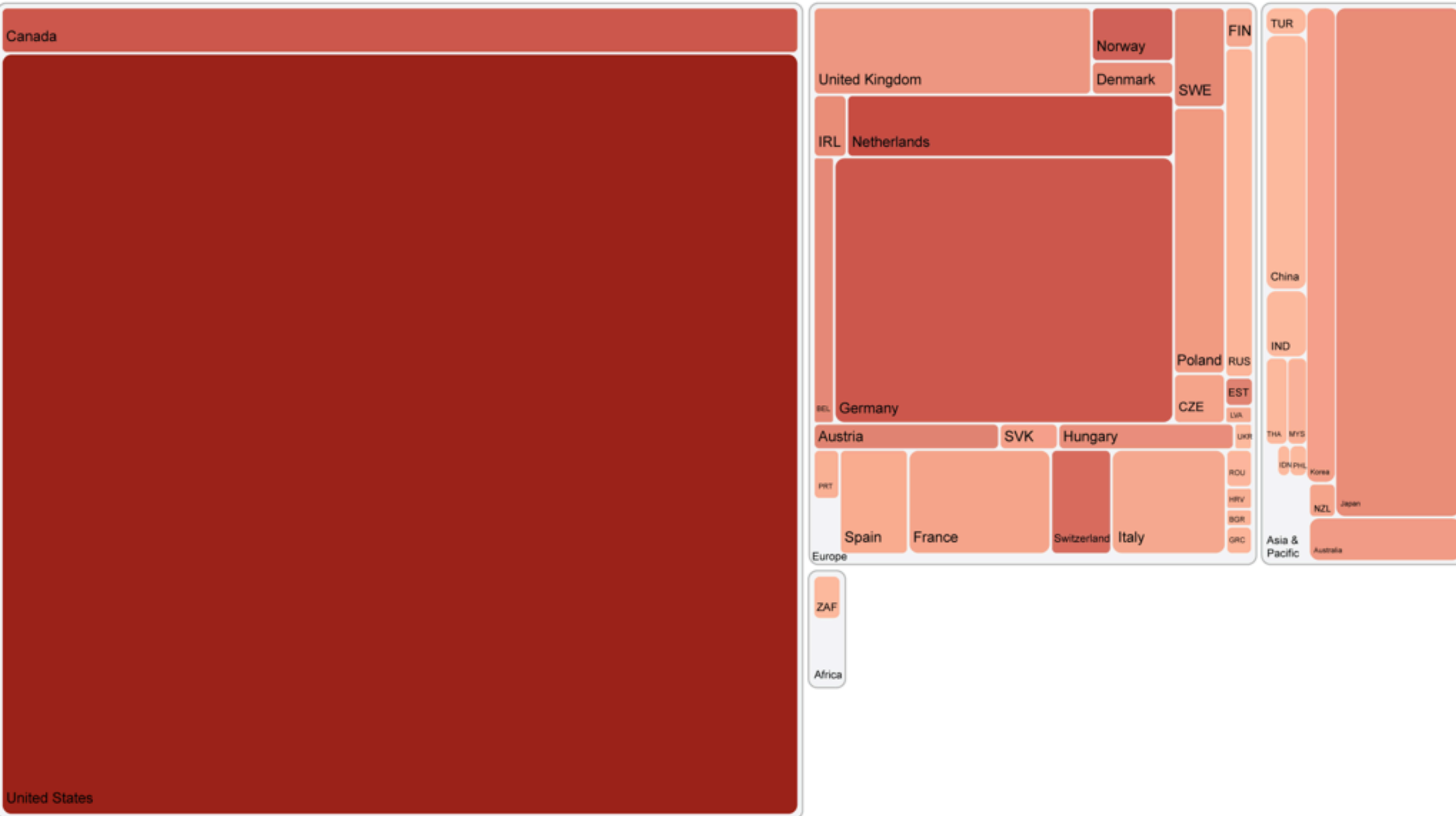


Representation Technologies

Tapan S. Parikh, UC Berkeley



Number of links to
georeferenced
content
(in millions)*



User-generated Content in Google

Visualization and analysis by Dr Mark Graham, Scott A. Hale and Monica Stephens in collaboration with Dr Corinne M. Flick and the Convoco Foundation. Data provided by Matthew Zook.

This map and other visualizations can be found on the OII visualization website at <http://www.oii.ox.ac.uk/vis/>

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Representation Technologies

- Technology for representing and communicating knowledge
- All sources of knowledge not equally represented
- We must design for diversity in users, and in forms of knowledge

Outline

- Awaaz.De: Re-thinking UIs for content authoring by underrepresented groups
- Local Ground: Re-thinking data processes to support learning and access
- Can new forms and processes of knowledge representation lead to more equitable political representation?

Awaaz.De

Give Voice



Photo: <http://assets.knowledge.allianz.com/>

Orality and Literacy

- Oral communities have distinct ways of representing knowledge
- Aggregative - tolerant of repetition, redundancy and inconsistency
- Situational - tied to specific situations and people; not abstract concepts
- Dialectic - reinforced by dialogue



dsc
Development
Support
Centre





You have reached Avaaj Otalo:

Press 1 to ask a question

Press 2 to browse questions

Press 3 to hear announcements

“I want to grow cotton.
Which weather
environment is best?”

“I am <> speaking from <>.
What is the best seed for
summer *bajri*,
and where can I buy it? ”



Forums

🏠

Question and Answer

✉

Inbox

+

Approved

✖

Rejected

📄

Responses

📄

Upload

Forums

+

🏠

General Info_sks

+

🏠

Buying-Selling_sks

Other Features

📶

Broadcasts

Date	User	Message	1 - 6 of 6	
2011-04-07 16:44:23	1003	◀ ▶	+	✖
2011-04-07 15:54:23	1003		+	✖
2011-03-10 04:13:30	1003		+	✖
2011-03-10 03:57:12	1003		+	✖
2011-01-01 03:41:44	1002		+	✖
2010-12-01 08:50:12	9723887815		+	✖

Message List

Caller Details

Number

Name

District

Taluka

Village

Thread

[1003 - 2011-04-07 16:40:39](#)

[Neil Patel \(1002\) - 2011-04-07 16:42:37](#)

[1003 - 2011-04-07 16:44:23](#)

[Neil Patel \(1002\) - 2011-04-07 16:46:05](#)

Upload Response

Crop

Topic

Assigned Responders:

Neil Patel

Paresh Dave

Parina Samuel

U.A. Parasara

Manhar Patel

Download

Save

Message Details

CALL

Caller Details	Thread	Crop <input type="text" value="Cotton"/>
Number <input type="text" value="9586481308"/>	Vivek Garg (9586481308) - 2010-08-08 12:59:51	Topic <input type="text" value="Diseases"/>
Name <input type="text" value="Vivek Nayak"/>	Bharat Patel (9428826158) - 2010-08-09 20:05:42	Assigned Responders:
District <input type="text" value="Bhavnagar"/>	Natu Thakkar (2737291211) - 2010-08-12 20:15:09	<input type="text" value="Manhar Patel"/>
Taluka <input type="text" value="Vallabhipur"/>	<input type="button" value="Upload Response"/>	<input type="text" value="Bharat Rajgor"/>
Village <input type="text" value="Rajgadh"/>		<input type="text" value="Bharat Patel"/>
		<input type="text" value="Sawani"/>
		<input type="text" value="Borad"/>

CALLER

EXPERTS



Hello! Farmer “Vivek”
has asked:

<question>

Press 1 to listen

Press 2 to respond

Press 3 to forward




You have an new answer:

<answer>

Press 1 to listen

Press 2 to respond

Press 3 to save

 **Recipients**

☐ Numbers:

☒ Users by Tag:

Cotton

Wheat

Cumin


Castor


Mustard

☐ Last

300

 callers since

 **Template**

 **Schedule**

Cancel

Send



ORIGINAL CALL

Caller Details	Thread	Crop <input type="text" value="Cotton"/>	Download
Number <input type="text" value="2737291211"/>	Vivek Garg (9586481308) - 2010-08-08 12:59:51	Topic <input type="text" value="Diseases"/>	
Name <input type="text" value="Natu Thakkar"/>	Bharat Patel (9428826158) - 2010-08-09 20:05:42	Assigned Responders:	
District <input type="text" value="Rajkot"/>	Natu Thakkar (2737291211) - 2010-08-12 20:15:09	<input type="text" value="Neil Patel"/>	
Taluka <input type="text" value="Wankaner"/>		<input type="text" value="Paresh Dave"/>	
Village <input type="text" value="Bhimguda"/>	<input type="button" value="Upload Response"/>	<input type="text" value="Parina Samuel"/>	
		<input type="text" value="U.A. Parasara"/>	
		<input type="text" value="Manhar Patel"/>	<input type="button" value="Save"/>

FIRST RESPONSE

ANOTHER RESPONSE

Experiments

- Pilot Evaluation (Patel et al., CHI 2010)
- DTMF > ASR (Patel et al., CHI 2009)
- Peers > Experts (Patel et al., ICTD 2012)
- Impact Evaluation (Cole & Fernando, 2012)

7 Identical Tips by Scientists and Farmers



Retired agronomy professors

Tip 1: Vaccinations

Tip 2: Mealybug

Tip 3: Pest eggs

Tip 4: Root rot

Tip 5: Orchards

Tip 6: Soil testing

Tip 7: Animal feed



Farmers from diff districts

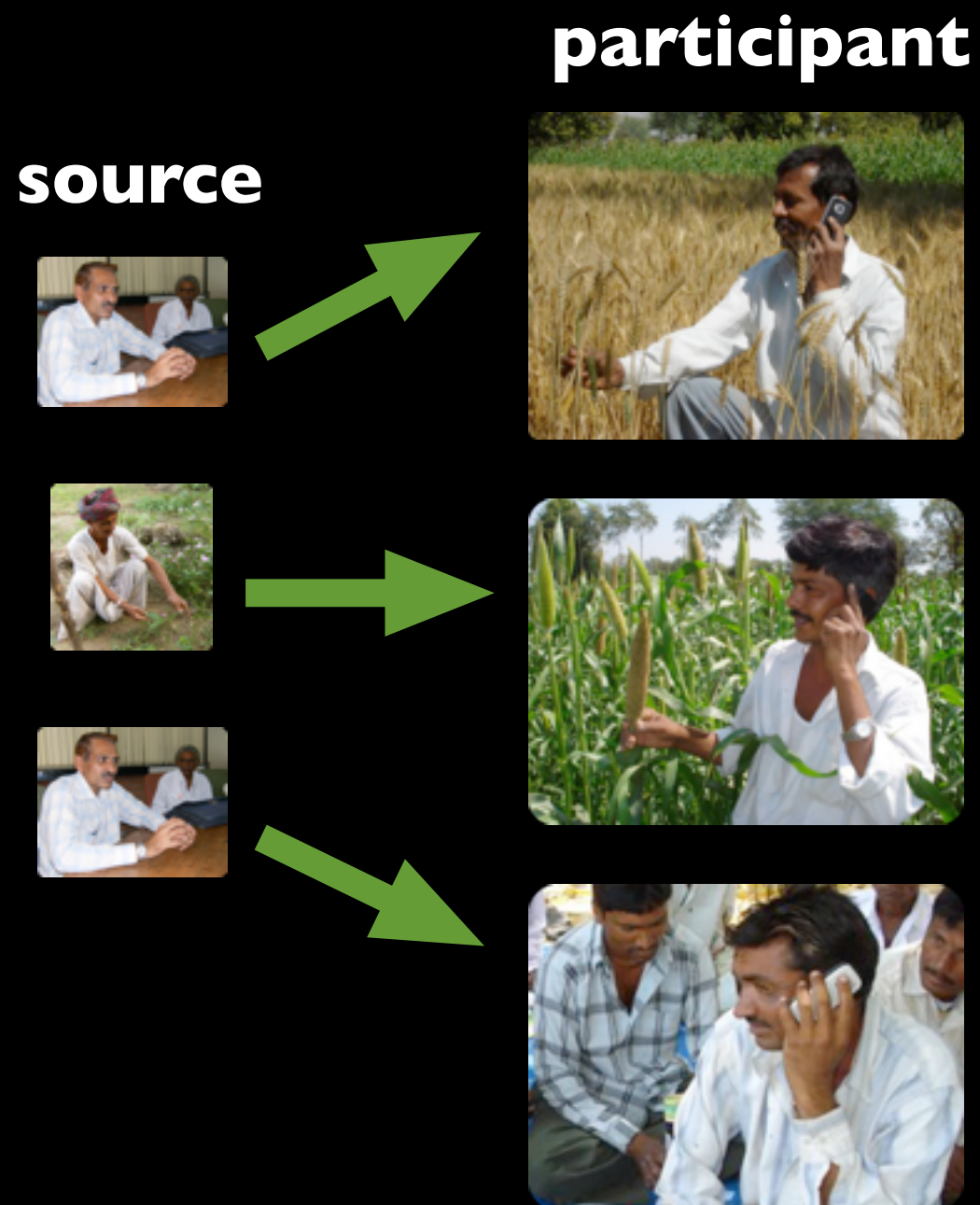
Tip #4: Root Rot

Hi, I am Dr. X, a retired professor from Y University.

All farmers would wish to have a bumper cotton crop. If we can avoid loss of production due to reduced plant stand, we can harvest more profit. The plant stand can be maintained by avoiding soil borne diseases like wilt and root rot...

To obtain more information about this topic, please call the following number XXX-XXXX.

Participants Received a Mix of Sources



Results

1883 calls

1316 completed

125 follow-ups



Follow-up Rate

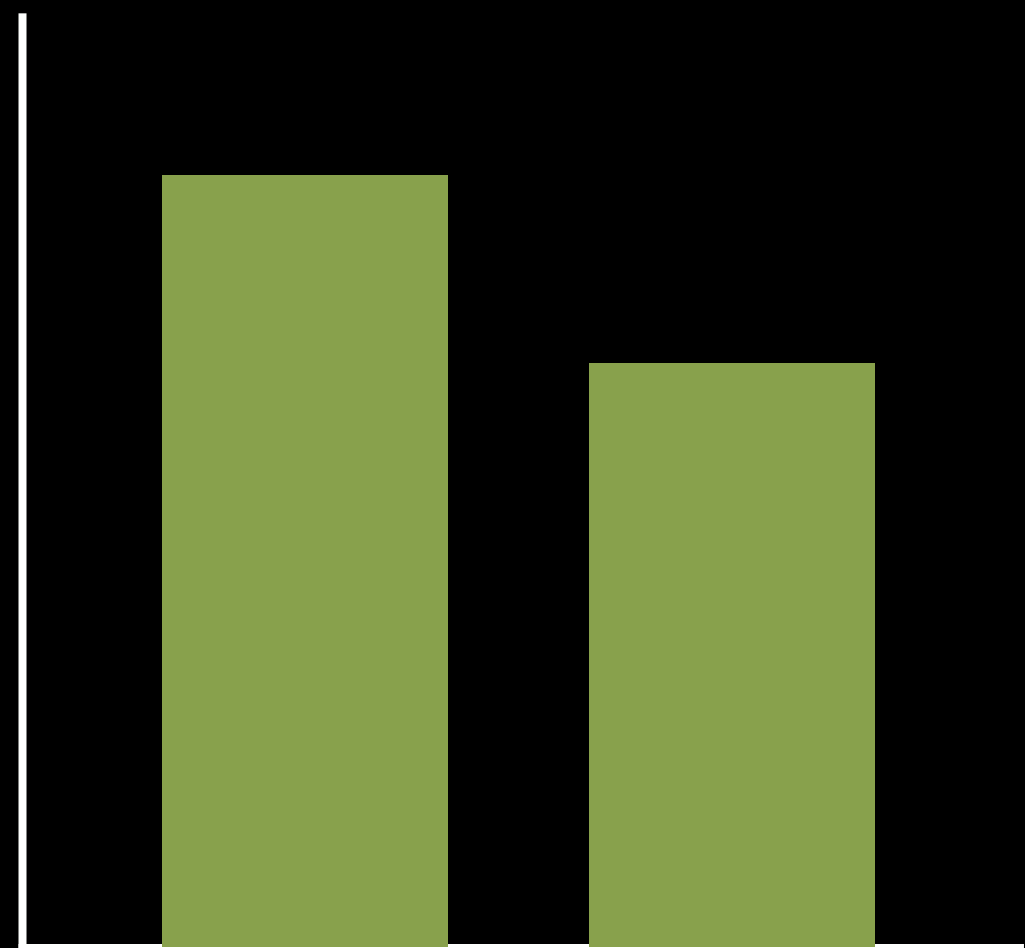
13%

10%

7%

3%

0%



Peer

Authority

($z = 2.08, p < .05$)

Possible Explanations

- Biased sample (AO users)
- Solidarity effect
- Social desirability
- Power to the peers!

Impact Evaluation

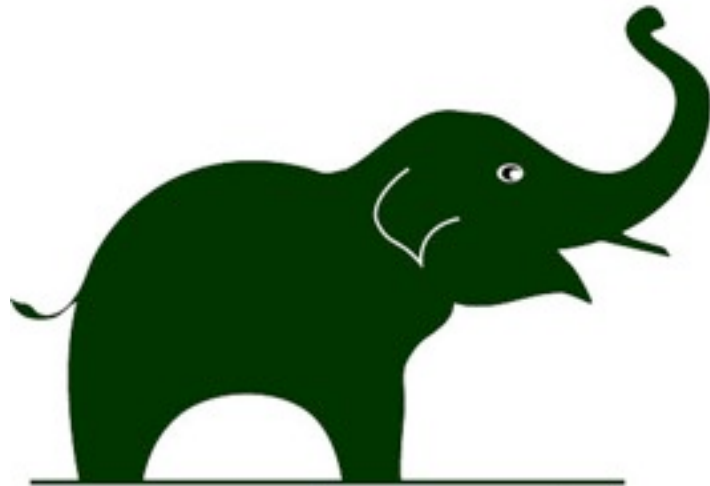
- Halfway through RCT w/ 1200 farmers
- 58% have called, 32% asked a question, and 16% have answered
- Treated farmers more likely to use more effective (and less harmful) pesticide
- Less likely to obtain information from input suppliers and other local sources

Limitations

- Not everyone has used the service
- More educated farmers used the service more, and learned more from it
- Decision-making not affected by education
- No evidence of impact on knowledge, especially for less educated

“Congratulations to Avaaj Otalo. I will be forever in your debt for the knowledgeable response you gave to my question, and *Shankarbhai*, the service you are providing here I pray to God that you keep offering just like it is. Farmers learn so much if an ordinary person is able to ask a question and you remember it and send me a message sitting at my house. In the seven years I have been farming this is the first and only time that I have received satisfactory information. Big up to you, and... I want to sow something now, so if I've got a little extra water, what should I sow?”

Awaaz.De: From Research to Practice



Awaaz . De

Number of employees: 4+

Number of calls: **600,000+**

digital**GREEN**

जतन **jatan**

123
GALLI GALLI SIM SIM

XIFMR
Research | CENTRE FOR
MICRO FINANCE

dsc
Development
Support
Centre

AKRSP
A project of
Aga Khan Foundation

KHŌJ
INTERNATIONAL ARTISTS' ASSOCIATION

RED
FM 93.5
Bajaate Raho!

S YUVA
INSTOPPABLE

LOGISTIMO

THE ECONOMIC TIMES
THE POWER OF ideas

E1
educational
initiatives

Manav Sadhna

**Ambuja
Cement**
— FOUNDATION —

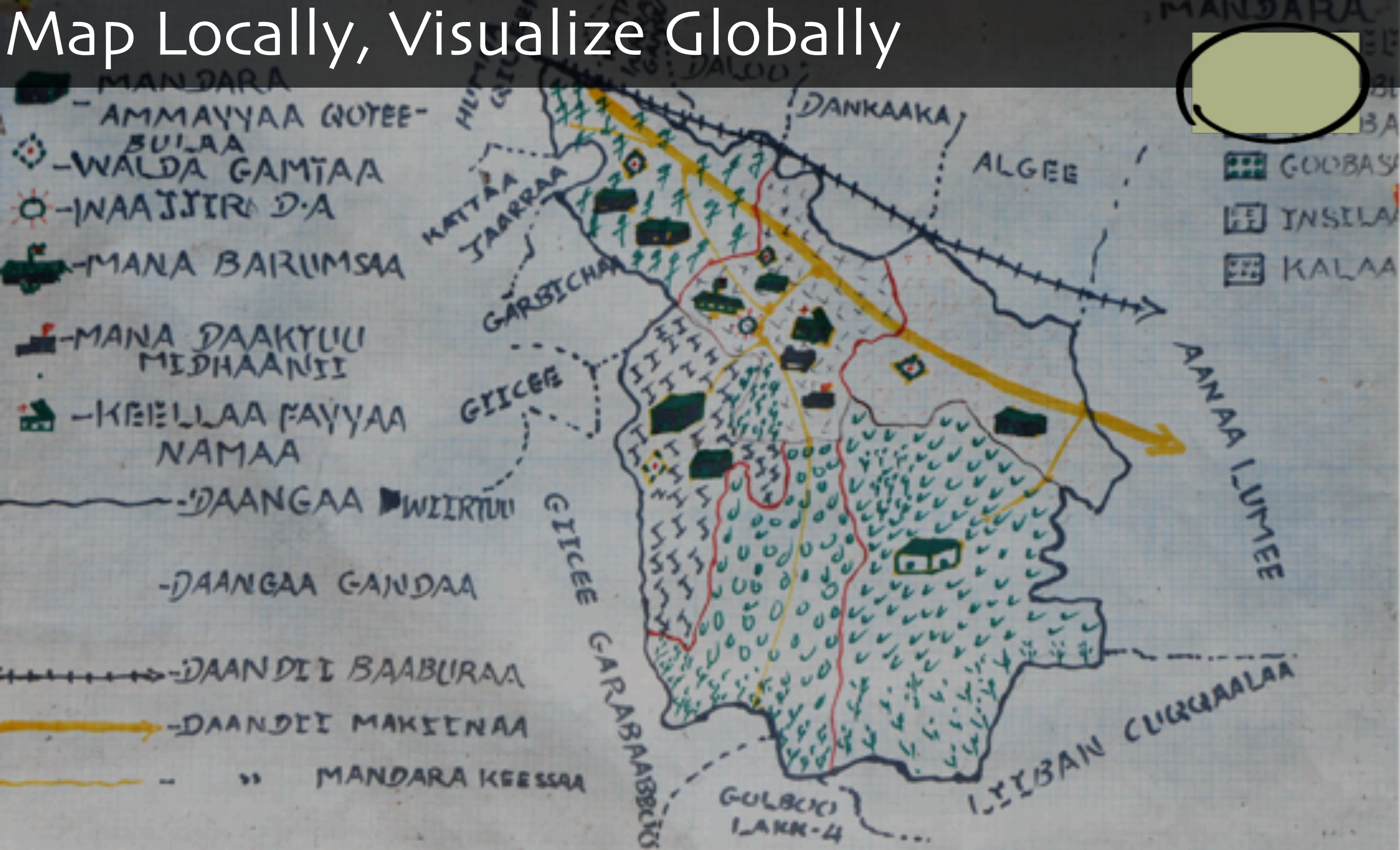
Outline

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- Can new forms and processes of knowledge representation lead to more equitable political representation?

Meta-Representation

- Unstructured knowledge must be processed for aggregation, comparison, filtering
- Requires translation to structured, quantifiable, categorical forms
- Ability to create and choose between representations is *meta-representational competence* (diSessa et al., 1991)

Map Locally, Visualize Globally

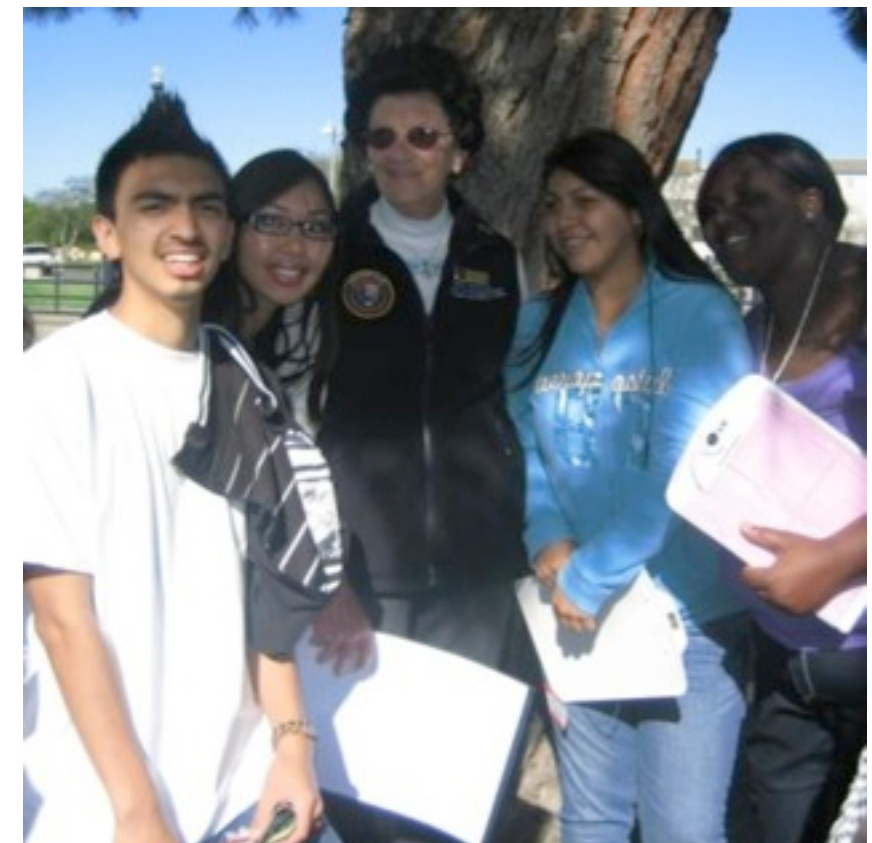


KAARTAA D.M.C. UDEE FI SIRBAA
LocalGround.org





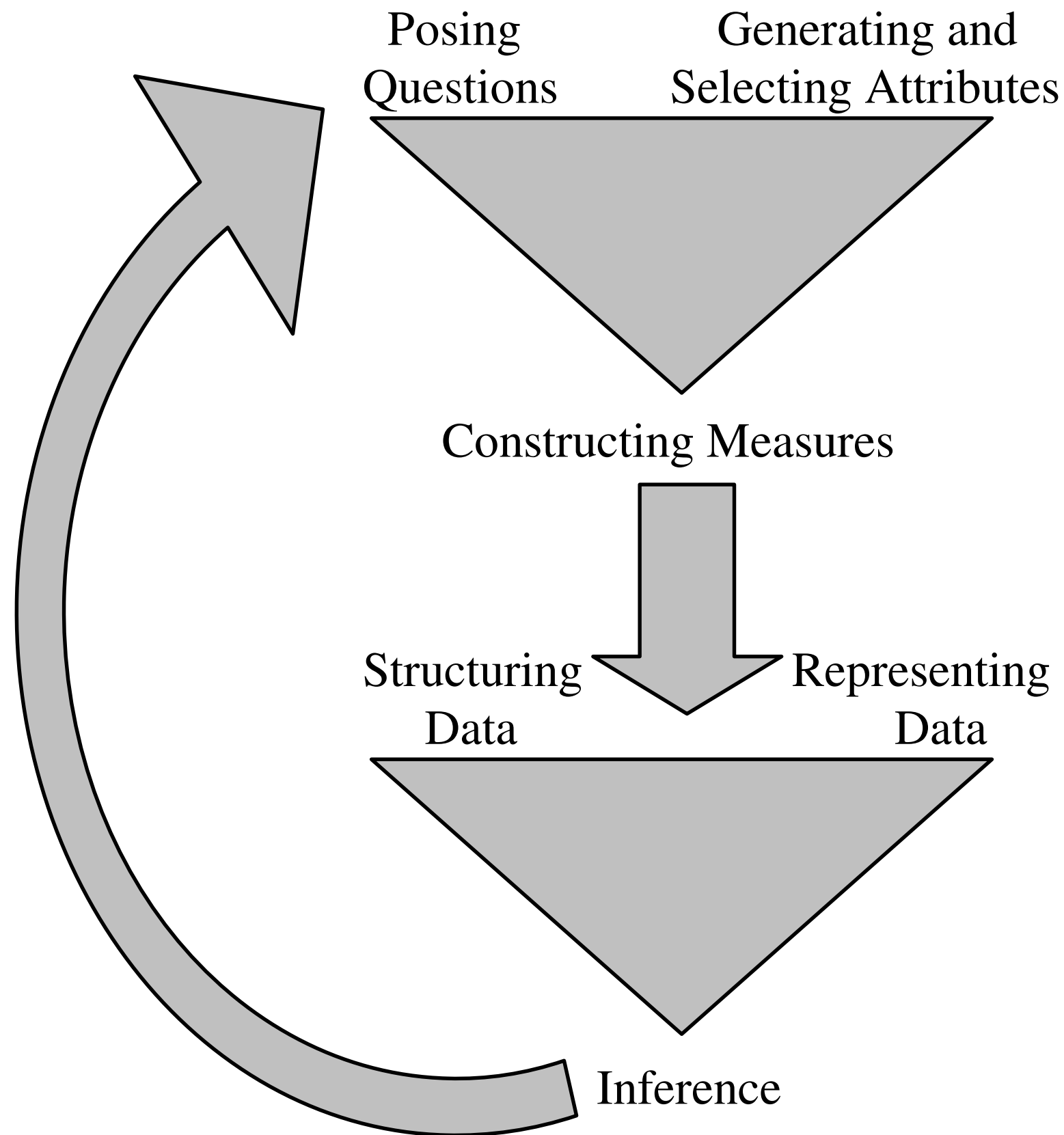
**THE LAWRENCE
HALL OF SCIENCE**
UNIVERSITY OF CALIFORNIA, BERKELEY



I-SEED
Institute for Sustainable Economic,
Educational, & Environmental Design



**OAKLAND UNIFIED
SCHOOL DISTRICT**



Step 1: Observe Planning a Park



Maritime Center



Nystrom Village Housing



**Nystrom
Elementary**



Martin Luther King Jr. Park

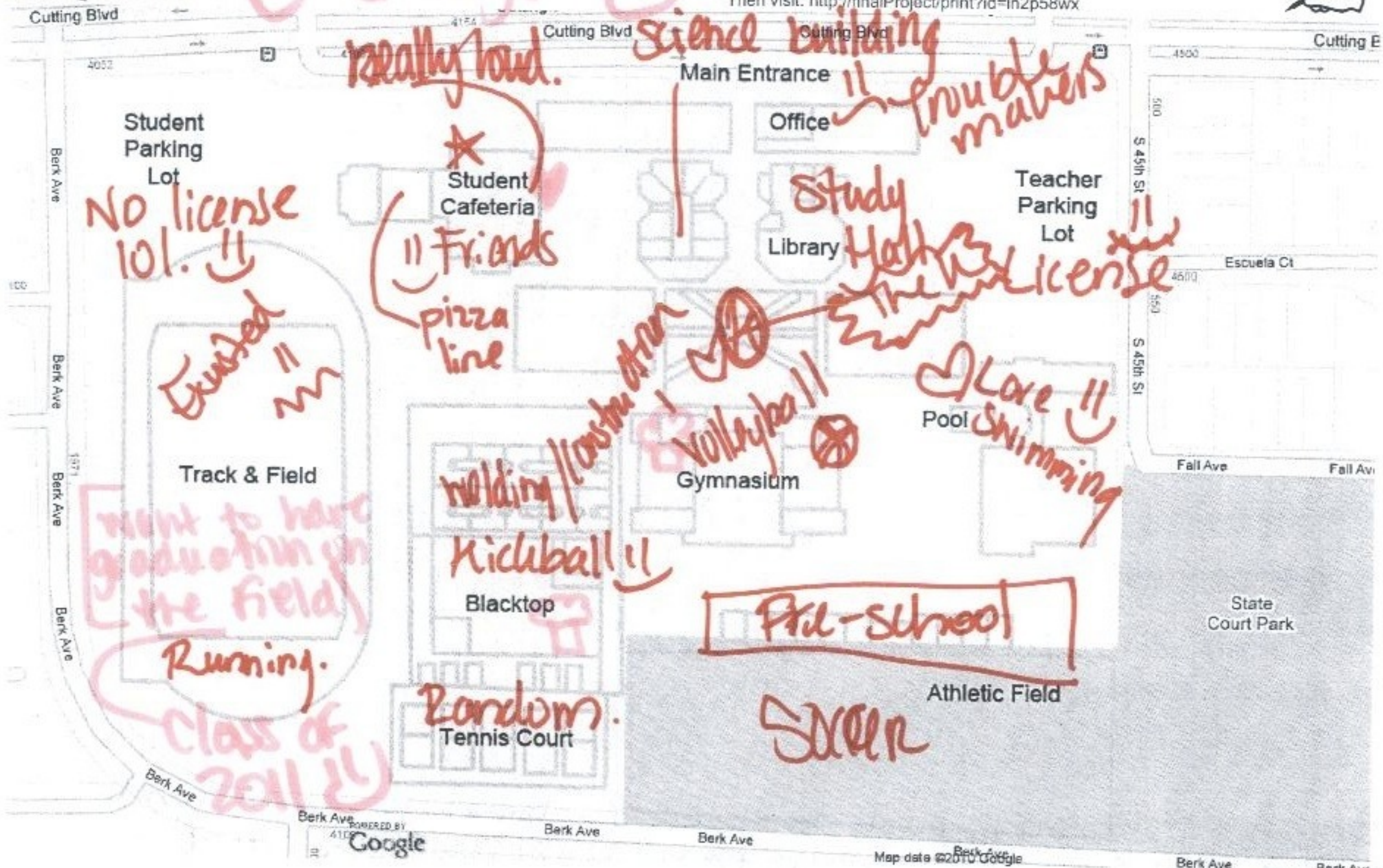


NURVE (Nystrom Urban ReVitalization Effort)





Help the Y-Plan understand your point of view by drawing on this map.
Then visit: <http://finalProject/print?id=ln2p58wx>



1. Mark your favorite place at Kennedy. Why do you like it?
2. Mark a place that isn't being used well. How you might improve it?
3. Mark a place that you've never noticed before today. Why do you think you haven't noticed it before?



Observation vs. Measurement

Need benches

X Nystron
village
community
not very
welcoming

trash every
where

my house
1500' BIK.

fencing
(low)
robbery
type
area

liquor

No trees



Nystron
village
community

looks like
crack house

Today's
House

1400
300
mostly houses
on every
house

500/1000
S 13th





Grayscale ▾

th Street

Martin Luther King Memorial
Park



Methadone Clinic



Cutting Boulevard

Cutting Boulevard

Cutting Boulevard

Grayscale ▾

Data & Media

Use the top menu
the map

Drawings Q

- ☐ turn on/off
- ☐ 500, the K
- ☐ art class
- ☒ Cupcakes
- ☐ Gang Asian,
- ☐ garden, the
- ☐ Green Xs
- ☐ My favorite p
- ☒ Pizza Line, n
- ☒ Sandwich
- ☐ Un-named
- ☐ Un-named
- ☐ Where EMP

Berk Avenue

ng Boulevard

Cutting Boulevard

Cutting BoulevardCutting Boulevard

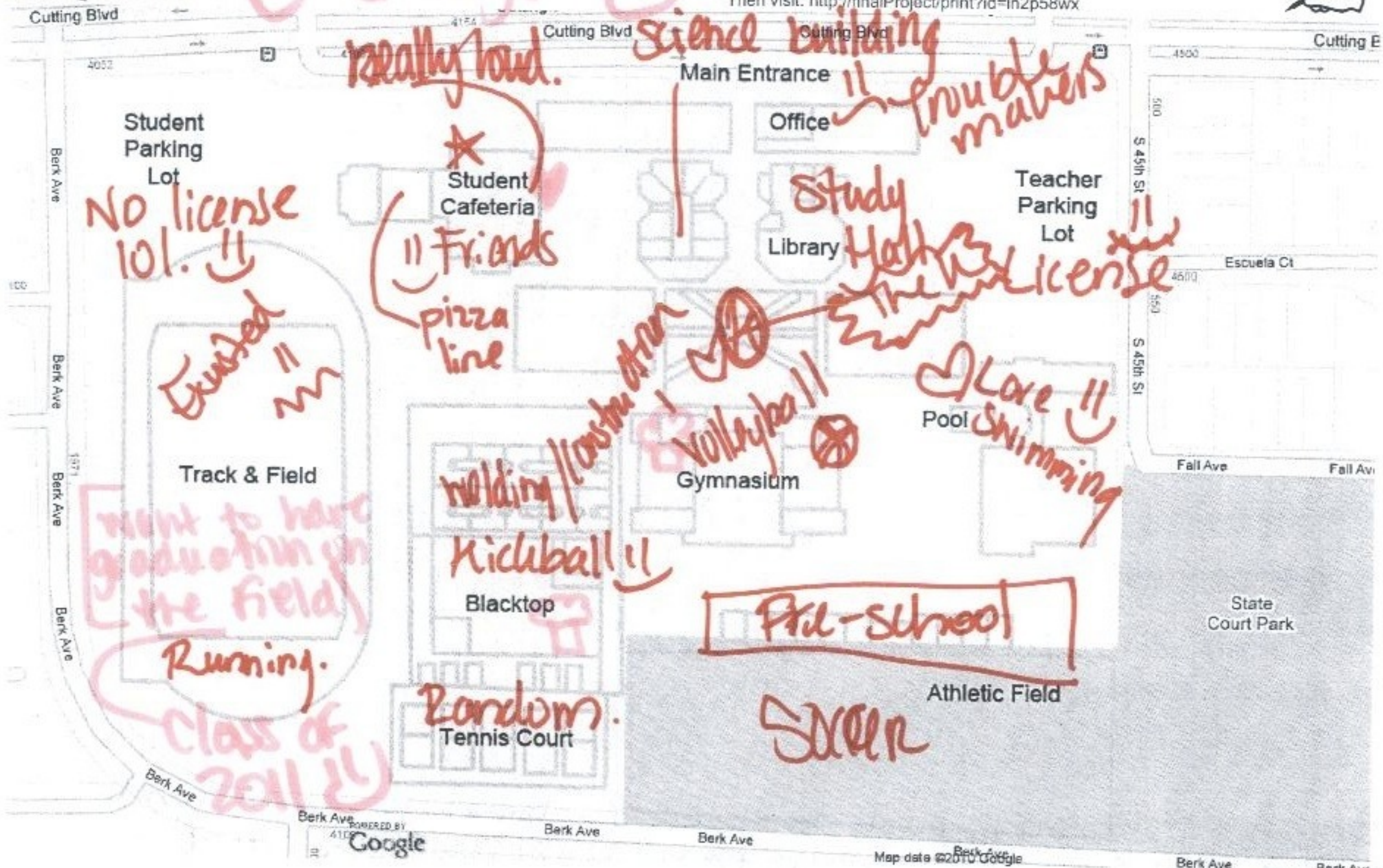
South 45th Street

Escuel

Ambiguity vs. Precision



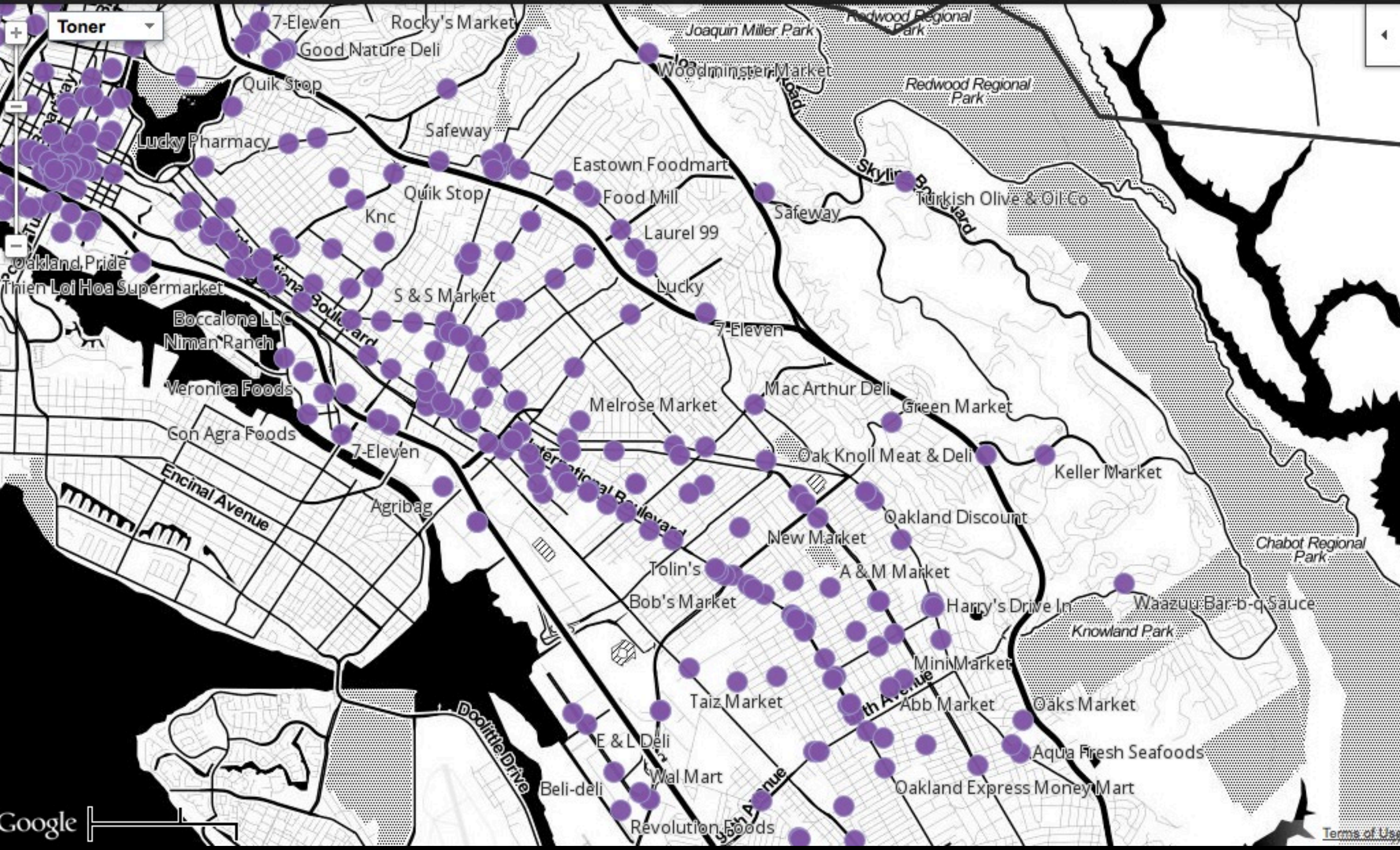
Help the Y-Plan understand your point of view by drawing on this map.
Then visit: <http://finalProject/print?id=ln2p58wx>



1. Mark your favorite place at Kennedy. Why do you like it?
2. Mark a place that isn't being used well. How you might improve it?
3. Mark a place that you've never noticed before today. Why do you think you haven't noticed it before?



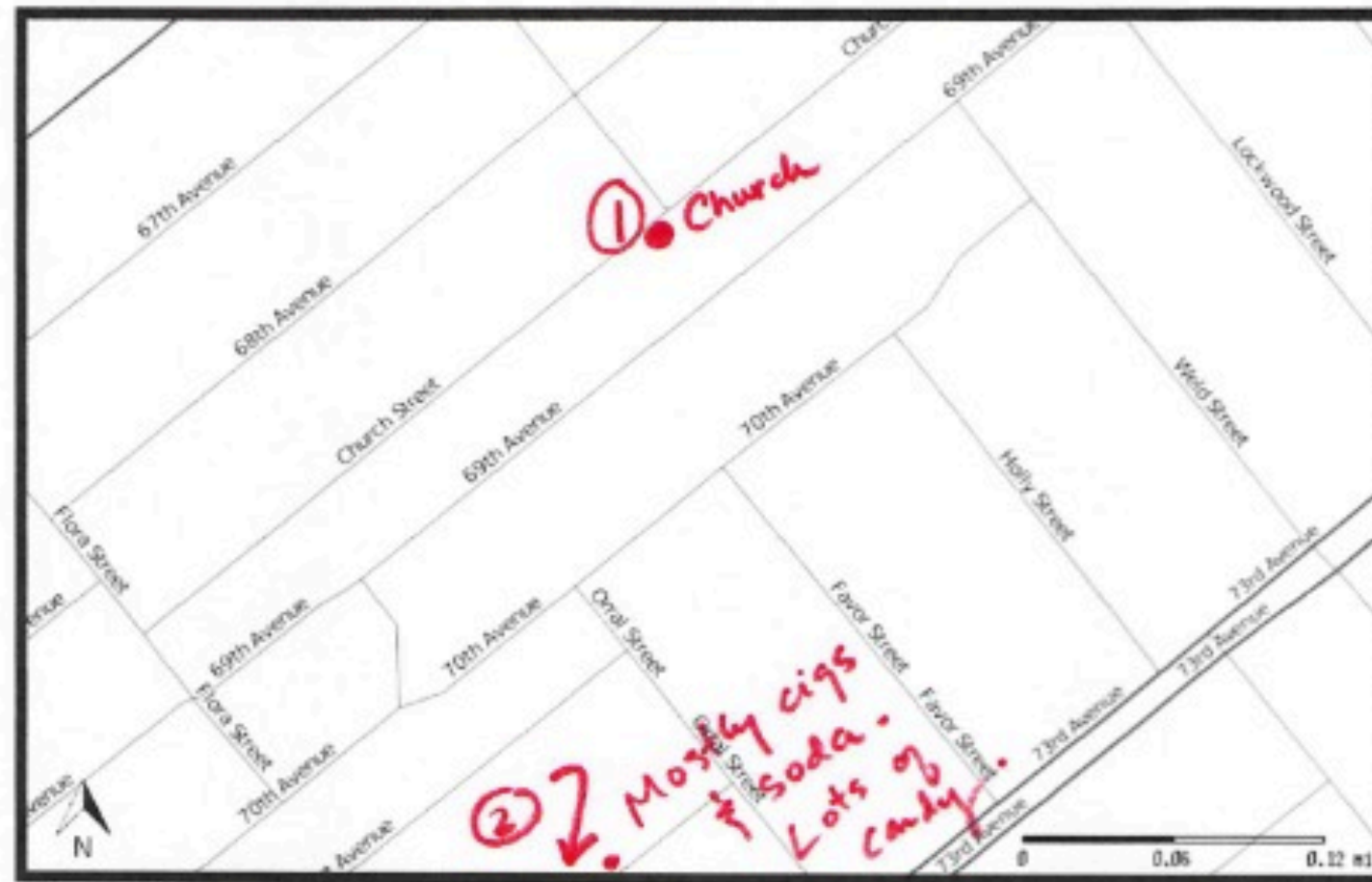
Step 2: Measure Verifying Groceries



Stores Near International

Name: _____

Colors Used: ○○○○○○○○○○○○



ID	Name	Rating	Category	Notes
1	Church St. Market	neg.	liquor/ corner	Soda, juice, empty space, house supplies
2.	Corner Gro.	OK	corner	Sells mostly soda and cigs. sunny D. No fruit!

When you're done drawing on the map, scan or photograph it and submit it to our website:
<http://localground.org/upload>, or email it to localground.uploader@gmail.com.



Print ID: niayup5n

e Data Record

Row Number

2

2.

Name

Corner grocery

Corner Groc.

Rating

neutral

OK

Category

corner store

Corner

Notes

sells mostly soda & cigs, Sunny D,
no fruits

Sells mostly soda and cigs.
Sunny D. No fruit!

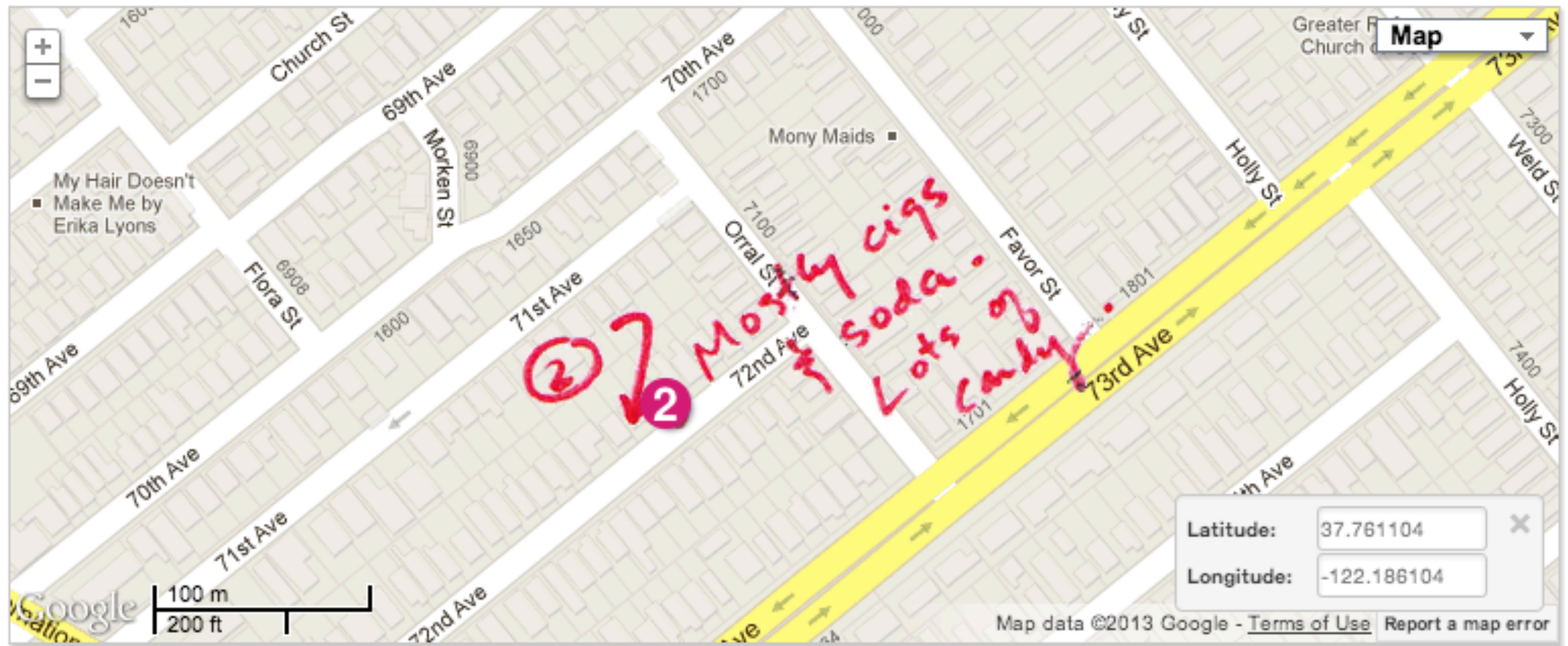
Save & Continue

Save

Automation vs. Participation

Update Data Record

Create a marker by clicking on the map closest to where this observation took place.



Select the map image that matches this record



Attachment Name **None - Attachment dbpwzauw**

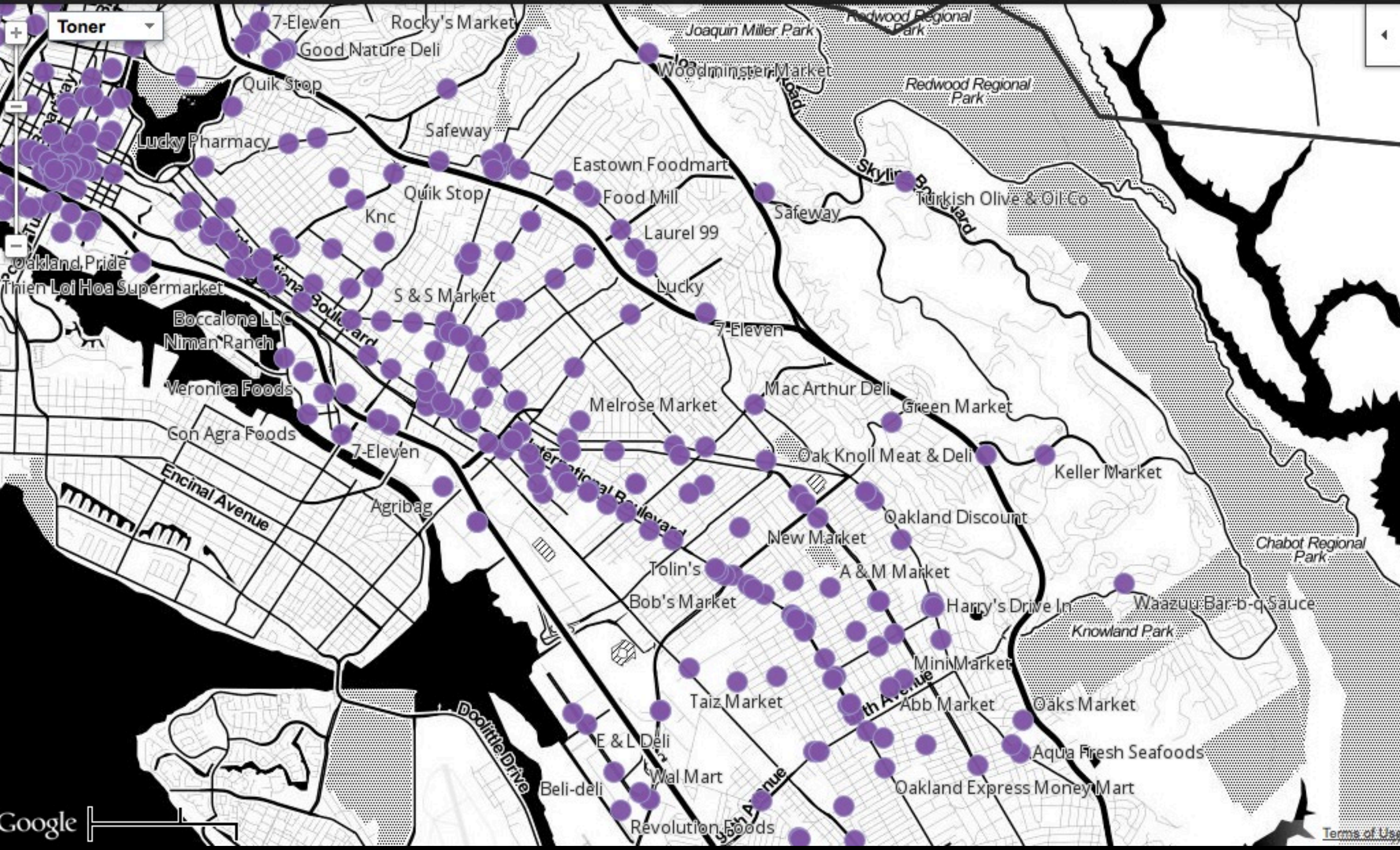
Row Number



Save & Continue

Save

Done





Data & Media

Legend

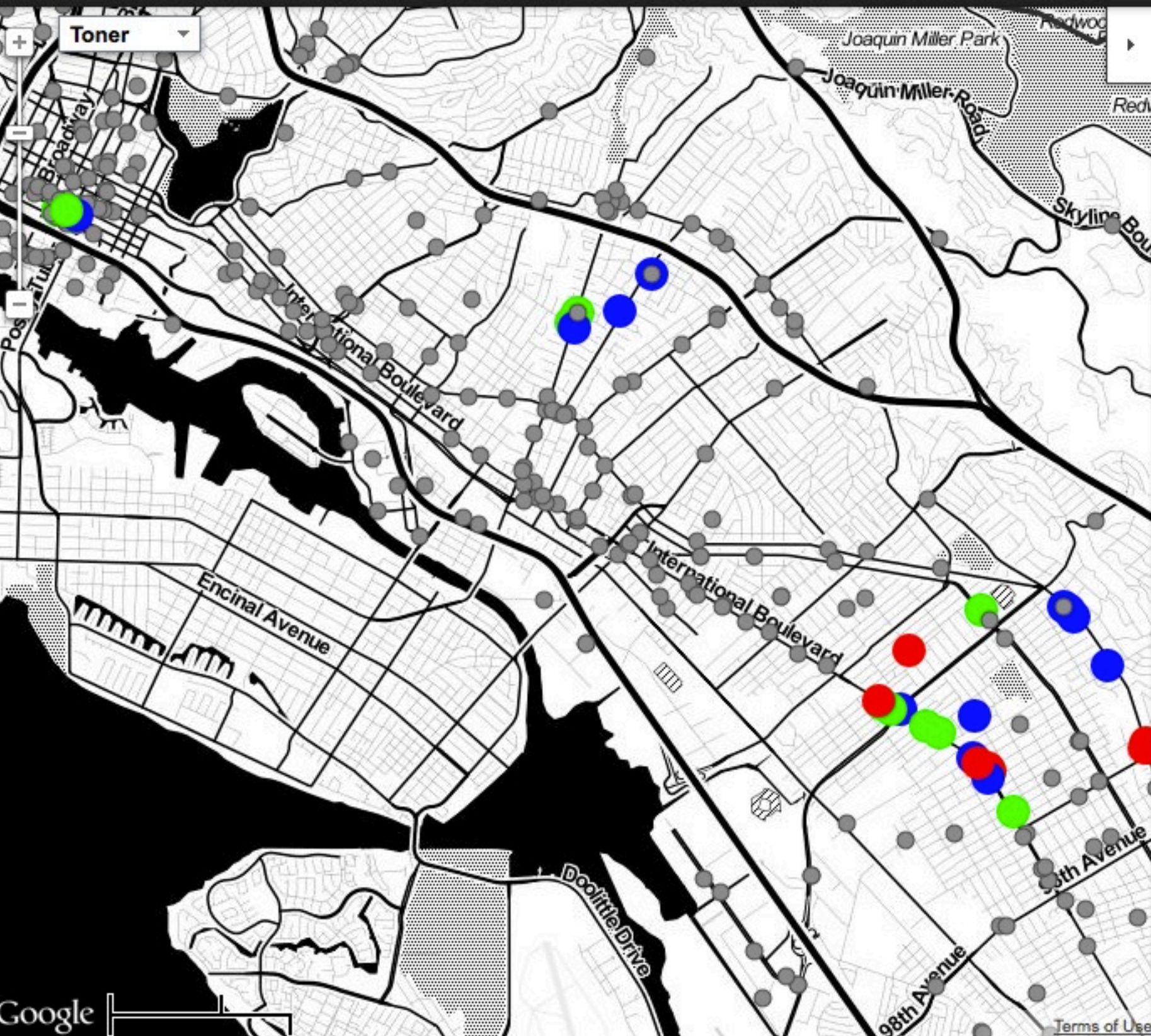
Download

California Counties

N County boundary

Oakland Food Retail Outlets by Type

- Grocery Store
- Corner / Convenience Store
- Liquor Store
- Other
- Specialty Store
- Not Visited

[Data & Media](#)[Legend](#)[Download](#)

California Counties

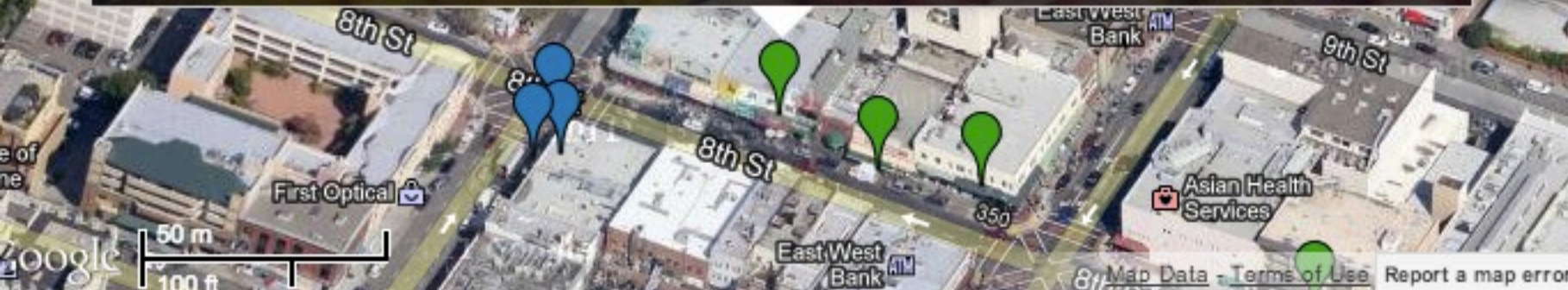
 County boundary

Oakland Food Retail Outlets by Rating

-  Positive
-  Neutral
-  Negative
-  Not Visited



Satellite ▾



Data & Media

Legend

Download

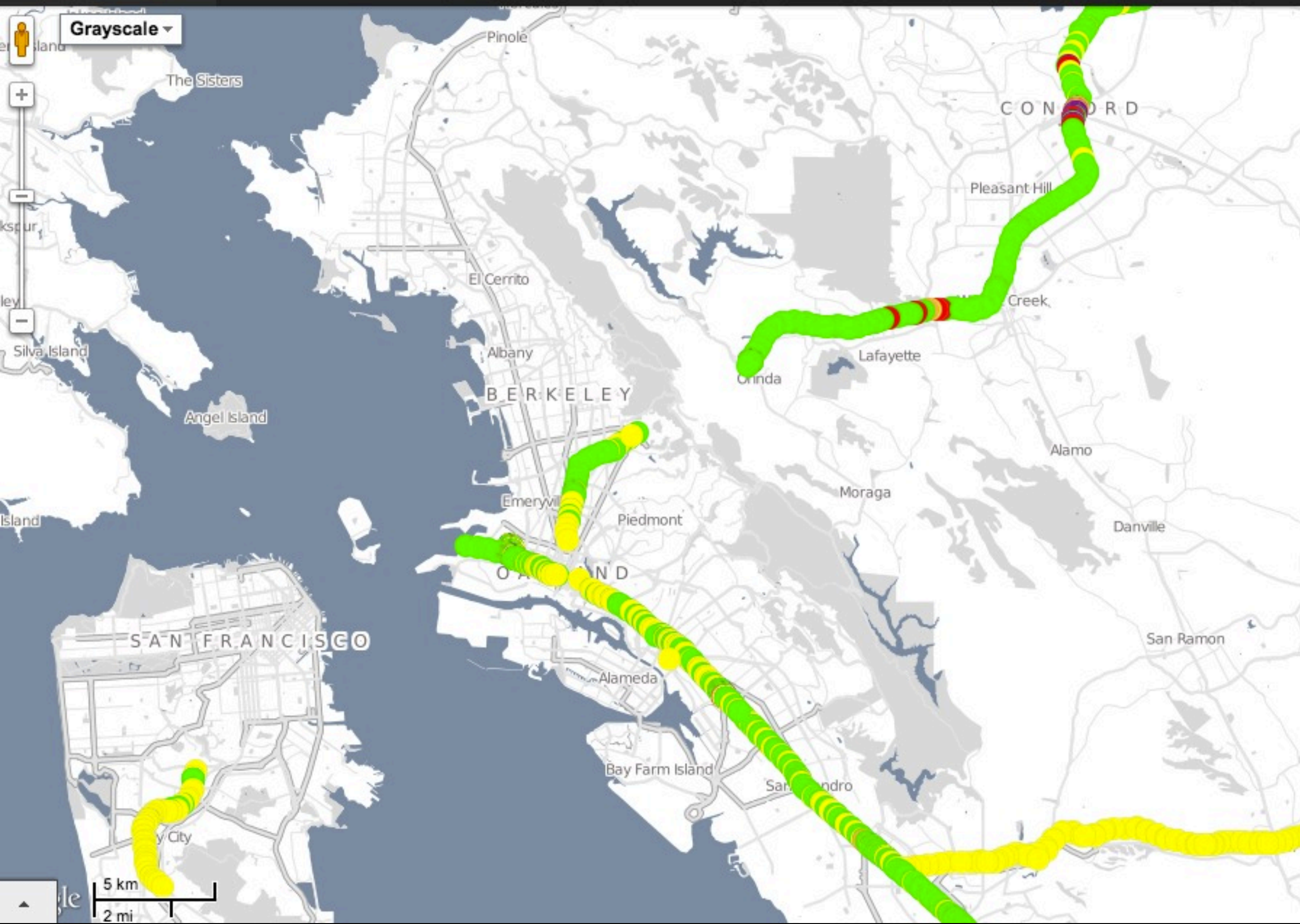
Use the top menus to add your data on the map

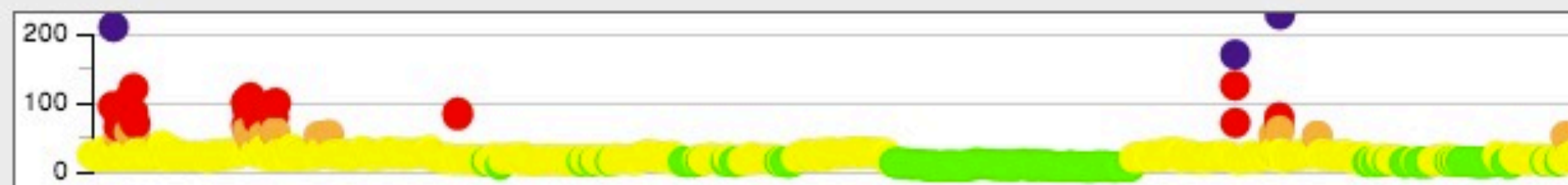
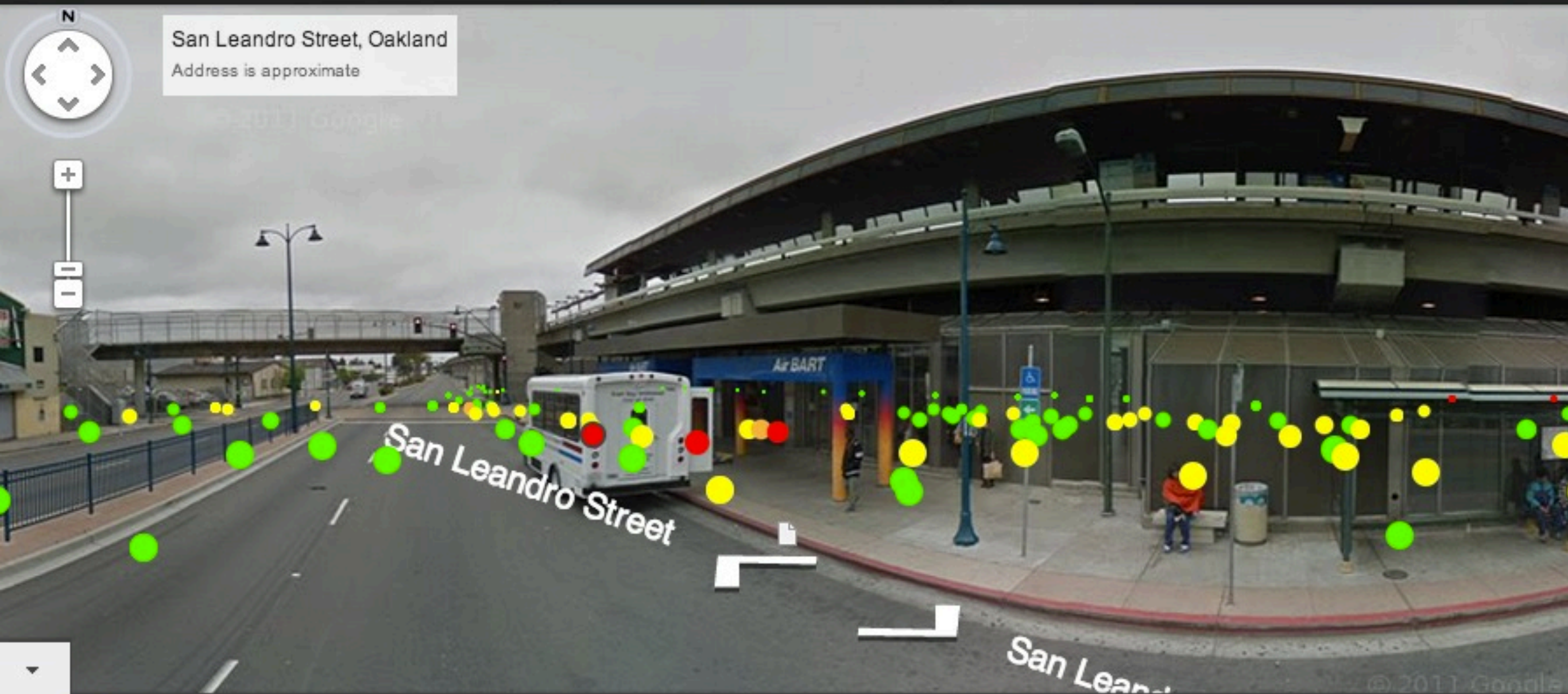
Edit

▸ ☐ Drawings▸ ☐ Audio Files▸ ☐ Photos▾ ☒ Markers☒ China Star Express
4 photo(s)☒ D & K Market
6 photo(s), 1 audio clip(s)☒ King Of Grocery
1 photo(s)☒ Lucky Seafood
1 photo(s)☒ My New Marker
4 photo(s)☒ Sam Yick Market
2 photo(s), 1 audio clip(s)☒ Yet Sun Market▸ ☐ D3P Summer Observations

Quantitative +
Qualitative

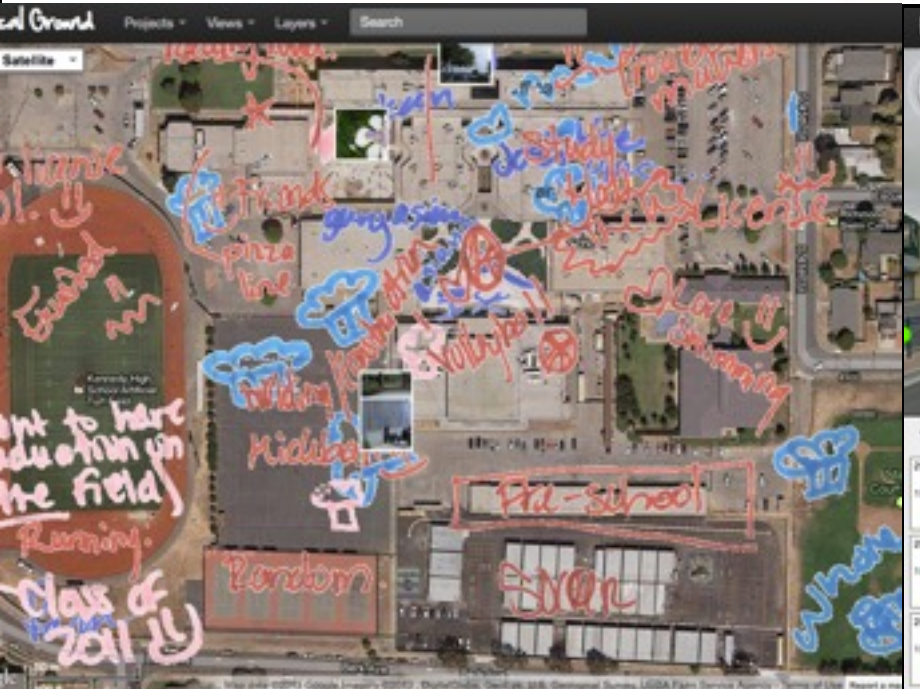
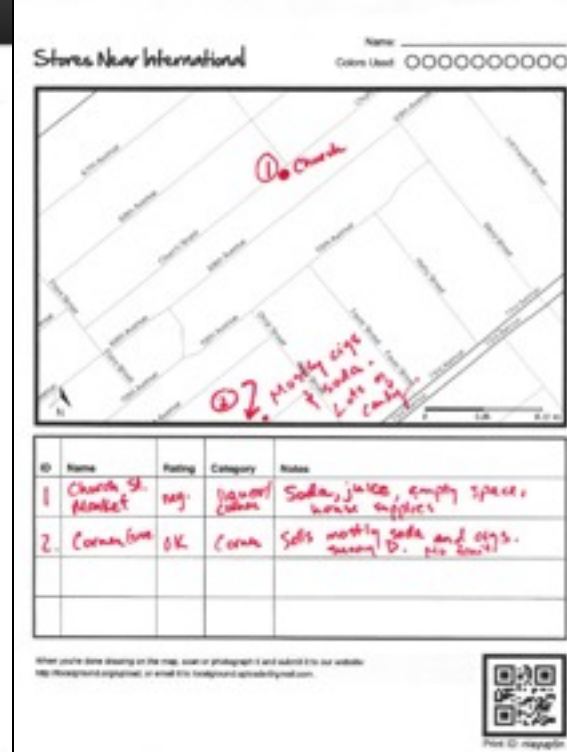
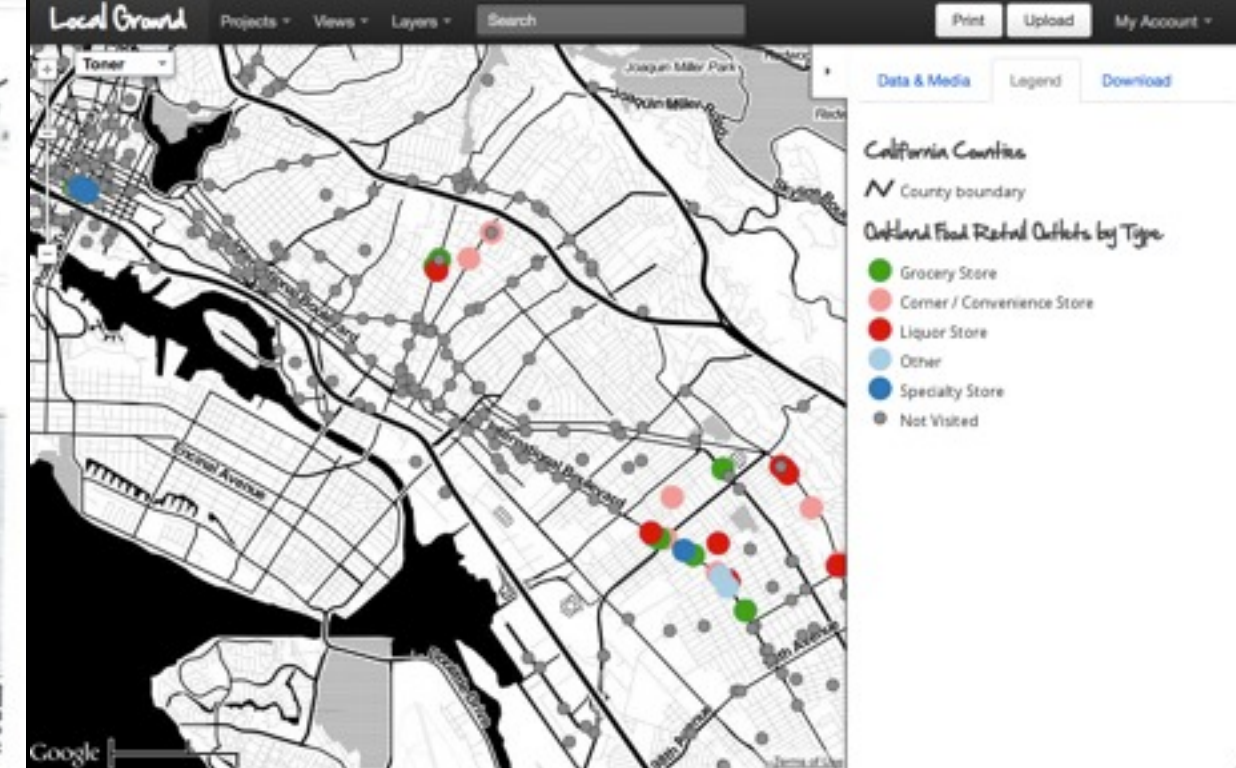
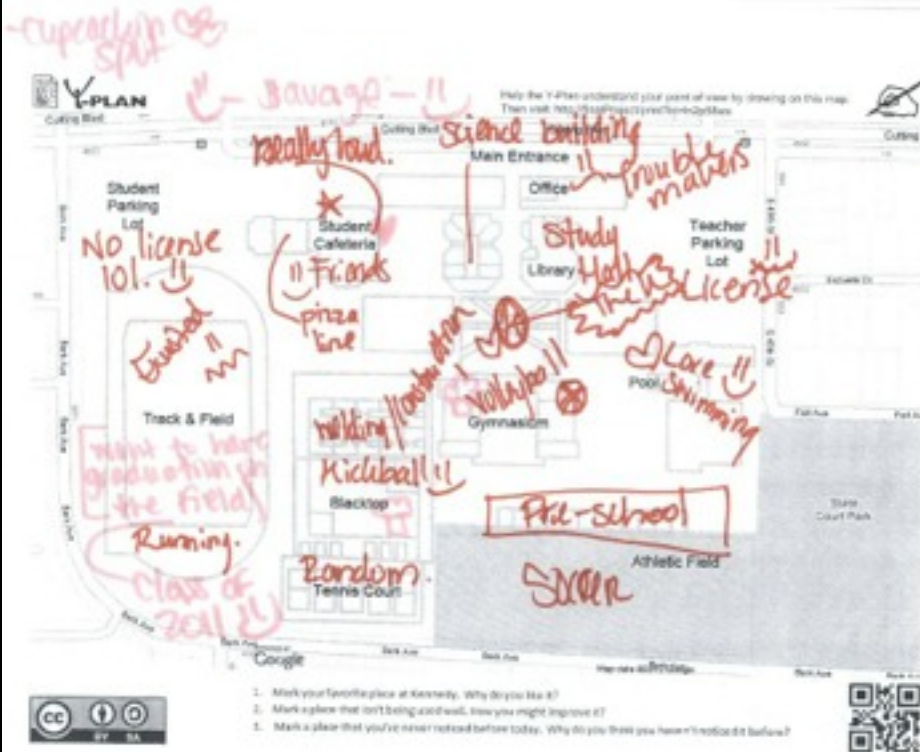
Step 3: Visualize Air Quality in BART





Data + Context

Step 4: Interpret Embarcadero vs. Pittsburg



Update Data Record

Row Number: 2

Name: Corner grocery

Rating: neutral

Category: corner store

Notes: sells mostly soda & eggs. Sunny D. no fruits

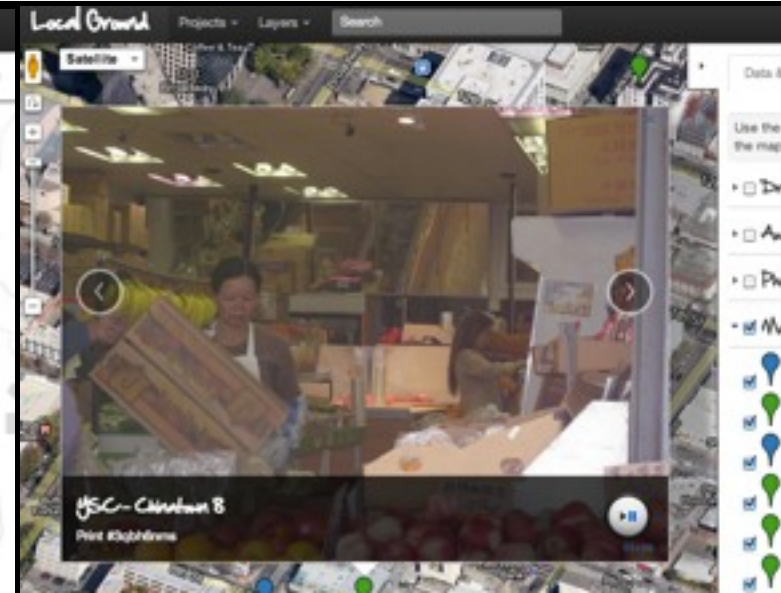
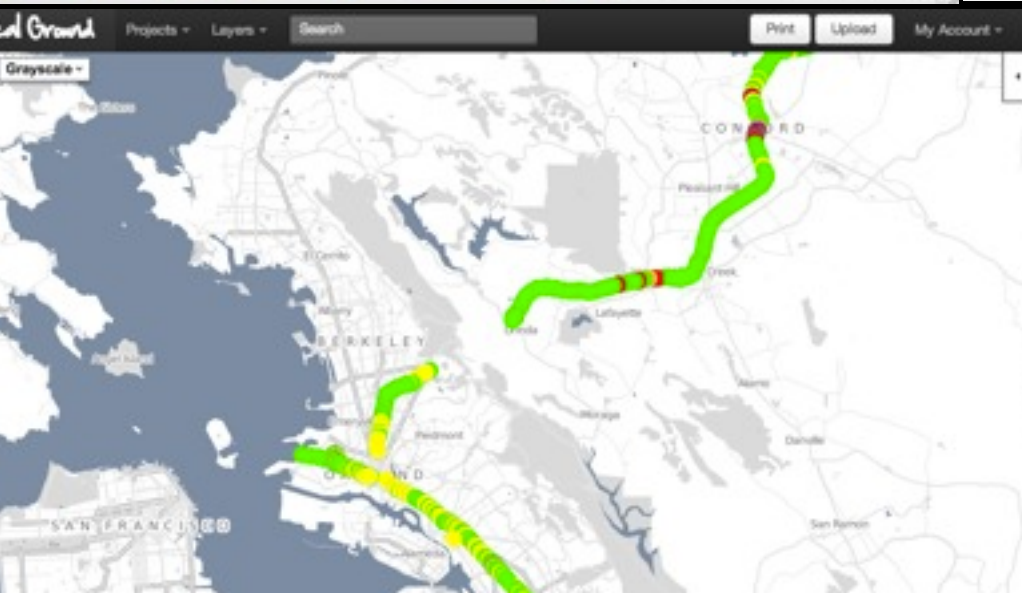
2.

Cornish

OK

Cornish

Sells mostly soda and eggs. Sunny D. No fruit



Step 5: Present Richmond Town Hall





Data vs. Politics



What is Data?

- Observation vs. Measurement
- Ambiguity vs. Precision
- Automation vs. Participation
- Qualitative + Quantitative
- Data + Context
- Data vs. Politics

Future Work

- Data literacy in K-12
- Impact on learning, agency
- Authoring data narratives
- More applications
- Public beta this summer!

Summary

- Paper kept things loose
- Accessibility + Expressivity
- Science + Advocacy
- Our data is “on Google”
- Data is a political process

Outline

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- Local Ground: Re-thinking data processes to support learning and access
- Can new forms and processes of knowledge representation lead to more equitable political representation?

LocalGround.org

Awaaz.De

Questions?

represent.berkeley.edu



aptricity

Mobile *Works*



NextDrop

blogs.ischool.berkeley.edu/ict4se

A man wearing a dark jacket and sunglasses on his head is sitting on a white motorcycle. The motorcycle has 'UNDP' logos on the front fairing and the side of the fuel tank. He is standing in front of a brick wall. To the right, a sign on a pole reads 'ROOM FIEL OFFICE'. The background shows a dirt road and some trees.

Thanks for all the fish!

DSC, Center for Cities & Schools, I-SEEED,
OUSD, Lawrence Hall of Science

Neil Patel, Sarah van Wart, Christy McCain

Farmers of Gujarat and Youth of Richmond &
Oakland!