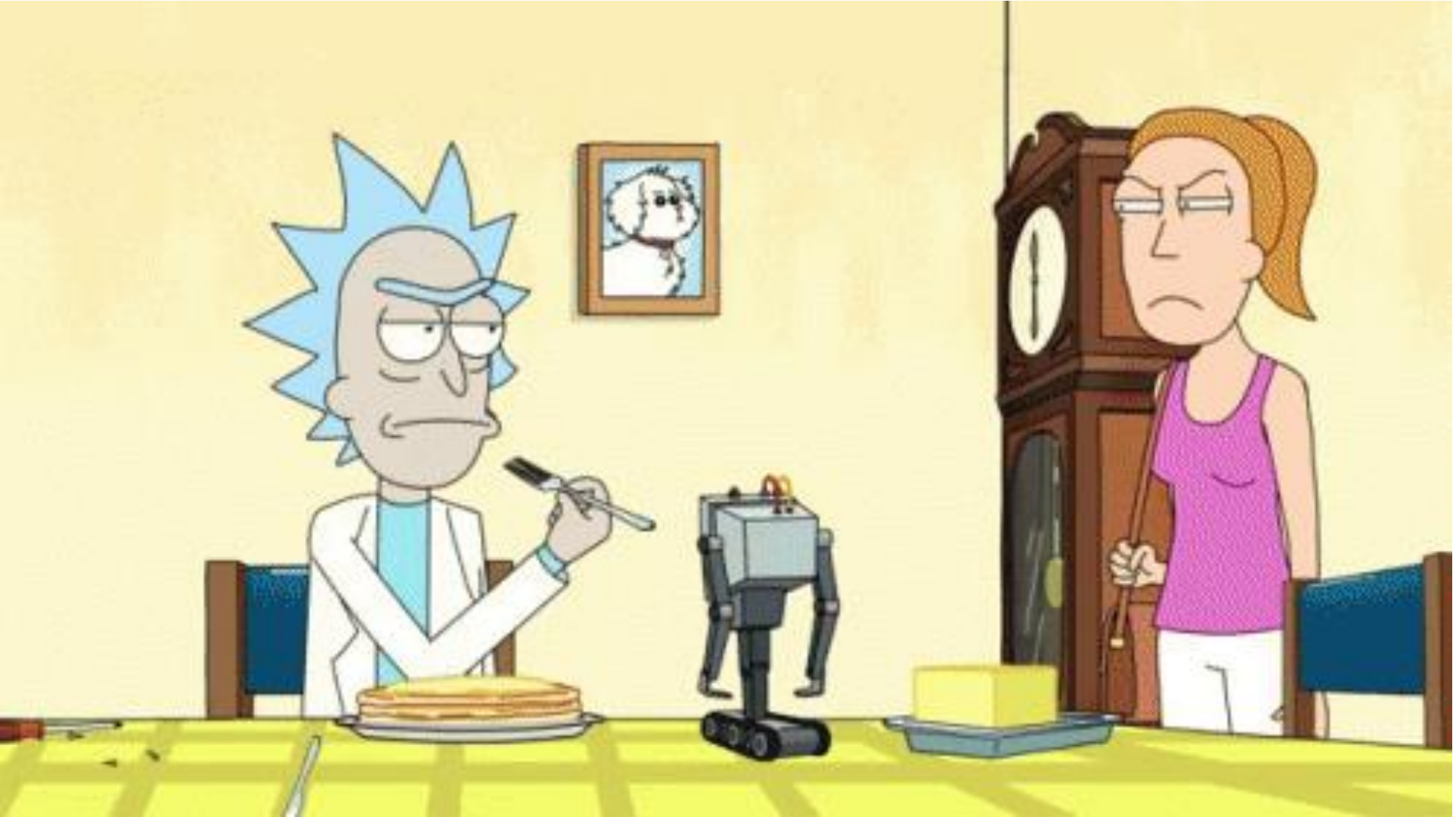
 Browse

Image URL

Submit

 Browse

Verification result: The two faces belong to different people. **Confidence is 0.46547.**





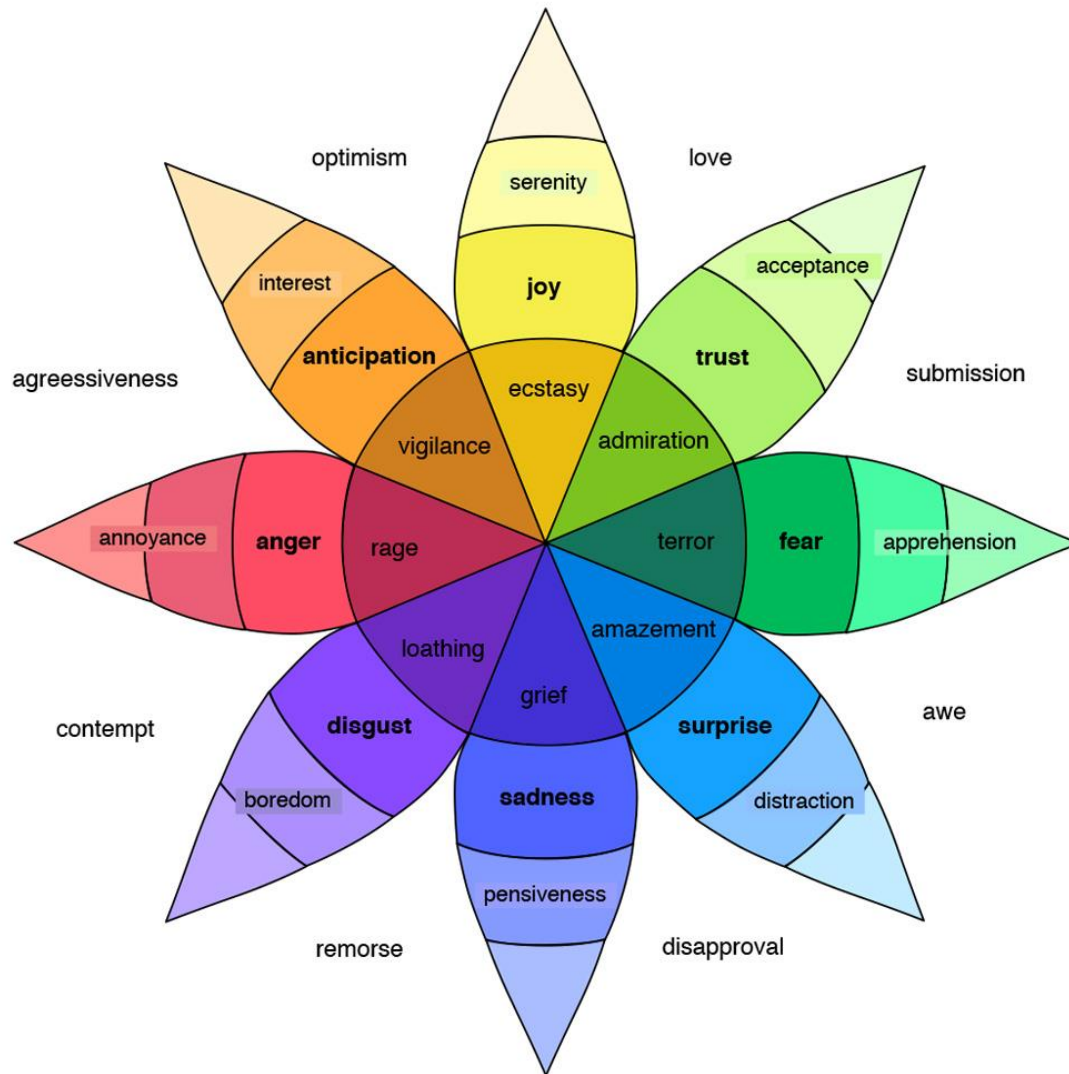
In the past, you  
had to adapt  
to  
the world.

In the future,  
the world will  
adapt to you.









































































# Artificial emotional intelligence

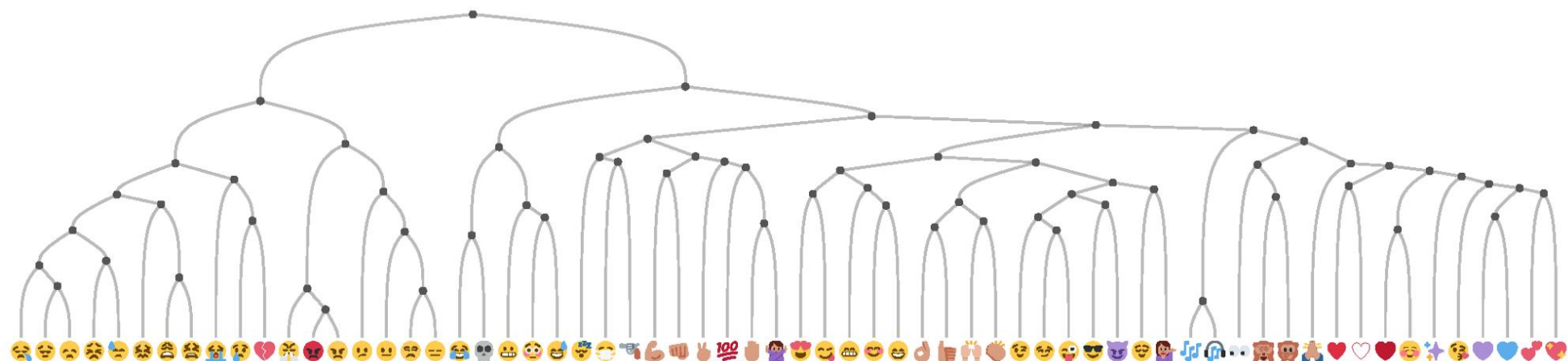


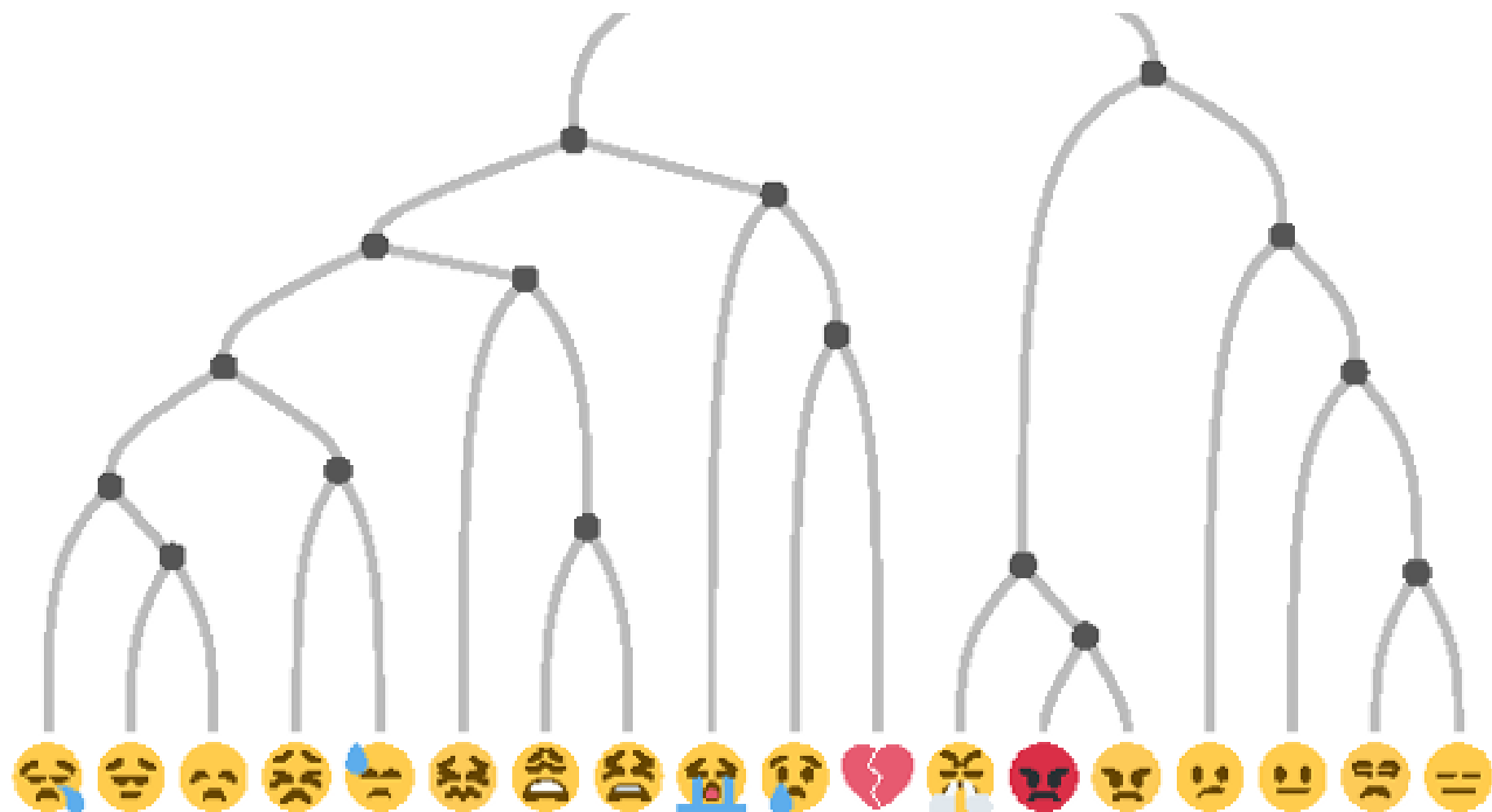


## Training each emoji in millions

															
233.7	82.2	79.5	78.1	60.8	54.7	54.6	51.7	50.5	44.0	39.5	39.1	34.8	34.4	32.1	28.1
															
24.8	23.4	21.6	21.0	20.5	20.3	19.9	19.6	18.9	17.5	17.0	16.9	16.1	15.3	15.2	15.0
															
14.9	14.3	14.2	14.2	12.9	12.4	12.0	12.0	11.7	11.7	11.3	11.2	11.1	11.0	11.0	10.8
															
10.2	9.6	9.5	9.3	9.2	8.9	8.7	8.6	8.1	6.3	6.0	5.7	5.6	5.5	5.4	5.1

55 Billion → 1.6 Billion



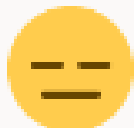


<http://deepmoji.mit.edu>

The electricity is off again. Oh Joy!

*Words are highlighted based on emotional impact. Click a word to turn it on/off.*

the electricity is off again . oh joy !



high confidence

# Cortana emotions



Calm



Optimistic 1



Optimistic 2



Reminder



Sensitive 1



Sensitive 2



Abashed



Alert



Bouncy



Need More

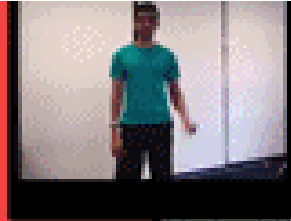


Elated



Satisfied

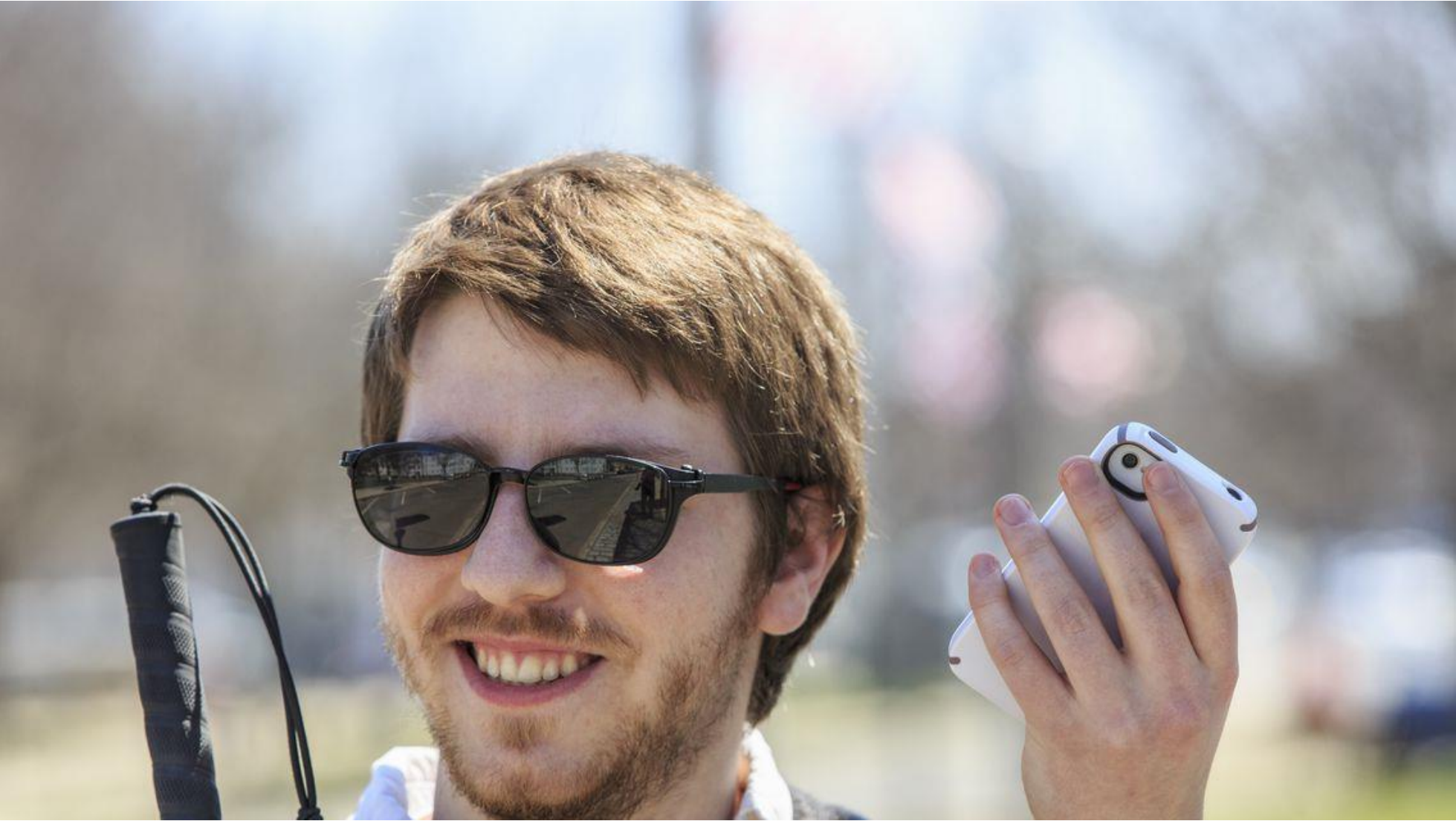
# Smart Assistant with Sign-language



# AI - Learn from diversity

1. Redefine **bias** as a spectrum
2. Enlist **customers** to correct bias
3. Cultivate **diversity** with privacy and consent
4. Balance **intelligence** with **discovery**
5. Build inclusive **AI** teams

<http://seeingai.com>









# Conclusion

1. Inclusive design
2. Website Standards
3. AI

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