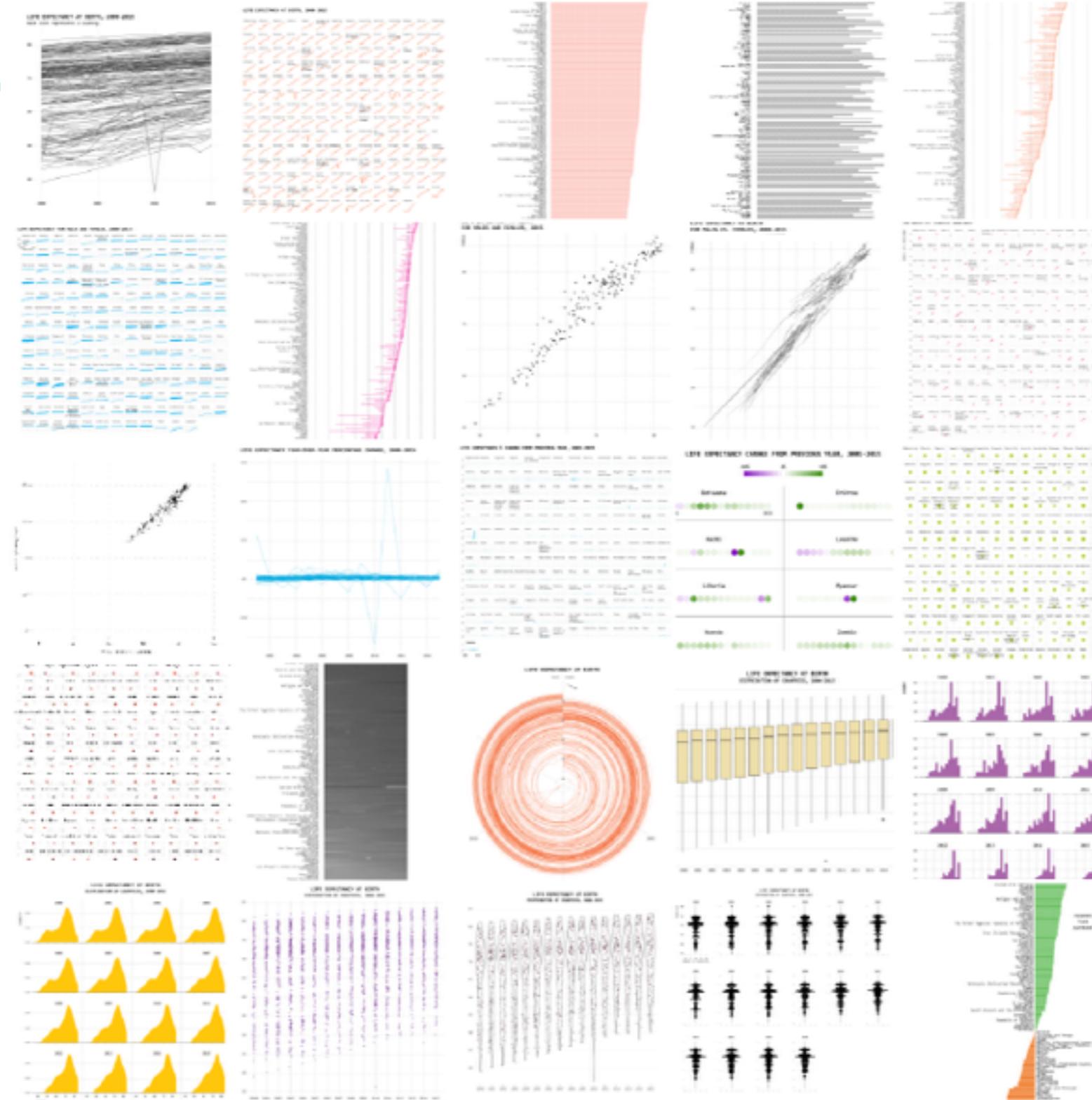


designing your data viz - the process

Mollie Pettit • @MollzMP

Same Data - 25 ways



<https://www.wired.com/2017/02/25-visualizations-spin-data-25-different-tales/>



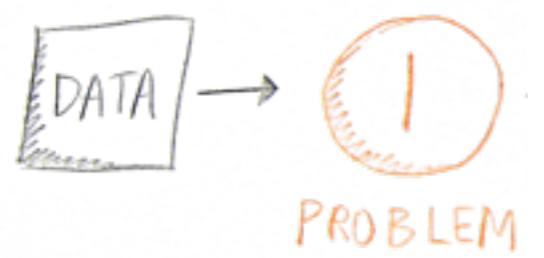
gunshowcomic.com

agenda

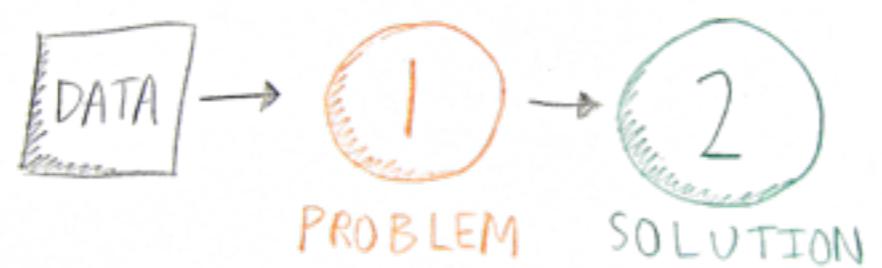
- a common approach to data problems
- trying to plan in an ambiguous world
- a better (iterative) approach
- getting started (the importance of brainstorming)

a common
approach

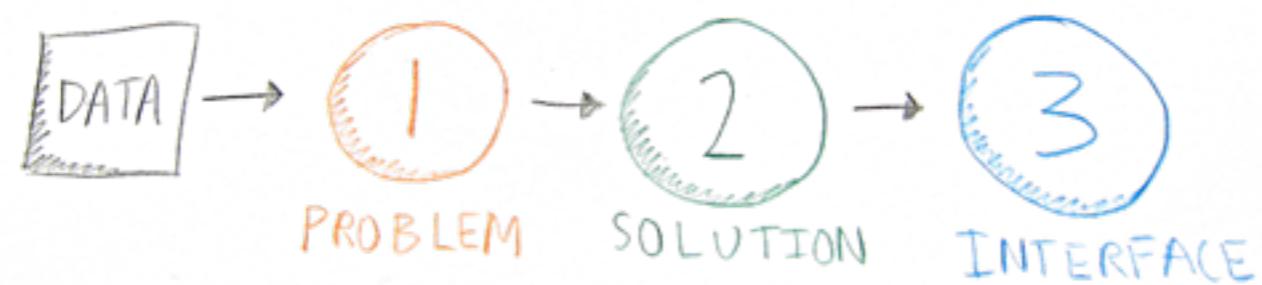




identify the problem

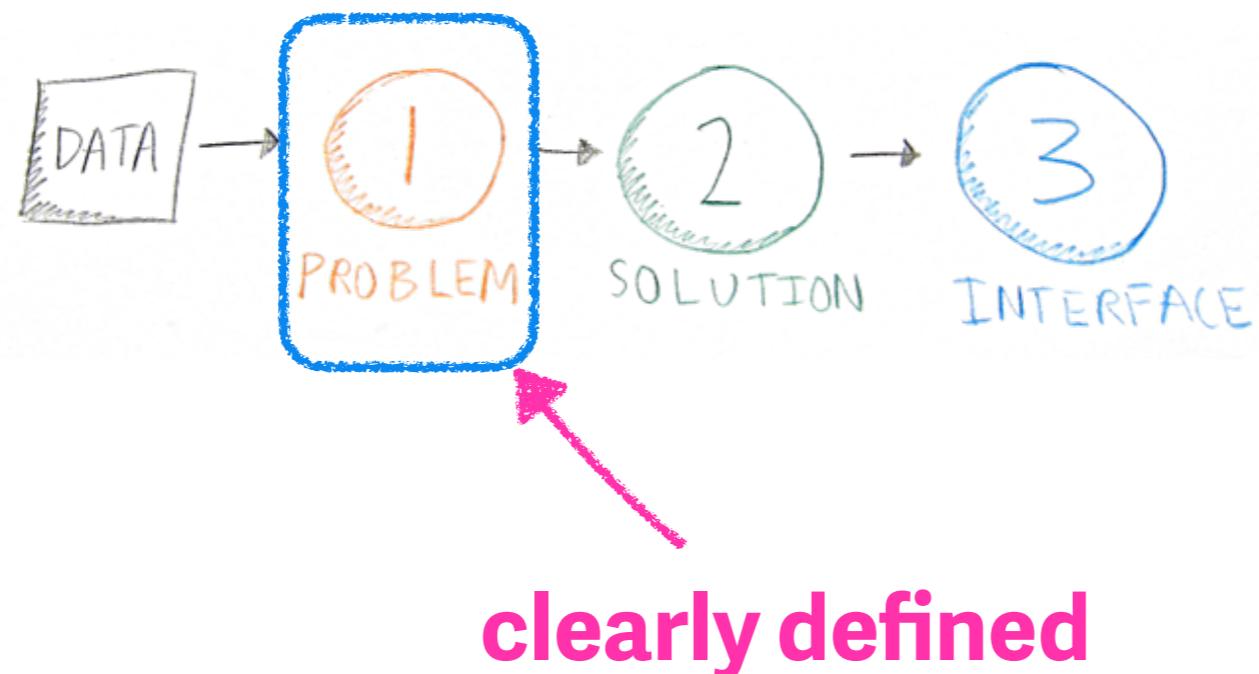


determine the solution



communicate results

linear



an ambiguous
world

the data world

unclear problems



identify the best locations to plant new trees

the data world

unclear problems



identify the best locations to plant **new trees**

how many?

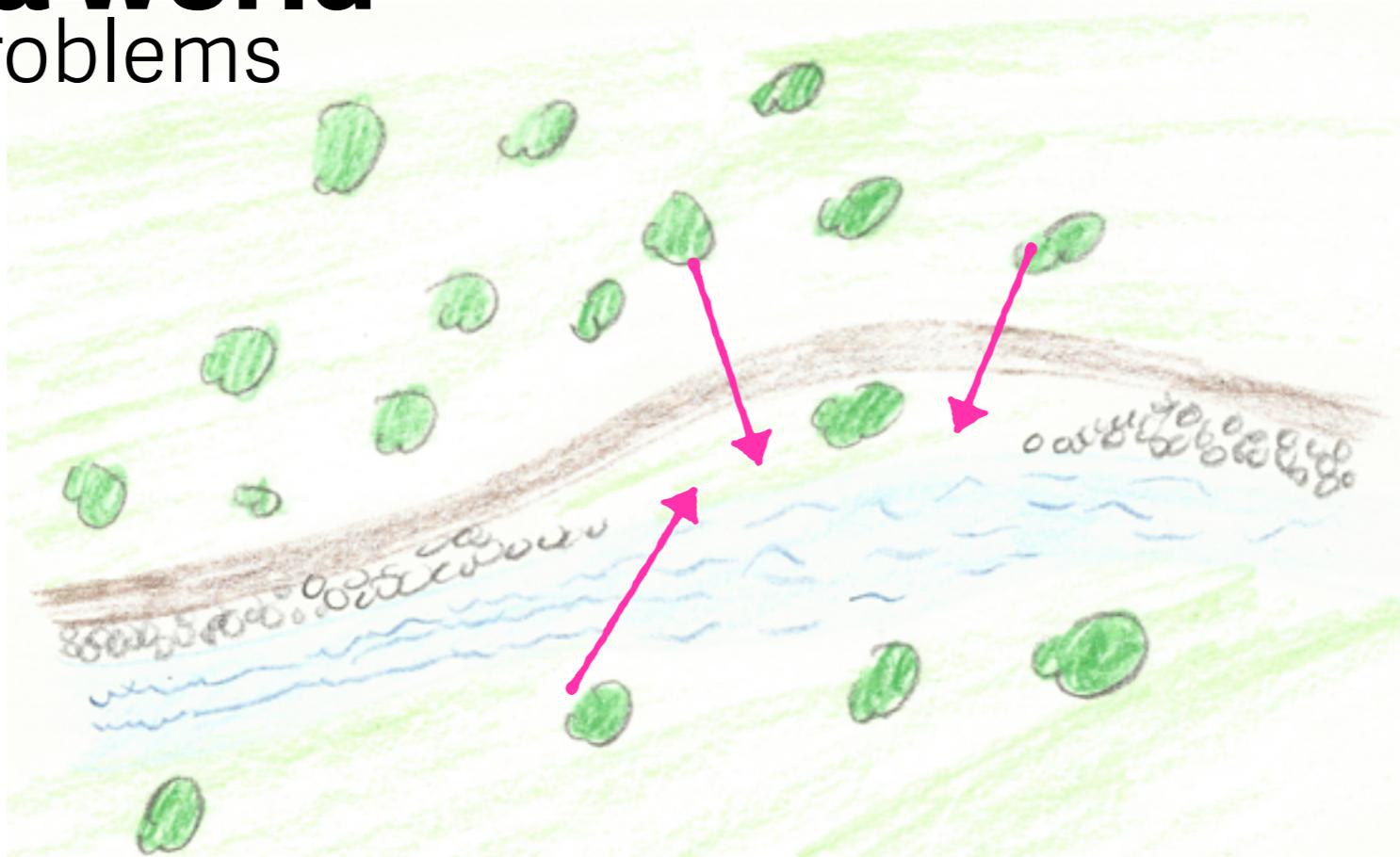
what kinds of trees?

move old trees?

replace old trees?

the data world

unclear problems



identify the best locations to plant new trees

aesthetically pleasing?

how many?

maximize growth?

what kinds of trees?

increase foliage?

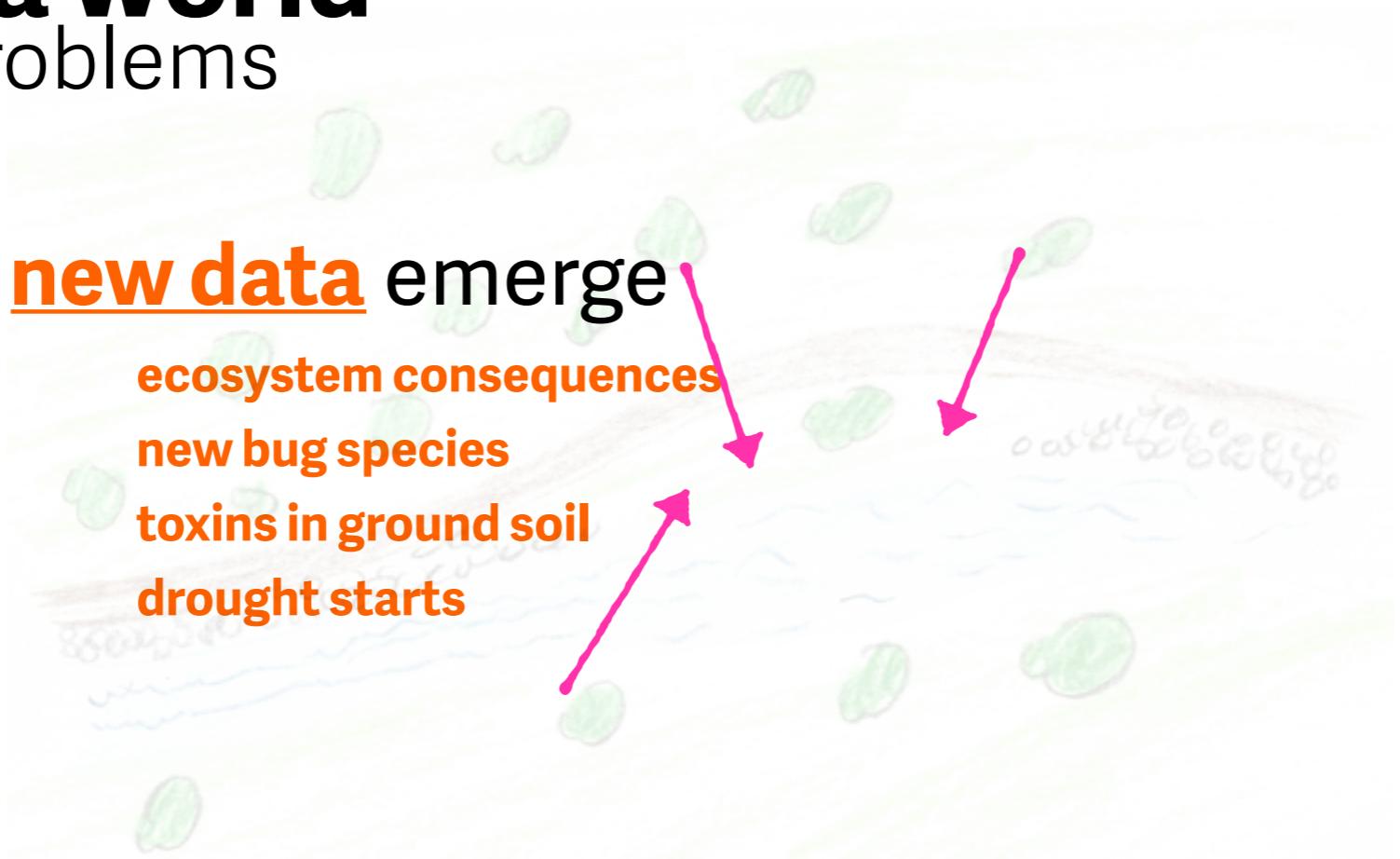
move old trees?

offset CO₂ emissions?

replace old trees?

the data world

unclear problems



new data emerge

- ecosystem consequences
- new bug species
- toxins in ground soil
- drought starts

identify the best locations to plant new trees

- aesthetically pleasing?
- maximize growth?
- increase foliage?
- offset CO₂ emissions?

- how many?
- what kinds of trees?
- move old trees?
- replace old trees?

the data world

unclear problems

new data emerge and new solutions!

- ecosystem consequences
- new bug species
- toxins in ground soil
- drought starts

- build a bike path
- add benches
- plant bushes
- introduce ladybugs

identify the best locations to plant new trees

- aesthetically pleasing?
- maximize growth?
- increase foliage?
- offset CO₂ emissions?

- how many?
- what kinds of trees?
- move old trees?
- replace old trees?

the data world
unclear problems



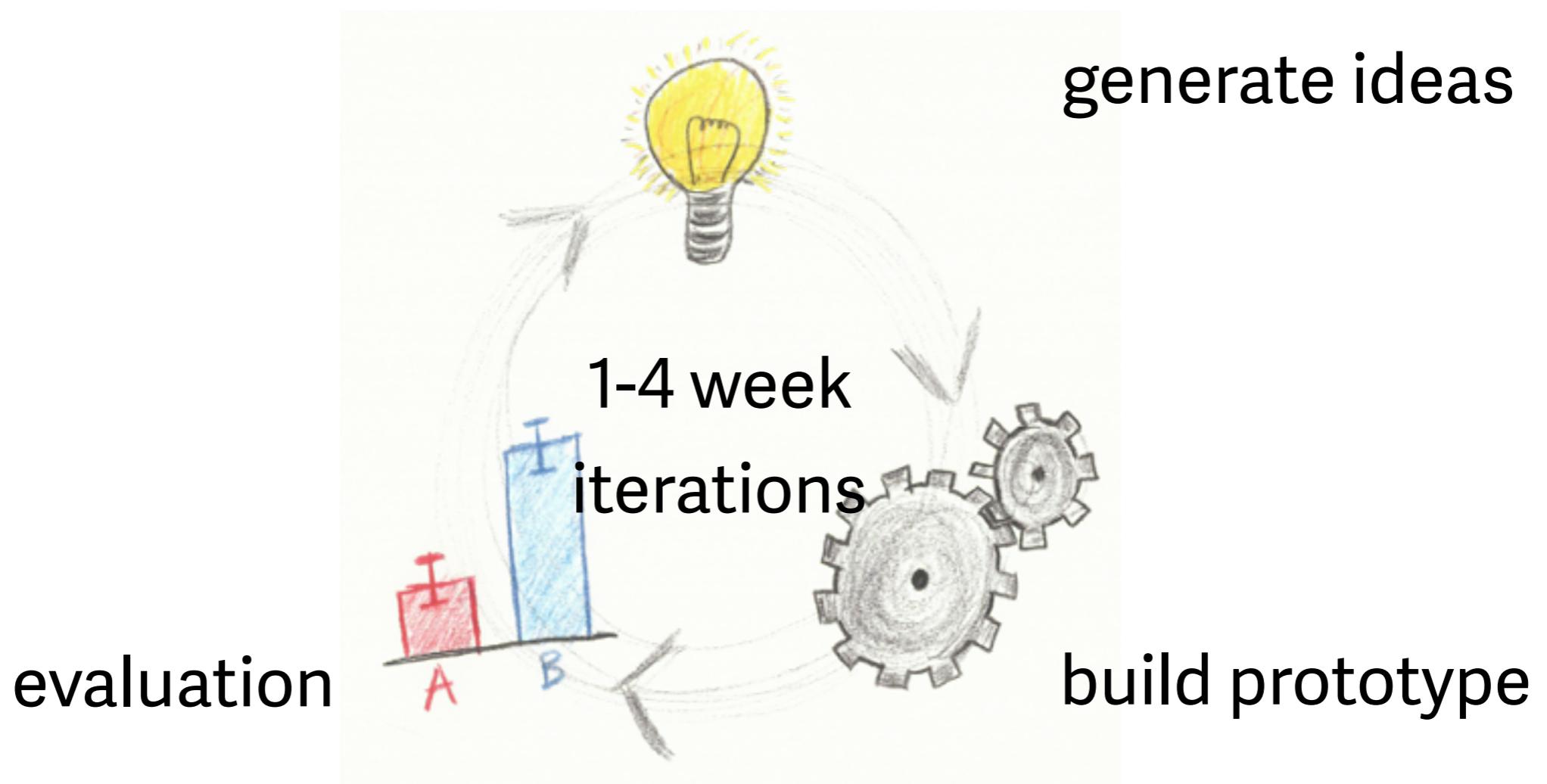
why trees?

identify the best locations to plant new trees

better
an ~~iterative~~
approach

iterative problem solving

anticipate refining your solution



iterative problem solving

anticipate refining your solution

human-centered design

generate ideas
personas, use cases

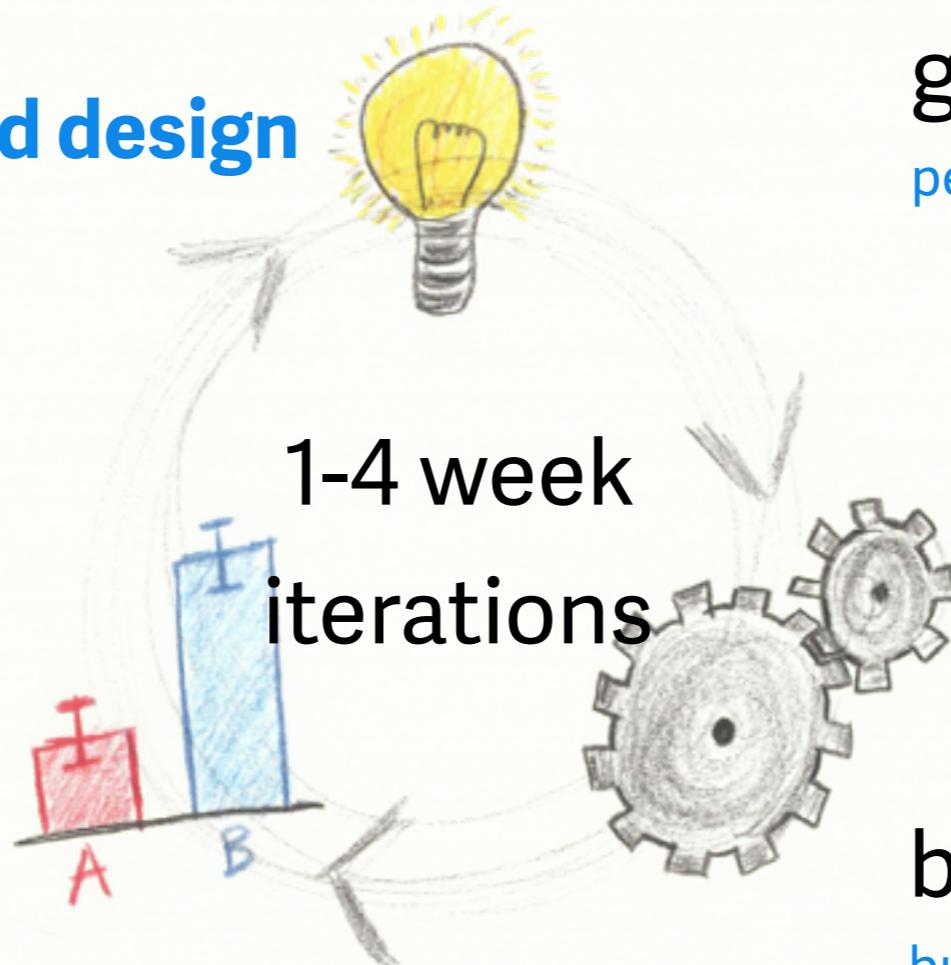
evaluation

surveys, interviews,

1-4 week
iterations

build prototype

build device prototypes



iterative problem solving

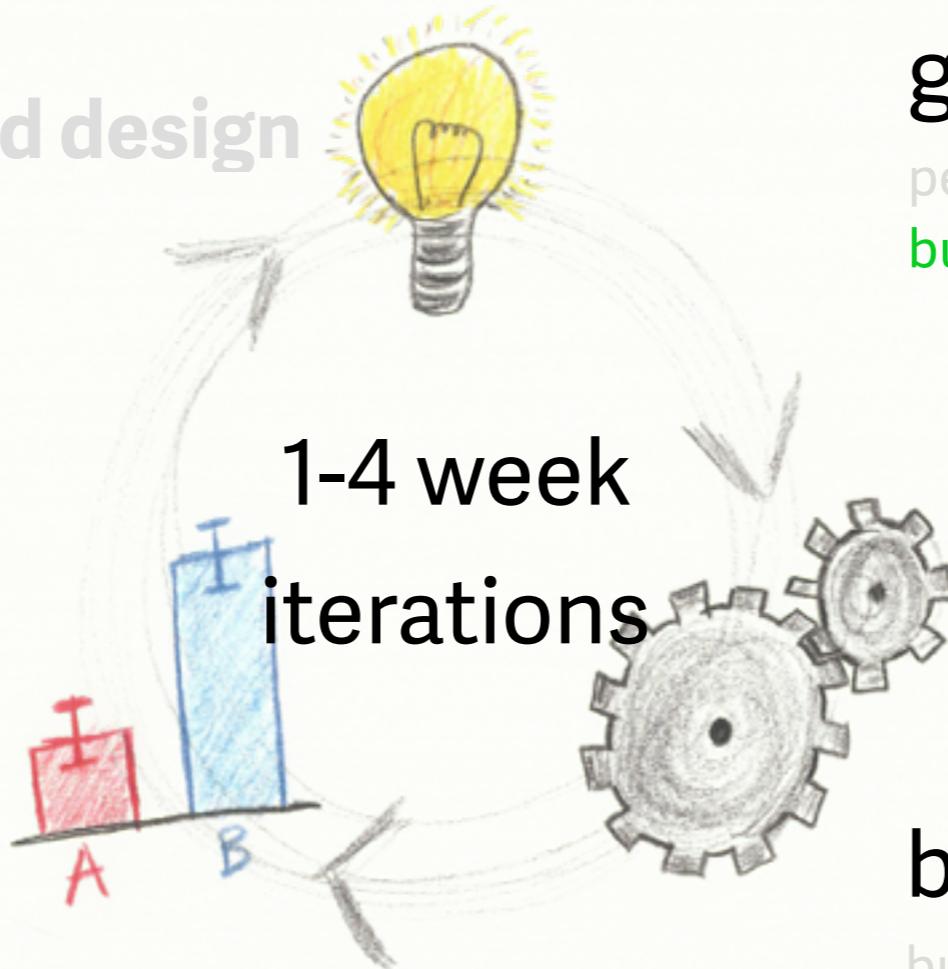
anticipate refining your solution

human-centered design
lean startup

evaluation

surveys, interviews,

split testing, A/B testing



generate ideas
personas, use cases
business requirements

build prototype
build device prototypes
minimum viable product

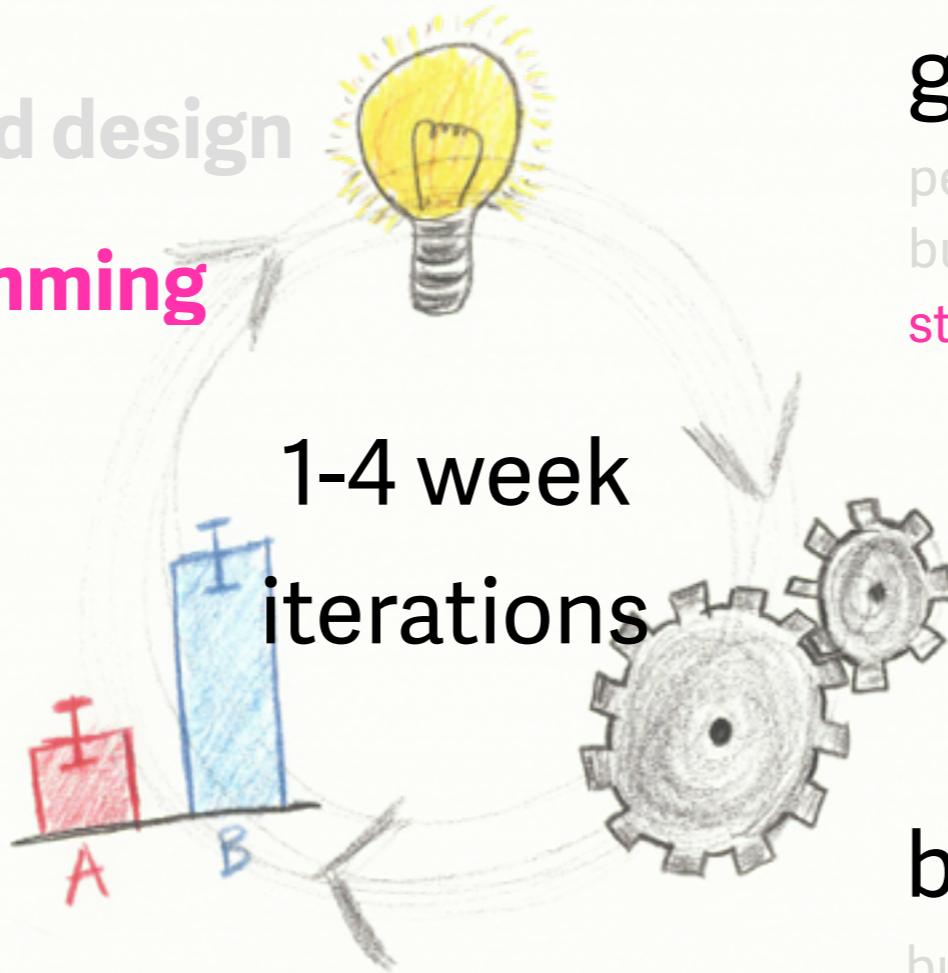
iterative problem solving

anticipate refining your solution

human-centered design
lean startup
agile programming

evaluation

surveys, interviews,
split testing, A/B testing
QA; requirements churn



generate ideas
personas, use cases
business requirements
story/user cards

build prototype
build device prototypes
minimum viable product
write code

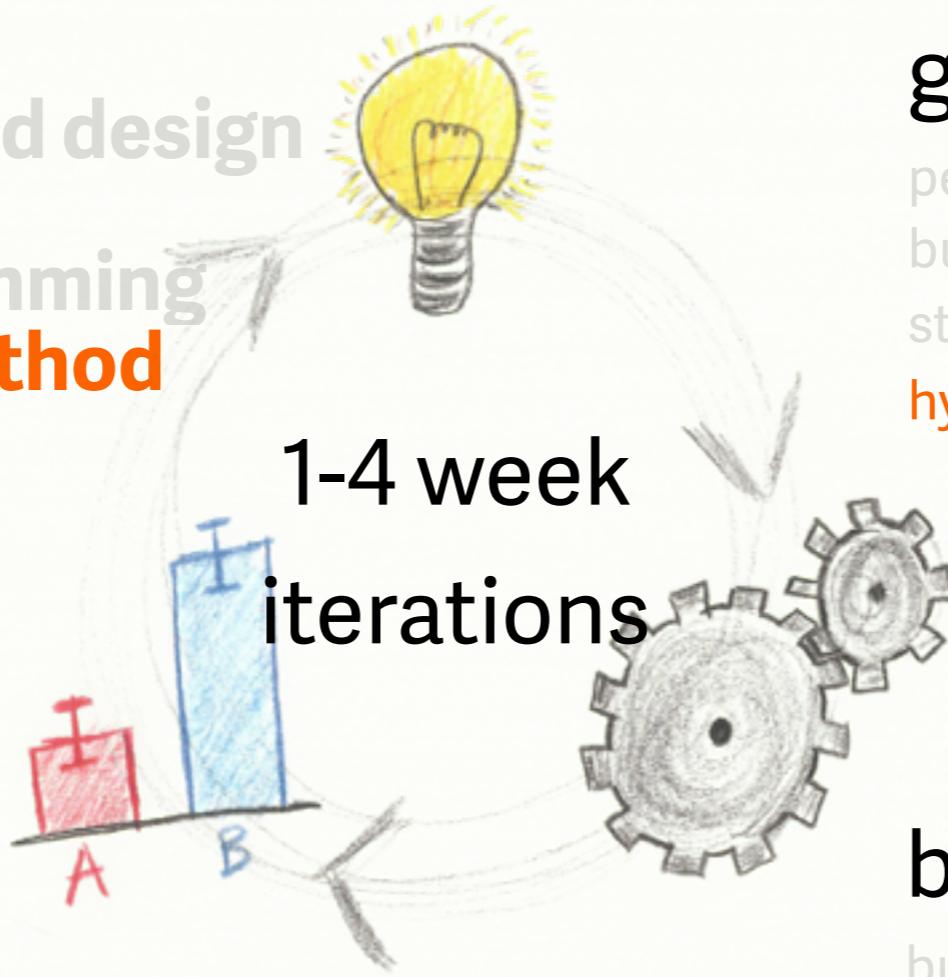
iterative problem solving

anticipate refining your solution

human-centered design
lean startup
agile programming
scientific method

evaluation

surveys, interviews,
split testing, A/B testing
QA; requirements churn
measurement



generate ideas
personas, use cases
business requirements
story/user cards
hypothesis

build prototype
build device prototypes
minimum viable product
write code
experiment

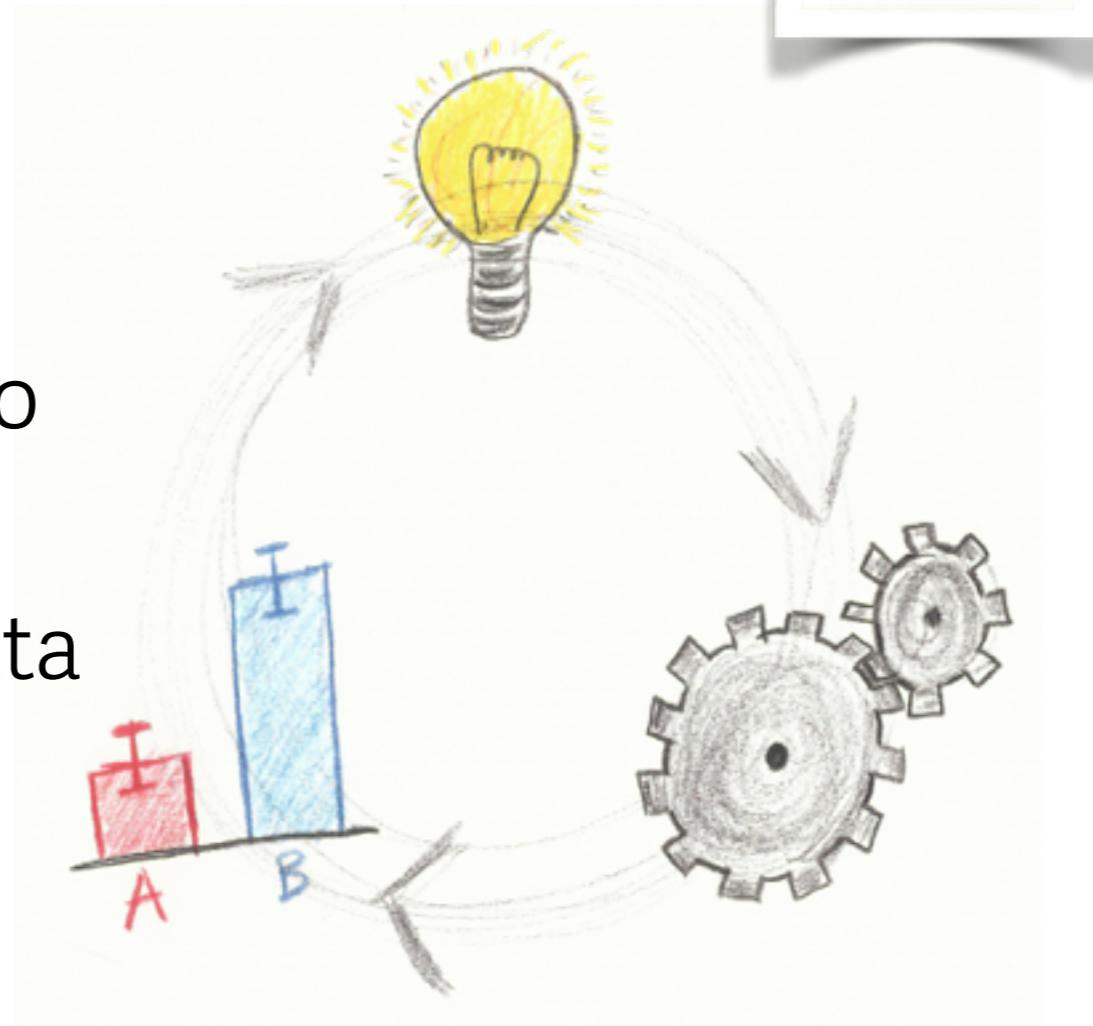
quick
an  informal

example

the goal

recent passion project

- explore tools / libraries
- learn more about Chicago
- play with social media data
- write a blog post



brainstorm

recent passion project



Instagram



tinder.TM

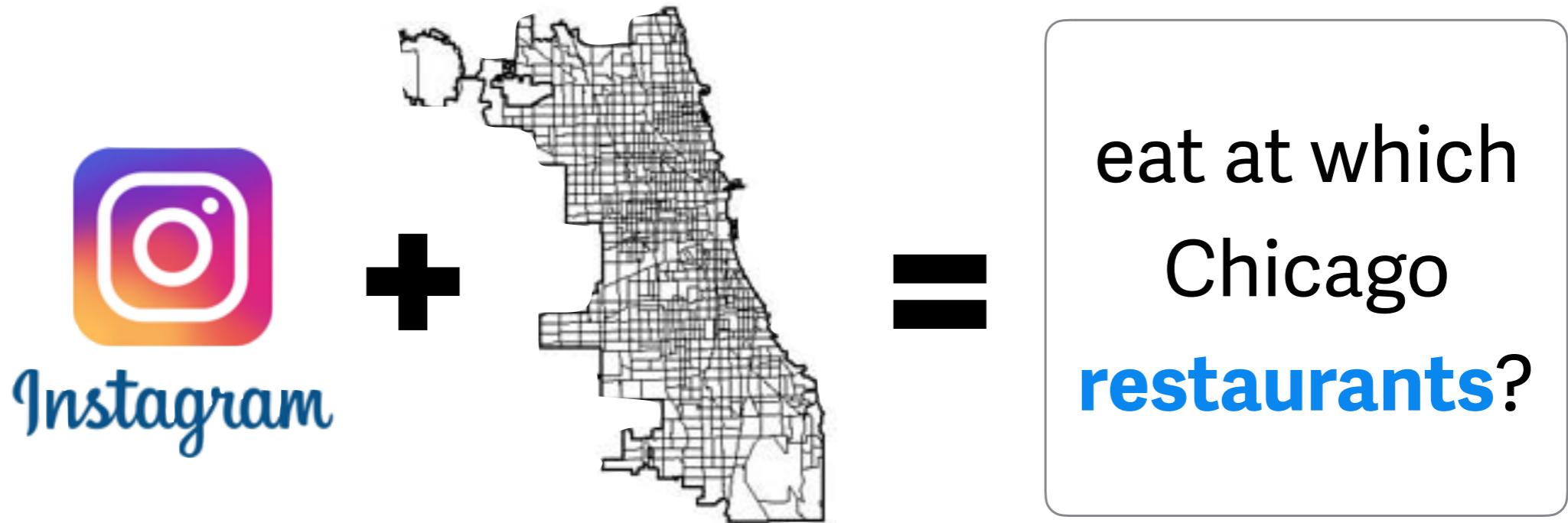
- text
- pictures
- geolocation
- networks
- timestamps
- who?
- where?
- when?
- to avoid?
- to go?

iterations

recent passion project

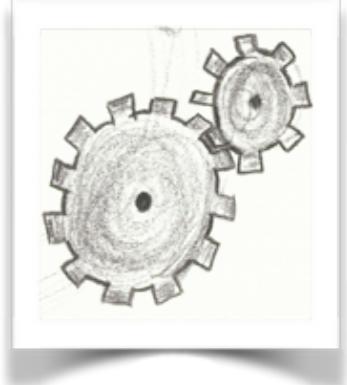


- map Instagram activity to Chicago neighborhoods

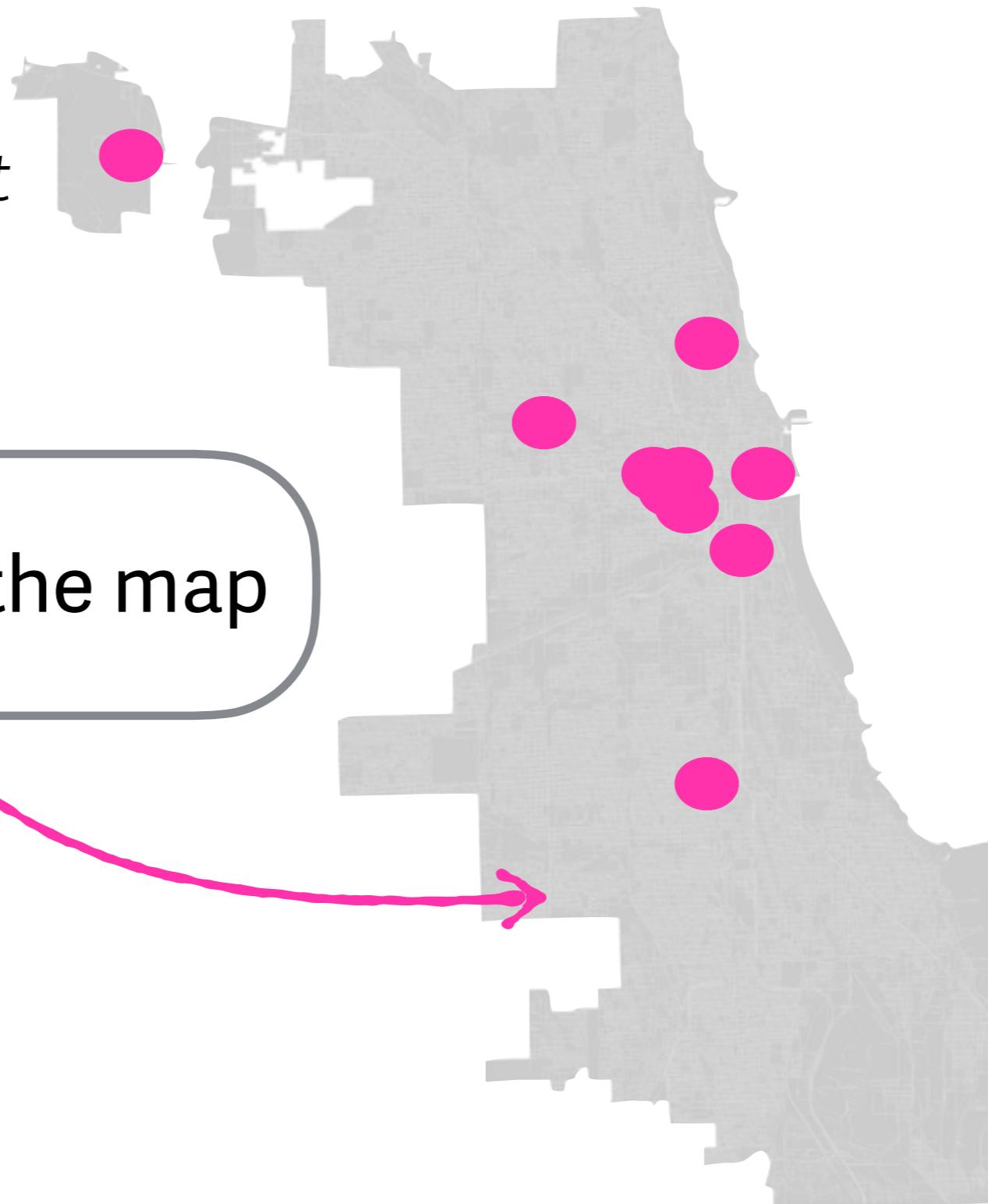


iterations

recent passion project

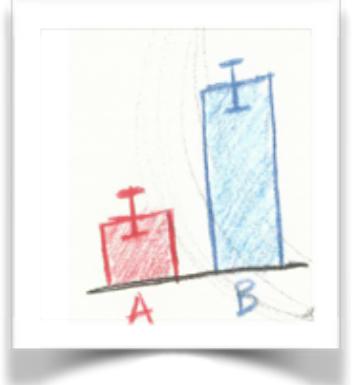


put one day on the map



missing data

recent passion project



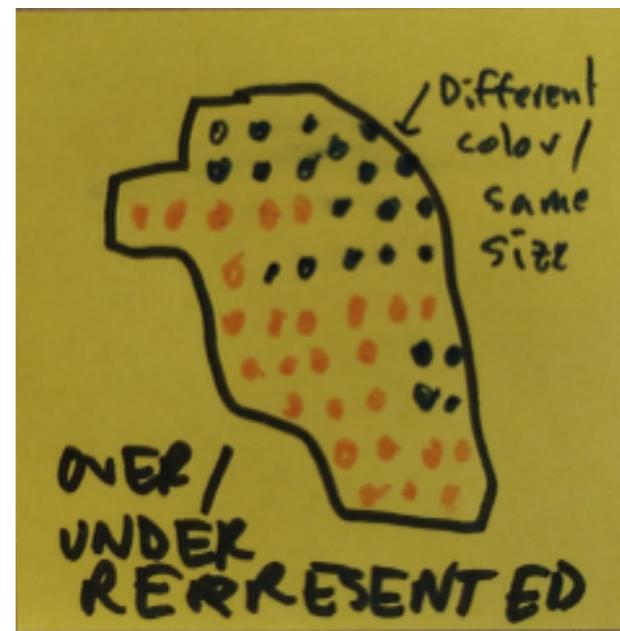
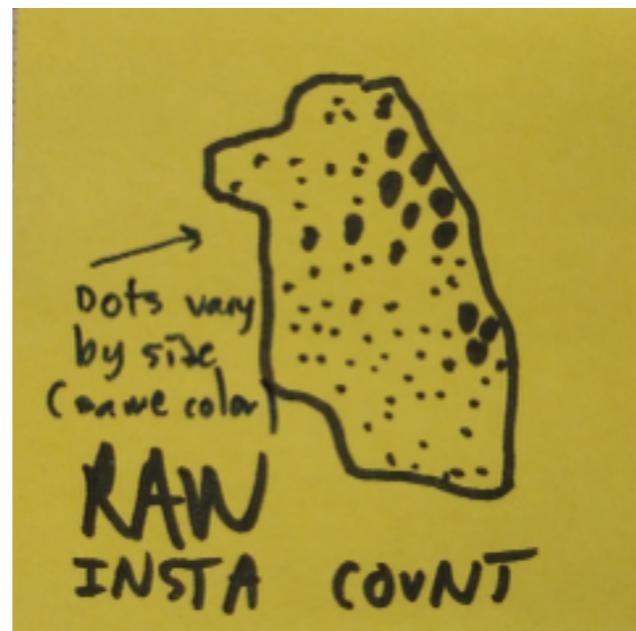
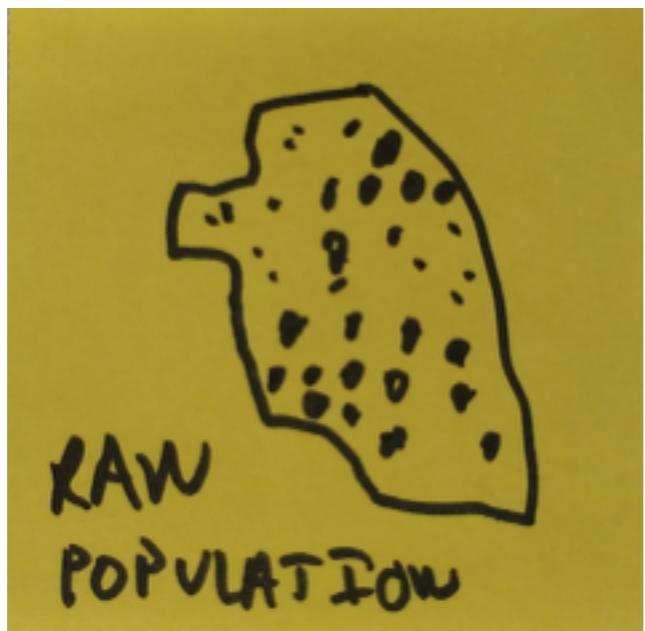
missing something?

redefined solution

recent passion project



- what **patterns** might you find?



redefined problem

recent passion project



- map Instagram activity to Chicago neighborhoods

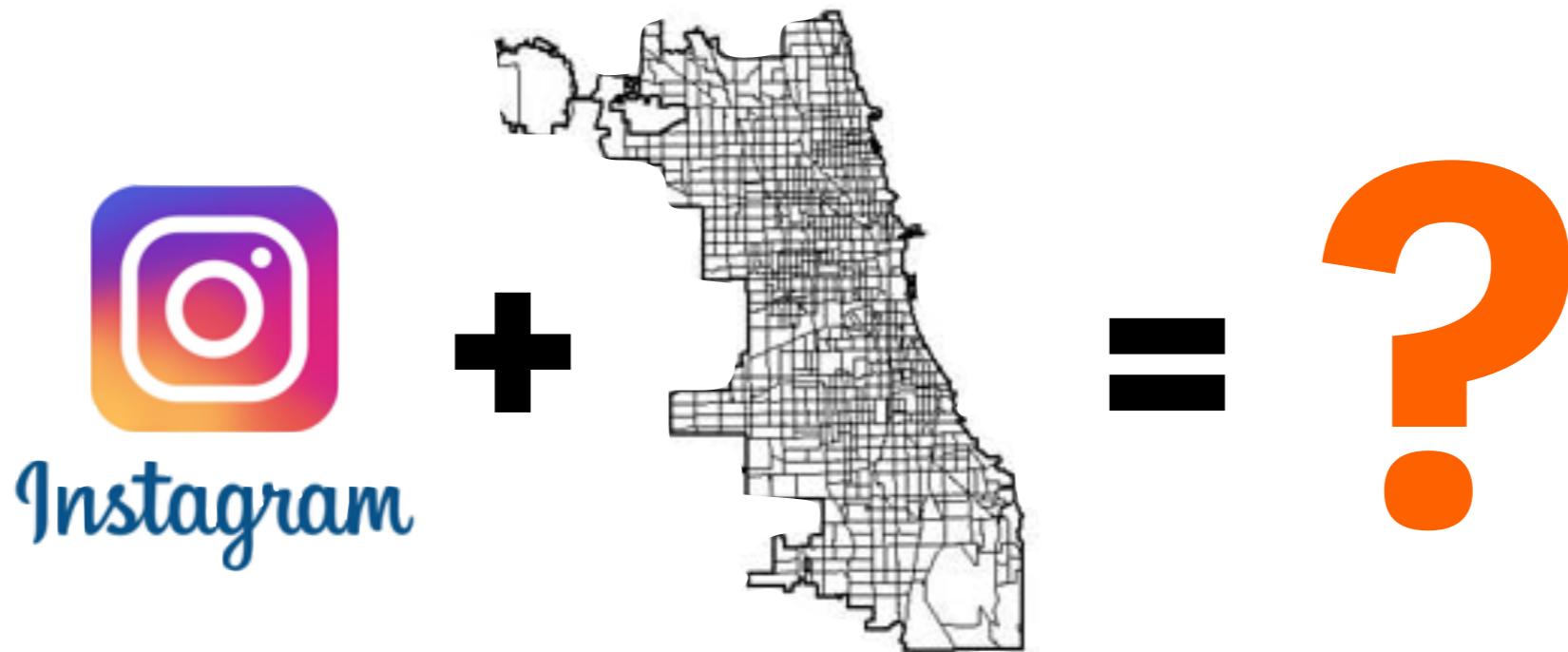


redefined problem

recent passion project

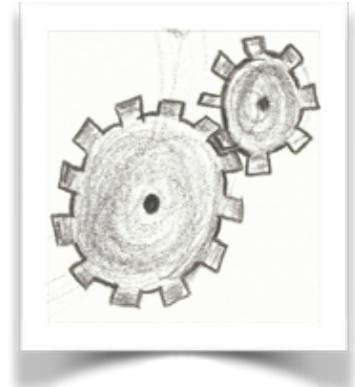


- who's (**not**) represented in Chicago's Instagram activity ?

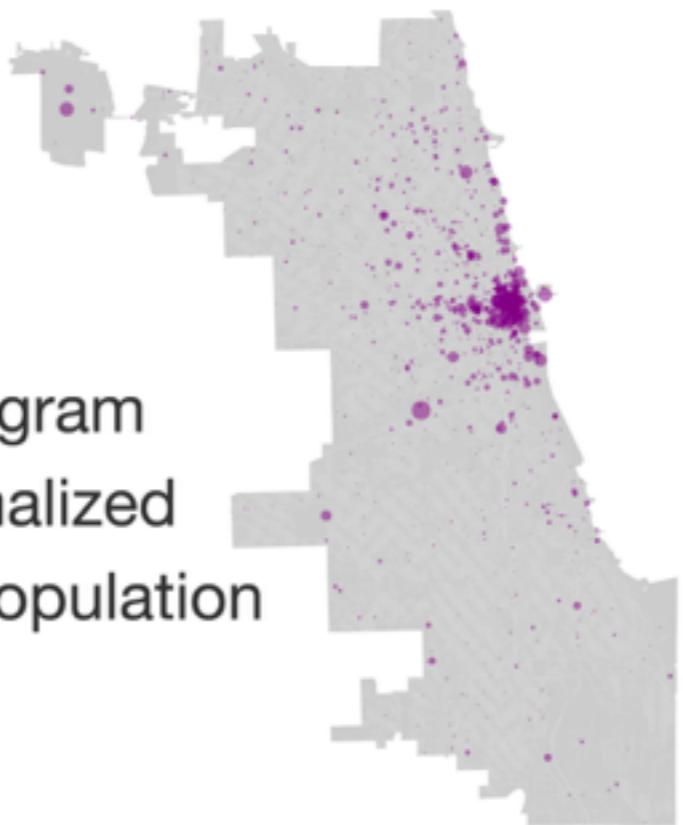


iterations

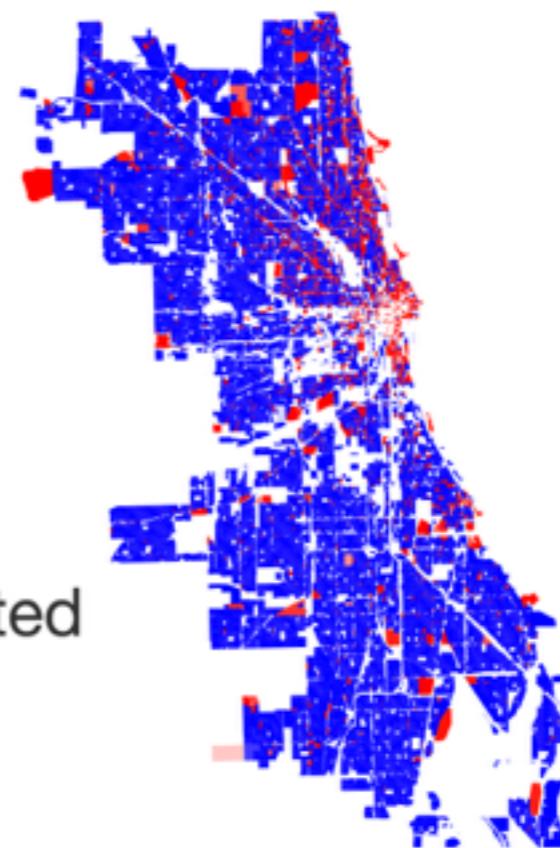
recent passion project



instagram
normalized
for population



over /
under
represented

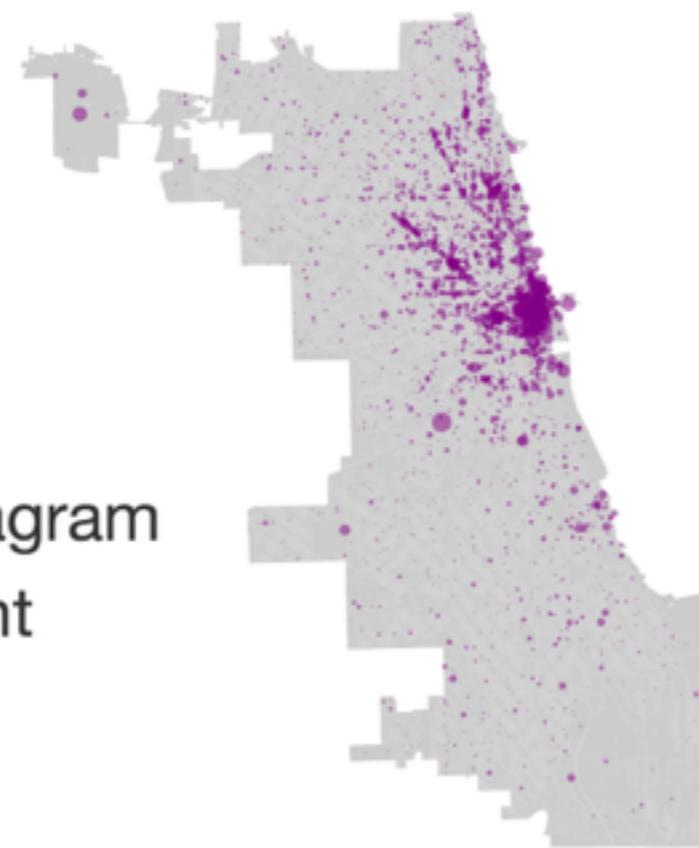


iterations

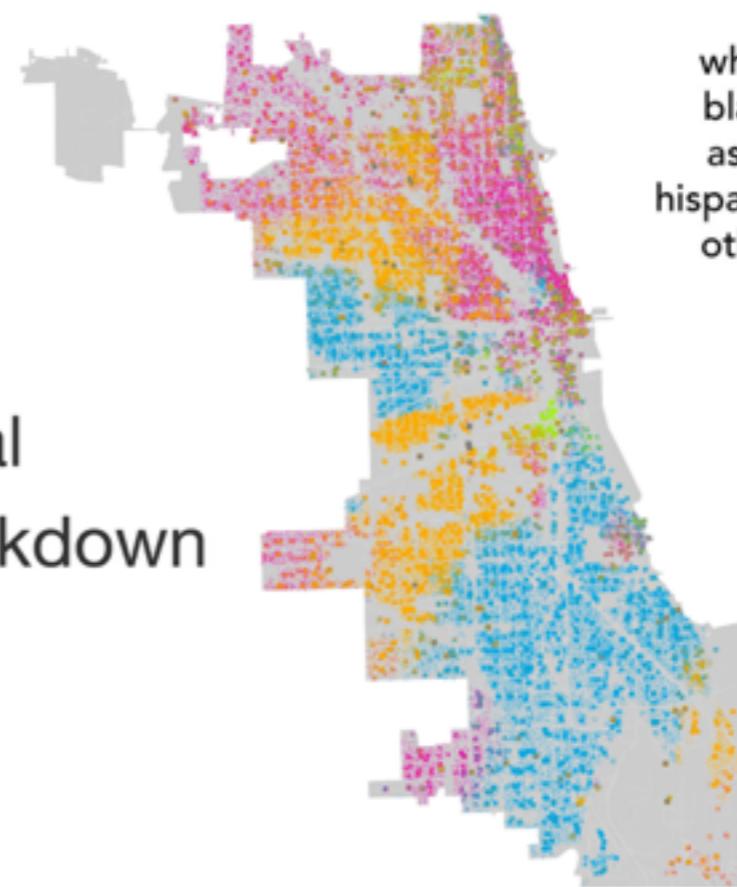
recent passion project



raw
instagram
count



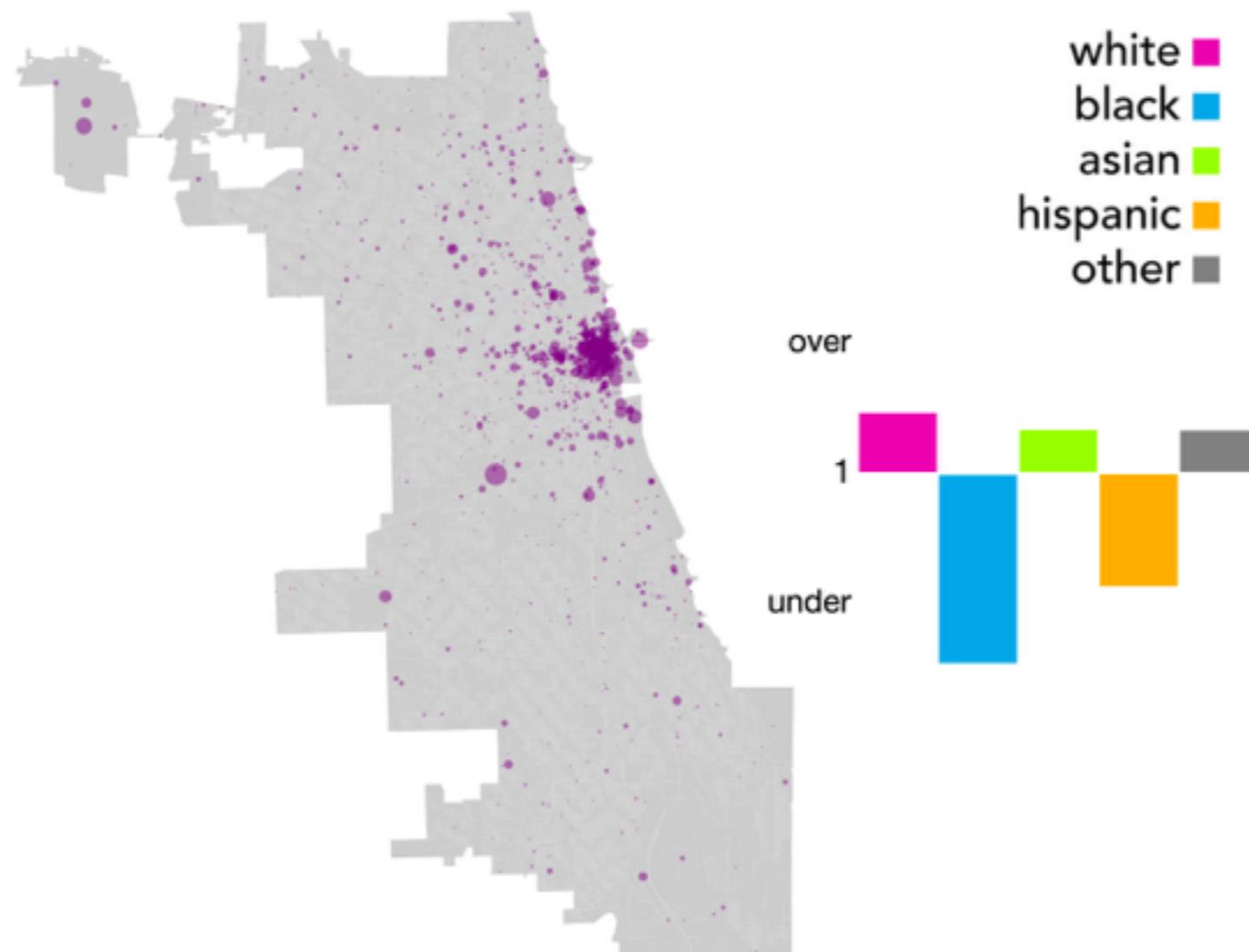
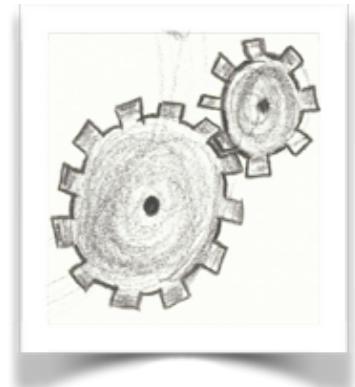
racial
breakdown



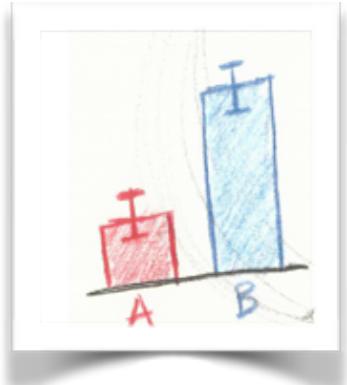
- white ■
- black ■
- asian ■
- hispanic ■
- other ■

final output

recent passion project



final output
recent passion project



Instagram's Blind Spot

July 19, 2016

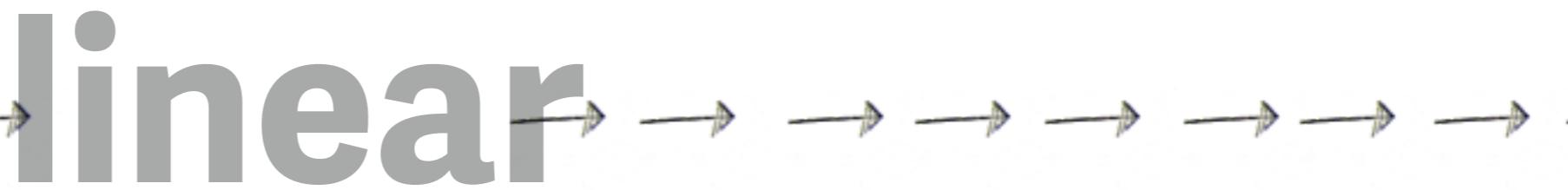
**Chicago as a case study in the
limitations of social media
datasets**



markets FOR
GOOD



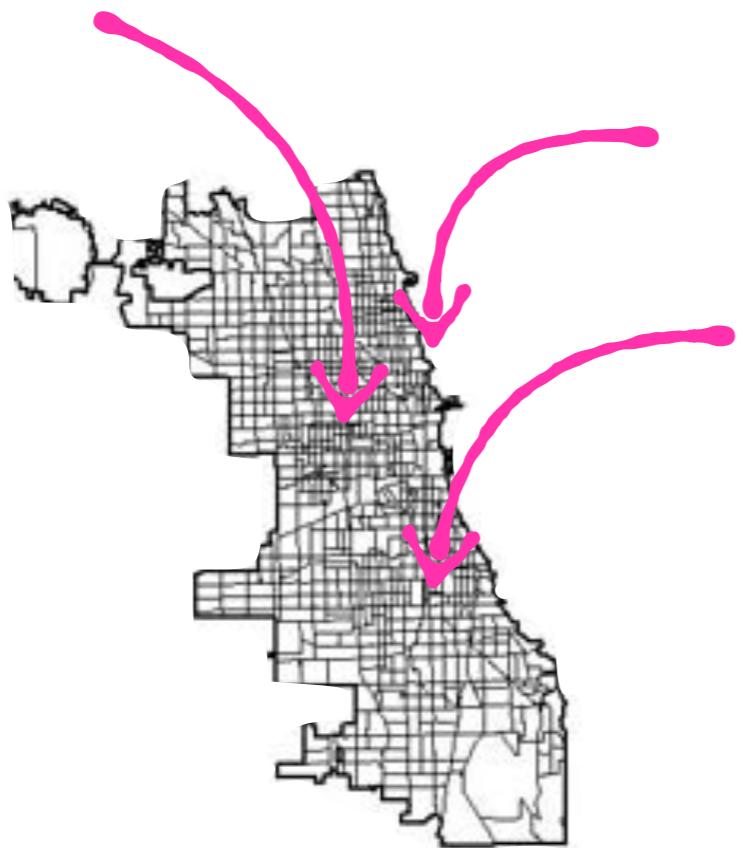
@jessfreaner



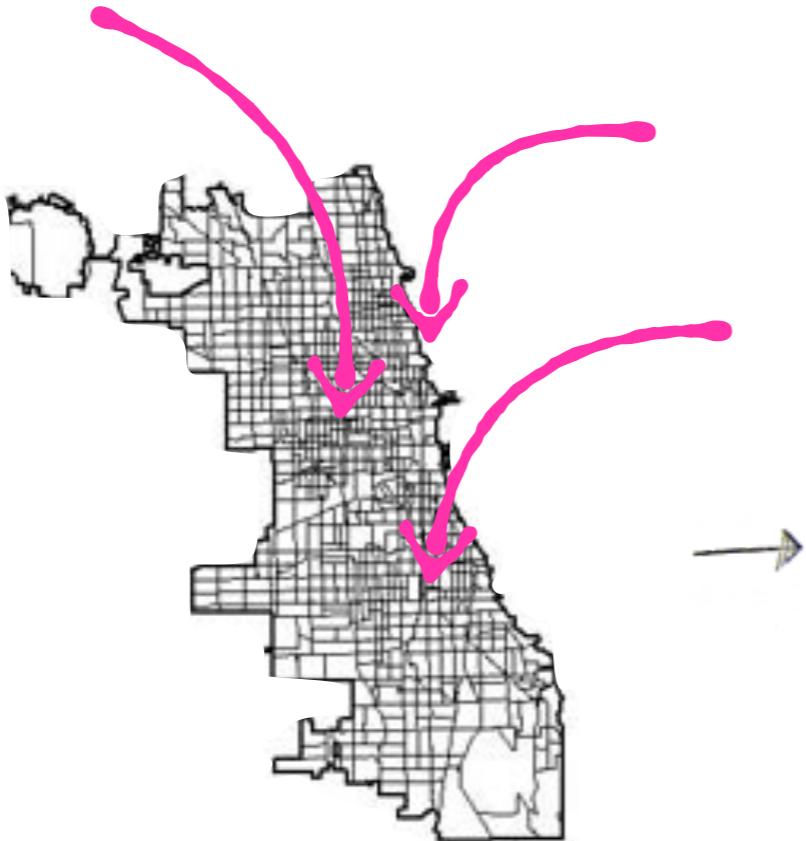
linear

eat at which
Chicago
restaurants?

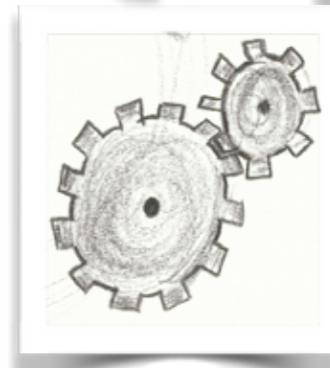
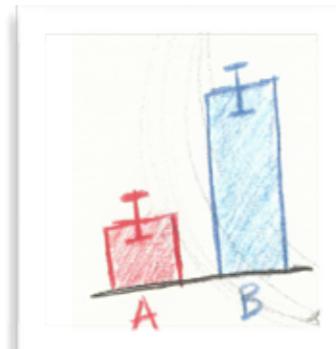
linear



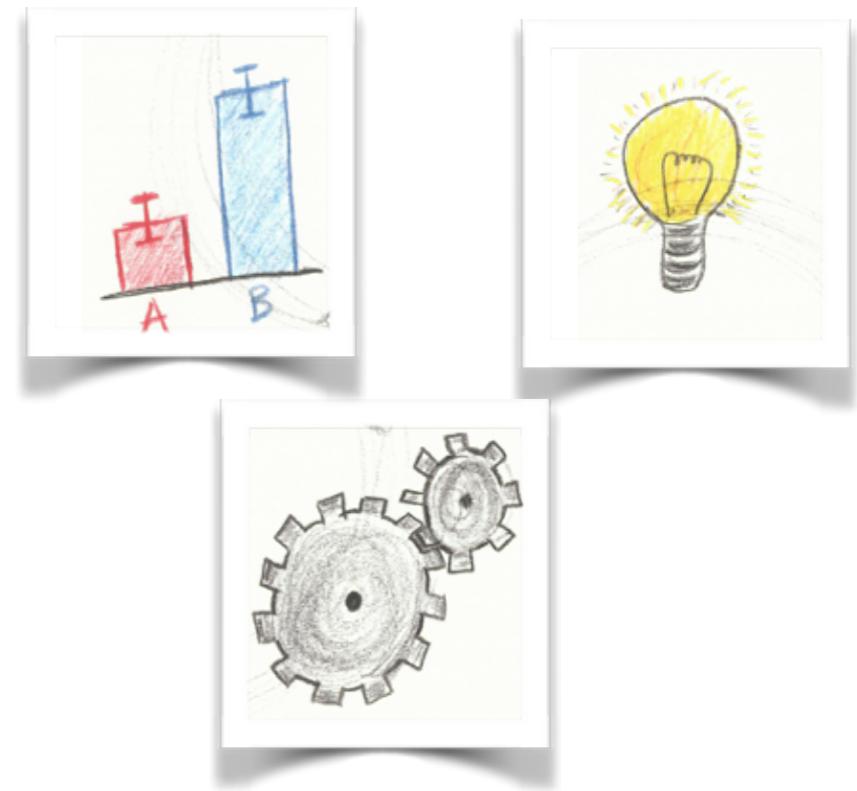
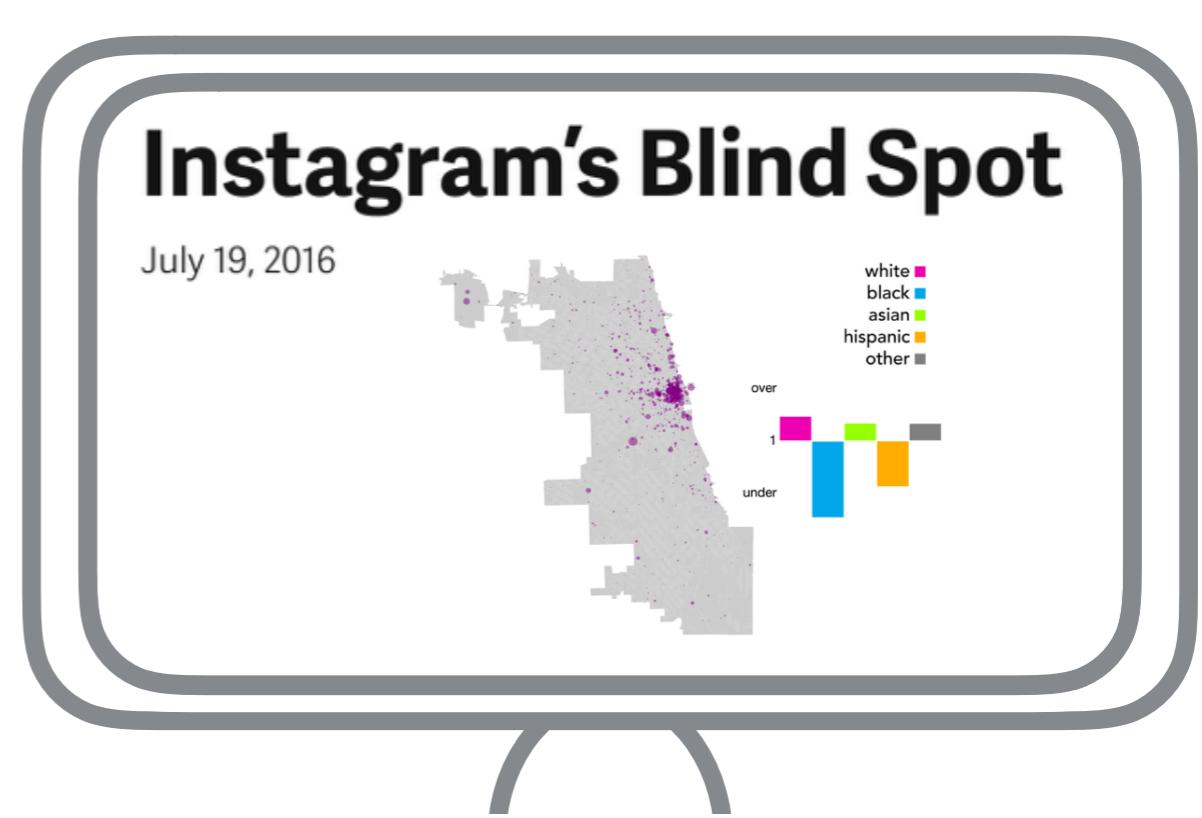
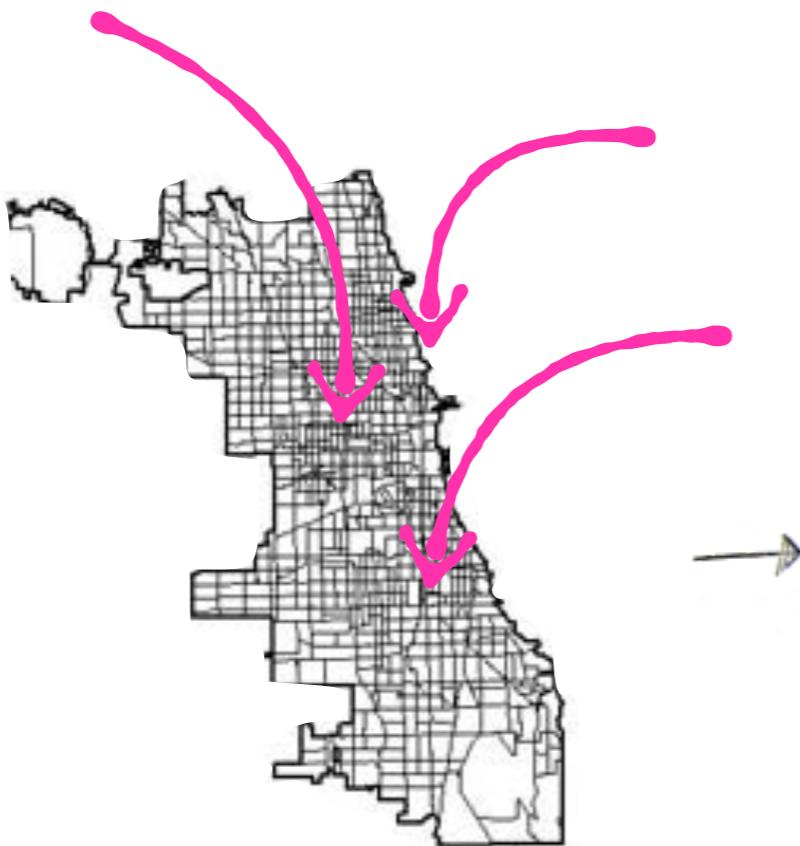
iterative



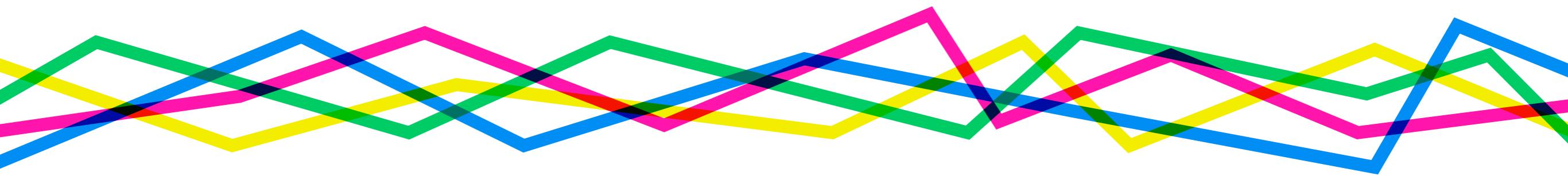
who is
missing from
Chicago's
instagram?



iterative



a case study



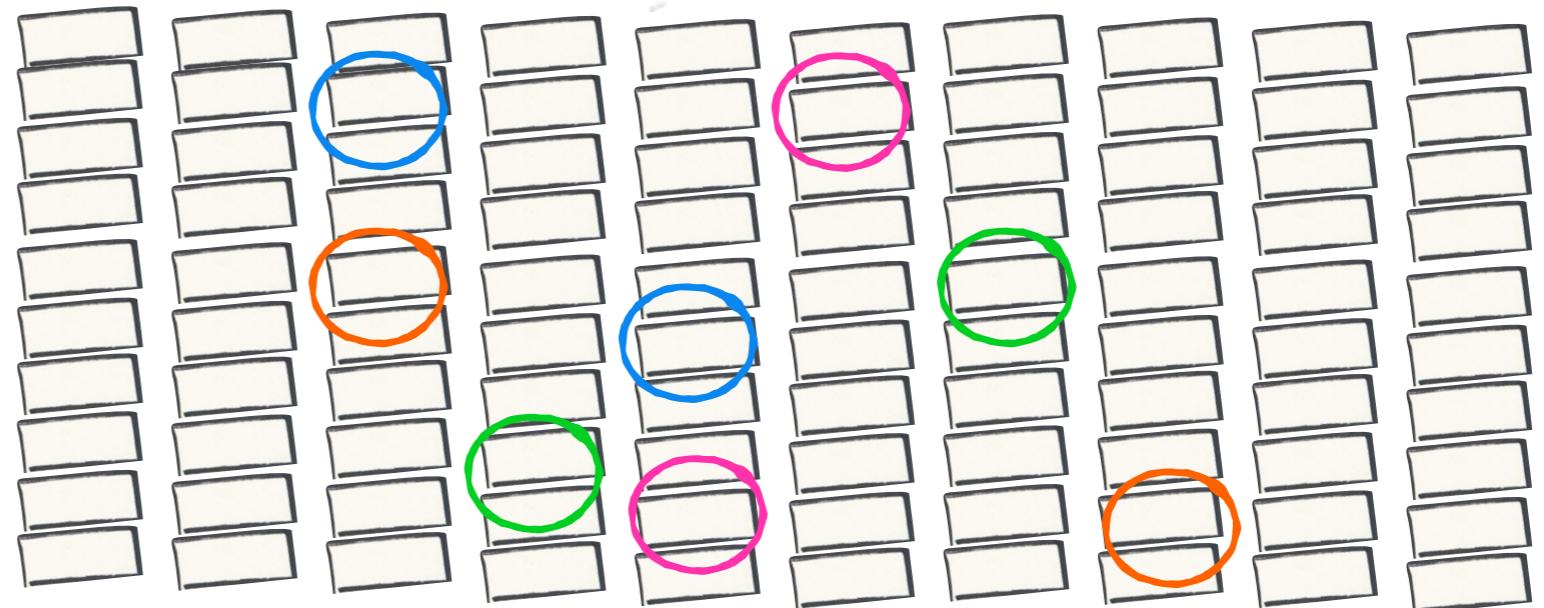
data driven expertise exploration
procter & gamble

backstory

procter & gamble

**10 product
categories**

**fortune 50
multinational**



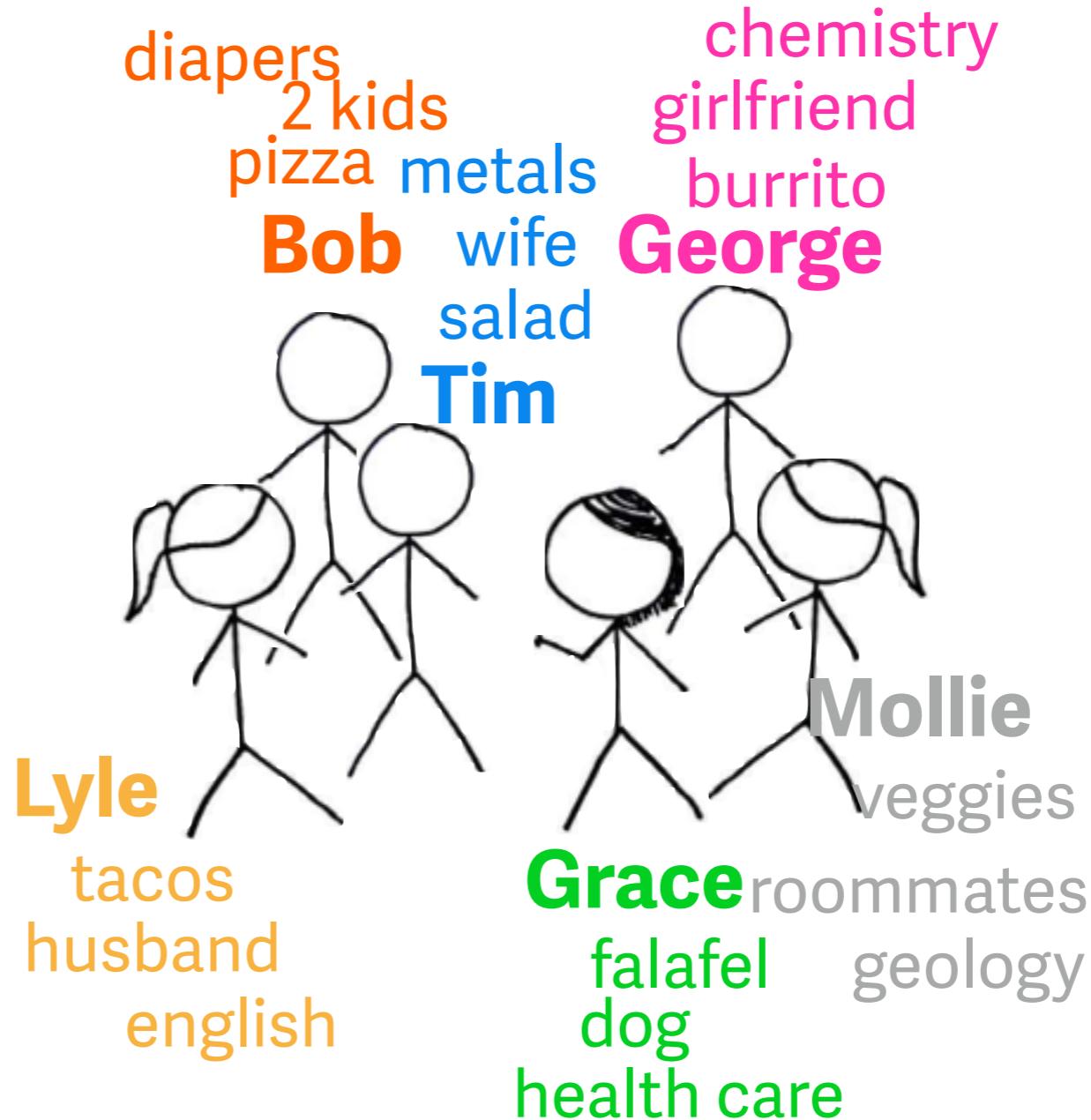
110,000+ employees

informal conversations to clarify goals

procter & gamble



Kathie



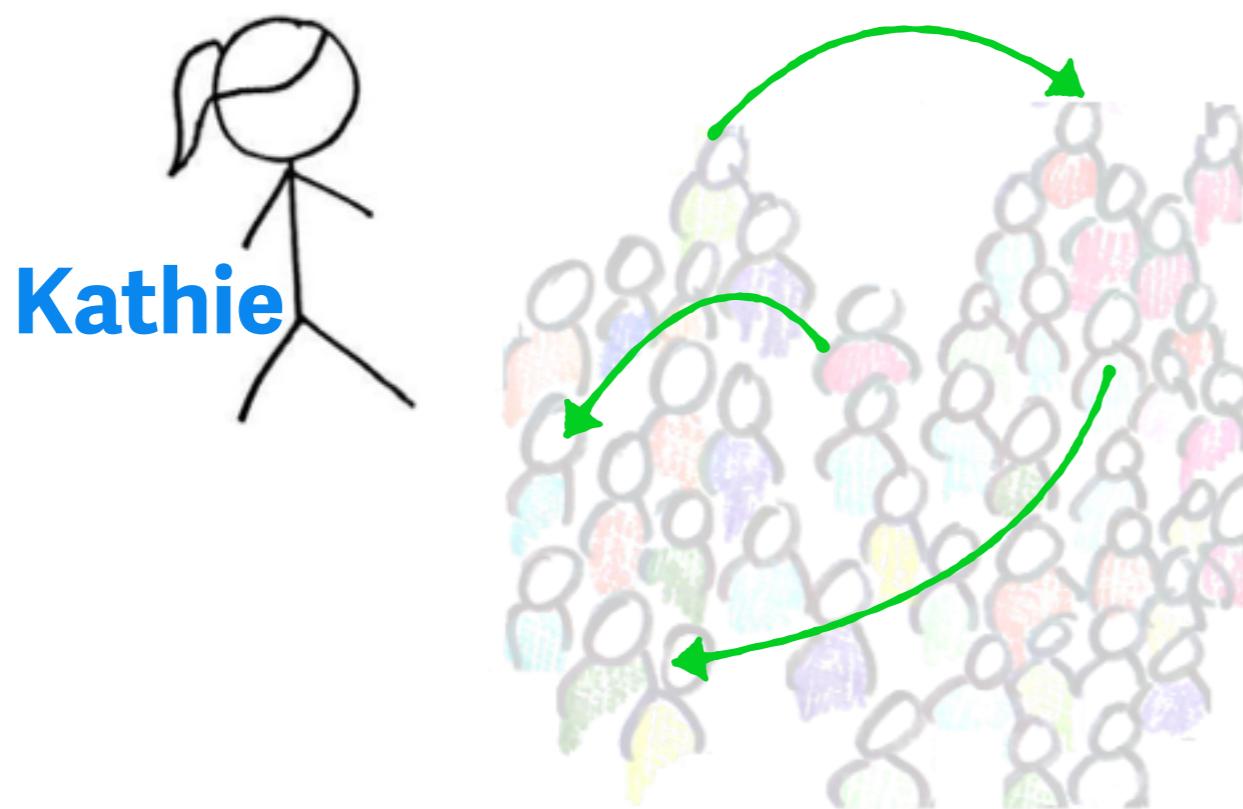
informal conversations to clarify goals

procter & gamble



informal conversations to clarify goals

procter & gamble



informal conversations to clarify goals

procter & gamble



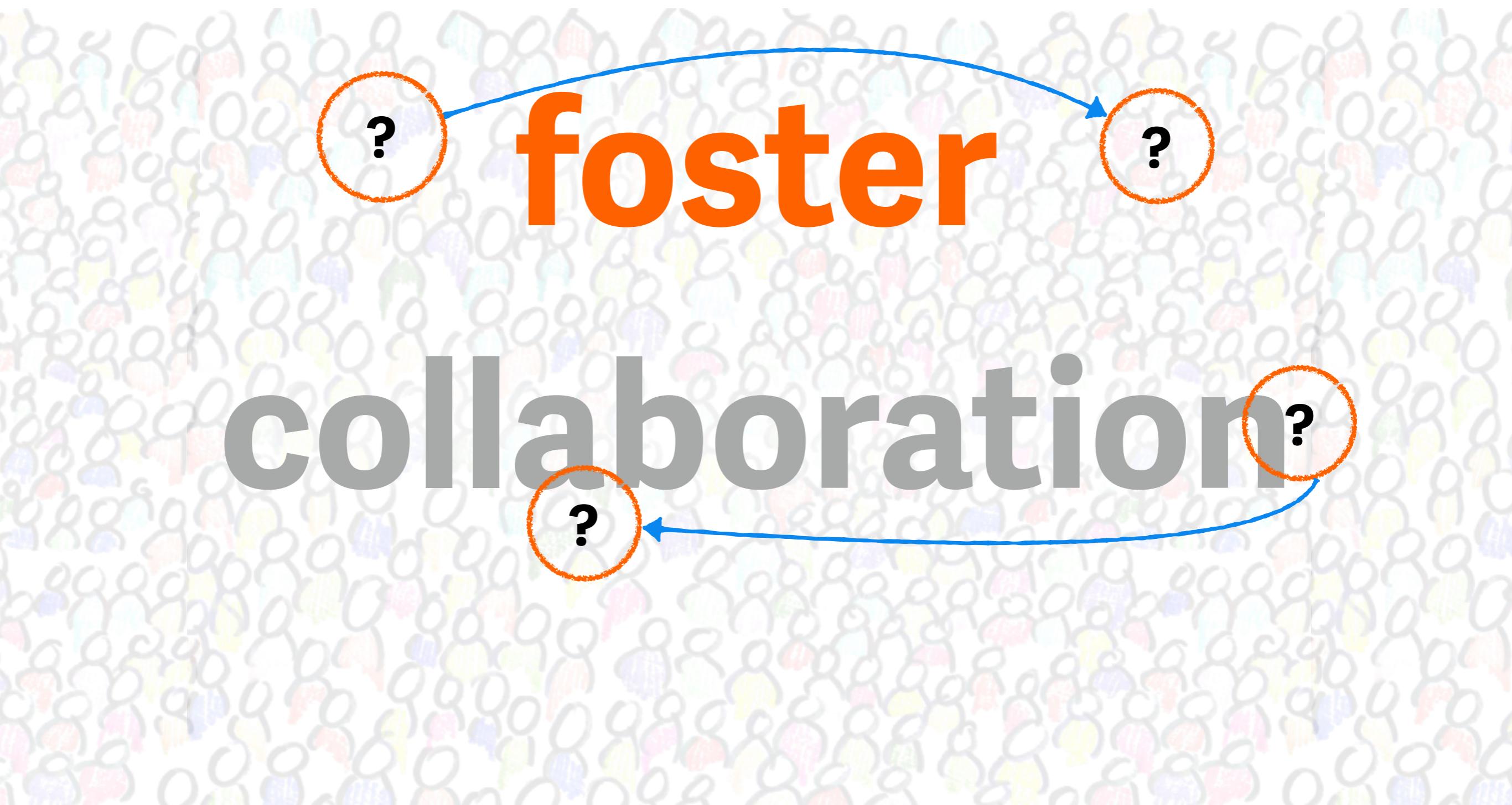
informal conversations to clarify goals

procter & gamble



informal conversations to clarify goals

procter & gamble

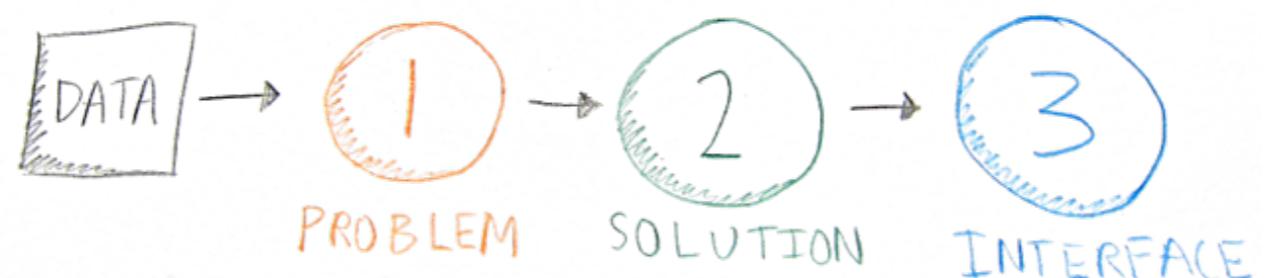


foster

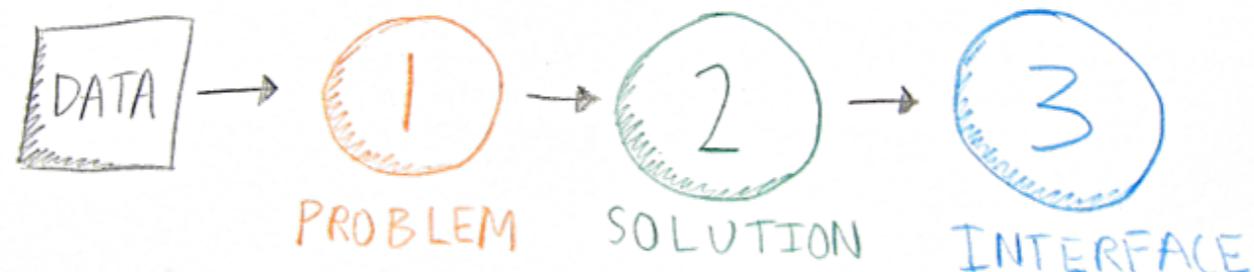
collaboration

The word "foster" is written in orange, and the word "collaboration" is written in gray. Both words are positioned over a large, faint background of stylized human icons in various colors. Four blue arrows originate from the letters "f", "o", "s", and "t" in "foster", pointing towards the letters "c", "o", "l", and "l" in "collaboration". Each arrow has a question mark inside a red circle at its origin.

linear

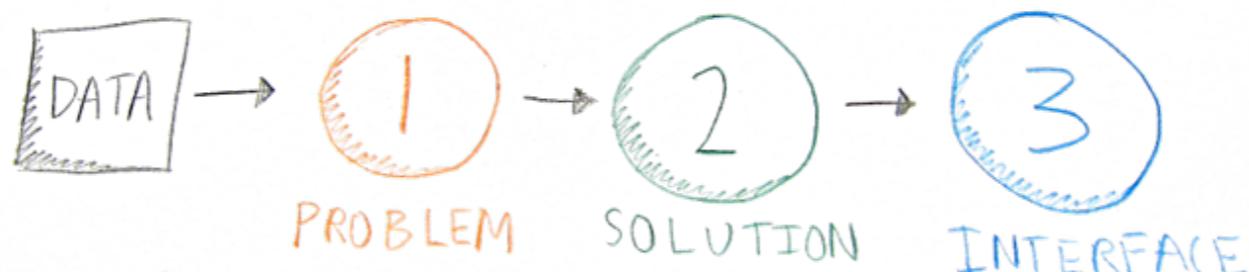


linear

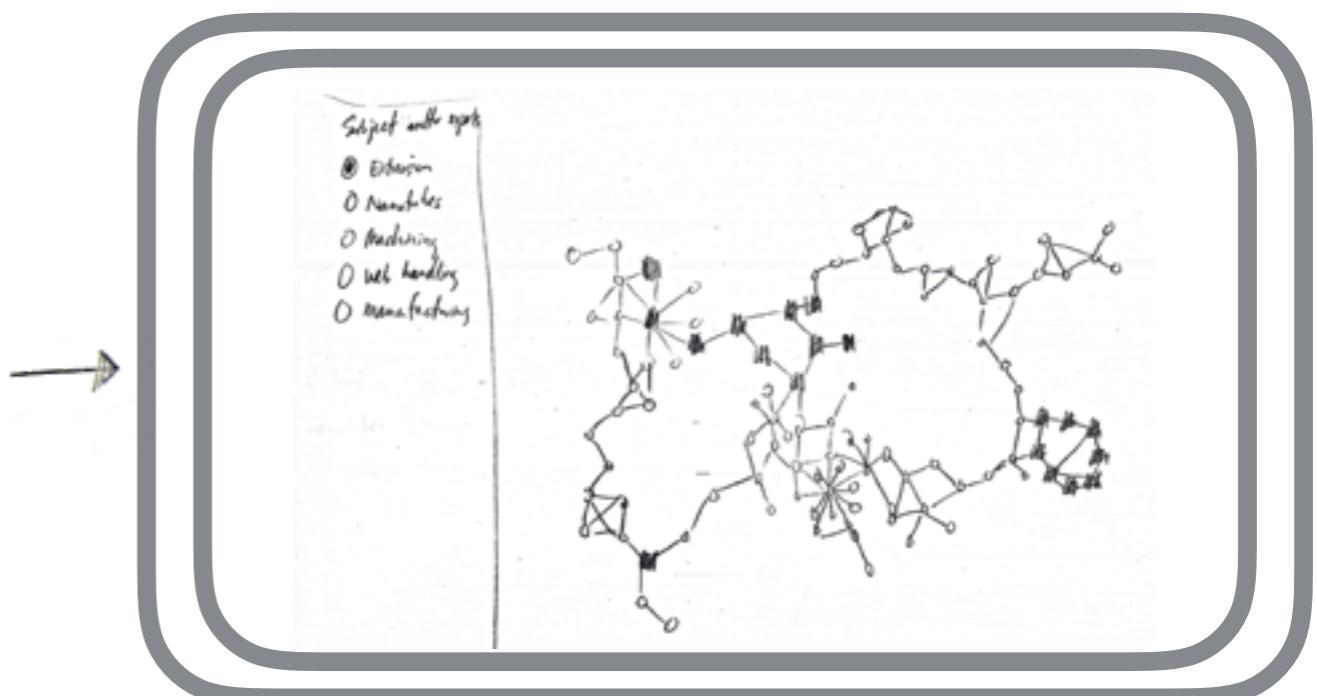


visualize
expertise in a
company

linear



visualize
expertise in a
company



data-driven expertise exploration

procter & gamble



Lorem Ipsum: a narrative about blankets.

Author: Charlie Brown

Date: 31 Jan 2012

>Lorem Ipsum is a dummy text used when typesetting or marking up documents. It has a long history starting from the 1500s and is still used in digital millennium for typesetting electronic documents, page designs, etc.

In itself, the original text of Lorem Ipsum might have been taken from an ancient Latin book that was written about 50 BC. Nevertheless, Lorem Ipsum's words have been changed so they don't read as a proper text.

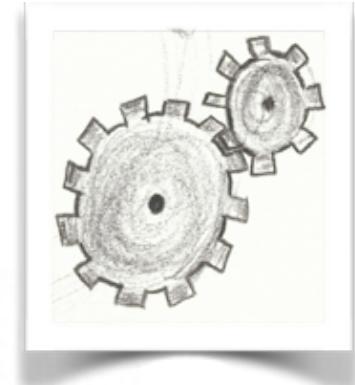
Naturally, page designs that are made for text documents must contain some text rather than placeholder dots or something else. However, should they contain proper English words and sentences almost every reader will deliberately try to interpret it eventually, missing the design itself.

However, a placeholder text must have a natural distribution of letters and punctuation or otherwise the markup will look strange and unnatural. That's what Lorem Ipsum helps to achieve.

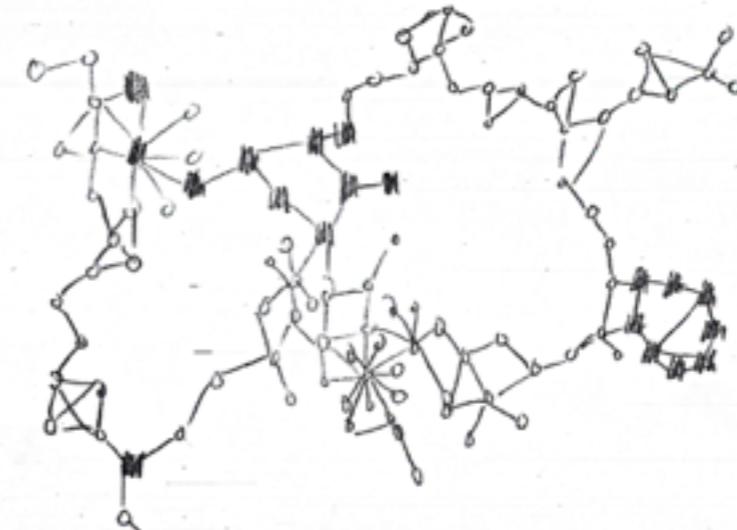
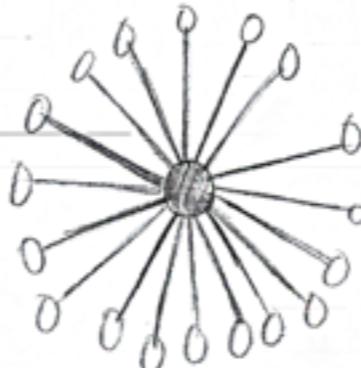
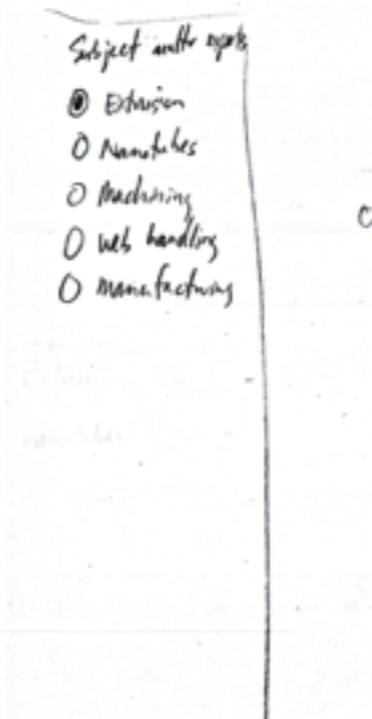
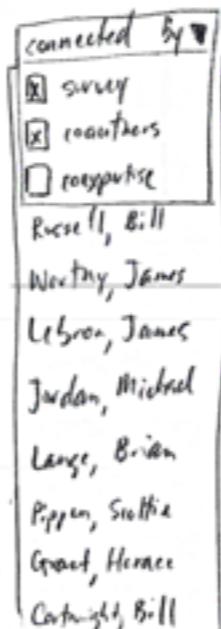
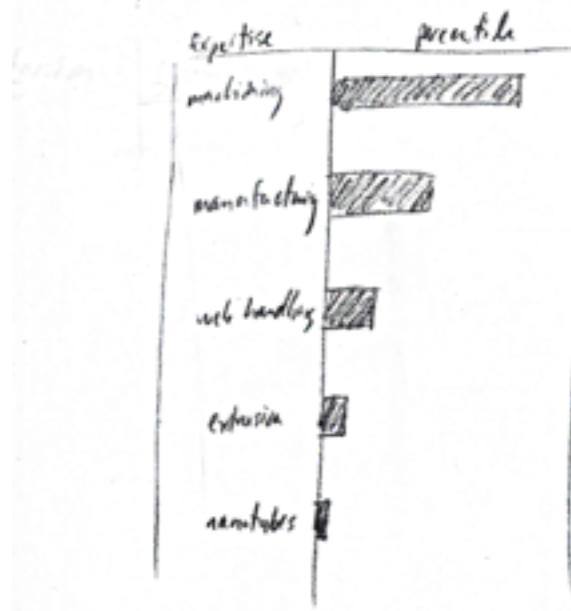
I would like to thank Peppermint Patty for her support on studying Lorem Ipsum as well as the infinite wisdom of Linus van Pelt and his willingness to use his blanket in my experiments.

concept sketch comparisons

procter & gamble



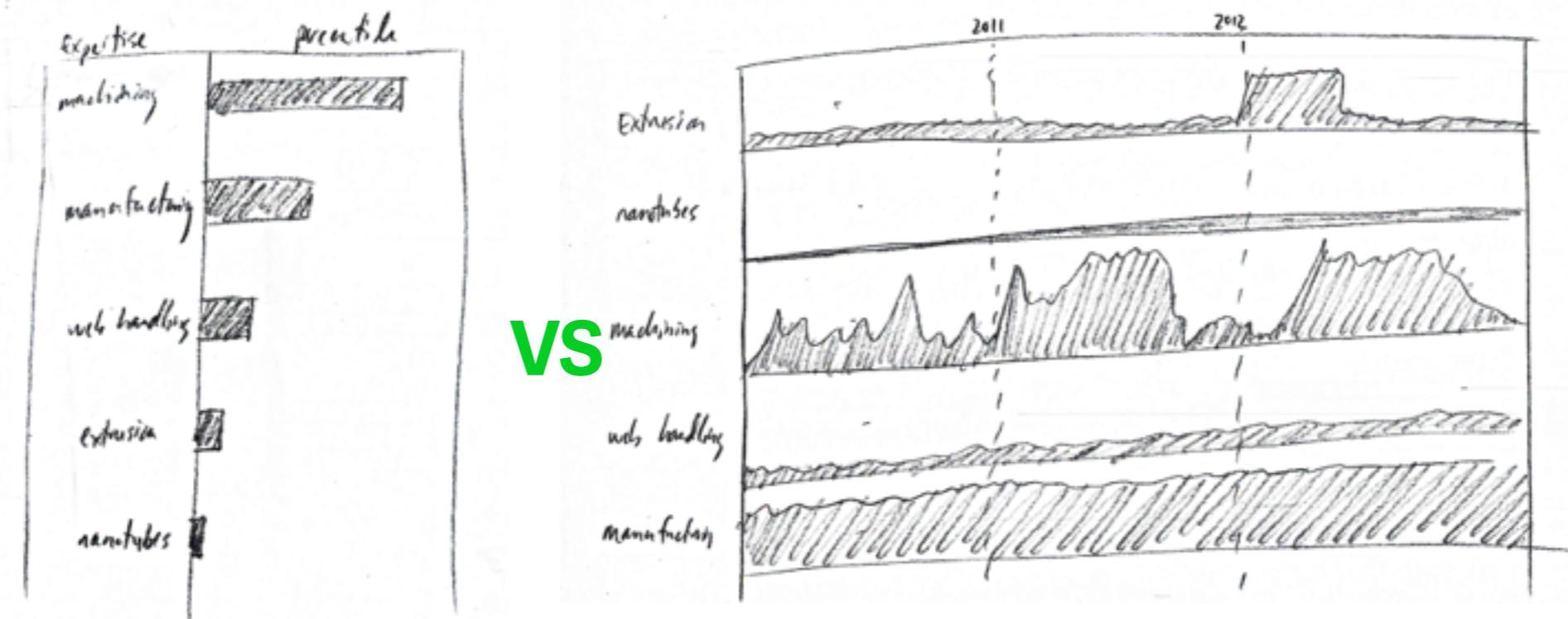
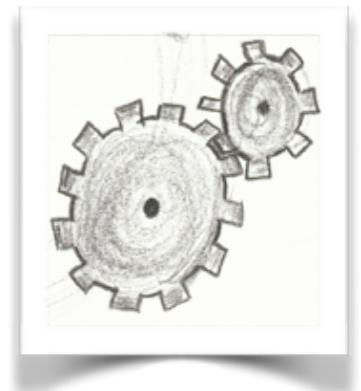
VS



what matters & why?

concept sketch comparisons

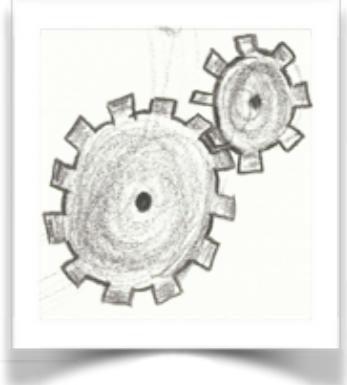
procter & gamble



what matters & why?

concept sketch comparisons

procter & gamble



Timeline

2012 4 SLS reports
cardboard, geodesic packaging
Relocated to Cologne, Germany

2011 23 SLS reports
buckyballs, nanotubes

2010 9 wiki posts

2009 Relocated to Crest

... click to expand before 2009

VS



Brown, Chuck

TU7263

Lecture: Cincinnati, OH USA
Education: University of Maryland
Band: 4



GBU: Design
Product: Tide

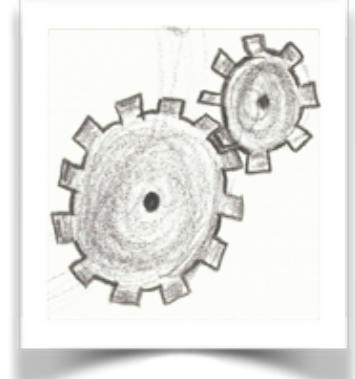
expertise	printable
extusion	10
nanofibers	2
machining	10
web handling	21
manufacturing	55

content coach
Machining is as easy as 1-2-3!
future manufacturing of the future
on the extension module
2nd century machines:
I am relative review

what matters & why?

concept sketch comparisons

procter & gamble



Asker: Jim Jamson

Anyone done work on using nonwoven fabrics in packaging?
#Transformations

Find

Top recommended:



Hob Jobson
3 SLS reports on nonwoven fabrics
2 wiki answers on "nonwovens"



you've emailed
Hob 4 times in the
last year

VS

Missing Links

click to compose an email to both

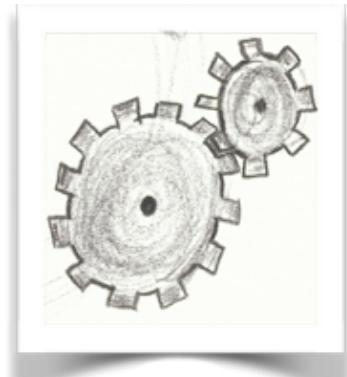
Jon Chanson Baby Care Kim Dimson Beauty
both have recently written about "aluminum oxide"

Cam Jamson Baby care Mae Jaeson Baby care
both have written about carbonic structures and work in Cincinnati

what matters & why?

concept sketch comparisons

procter & gamble



Asker: Jim Jamison
Anyone done work on using
nonwoven fabrics in packaging?
#Transformations

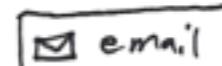
Top recommended:



Hob Jobson

3. SLS reports on nonwoven fabrics

2 wiki answers on "non waves"



You've emailed
Bob 4 times in the
last year

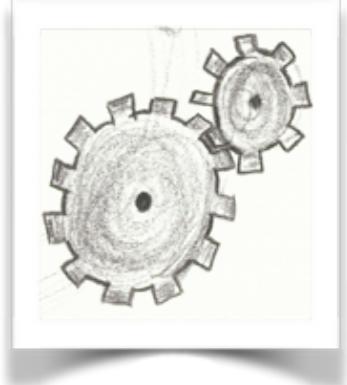
VS

<input checked="" type="checkbox"/> Aebi	SMEs in Cardboard
<input type="checkbox"/> Polymers	
cardboard >	<input checked="" type="checkbox"/> Dip Dapson  
laminates	<input checked="" type="checkbox"/> Dan Flanson  
ceramics	<input checked="" type="checkbox"/> Meg Crigson  
simulation	<input checked="" type="checkbox"/> will Jillson  
stress testing	
compostable	

what matters & why?

concept sketch comparisons

procter & gamble



Asker: Jim Jamson

Anyone done work on using nonwoven fabrics in packaging?
#Transformations

Find

Top recommended:

Hob Jobson
3 SL5 reports on nonwoven fabrics
2 wiki answers on "non wovens"

 email
you've emailed Hob 4 times in the last year

VS

Asker: Jim Jamson

Anyone done work on using nonwoven fabrics in packaging?
#Transformations

Find

Recommended matches: Knowledge index? Degrees separated?

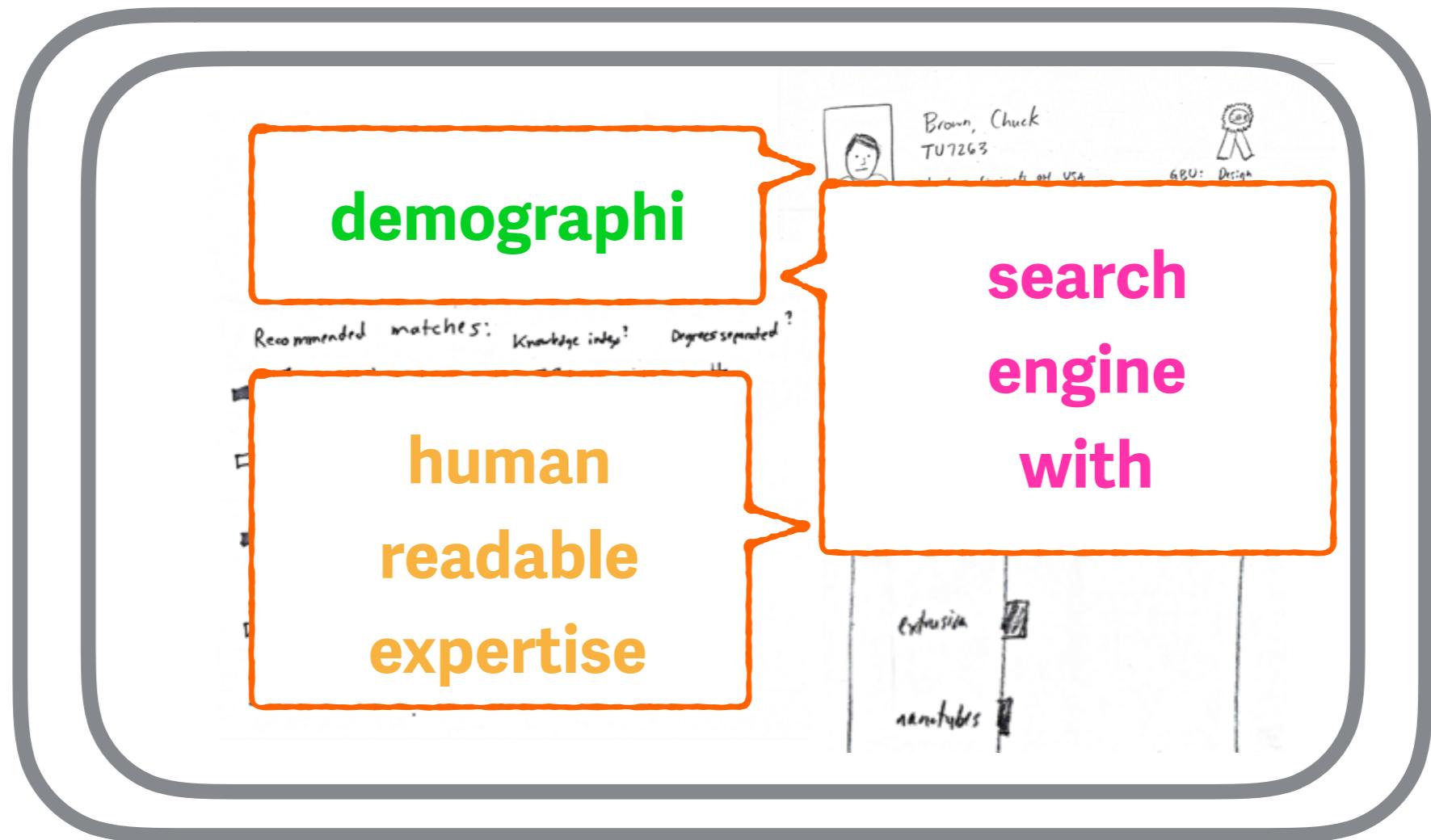
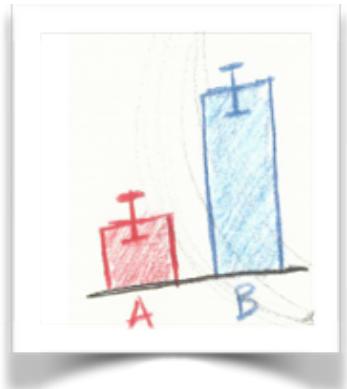
<input checked="" type="checkbox"/> Tim Thomson	79	4
<input type="checkbox"/> Sue Bruston	73	2
<input checked="" type="checkbox"/> Ted Bedson	47	1
<input type="checkbox"/> Ron Swanson	42	3

email selected

what matters & why?

moving forward

procter & gamble



what matters & why?

data-driven expertise exploration

procter & gamble



Lorem Ipsum: a narrative about blankets.

Author: Charlie Brown

Date: 31 Jan 2012

>Lorem Ipsum is a dummy text used when typesetting or marking up documents. It has a long history starting from the 1500s and is still used in digital millennium for typesetting electronic documents, page designs, etc.

In itself, the original text of Lorem Ipsum might have been taken from an ancient Latin book that was written about 50 BC. Nevertheless, Lorem Ipsum's words have been changed so they don't read as a proper text.

Naturally, page designs that are made for text documents must contain some text rather than placeholder dots or something else. However, should they contain proper English words and sentences almost every reader will deliberately try to interpret it eventually, missing the design itself.

However, a placeholder text must have a natural distribution of letters and punctuation or otherwise the markup will look strange and unnatural. That's what Lorem Ipsum helps to achieve.

I would like to thank Peppermint Patty for her support on studying Lorem Ipsum as well as the infinite wisdom of Linus van Pelt and his willingness to use his blanket in my experiments.

prototype iterations

procter & gamble

low fidelity



Asker: Chip Dipson

Anyone have experience machining aluminum at micron-level tolerances?

e-mail selected

Search

	expertise index	activity index
Chuck Brown	High	Medium
Sue Bruston	Medium	Low
Ted Bedson	Medium	Medium
Tim Thomson	Medium	High

load more...

Brown, Chuck
Cambridge, MA, USA
Chemical Engineer

email
4 emails sent recently

3 mutual connections with: < question asker >

Profile	Profile	Profile	Profile	Profile
Profile 1	Profile 2	Profile 3	Profile 4	Profile 5

Area of Expertise

Area	Level
Machining	High
Manufacturing	Medium
Web handling	Medium
Extrusion	Low
Nanotubes	Low

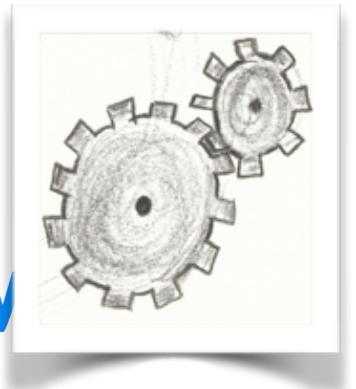
Activity

Activity	Count
Machining	3 reports
Manufacturing	3 reports
	5 wiki answers
	1 conference/presentation

prototype iterations

procter & gamble

higher fidelity



expert finder

asker: Chip Dipson

Anyone have experience machining aluminum at micron-level tolerances?

[Redo search](#) [Email Chip w/ 3 selections](#)

▼ expertise index activity level degrees separated

	Expertise	Activity	Connections
<input checked="" type="checkbox"/> Chuck Brown	★★★★	● ● ●	2
<input checked="" type="checkbox"/> Sue Bruston	★★★★	●	3
<input type="checkbox"/> Jed Bedson	★★★½	● ●	1
<input checked="" type="checkbox"/> Tim Thomson	★★½	● ● ●	2
<input type="checkbox"/> Bing Kingston	★★½	●	3
<input type="checkbox"/> Daniel Manson	★½	● ●	1

[load more...](#)

Chuck Brown
Research Fellow
Cambridge, MA, USA
Hill Technical Center
[17 recommendations](#) ✓

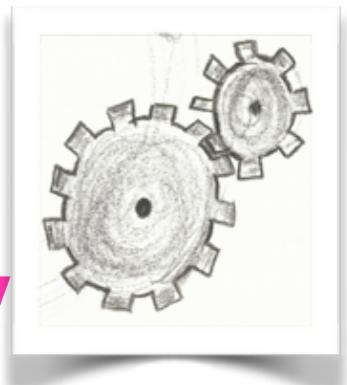
2 mutual connections with Chip

Expertise
Machining
Manufacturing
Web Handling
Nanotubes
Extrusion
Additional Info
[Social Network Survey Page](#)
[Profile](#)
[Articles](#)

prototype iterations

procter & gamble

high fidelity



where's waldo? - hi DsA, logout

asker
who asked the question?

query
an excellent search query

search email 1 recommendation

Showing results for: "an excellent search query"

experts	expertise alignment	authored	mentioned	degrees separated
<input type="checkbox"/> [redacted]	★★★★	8	20	
<input type="checkbox"/> [redacted]	★★★	21	62	
<input checked="" type="checkbox"/> [redacted]	★★★★	10	14	
<input type="checkbox"/> [redacted]	★★★	3	17	
<input type="checkbox"/> [redacted]	★★★	21	34	
<input type="checkbox"/> [redacted]	★★	28	52	
<input type="checkbox"/> [redacted]	★★	28	48	
<input type="checkbox"/> [redacted]	★★★	12	13	
<input type="checkbox"/> [redacted]	★★★★	1	5	
<input type="checkbox"/> [redacted]	★★★★	0	5	

Expertise

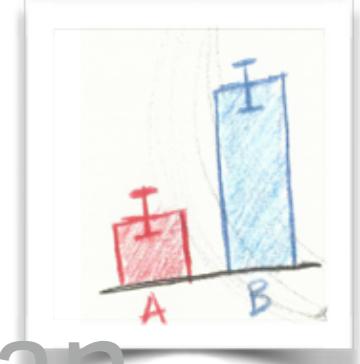
- Irritant diaper dermatitis
- Probiotic
- Collaboratory
- Silver nitrate
- IARP

Additional info

- > [redacted]
- > [redacted]
- > [redacted]

data-driven expertise exploration

procter & gamble

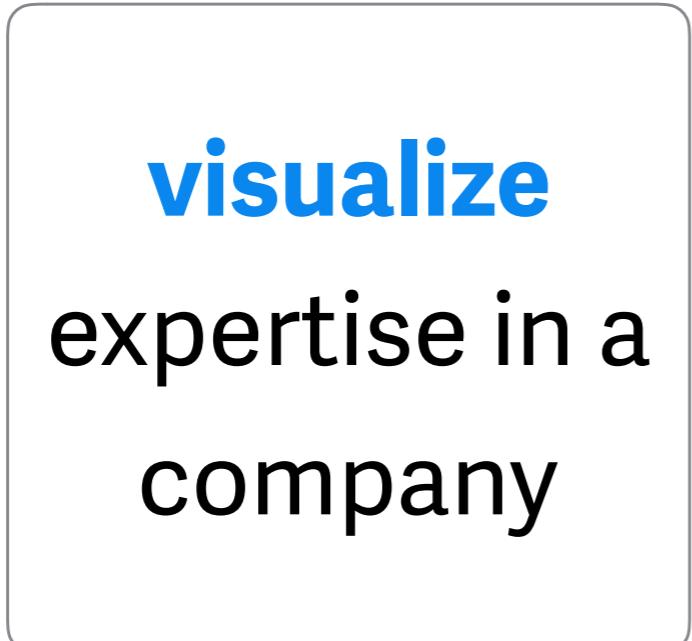


They delivered an
innovative, one-of-a-kind
tool that I use **every day**
to increase collaboration
and better understand

our company
– Kathie Felber, Technical CoP Leader

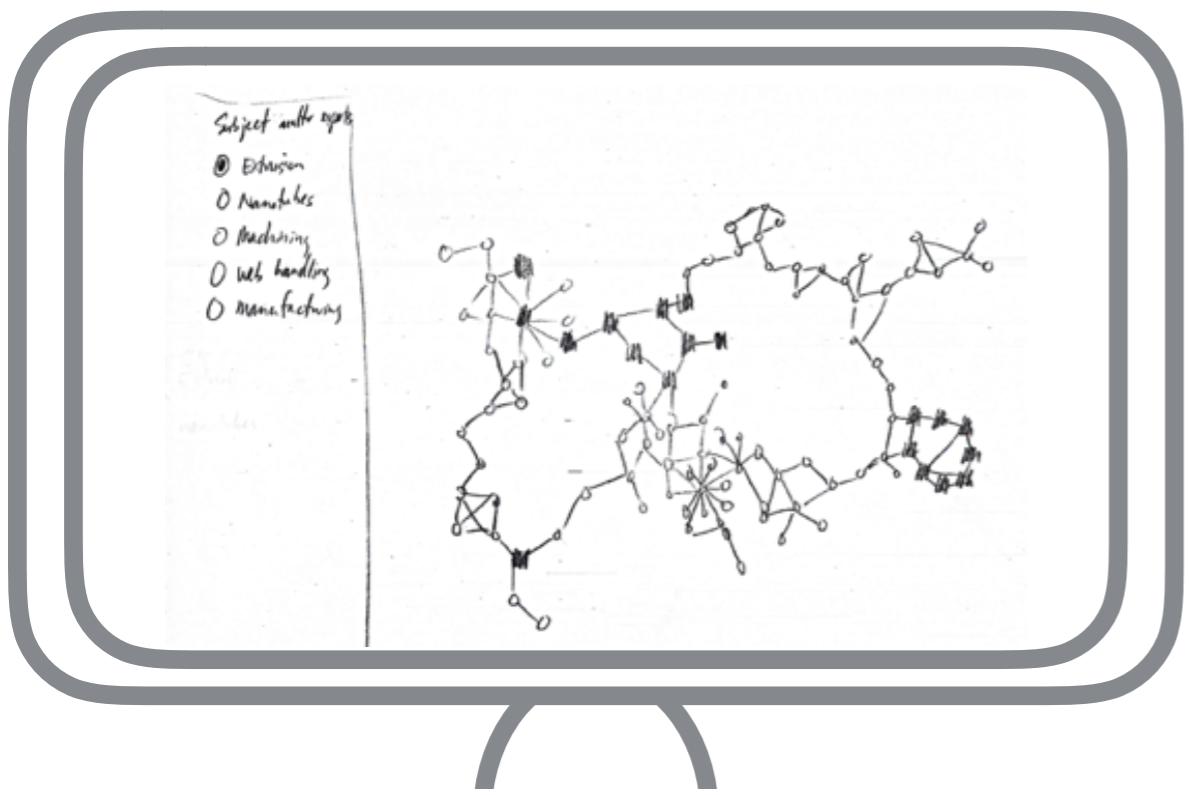


linear

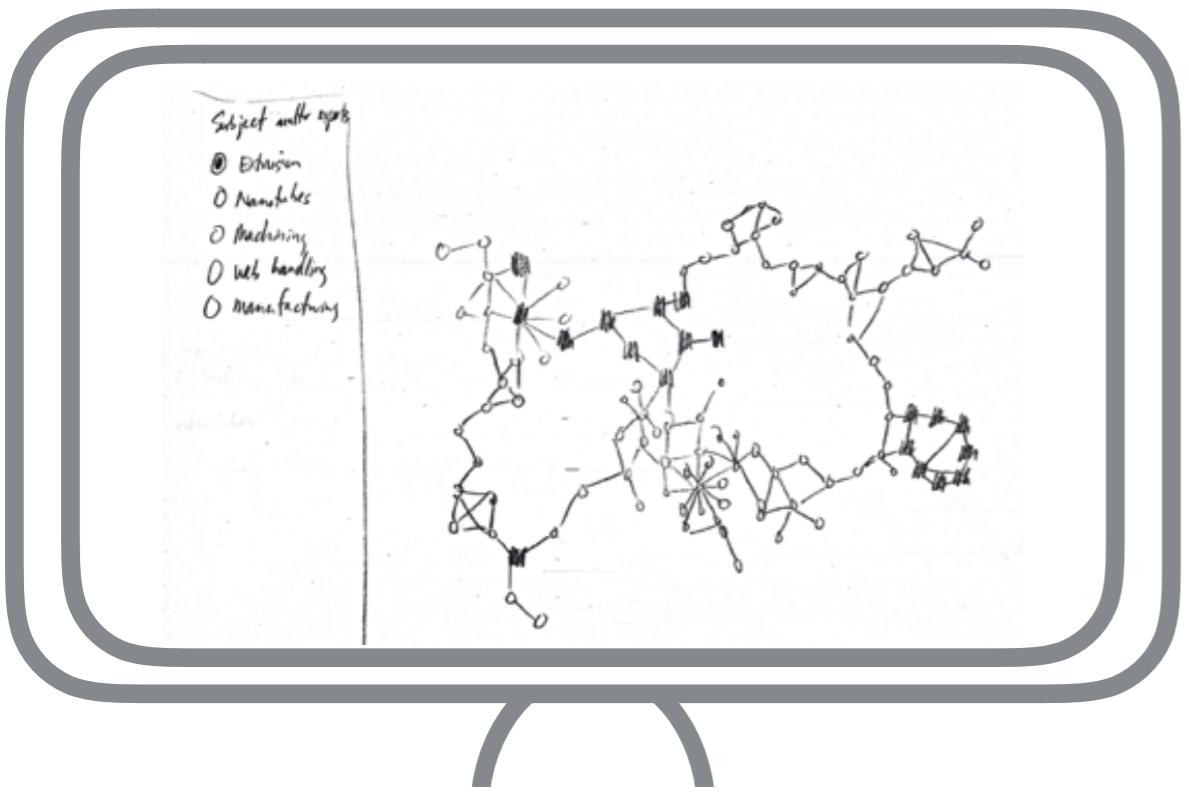
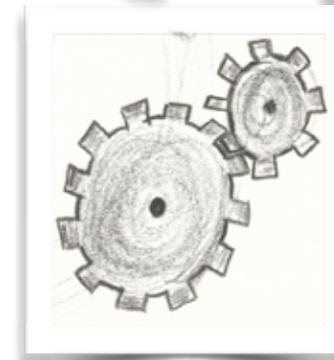


visualize
expertise in a
company

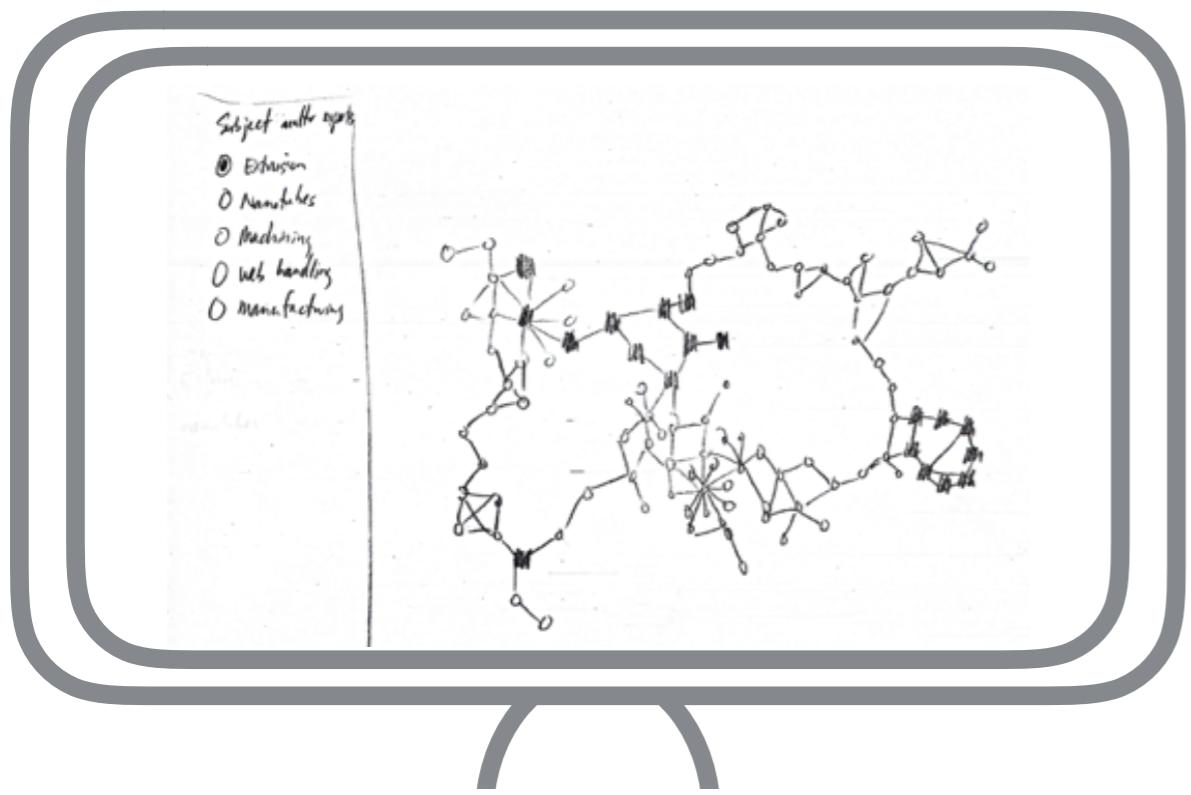
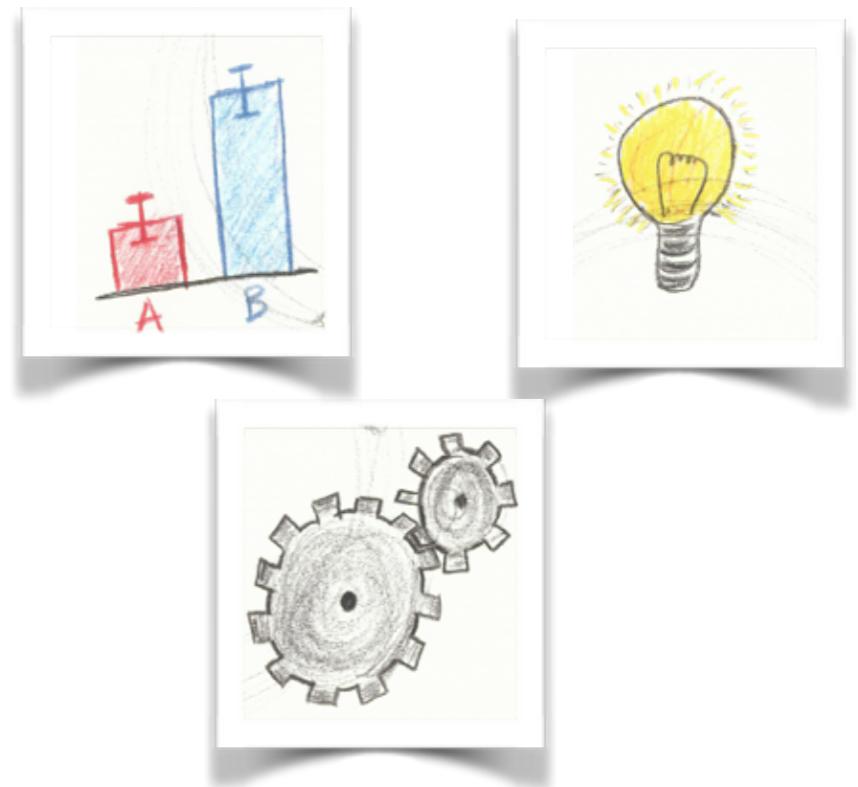
linear



iterative

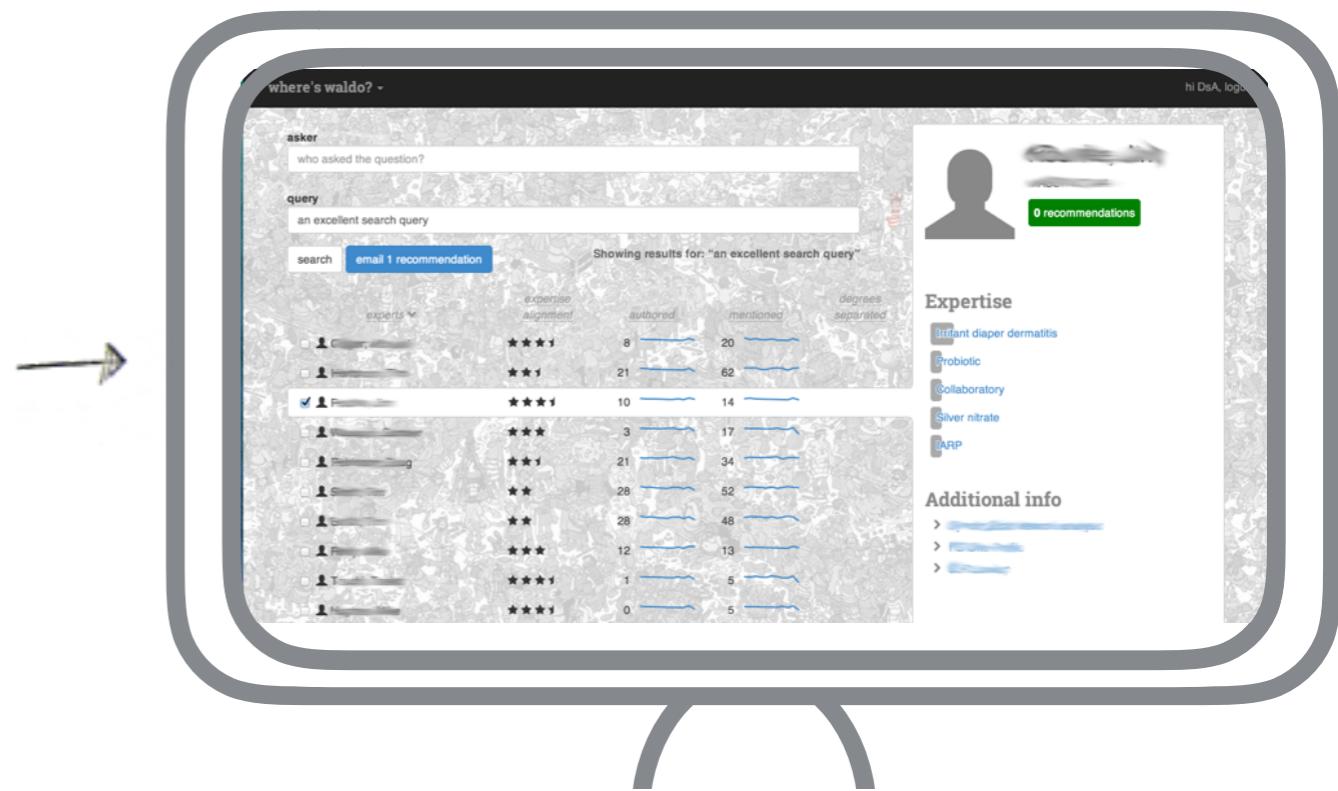
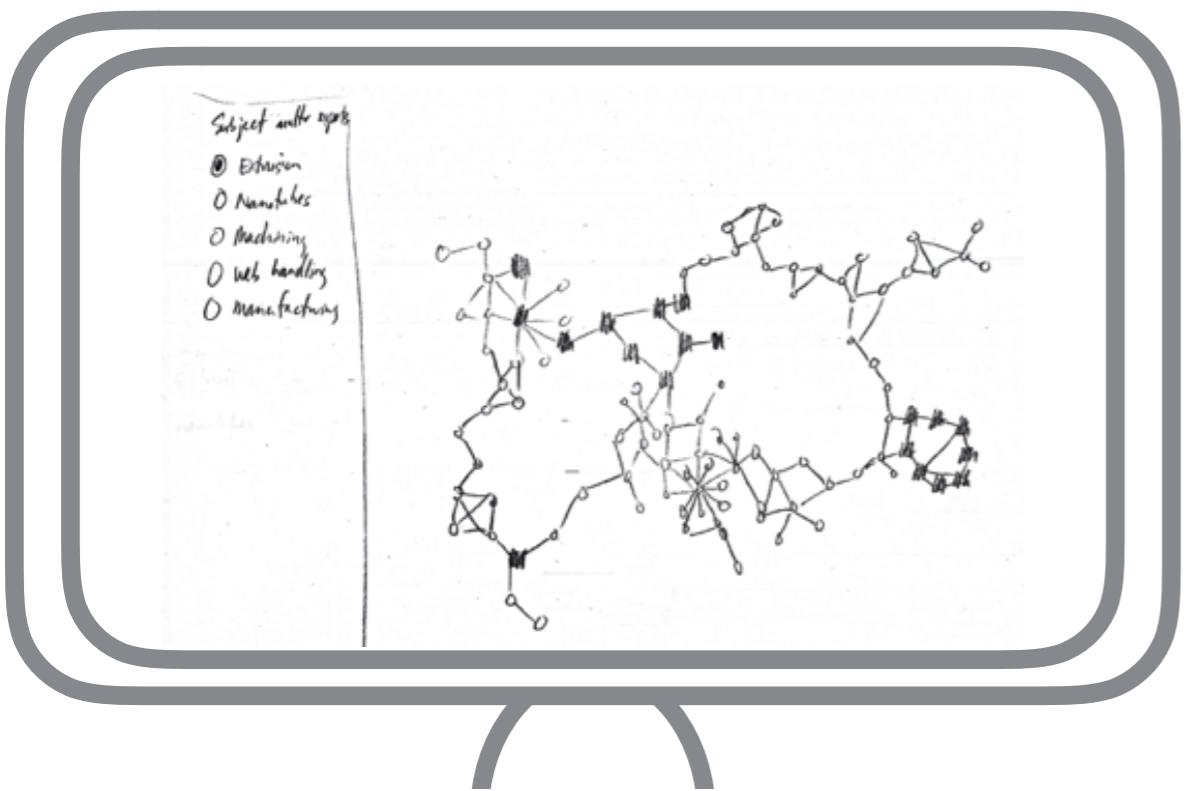
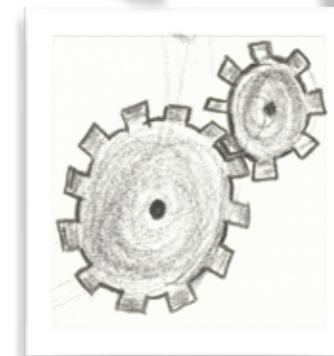
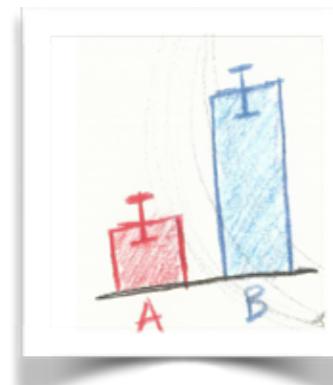


iterative

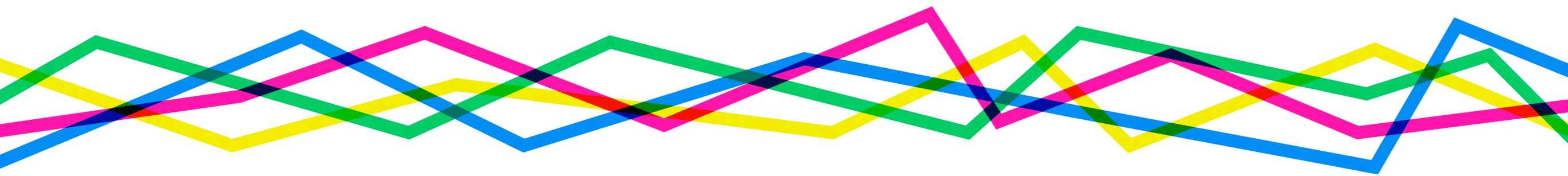


search for
expertise in a
company

iterative



a case study



data viz for public consumption

Outlier

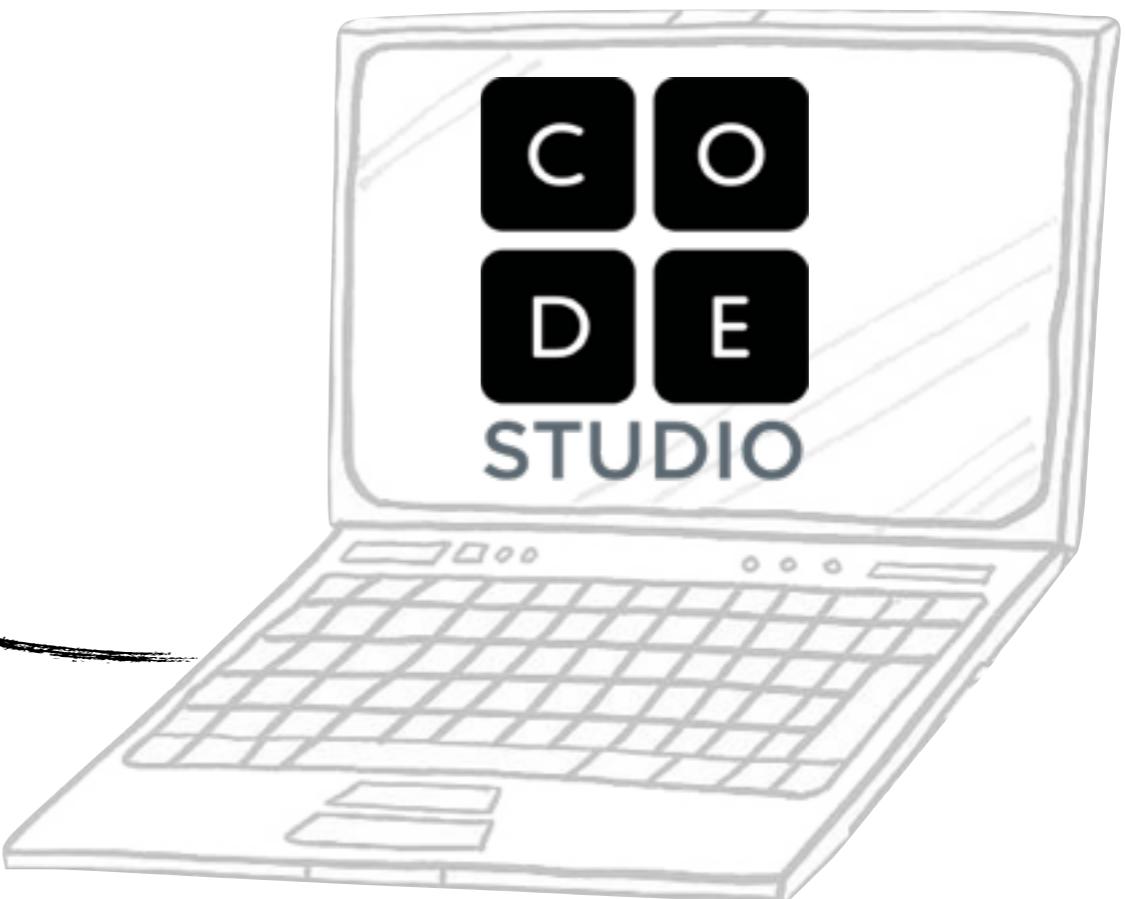
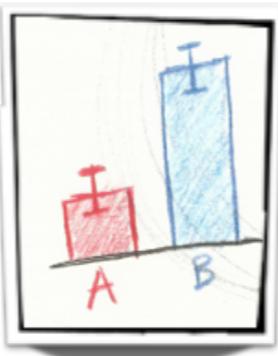
backstory



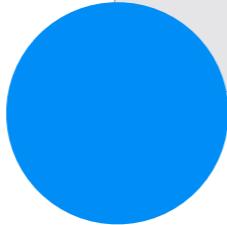
backstory

outlier

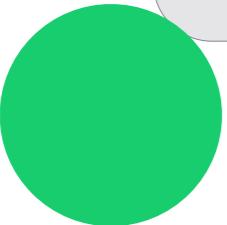
RESEARCH & EVALUATION
CEMSE | UNIVERSITY OF CHICAGO



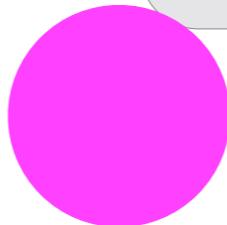
**what is computer
science?**



I think you
learn about
computer safety.



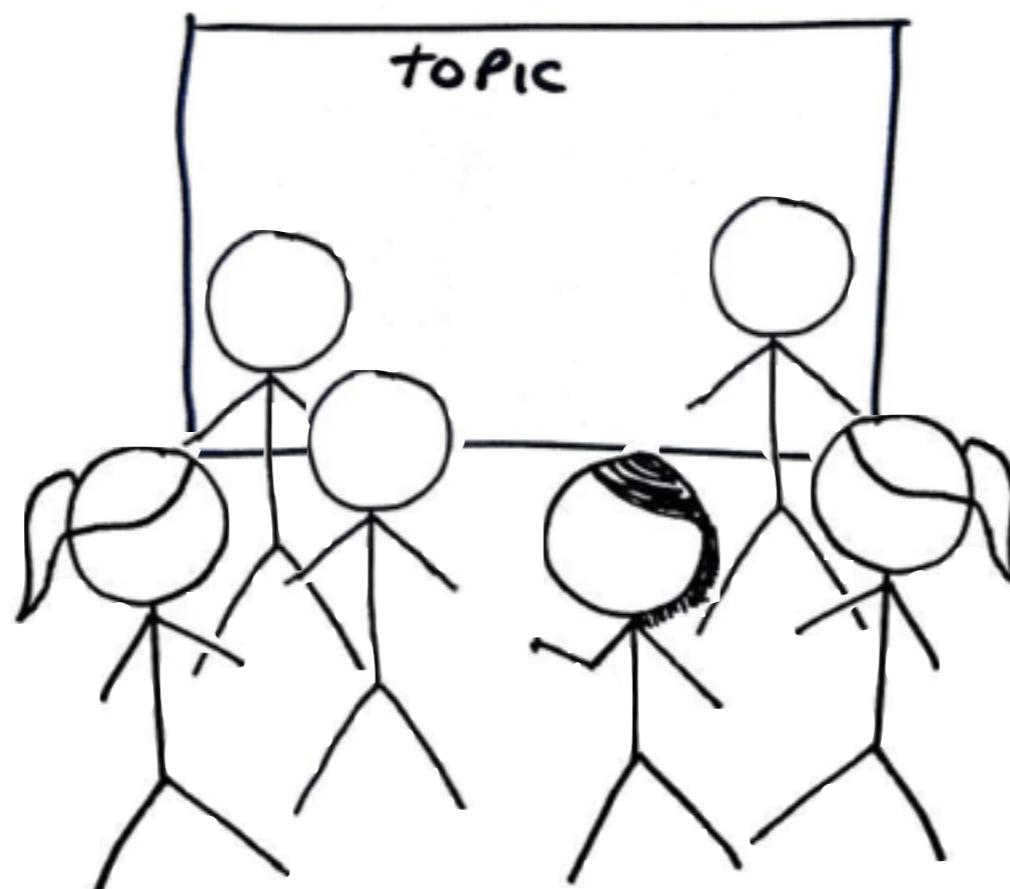
Using code and
fixing and
making
computers.



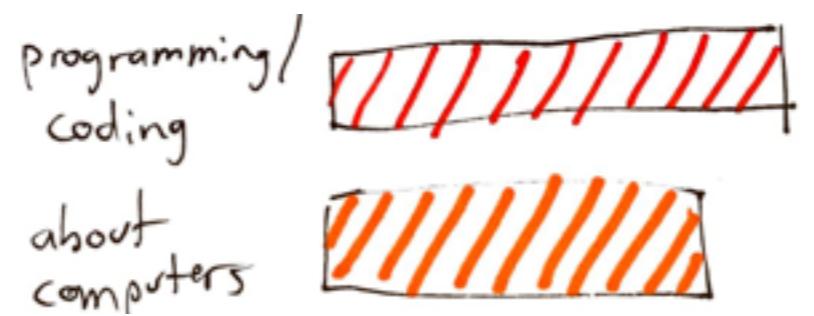
When you are a
genis at
electronics

how computers work	studying computers I like it!
using computers to solve problems	typing / testing
engineering	making apps, games, or websites
science on a computer	
experiments / research / modeling	internet safety
class / learning / lessons	programming / coding
someone good at computers	I don't know
what's inside a computer	how to use computers
a website, program, or game	

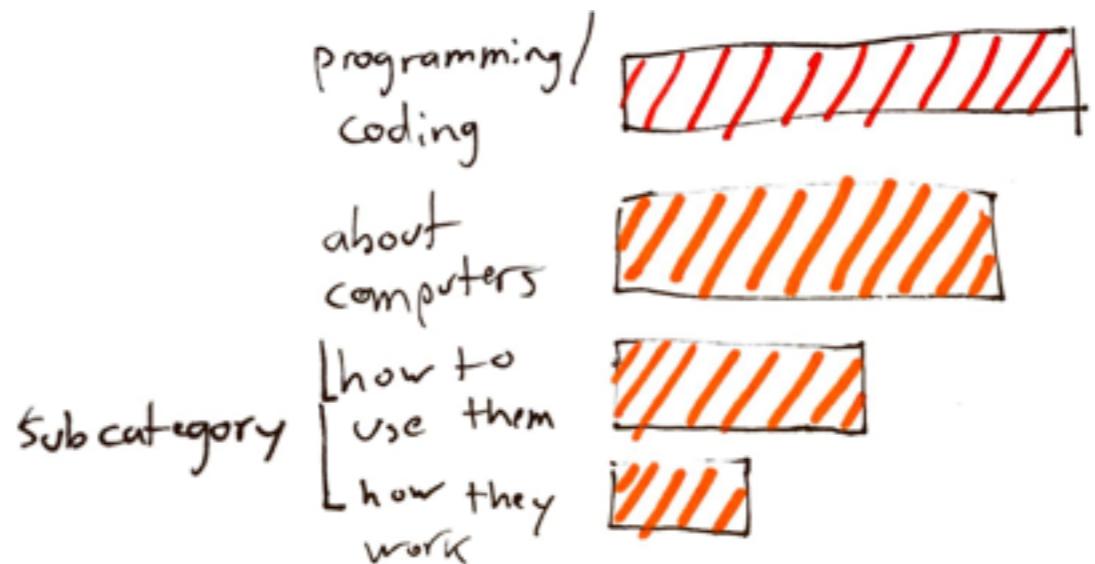
brainstorm



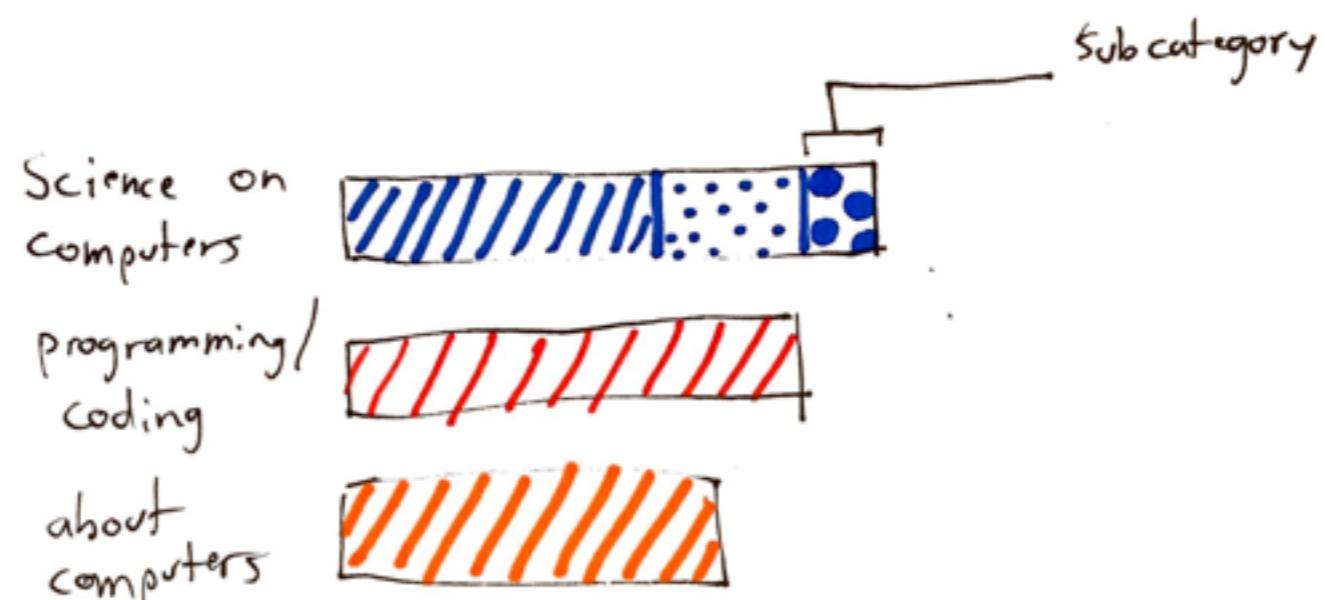
bar charts



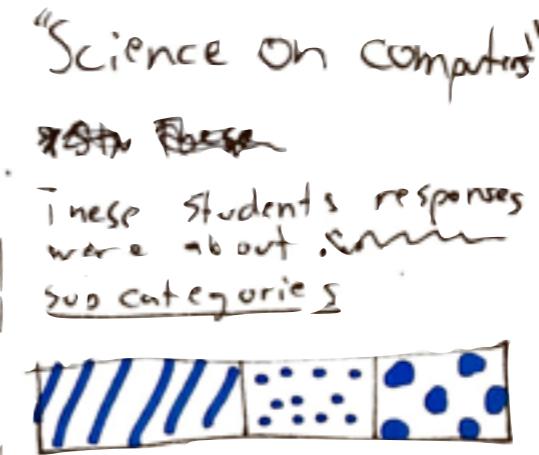
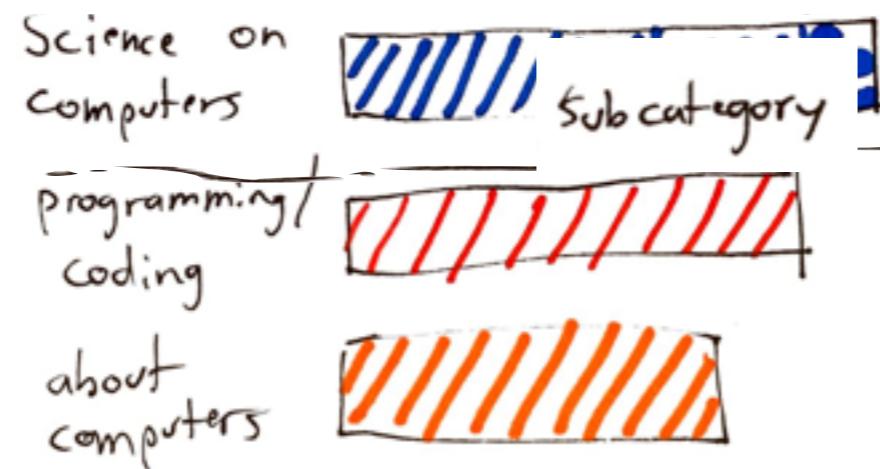
bar charts



bar charts



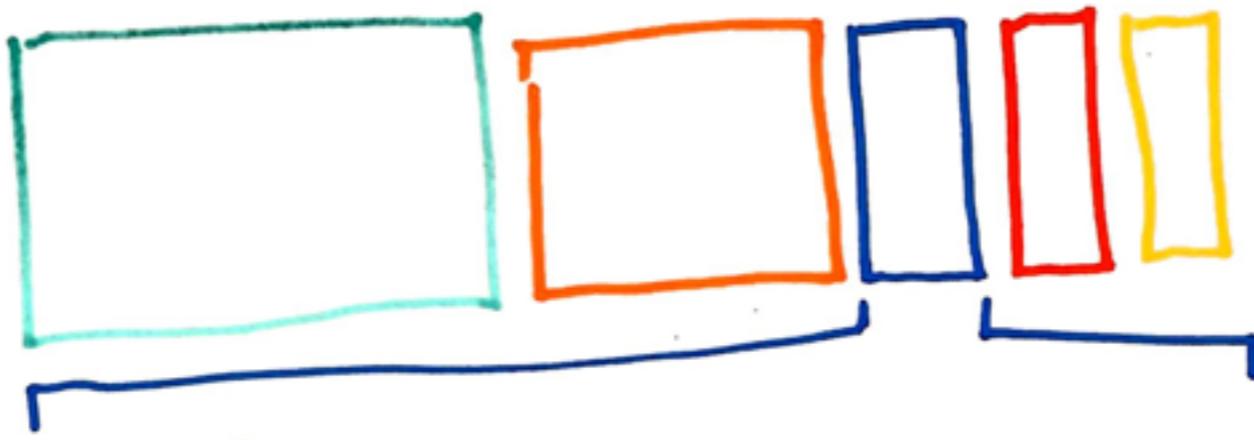
bar charts



Keywords

NASA experiment
graph learn DNA
data ab

“ribbon” bar

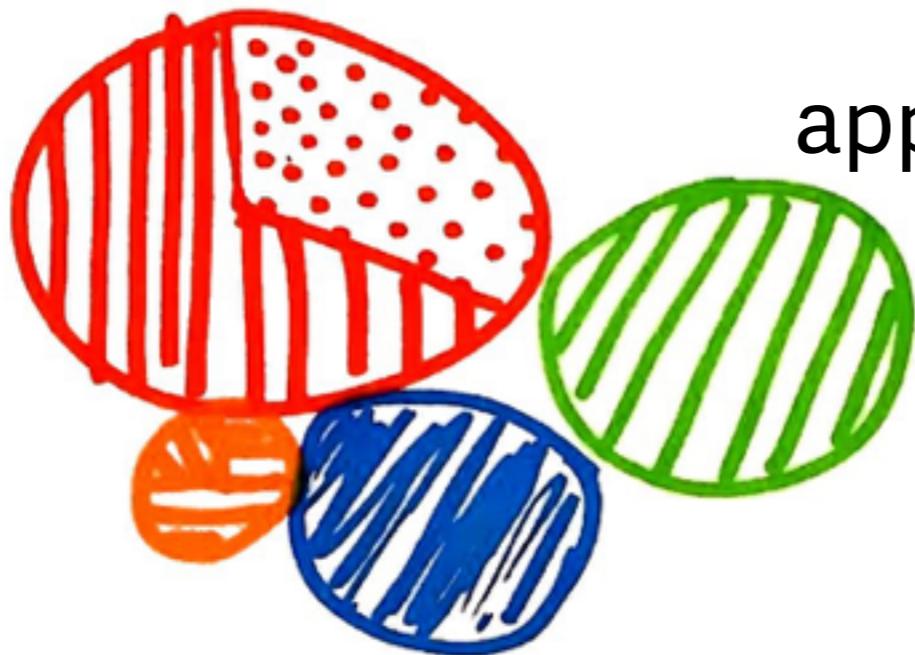


these responses represent students who view CS as
a class or part of school ...

etc...

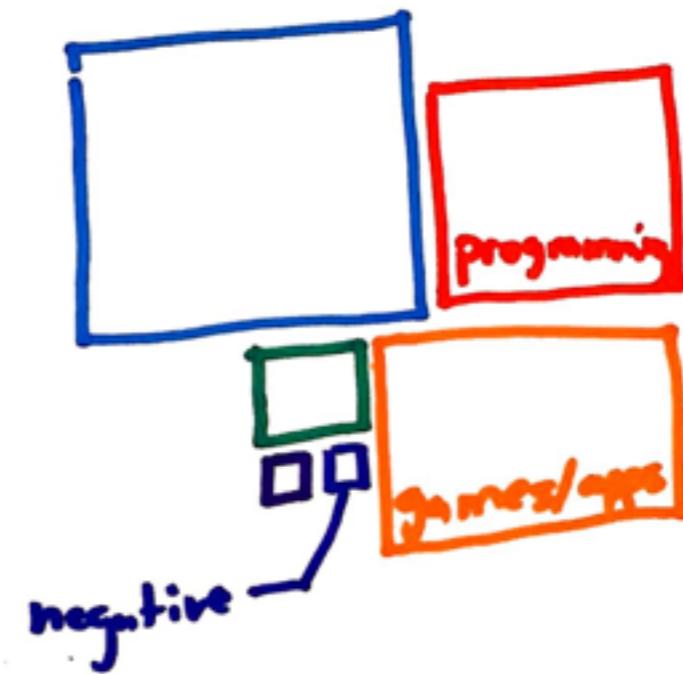
grouped view

programming



apps/games

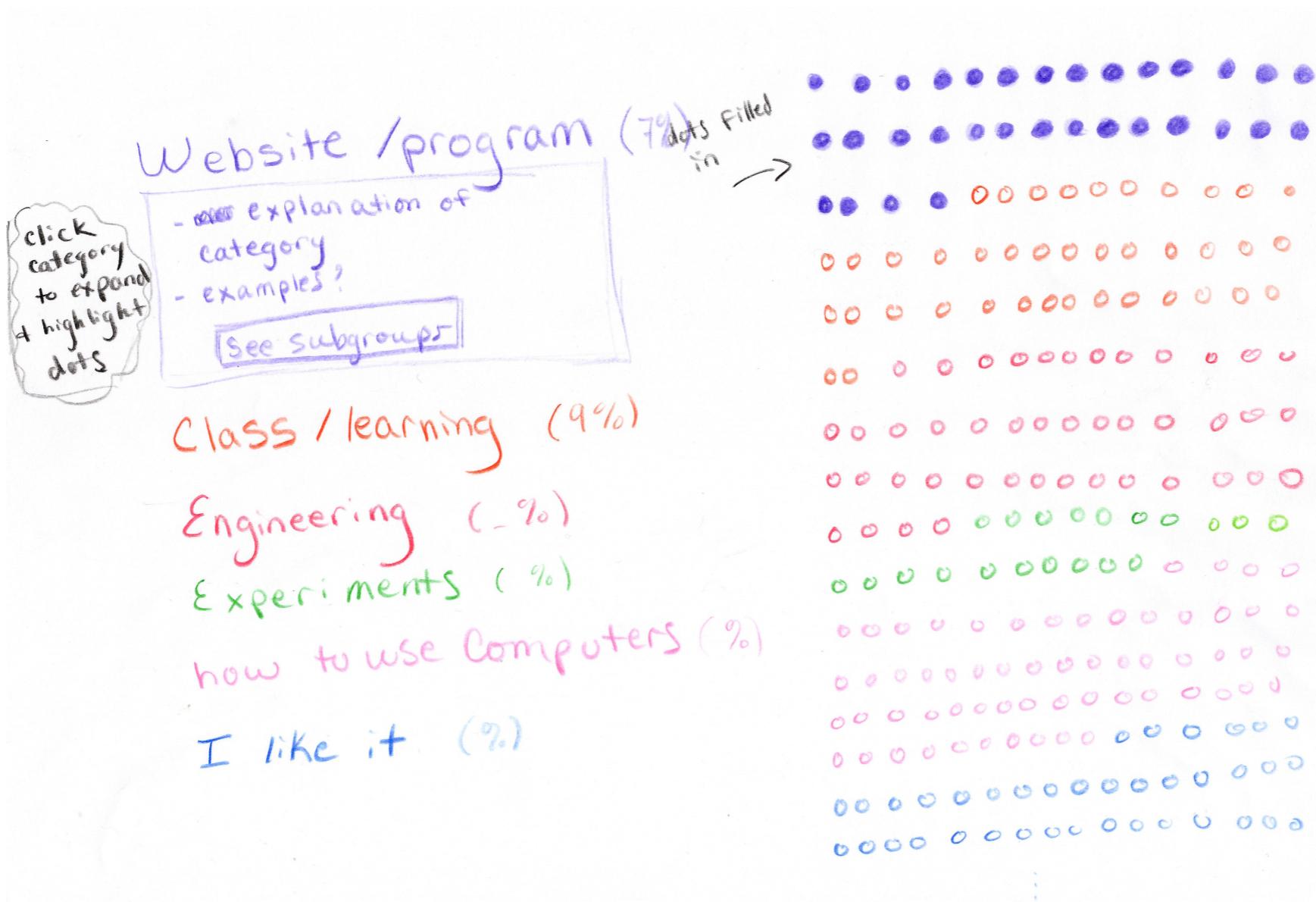
vs



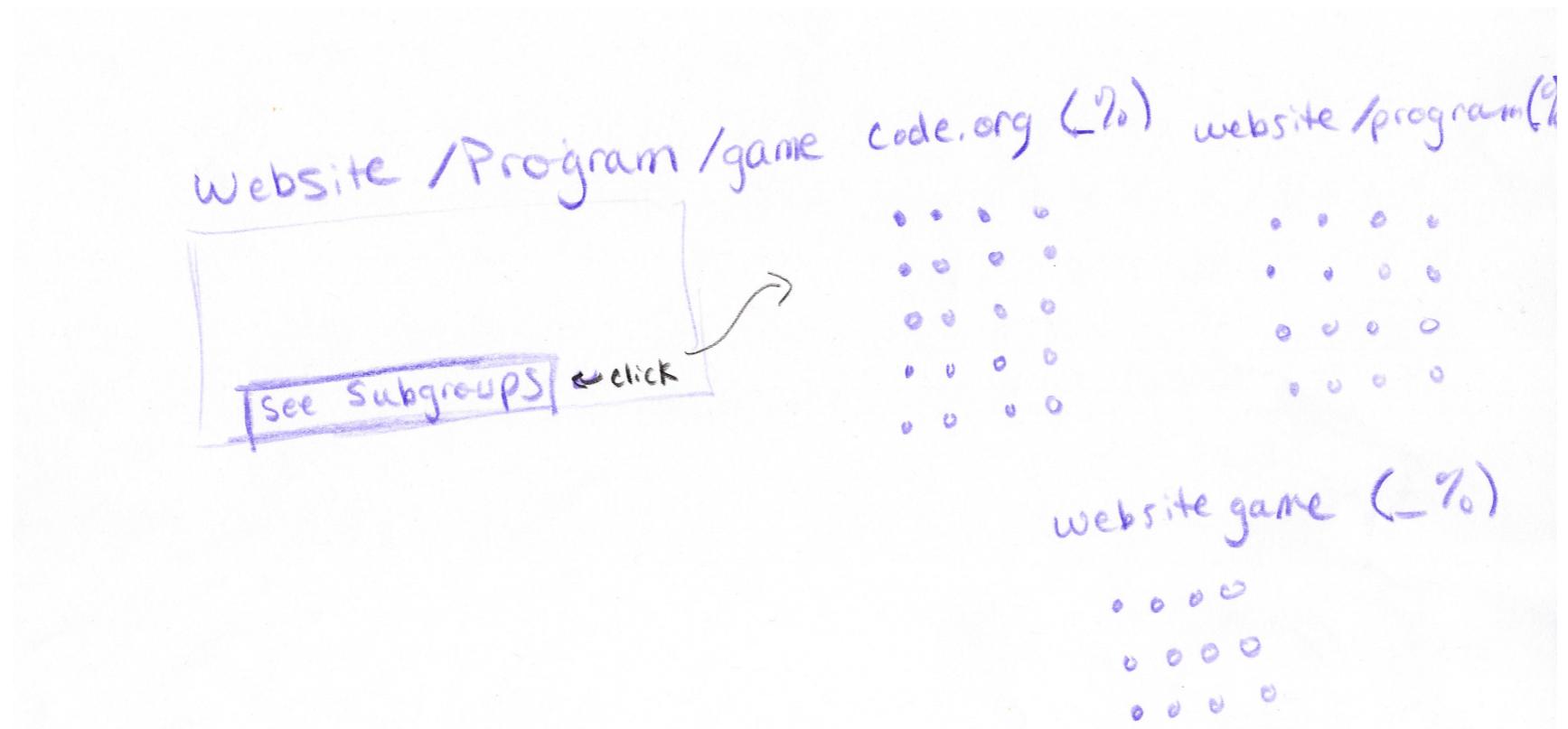
cell/treemap charts



cohort view



cohort view



keywords/phrases in free text

word cloud

Science on a computer

Programming code
websites

Fun

code.org

Coding

Internet

Interesting

Engineering

Fixing computers

Excited

Cool

Stress

Boring

FUN

Interesting

Gmail

Angry Birds

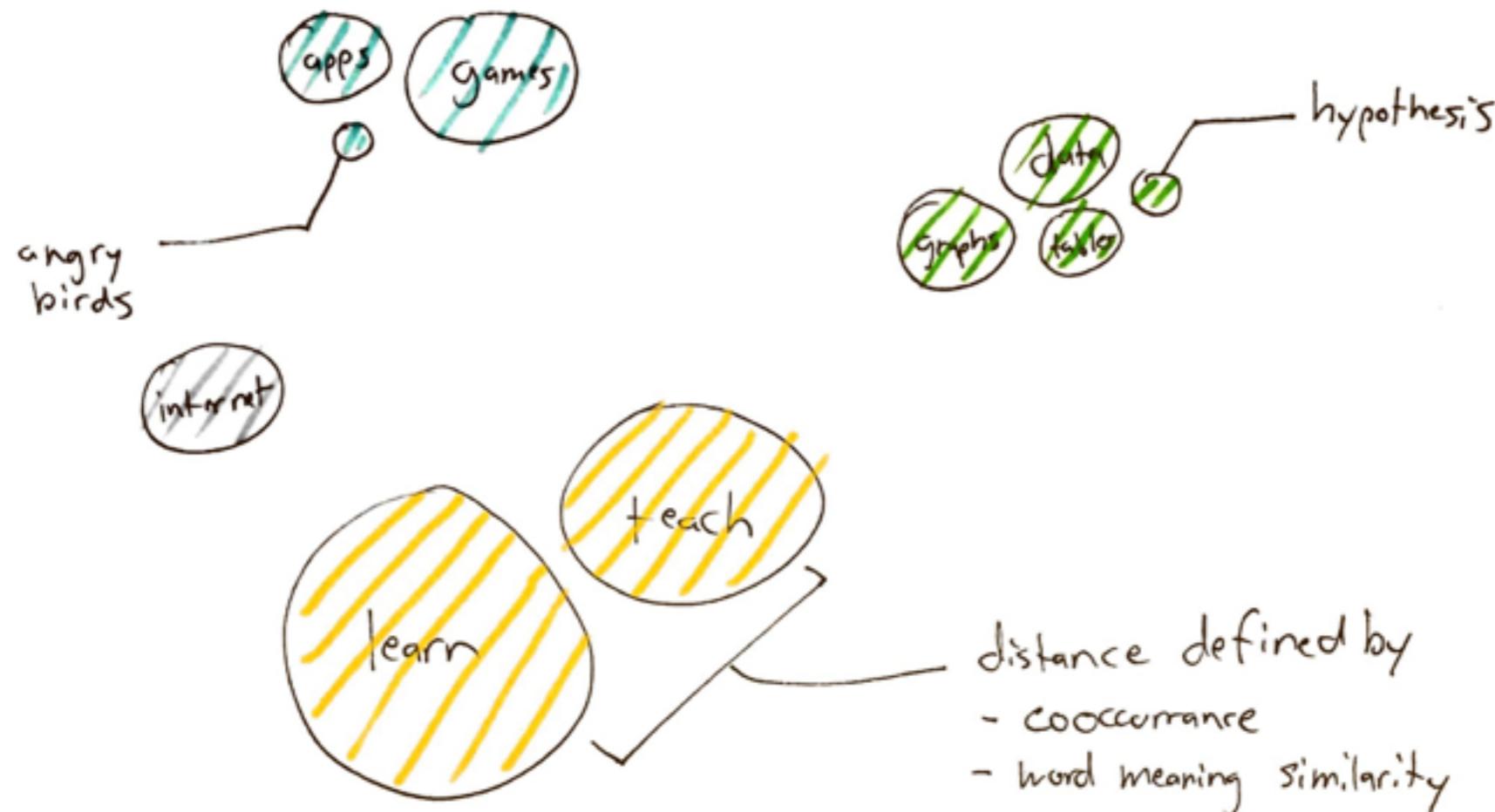
Code.org

Khan academy

Mojang

google

keywords/phrases in free text clusters



punctuation



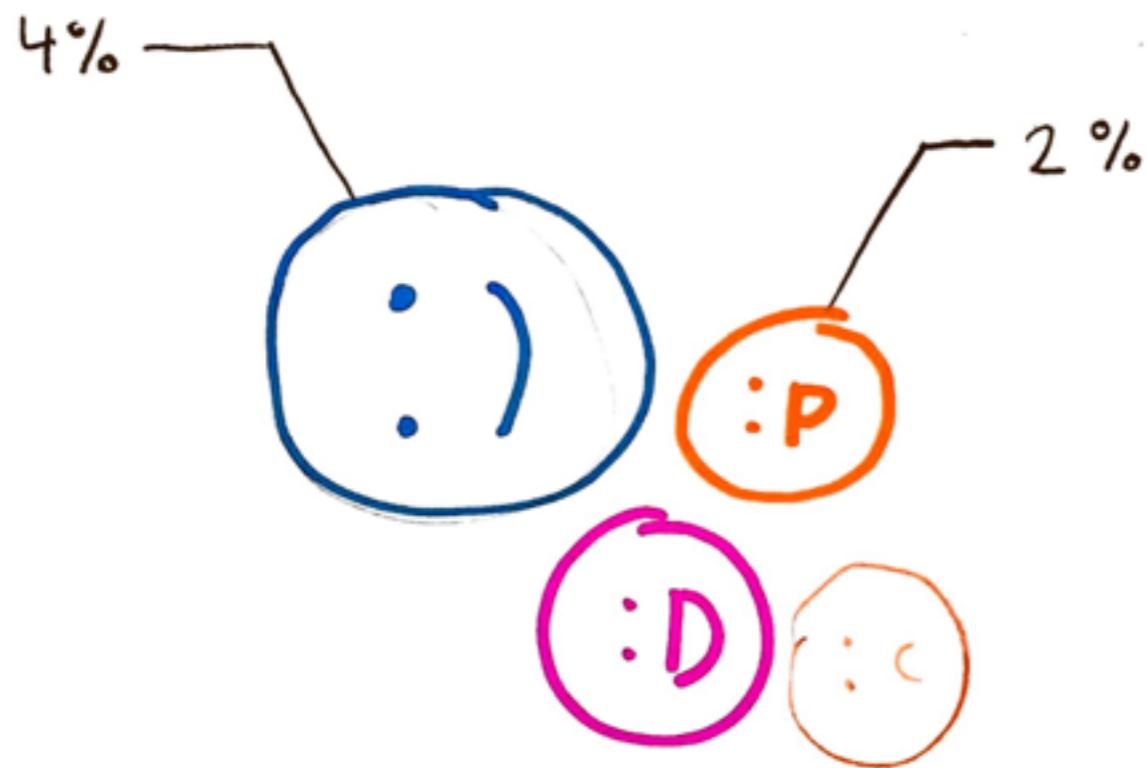
872 occur
from 760 students



680 occur
from 670 students

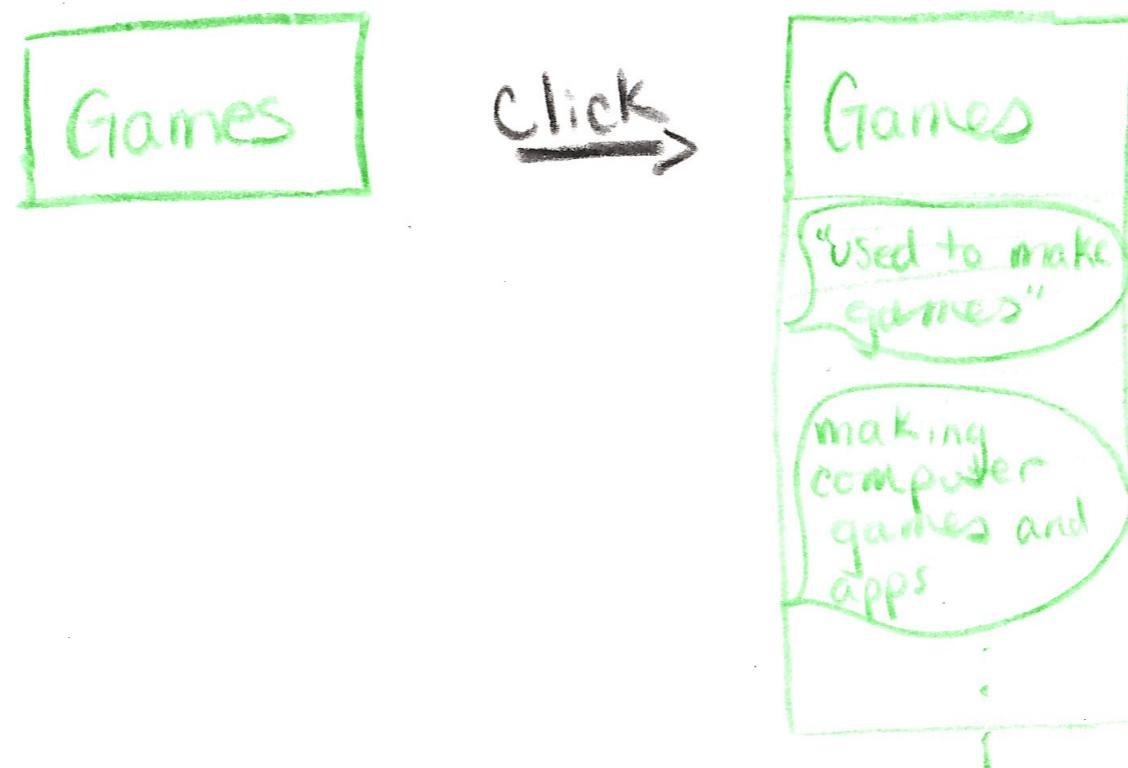
????????????
????????????

emoticons



specific responses?

when you click one?



specific responses?

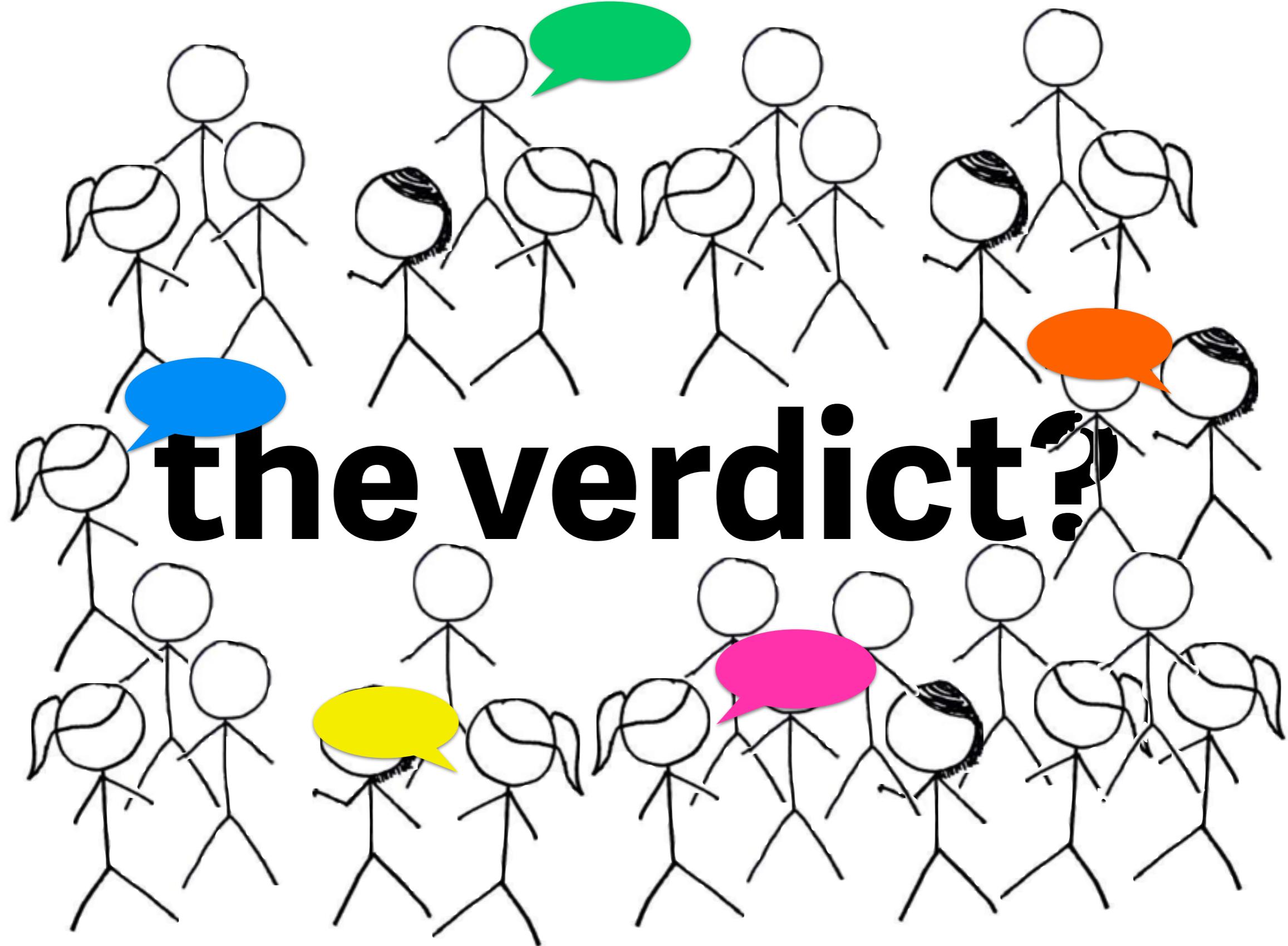
use sentiment analysis to show:

"Positive" responses

- "I like it. It sounds fun!"
- "So cool!"

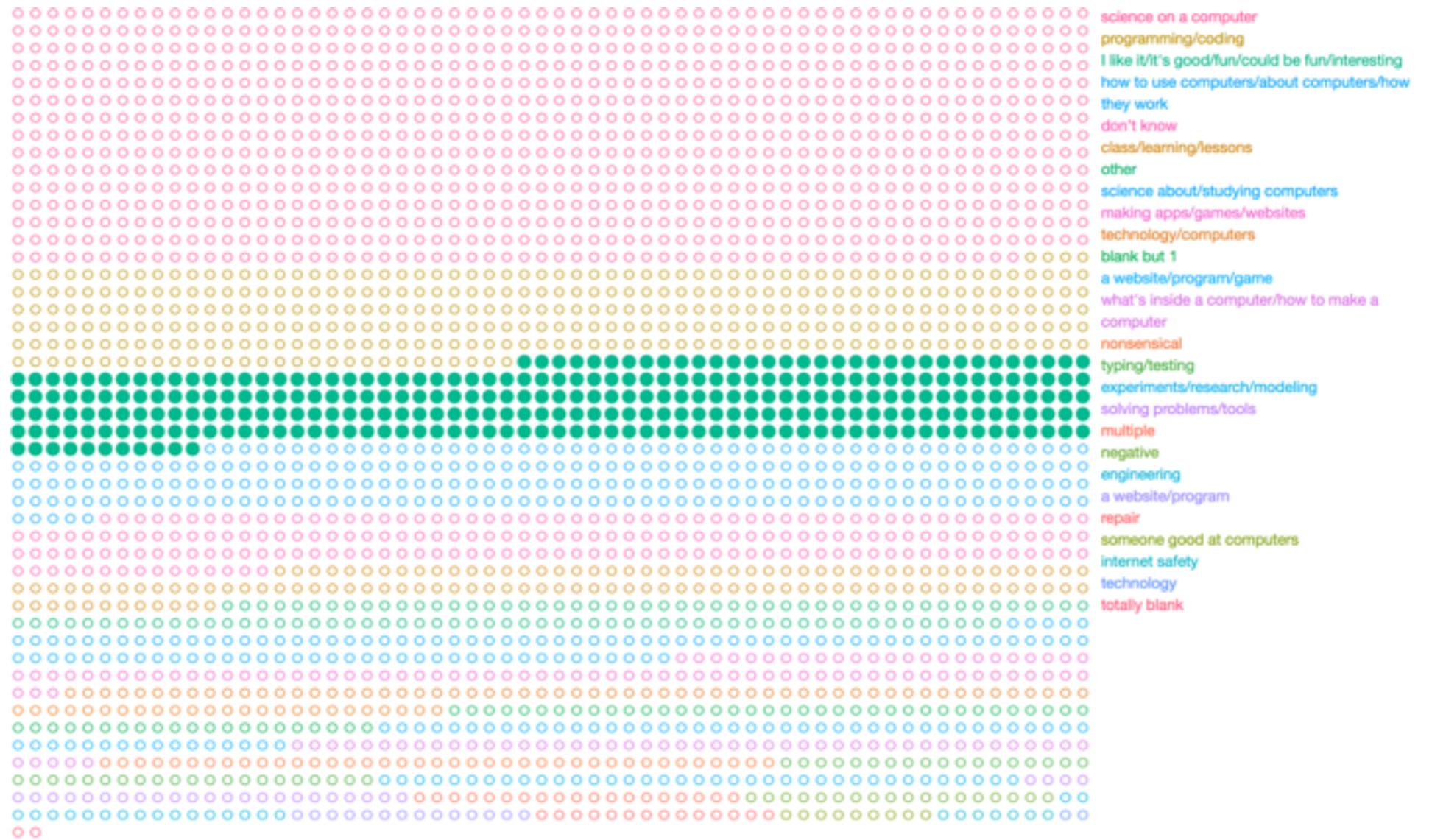
"Negative" responses

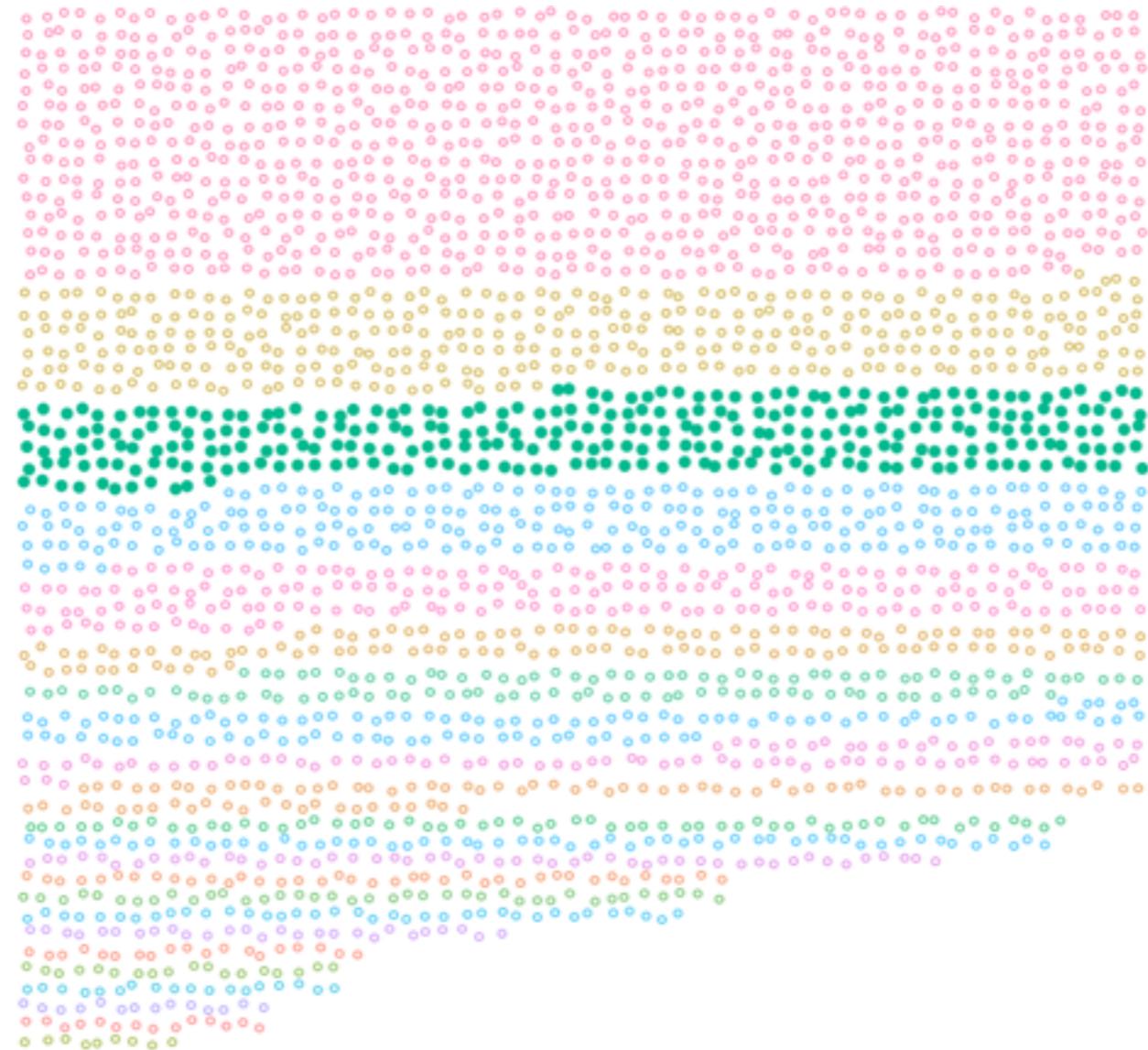
- "very boring"
- "Too hard"



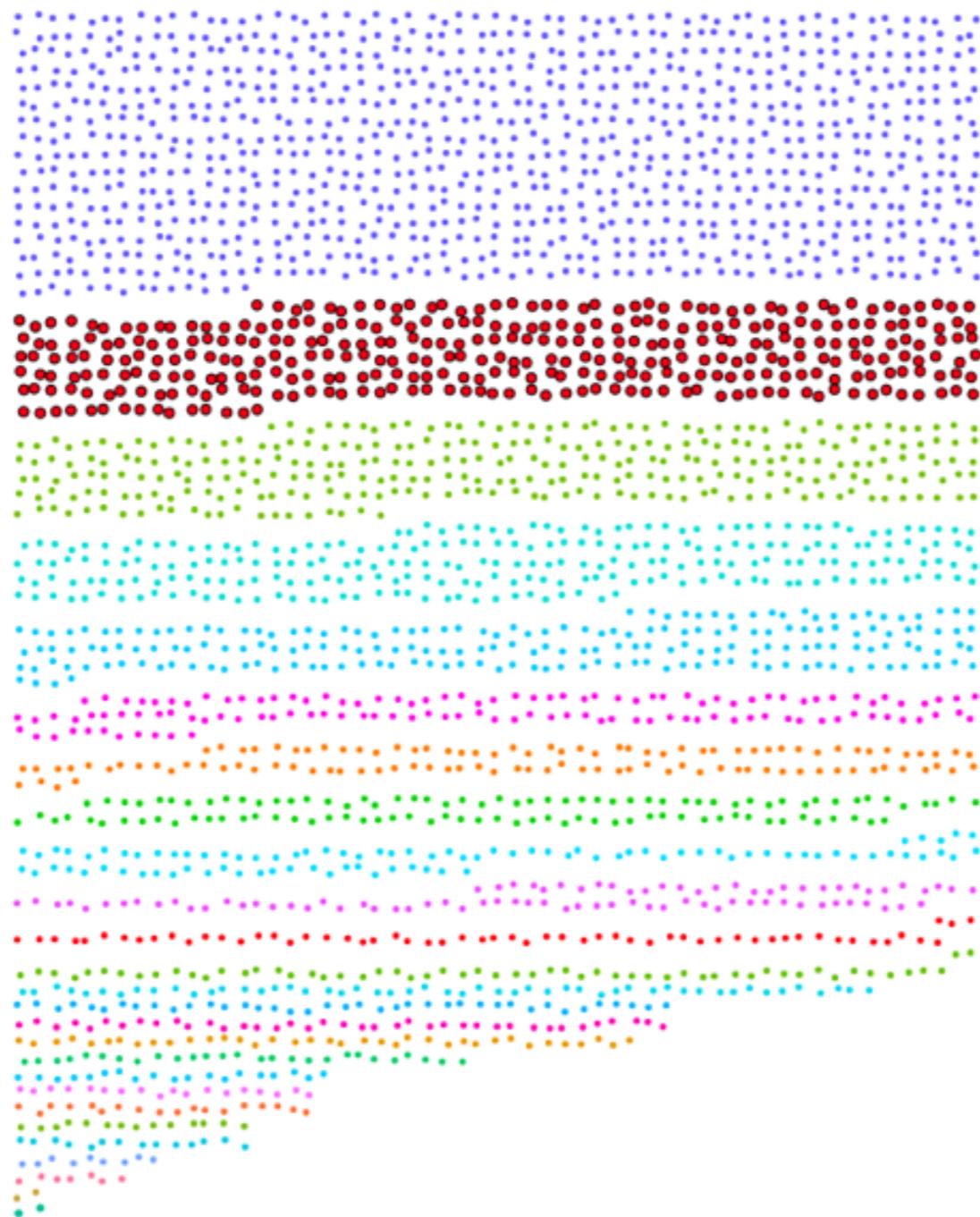
the verdict?

cohort view





science on a computer
programming/coding
I like it/it's good/fun/could be fun/interesting
how to use computers/about computers/how they work
don't know
class/learning/lessons
other
science about/studying computers
making apps/games/websites
technology/computers
blank but 1
a website/program/game
what's inside a computer/how to make a computer
nonsensical
typing/testing
experiments/research/modeling
solving problems/tools
multiple
negative
engineering
a website/program
repair
someone good at computers
internet safety
technology
totally blank



science on a computer

programming/coding

I like it/it's good/fun/could be fun/interesting

how to use computers/about computers/how they work
don't know

class/learning/lessons
other

science about/studying computers

making apps/games/websites

technology/computers

blank but 1

a website/program/game

what's inside a computer/how to make a computer

nonsensical

typing/testing

experiments/research/modeling

solving problems/tools

multiple

negative

engineering

a website/program

repair

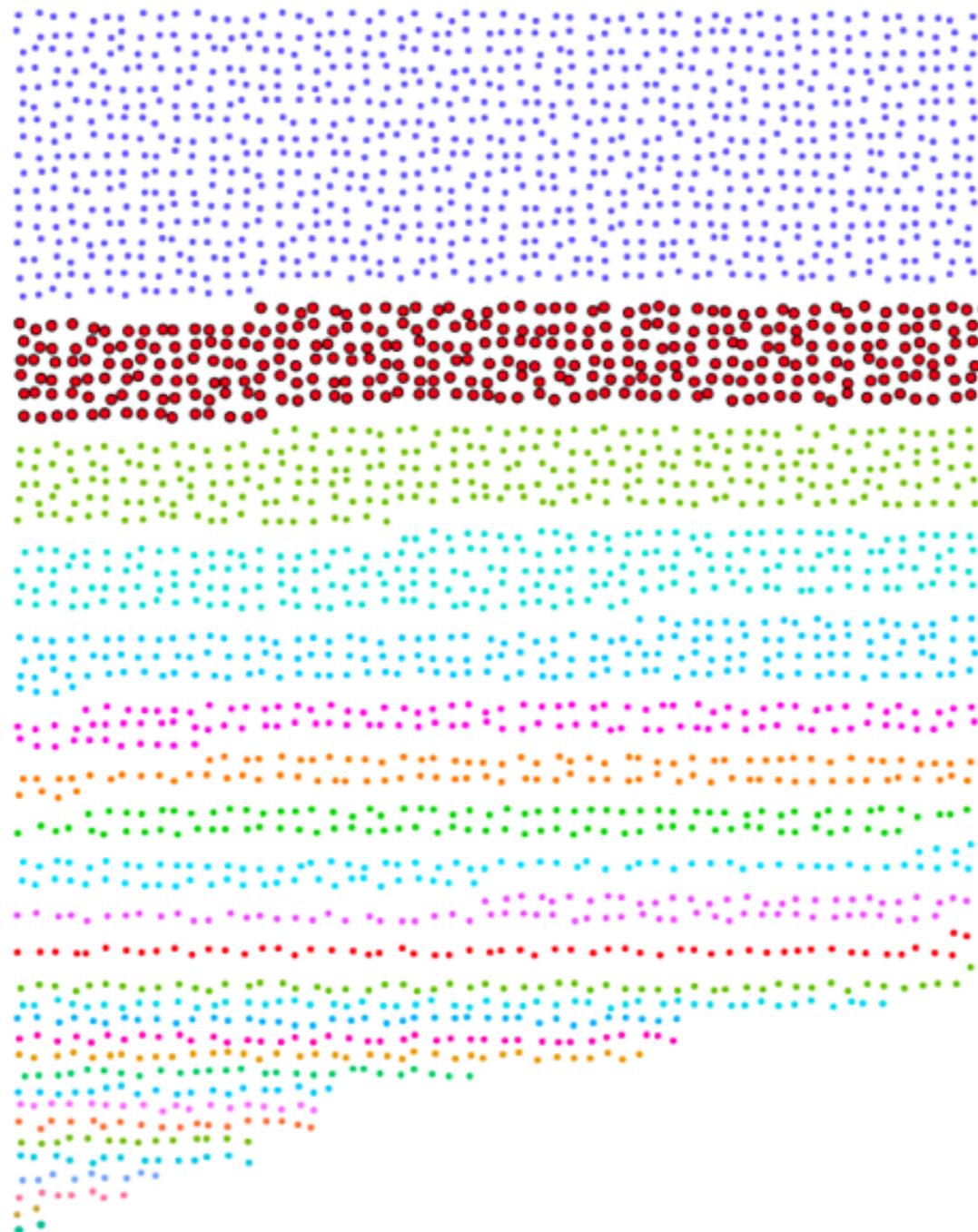
someone good at computers

internet safety

technology

totally blank

blurb list



science on a computer

programming/coding

description of category goes here



like how u can
control the angry
birds like u make



Learning how
computers work.

I like it/it's good/fun/could be
fun/interesting

how to use computers/about
computers/how they work

don't know

class/learning/lessons

other

science about/studying computers

making apps/games/websites

technology/computers

blank but 1

a website/program/game

what's inside a computer/how to make a
computer

nonsensical

typing/testing

experiments/research/modeling

solving problems/tools

multiple

negative

engineering

a website/program

repair

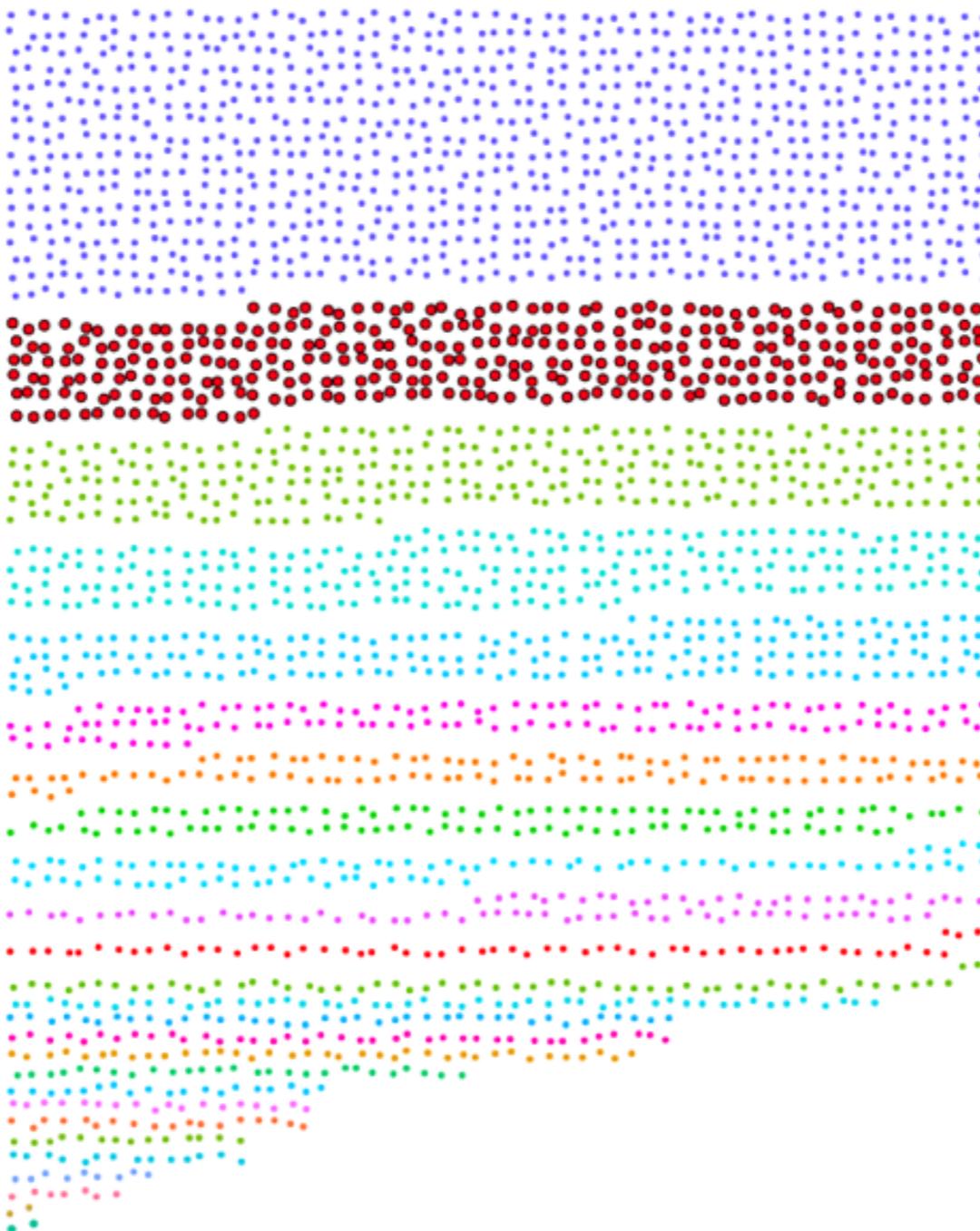
someone good at computers

internet safety

technology

totally blank

slide blurbs



science on a computer
programming/coding
description of category goes here

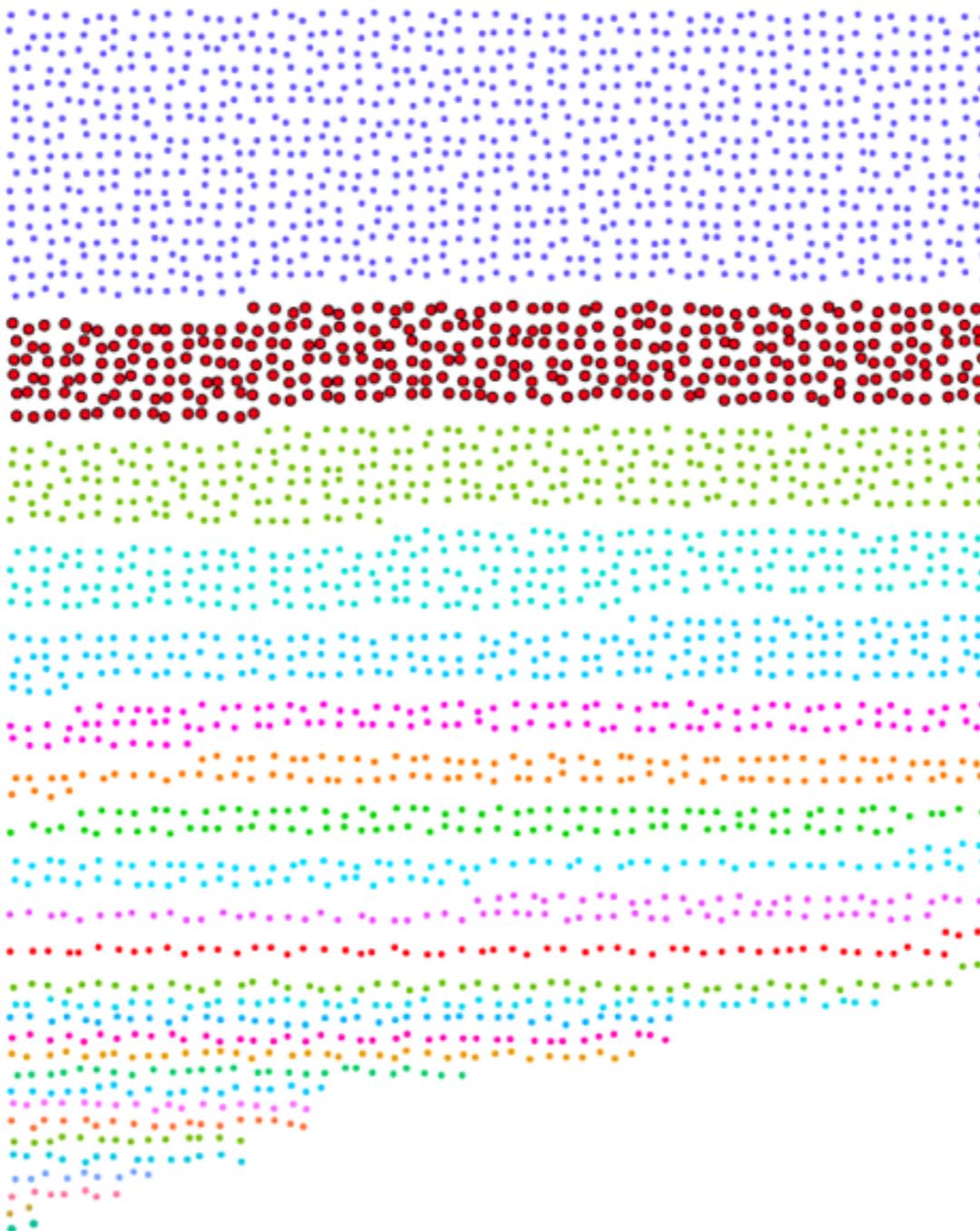
Learning how computers work.

:)



I like it/it's good/fun/could be fun/interesting
how to use computers/about computers/how they work
don't know
class/learning/lessons
other
science about/studying computers
making apps/games/websites
technology/computers
blank but 1
a website/program/game
what's inside a computer/how to make a computer
nonsensical
typing/testing
experiments/research/modeling
solving problems/tools
multiple
negative
engineering
a website/program
repair
someone good at computers
internet safety
technology
totally blank

slide blurbs



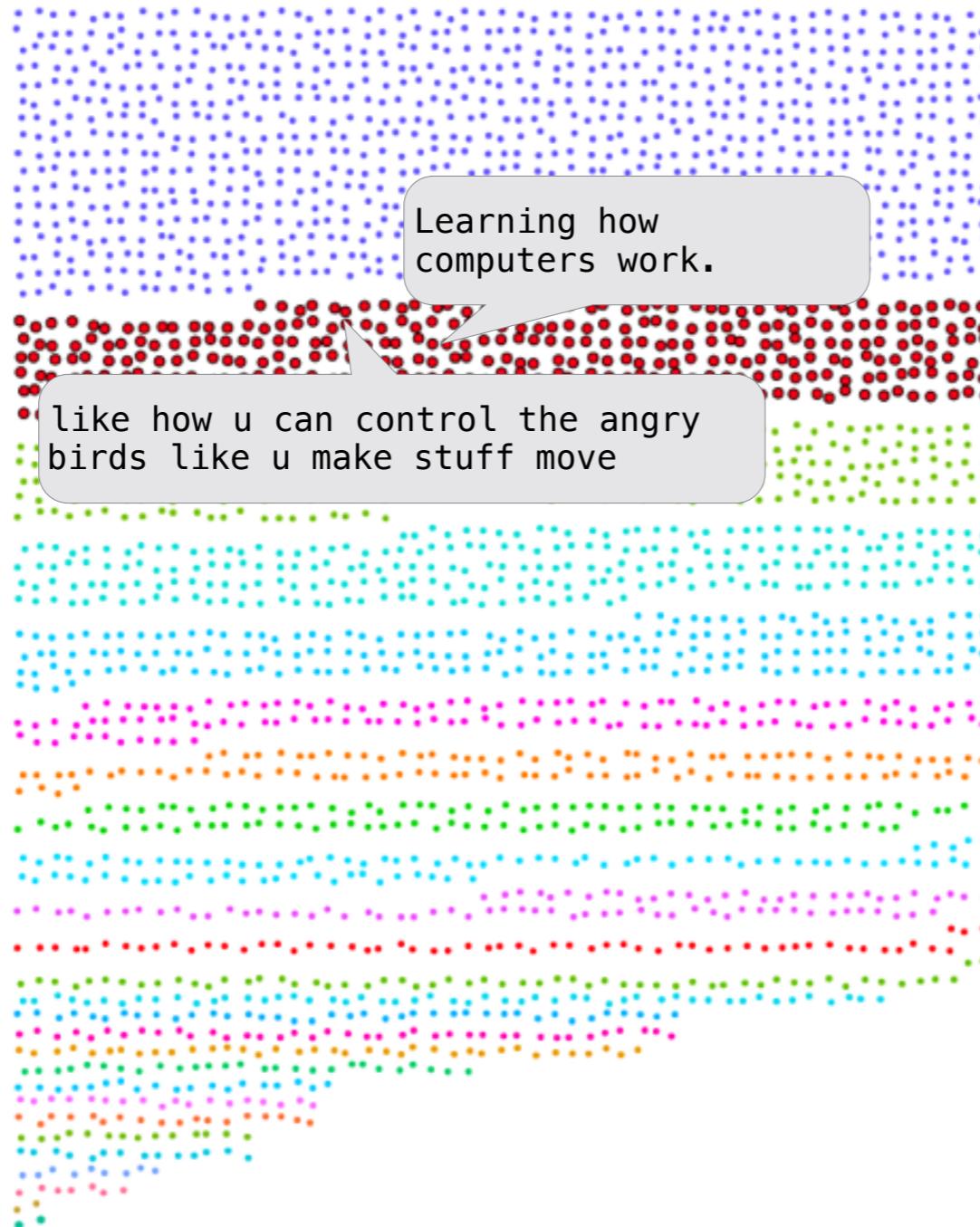
science on a computer
programming/coding
description of category goes here

like how u can control
the angry birds like u
make stuff move



I like it/it's good/fun/could be
fun/interesting
how to use computers/about
computers/how they work
don't know
class/learning/lessons
other
science about/studying computers
making apps/games/websites
technology/computers
blank but 1
a website/program/game
what's inside a computer/how to make a
computer
nonsensical
typing/testing
experiments/research/modeling
solving problems/tools
multiple
negative
engineering
a website/program
repair
someone good at computers
internet safety
technology
totally blank

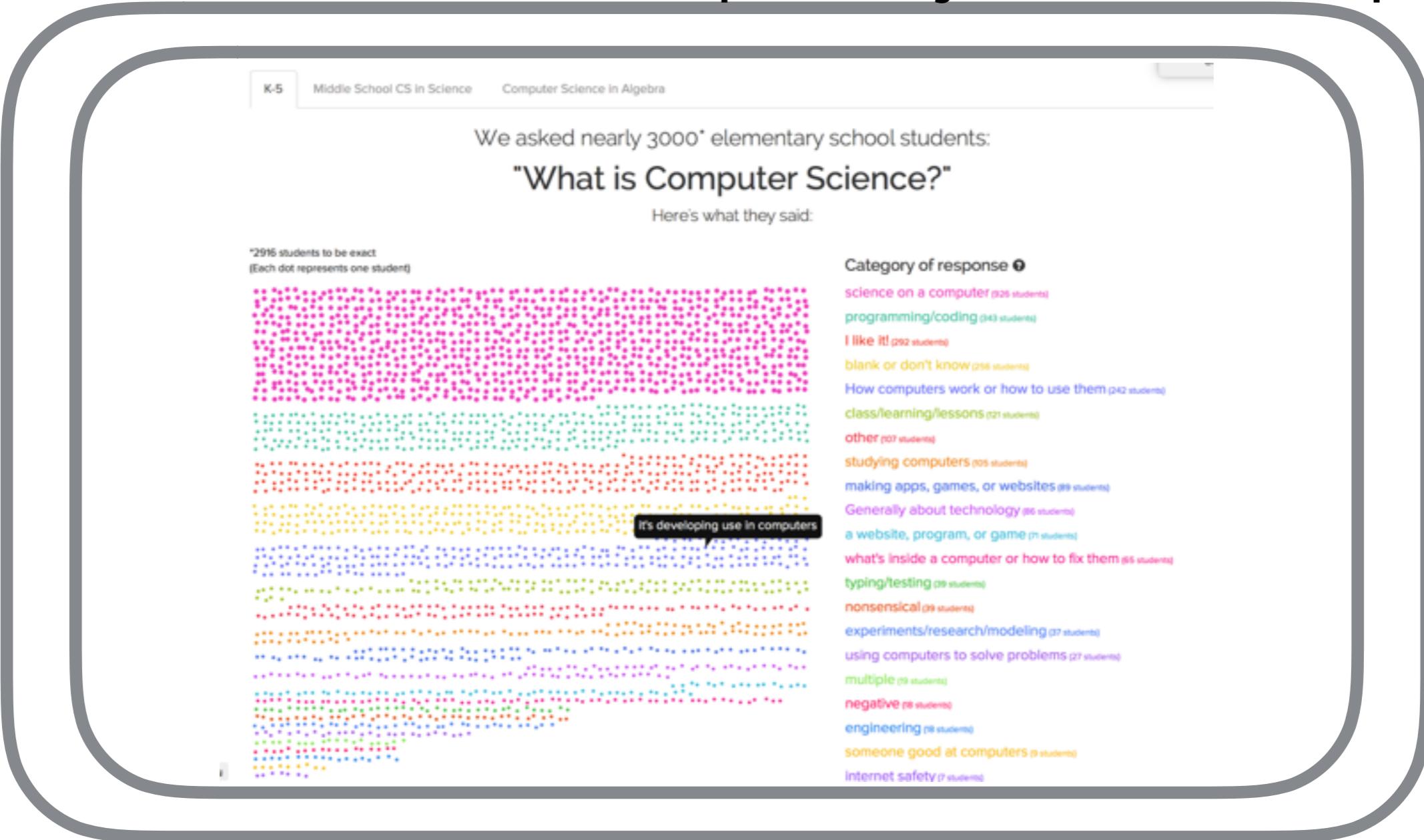
crowd blurbs



science on a computer
programming/coding
I like it/it's good/fun/could be fun/interesting
how to use computers/about computers/how they work
don't know
class/learning/lessons
other
science about/studying computers
making apps/games/websites
technology/computers
blank but 1
a website/program/game
what's inside a computer/how to make a computer
nonsensical
typing/testing
experiments/research/modeling
solving problems/tools
multiple
negative
engineering
a website/program
repair
someone good at computers
internet safety
technology
totally blank

the end result

<http://bit.ly/what-is-comp-sci>



linear

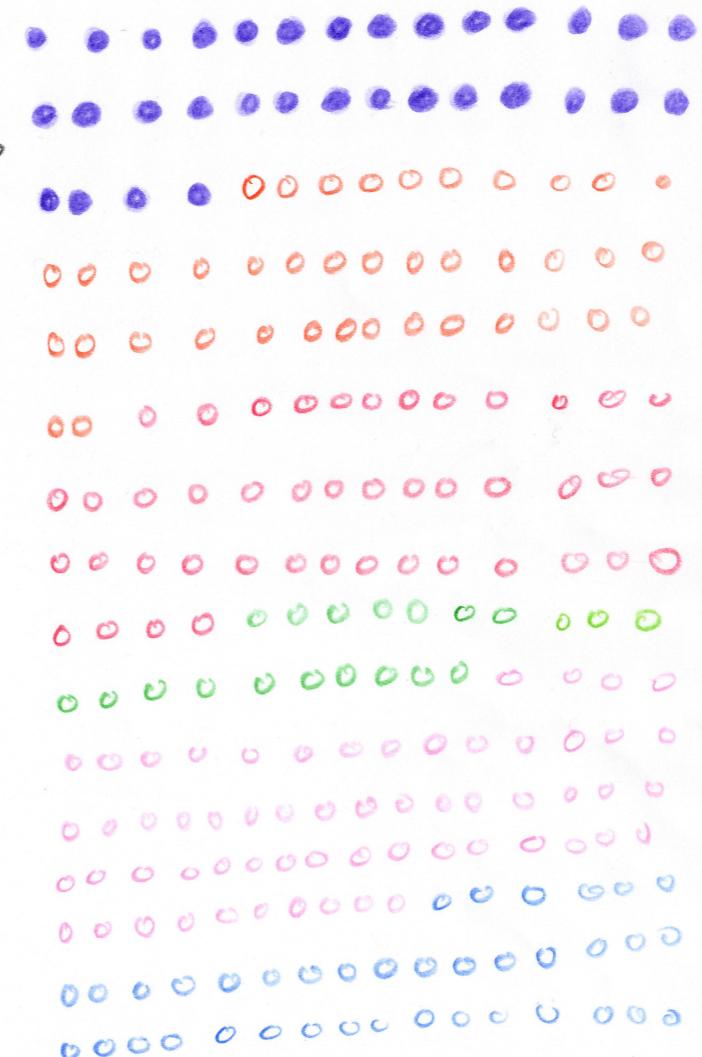


Website / program (7%)

click category
to expand & highlight dots

- explanation of category
- examples?

See Subgroups



Class / learning (9%)

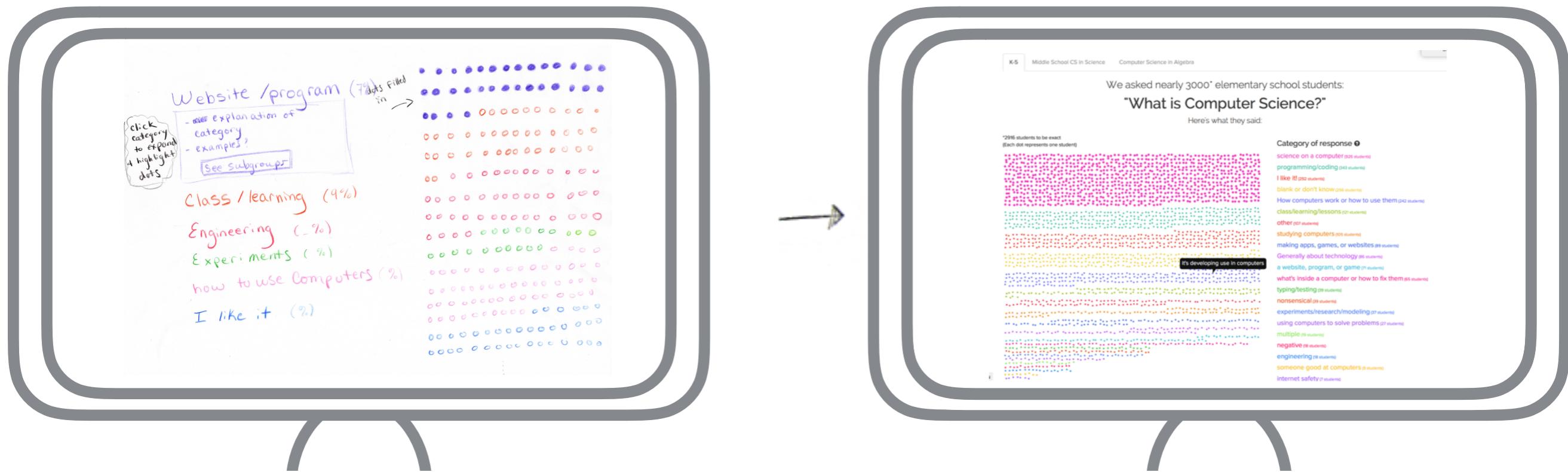
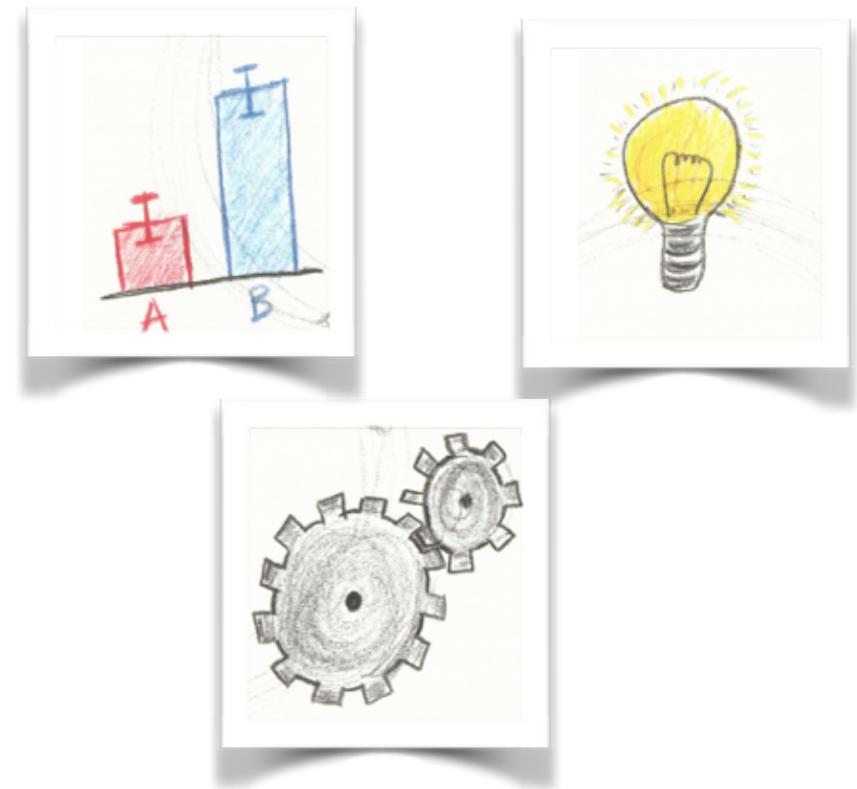
Engineering (- %)

Experiments (%)

how to use Computers (%)

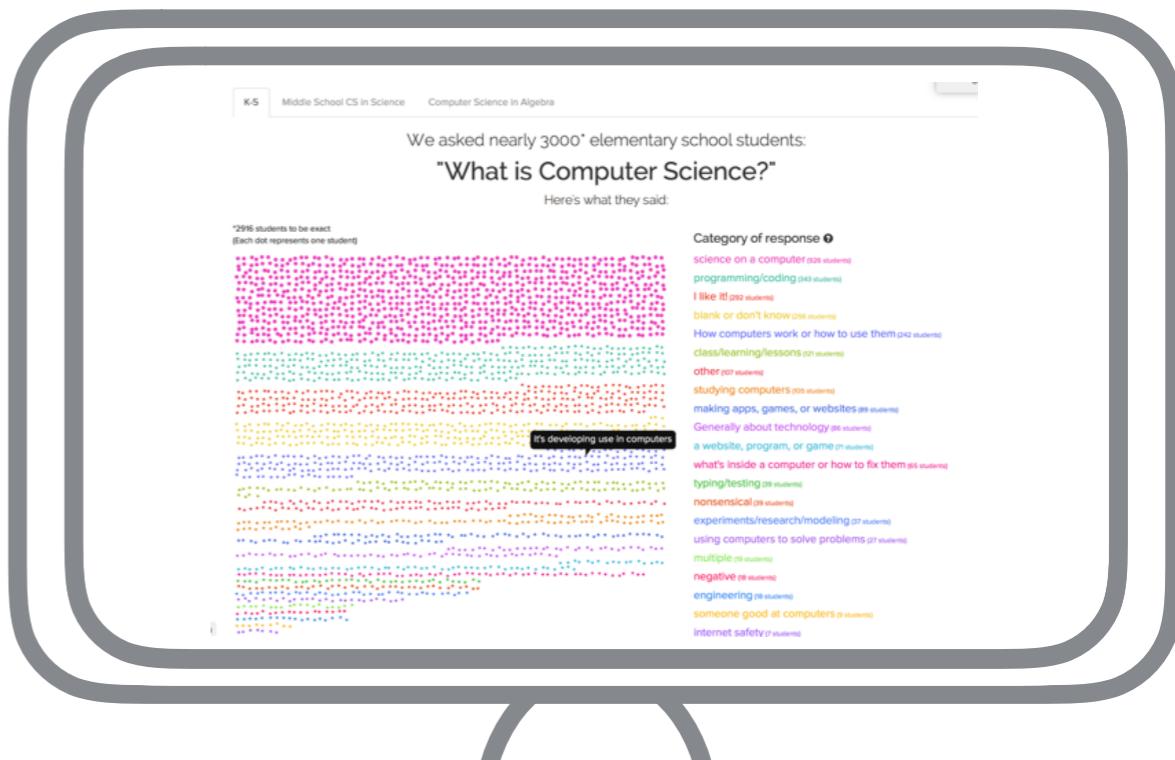
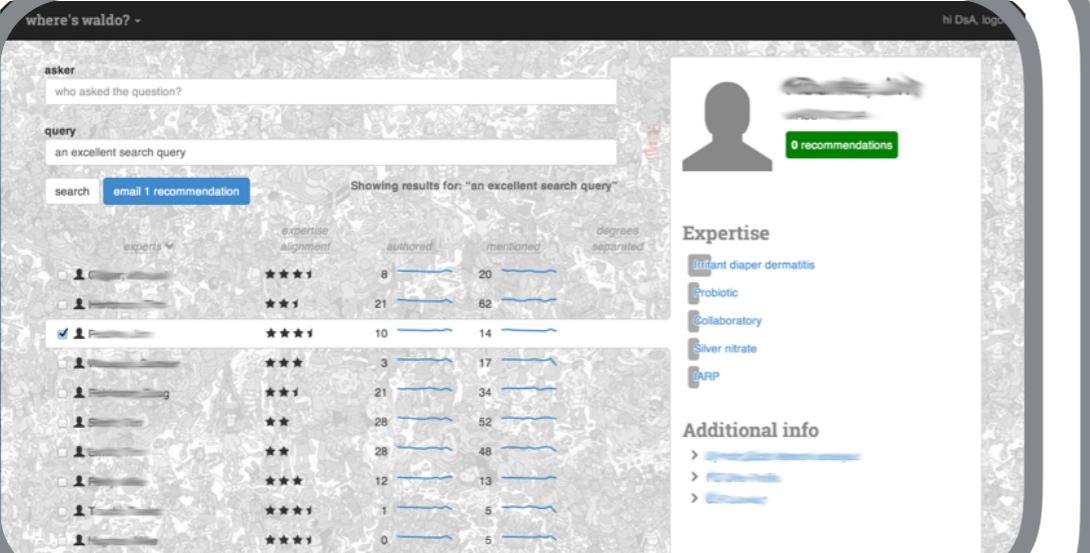
I like it. (%)

iterative



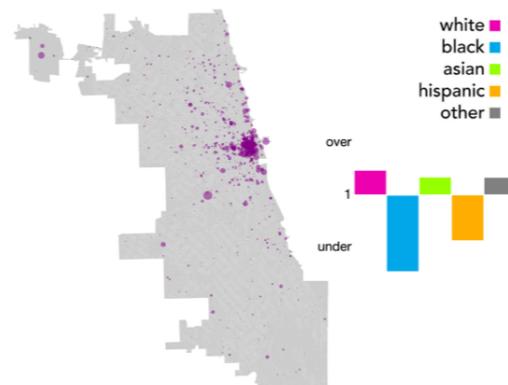
doing is better
than planning

while doing
refine your approach
get feedback
keep asking questions



Instagram's Blind Spot

July 19, 2016



getting

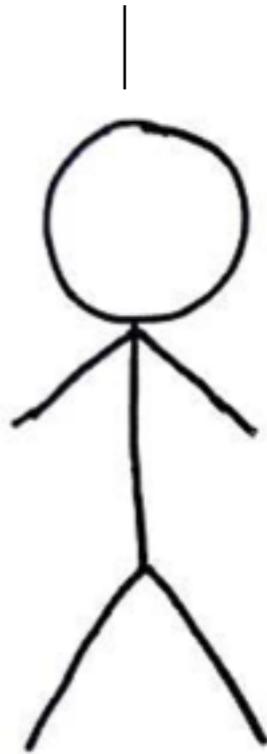
started

brainstorm

- defer judgement (no blocking of ideas)



THAT'S NOT
A GOOD
IDEA.



brainstorm

- defer judgement (no blocking of ideas)
- encourage WILD ideas



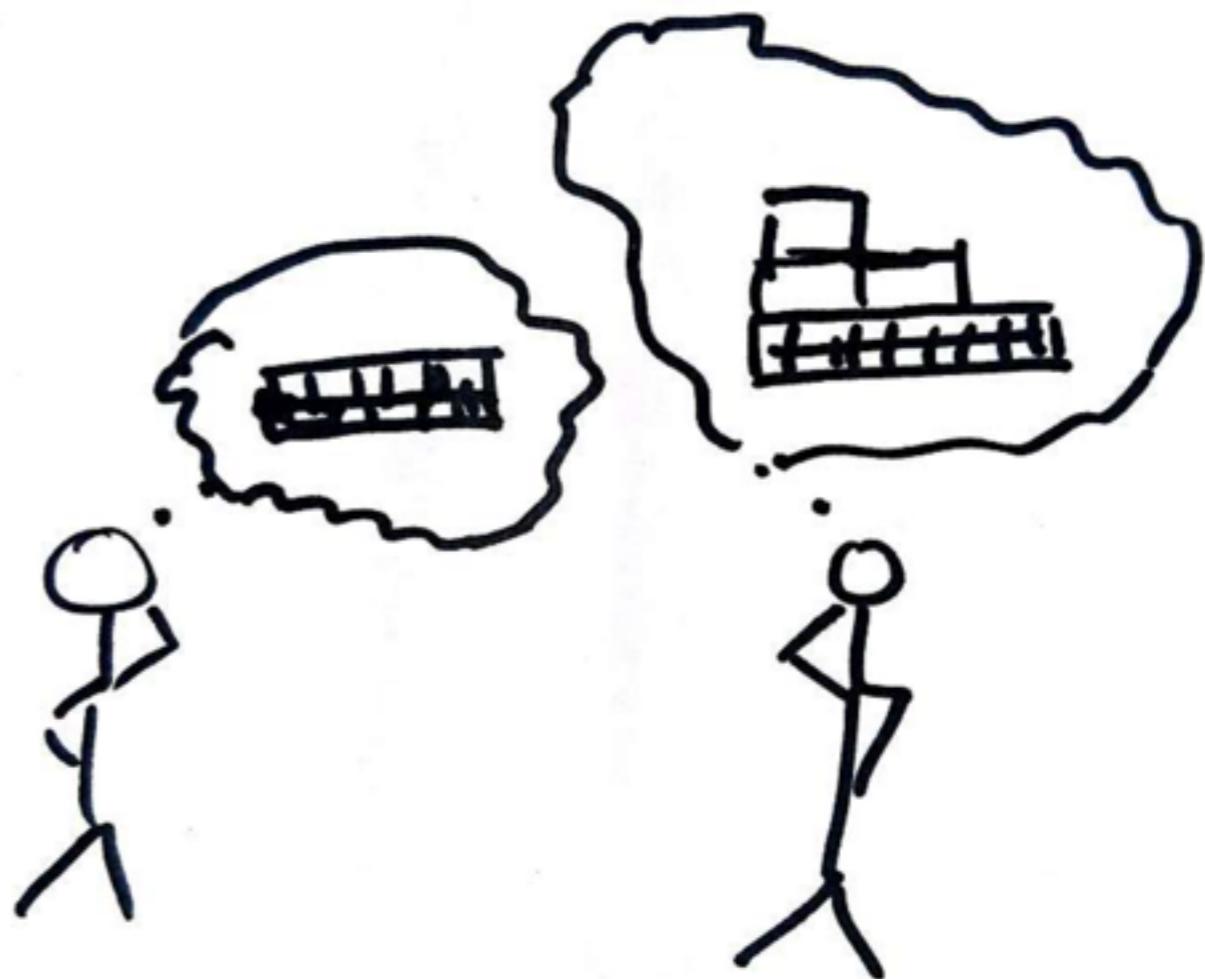
brainstorm

- defer judgement (no blocking of ideas)
- encourage WILD ideas
- build on the ideas of others



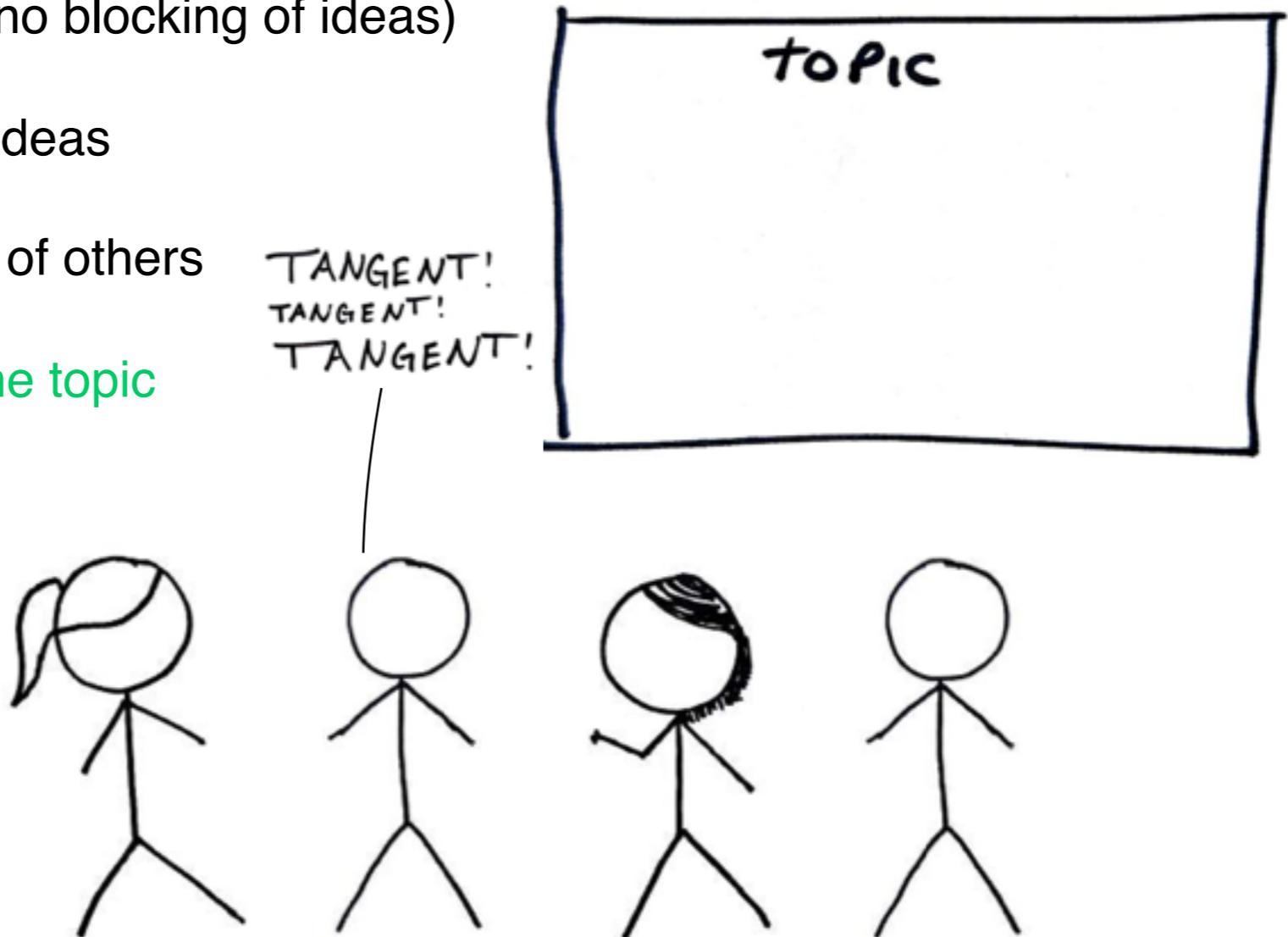
brainstorm

- defer judgement (no blocking of ideas)
- encourage WILD ideas
- build on the ideas of others



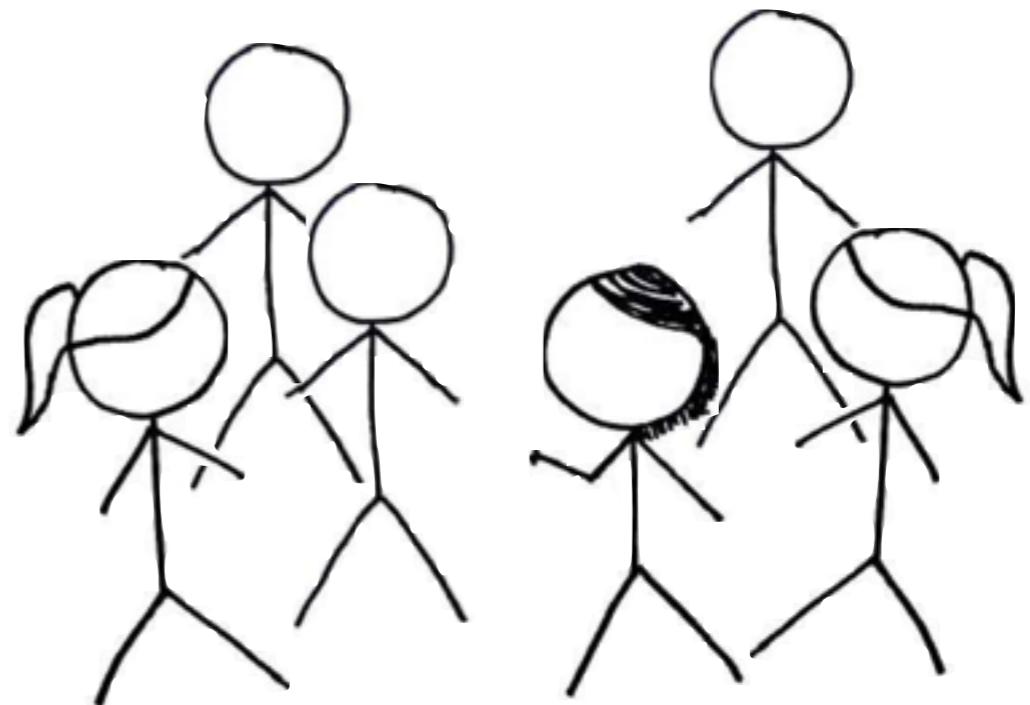
brainstorm

- defer judgement (no blocking of ideas)
- encourage WILD ideas
- build on the ideas of others
- stay focused on the topic



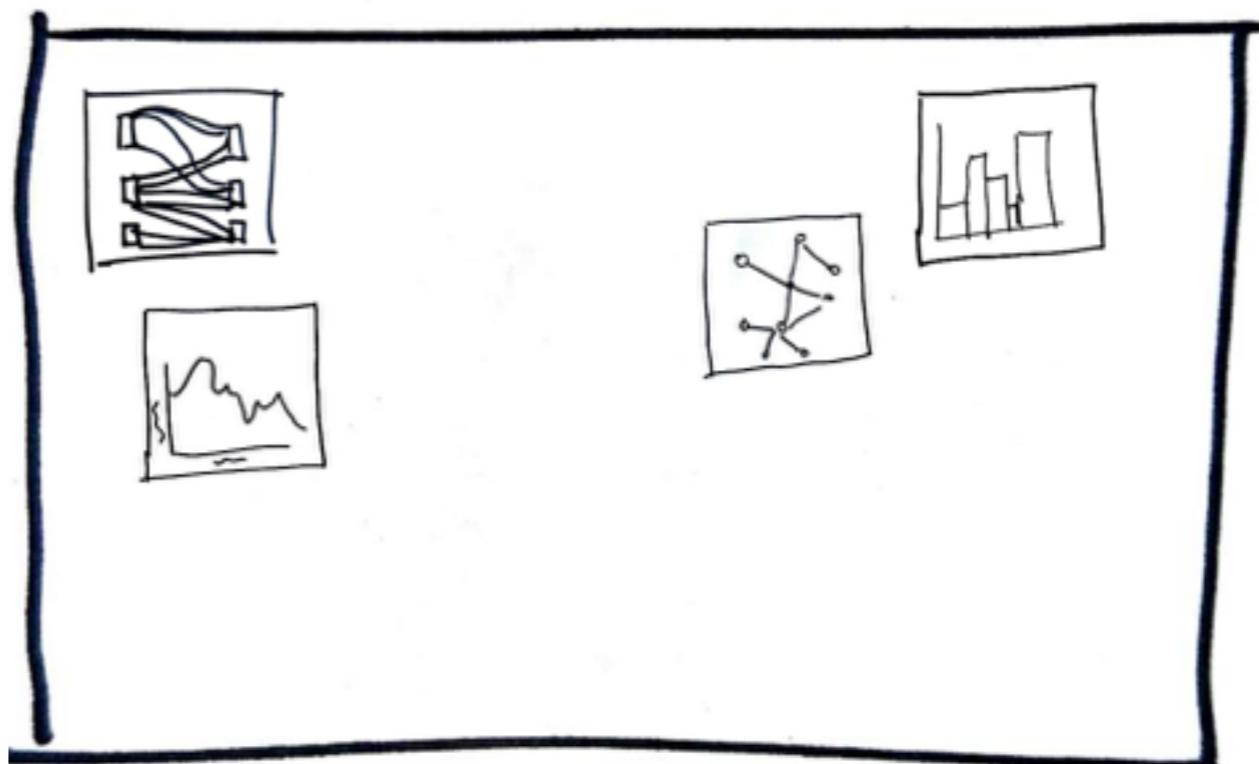
brainstorm

- defer judgement (no blocking of ideas)
- encourage WILD ideas
- build on the ideas of others
- stay focused on the topic
- one conversation at a time



brainstorm

- defer judgement (no blocking of ideas)
- encourage WILD ideas
- build on the ideas of others
- stay focused on the topic
- one conversation at a time
- be visual



brainstorm

- defer judgement (no blocking of ideas)
- encourage WILD ideas
- build on the ideas of others
- stay focused on the topic
- one conversation at a time
- be visual
- go for QUANTITY



Questions?

Thoughts?

:)