12/11 Final day

Transcript for screen casting:

[Intro]
Dan:
Welcome to our website on tap water quality.

[Counter]
Dan:
80000 chemicals are used in commerce. The first visualization engages the audience by asking the user how many chemicals they think are *regulated* revealing a mere 96 chemicals. This serves as the roadmap for the remaining website-- asking: what can *you* do to protect drinking water resources?

[Timeline]
Dan:
A timeline highlights a series of tap water crises that occurred in the US. These stories demonstrate the reality of unregulated, untested tap water resources.

The animated droplets reveal the three tap water regulations most relevant to our website: the Safe Drinking Water Act of 1974, Safe Drinking Water Act Amendments-- the last addition of regulated chemicals in 1986, and the Unregulated Contaminants Monitoring Rule.

[Tree Map]
We will concentrate on the 28 potentially most harmful chemicals.They can be grouped into 6 categories.
Each category can be expanded. We can click on the labels to be referred to further information sources.

[Contamination Ranking]

Now let's look into detailed data.
The scatterplot presents all the counties in the continental US. The x-axis shows the number of water samples per county. It is correlated with the population size, represented by the bubble size.The y-axis shows the contamination index value.

For each contaminant we see the 5 worst performing counties in the US. We can also blank out color-coded regions to analyze patterns for parts of the US.

Finally, we can look for a particular county by typing in its name. Let’s try King.

[Choropleth map]
Cindy: Users can find out about water contamination around their home using this zoomable, interactive map. First, let’s look at the summary score, averaged by state. As we zoom in, more detailed, county level data will show up. The table on the right breaks down the water

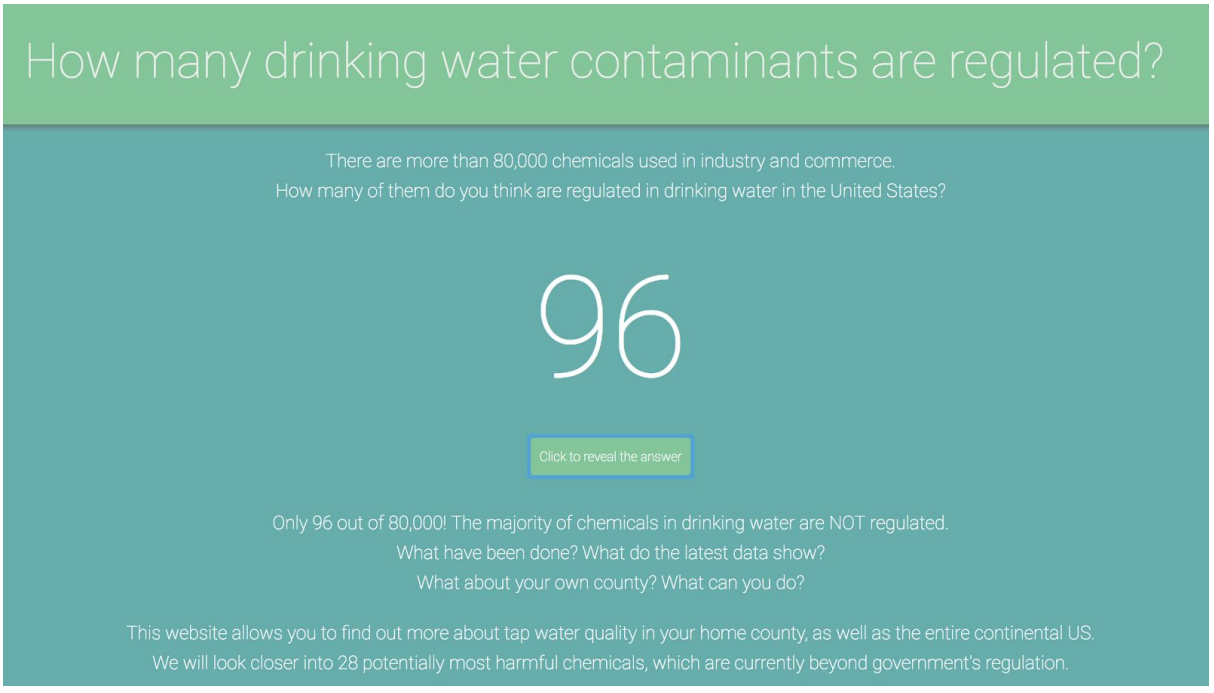
contamination index, and reveal the biggest contributor to the pollution. For most places, those are heavy metals. Switch to a different subset of chemicals to explore more.

[Your action]
Cindy: There are multiple ways individuals can help. We hope this site raises the awareness of insufficient regulation on tap water quality, and empowers individuals to protect themselves and their families.

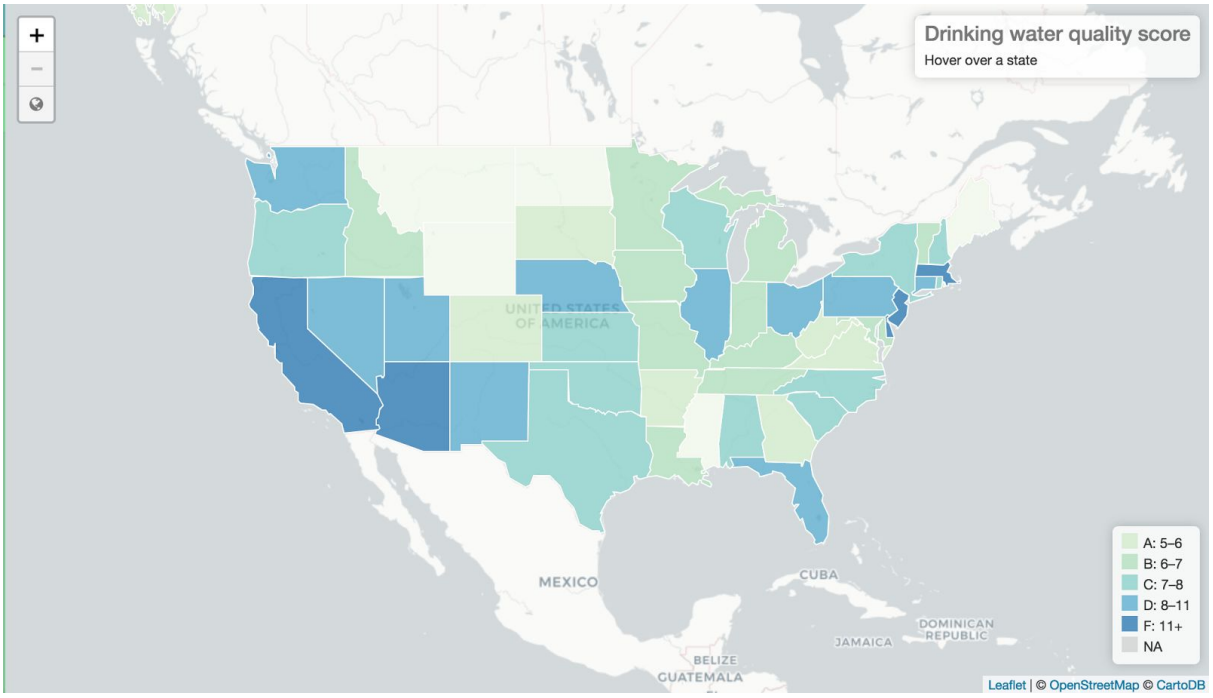
12/9-10 Fine tune project

Add a counter intro

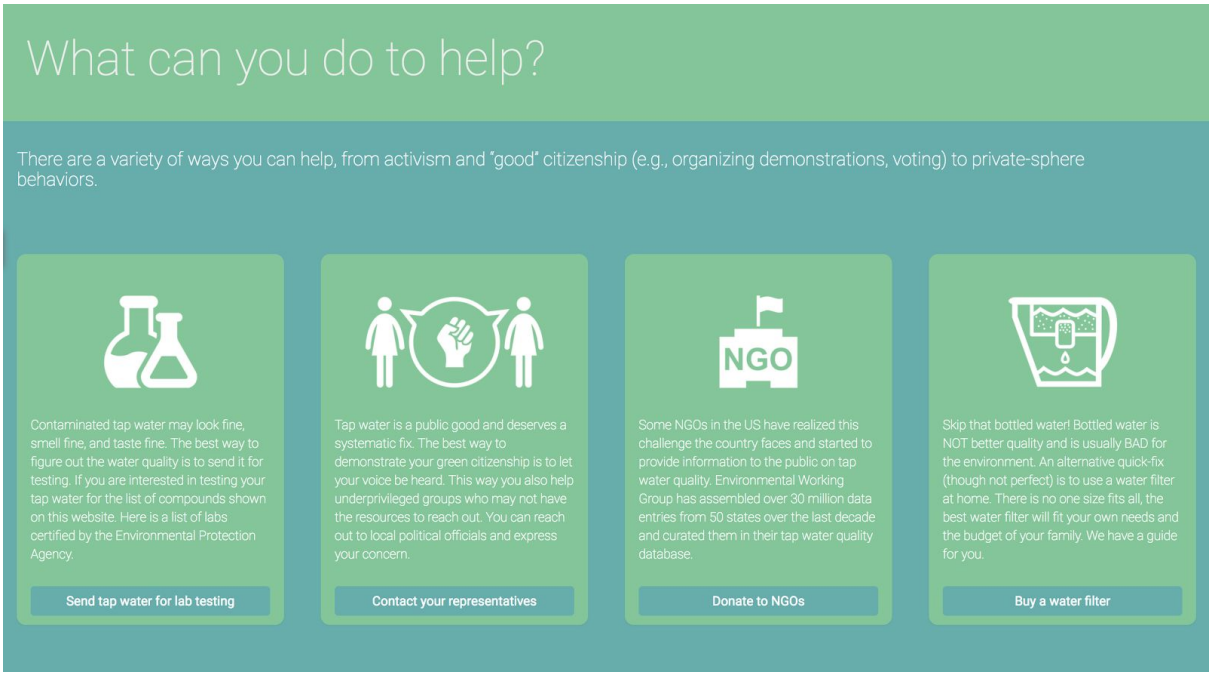
We draw people's attention to the magnitude of the problem by having a counter counting down from 80,000 to 96.



Add a min zoom controller to leaflet map. Now people can click on the globe to go back to minimal zoom level. We used a external JS library for this (https://github.com/alanshaw/leaflet-zoom-min)



Add a section on “what can you do”. Link to four external websites.



Add a section introducing the three team members.

Who We Are

Xindi (Cindy) Hu

Cindy is a doctoral candidate in Environmental Health at Harvard T.H.Chan School of Public Health. Her thesis examines drinking water contaminants in the U.S. and their relevant human health risks.

Go to Cindy's website

Dan Tompkins

Daniel is a candidate for Masters in Design Studies (MDes--Art, Design, and the Public Domain) at Harvard University. He received a Bachelor of Architecture from Cornell University and works in a variety of design media.

Go to Dan's website

Paul von Chamier

Paul is a candidate for Masters in Public Administration in International Development at Harvard University. He specializes in data analysis and econometrics. He gathered professional experience at the World Bank and Procter&Gamble eBusiness.

Go to Paul's website

12/1 Meet with project mentor Javier

We met with our project mentor Javier to hear from him feedback on our prototype V2. Here is a list of suggestions.

- Add text to explain the problem of insufficient data near scatter plot, explain the x axis means number of samples taken
- Add school grade next to the water contamination index, A A+
- Focus on the storytelling, why should a user care?
- Some nice to haves: layout, search inbox and highlight

11/28 Feedback from Fritz

Website for color choice
https://colorable.jxnblk.com/000c66/e1ff00

V2 feedback

- Fullpage js. https://alvarotrigo.com/fullPage/#secondPage
- Unify fonts (san serif v.s. serif)
- Search for county name in bubble chart and highlight it
- Unify color schemes, the last two maps are very different from previous ones
- Timeline, add explanations of green and blue
- Show surprises
  https://medium.com/@uwdata/surprise-maps-showing-the-unexpected-e92b67398865
- Dropdown should be replaced by buttons, next to each other, users are lazy
- Make little things blink so that users know they need to click

CS 171 Project Presentations

(Give the completed form to the team you gave feedback on. They will have to scan it in and attach it to their final submission.)

Your Names: Yanni Cho. Rachel Kang. Haixing Yin

Your E-mail:

haixing_yin@g.harvard.edu, rachel_kang@college.harvard.edu
y-cho @ college.harvard.edu

Name of group you evaluated:

Team aqua

What is good about the group's visualization?

- cute details
- good storyline
- detailed info. allows user to explore substantively
- nice timeline

What could be improved?

- distinction btwn Each page / section
- cont. right column is kind of confusing
- connected vis of counties. color representing region is not intuitive. Highlighting legend more would be great.
- text heavy pages
- last map color scheme doesn't fit in as well with rest of site.

Is the message clear? What is the message?

Yes. Water contamination is a problem nationwide.

CS 171 Project Presentations

(Give the completed form to the team you gave feedback on. They will have to scan it in and attach it to their final submission.)

Your Names: Michelle Ho, Cindy Zhao, Zigi Guo

Your E-mail:

chiachi_ho@g.harvard.edu, zguo@g.harvard.edu, x_zhao@g.harvard.edu

Name of group you evaluated:

What's in your water?

What is good about the group's visualization?

The plots are encoding a lot of dimensions of data, but still easy to understand how to interact.

Color scheme is well-chosen! Love the little icons & detail touches on some of the plots making it unique.

Very eye-catching intro!

What could be improved?

Texts overall can be better positioned & formatted. Bold / underline / sizing can be more consistent. or be clearer why one you underlining certain text / sizing up.

Bubble chart: size of bubble might be little misleading. Not sure if color encoding region is the most efficient way of using this channel (Most regions showing up in the right seem always to be mid-Atlantic & West). Feel color can be ~~not best used~~ better-utilized to encode some of problem.

Bar charts showing tie instead of always 5.

Is the message clear? What is the message?

Yes! Very informative. Tap water may be badly contaminated & people should be more aware.

Feedback from peers informally

- Fullpage js. https://alvarotrigo.com/fullPage/#secondPage
- Unify fonts (san serif v.s. serif)
- Search for county name in bubble chart and highlight it
- Unify color schemes, the last two maps are very different from previous ones
- Timeline, add explanations of green and blue

12/1

Timeline Visualization and Layout
Dan

Following critiques and suggestions from the first iteration, I tried to reorganize the text to flow along with the visualizations a bit better. I reorganized the bootstrap columns/rows into a wide lefthand column with the visualizations and title bars (see prototype v2) and a thinner righthand column with the text.

For the timeline, I found a premade “droplet” svg path and entered the data from a .json that I created from scratch-- taking information from a few dozen websites on major water crises and tap water legislation. A “tooltip”-like div displays a summary of these events, a title, year, location (for crises), and a small photo or logo upon clicking the droplet.

For the next iteration, we’re going to try to further define the different sections of the website--- linking these up to a menu bar that follows you down the page. This will hopefully reduce some confusion that users were experiencing in regard to the text not matching up with the visualization-- as well as giving them an interaction for quickly moving between different sections of the website.

11/27

Page layout and design
Dan

Moving into the final prototype, I was responsible for the timeline visualization, and for organizing the other visuals and content into a cohesive story. Our first iteration was quite linear, and we had the single working visualization of the water quality scatterplot.

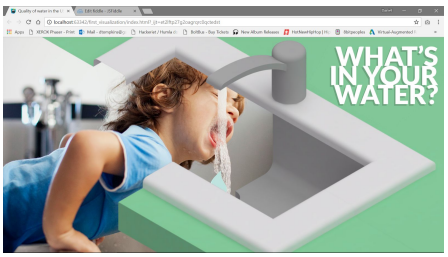
The organization went: Landing page → Title/Scatterplot → explanatory text → Title/Timeline of water quality → explanatory text → Title/Map of contaminants → more explanatory text and then how the viewer could get involved

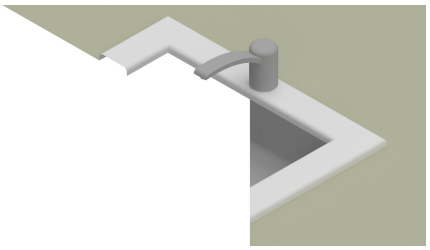
The shifts were a bit abrupt: the title separated each section and it was chunky moving through (which was no surprise for the first prototype). Moving forward, however, we instead introduced the website with a tree visual to show the various chemical and mineral contaminants that we were looking at-- and organizing them in an understandable and interactive way.

This gives the user an immediate understanding of the contaminants discussed throughout the remaining page. We also felt that the end-- the call to action-- was actually very important. We want people to be able to do something about their own municipalities' water-- to collect samples and send them to a lab, or write to their local policy-makers or lobbyists.

With this in mind, I rearranged the flow of the website to have most of the text follow along with the visualizations, complementing one another as you move down the page. The title blocks are less obtrusive, and don't so much interrupt the flow, as delegate themes for each sub-section.

Additionally, the color schemes of each visual reflects that of the website as a whole and gives it a very cohesive "branding". The initial landing page went through further iterations, and we settled on a cutaway sink and faucet with a child leaning in to grab a drink at the tap with the headline "What's in your water?".





11/13

First Prototype Submission
Dan

For the first prototype, we are considering the overall storytelling in the flow of information and visuals. This first prototype began with a 3D-modeled faucet and droplet of water that moves back into the sink with CSS and parallax scrolling.

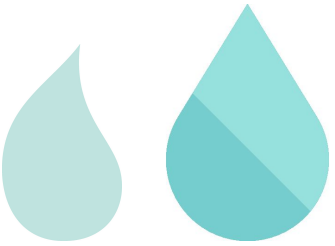
As a designer, I wanted to incorporate not only the d3 library-- but to use d3 as another medium of expression in explaining the working data and the story it tells. I thought that this initial landing page would have a strong graphical attraction while summarizing the theme of the overall website: tap water, interaction, and the potability of that water.

Earlier, I had compiled a series of UI/UX designs that I appreciated, and that had a certain fluid-quality. Buttons and menus that seemed to drip or react to a click or a hover like water.

With this in mind, we wanted to create a “brand”--- an overall cohesion to our story that would be reflected in the interactions, the colors, visuals, text, etc. I also compiled a moodboard of images that spoke to the quality of the data. Here are a few of those images as well as some initial models and “sketches” for icons and svgs:

1) This is actually a gif of a droplet hitting the surface of the water in the glass
2) A few water droplets sketched in Adobe Illustrator
3) Axonometric drawings of faucets for possible use (before I decided to 3D model it from scratch)
4) A hi-fidelity macro-shot of a running faucet-- a little dingy to suggest the quality of the water
5) Filling a glass at the sink-- there is a nice, old-timey aesthetic to this that I liked-- something like an older advertisement
6) This image was getting even closer to the final sink/faucet we used-- there’s a cartoonishness to the highlights
7) We went through a few iterations of the sink-- the final version was layered to hide the droplet as it moves-- giving the illusion of dimension to the 2D screen
8) Lastly, the title went through a couple iterations-- this one was supposed to look as though the letters were floating on the countertop

1 

2 

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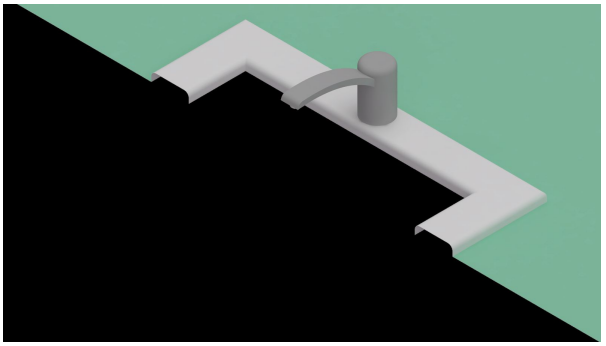
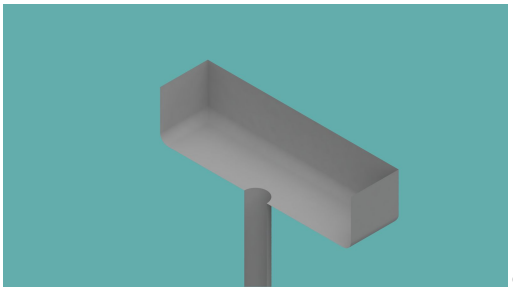
7 

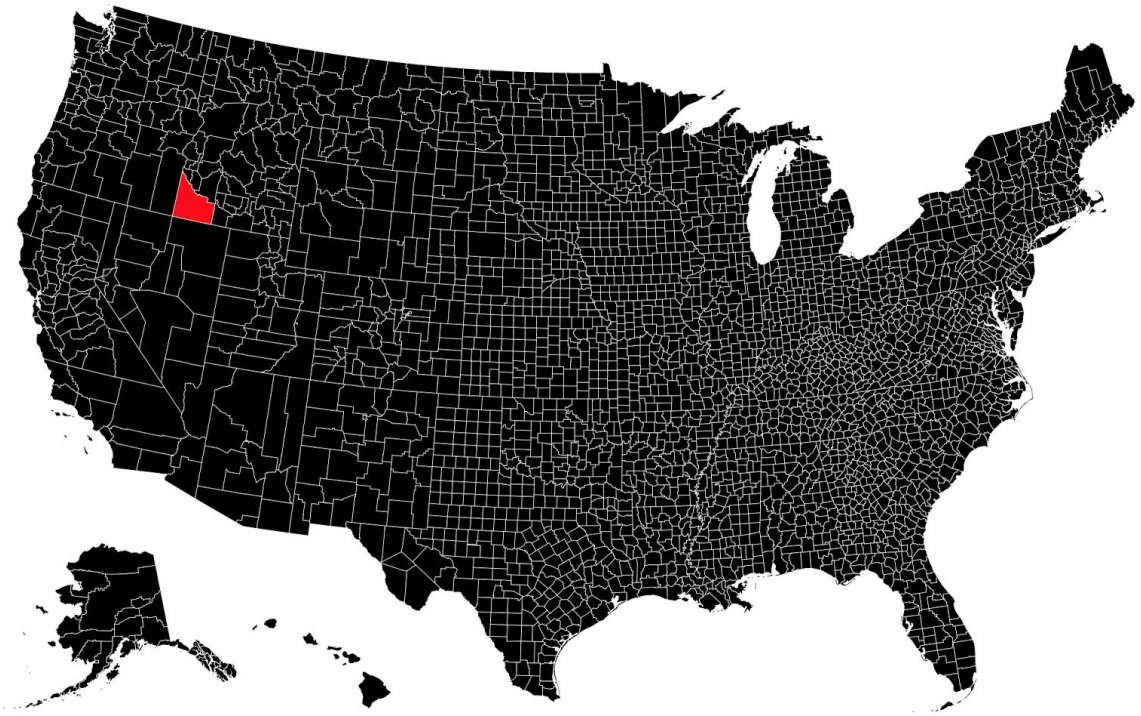
8 

11/23

Implement Map visualization

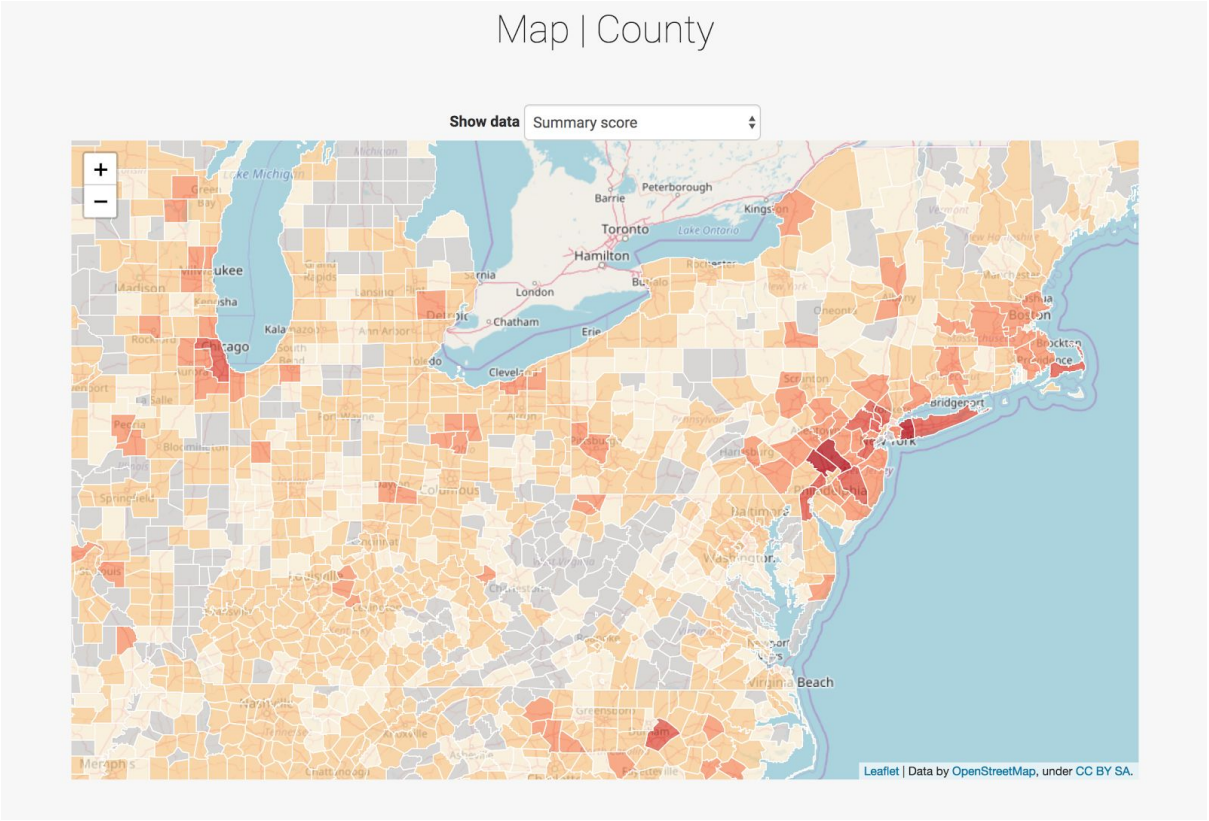
We want to use choropleth map to visualize tap water quality score. The map should be zoomable, allowing users different level of detailedness.

Version 1 - implement interactive map using D3



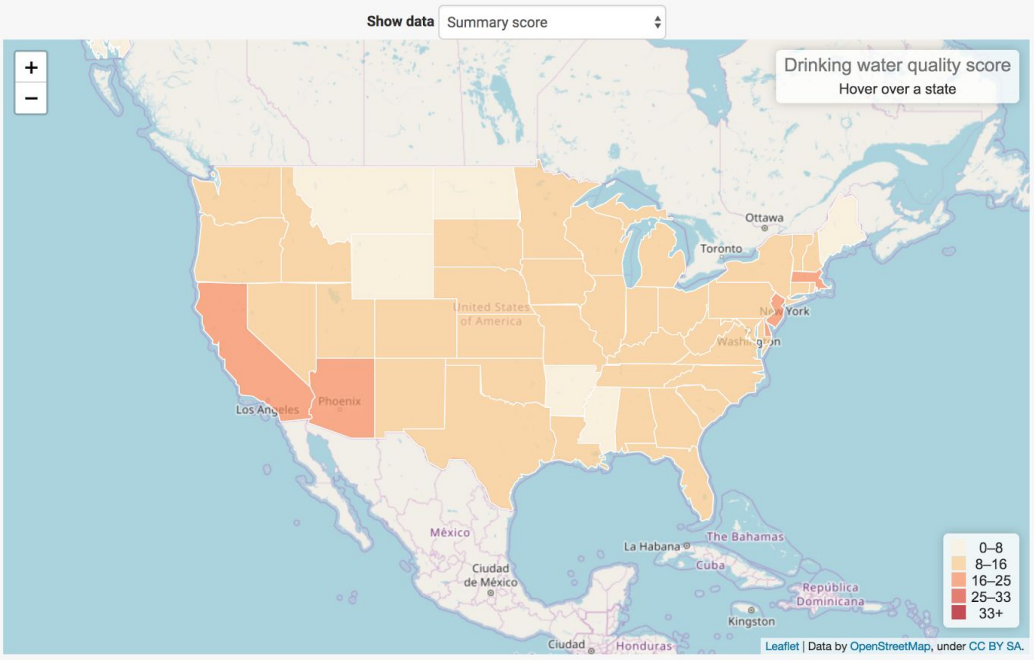
Cindy first tried implementing a choropleth map in D3. However if the user zooms a D3 map, the user just gets a magnified object without more details. Cindy thinks it is important to connect it to a basemap. By connecting with a real basemap, the user can pick up more information as they zoom, and then may help them with recognizing the location better.

Version 2 - try connect a D3 svg map object with leaflet
Cindy found a blog post from Mike Bostock (https://bost.ocks.org/mike/leaflet/), which creates a D3 svg map and “glue” it to leaflet layer with some necessary transformation. The code does what it is designed to do. However, it is tougher to implement all the other interactions we have designed. Therefore, we moved on to version 3.

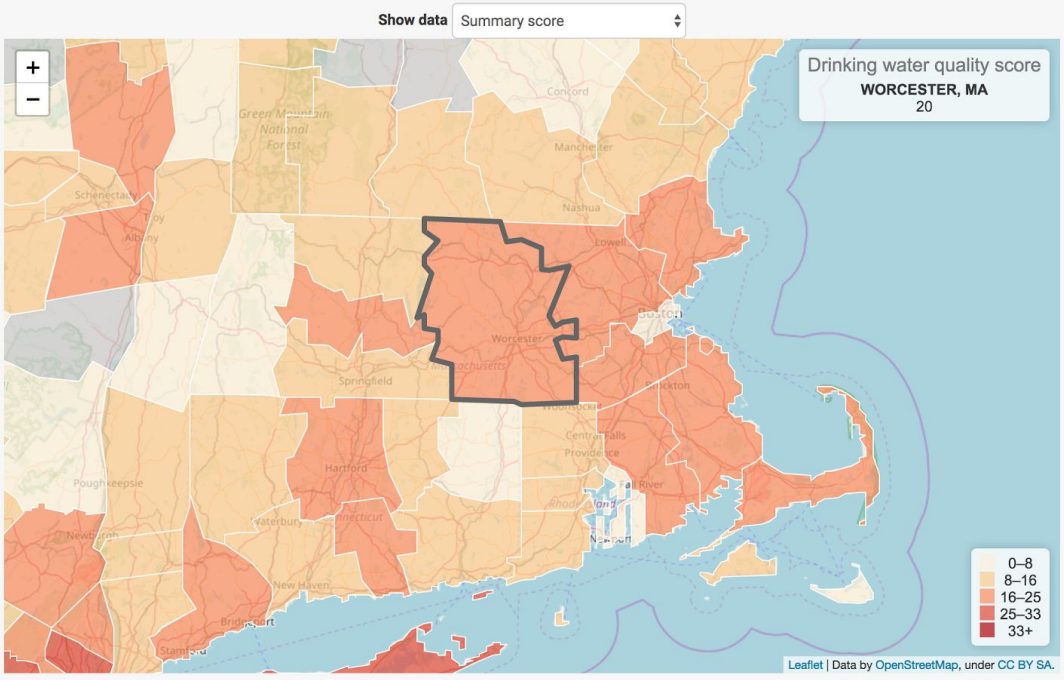


Version 3 - implement zoomable interactive map in leaflet
By using the L.geoJson function in leaflet library, Cindy was able to implement the zoomable-interactive map. By changing the selection above the map, the user has a chance to view drinking water overall scores, and scores by chemical contaminants subtypes. The tooltip allows the user to learn more information about the score in each state or each county as they hover the mouse over. The data being displayed is depending on the zoom level. When the zoom level is low (i.e. zoom-out), the map shows the state level data. When the zoom level is high (i.e. zoom-in), the map shows the county level data.

Tap water quality score for the US



Tap water quality score for the US



11/13 Prototype V1

Design and Interaction Inspiration:

Water-themed UI/UX

- https://codepen.io/lbebber/pen/pvwZJp
- https://codemyui.com/gooey-sidebar-stretch-menu-concept/
- https://tympanus.net/Development/CreativeGooeyEffects/menu.html
- https://codemyui.com/material-design-gooey-arrow

More data wrangling

- Cindy grouped 28 chemicals into 7 subgroups to make it easier for user to understand. Because we feel like throwing all the 28 chemical names at general internet user is not very friendly.
- Cindy created a json file to illustrate this parent-child relationship for the tree graph. We use this at the beginning of the website to provide people the context and show them what chemicals we are showing them in the visualizations.

Implement the first interactive chart (bubble chart from Paul)

11/06 Detailed Project Plan

Team name:

Team Aqua

Group Members:

Paul Caesar Von Chamier
paul_von_chamier@hks18.harvard.edu
Harvard Kennedy School

Cindy Hu
xhu@mail.harvard.edu
School of Public Health

Daniel Tompkins
dtompkins@gsd.harvard.edu
Graduate School of Design

Working Title:

What's in My Water?
Visualizing unregulated chemical contaminants in US drinking water

Goals and Tasks:

Background:
There are 80,000 chemicals used in commerce, only 96 were regulated in US tap water. Recent drinking water crises in the US (i.e Flint, Michigan for lead, Hoosick Falls, New York for highly fluorinated compounds, New Hampshire for arsenic) highlights the fact that tap water quality in this country faces serious challenges, and can not be taken for granted.

The US Environmental Protection Agencies has collected monitoring data in tap water, both for regulated and unregulated chemical contaminants, but usually this data exist in obscure databases and are not easily comprehensible by the public. We would like to inform the general population the health impact of contaminated tap water in the US, what tools they have at their disposal to know more about the water quality in their area, and how they can reduce their family's exposure to harmful chemicals.

Some NGOs in the US have realized the challenge the country face and started to provide information to the public on tap water quality. Environmental Working Group has assembled over 30 million data entries from 50 states over the last decade, and curated them in their tap water quality database. https://www.ewg.org/tapwater This is a comprehensive database but lacks interactive visualizations to engage the users, and compare themselves to other countries. Toxinalert.org is another organization that has done much work in lead in drinking water.https://www.toxinalert.org/toxin-alert-map

However, the general public still lacks a one-stop resource of information that provides an interactive view on tap water quality in the US. By using an interactive visualization and displaying how the rapid growth of industrialized lifestyle has contributed to rising contaminants in drinking water, how spatially variable drinking water contamination is and how real human lives have been impacted, we want to draw people's attention to the situation of chemical contamination in US tap water, educate people about the potential harmful effects, and build urgency to take immediate action.

Goals:

Illustrate the tap water quality situation in the US

- Give detailed overview per ZIP code
- Provide interactive statistics and insights

Create resources for policy-makers

- Understand the water quality dynamics in the US
- Identify the trends - both positive and negative
- Distill lessons as to how water quality challenges can be addressed

Raise awareness among Americans

- Draw social interest to the topic of water quality
- Help build political momentum towards taking more care of water quality
- Provide information on analytical methods for gathering and preserving samples, measuring contaminants, or finding local organizations and EPA-approved labs that provide such tests
- Indicate products or tools for safely reducing the number of contaminants in household drinking water
- Provide a more thorough explanation of existing chemical contaminants

Tasks:

Data collection/ Data wrangling

- We need to combine data from three different sources (US EPA third Unregulated Contaminants Monitoring Rule dataset, Safe Drinking Water Information System, Toxic Release Inventory) into a cohesive dataset.
- We have to process the data in order to make it comprehendible for javascript and d3.

Storyline

- We should develop the visual narrative for our website
- We also have to Identify the core concise message to be shared

Design

- We will have to conceptualize visualization addressing the Storyline pivots.
- We should divide the conceptualized visualizations among the team members.
- We will have to check our visualization concepts' consistency with the design principles (Tufte, Gestalt, Bernard and others)

Implementation

- We will have to come up with the data visualization
- We will also need to visualize the website layout and the storyline flow process
- Our website will need hosting on a server
- We will wrap up the process by developing a 2 minutes narrative debriefing the project rationale.

Description of Data:

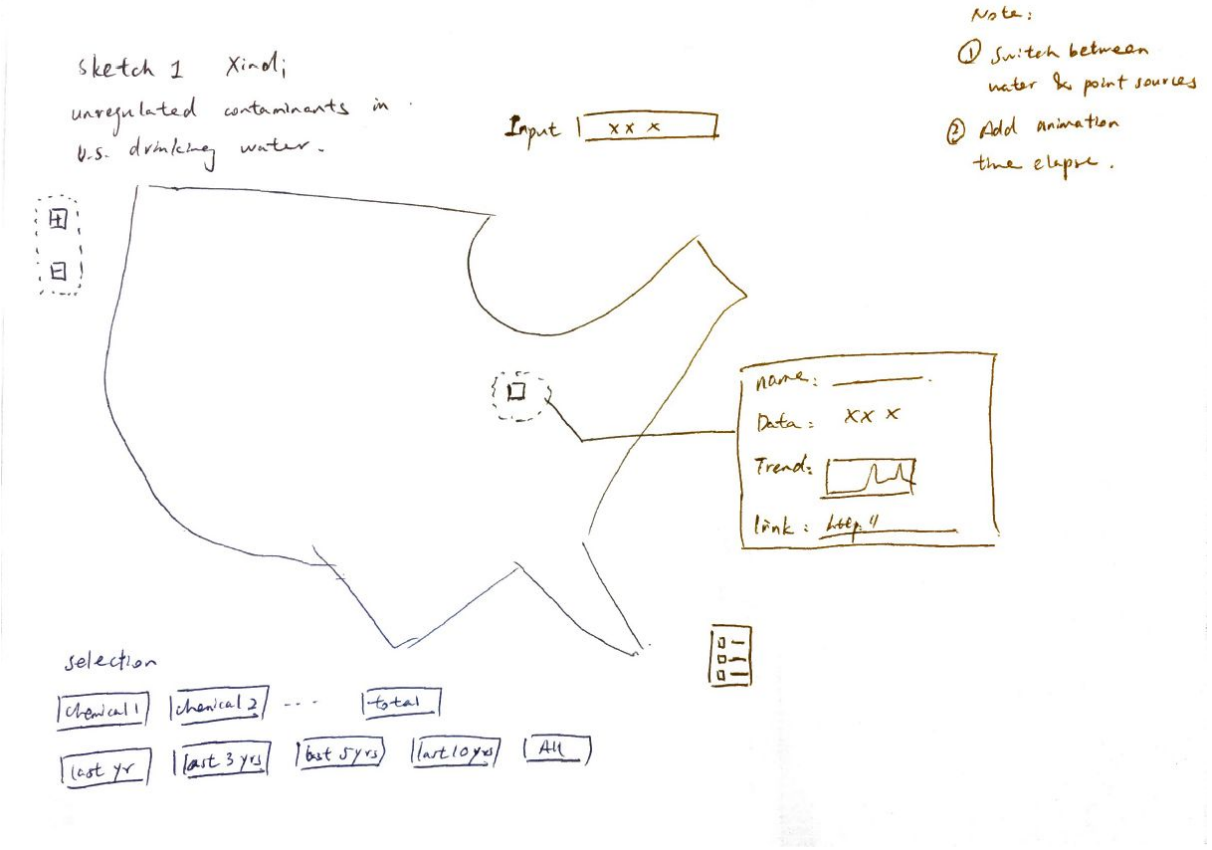
- The US Environmental Protection Agency (EPA) third Unregulated Contaminant Monitoring Rule covering the whole US https://www.epa.gov/dwucmr/third-unregulated-contaminant-monitoring-rule

- Safe Drinking Water Information System from US EPA https://www3.epa.gov/enviro/facts/sdwis/search.html

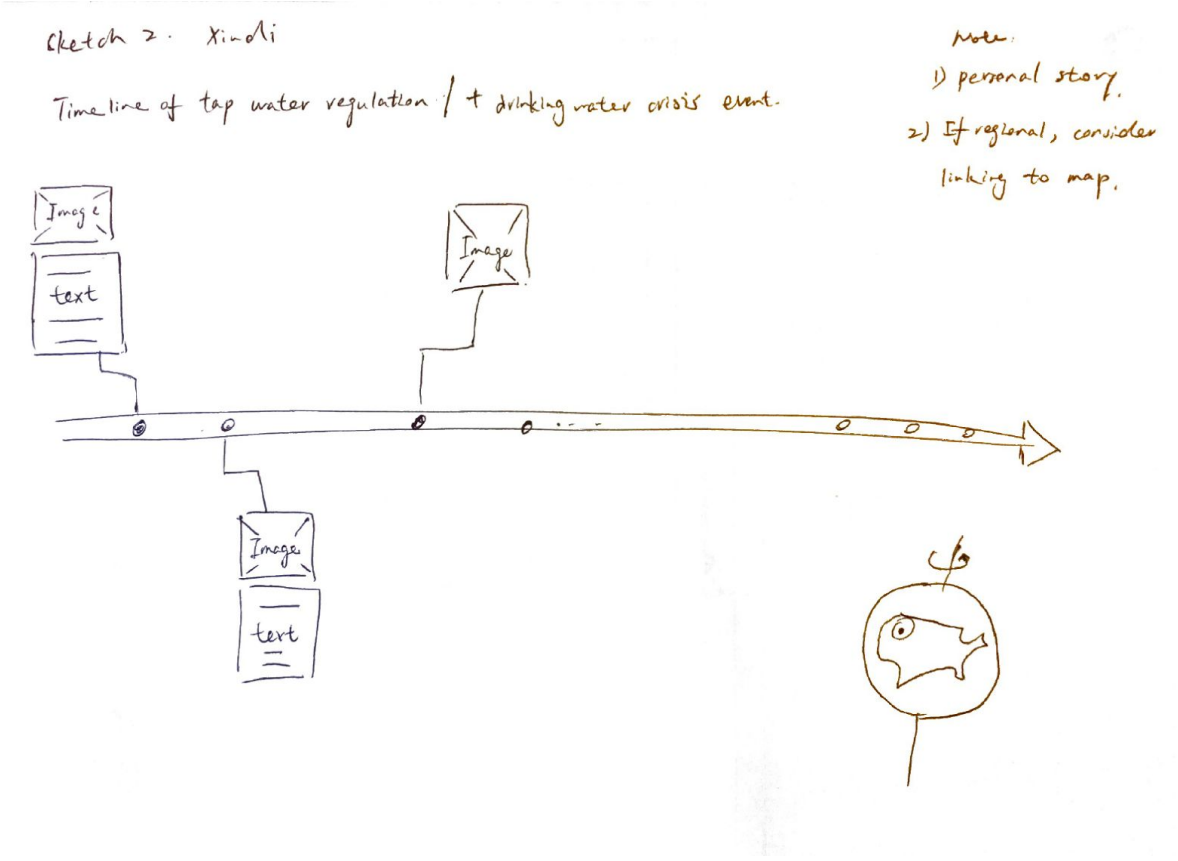
- Complementary dataset: Drinking Water Watch for regulated chemicals from 11 states covering early 1990s to 2017, if needed
    - California https://sdwis.waterboards.ca.gov/PDWW/index.jsp
    - New Jersey https://www9.state.nj.us/DEP_WaterWatch_public/
    - Texas http://dww2.tceq.texas.gov/DWW/
    - etc.

Sketches:

Sketch 1:
Main visualization, a map of unregulated chemical contaminants and industrial sources in the US

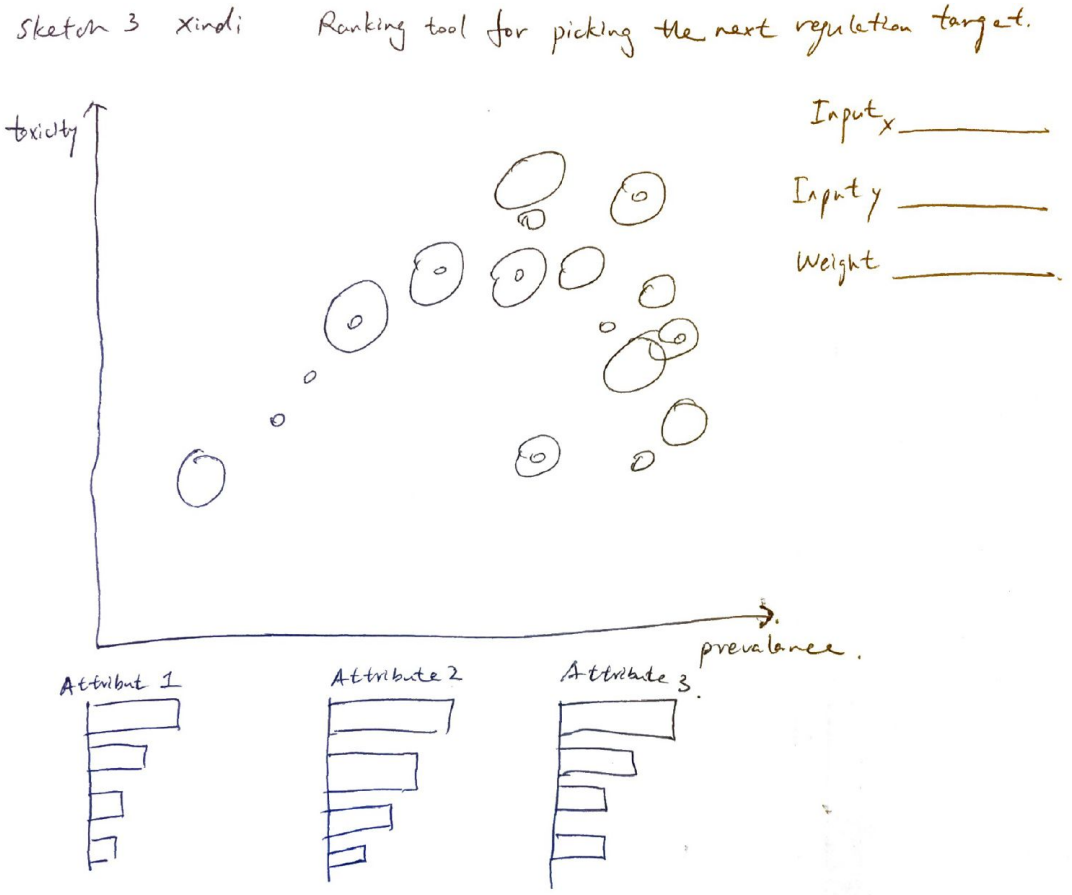


Sketch 2:
Timeline with history of tap water regulation in the US, and outcry of tap water crisis.

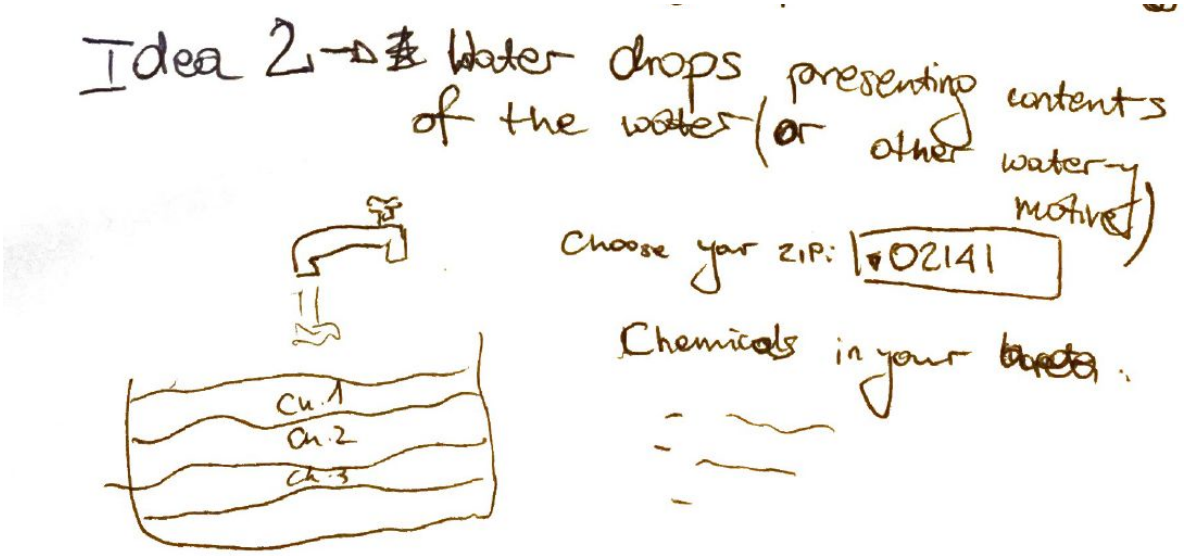


Sketch 3:

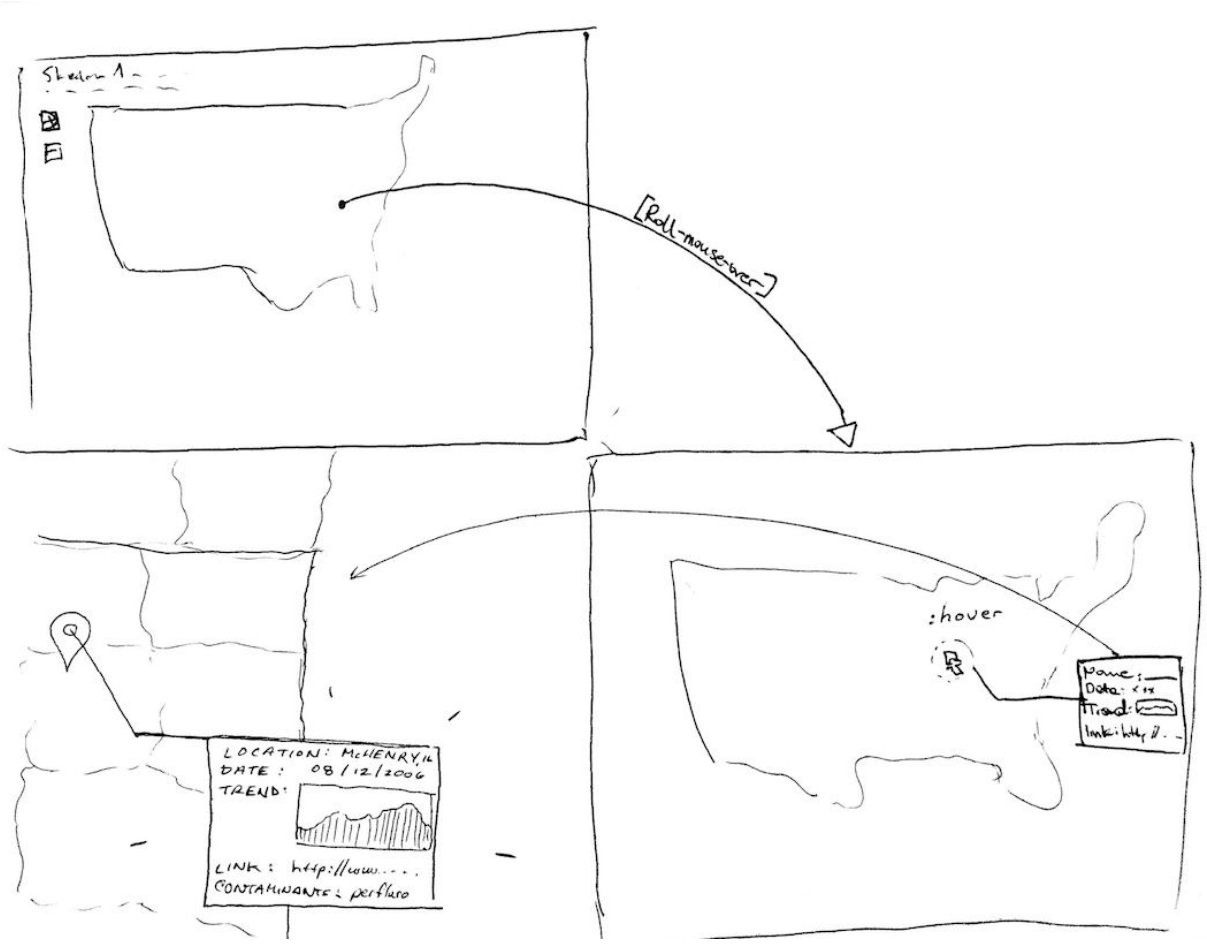
Barchart for the worst ten cities and the best ten cities for tap water quality



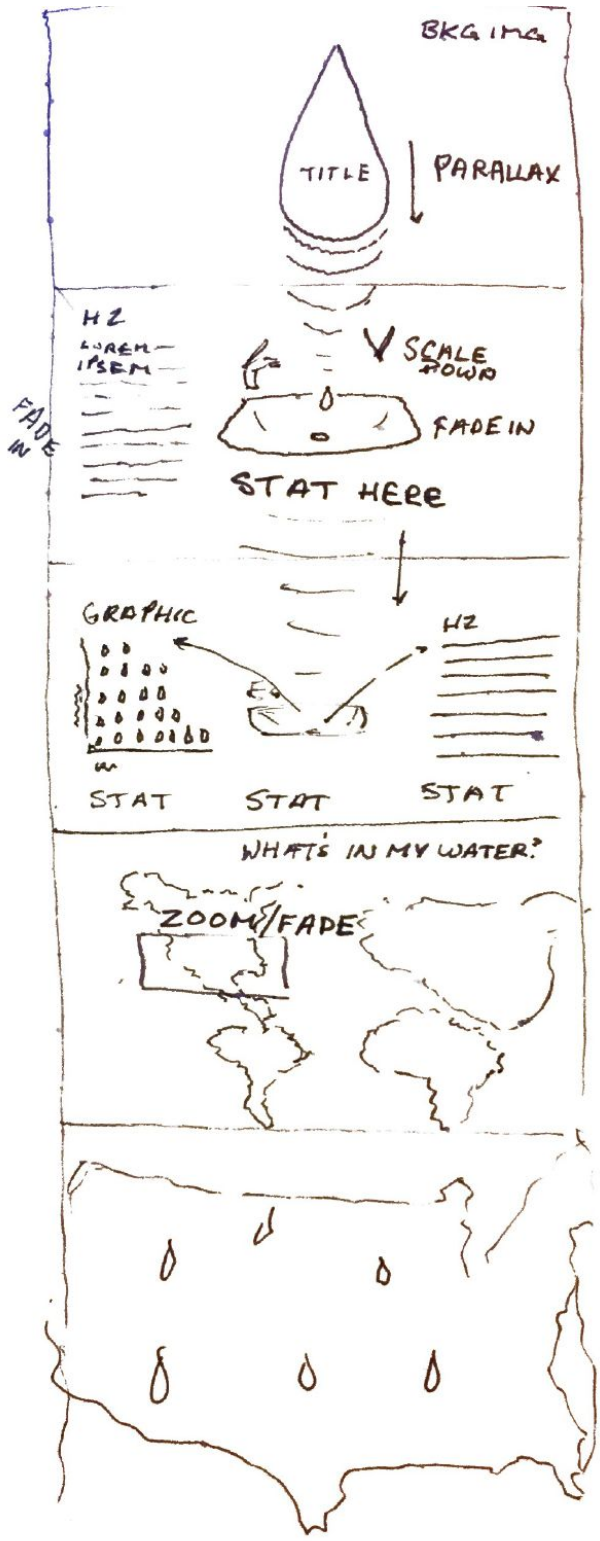
Sketch 4:
Stacked Areachart for tap water quality of a given county or zipcode area.

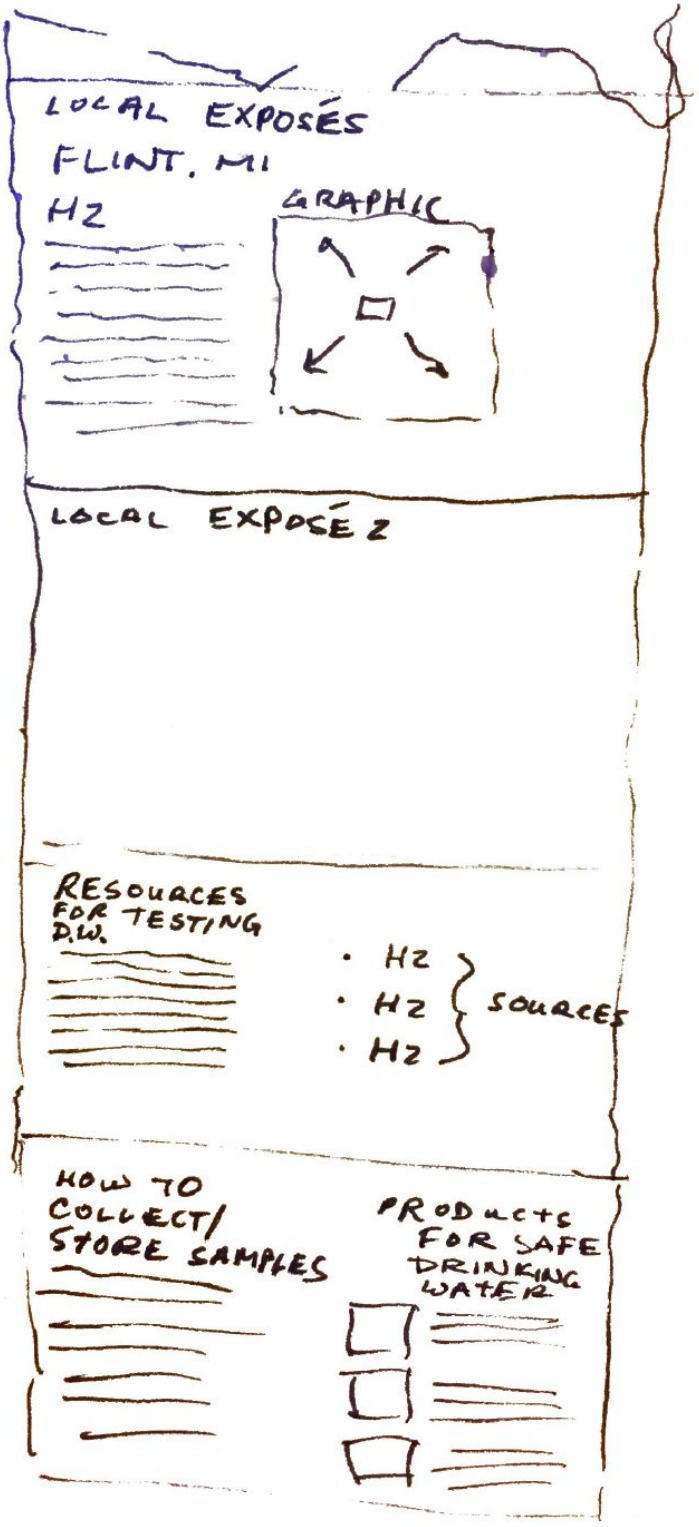


Interaction Storyboard:
Tooltip on visualization for mapping chemical contaminant histories



Webpage Layout / Storytelling:




LOCAL EXPOSÉS
FLINT, MI
HZ
GRAPHIC
LOCAL EXPOSÉ 2
RESOURCES FOR TESTING D.W.
· HZ
· HZ
· HZ
SOURCES
HOW TO COLLECT/ STORE SAMPLES
PRODUCTS FOR SAFE DRINKING WATER

Project Timeline:

Date	**Milestone 1**	**Milestone 2**	**Milestone 3**
November 13th	Have a layout with a theme, choice of colors and font	At least one draft of visualization to show	Data wrangling
November 20th	Drafts of all the visualizations ready and placed in the layout		
November 27th	At least one of the visualization ready	Applying tooltips and interactions	
December 4th	Website ready for beta-tests with fresh users		
December 11th	Implementation of improvement based on beta-test feedback	server setup	project submission

Feature List (ranked):

1. Must-have: The interactive map, stack chart, timeline
2. Should-have: Parallax dynamic layout, bubble chart
3. Could-have: zoom-in/out on the map linked to the timeline

Description of Team Roles:

Paul: Stack chart, Bubble chart, Submission
Cindy: Interactive map, Content for the timeline, Data wrangling
Dan: Layout with intro (CSS, Bootstrap), Timeline

10/31 Project Proposal

Working Title:

What's in My Water?

Visualizing unregulated chemical contaminants in US drinking water

Goals and Tasks:

There are 80,000 chemicals used in commerce, only 96 were regulated in US tap water. We want to draw people's attention to the situation of chemical contamination in US tap water, educate people about the potential harmful effects, and build urgency around taking immediate actions.

We would like to inform the general population what tools they have at their disposal to know more about the water quality in their area and how they can reduce their family's exposure to harmful chemicals.

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    - New Jersey https://www9.state.nj.us/DEP_WaterWatch_public/
    - Texas http://dww2.tceq.texas.gov/DWW/
    - etc.