# THE ACCESSIBILITY GAP FOR TECH USERS AND DEVELOPERS

*Emily E. Ackerman*
*University of Pittsburgh*

*CMU Accessibility Group*
*April 2, 2020*

# *WHO AM I?*
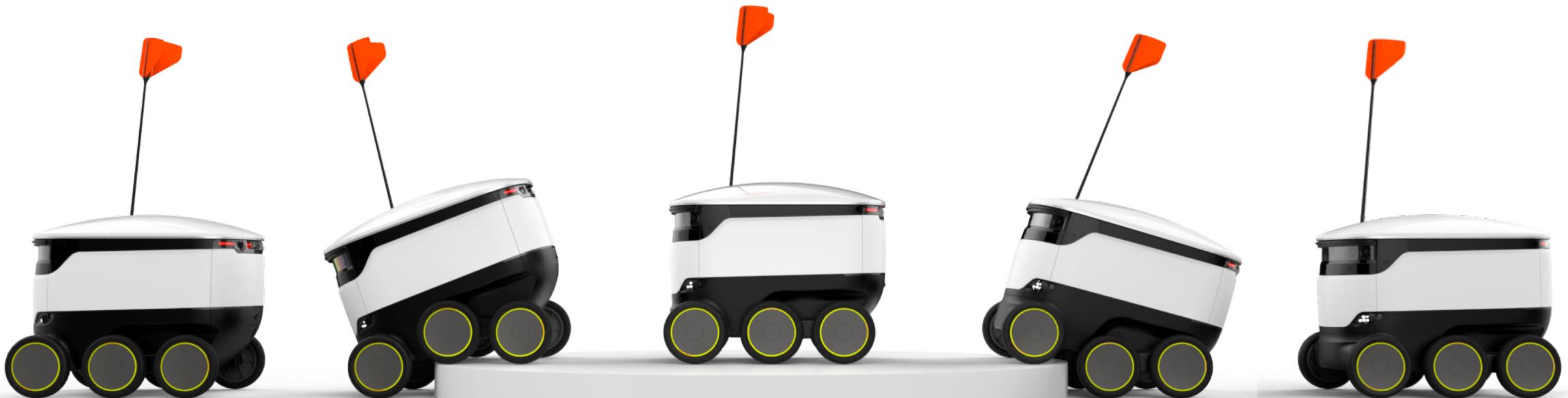
PhD student,
University of Pittsburgh,
Department of Chemical Engineering

ChemE by training,
Systems biologist by choice

Lifetime wheelchair user

# *WHAT HAPPENED?*

# WHAT HAPPENED?



PITT'S FOOD DELIVERY ROBOTS ON HOLD
STUDENT IN WHEELCHAIR SAY THEY POSE A SAFETY RISK

NEW ON 4

PITTSBURGH'S
ACTION
NEWS 4

☰ SHOW TRANSCRIPT

**Food delivery robot pauses operations after Monday incident**

Emily Ackerman relies on a wheelchair for mobility and was trapped on Forbes Avenue when robot wouldn't move

PITTSBURGH'S
Action 4
News

Updated: 7:13 PM EDT Oct 22, 2019

# *THE ENCOUNTER*

**Emily Slackerman Ackerman**
@EmilyEAckerman

i (in a wheelchair) was just trapped *on* forbes ave by one of these robots, only days after their independent roll out. i can tell that as long as they continue to operate, they are going to be a major accessibility and safety issue. [thread]



Everything we know about the Starship food delivery robots - The Pitt News
pittnews.com

3:27 PM · 10/21/19 · Twitter Web App

View Tweet activity

**3,121** Retweets **4,329** Likes

---

**Emily Slackerman Ackerman** @EmilyEAckerman · 10/21/19
hey @StarshipRobots what are you doing about this? hey @PittTweet what are you doing about this?

💬 17     🔁 314     ♡ 1,934     ⬆️

**University of Pittsburgh** ✓
@PittTweet

Replying to @EmilyEAckerman and @StarshipRobots
We have paused testing to review the technology further and ensure everyone's safety. We value your feedback and someone from Pitt will be in touch to learn more about your experience.

5:40 PM · 10/21/19 · Twitter Web App

**7** Retweets **283** Likes

The sympathizing, worrying crowd

**Mark Mandel**
@markjmandel

I spotted @StarshipRobots at @UWMadison today — do they block wheelchair access here too? If so they should be out of service until this issue is fully addressed. twitter.com/emilyeackerman...

**Zachary Baiel**
@baielala

I still don't know how they are legally operating on the pedestrian only sidewalks.

The ordinances are very clear on this.

This is from Pittsburgh, but we have the same robots here.

Share your stories.

**Jason Snell** ✓
@jsnell

Spotted a robot (or not) on the streets of Berkeley yesterday.



**oc-taber** ☠️ ☠️
@taber

Students and staff at George Mason University have raised this flag - the delivery robots *CAN not and WILL not* get out of the way of people using wheelchairs - and it's terrifying that institutions are *still* signing up to voluntarily permit these things.

🏳️‍🌈 **Cy(berpunk) is anticapitalist**
@cyrusinitaly

Replying to @EmilyEAckerman

Just had one partially block the accessibility ramp to one of the dining halls at @UWMadison. One person at a time could walk around, but no way a wheelchair could get around. Also likely a fire escape hazard/block.



**Tart of Darkness**
@theinfophile

We have similar ones in Berkeley. They're always hogging the ramps.

The sympathizing, worrying crowd

**Mark Mandel**
@markjmandel

I spotted @StarshipRobots at @UWMadison today — do they block wheelchair access here too? If so they should be out of service until this issue is fully addressed. twitter.com/emilyeackerman...

The tech/design crowd

**Jared, INTERNATIONAL THOUGHT...**
@jaredtm

Replying to @EmilyEAckerman

This is so upsetting. The people behind initiatives like this *should* be aligned advocates for accessibility. You can tell from what they made that they do not have a diverse group of human centered designers behind the wheel there.

The disabled crowd

**ace tilton ratcliff** ♿
@MortuaryReport

thread. this is, per usual, an issue of inaccessibility likely bc there were no disabled humans consulted/hired. i would not be surprised to learn engineers did not know history of curb cuts related to wheelchairs. @StarshipRobots, how are you fixing this? #HellaInaccessible
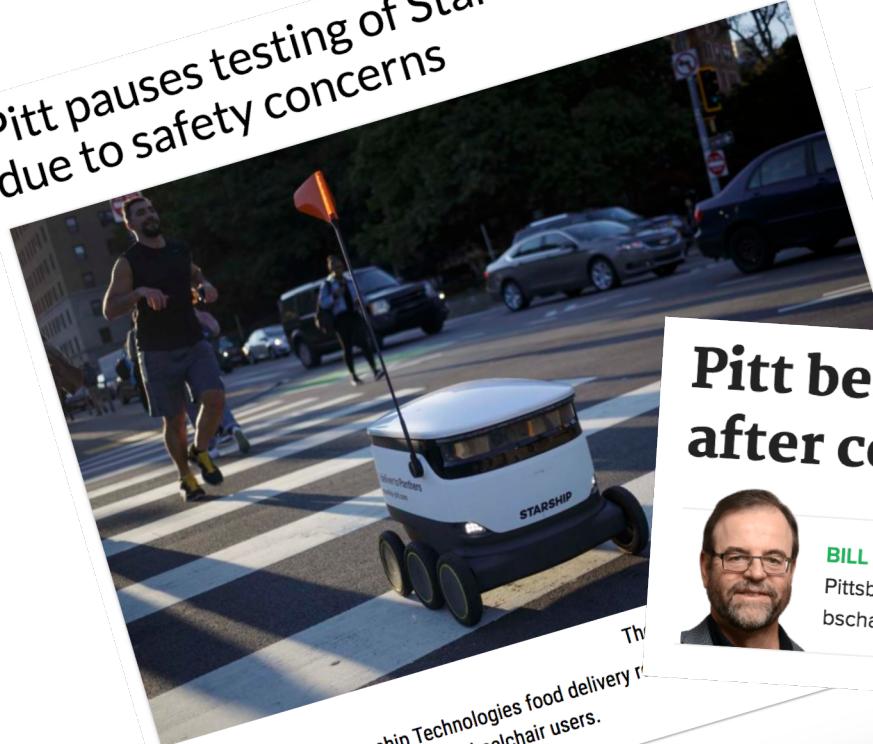
The well meaning, sometimes ableist crowd

**Christine Casalini**
@queen2knight

We need to innovate with accessibility in mind. Also do we really need food delivery robots???????

# Pitt pauses testing of Starship robots due to safety concerns

The testing of the Starship Technologies food delivery r...
over potential safety issues for wheelchair users.

# Food Delivery Robots Pulled From Pitt Campus After Backlash About Mobility

By KATHLEEN J. DAVIS · OCT 22, 2019

**90.5 WESA**

PITT'S FOOD DELIVERY ROBOTS ON HOLD
STUDENT IN WHEELCHAIR SAY THEY POSE A SAFETY RISK

NEW ON 4

SHOW TRANSCRIPT

livery robot pauses operations
after Monday incident

an relies on a wheelchair for mobility
pped on Forbes Avenue when robot
wouldn't move

PITTSBURGH'S
ACTI

# Pitt benches food-delivery robots after complaint from a student

**BILL SCHACKNER** ✅
Pittsburgh Post-Gazette
bschackner@post-gazette.com 🐦

OCT 23, 2019    3:52 PM

# Progress is complicated: Pitt student starts dialogue on technology, accessibility

Experiments with new technologies should not come at the expense of safety or accessibility

Ms. Ackerman is to be commended for sparking the conversation about the intersection of technology and accessibility. Having worked extensively at

The food-delivery robots only served their stated purpose for a short time, causing quite a dust-up in the process. But the conversations, ideas and progress they have provoked have been well worth the controversy.

# My Fight With a Sidewalk Robot

**A life-threatening encounter with AI technology convinced me that the needs of people with disabilities need to be engineered into our autonomous future.**

NOVEMBER 19, 2019

**EMILY ACKERMAN**
Ph.D. student and disability rights advocate

**NATIONAL GEOGRAPHIC**

**arirang**
아리랑국제방송

*Hi Emily,*

*The delivery robots are currently traveling around the [School] campus, and have already endangered one of my advisee's life (he uses a wheelchair).*

GONZAGA UNIVERSITY
DEO PATRIÆ, SCIENTIIS, ARTIBUS
A.M.  D.G.
SCHOOL OF LAW
IHS

**FINANCIAL TIMES**                    *my*FT

HOME  WORLD  US  COMPANIES  TECH  MARKETS  GRAPHICS  OPINION  WORK & CAREERS  LIFE & ARTS  HOW TO SPEND IT        Portfolio  Settings & Account

Work & Careers    + Add to myFT

## How to design AI that eliminates disability bias

Tackling the multi-faceted needs of employees requires new learning systems

© Stephanie Strasburg/FT

Alicia Clegg  JANUARY 26 2020                    💬 4  🖨
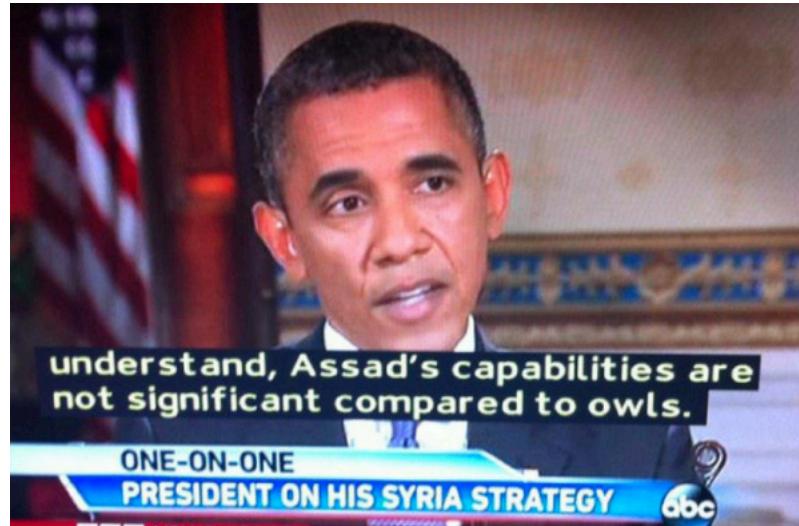
# HOW DID WE GET HERE?

# HOW IS TECHNOLOGY SO ACTIVELY INACCESSIBLE?

**Websites with informational images**

**Dockless motorized scooters**

**Unreliable or nonexistent subtitles**

# HOW ARE ACCESSIBLE SOLUTIONS SO ACTIVELY INACCESSIBLE?

$60

$100

*Xbox controller*

*Adapted Xbox controller*

# HOW ARE ACCESSIBLE SOLUTIONS SO ACTIVELY INACCESSIBLE?



**$40k**

*Exoskeleton*



**$40k**

*Stair Climbing Wheelchair*

# HOW CAN PEOPLE WITH DISABILITIES STILL BE SO FAR BEHIND?

*15% of the world's adults are disabled (>1 bil)[1]*

Median earnings, US, 2015:
$21,572 (abled: $31,872)[2]

Internet users, US, 2015: 54% (Abled: 81%)[2]

# HOW CAN PEOPLE WITH DISABILITIES STILL BE SO FAR BEHIND?

**15% of the world's adults are disabled (>1 bil)[1]**

Undergraduate population in STEM with disability, US, 2019: 11%[3]

Doctoral degrees awarded to those in STEM with disabilities, US, 2019: 6.8%[4]

[1]World Report On Disability, WHO, 2011
[3]National Center for Education Statistics
[4]Women, Minorities, and Persons with Disabilities in Science and Engineering, NSF, 2012

# *HOW CAN PEOPLE WITH DISABILITIES STILL BE SO FAR BEHIND?*

**15% of the world's adults are disabled (>1 bil)[1]**

Google

7.5% self-identified as having a disability[5]
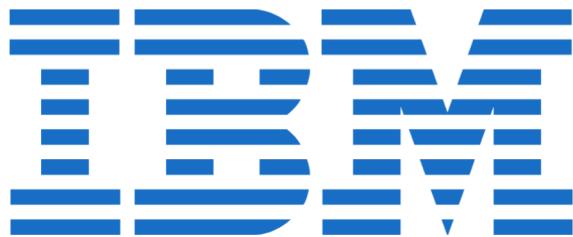
(Note: 2019 is first year reporting)

[1]*World Report On Disability, WHO, 2011*
[5]*Google diversity annual report 2019*

# HOW CAN PEOPLE WITH DISABILITIES STILL BE SO FAR BEHIND?

*Companies touting "disability inclusion" without providing employment statistics*



IBM

amazon

The Amazon blog
≡ dayone          Reading Now   Why we choose to include

Community
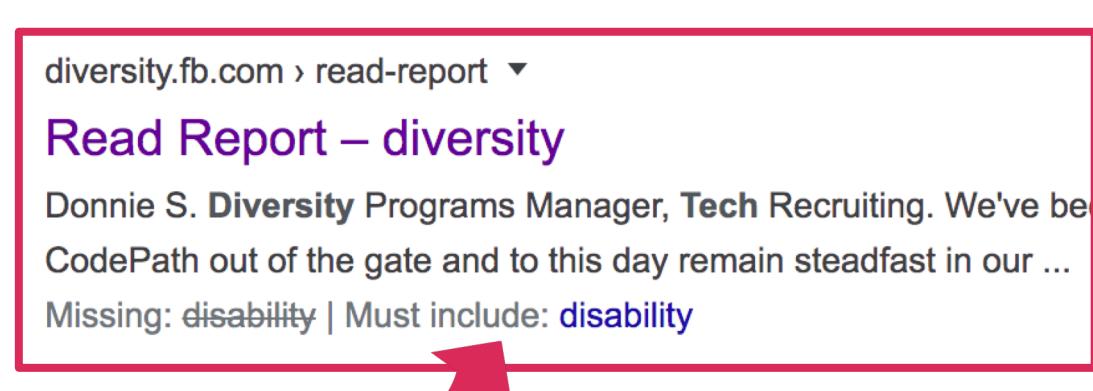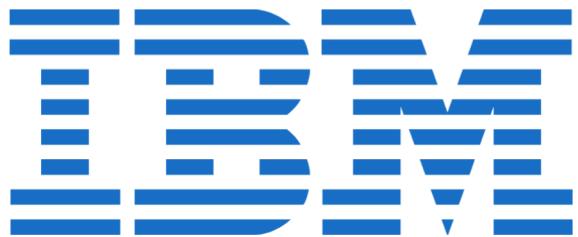
Why we choose to include

Helping people with disabilities find employment is part of Amazon's commitment to increase diversity and inclusion in the workplace.

By Neal Karlinsky on June 12, 2018
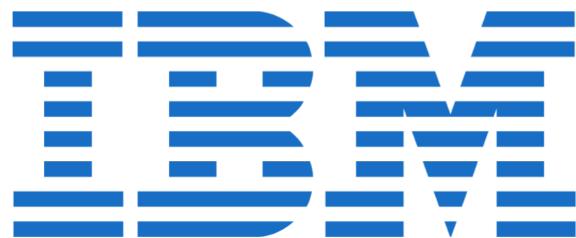
# *HOW CAN PEOPLE WITH DISABILITIES STILL BE SO FAR BEHIND?*

## *Companies touting "disability inclusion" without providing employment statistics*

# HOW CAN PEOPLE WITH DISABILITIES STILL BE SO FAR BEHIND?

*Companies touting "disability inclusion" without providing employment statistics*
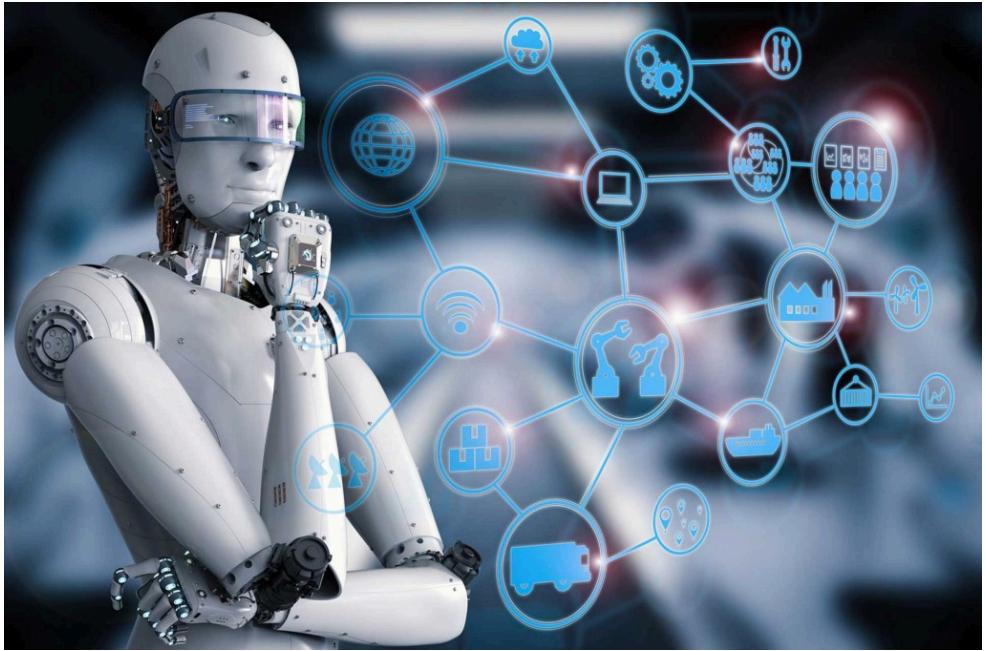


*(I don't have all day to look it up but you get the idea)*

# *WE HAVE ALWAYS RELIED ON TECH*
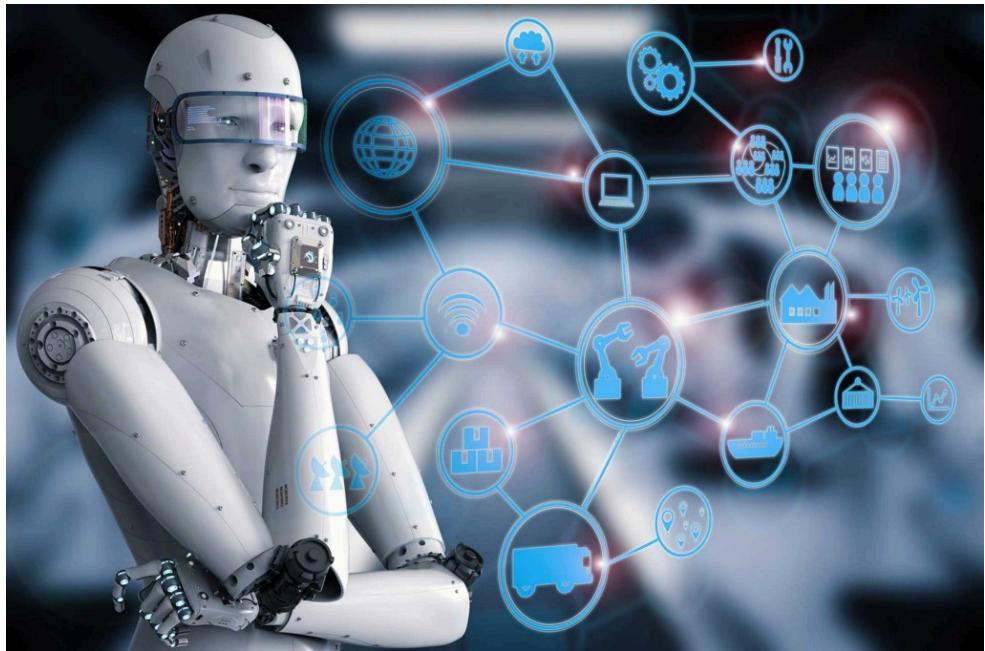
*Tech, 2020*

*Tech, 1960*
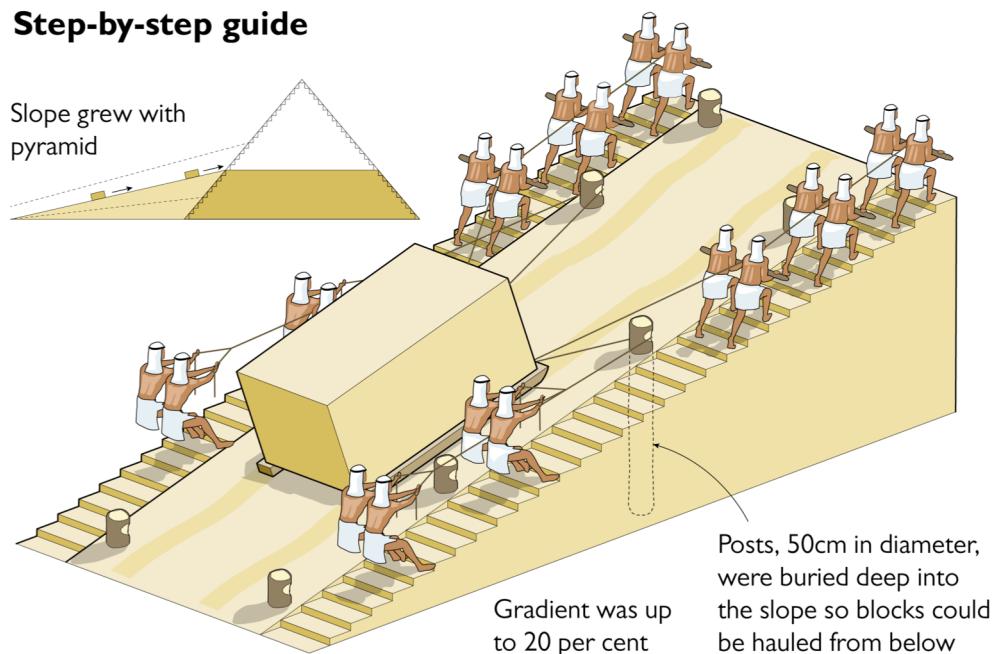
# *WE HAVE ALWAYS RELIED ON TECH*

*Tech, 2020*

*Tech, 2500 BC*
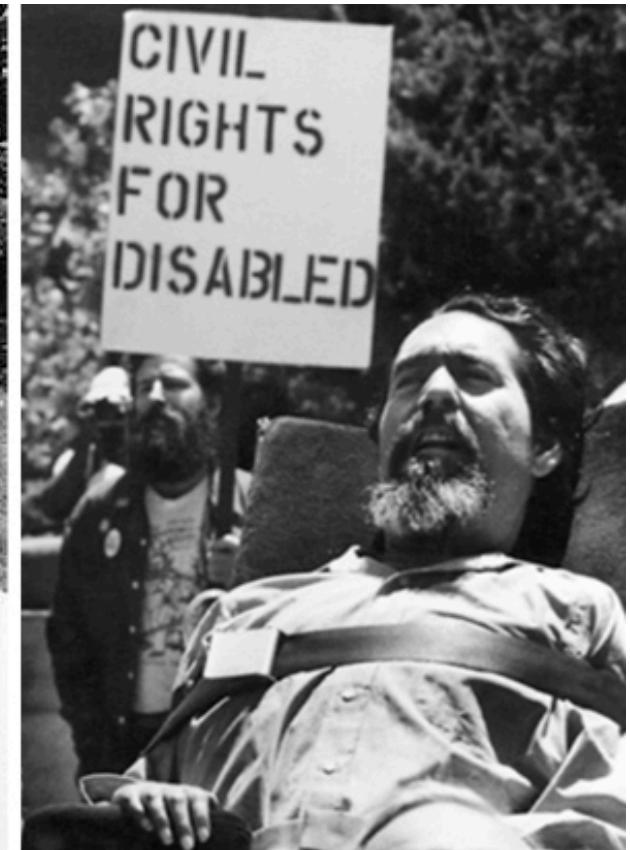


**Step-by-step guide**

Slope grew with pyramid

Gradient was up to 20 per cent

Posts, 50cm in diameter, were buried deep into the slope so blocks could be hauled from below

# ACCESS TO TECH AND EDUCATION HAS HISTORICALLY BEEN LIMITED

## Ed Roberts

First student at Berkley in a wheelchair, 1962

Forced to live in hospital by university

Led the fight for curb cuts in the city

# ACCESS TO TECH AND EDUCATION HAS HISTORICALLY BEEN LIMITED

## Ed Roberts

First student at Berkley in a wheelchair, 1962

Forced to live in hospital by university

Led the fight for curb cuts in the city

# ACCESS TO TECH AND EDUCATION HAS HISTORICALLY BEEN LIMITED

## Protests for the Rehabilitation Act of 1973

# THE ADA (1990)

**Covers:**

Employment discrimination
- "Reasonable accommodations"

Public entities and accommodations
- "readily achievable"
- "…easily accomplished without much difficulty or expense"
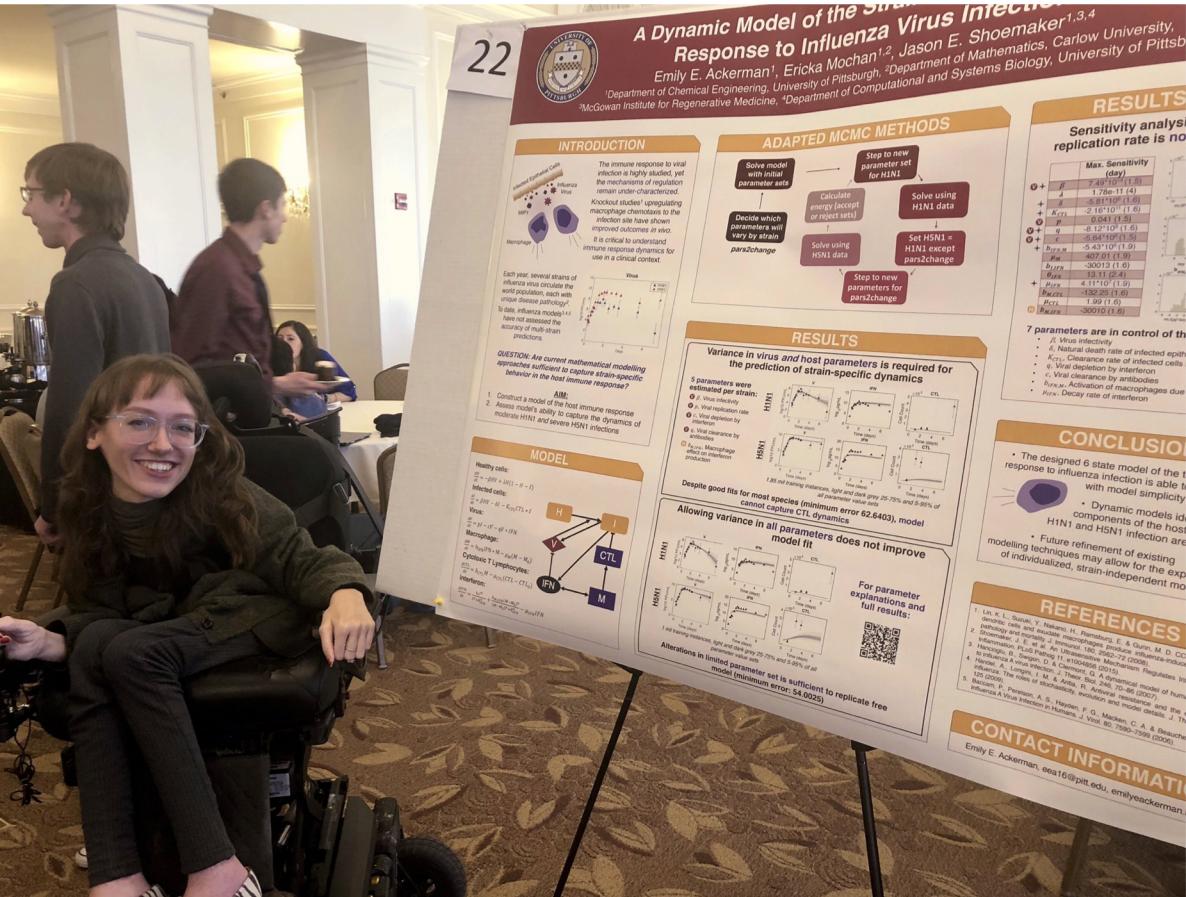
Telecommunications

# *THE RESULT:*

# *THE RESULT:*
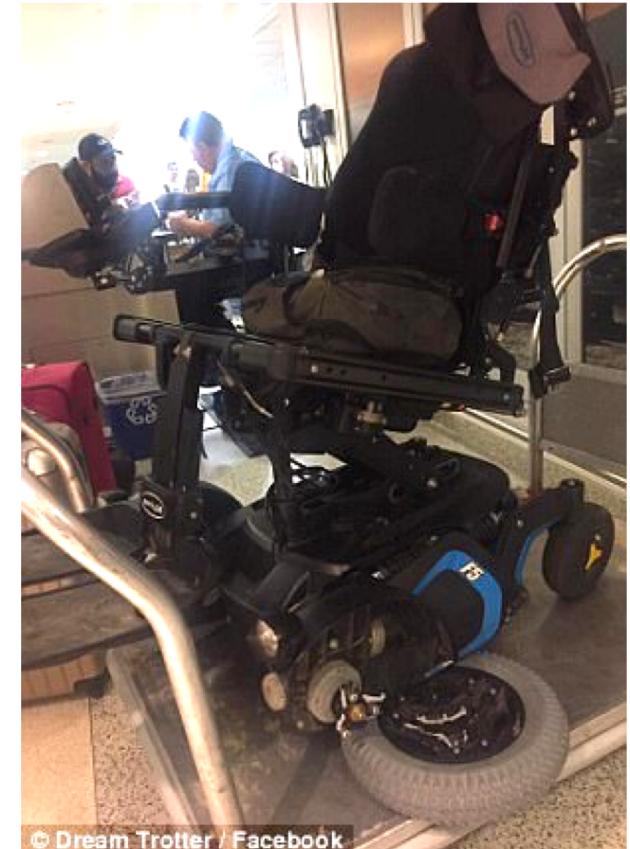
# *THE RESULT: AIR TRANSPORTATION*

*Air travel is a private industry that falls under the Air Carriers Access Act,1986*

**Problem:**

Provides no private cause of action
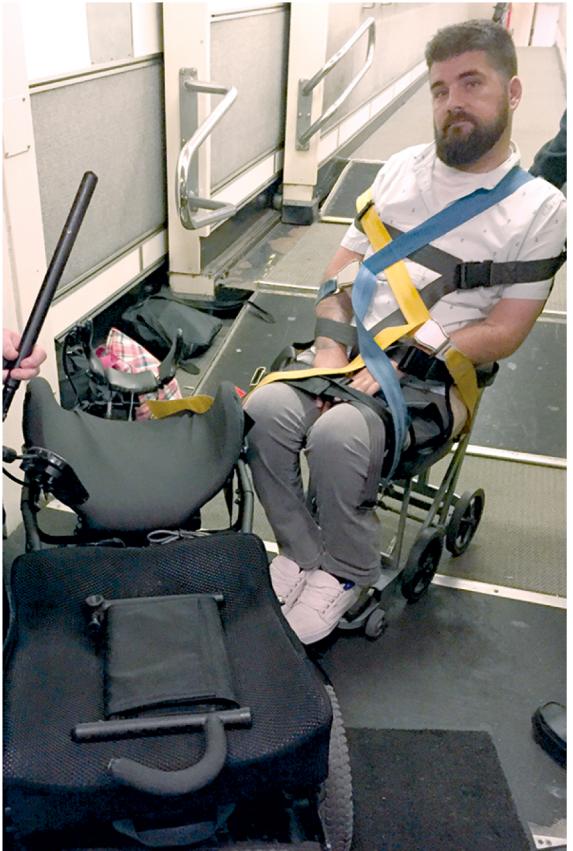
Individuals cannot file lawsuits based on violations

# *THE RESULT: AIR TRANSPORTATION*

*Air travel is a private industry that falls under the Air Carriers Access Act,1986*
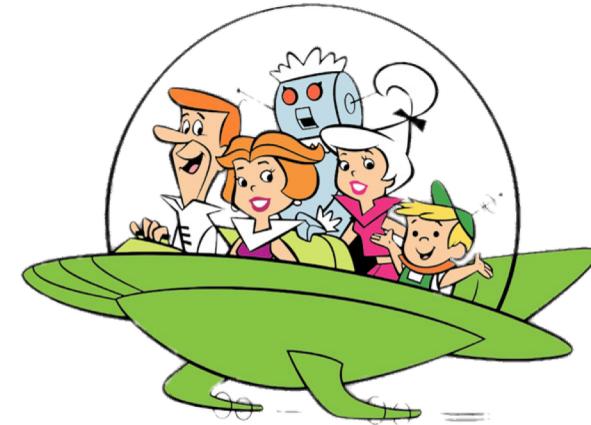


**December, 2018:**
701 wheelchairs and scooters were damaged by the 12 most popular US airlines

Decades of optimization hasn't guaranteed safety or respect to the disabled

# *THE PRESENT IS SCARY THEREFORE, THE FUTURE IS SCARIER*

Where is the future of technology, robotics, AI, etc. headed?

Who's driving the spaceship?

"Where are the disabled engineers? I'd hire them if they existed!"

# POOR REPRESENTATION IS CAUSED BY INACCESSIBILITY AT TWO LEVELS

REPRESENTATION

Developer access to industries

Equal access to tech for users

As a result, the tech industry is in a place where it *must* anticipate the needs of its users

# POOR REPRESENTATION IS CAUSED BY INACCESSIBILITY AT TWO LEVELS
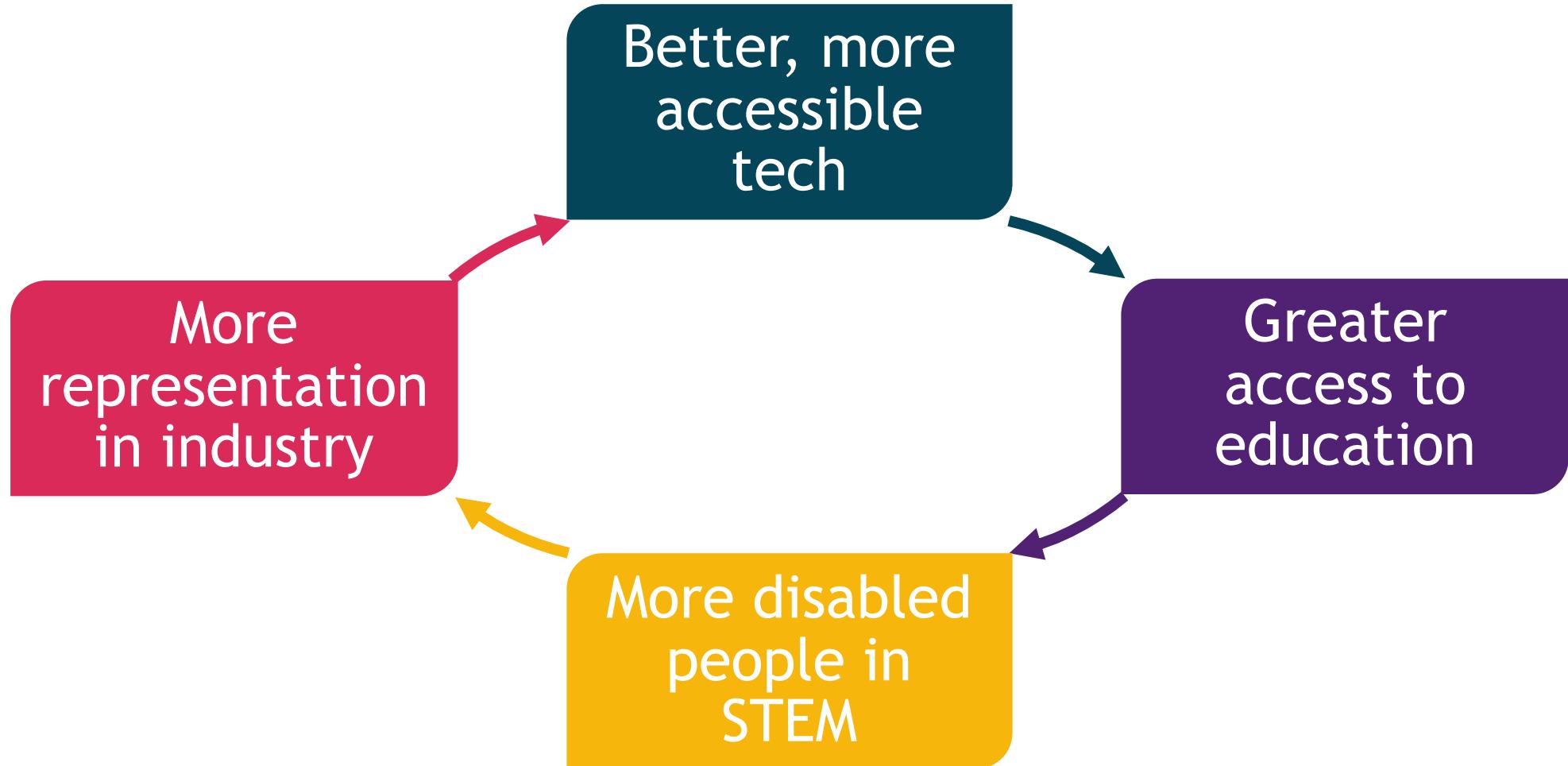
As a result, the tech industry is in a place where it **must** anticipate the needs of its users

*The goal:* A future where

1. abled developers aren't responsible for foreseeing a user experience they'll never have

2. the burden doesn't fall to the user to protest or rely the good faith of the developer

## THIS IS A TEMPORARY PROBLEM
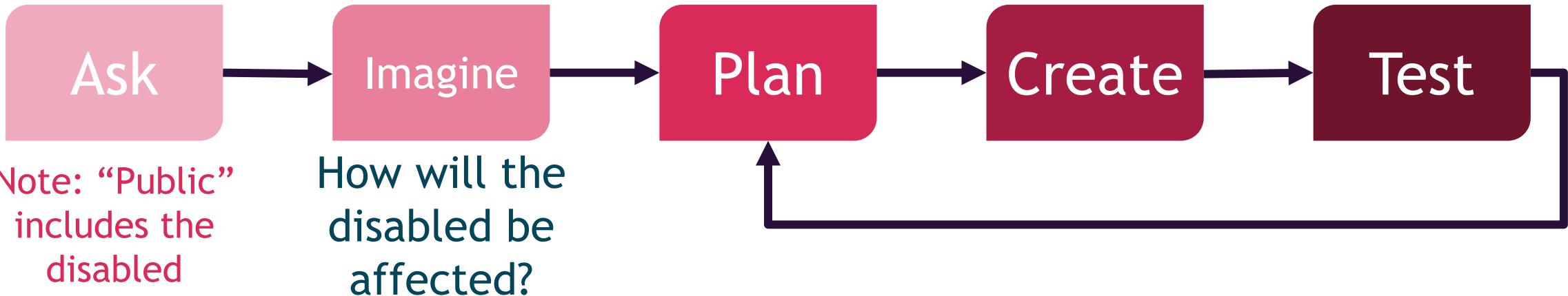
# THE SOLUTION IS POSITIVE FEEDBACK

# THE INDUSTRY MUST DIVERSIFY

*Multilevel involvement in the design process is key*

Who is the user? What are their needs?

Is the chosen solution serving minorities?

What is the user feedback?

**Ask** → **Imagine** → **Plan** → **Create** → **Test**

Note: "Public" includes the disabled

How will the disabled be affected?

# *THE INDUSTRY MUST DIVERSIFY*

*Multilevel involvement in the design process is key*

Inaccessible solutions are harmful,
even when accidental or resulting from noble intention

Greater recognition of voluntary and involuntary users

# *THE INDUSTRY MUST SLOW DOWN*

A harmful solution isn't good because it's first

Development is fast, reactionary legislation is slow

Design must be based in ethical decision making

We have no trust in "good faith"

*"Move fast and break things" cannot come at the expense of the marginalized*

# *EDUCATION MUST BECOME MORE ACCESSIBLE* *(A WHOLE TALK IN ITSELF)*

What can you do in your department/company? in your community?

Do your children have disabled role models?

How can you make your work less of a black box for the public?

*Public education on the future of tech is necessary*

# *THIS IS A TEMPORARY PROBLEM*

## *We in the disability community need:*

Recognition of the disabled experience

Access to equitable, ethical solutions

Commitment from the tech to actively bring us inside

# THANK YOU!

emilyeackerman.netlify.com        twitter.com/emilyeackerman        eea16@pitt.edu