PROJECT SIDEWALK

CROWD+AI TECHNIQUES TO MAP & ASSESS THE WORLD'S SIDEWALKS

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MAKEABILITY LAB

UNIVERSITY of WASHINGTON

UIC UNIVERSITY OF ILLINOIS CHICAGO

easterseals

SIDEWALKS ARE CRITICAL PUBLIC INFRASTRUCTURE

Thapar *et al.*, 2004 ; Nuernberger, 2008

Source: https://americanhistory.si.edu/

NO CURB RAMPS
CHANEL
ONE WAY
DIESEL

PHYSICAL OBSTACLES

FedEx
INCOMPLETE SIDEWALKS

SURFACE PROBLEMS

PHYSICAL OBSTACLES
NO CURB RAMP
SURFACE DEGRADATION

THE PROBLEM IS
NOT JUST A LACK
OF ACCESSIBLE
INFRASTRUCTURE
A LACK OF DATA

The National Council on Disability notes that there is **no comprehensive information** on "the degree to which sidewalks are accessible" in cities.

National Council on Disability, 2007
The impact of the Americans with Disabilities Act: Assessing the progress toward achieving the goals of the ADA

BACKGROUND

STUDY OF ADA TRANSITION PLANS

Cities 102 (2020) 102720

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Cities

journal homepage: www.elsevier.com/locate/cities

Are communities in the United States planning for pedestrians with disabilities? Findings from a systematic evaluation of local government barrier removal plans

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Disability
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Urban policy
Equitable planning

ABSTRACT

Cities with many pedestrian barriers can inhibit community mobility, access to services, and social participation for people with disabilities. Although National Disability Rights policies have been enacted in several nations, it is unclear what progress local governments have made in developing plans and implementing accessibility improvements to the pedestrian infrastructure. The purpose of this study was to evaluate the existence and quality of city plans used to remove barriers for pedestrians with disabilities. We conducted a systematic evaluation of American's with Disabilities Act (ADA) transition plans, for a stratified random sample of local cities and counties. An expert panel developed a quality appraisal tool that we used to evaluate plans. Among the 401 government entities reviewed, only 13% (54) had ADA transition plans readily available. Just seven of the 54 plans we acquired met all the minimum criteria required. Based on those reporting barriers, an average of 65% of curb ramps and 48% of sidewalks were *not* accessible. Many communities across the US have not developed ADA transition plans for pedestrian infrastructure or have developed low-quality plans. This case study provides insight on local level implementation of barrier removal plans whose lessons may apply inside and outside of the US.

1. Introduction

In communities around the world, people with disabilities experience multiple, interrelated barriers in the built environment that can lead to social exclusion and isolation. Barriers are encountered on pathways and routes that are used for walking/rolling in cities globally (Baris & Uslu, 2009; Gell, Rosenberg, Carlson, Kerr, & Belza, 2015; Haselwandter et al., 2015; Meshur, 2013), as part of transportation (Rosenberg, Huang, Simonovich, & Belza, 2013), at community recreation sites (Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004; Vasudevan, 2016), and public buildings generally (Banda-Chalwe, Nitz, & De Jonge, 2014; Evcil, 2009; Gleeson, 1997). Based on the social model of disability and the International Classification of Functioning, Disability and Health (ICF), environmental barriers impacting the pedestrian environment are seen as a cause of disablement. State and local policy interventions that require improving access to walking/rolling on city pathways and other aspects of the built environment can facilitate numerous aspects of independent living, social participation, and employment for all people, and especially people with disabilities (Hammel et al., 2015). Accessible communities benefit people with disabilities as well as older adults, both of whom represent growing populations around the world (Institute of Medicine, 2007; United Nations, 2001).

Several countries around the world have adopted national policies to address built environment barriers. Some countries address environmental barriers through antidiscrimination legislation, such as the Americans with Disabilities Act (ADA) in the US and the Disability Discrimination Act in the UK. It is also common for National, State, or local governments to adopt a set of building standards that require new construction and renovations to follow guidelines for accessible design of the physical environment (Imrie, 2000). Although the enactment of federal policies and the adoption of standards are notable benchmarks and significant achievements in improving accessibility internationally, sparse research to date has been conducted regarding the implementation of such policy related to the built environment at the State or local level.

It is unclear whether cities and other local governments have developed plans for removing environmental barriers to accessibility or

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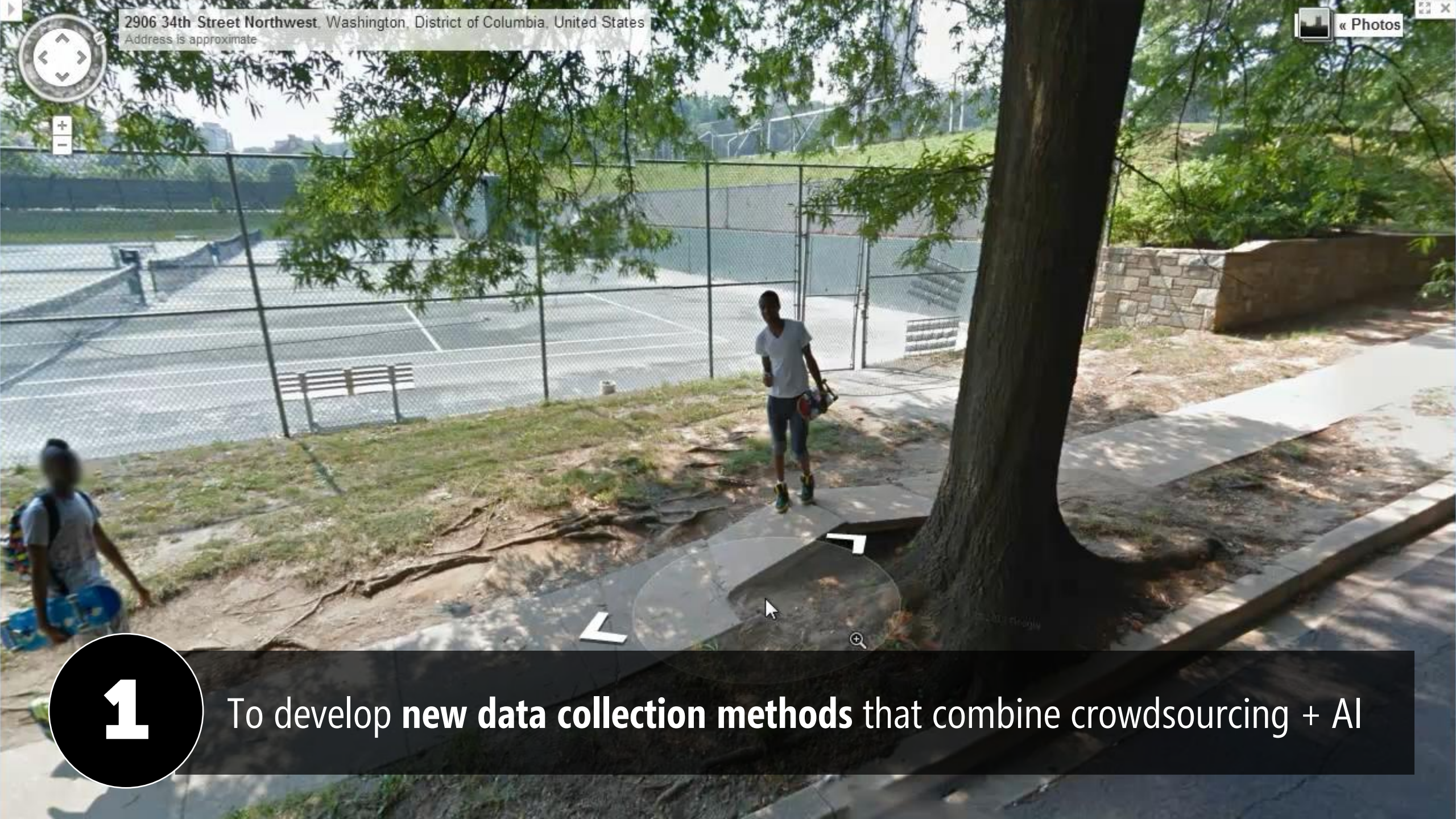
401 LOCAL GOVERNMENTS

13%
w/ADA transition plans

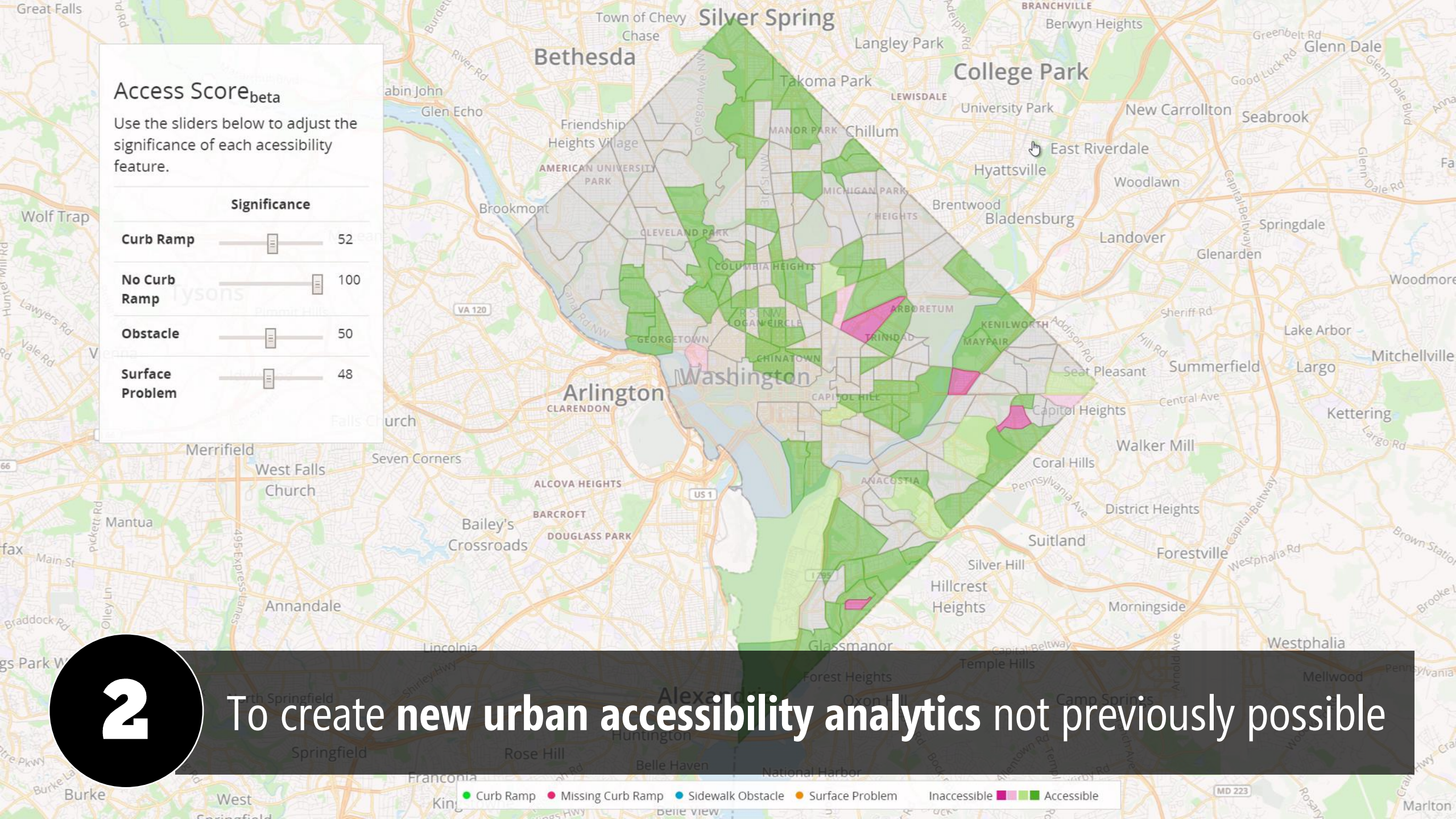
1.7%
Met minimum requirements

Source: Eisenberg, Y., Heider, A., Gould, R., & Jones, R. (2020). Are communities in the United States planning for pedestrians with disabilities? Findings from a systematic evaluation of local government barrier removal plans. Cities, 102, 102720.

We are pursuing a **two-fold solution**



1 To develop **new data collection methods** that combine crowdsourcing + AI

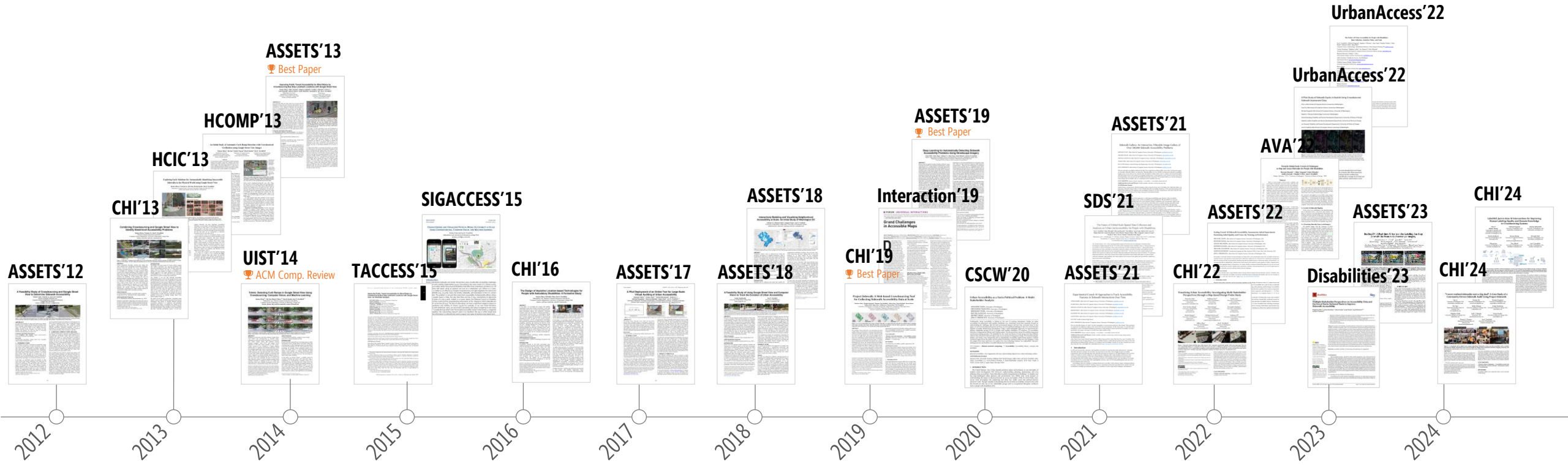


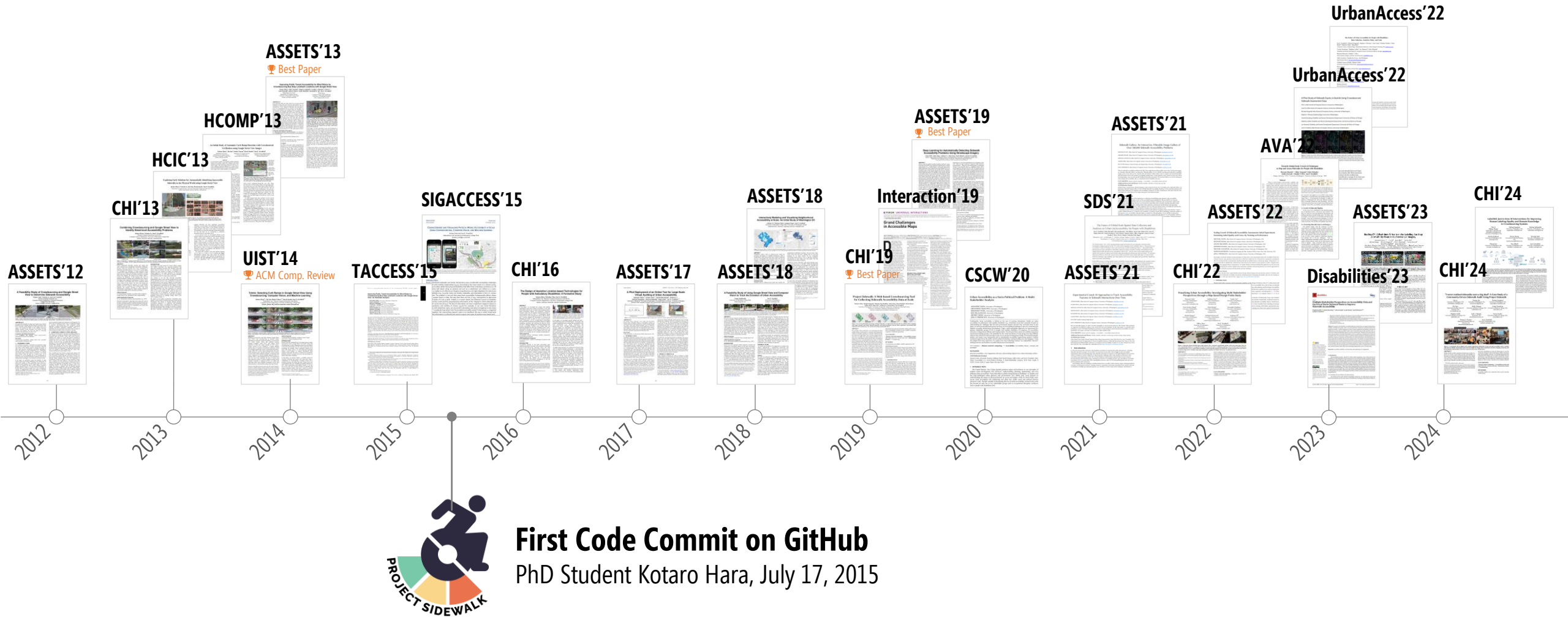
2 To create **new urban accessibility analytics** not previously possible

MAP, ASSESS, & VISUALIZE EVERY SIDEWALK IN THE WORLD

PROJECTSIDEWALK.ORG

And we've been working on this problem a long time…





PROJECT SIDEWALK

First Code Commit on GitHub

PhD Student Kotaro Hara, July 17, 2015

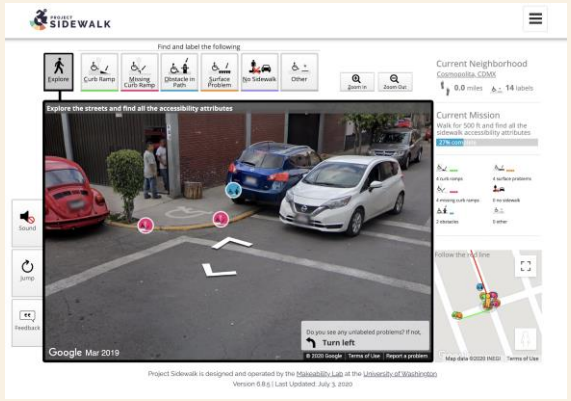
TRY IT!

PROJECT SIDEWALK

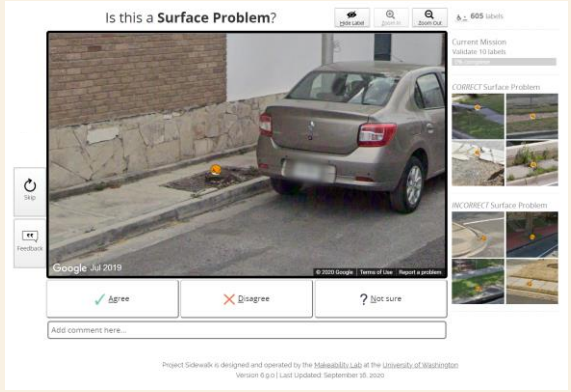
http://projectsidewalk.org

ONLINE MAP IMAGERY

REMOTE CROWDSOURCING INTERFACES



Labeling missions



Validation missions

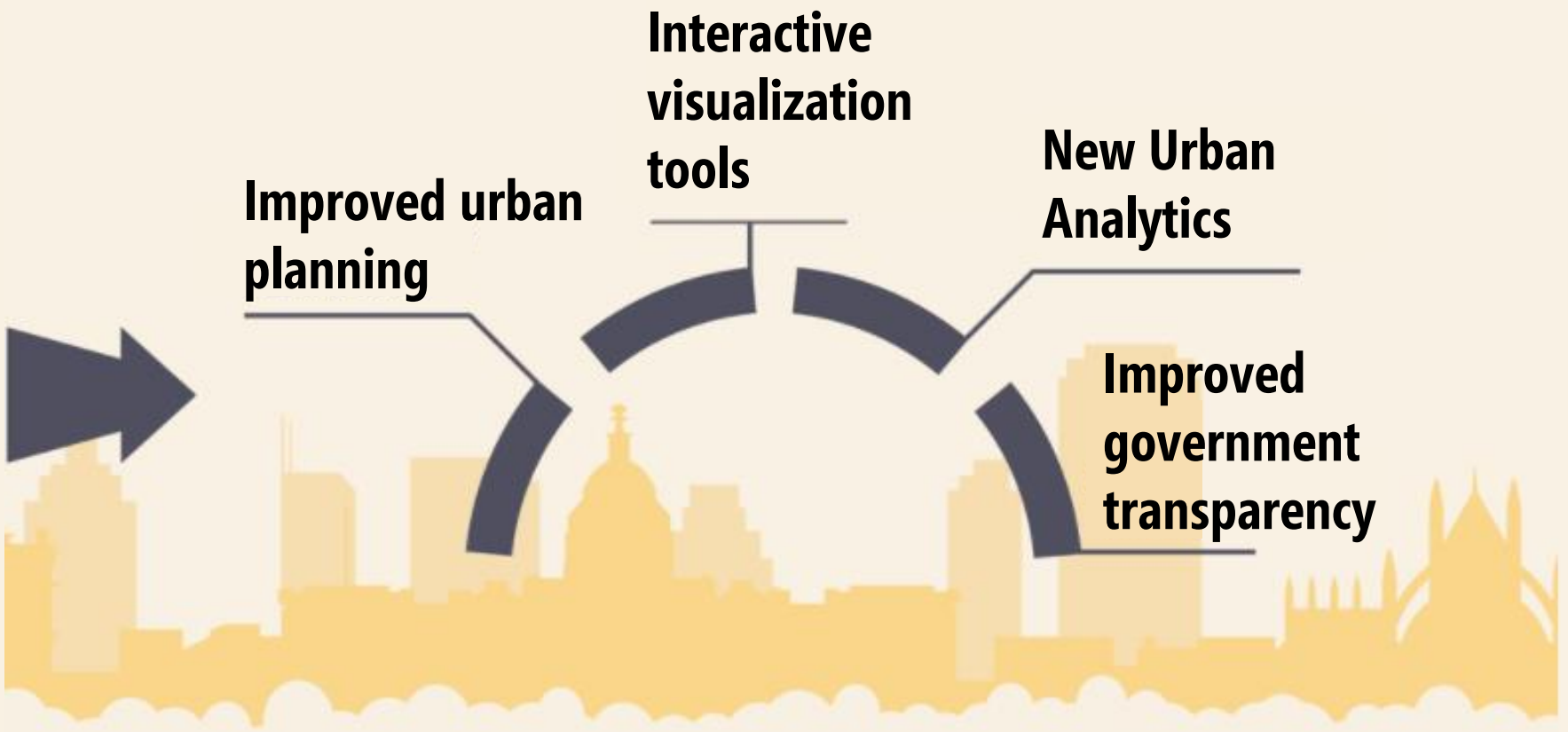
HUMAN LABELS

MACHINE LEARNING

PROJECT SIDEWALK
HTTP://PROJECTSIDEWALK.IO

OUTCOMES

MACHINE LEARNING

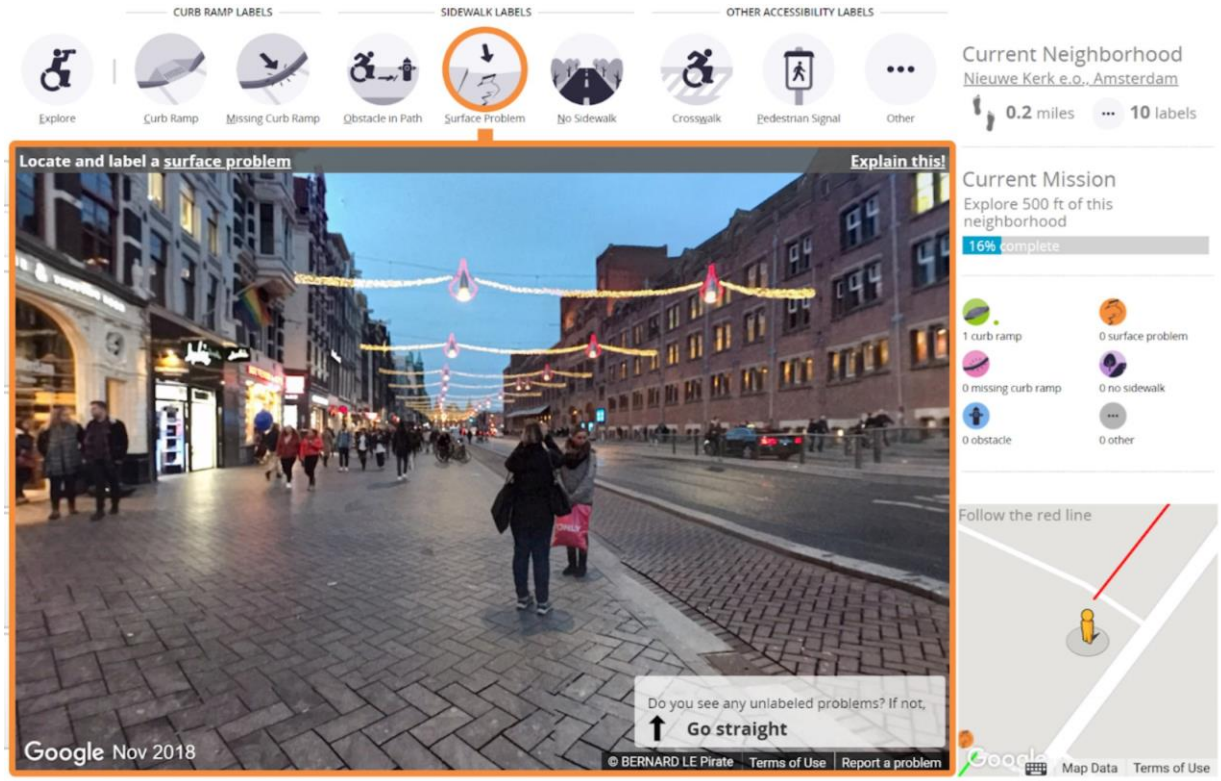


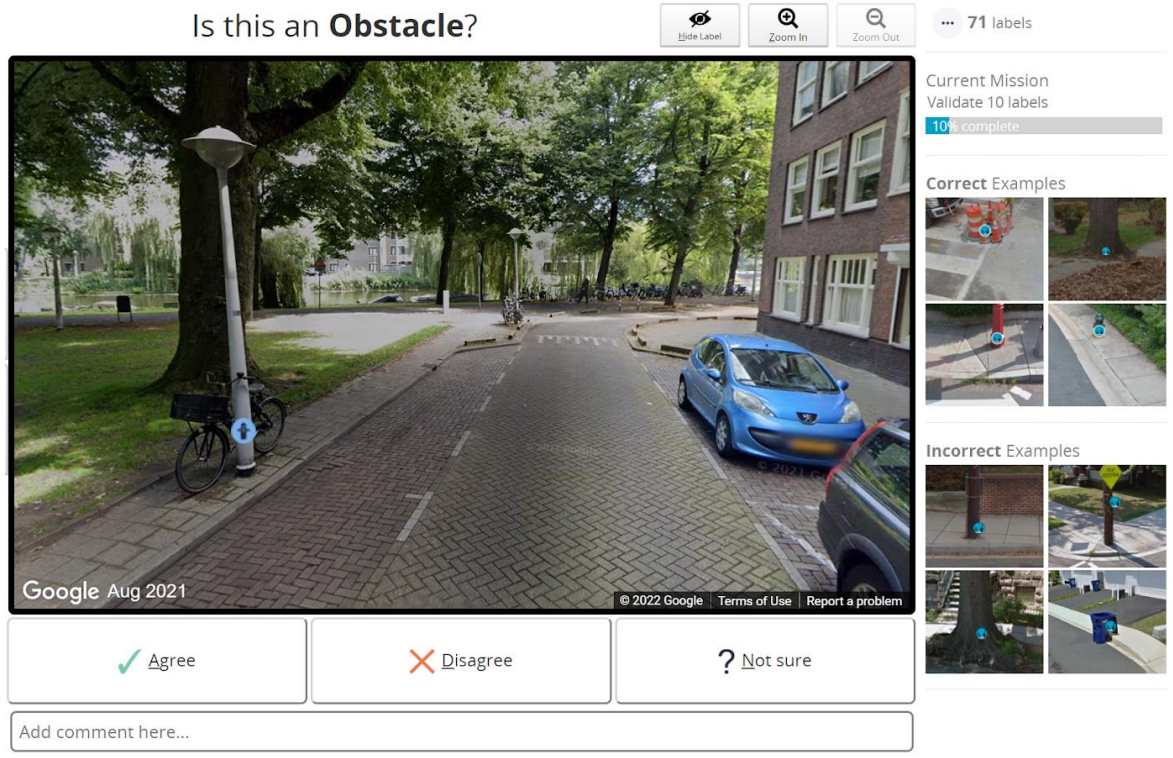
PROJECT SIDEWALK
HTTP://PROJECTSIDEWALK.IO

HOW TO USE
PROJECT SIDEWALK

PROJECT SIDEWALK

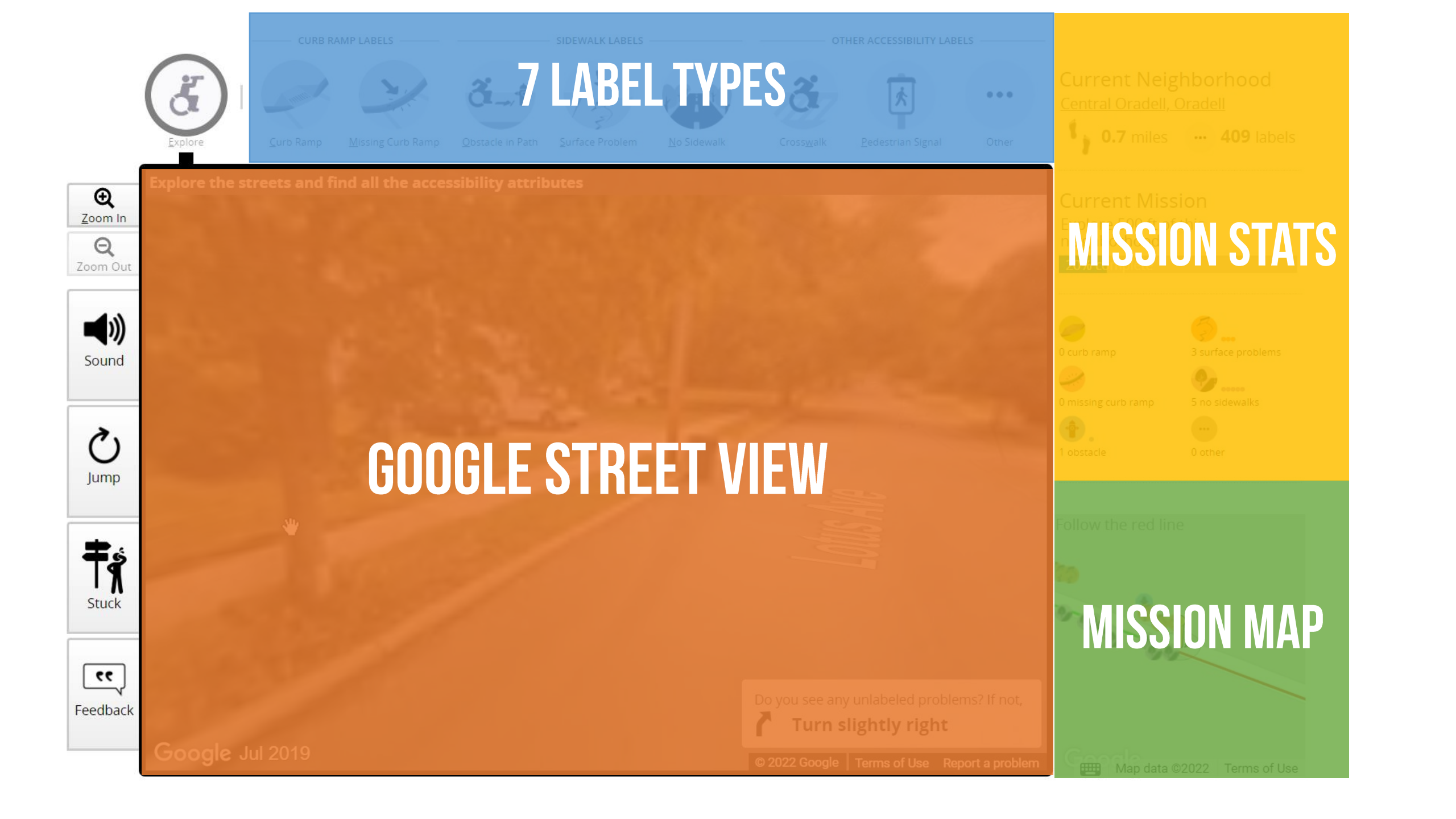
TWO DATA COLLECTION MISSIONS





1 FIND, LABEL, & ASSESS SIDEWALKS

2 VALIDATING & CORRECTING LABELS


CURB RAMP LABELS
SIDEWALK LABELS
OTHER ACCESSIBILITY LABELS
7 LABEL TYPES
Explore
Curb Ramp
Missing Curb Ramp
Obstacle in Path
Surface Problem
No Sidewalk
Crosswalk
Pedestrian Signal
Other
Current Neighborhood
Central Oradell, Oradell
0.7 miles
409 labels
Current Mission
MISSION STATS
0 curb ramp
3 surface problems
0 missing curb ramp
5 no sidewalks
1 obstacle
0 other
Zoom In
Zoom Out
Sound
Jump
Stuck
Feedback
Explore the streets and find all the accessibility attributes
GOOGLE STREET VIEW
Do you see any unlabeled problems? If not,
Turn slightly right
Google Jul 2019
© 2022 Google
Terms of Use
Report a problem
Follow the red line
MISSION MAP
Map data ©2022
Terms of Use

CURB RAMP LABELS | SIDEWALK LABELS | OTHER ACCESSIBILITY LABELS

Explore | Curb Ramp | Missing Curb Ramp | Obstacle in Path | Surface Problem | No Sidewalk | Crosswalk | Pedestrian Signal | Other

Zoom In

Zoom Out

Sound

Jump

Stuck

Feedback

Current Neighborhood

Central Oradell, Oradell

0.0 miles | **33** labels

Current Mission

Explore 250 ft of this neighborhood

0% complete

4 curb ramps

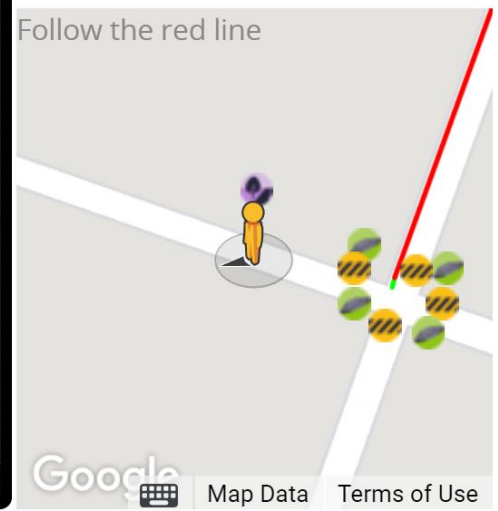
0 surface problem

0 missing curb ramp

1 no sidewalk

0 obstacle

4 others



© 2022 Google
TRIPPING HAZARD

Press the "S" key

CURB RAMP LABELS

OTHER ACCESSIBILITY LABELS

Explore | Curb Ramp | Missing Curb Ramp | Obstacle in Path | Surface Problem | No Sidewalk | Crosswalk | Pedestrian Signal | Other

Explore the streets and find all the accessibility attributes

CLICK SURFACE PROBLEM

Zoom In

Zoom Out

Sound

Jump

Stuck

Feedback

Do you see any unlabeled problems? If not,

Turn right

Google Jun 2018

© 2022 Google | Terms of Use | Report a problem

Current Neighborhood

Central Oradell, Oradell

0.0 miles | **33** labels

Current Mission

Explore 250 ft of this neighborhood

0% complete

4 curb ramps

0 surface problem

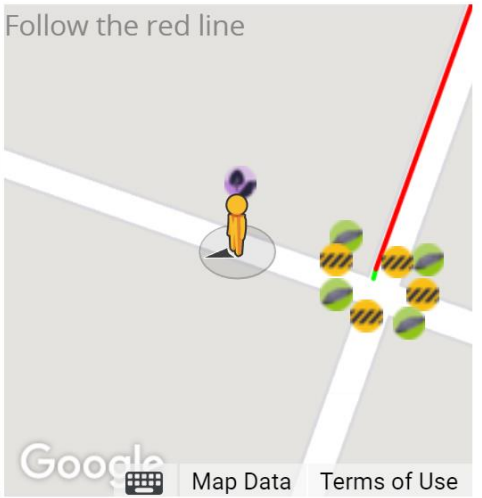
0 missing curb ramp

1 no sidewalk

0 obstacle

4 others

Follow the red line



CURB RAMP LABELS | SIDEWALK LABELS | OTHER ACCESSIBILITY LABELS

Explore | Curb Ramp | Missing Curb Ramp | Obstacle in Path | Surface Problem | No Sidewalk | Crosswalk | Pedestrian Signal | Other

Zoom In

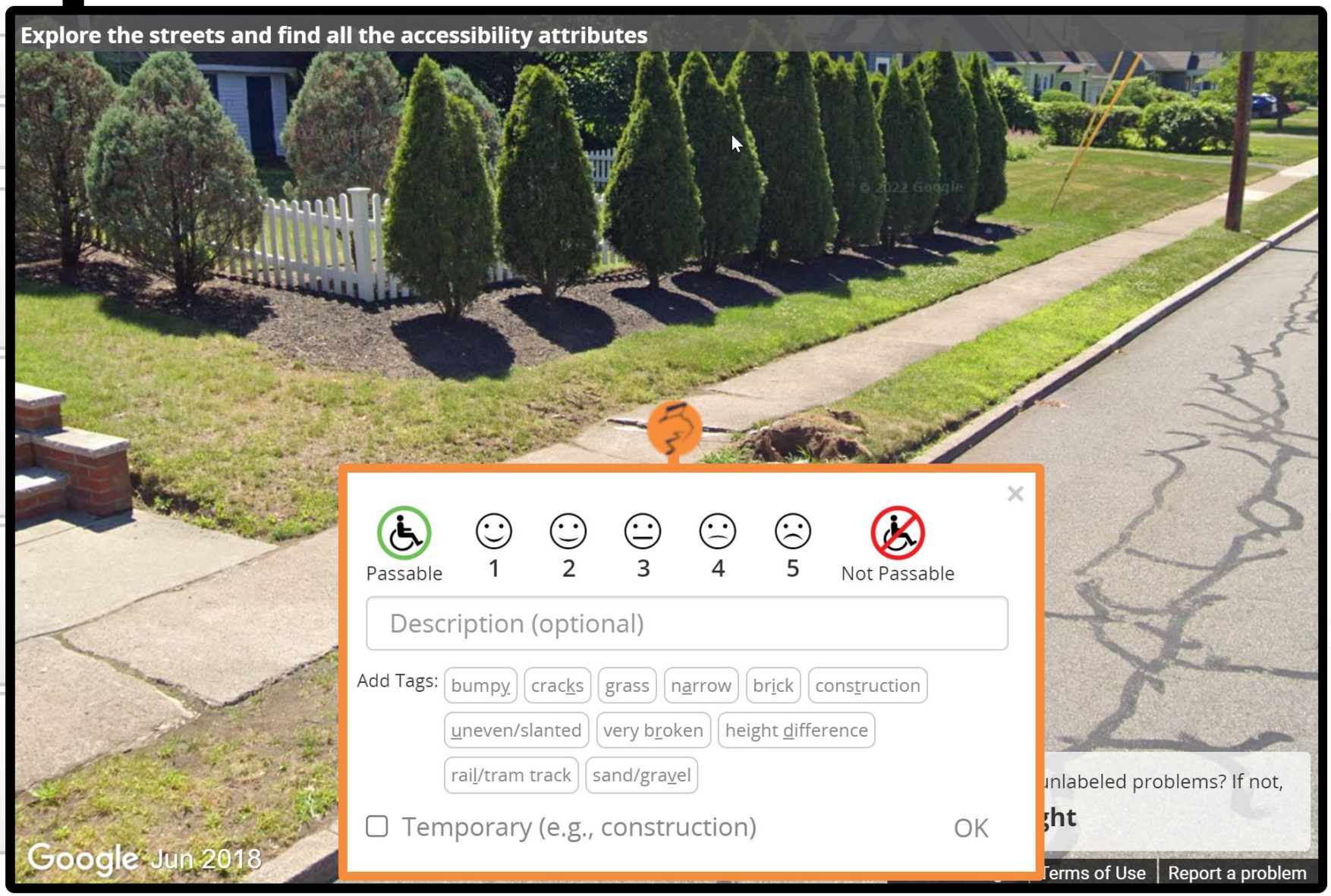
Zoom Out

Sound

Jump

Stuck

Feedback



Current Neighborhood

Central Oradell, Oradell

0.0 miles | **34** labels

Current Mission

Explore 250 ft of this neighborhood

0% complete

4 curb ramps

1 surface problem

0 missing curb ramp

1 no sidewalk

0 obstacle

4 others

CURB RAMP LABELS | SIDEWALK LABELS | OTHER ACCESSIBILITY LABELS

Explore | Curb Ramp | Missing Curb Ramp | Obstacle in Path | Surface Problem | No Sidewalk | Crosswalk | Pedestrian Signal | Other

Zoom In

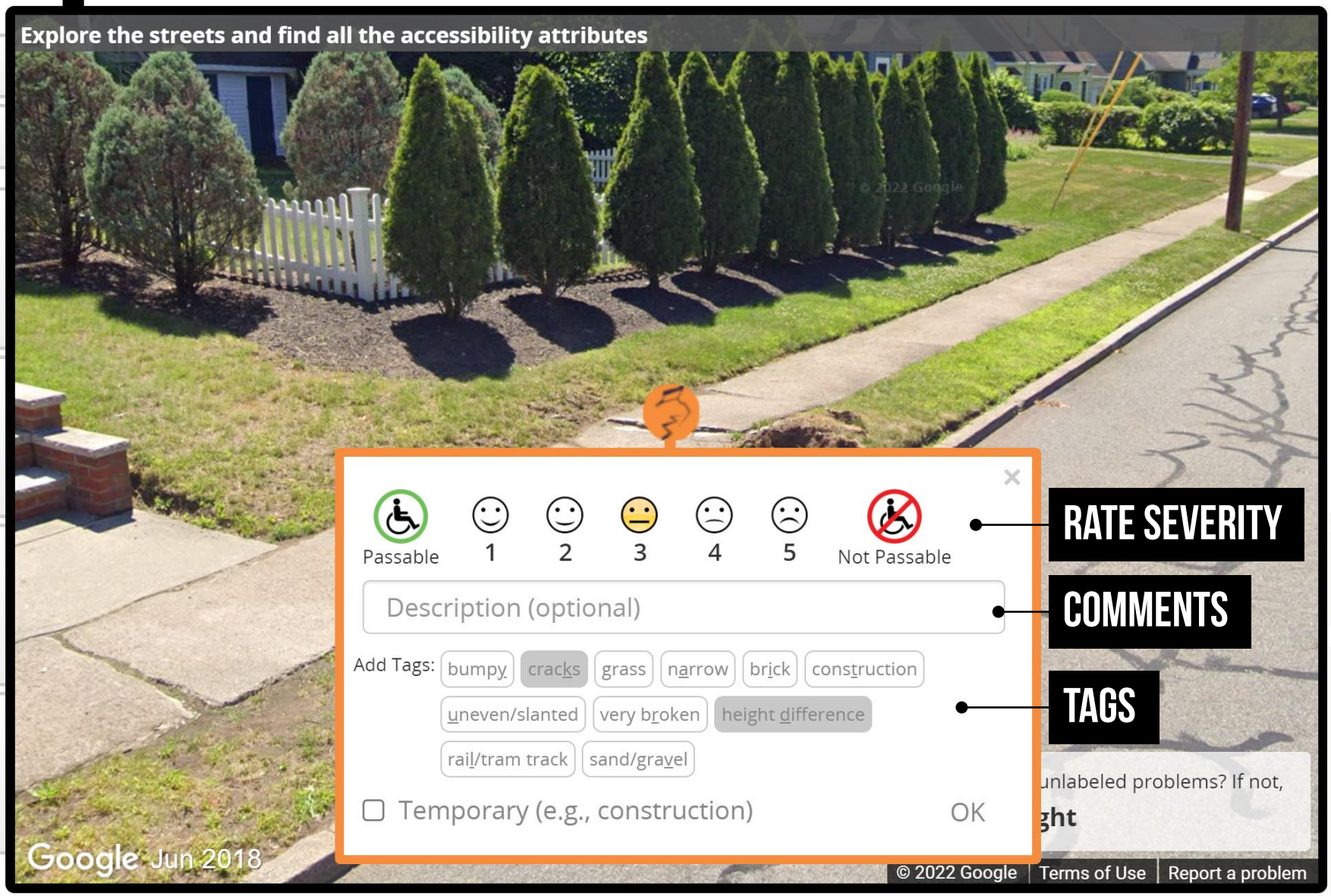
Zoom Out

Sound

Jump

Stuck

Feedback



Current Neighborhood

Central Oradell, Oradell

0.0 miles | **34** labels

Current Mission

Explore 250 ft of this neighborhood

0% complete

4 curb ramps

1 surface problem

0 missing curb ramp

1 no sidewalk

0 obstacle

4 others

CURB RAMP LABELS | SIDEWALK LABELS | OTHER ACCESSIBILITY LABELS

Explore | Curb Ramp | Missing Curb Ramp | Obstacle in Path | Surface Problem | No Sidewalk | Crosswalk | Pedestrian Signal | Other

Zoom In

Zoom Out

Sound

Jump

Stuck

Feedback

Current Neighborhood

Jardines del Carmen, La Piedad

1.5 miles | 1024 labels

Current Mission

Explore 500 ft of this neighborhood

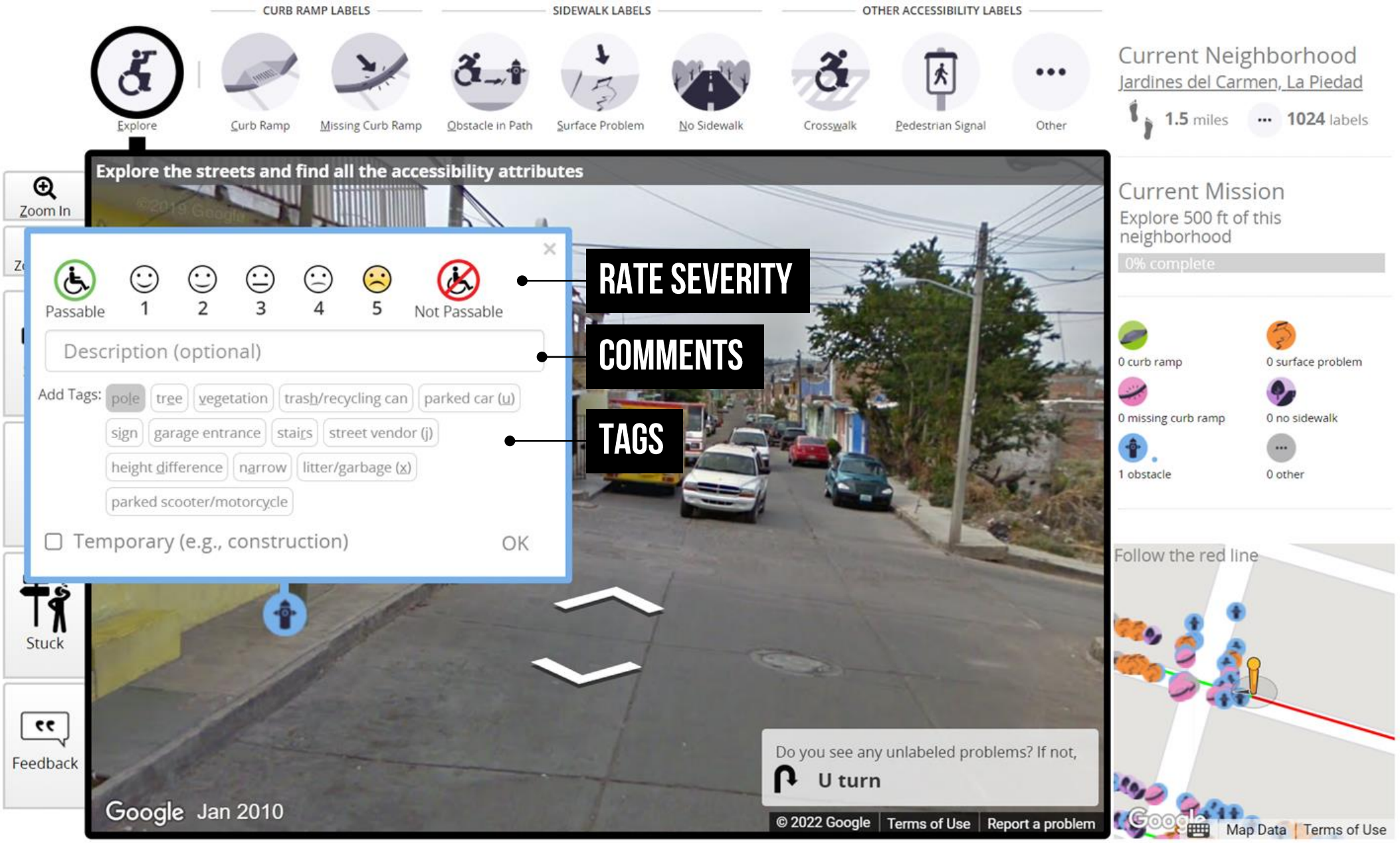
0% complete

0 curb ramp | 0 surface problem

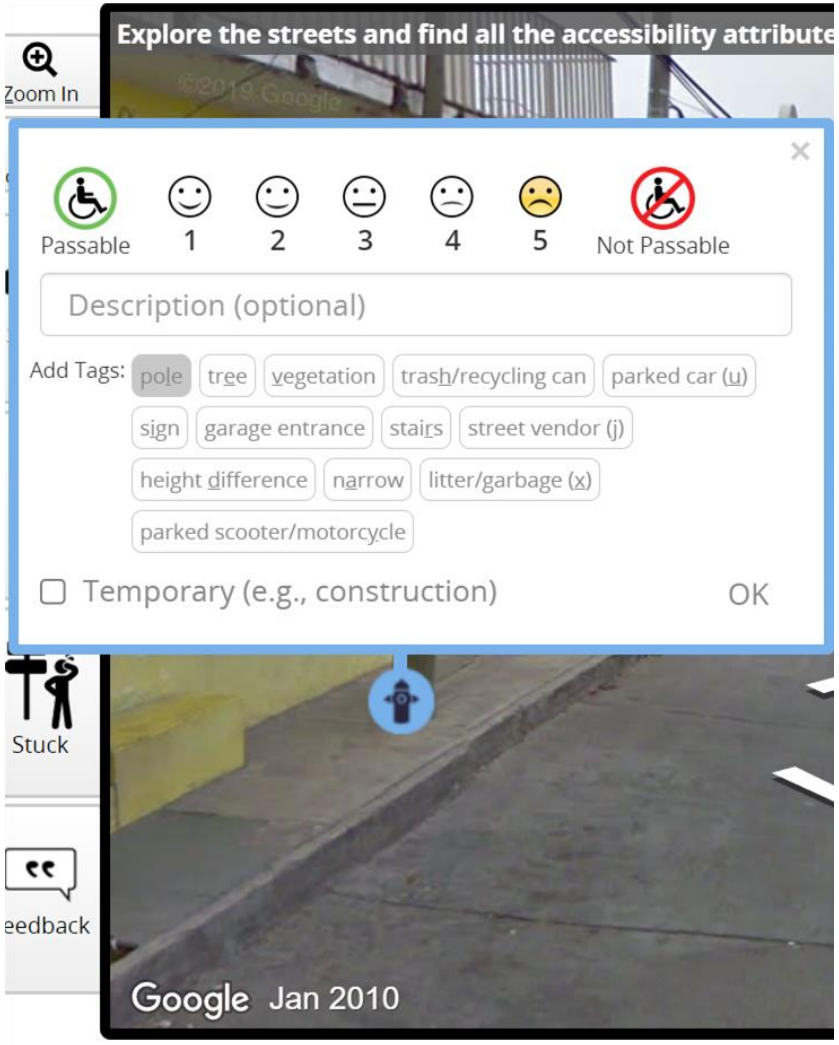
0 missing curb ramp | 0 no sidewalk

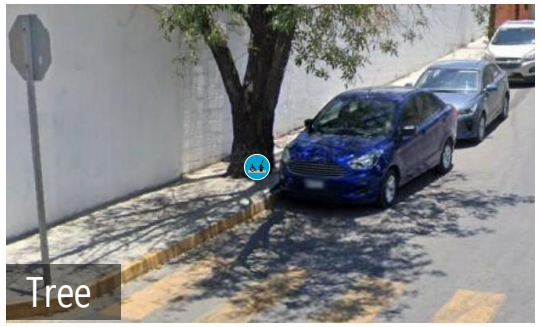
1 obstacle | 0 other

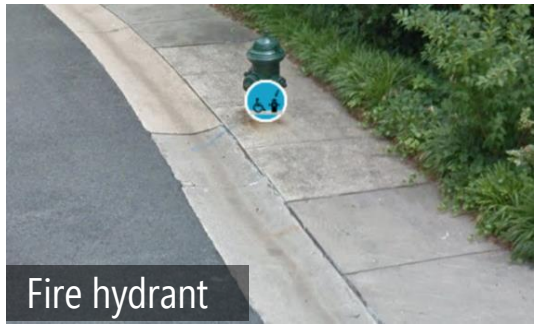
POLE OBSTACLE

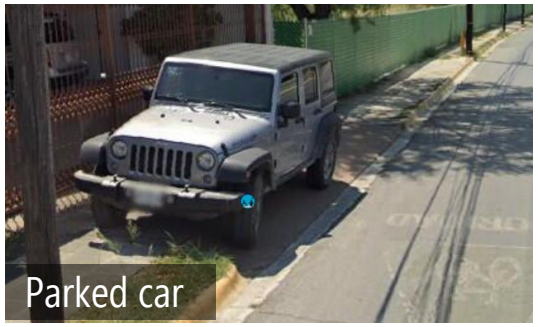

CURB RAMP LABELS
SIDEWALK LABELS
OTHER ACCESSIBILITY LABELS
Explore
Curb Ramp
Missing Curb Ramp
Obstacle in Path
Surface Problem
No Sidewalk
Crosswalk
Pedestrian Signal
Other
Current Neighborhood
Jardines del Carmen, La Piedad
1.5 miles
1024 labels
Explore the streets and find all the accessibility attributes
Zoom In
Stuck
Feedback
Passable
1
2
3
4
5
Not Passable
RATE SEVERITY
Description (optional)
COMMENTS
Add Tags:
pole
tree
vegetation
trash/recycling can
parked car (u)
sign
garage entrance
stairs
street vendor (j)
height difference
narrow
litter/garbage (x)
parked scooter/motorcycle
TAGS
Temporary (e.g., construction)
OK
Current Mission
Explore 500 ft of this neighborhood
0% complete
0 curb ramp
0 surface problem
0 missing curb ramp
0 no sidewalk
1 obstacle
0 other
Follow the red line
Do you see any unlabeled problems? If not,
U turn
Google Jan 2010
© 2022 Google
Terms of Use
Report a problem
Map Data
Terms of Use

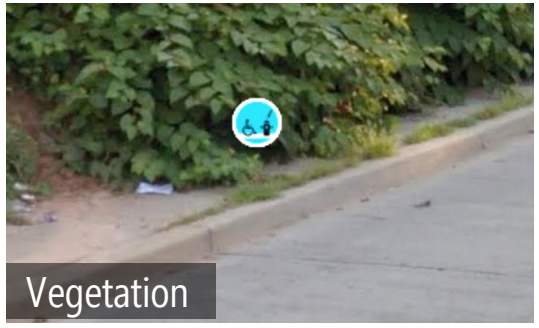
EXAMPLE OBSTACLE TAGS

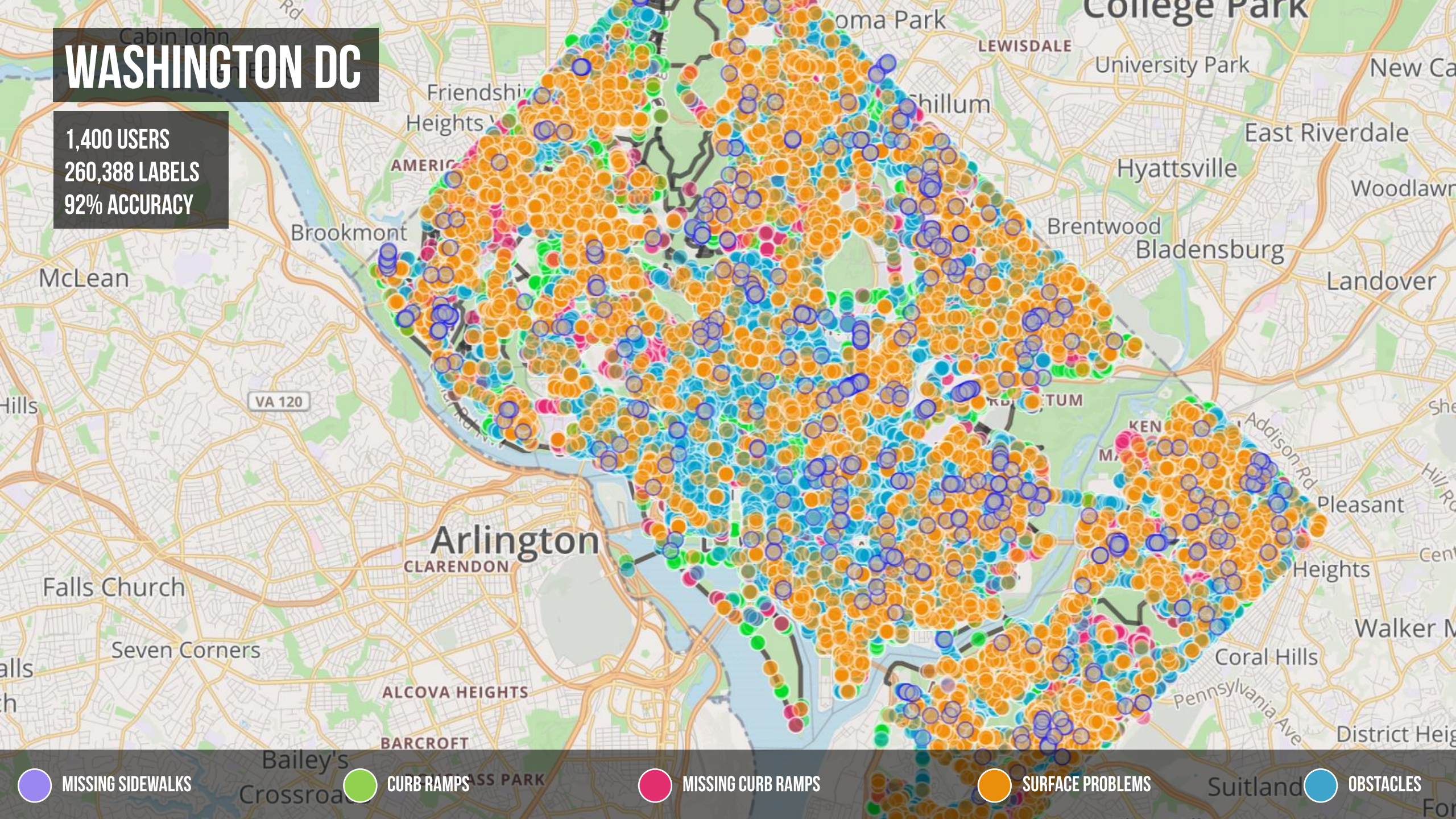











WASHINGTON DC
1,400 USERS
260,388 LABELS
92% ACCURACY
College Park
LEWISDALE
University Park
East Riverdale
Hyattsville
Brentwood
Bladensburg
Landover
Brookmont
McLean
VA 120
Arlington
CLARENDON
Falls Church
Seven Corners
ALCOVA HEIGHTS
BARCROFT
Coral Hills
Pleasant
Addison Rd
Pennsylvania Ave
MISSING SIDEWALKS
CURB RAMPS
MISSING CURB RAMPS
SURFACE PROBLEMS
OBSTACLES

PROJECT SIDEWALK

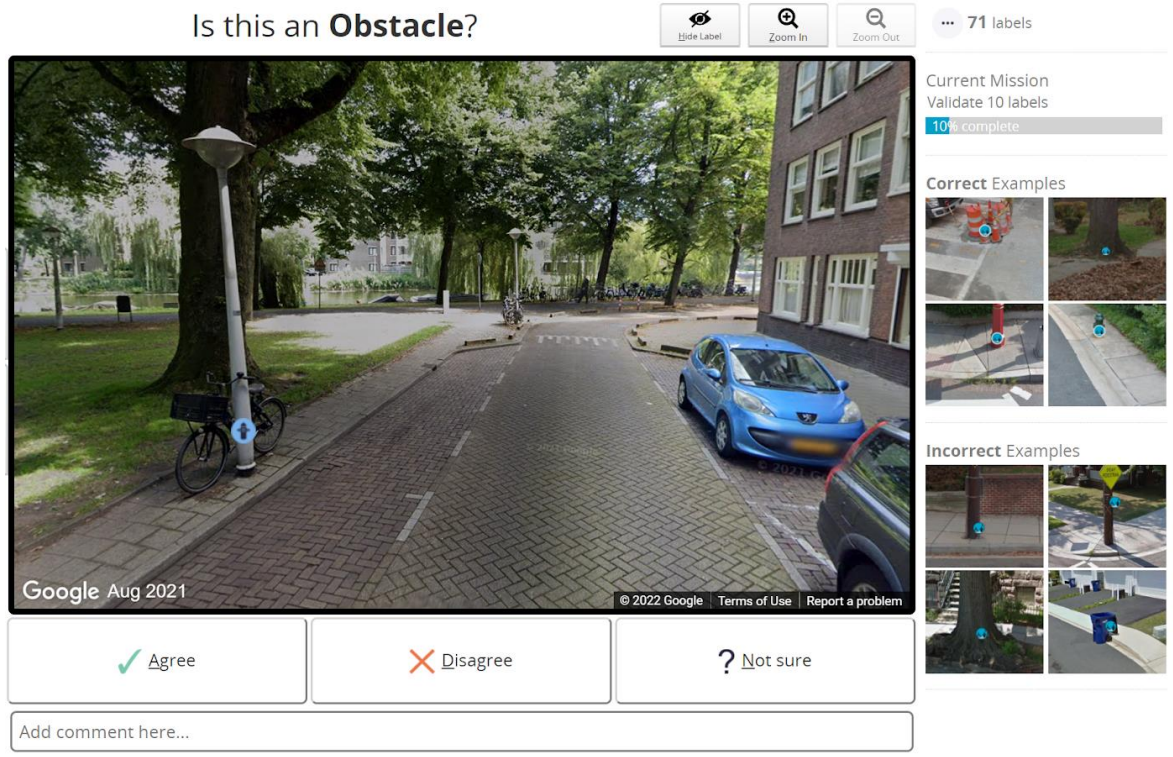
REMOTE CROWDSOURCING

LABELING MEXICO CITY FROM GERMANY!

Source: Edgar Martínez, Liga Peatonal

PROJECT SIDEWALK

TWO DATA COLLECTION MISSIONS



1 FIND, LABEL, & ASSESS SIDEWALKS

2 VALIDATING & CORRECTING LABELS

Is this an **Obstacle**?

Hide Label | Zoom In | Zoom Out

71 labels

Current Mission
Validate 10 labels
10% complete

Correct Examples

Incorrect Examples

✓ Agree | ✗ Disagree | ? Not sure

Add comment here...

Is this a **Missing Curb Ramp**?

Hide Label | Zoom In | Zoom Out

1113 labels

✓ Agree

✗ Disagree

? Not sure

Add comment here...

Current Mission
Validate 10 labels

50% complete

CORRECT Missing Curb Ramp

INCORRECT Missing Curb Ramp

Hide Label

Is this a **Curb Ramp**?

Zoom In | Zoom Out

0 labels

✓ Agree | ✗ Disagree | ? Not sure

Current Mission

Validate 10 labels

0% complete

Curb Ramp

NOT a Curb Ramp

Is this an **Obstacle**?

Hide Label | Zoom In | Zoom Out

934 labels

Skip

Feedback

✓ Agree | ✗ Disagree | ? Not sure

Add comment here...

Current Mission
Validate 10 labels
0% complete

Correct Examples

Incorrect Examples

Is this a **Surface Problem**?

Hide Label | Zoom In | Zoom Out

3337 labels

Skip

Feedback

✓ Agree

✗ Disagree

? Not sure

Add comment here...

Current Mission

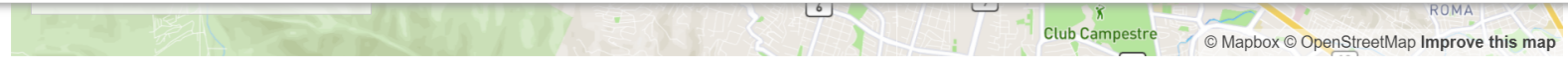
Validate 10 labels

0% complete

Correct Examples

Incorrect Examples

We also try to make Project Sidewalk **fun** and **educational**



Your missions	Distance	Labels	Validations	Accuracy
140	2.03 mi	568	1249	90.7%

Achievements

Missions

Congratulations, you've earned all mission badges!

Distance

Thanks for helping! **2.97 more miles** until your next achievement.

Labels

Great job! **432 more labels** until your next achievement.

Validations

Amazing work! **3751 more validations** until your next achievement.

Overall Leaderboard

Leaders are calculated based on their labels, distance, and accuracy

#	Username	Labels	Missions	Distance	Accuracy
1	mariana.velasco	2894	150	9.6 miles	85.3%
2	maria	1918	51	9.0 miles	89.1%
3	abarragan99	1895	81	2.7 miles	86.5%
4	marian.trevino	1543	66	9.4 miles	82.2%
5	dordaz	1483	46	3.5 miles	84.2%
6	Gerardo R	1274	86	5.4 miles	87.6%
7	mariagarza	1205	62	9.4 miles	87.2%
8	ana.alvarezc	1053	63	9.8 miles	84.8%
9	Gari01234	848	62	4.6 miles	89.1%
10	Luis Gonzalez	812	59	9.7 miles	94.1%

Want to make it into the Top 10? Start exploring!

PROJECT SIDEWALK

DEPLOYMENTS & PARTNERSHIPS

DEPLOYMENTS

4 CONTINENTS, 7 COUNTRIES, 20 CITIES, 17K KM

13K	919K	609K	17K KM
USERS	LABELS	VALIDATIONS	AUDITED

DEPLOYMENTS

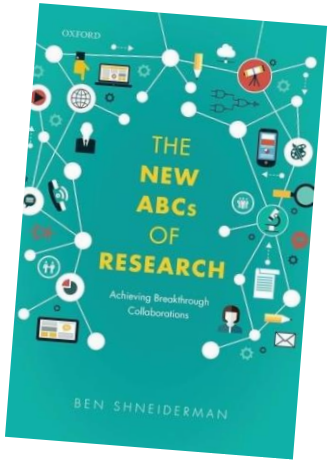
CHRONOLOGICAL TIMELINE

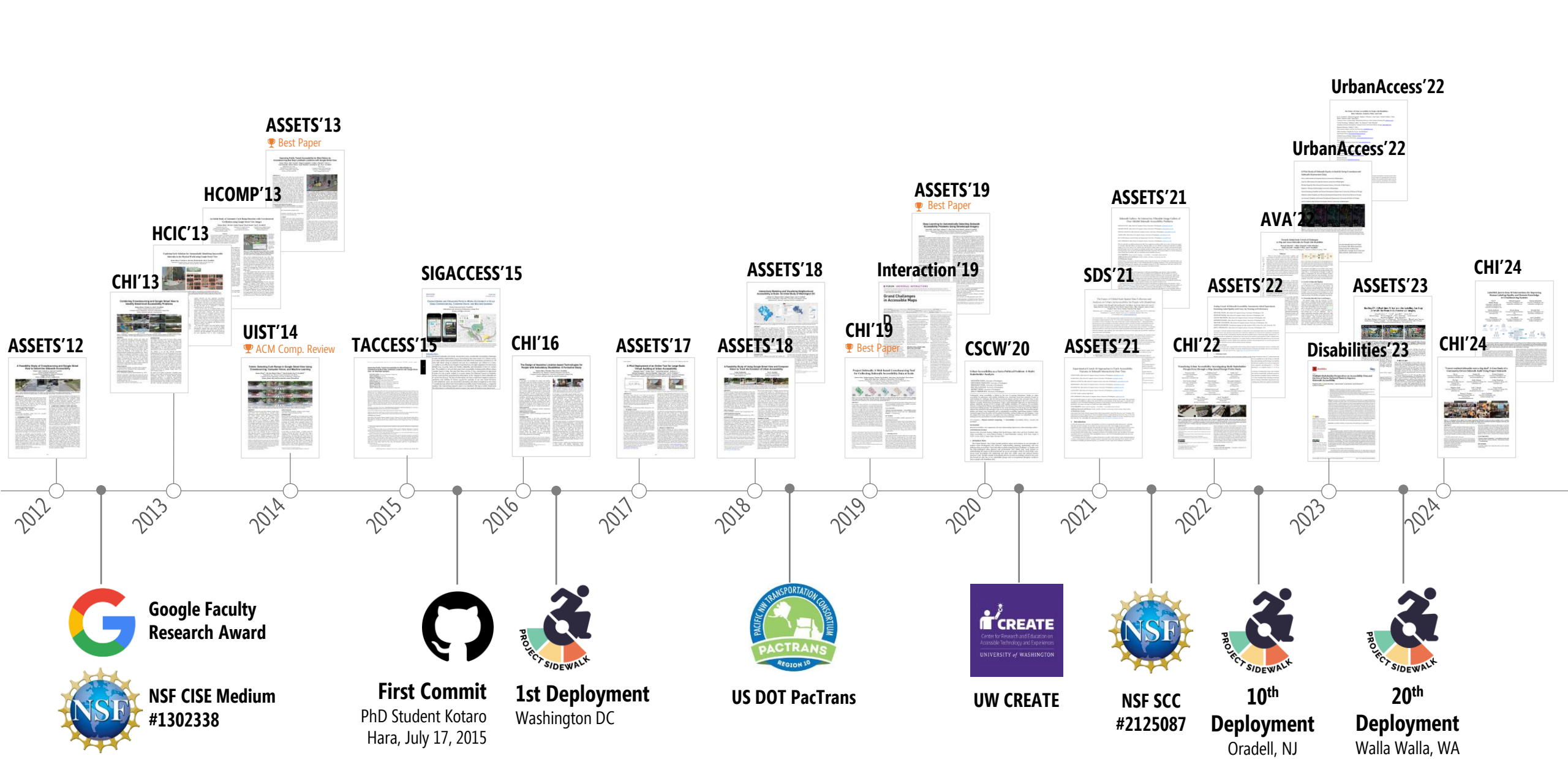
Time

city	launch_date	audited (km)	mi_explored	users	labelers	labels	validations	labels_vali...	% lbls valid...	accuracy
dc	2015-10-17	5482.0	3406.4	1,395	1,395	263,403	0	0	0.0	0.0
Newberg	2019-01-31	284.1	176.6	292	154	16,863	14,755	8,057	47.8	88.3
Seattle	2019-03-12	4608.8	2863.8	5,435	2,630	230,043	234,565	126,687	55.1	84.3
Columbus	2019-11-12	415.8	258.4	547	266	35,156	20,764	13,538	38.5	87.1
Mexico City	2020-01-09	1064.9	661.7	978	566	55,017	29,145	21,065	38.3	87.7
San Pedro G...	2020-05-30	1465.4	910.6	1,824	568	103,266	46,310	30,155	29.2	83.3
Pittsburgh	2020-07-30	271.3	168.6	414	228	19,475	14,275	8,034	41.3	86.9
Chicago	2021-09-03	634.7	394.4	673	377	40,298	53,384	29,704	73.7	86.8
La Piedad	2022-03-17	28.8	17.9	65	29	4,364	2,579	1,432	32.8	66.0
Oradell	2022-03-17	157.1	97.6	292	153	12,733	21,159	10,213	80.2	94.2
Amsterdam	2022-03-17	1075.0	668.0	457	338	28,588	31,527	11,229	39.3	70.5
Zurich	2022-11-08	199.4	123.9	94	81	7,350	9,868	5,116	69.6	72.5
Taipei	2023-01-24	536.7	333.5	256	98	44,745	72,120	28,297	63.2	77.8
Auckland	2023-02-14	152.7	94.9	19	15	5,637	4,345	2,512	44.6	91.8
Cuenca	2023-04-02	166.0	103.2	124	113	14,995	7,879	5,736	38.3	86.3
New Taipei	2023-08-06	196.3	122.0	58	29	18,087	33,348	10,980	60.7	69.2
Burnaby	2023-08-09	106.9	66.5	18	11	7,296	4,917	3,587	49.2	93.2
Keelung	2023-08-10	110.7	68.8	30	21	7,127	17,584	5,024	70.5	72.6
Teaneck	2023-08-24	104.7	65.0	63	34	3,588	3,014	1,480	41.2	88.9
Walla Walla	2023-10-05	13.2	8.2	11	5	1,347	1,366	1,043	77.4	95.5
TOTAL	**N/A**	**17,074.596**	**10,609.659**	**13,045**	**7,111**	**919,378**	**622,904**	**323,889**	**35.229**	**83.48**

NSF SCC Grant Awarded

Applied research to **advance science**
and make **community impact**




ASSETS'12
CHI'13
HCIC'13
HCOMP'13
ASSETS'13
Best Paper
UIST'14
ACM Comp. Review
TACCESS'15
SIGACCESS'15
CHI'16
ASSETS'17
ASSETS'18
ASSETS'18
CHI'19
Best Paper
Interaction'19
ASSETS'19
Best Paper
CSCW'20
ASSETS'21
SDS'21
ASSETS'21
CHI'22
ASSETS'22
AVA'22
UrbanAccess'22
UrbanAccess'22
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2012
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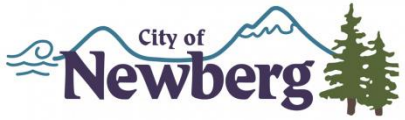
2024
Google Faculty Research Award
NSF CISE Medium #1302338
First Commit
PhD Student Kotaro Hara, July 17, 2015
1st Deployment
Washington DC
US DOT PacTrans
UW CREATE
NSF SCC #2125087
10th Deployment
Oradell, NJ
20th Deployment
Walla Walla, WA

Single most important ingredient:
close partnerships with aligned goals

Oradell Girl Scouts

Hackensack Meridian School of Medicine



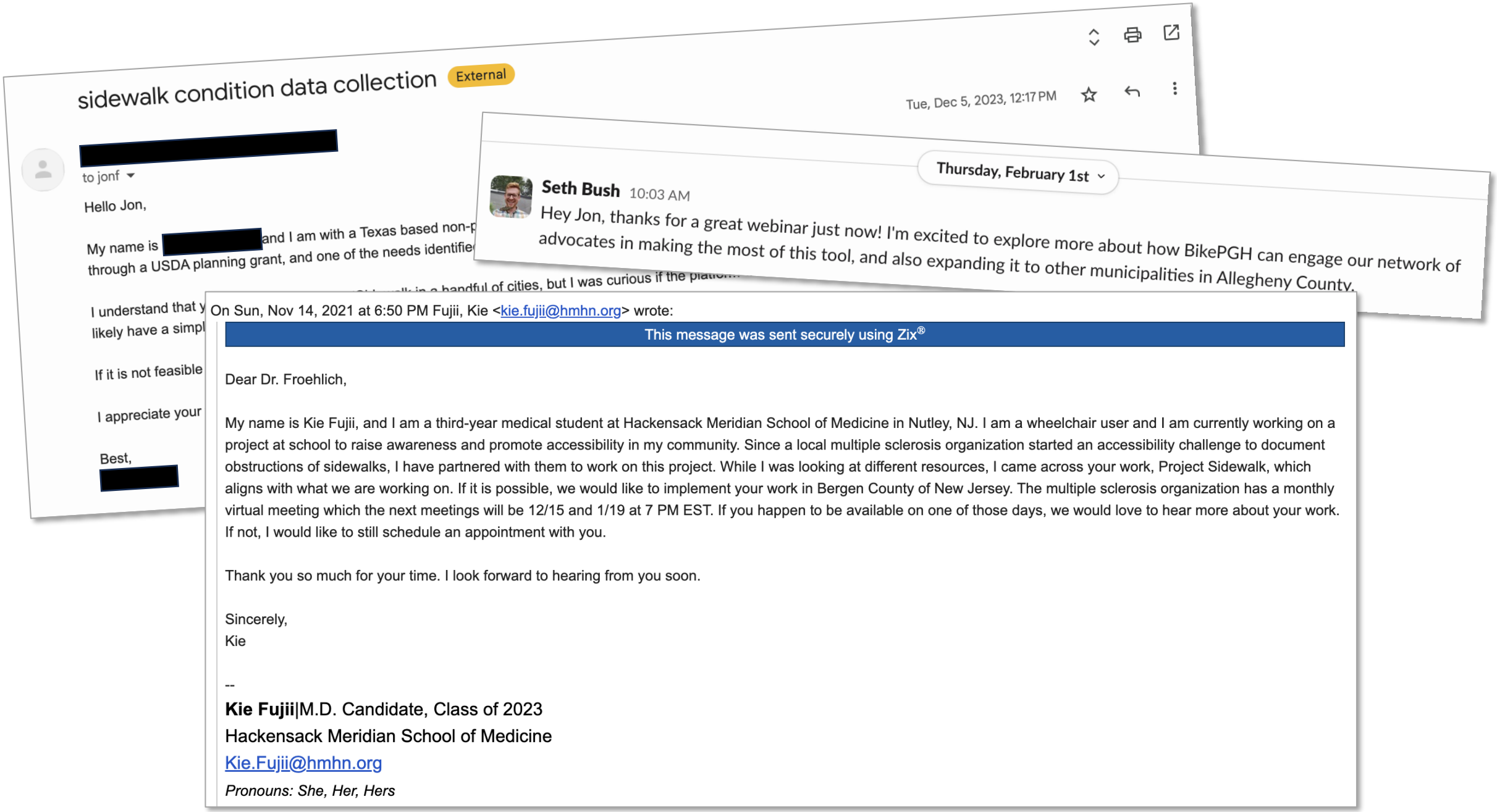
UW Disability & D/deaf Cultural Center

National Multiple Sclerosis Society
Bergen Multiple Sclerosis Community Council

Teaneck High School

People Nudge

Denny International Middle School



sidewalk condition data collection External

Tue, Dec 5, 2023, 12:17 PM

[redacted]

to jonf

Hello Jon,

My name is [redacted] and I am with a Texas based non-p
through a USDA planning grant, and one of the needs identifie

I understand that y
likely have a simpl

If it is not feasible

I appreciate your

Best,
[redacted]

Thursday, February 1st

Seth Bush 10:03 AM

Hey Jon, thanks for a great webinar just now! I'm excited to explore more about how BikePGH can engage our network of advocates in making the most of this tool, and also expanding it to other municipalities in Allegheny County.

On Sun, Nov 14, 2021 at 6:50 PM Fujii, Kie <kie.fujii@hmhn.org> wrote:

This message was sent securely using Zix®

Dear Dr. Froehlich,

My name is Kie Fujii, and I am a third-year medical student at Hackensack Meridian School of Medicine in Nutley, NJ. I am a wheelchair user and I am currently working on a project at school to raise awareness and promote accessibility in my community. Since a local multiple sclerosis organization started an accessibility challenge to document obstructions of sidewalks, I have partnered with them to work on this project. While I was looking at different resources, I came across your work, Project Sidewalk, which aligns with what we are working on. If it is possible, we would like to implement your work in Bergen County of New Jersey. The multiple sclerosis organization has a monthly virtual meeting which the next meetings will be 12/15 and 1/19 at 7 PM EST. If you happen to be available on one of those days, we would love to hear more about your work. If not, I would like to still schedule an appointment with you.

Thank you so much for your time. I look forward to hearing from you soon.

Sincerely,
Kie

--

Kie Fujii|M.D. Candidate, Class of 2023
Hackensack Meridian School of Medicine
Kie.Fujii@hmhn.org
Pronouns: She, Her, Hers

World Enabled
City of
Amsterdam
AMSTERDAM

LIGA
PEATONAL
MEXICO CITY

NEWBERG, OR
Disability Advocates
City of Newberg
Public Works Office

Project Sidewalk

AS OF 2019 100% OF STREETS HAVE HAD A 1st REVIEW AND

62% HAVE HAD THE 2nd CALLED *"VERIFICATION"*

WE NEED YOUR HELP TO LOG IN AND "VERIFY" LABELS OTHERS HAVE ENTERED.

Over 300 people have participated so far!

Newberg will be the first city in Oregon to map its entire pedestrian network with Project Sidewalk!

Click this *link to begin.*

Newberg has over 116 miles of pedestrian pathsways used for travel to work and school; for exercise and business; and community events. For people with sensory or mobility restrictions it is critical that sidewalks are safe and accessible.

A lack of current information makes it difficult to track conditions and plan improvements.

Enter *Project Sidewalk*

A learning computer database managed by the University of Washington Computer/Engineering Dept. that uses interactive "crowd sourcing" to collect data. It is already in use in Seattle and Washington D.C and now its been made available in Newberg!

This is a perfect activity anyone who lives, works or visits Newberg.

From any *desktop or laptop computer* you can "*virtually*" explore sidewalks in Newberg and label conditions you find.

Click this *link to begin* assesing local sidewalks.

Public Works

Jay Harris, PE.
Public Works Director
PO BOX 970 Newberg, OR 97132
jay.harris@newbergoregon.gov

Engineering (503) 537-1273

Maintenance (503) 537-1234

Operations (503) 537-1252

Compost (503) 537-1252

Report damage 24hr (503) 538-8321

Utility Billing (503) 537-1205

+ Engineering

Maintenance

Operations

Optional Sewer and Water line insurance

Current Projects

Surplus Stock

Frequently Asked Questions- Who do I Contact ?

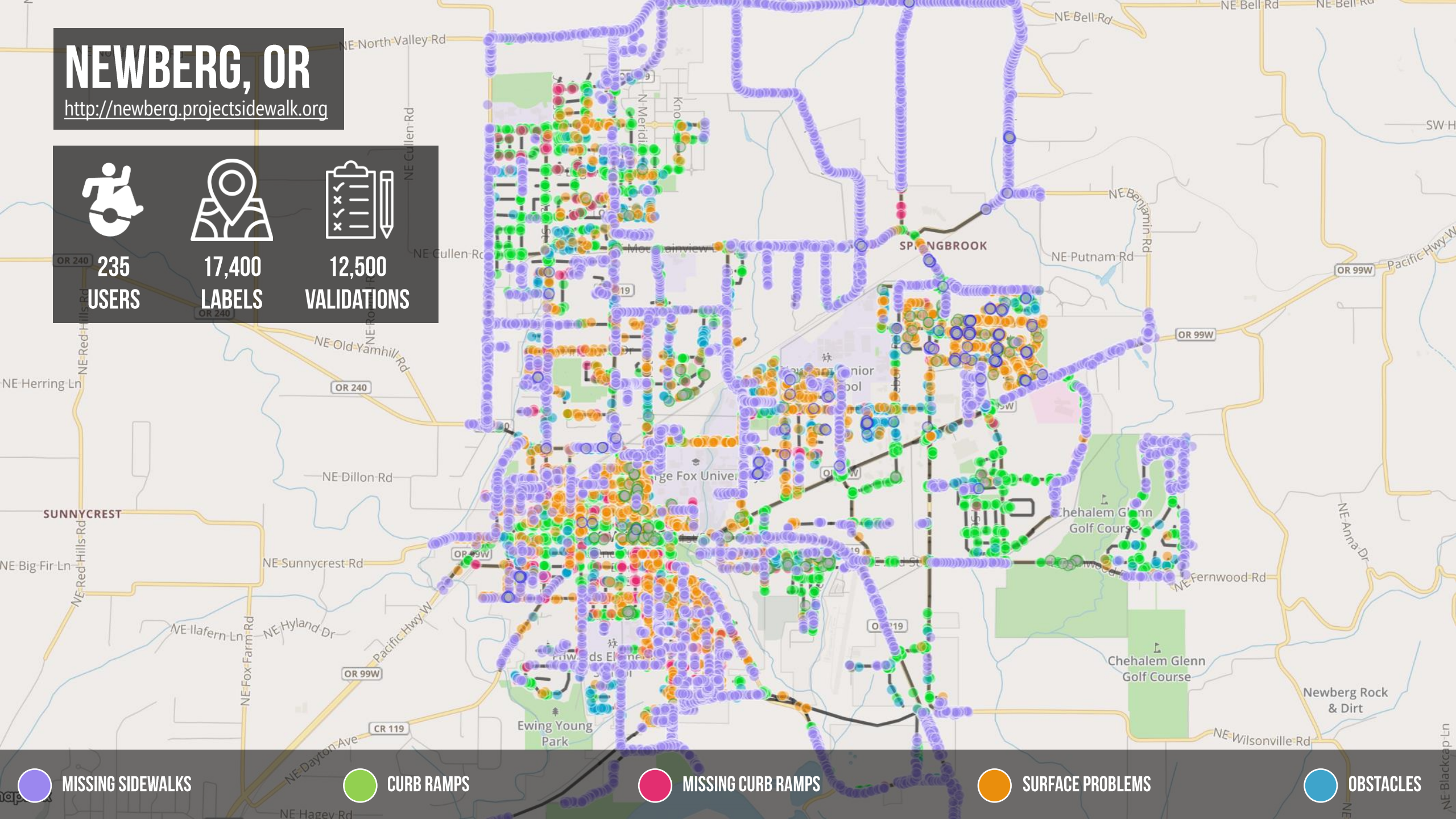
NEWBERG, OR

http://newberg.projectsidewalk.org

235
USERS

17,400
LABELS

12,500
VALIDATIONS



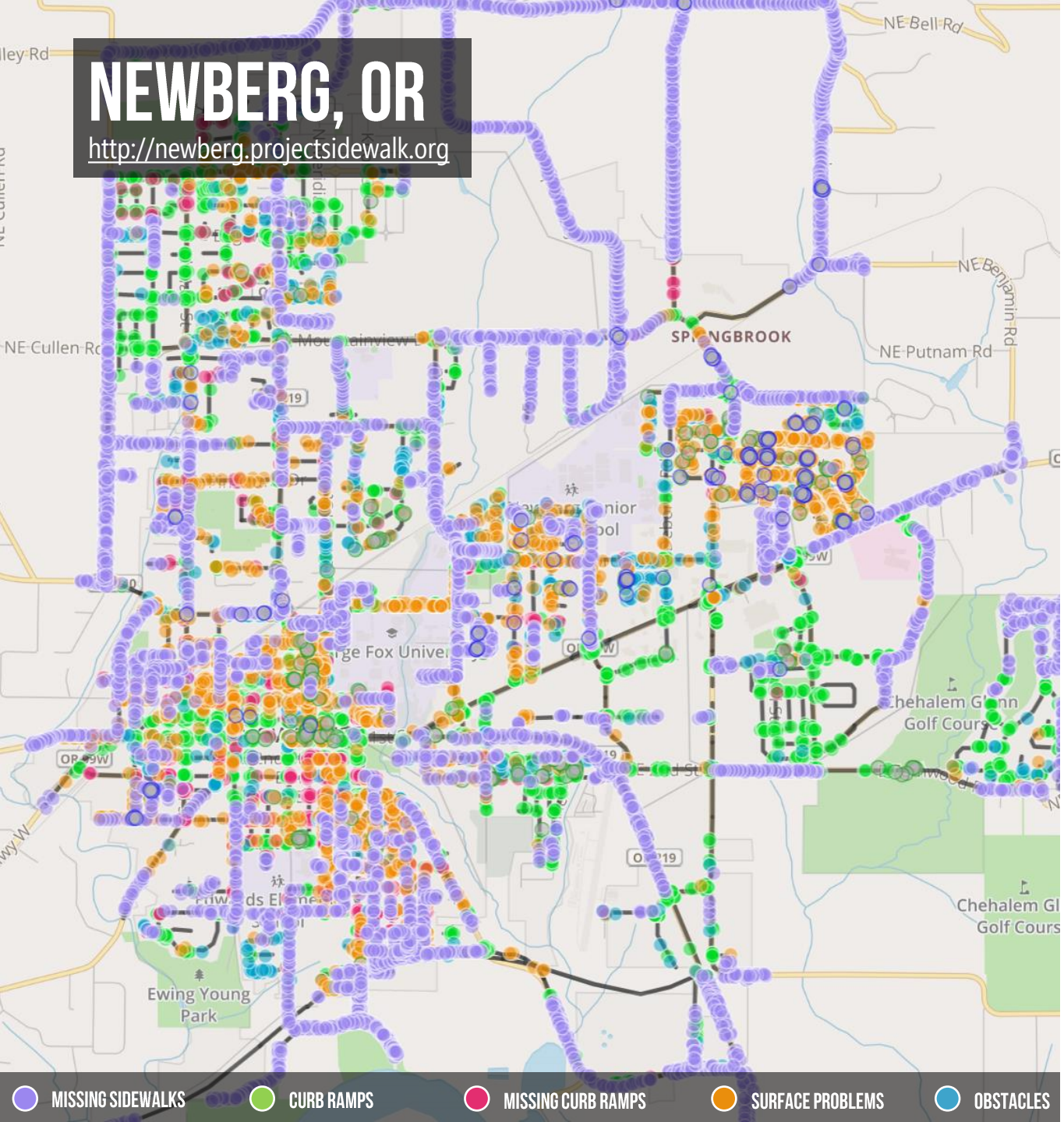
MISSING SIDEWALKS

CURB RAMPS

MISSING CURB RAMPS

SURFACE PROBLEMS

OBSTACLES



City of Newberg
January 30 at 9:29 AM · 🌐

Like Page

Congratulations and THANK YOU to the citizens of Newberg for putting in the work to map 100% of Newberg through Project Sidewalk. That's over 107 miles covered with 264 local users who contributed to the data.

This information will be used to identify areas in Newberg that need sidewalks, need sidewalk repairs, and need to be updated to become more accessible. Through your efforts, Newberg can become a safer, more accessible community.

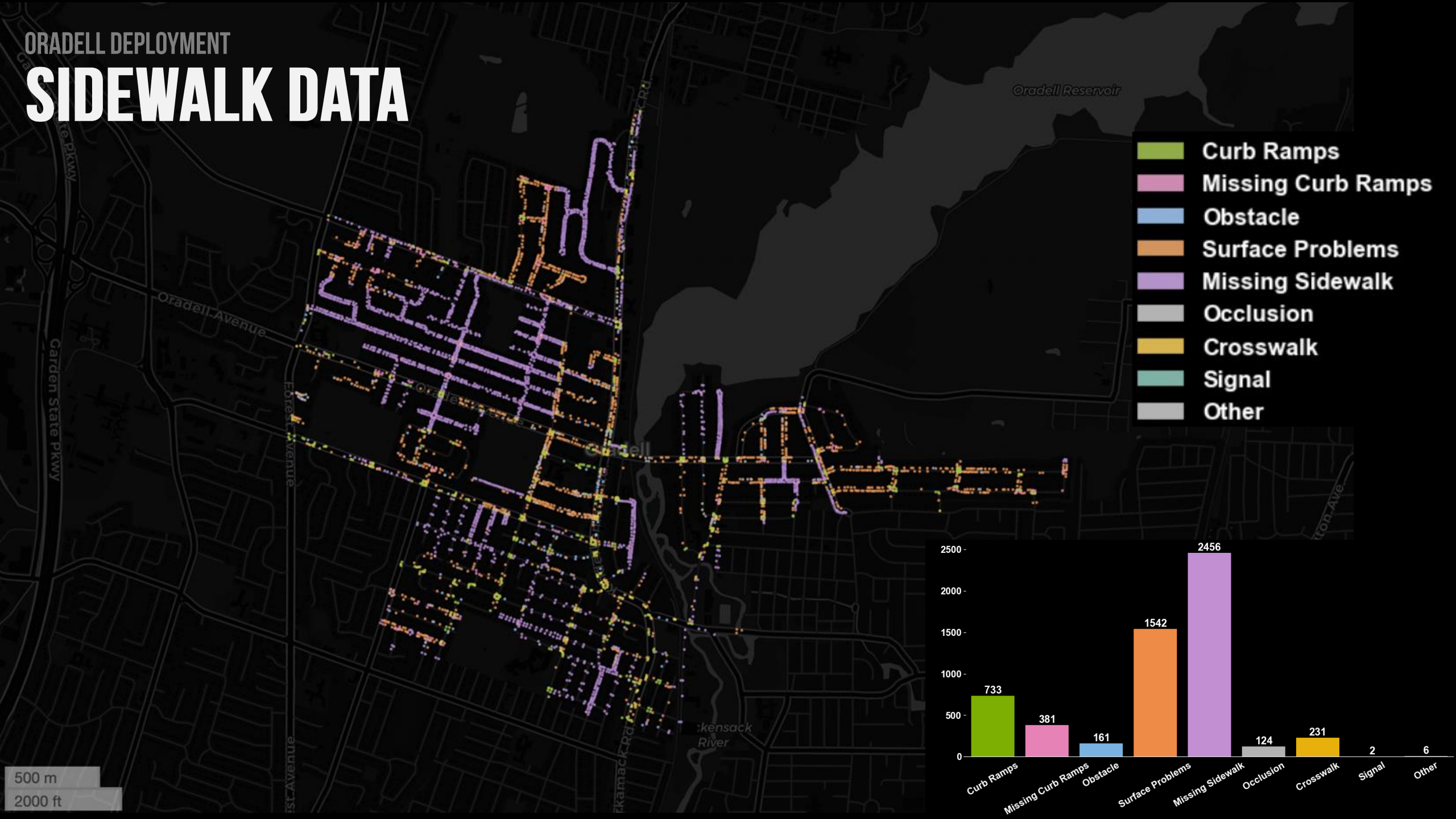
Looking to help? Verifications are still needed for the collected data. Click the link below to learn more.

SIDEWALK-NEWBERG.CS.WASHINGTON.EDU
sidewalk-newberg.cs.washington.edu

ORADELL, NEW JERSEY
Oradell Girl Scouts
Hackensack Meridian School of Medicine
Bergen Multiple Sclerosis Community Council

ORADELL DEPLOYMENT

SIDEWALK DATA



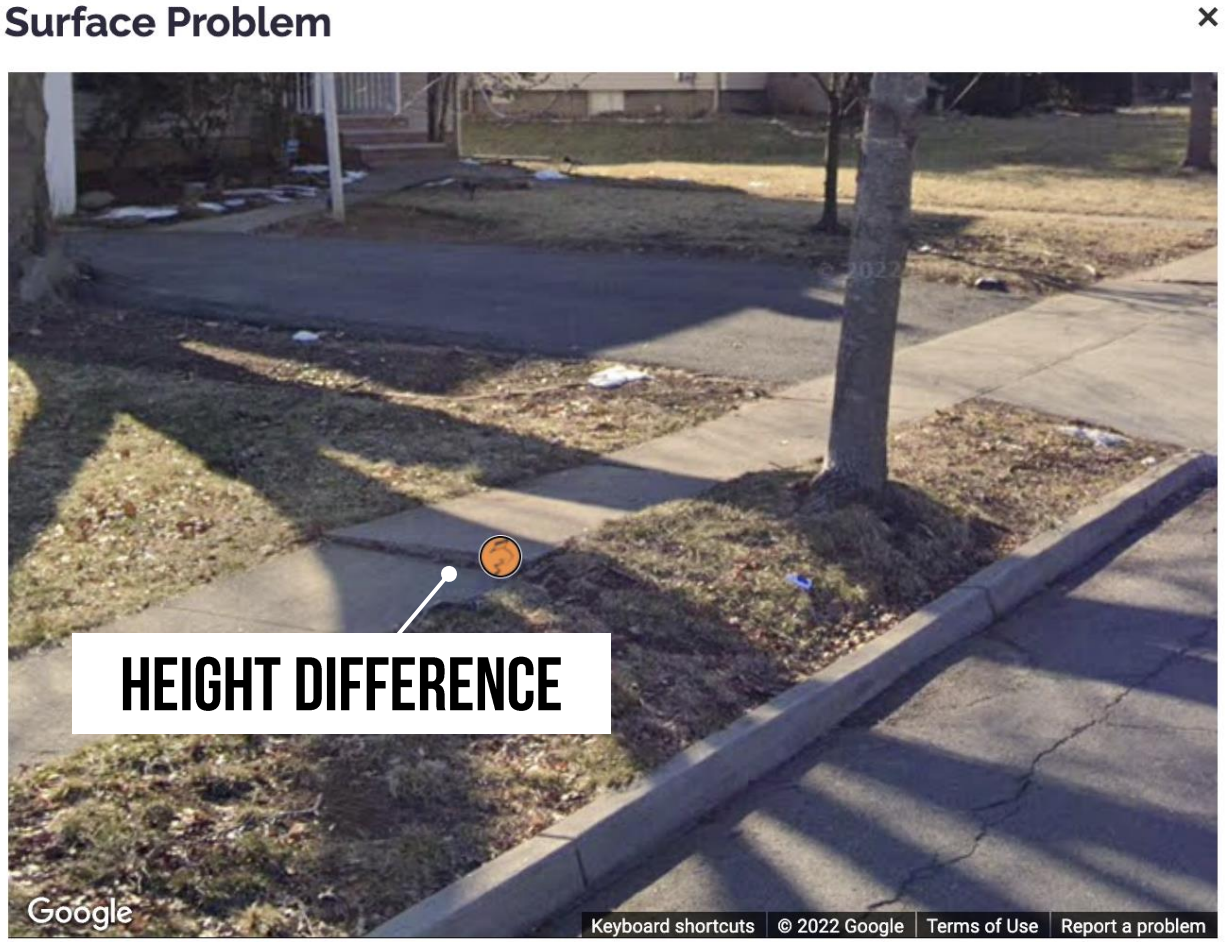
Surface Problems
1,542 labels

Missing Sidewalks
2,456 labels

ORADELL DEPLOYMENT

TAG ANALYSIS

Surface Problem Tags	Count	% of Surface Tags	Avg Severity (SD)
height difference	**1455**	**29.0%**	**1.96 (0.99)**
cracks	**1256**	**25.0%**	**1.71 (0.79)**
uneven/slanted	**1031**	**21.0%**	**2.34 (1.02)**
grass	547	11.0%	1.46 (0.63)
very broken	235	5.0%	2.44 (1.04)
bumpy	177	4.0%	2.25 (0.92)
n/a	90	2.0%	2.00 (1.02)
narrow sidewalk	88	2.0%	2.59 (0.93)
brick/cobblestone	74	1.0%	1.95 (0.72)
sand/gravel	47	1.0%	2.26 (0.94)
construction	2	0.0%	4.00 (n/a)
street has no sidewalks	1	0.0%	3.00 (n/a)



ORADELL DEPLOYMENT

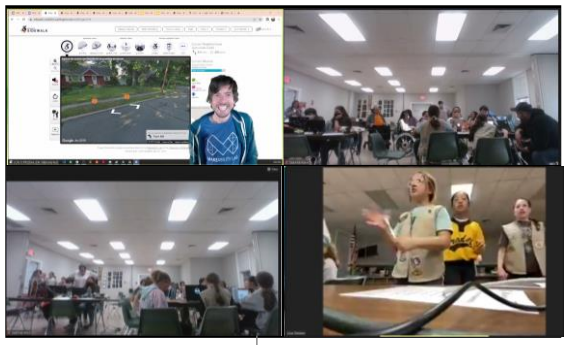
HIGH SEVERITY (≥ 4) SURFACE PROBLEMS

Initial Presentation to Oradell City Council

Mar 2022

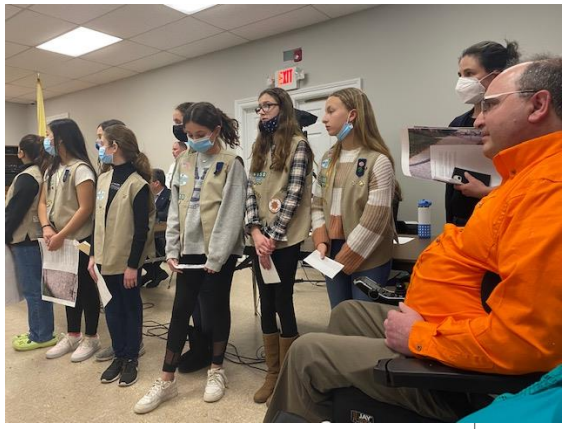
Second Mapathon (Hybrid)

Aug 2022



Presentation to City Council

Feb 2023



First Mapathon (Hybrid)

Apr 2022

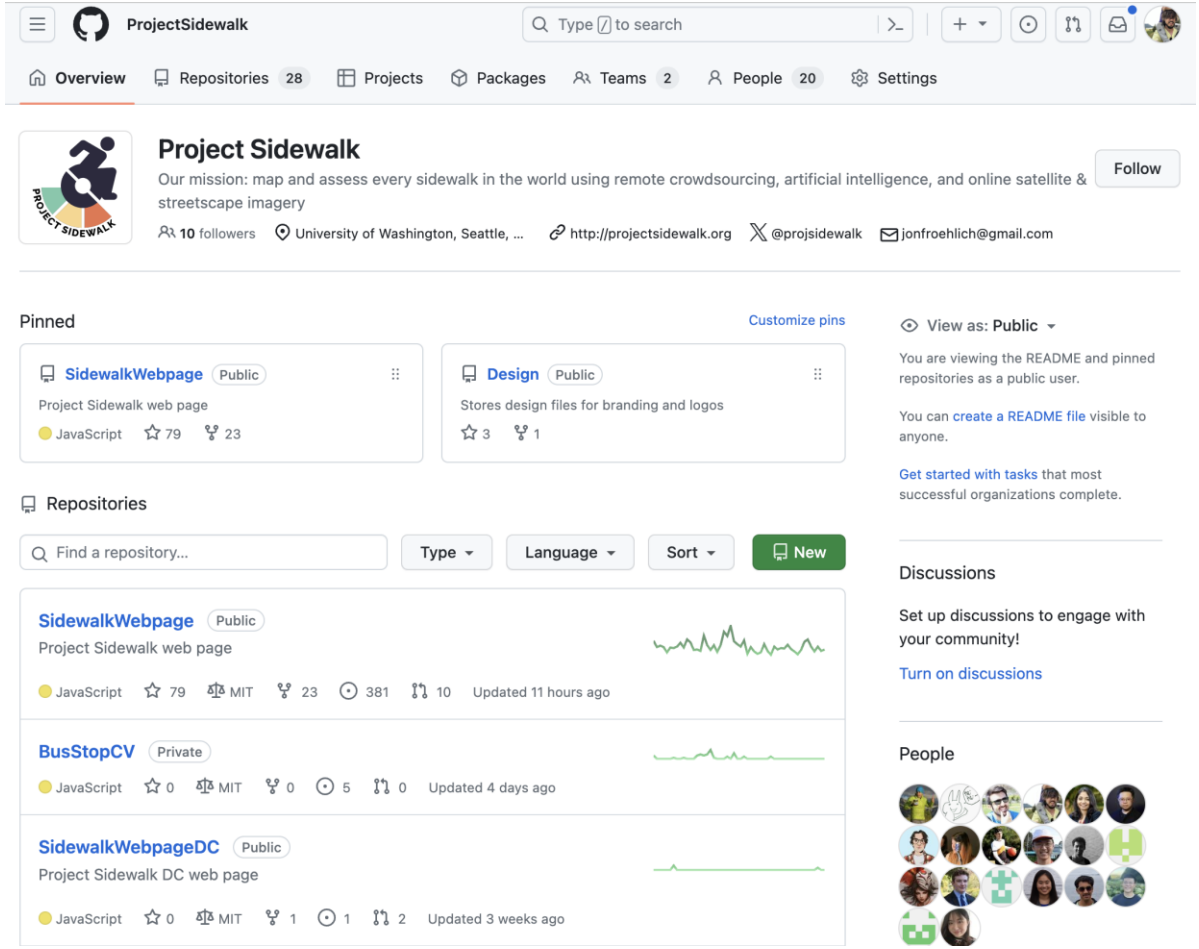
Girl Scout Data Analysis

Oct 2022

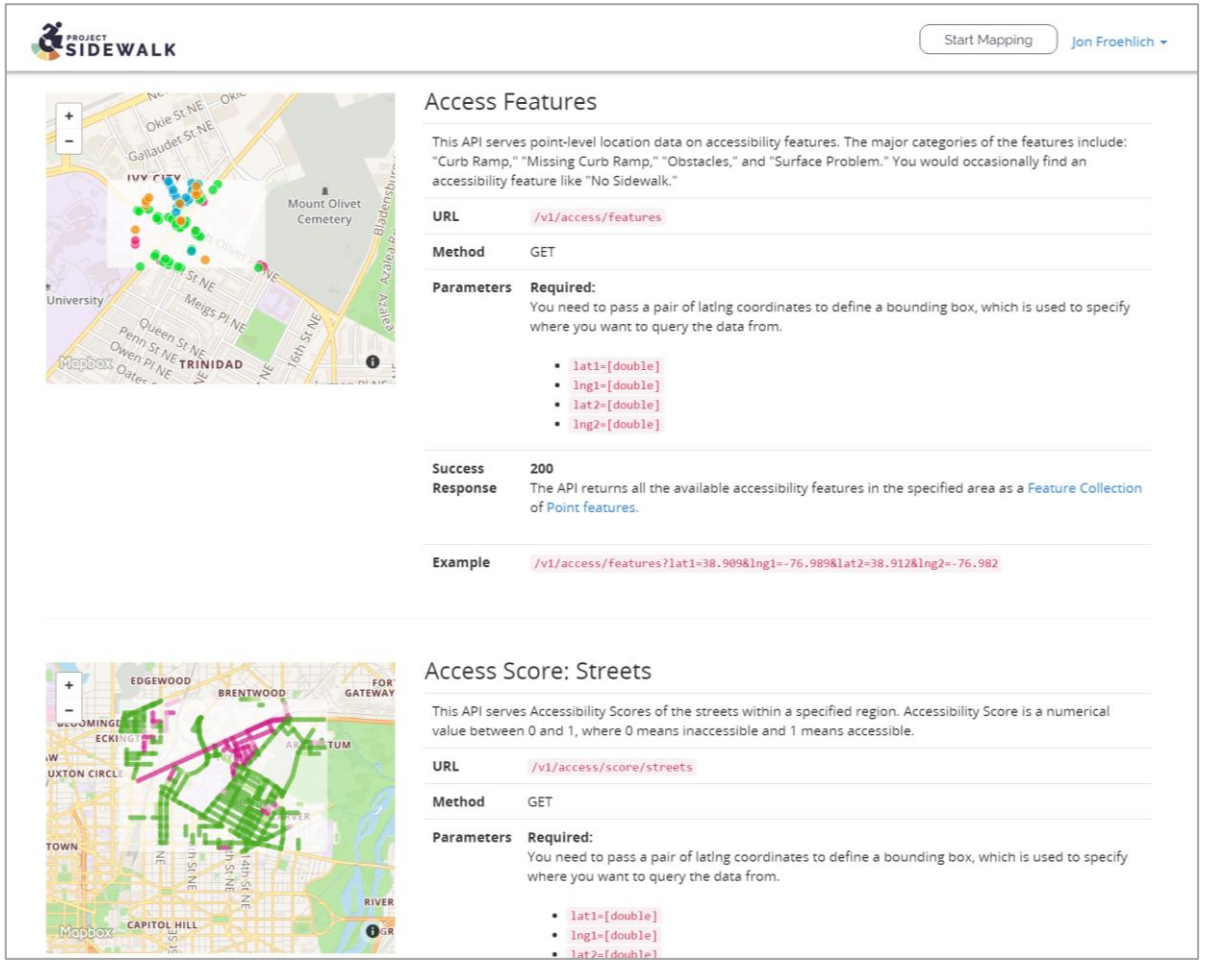
Open source + open data **broadens impact**

PROJECT SIDEWALK

ALL OUR CODE + DATA IS 100% OPEN SOURCE



https://github.com/ProjectSidewalk

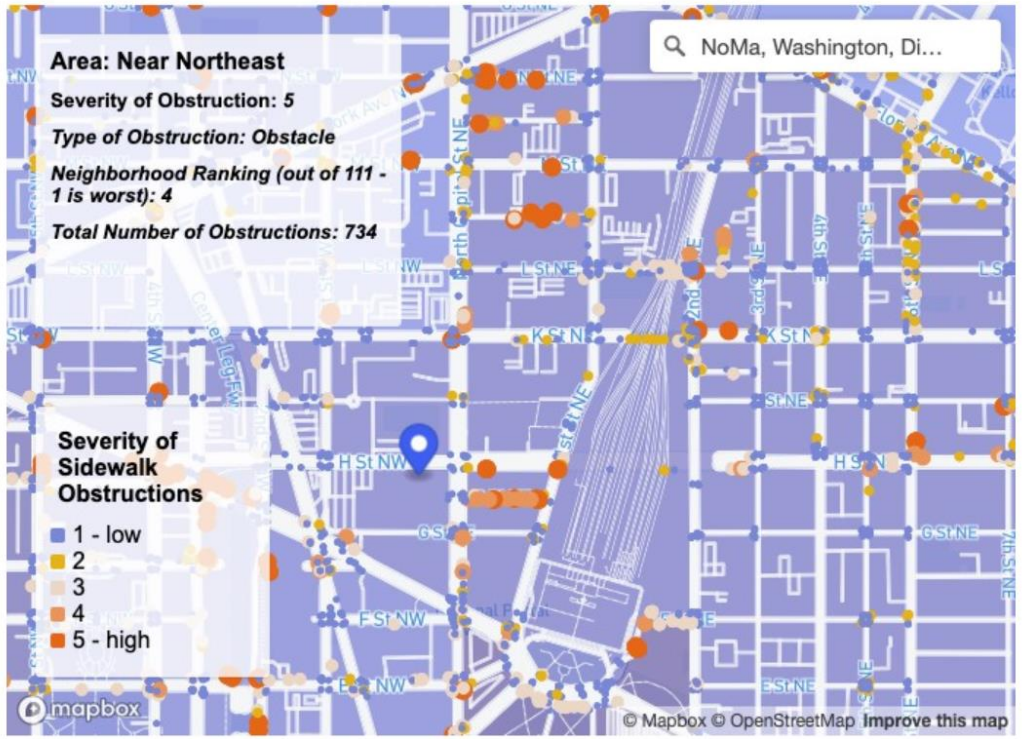


http://projectsidewalk.io/api

A city is only as accessible as its sidewalks. This map shows DC's are often blocked.

WALKING By Barbara Moreno (Guest Contributor) September 10, 2019 32

SHARE



A snapshot of sidewalk obstructions on NoMa's streets. by the author.

When Washingtonians like myself look for new apartments, we pay close attention to the walk score of a neighborhood. Any score upwards of 90 on a hundred point scale marks an area as a "walker's paradise," meaning major needs such as grocery stores and transit are within walking distance. However, what is *not* factored into the walkability score is the actual condition of the sidewalks.

ALSO OF INTEREST

WALKING
A pedestrian-only block in Alexandria may become a reality this spring 8

TRANSIT ANALYSIS
The good, the bad and the unexplained: what you need to know about the WMATA budget 27

DEVELOPMENT
Innovation Center Metro won't get a corporate name (for now), but a lot is already happening there. 17

TRANSIT
Baltimore's transit system is not meeting residents' needs. Can this plan change that? 17

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AI For Good Lab

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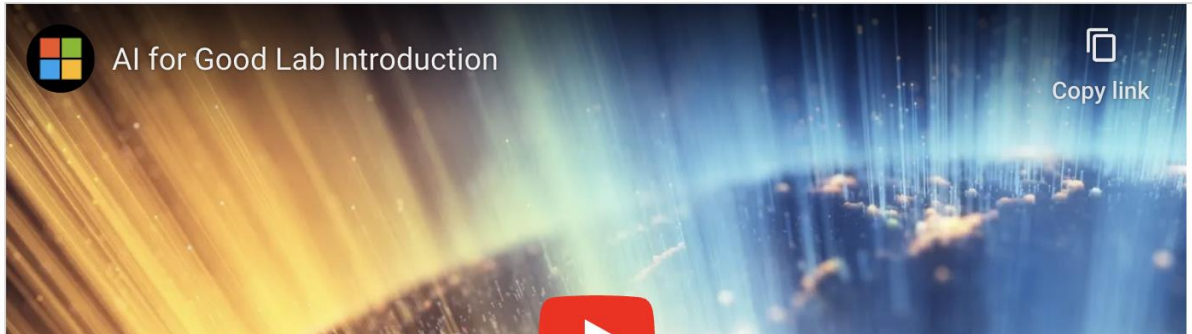
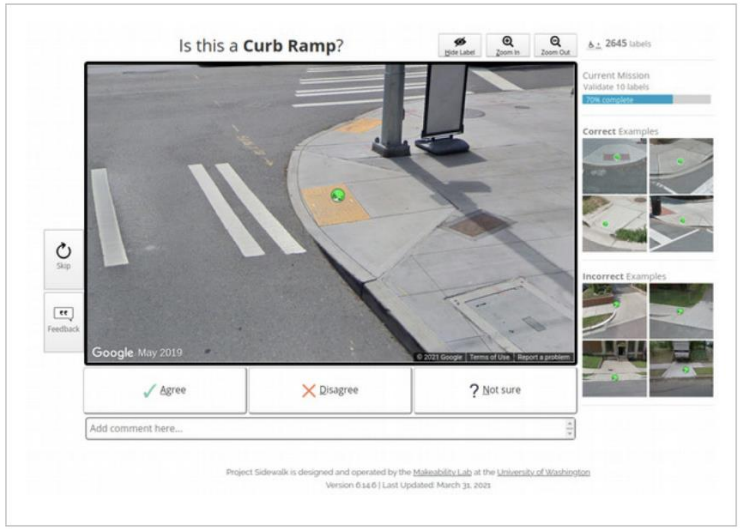


At the Microsoft AI for Good Lab, we're dedicated to leveraging digital technology responsibly. Our commitment is focused on creating an equitable, sustainable, resilient, and secure future. The Lab, a research hub using big data

Find more projects



Off-site Project

scistarter affiliate

You have joined this project!

Visit Your Dashboard

Visit

Message Project

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Recommended for jonfroehlich

Project Sidewalk

Published Active

120

Add to my lists

PRESENTED BY: The Makeability Lab at the University of Washington

GOAL: Collect an open dataset on sidewalk accessibility in cities

TASK: Find accessibility problems virtually using Google Street View

WHERE: Online

DESCRIPTION: Despite comprehensive civil rights legislation for Americans with disabilities, many city streets, sidewalks, and businesses remain inaccessible. Project Sidewalk, and our network of volunteers, plan to change that. Project Sidewalk is a web-based tool that allows anyone with a web browser and internet connection to contribute sidewalk accessibility information virtually using Google Street View. The data we collect is open and publicly available through our APIs. The data can be u... See more

HOW TO GET STARTED: Good news! This is a SciStarter Affiliate project. You can earn credit in your SciStarter Dashboard for your participation.

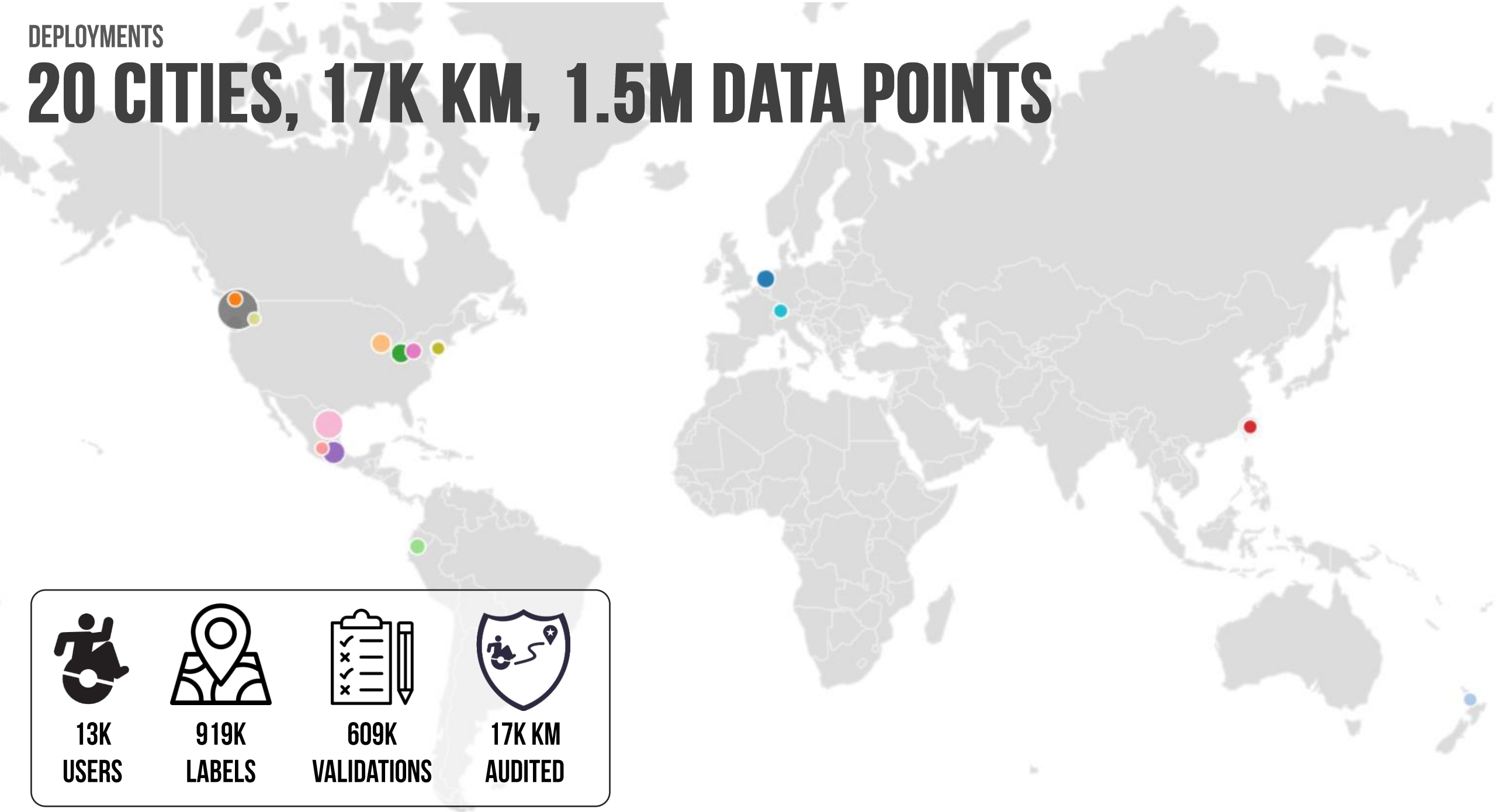
Click the **"Visit"** button on this page. You will be directed to the project's website or app and invited to create a project account there. **Use the same email address (case sensitive!) you used to create your SciStarter account to join this project.**

Important to note:
1. On the mobile site, simply sign up or sign in and start validating accessibility issues labeled by other users.
2. On the desktop site, sign in/up and complete the tutorial, then you can either click Validate in the navbar to validate other users' labels, or you can click Explore to view Google Street View images and

Where does **AI** come in?

DEPLOYMENTS

20 CITIES, 17K KM, 1.5M DATA POINTS



13K
USERS

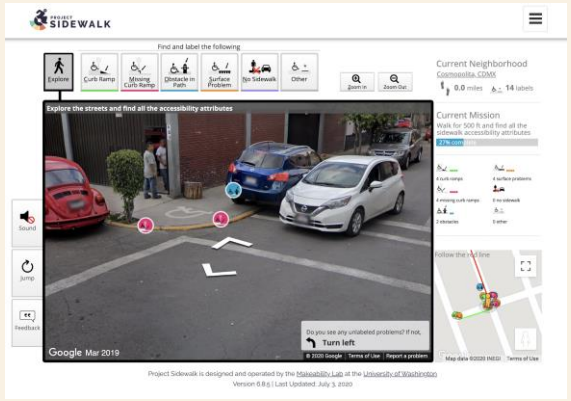
919K
LABELS

609K
VALIDATIONS

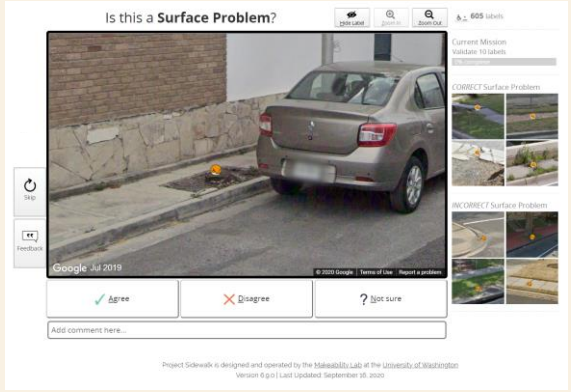
17K KM
AUDITED

ONLINE MAP IMAGERY

REMOTE CROWDSOURCING INTERFACES



Labeling missions



Validation missions

HUMAN LABELS

MACHINE LEARNING

PROJECT SIDEWALK
HTTP://PROJECTSIDEWALK.IO

HOW CAN WE USE AI TO IMPROVE DATA QUALITY & INCREASE ASSESSMENT SPEED?

ONLINE MAP

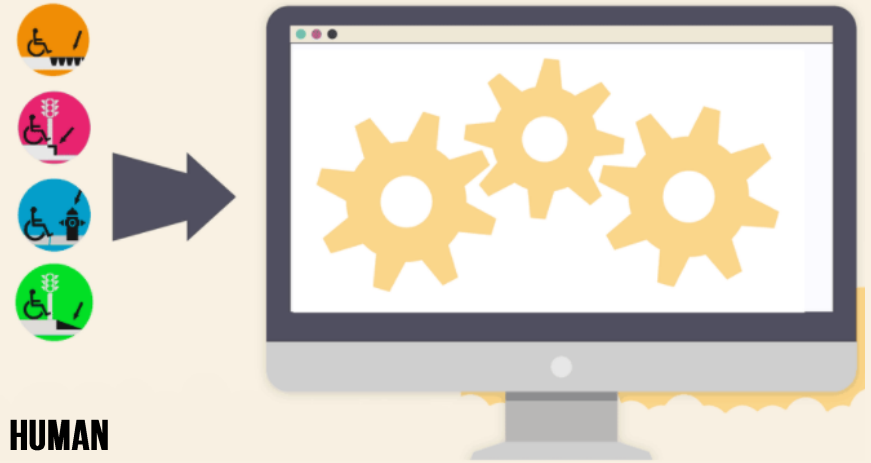
REMOTE

Labeling missions

+

Validation missions

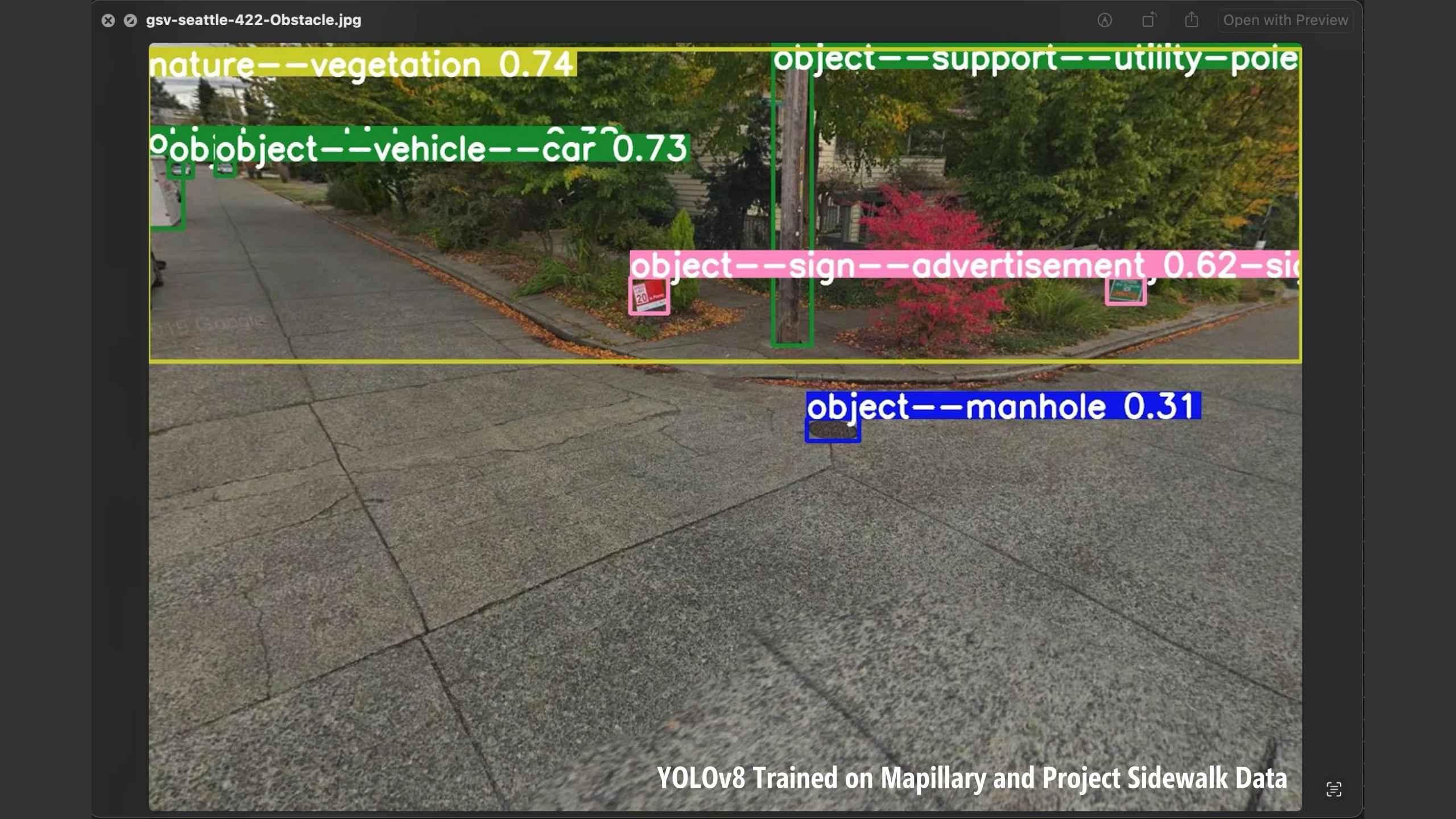
MACHINE LEARNING



HUMAN LABELS

PROJECT SIDEWALK

HTTP://PROJECTSIDEWALK.IO


gsv-seattle-422-Obstacle.jpg
Open with Preview
nature--vegetation 0.74
object--support--utility-pole
object--vehicle--car 0.73
object--sign--advertisement 0.62
object--manhole 0.31
YOLOv8 Trained on Mapillary and Project Sidewalk Data

Project Sidewalk - Validate

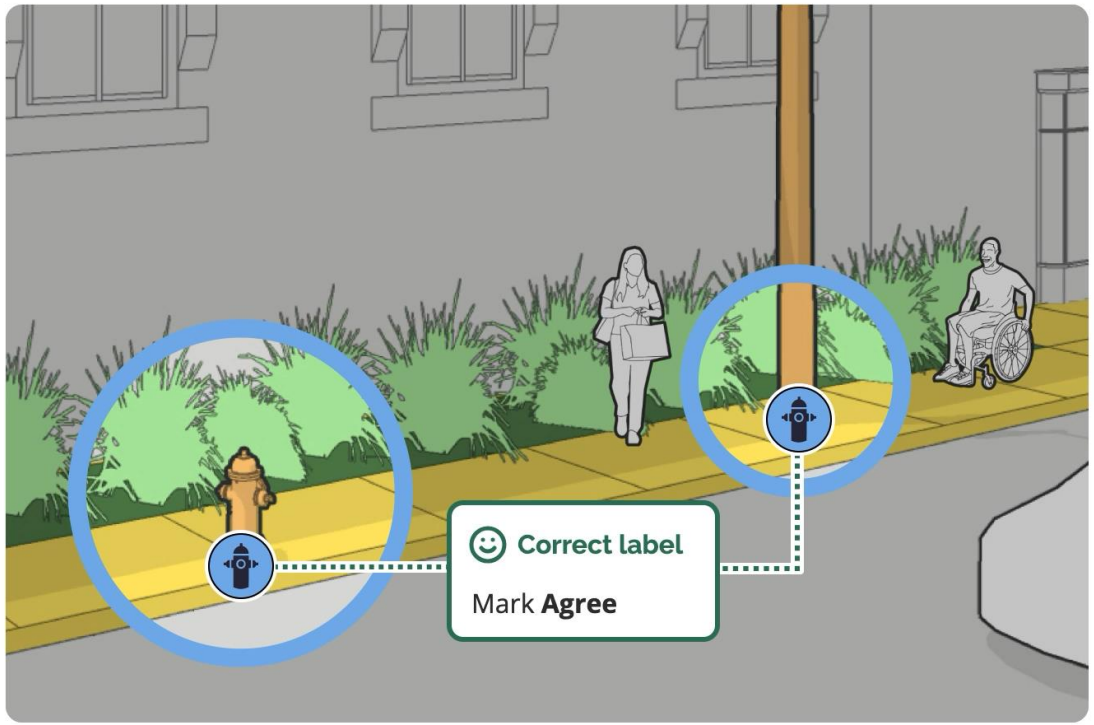
localhost:9000/validate

PROJECT SIDEWALK

Explore | How to Label | API | Tools | Seattle | Sign in | US English

YOUR MISSION

Validate 65 Obstacle in Path Labels



CORRECT EXAMPLE

Obstacle in Path

Obstacles are barriers that impede **pedestrian pathways** for people using wheelchairs, walkers, or other mobility aids.

Not all fire hydrants, poles, and signs are obstacles—only those that clearly obstruct pedestrian paths.

Start mission

BusStopCV: A real-time AI assistant for labeling bus stop accessibility features in streetscape imagery

Minchu Kulkarni[1,2], Chu Li[1], Jaye Ahn[1,2], Katrina Ma[3], Zhihan Zhang[1], Michael Saugstad[1], Yochai Eisenberg[4], Valerie Novak[5], Brent Chamberlain[5], Jon E. Froehlich[1]

[1]Allen School of Computer Science, University of Washington, [2]MHCI+D Program, [3]Human Centered Design & Engineering, University of Washington, [4]Disability and Human Development, University of Illinois Chicago, [5]Landscape Architecture & Environmental Planning, Utah State University

MAKEABILITY LAB

PAUL G. ALLEN SCHOOL OF COMPUTER SCIENCE & ENGINEERING

UIC UNIVERSITY OF ILLINOIS CHICAGO
Institute on Disability and Human Development

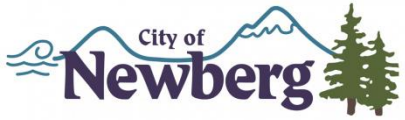
UtahState University

Five **lessons learned**

1. **Partnerships** are everything

Oradell Girl Scouts

Hackensack Meridian School of Medicine



UW Disability & D/deaf Cultural Center

National Multiple Sclerosis Society
Bergen Multiple Sclerosis Community Council

Teaneck High School

People Nudge

Denny International Middle School

> Being able to **virtually walk through a city**, easily collect data, and then to analyze that data (create heatmaps, etc.) is a **huge win** and helps better inform our planning. We just don't have a way of collecting and looking at data at a holistic level. Staffing and resources is also a **huge constraint** for us.
>
> – City Planner

2. Know your **value** and **limitations**

Considerations when Preparing for and Deploying to New Cities

Edit New page

Jon Froehlich edited this page now · 21 revisions

Project Sidewalk is an open source project run by Professor Jon E. Froehlich, research scientist Michael "Mikey" Saugstad, and PhD and undergraduate students at the University of Washington.

From the beginning, our overarching vision has been to develop tools & techniques that semi-automatically map and assess all of the sidewalks in the world—using an intermixing of computer vision, machine learning, and crowdsourcing. As part of this vision, we are looking for new deployment cities outside of the US.

Based on our experiences deploying into cities in the US, the Netherlands, Mexico, Zurich, and beyond, here are our primary considerations:

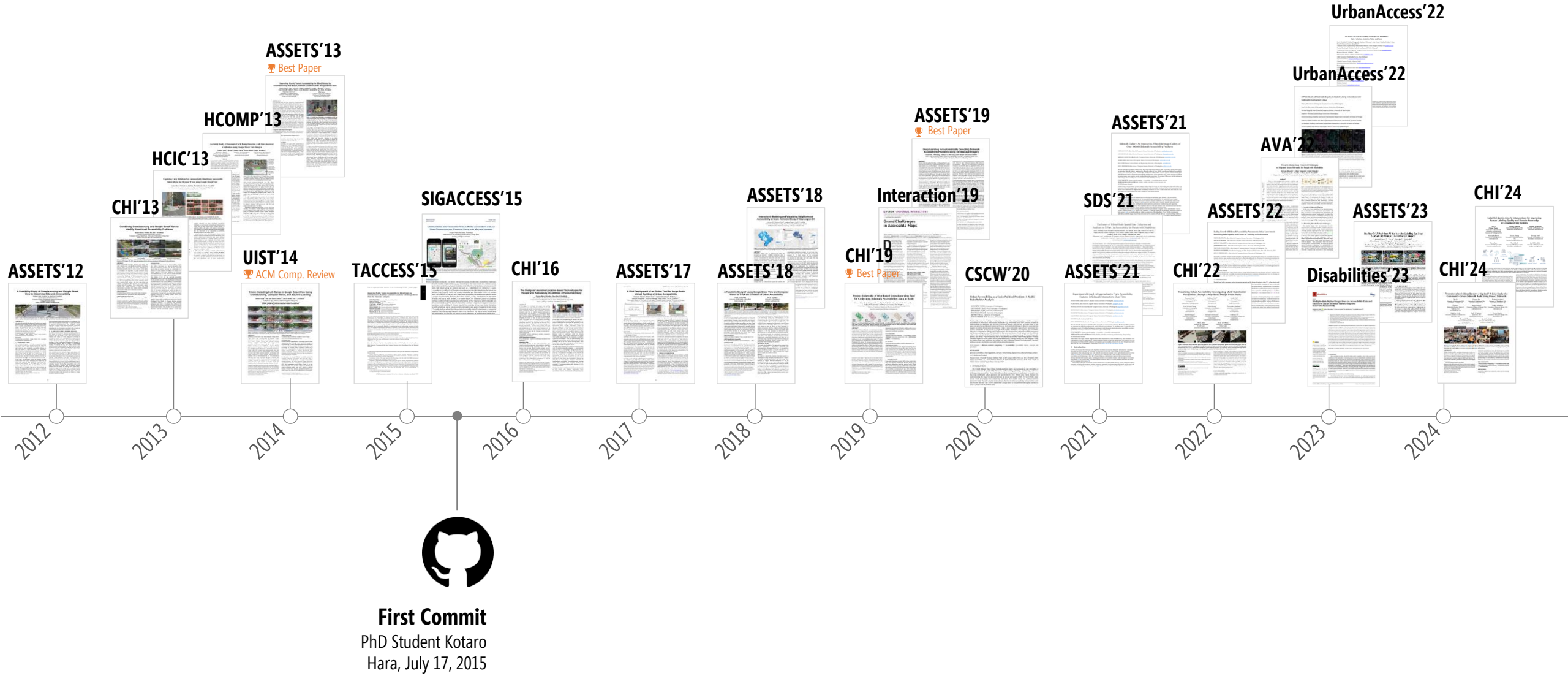
- **Strong, active partners.** Most importantly, the presence of strong local advocates such as citizens, non-profit organizations, or government officials who can help us recruit and sustain communities of volunteers to help (*e.g.*, to help run mapathons, to engage local schools and youth organizations, etc.). We want to *partner* with you to make this work. Ideally, we would also work with people with mobility disabilities in our deployment cities to help inform how to deploy and improve our tools and help impact change. As some examples:
    - In Newberg, Oregon we worked directly with local community accessibility advocates and the city government
    - In San Pedro Mexico, we worked with a Mexico-based NGO called Liga Peatonal and the local government
    - In Amsterdam, we worked with the local government and the organization World Enabled

Pages 19

Find a page...

Home
Adding a new language
Adding new road geometries to a d...
API Documentation
Community Service Hours
Considerations when Preparing for...
Creating a new database schema (...
Creating database for a new city
Deploying code to the server
Descriptions of Logged Events
Developer notes
Developing with IntelliJ IDEA
Docker Troubleshooting

3. Sustaining an open-source project is **hard**



First Commit

PhD Student Kotaro Hara, July 17, 2015

381 OPEN ISSUES

9,383 COMMITS

147 RELEASES

Edit Pins Unwatch 17 Fork 23 Starred 79

develop 45 Branches 148 Tags Go to file t Add file

misaugstad Merge pull request #3505 from ProjectSidewalk/save-crops 42bb2a6 · yesterday 9,383 Commits

.github	Improves PR template with more clarifying comments	last year
.ivy2	updates ivy2 cache for postgres driver 9.4.1212 -> 42.7.1	3 weeks ago
.sbt/boot	upgrade Scala 2.10.6->2.10.7, scala-guice 4.1.0->4.1.1	3 years ago
app	renames /developer to /api by default	4 days ago
conf	updates default crop storage location	yesterday
db	switches db dumps from tar to custom pg_dump format t...	3 weeks ago
project	upgrades play framework 2.3.8 -> 2.3.10	3 years ago
public	Merge branch 'develop' of https://github.com/ProjectSide...	yesterday
.eslintrc.json	removes extra spaces	3 years ago
.gitattributes	fixes default line endings	4 years ago
.gitignore	moves package-lock.json to the .gitignore	2 weeks ago
.gitmodules	Updated views	9 years ago
.htmlhintrc	updates some linting settings	3 years ago

Project Sidewalk web page

projectsidewalk.org

accessibility osm google-streetview sidewalk

Readme

MIT license

Activity

Custom properties

79 stars

17 wa

23 for

Report rep

Releases 147

v7.18.3 Latest

2 weeks ago

+ 146 releases

Packages

No packages published

Mikey Saugstad

Research Scientist, Computer Science
University of Washington

Github Twitter

Mikey is a current Research Scientist in the Makeability Lab. They have been in the lab for 6.9 years and contributed to 3 projects and 15 publications.

This bio was auto-generated.

Recent Mikey News

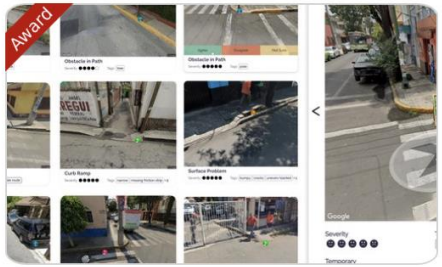
Makeability Lab Goes 6/6 at CHI2024!
Jan 19, 2024

Makeability Lab Holiday Potluck
Dec 07, 2022

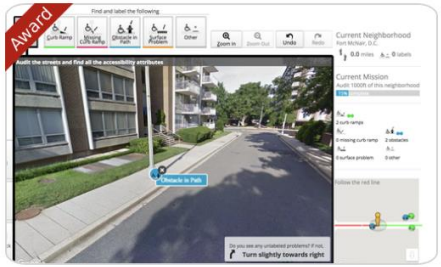
Mikey visits the lab!
Dec 06, 2022

PROJECTS

Project Sidewalk + Community Scie...
2021 – Present



Sidewalk Gallery
2019 – 2021



Project Sidewalk
2012 – Present

RECENT PAPERS

"I never realized sidewalks were a big deal": A Case Study of a...
CHI *To Appear*
Chu Li, Katrina Ma, Mikey Saugstad, Kie Fujii, Molly Delany, Yochai Eisenberg, Delphine Labbé, Judy L. Shanley, Devon Snyder,...

BusStopCV: A Real-time AI Assistant for Labeling Bus Stop...
Poster Proceedings of ASSETS 2023
Minchu Kulkarni, Chu Li, Jaye Ahn, Katrina Ma, Zhihan Zhang, Mikey Saugstad, Yochai Eisenberg, Valerie Novack, Brent...

Implementing a Community-Based Virtual Tool To...
ASCIP 2023 Annual Meeting
Kie Fujii, Katrina Ma, Chu Li, Mikey Saugstad, Lisa Stolarz, Michael Starr, Florian P. Thomas, Jon E. Froehlich

4. Build (invest in) a **research community**

LESSONS LEARNED

CROSS-DISCIPLINARY TEAM

Dr. Jon E. Froehlich
Computer Science
University of Washington

Dr. Yochai Eisenberg
Disability + Urban Planning
University of Illinois Chicago

Dr. Delphine Labbé
Disability + Health
University of Illinois Chicago

Dr. Joy Hammel
Occupational Health
University of Illinois Chicago

Dr. Judy Shanley
Director, Mobility Management
Easterseals

Search Project Sidewalk

Project Sidewalk

Home
DMs
Activity
Later
More

Add external people

Channels
amsterdam
auckland
burnaby
bus-stop-cv
chicago
core
core-design
cuenca
cv
disability-parking
general
gsv-bias
interns2024
mexico
nsf-convergence
nsf-cssi
nsf-nrt
nsf-scc
oradell-teaneck
pittsburgh
prediction-model
random

random
Non-work banter and water cooler conversation

208
Canvas

208 MEMBERS

Wednesday, February 14th

Jon Froehlich 6:58 PM
https://www.linkedin.com/posts/anna-zivarts_just-like-a-new-road-is-fun-...7?utm_source=share&utm_medium=member_ios

linkedin.com
Anna Zivarts on LinkedIn: "Just like a new road is fun to drive on in a car, a new sidewalk can also...
"Just like a new road is fun to drive on in a car, a new sidewalk can also encourage everybody to walk around and get out more." Dylan, Seattle (56 kB)

https://www.linkedin.com/posts/anna-zivarts_advocates-report-sets-a-3-billion-price-activity-7163580823181451264-w2rQ?utm_source=share&utm_medium=member_ios

linkedin.com
Anna Zivarts on LinkedIn: Advocates' report sets a $3 billion price tag to the City's Seattle...
"The City of Seattle repaired 222 blocks of sidewalks in the last 8 years, less than

Message #random

The 1st ASSETS'22 workshop on

THE FUTURE OF URBAN ACCESSIBILITY

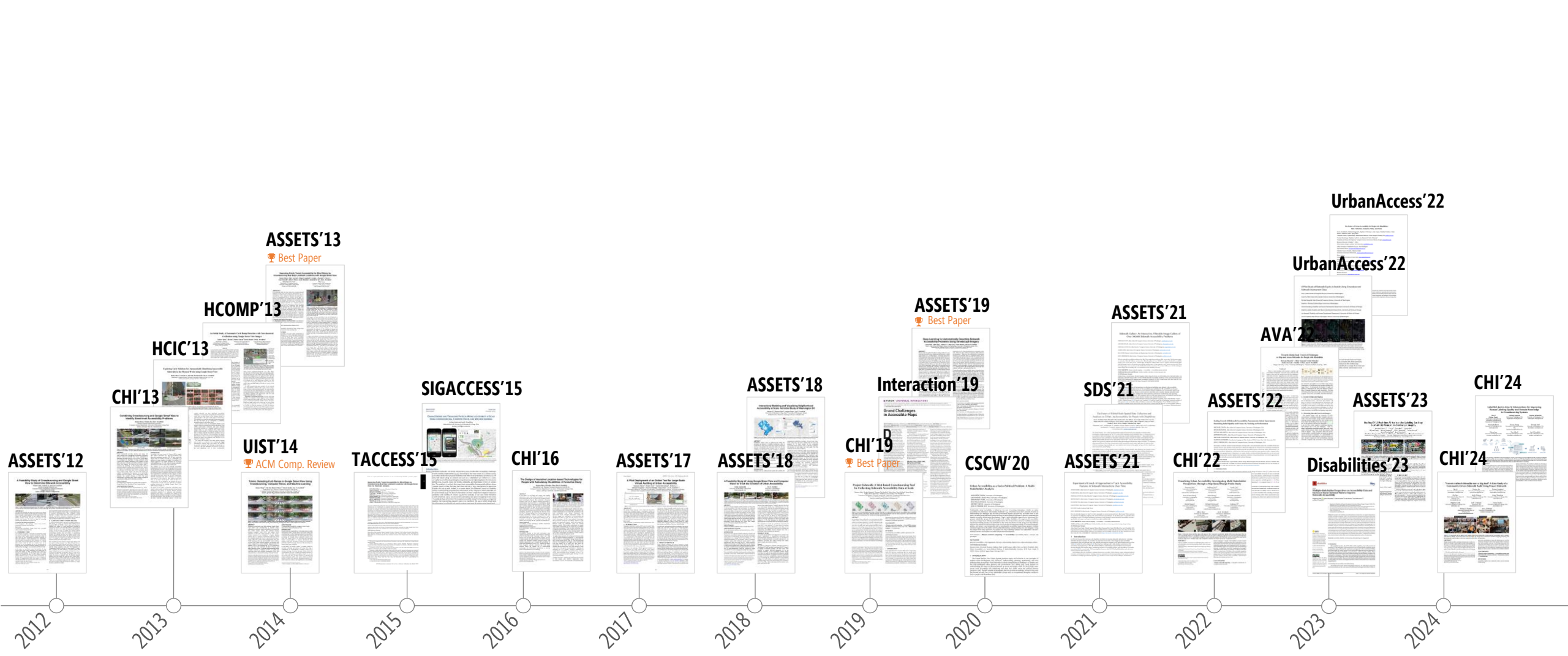
PARTICIPATE!

5. **Applied research** is worth it

DEPLOYMENTS

4 CONTINENTS, 7 COUNTRIES, 20 CITIES, 17K KM

13K	919K	609K	17K KM
USERS	LABELS	VALIDATIONS	AUDITED


ASSETS'12
CHI'13
HCIC'13
HCOMP'13
ASSETS'13
Best Paper
UIST'14
ACM Comp. Review
TACCESS'15
SIGACCESS'15
CHI'16
ASSETS'17
ASSETS'18
ASSETS'18
CHI'19
Best Paper
Interaction'19
ASSETS'19
Best Paper
CSCW'20
ASSETS'21
SDS'21
ASSETS'21
ASSETS'22
CHI'22
AVA'22
UrbanAccess'22
UrbanAccess'22
Disabilities'23
ASSETS'23
CHI'24
CHI'24
2012
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2023
2024

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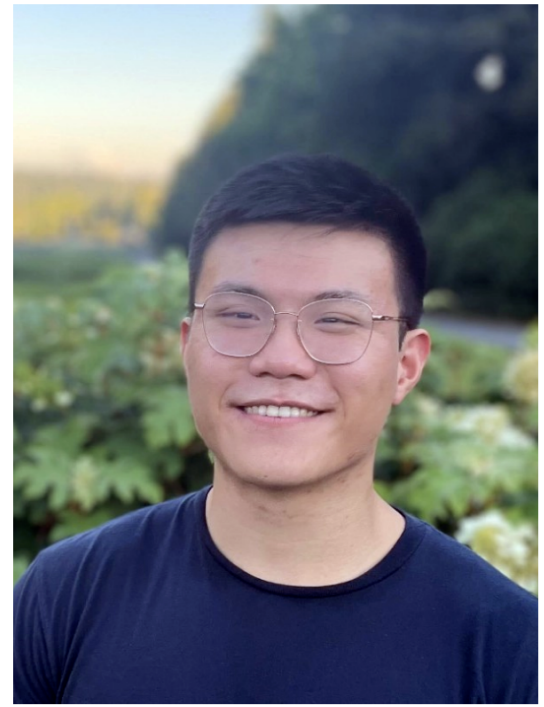
Allen School's Michael Duan and Anas Awadalla recognized by CRA Outstanding Undergraduate Researcher Awards program

The Computing Research Association recently honored Allen School undergraduates Michael Duan and Anas Awadalla as part of its Outstanding Undergraduate Researcher Awards program for 2023. The annual program highlights exceptional undergraduate students from across North America for their contributions to the computing field.



Michael Duan

Duan, who works with professor and advisor Jon Froehlich in the Makeability Lab, was selected as a finalist for his work on Scaling Crowd+AI Sidewalk Accessibility Assessments and Sidewalk Gallery: An Interactive, Filterable Image Gallery of Over 500,000 Sidewalk Accessibility Problems. The senior computer science major is the first undergraduate student in the lab's history to receive such an honor.

"It's really cool that I got a chance to be considered among other innovative and hardworking undergraduates," Duan said. "Their work is extremely inspiring to me, so I'm glad I got an opportunity to share my work alongside them."

Duan was first author on both projects. The first focused on automated sidewalk accessibility assessment with crowdsourced data. Together, Duan and his co-authors investigated using computer vision methods to determine and label the presence of accessibility features such as curb ramps in urban scenery — findings, he said, that can assist urban planners, disability advocates and city governments in designing smarter, more inclusive infrastructure.

The second project explored data visualization related to disability advocacy and urban planning. With the sheer amount of ever-increasing datasets, better ways of visualizing that data are needed. To tackle this problem, Duan and his collaborators introduced Sidewalk Gallery, an interactive, filterable gallery of more than 500,000 crowdsourced sidewalk accessibility images across seven cities in two countries. The innovative interface allows users to browse and cull these images for different accessibility problem types, severity levels and more, providing a visualization aid and a teaching tool for

THANK YOU!

ACKNOWLEDGEMENTS

FUNDING SOURCES

NSF #1302338, #2125087

Google

CREATE

Center for Research and Education on Accessible Technology and Experiences

UNIVERSITY of WASHINGTON

Alfred P. Sloan FOUNDATION

IBM

Join us. Together, let's transform the world's sidewalks.

PROJECT SIDEWALK

projectsidewalk.org