Process book, CS 171 Final Project
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To Bees or Not To Bees?

Abstract:
For several years, the condition of apiculture and honeybee health in general has been brought to public attention by beekeepers, scientists and the media. The alarming phenomenon known as Colony Collapse Disorder (CCD), in which the majority of able-bodied worker bees abscond from the hive without warning, has resulted in over ten million lost hives across the United States and Europe. Hypotheses as to the cause of the condition include mite infestation, harmful pesticides, and climate change, yet there is not yet a single consensus among either beekeepers or researchers. Fortunately, despite the ongoing prevalence of the condition, the number of managed bee colonies worldwide has grown in the past few years. Whether or not this is due to increased focus on apiculture or a decline in the prevalence of CCD is to be determined.

Our motivation for this project is that the health of honeybees worldwide is of paramount importance to global ecology, economics, and world health. Honeybees alone are responsible for pollinating a significant portion of crops grown for human and animal consumption, their annual productivity being equated to tens of millions of dollars. By examining data gathered from
beekeeping surveys conducted by agricultural groups like the National Agricultural Statistics Service, the United States Department of Agriculture, and the Food and Agriculture Organization of the
United Nations, we can examine managed honeybee populations over time and examine how they have fared both in the past and recently against these threats. Additional data sourced from the USDA and the US Department of the Interior also explores overall pollinator health and pathogen data gathered from colonies suffering from CCD, which may be able to provide more insight into what sorts of problems induce the condition in colonies. We hope to create an information-driven web page that examines the rise and fall of honeybee population both in the United States and beyond and examines several likely candidates for their condition using data-driven visualizations.

11/4

- Initial idea: something to do with beekeeping?
    - Perhaps flowers in the USA, state by state (choropleth?)
- Datasets:

    - http://usda.mannlib.cornell.edu/usda/current/BeeColonies/BeeColonies-08-01-2018.txt?fbclid=IwAR1fpoLcUBLdXmvIGAQnKARk9x9bBPuW633mPVChHW1nVe6nMZOeVfpDEm4
    - Collapsing pathogen webs in colonies: https://catalog.data.gov/dataset/data-from-pathogen-webs-in-collapsing-honey-bee-colonies
    - Pollinator monitoring program: https://catalog.data.gov/dataset/pollinator-monitoring-program-u-s-fish-and-wildlife-service-region-1
    - Can easily do state flowers, but seems kinda boring

Detailed Process Plan

Jack, Leyla, and Michael all worked hard on this portion.

11/7 - Start of Detailed Process Plan

Client

The American Beekeeping Federation (ABF) has hired us to create a new section of their website regarding the importance and peril of bee colonies in the United States.

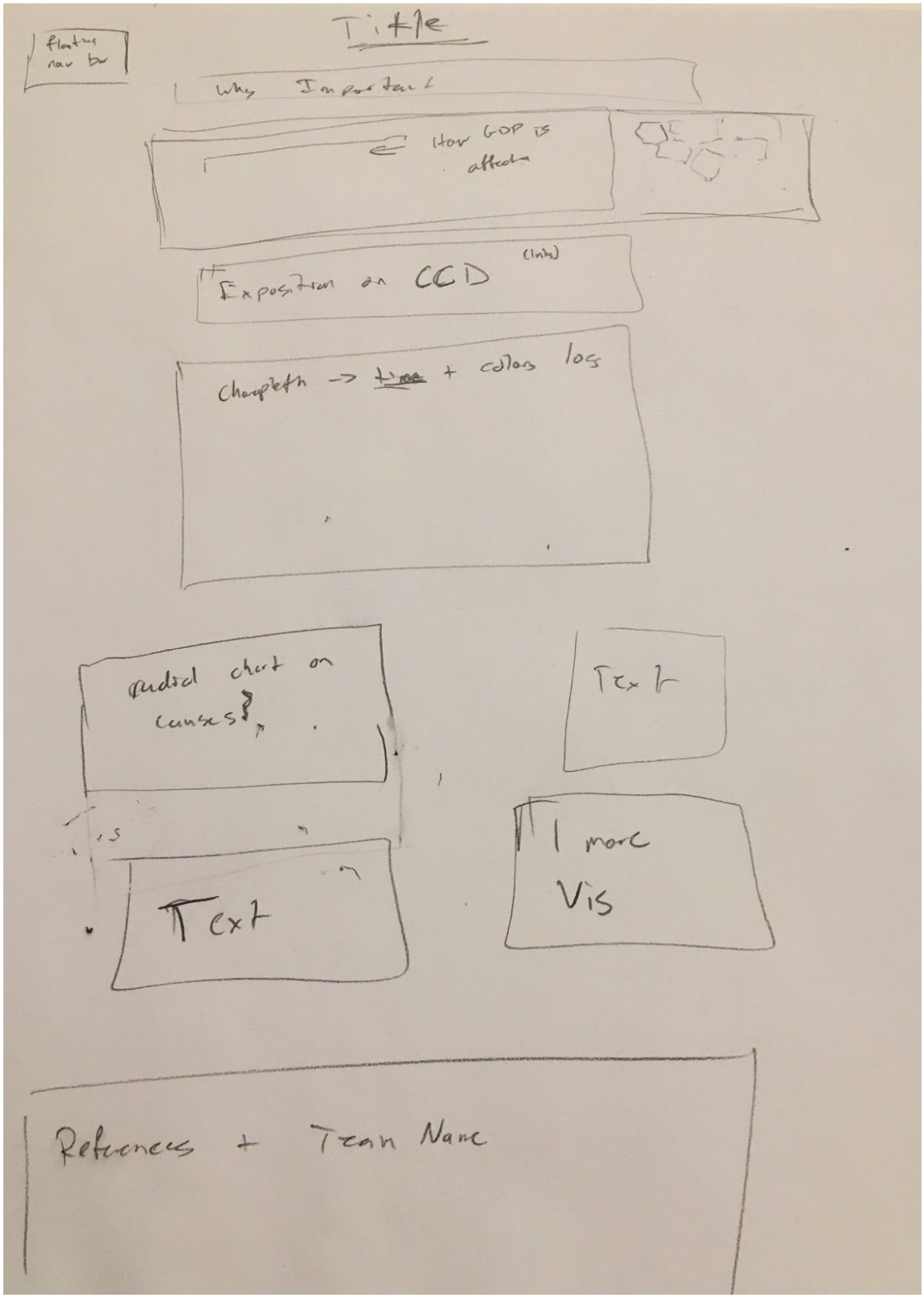
Audience

The general public, who will hopefully be linked to the site, but also the ABF's members.

Questions

- Where are there the most beehives in the USA?
    - Has the distribution of beehives changed in the past few years?
- Have beehives been dying off?
    - What has caused beehives to die off?
    - When did it begin?
    - Is there a pattern?
    - Will it get worse?
- Are bees important? Why are bees important?
    - Where are the bees most important?
- Where and when have instances of CCD occurred?
    - What is CCD?
- Which portions of America have seen the greatest losses?
- Which pathogens/pests are most prevalent across bee colonies in America?
    - Which have been the most present in colonies which have collapsed?
- How/where/when did such pathogens/pests spread?

Initial Storyboard Sketch:



11/11 - Continued work on detailed process plan

Goals

Our main goal is to create an educational resource that will help inform the general public on the decline in honeybee colonies, and the consequences that said decline could bring to everyday life. We hope to do this by creating an interactive website, with multiple visualizations, as well as text and image components. Our secondary goal is more normative: to encourage viewers to donate to the American Beekeeping Federation. We believe that effective storytelling in our primary goal, coupled with the mission of the ABF, will go a long way towards accomplishing our secondary goal as well, as we will hopefully convince viewers that the decline in honeybee colonies has severe consequences, and that they should do something to stop it.

Tasks

Our tasks are as follows, in what we believe is the order they must be accomplished:

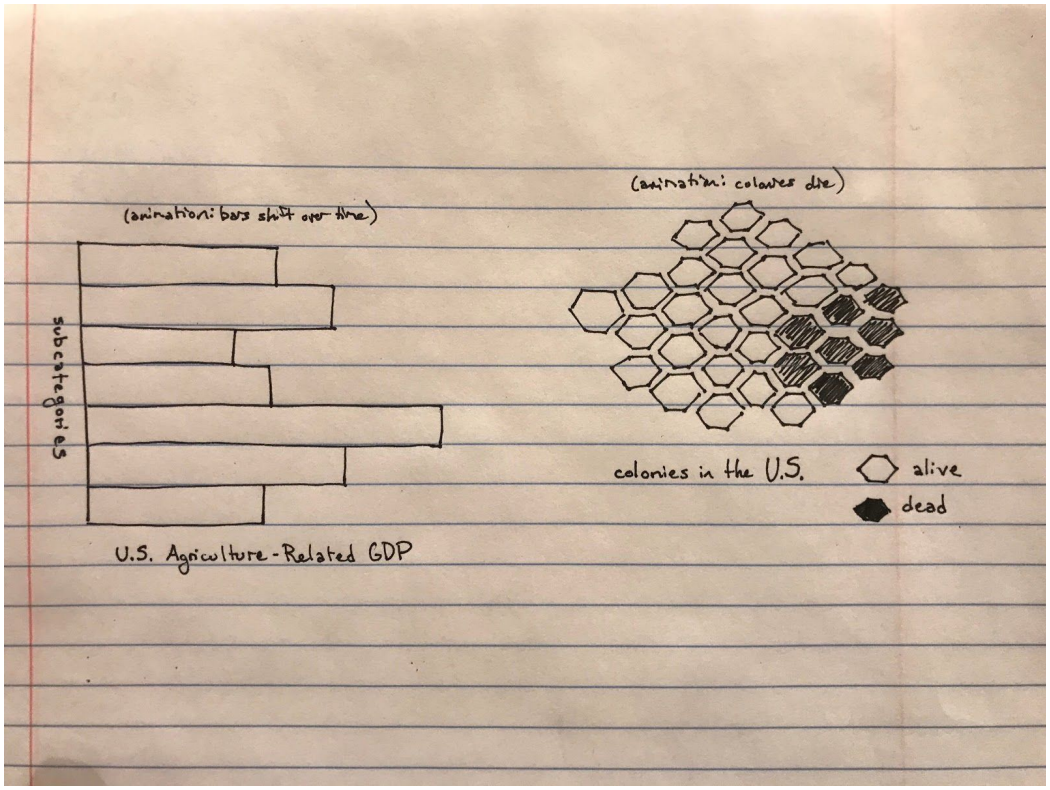
1. Create a plan for how to most effectively tell the story
2. Choose visualizations that effectively convey key points in the story
3. Code static versions of the visualizations
4. Add user interactivity to the visualizations through tooltips and dynamic filtering
5. Prototype a website using the dynamic visualizations and placeholders for other elements
6. Add text and images to the website
7. Test, revise, repeat from 6 (or 2 if necessary)

Data Sources

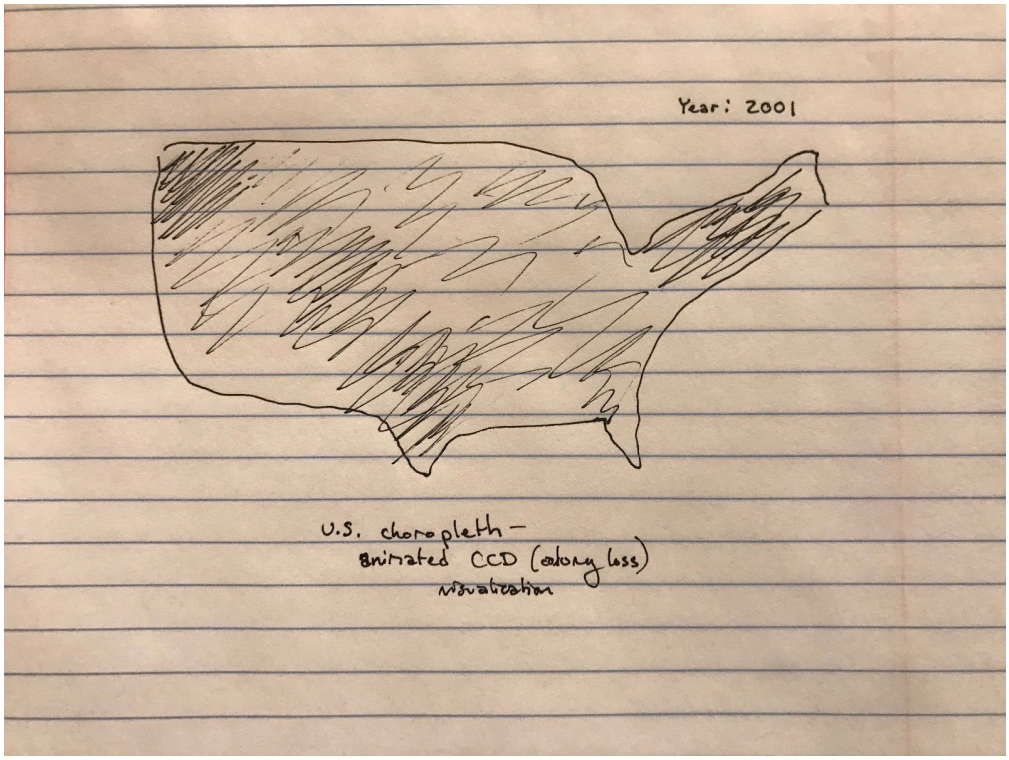
- Data from: Low dose of neonicotinoid insecticide reduces foraging motivation of bumblebees (link)
    - Contains several data sets, including:
        - Foraging and feeding observation for single bumblebees given small doses of neonictinoids
        - Foraging and feeding observations over the entire foraging sequence for bumblebees

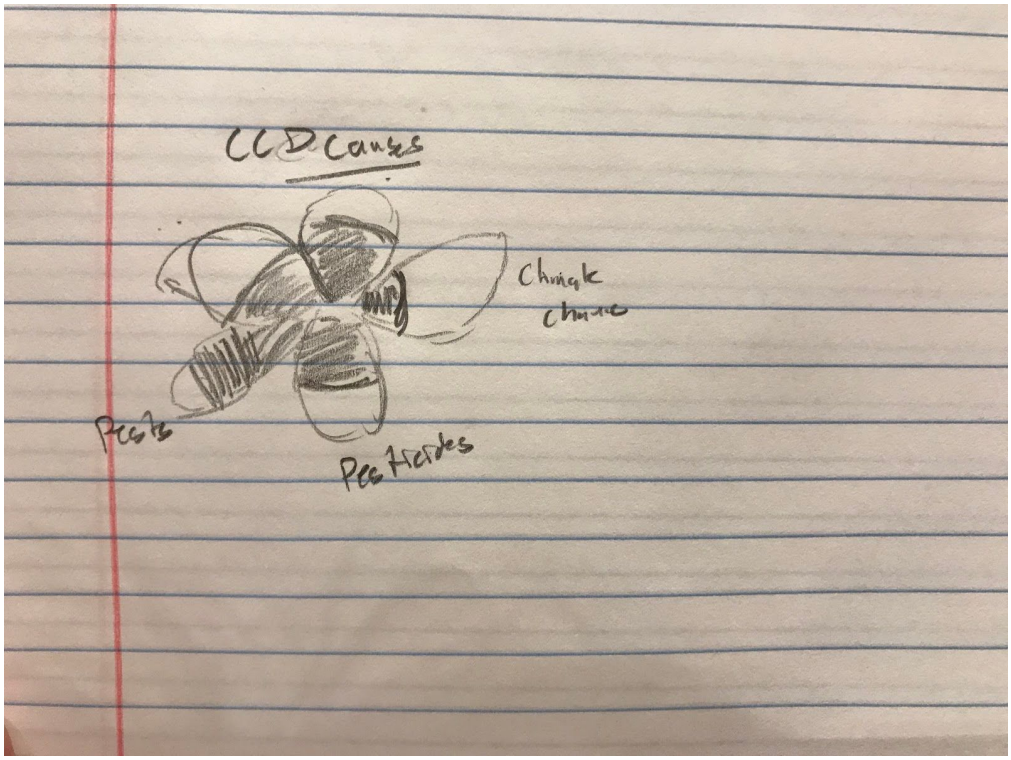
- Honey production in the USA, 1998 - 2012 (link)
    - Honey production in pounds and USD by colony, sortable by year and state.
- Estimated Annual Agricultural Pesticide Use (link)
    - Pesticide usage by compound from 1997 to 2012, projections up to 2017. Contains information about state and county as well as amount used.
- Honey Bees and Neonic Pesticides (link)
    - Same data as “Honey production in the USA” but with additional columns detailing specific neonicotinoid usage by region
- Bee Colony Statistical Data, 1987 - 2017 (link)
    - Contains data about colony loss per region throughout the United States.
- U.S. Daily Climate Normals, 1981 - 2010 (link)
    - Contains daily climate information about temperature, precipitation, frost/freeze dates, etc. throughout the United States.
- Future datasets may be gathered from:
    - https://data.world/datasets/bees
    - https://www.ars.usda.gov/oc/br/ccd/index/

Visualization Idea Sketches

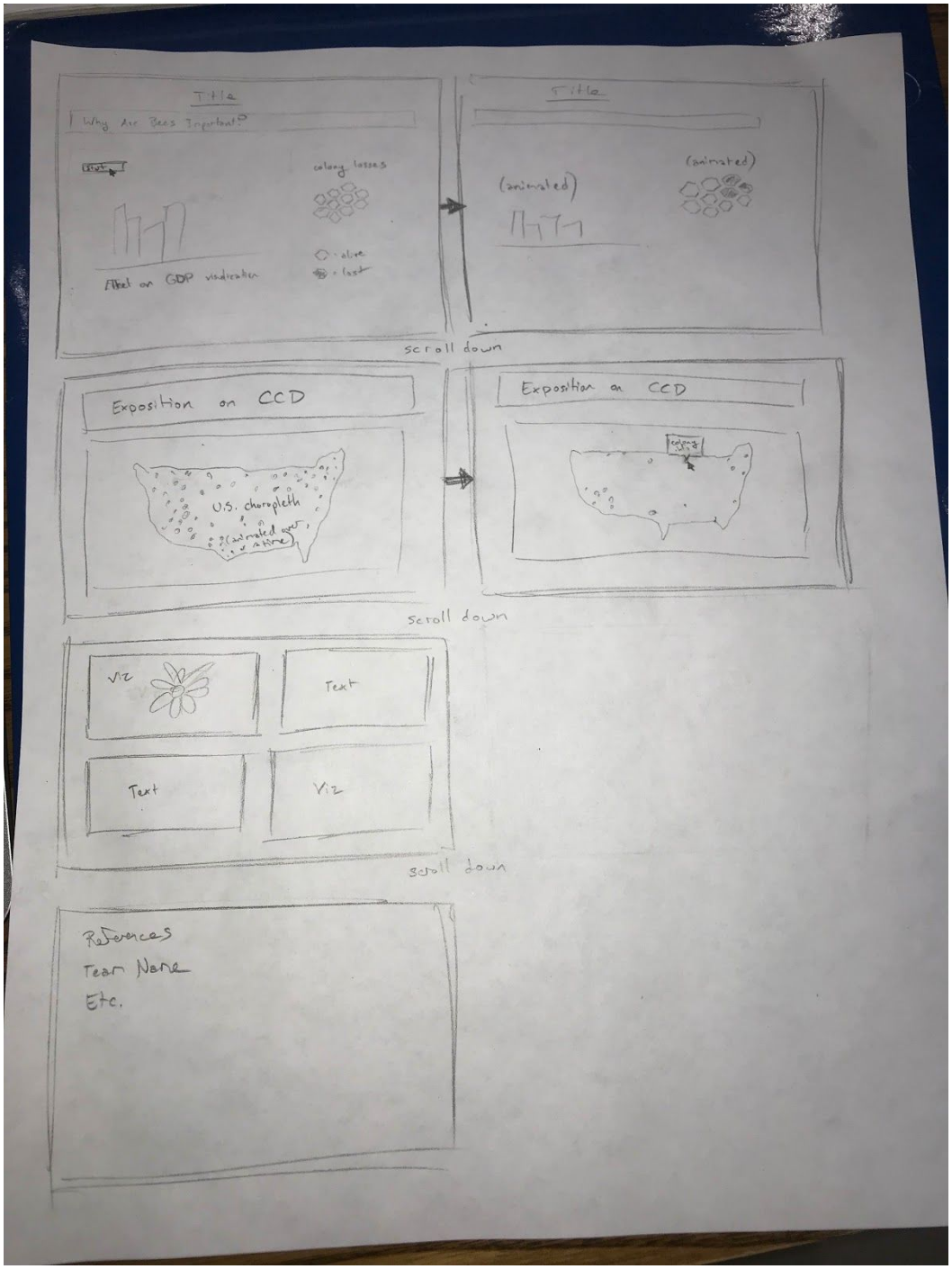


Linked bar chart and plot, showing colony loss and GDP over time (simultaneous animations)

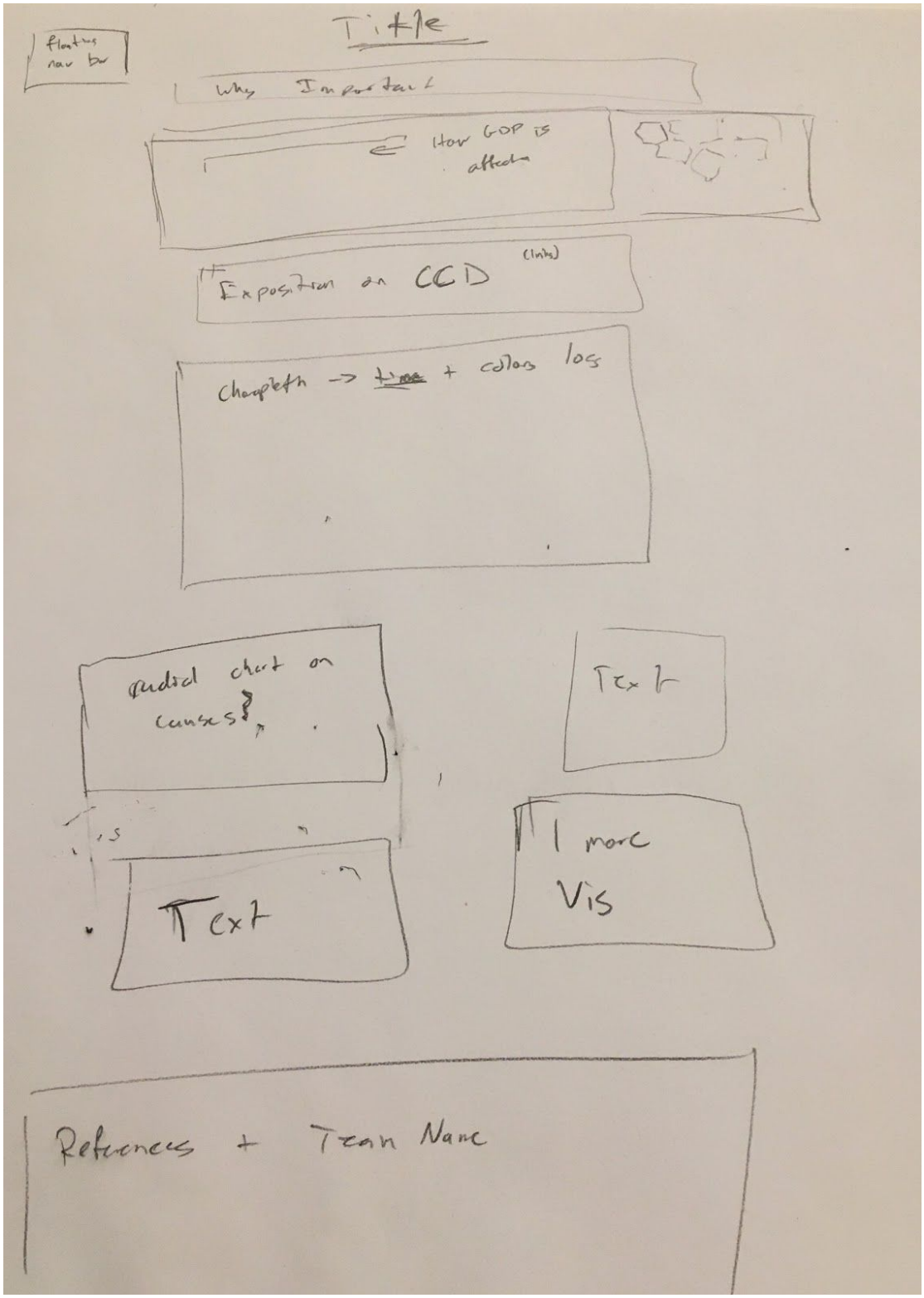

Year: 2001
U.S. choropleth –
animated CCD (colony loss)
visualization


CCD causes
Chunk
Pesticides
Pesticides

Interaction Storyboard



Webpage Layout/Storytelling



Project Timeline

- Static visualizations: 11/15
- Dynamic visualizations, full website w/ placeholders: 11/18
- Full website prototype: 11/25
- Final product: 12/2

Feature List:

- Must have
    - 3 visualizations w/ interactivity
    - Text/images on website
    - Year by year filtering on choropleth
- Good to have
    - Dynamic filtering between visualizations
    - Carousels of images on website
    - Timeline features linked to d3 ticks
    - Brush feature on choropleth
- Optional (best case)
    - Multiple website pages
    - Extra visualizations (perhaps climate change?)

Description of Team Roles

Although we are expecting each member of the team to be able to contribute to all facets of the project, we will all take on a specific aspect of the implementation to specialize in and oversee.

Jack “Code Wizard” Deschler: Oversees the code implementations of visualizations.

Leyla “Artist in Residence” Brittan: Oversees aesthetics and design of visualizations and website.

Michael “The Bee Guy” Scott: Our resident bee expert, in charge of data and information about bees, bee health, colony collapse disorder.

Link to slides:
https://docs.google.com/presentation/d/1SdQkSVdAoAyjS1MnnRfw1CynBbwFrTHUo3DjziAZAh4/edit?usp=sharing

11/14/18

Presentation feedback

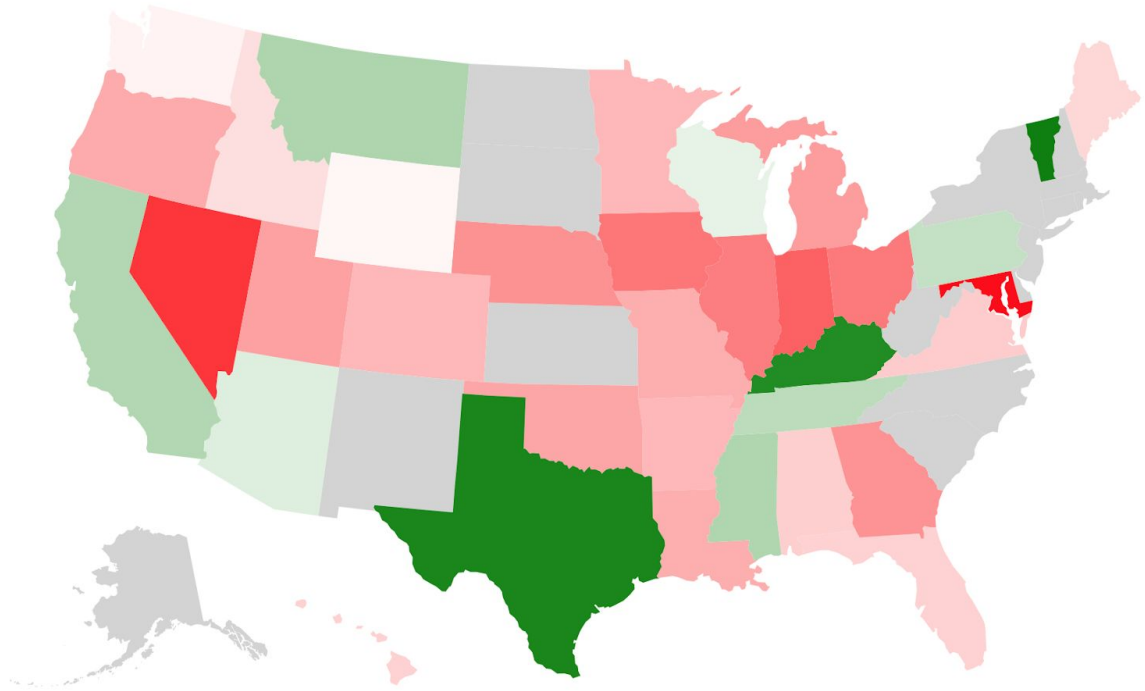
- How do we plan to aggregate data?
- How do we plan to implement the hexagons?

Prototype V1

Jack, Michael, Leyla, and Caroline all worked on this!

11/18/18

Draft of static choropleth:



Notes: See the hexagon sketches for the design of our innovative view

Interactions: Users can filter the choropleth data to a specific range of dates, as well as hover over states to see a tooltip with the actual percent values.

Website pictures:

To Bee or Not To Bee

That is the question

Why are bees important? Lots of reasons. This text is just placeholder right now while we actually go out and find the facts and figures however. Bees bees bees bees bees bees Bees bees bees bees bees bees bees Bees bees bees bees bees bees bees Bees

CCD Causes

subtitle

Flower Chart

Bees bees bees bees bees bees bees Bees bees bees bees bees bees Bees bees bees bees bees bees bees bees bees bees bees bees Bees bees bees bees bees bees bees bees bees bees bees bees Bees bees bees bees bees bees