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**Wiki-map proposal**

**Goal:** Create an online wiki-map of the world

**Overview:** I would like to build (and currently have a working prototype of) an online wiki-map of the world.  The map's developers will create a blank structure that allows for the easy inputting of data, while the map's content will be inputted by trusted users (the wiki component).  The map will allow users to see geographical features (rivers, mountains, etc.), zoom in and out spatially, and move across time.  At its most basic level, this map would display how national (and sub-national) borders have changed over time (and how nation-states have risen and fallen).  But, at a deeper level, the wiki-map will allow users to see how different pieces of data interact spatially and temporally.  To this end, the wiki-map will have clickable layers, where each layer represents a particular type of data.  For example, one layer could display a measure of income inequality, another could display child mortality rates, another the literacy rate, another temperature change, etc.  Then, by clicking on two layers of interest, the user can see how those two pieces of data interact across time and space.  (As an example of the interaction, suppose you click on the climate change and migration layers. This would allow you to see whether the places and times of large changes in climate are associated with the places and times of large migrations. Another example would be civil protests and railroads or famine and disease morbidity.) Finally, the wiki-map will have a 'more information' button, which (when pushed) will show the user the source of the information displayed and any additional helpful references about the region / time period / subject matter the user is focused upon.

**Important features of the wiki-map:**

* Wiki
  + Map must be editable by trusted users. (Like Wikipedia, we should have different “trust” levels for users which gives the users different levels of ability to edit the map.)
  + Users should have the ability to edit the placement of borders over time, input data values by region by time, and they should also be able to add new layers of data.
  + When inputting data, users should be able to choose from different ways of entering that data. One possible method is to allow users to click on the name of a region at a particular point in time (Manhattan, Oct 1944; let’s say) and then enter the data point by hand. Another method is to allow users to draw by hand some data (like borders) at a particular point in time. This would allow users, for example, to use the geographical features of the map to help indicate borders. A third possibility would be to allow users to click on a particular region on the map at a particular date and then input data (clicking on the space associated with a region that is, rather than the name of that region).
* A time slider
  + The time slider will allow users to see how borders and data change over time.
  + The time slider should allow users to press “play”, an action that would move the wiki-map forward in time at a constant rate (defined by the value of the time increment).
  + The user should be able to manipulate the value of the time increment (one day, one year, one decade, etc.) meaning that the wiki-map would move forward in time at that rate when the user presses “play”. This would allow the user to change the pace of history, helping the user focus either on the broader path of history or on some particular point in time.
  + The time slider should allow users to drag the slider forward or backward in time
* Zoom
  + The zoom feature would allow users to zoom in and out of any region on the map, giving users the ability to see what is happening elsewhere in the world at the same moment in time.
  + The zoom should allow the user to zoom down to street level and up to view the entire world at once. Mapbox allows this flexibility of zoom.
  + The user should be able to type in on the name of a region and have the map zoom in only on that region (potentially greying out all other regions surrounding the one of interest).
* Clickable layers
  + The wiki-map should allow users to click on (and off) multiple additional layers, where each layer visually depicts a particular type of data. Examples of possible layers are measures of income inequality, child mortality rates, literacy rates, and temperature changes. As these data values change over time and by region, the layers would allow the user to see how those data values change over time and by region.
  + Each layer should be connected to the time slider so that the layer’s data updates across time.
  + In order to allow the user to see how different types of data interact by region and across time, we should allow the layers to depict that data in more than one way. For example, we could use color (darkness/lightness) for one layer, the density of circles within the region for another, the density of vertical bars for another, etc.
  + If there is no information about a particular type of data for a particular region at a particular point in time, then the layer should indicate that ignorance by potentially coloring the region grey.
  + When a particular layer is clicked on, if the user hovers the cursor over a region, then the specific value of that region’s data at that point in time should appear somewhere on the map.
  + The layers should be presented as a nested menu, where the top-most layer would display very broad topics like “economic data”, “health data”, etc. Then, when the user clicks on one of those broad topics, a new menu appears with more refined data (so, within economic data could be topics like “GDP growth”, “Income inequality”, “Economic mobility rate”, etc.). As the user clicks further and further down the menu of options, the user will be able to display exactly the data that he or she wants to view.
* Geography
  + Map must contain information on physical features of each region: rivers, mountains, etc. Mapbox allows this with its satellite option.
  + Viewing the geography of a region would allow users to see connection between history and geography and would help users edit the wiki-map
* More information button
  + The map should have a “more information” button, which would allow users to see the source of the information displayed and any additional helpful references about the region / time period / subject matter the user is focused upon
  + The additional information that appears should depend upon the region, time, and data layer that the user is viewing. So, for example, if the user isn’t clicked on any data layer but is currently looking at Japan in 1946, then the additional information could show a book related to post-war Japan; while if a user is clicked on the data layer “income inequality”, the additional information could link to both where that data came from and a book like Thomas Piketty’s “Capital in the Twenty-First Century”
* User-friendly
  + Allow for user-friendly viewing
  + Allow for user-friendly interface for adding custom layers
    - Users should have multiple options for inputting data, including by free-hand drawing and by clicking on a region at a particular point in time.
    - It would be ideal if the interface allows users to easily upload GIS or GeoJSON data so that the wiki-map could connect nicely with pre-existing data sites.
    - It would also be great if the user could upload an excel file that contains all of the data in a pre-set way and the website would translate this excel file onto the wikimap.

**The architecture of the current wiki-map prototype**

* The prototype of the map is currently developed using HTML, CSS, and javascript
  + The prototype can be found here: <https://d1q0pruxzddypy.cloudfront.net/MapFinal.html>
    - Username: prototype; PW: wikimap
  + There are four files
    - MapFinal.html contains the code
    - members.geojson contains coordinates for EU countries
    - UNMembers.geojson contains coordinates for most UN countries
    - States.geojson contains coordinates for US states
* To run locally on python server
  + Make sure the HTML and geojson files are on your computer
  + Search for and open “terminal” on any Mac
  + Paste this line into terminal “python -m SimpleHTTPServer 8000” and hit enter
  + Go to a web browser and type “http://localhost:8000” into the address bar
  + Navigate through the folders to find the HTML file on your computer
* Developed using Mapbox GL JS (javascript graphics library)
  + Mapbox GL JS provides open-source libraries for embedding highly customizable and responsive client-side maps in Web applications
  + Mapbox provides several Google-maps-quality base map with labels and satellite capabilities
  + Mapbox is free for up to 50,000 map views, but will require payment after that
  + $0.50 per 1000 views thereafter

**Future development to turn prototype into final version**

* Create a dynamic website
* The website will require server-side backend programming
  + Need to pick a development language and a server-side web framework
  + Web frameworks provide a standard way to build and deploy web applications and provide tools like libraries for database access
  + Common industry leaders (language with framework):
    - Java with Struts
    - Ruby with Ruby on Rails
    - Python with Django
    - Javascript with Angular or React
    - PHP
  + Will need a programmer with backend experience who knows which language / framework combination will work best
* Integrate a database to store layer and user information
  + Need a database server like MySQL, Oracle, etc.
  + This database will be required to store layer information and account information
  + Will need programmers with SQL and database experience
* Need a server to host the site
  + Look into payment plans with AWS or others that can host dynamic websites

**Basics on how to use the prototype**

* When in doubt, reload the page to clear everything and get back to the start
* To start, only the “countries” layer is clicked on
* Layer menu
  + Layers that are visible (on) appear blue in the layer menu
  + One caveat: When you click to change the map type (street, light, dark, basic, satellite), the layers that were previously blue will appear blue (as if they are turned on), but they will not appear on the map.
  + If a layer is blue in the menu but is not appearing on the map, then click it again. It should stay blue and now appear on the map
  + This is only an issue when you change the base map type (street, light, dark, basic, satellite)
* Slider
  + Drag the slider to change the year
  + Press play to move the slider automatically
  + Note the slider increment is stuck at one and can only be changed with a change in the code for now
  + Do not drag the slider while the play button is running. Hit the play button again to stop it. Then drag the slider
  + Currently, EU Members, UN Members, US States, and Gini Coefficient work with the slider
    - EU Members appear between 1957 and 2018
    - UN Members appear between 1945 and 2018
    - Gini coefficient data appears between 1977 and 2008
    - US states appear between 1787 and 2018
  + The slider currently goes from 1775 to 2018 but that can be easily changed in the code
* Maneuvering
  + To zoom in and out use two fingers up and down in the same direction on the track pad
  + On a desktop the mouse wheel may work?
  + Click and drag on the map to move up/down/left/right
* Base map type
  + To change the base map type, click the bubble to the left of the options (street, light, dark, basic, satellite)
  + As said above, the only layer that will be visible when you switch is countries, but others may appear blue on the side. When in doubt keep toggling layers that should be on or off.

**Challenges**

* Boundaries are not always clear and well-defined. How can we deal with this uncertainty?
* Areas are not always under direct control of a state. That is, even if a region is nominally governed by some country, sometimes the de facto power lies elsewhere. How do we depict this visually?
  + What if a country is a vassal state? How should we deal with soft influence? What should the map look like if there’s a revolution? Should the map distinguish between whether that revolution will be successful or failed?
* Data definitions associated with layers have to be very specific to alleviate some of the issues of data messiness.
  + For example, what does it mean for a technology to have spread to a particular region? You could define a technology usage layer as when at least 50% of all people in that region use that technology (cell phones, computers, plows, etc.).
  + Another example: What does it mean for a country to have a certain religion? You could specify different data definitions, where one could be whether the government officially recognizes (or supports) a religion and another could be whether at least 50% of the population is a member of that religion.
* How can we visually depict military campaigns?
* Should we require that all data points come with the source for that data as a potential check on error?

**What we need to do:**

* Apply for funding to hire coders
* Learn from researchers how they would like to input data into the wiki-map, then modify the structure of the wiki-map to fit those desires
* Learn from researchers how to visually represent some of the “messier” parts of history (client states, loose federations, rebellions, etc.). What other messiness do we need to account for?
* Once the wiki-map has been built, we should work with data researchers to begin populating it (for example, work with the Southern Poverty Law Center to depict hate groups in the US across time).

**Issues with current maps:**

* Most maps are very static / limited. That is, they are limited in what regions are shown (if the map depicts the Roman Empire, the viewer can’t easily see what’s happening in China), they are limited by the time-frame shown (if the map depicts Europe during World War I, the viewer can’t easily see when Germany unified), and they are limited in what data they show (they only show what the map-maker intended and aren’t flexible enough to show other data that the viewer might be interested in).
* There has been a surge in the quality of maps recently, but these maps are often very silo-ed, meaning that every researcher has to create their own map and then a user must know how to find that map to make use of it. Particularly makes working cross-discipline hard.