

Power BI: COVID-19 Dashboard

BY: THOMAS FITZGERALD

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PowerPoint Overview Goal:

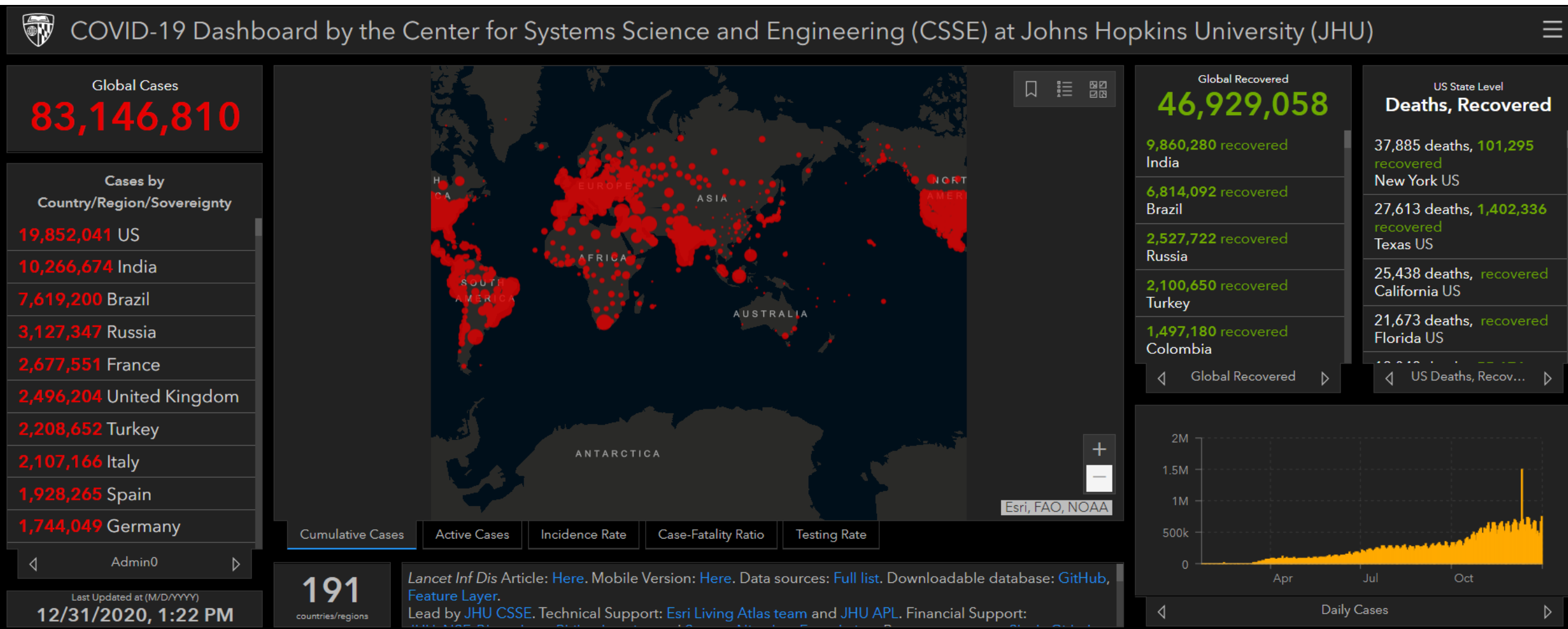
- Enable file sharing for this Power BI project
- Quick enough to compare John Hopkins & Tom's COVID-19 Dashboards
- Detailed enough to analyze beyond surface-level
- John Hopkins' Dashboard (has been updated several times):
<https://coronavirus.jhu.edu/map.html>

Motivation / Background Information

- Watched weekly stats of COVID-19 around April 2020 on worldometer.info/coronavirus (basic graphs & tables)
- Came across John Hopkins' dashboard & enjoyed the dynamic visualizations
- **Challenged myself to learn Power BI & recreate their dashboard**
- Fun project to analyze the global pandemic while the world is impacted by it
- Raw time series data provided on GitHub by the University
- <https://github.com/CSSEGISandData/COVID-19>

John Hopkins' Initial Dashboard

Screenshot Date: 12/31/2020, created by CSSE at John Hopkins



Tom Fitzgerald's Power BI Dashboard

Screenshot Date: 1/6/2021, created by Tom

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Global Cases

87,186,540

Cases by
Country

21,299,340	US
10,395,278	India
7,873,830	Brazil
3,274,615	Russia
2,845,265	United Kingdom
2,763,116	France
2,283,931	Turkey
2,201,945	Italy
1,982,544	Spain
1,841,228	Germany
1,719,771	Colombia
1,676,171	Argentina
1,479,835	Mexico

Country

Last Updated at (M/D/YYYY)

1/6/2021 12:00 AM



Cumulative Cases

Active Cases

Incidence Rate

Case-Fatality Ratio

Testing Rate

192

countries/regions

Lancet Inf Dis Article: [Here](#). Mobile Version: [Here](#). Data sources: [Full list](#). Downloadable database: [GitHub](#), [Feature Layer](#).

Lead by [JHU CSSE](#). Technical Support: [Esri Living Atlas team](#) and [JHU APL](#). Financial Support: [JHU](#), [NSF](#), [Bloomberg Philanthropies](#) and [Stavros Niarchos Foundation](#). Resource support: [Slack](#), [Github](#) and [AWS](#). Click [here](#) to **donate** to the CSSE dashboard team, and other JHU COVID-19 Research

Global Recovered

48,215,743

10,016,859	India
7,033,286	Brazil
2,657,994	Russia
2,164,040	Turkey
1,569,578	Colombia
1,556,356	Italy
1,496,182	Germany
1,474,048	Argentina

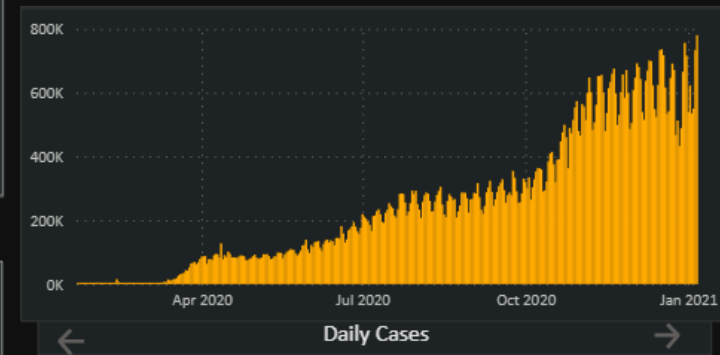
Global Recovered

Deaths per US State

361,123

38,912	New York, US
29,118	Texas, US
27,926	California, US
22,317	Florida, US
19,523	New Jersey, US
18,735	Illinois, US
16,915	Pennsylvania, US

US Deaths, Recov...



Daily Cases

T-Chart Dashboard Comparison

John Hopkins:

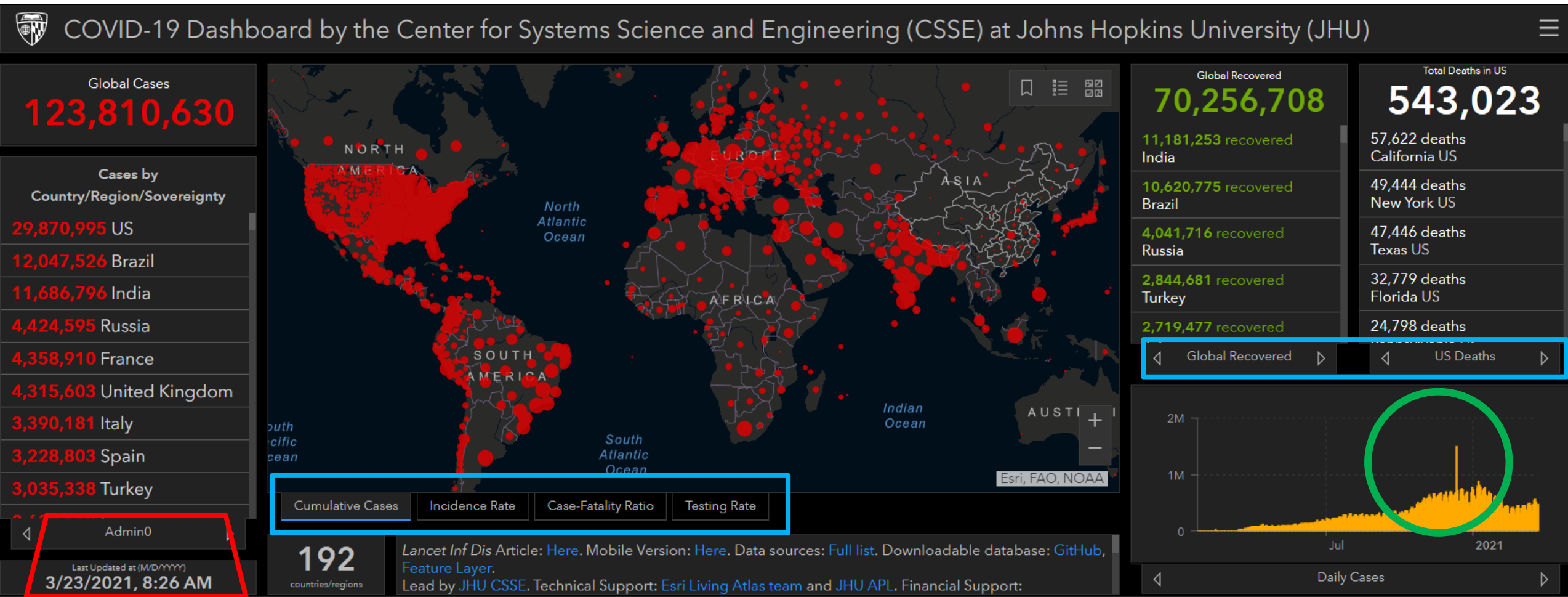
- **ArcGIS Dashboard (not free)**
- Includes additional data like testing rate (blue box, next slide)
- Known dirty data not cleaned (green circle)
- Stopped providing US recovery data during Winter 2020 Holiday
- Map data points = Red

Tom:

- **Power BI Dashboard (Microsoft, free)**
- Did not incorporate additional data / 85% completed (blue boxes)
- Cleaned daily cases data (green)
- Dashboard dependent on JHU data
- **ArcGIS has features Power BI may not have (i.e. Formatting, requires coding to manipulate the “look”)**
- Map data points = Pink & Red

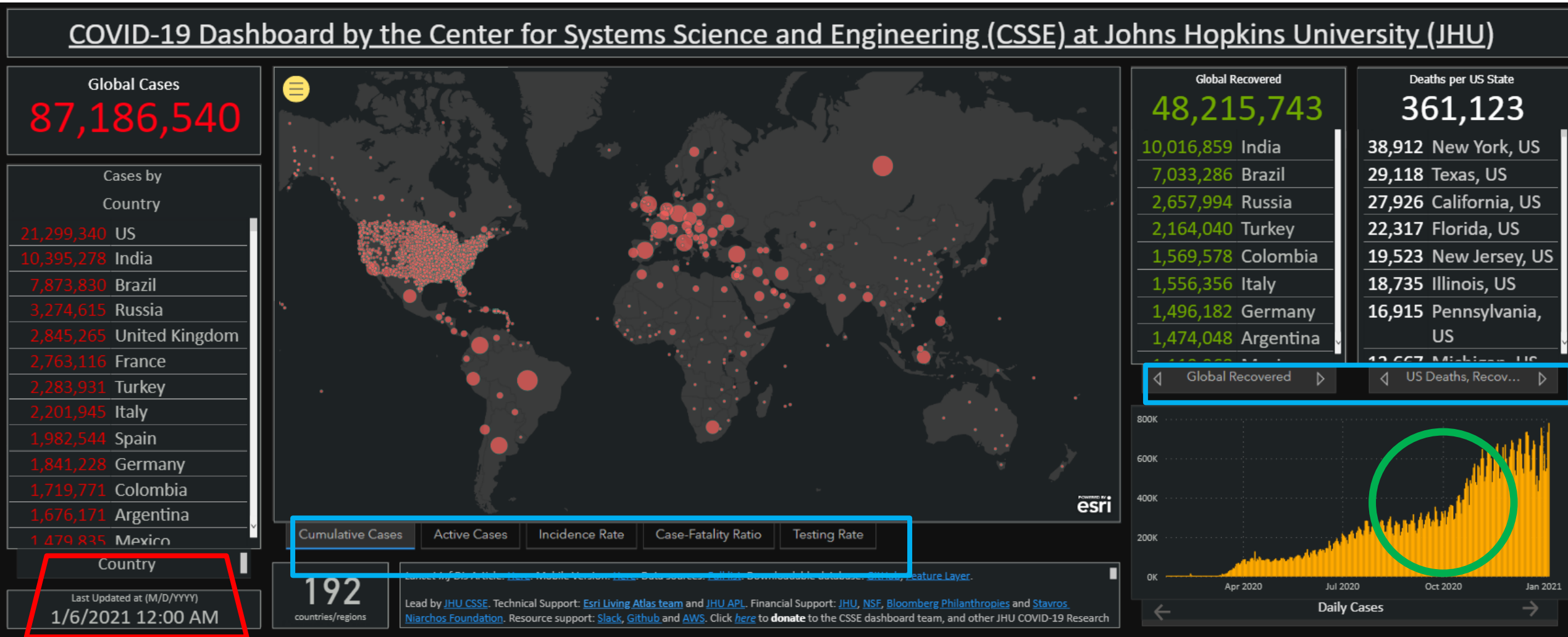
John Hopkins' Comparison:

1. ArcGIS Dashboard / Updated Data From March (Bottom Left)
2. Includes Incidence Rate, Case-Fatality Ratio, Testing Rate
3. Daily Cases Data Not Cleaned



Tom's Comparison:

1. Power BI Dashboard (Jan 2021 Data)
2. Does not include additional data, "Bookmark Tabs" (Blue Rectangles)
3. Daily Cases Graph; Turkey Data Error Cleaned (Green Circle)



Tom's Dashboard – No Background

- Blue Rectangles show the “missing tabs”
- These tabs require Power BI “bookmarks” (i.e bottom right graph arrows to change the graph type)

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

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countries/regions

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Global Recovered

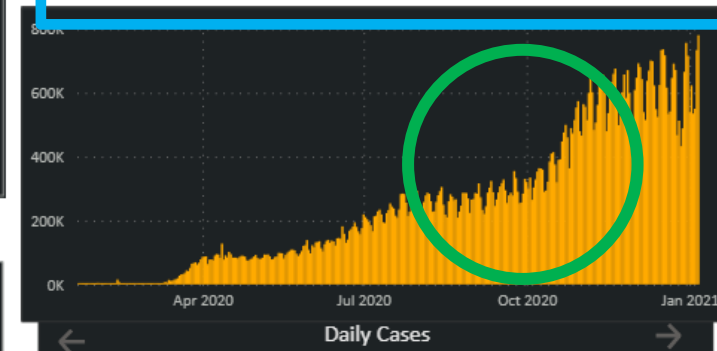
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18,735	Illinois, US
16,915	Pennsylvania, US



Tom's Dynamic Dashboard Example:

John Hopkins' US Recovery



No data available in this place

Global Recovered
70,256,708

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Global Cases

21,299,340

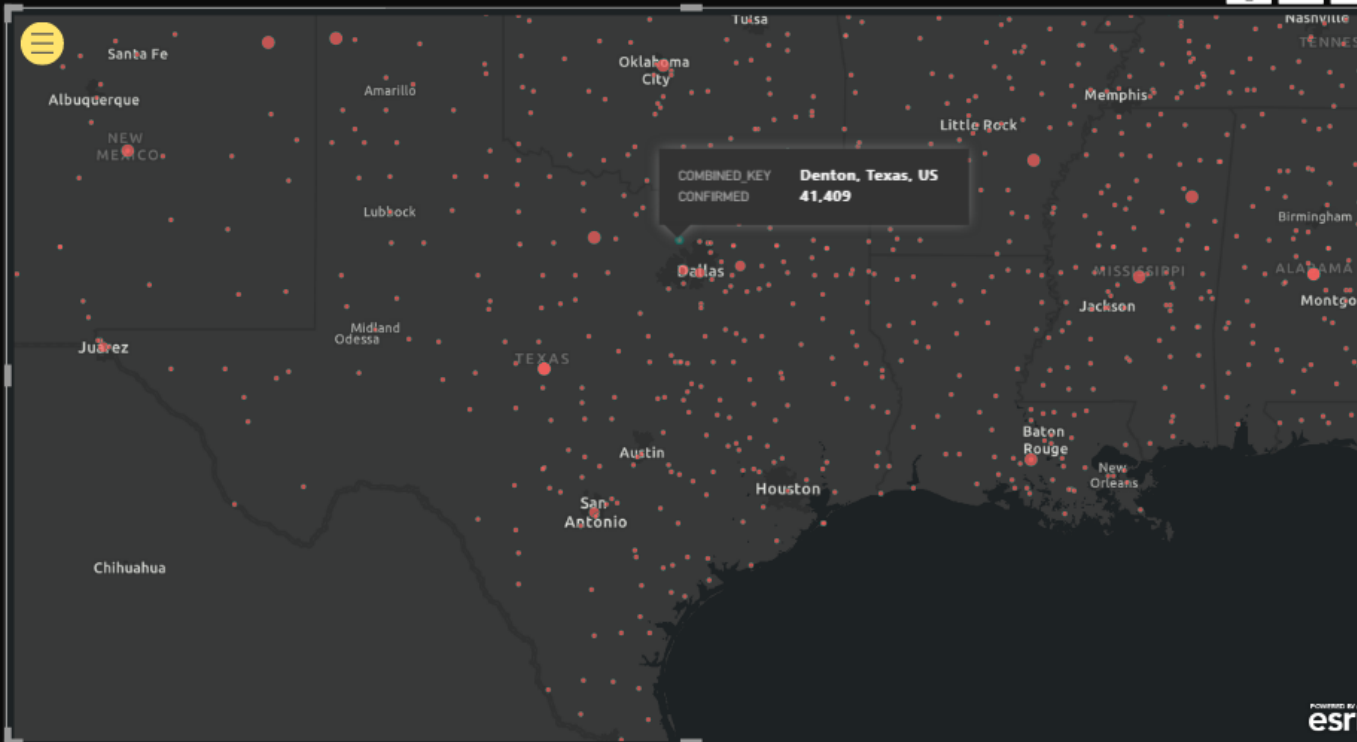
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Global Recovered

0
0 US

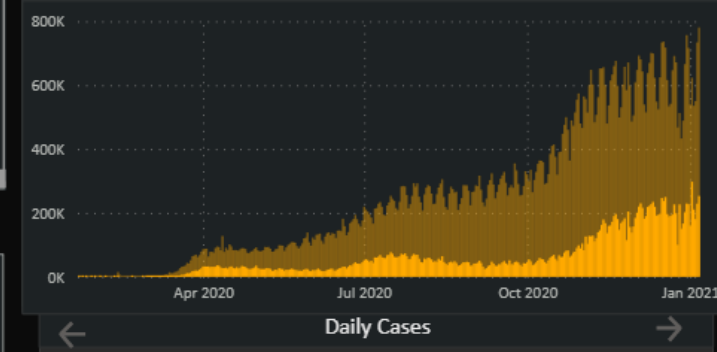
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18,735	Illinois, US
16,915	Pennsylvania, US
12,667	Michigan, US

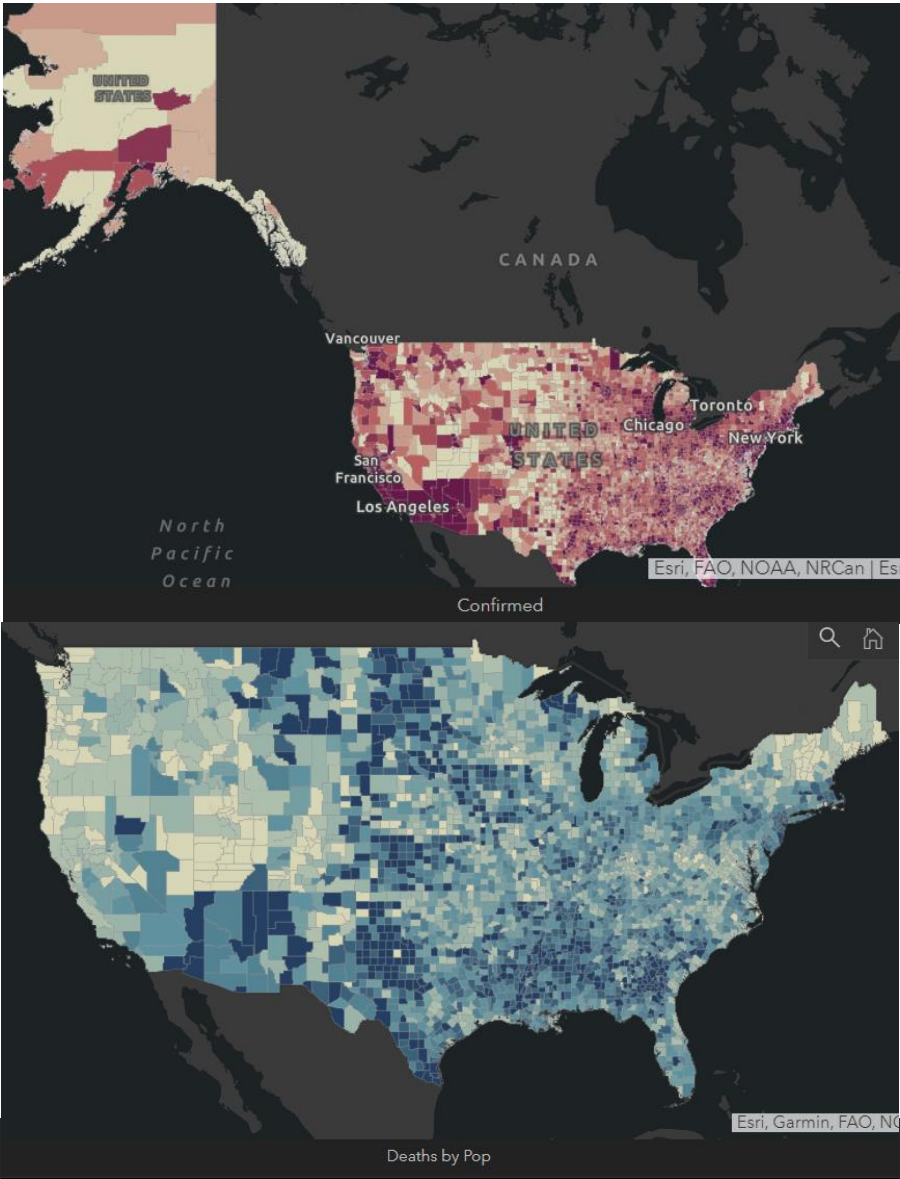
Global Recovered

US Deaths, Recov...



John Hopkins'

March 2021 Data



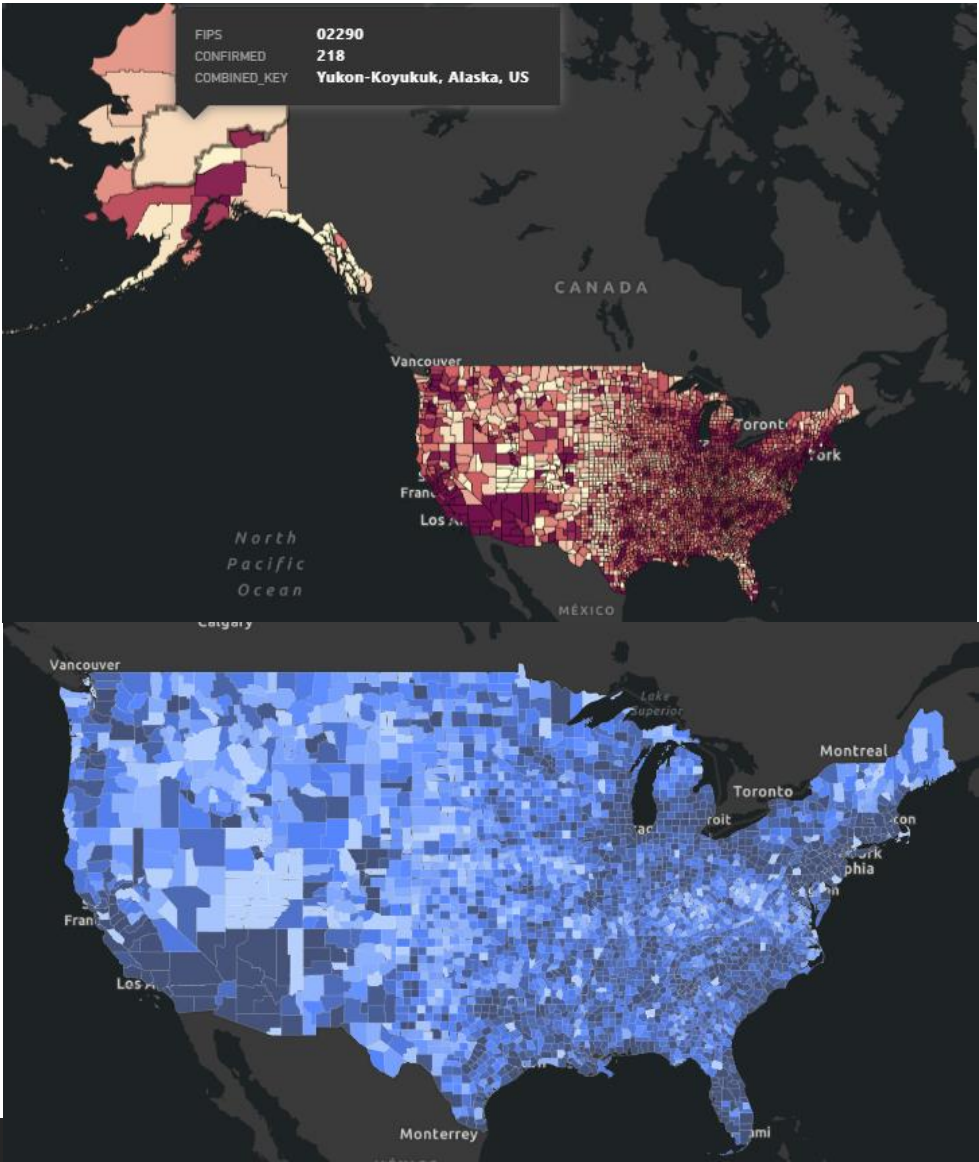
US Only Maps (By County/ Pop)

Confirmed Cases

Deaths

Tom's

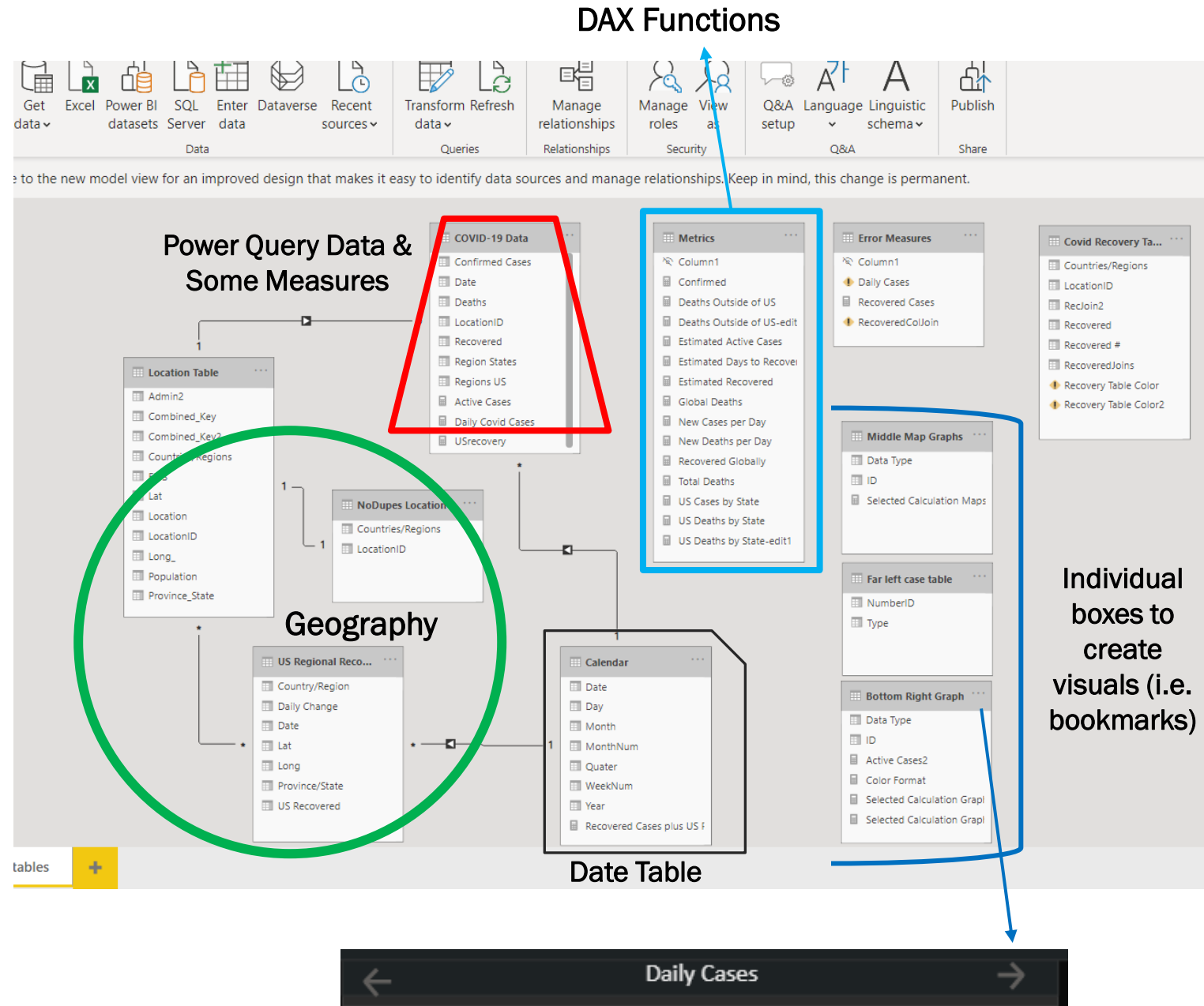
Jan 2021 Data



Model View

- Shows all tables, columns, & relationships in the model
- This is how we can link data between multiple data sets or tables
- One to Many Relationships:
 - COVID-19 Data to Calendar via Date
 - Location Table to COVID-19 Data via LocationID
 - Calendar to US Regional Recov... via Date
- The “Metrics” table enables dynamic visuals as the functions are calculated in each visual interaction
- All Data Sourced From John Hopkins’s GitHub Page

<https://github.com/CSSEGISandData/COVID-19>



Power BI Challenges:

- Troubleshooting DAX / Measure errors & verifying correct values
- Starting over 3 times after identifying a better way to model & add data (increasing speeds)
- Including US County data is more involved to combine it with global data (3 location tables were used for this)
 - Otherwise there would be 1 pink dot displayed in the US or 1 for each US state / territory (i.e. shown on pages 9,10,11)
- Format and aesthetics were **trial and error & a 3rd of time** spent
- Power BI has limits while constantly adding new features (i.e. not including a **green recovered** column label)
- Default (left) table cannot create the middle table by itself

Default Power BI

Countries/Regions	Recovered Globally
India	10,016,859
Brazil	7,033,286

Tom's Attempt

Global Recovered	
48,215,743	
10,016,859	India
7,033,286	Brazil

John Hopkins Uni

Global Recovered	
46,929,058	
9,860,280 recovered	India
6,814,092 recovered	Brazil

Appendix A. DAX Sample Calculation

Confirmed COVID-19 Cases =

```
var LatestDate = MAX('COVID-19 Data'[Date])
```

```
return
```

```
CALCULATE(SUM('COVID-19 Data'[Confirmed Cases]),'COVID-19 Data'[Date] = LatestDate)
```

= In English =

```
CALCULATE(SUM('Table Name'[Table Column]),'Table Name'[Column] = Filtered Data)
```

Data we want to examine

How we want to filter the data

- The calculate function is one way to filter data for:
 - Total Cases, Total Deaths, Total Recoveries...
 - Otherwise, our data would not be dynamic and contain inaccurate values

Appendix B. Gathering Data Setup

- Import time series data for global (confirmed, deaths, recovered) & ISO FIPS Lookup (this is the location table query to index countries / regions)
- This raw data is not efficient to model & must be reformatted
- Unpivot / pivot all columns that include date and COVID data to create 2 columns instead of having 100s
- Each individual confirmed, death, recovered query should look like this:

^A _C Province/State	^A _C Country/Region	^A _C Lat	^A _C Long	Date	¹ ₂ Confirmed Cases
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Time Series Data:

https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series

Appendix B. Gathering Data Cont.

- At this point we can merge all 3 queries into one given identical format while extracting the columns of interest (COVID-19 Data)

A^B_C Country/Region	A^B_C Lat	A^B_C Long	Date	1^2_3 Confirmed Cases	1^2_3 Deaths	1^2_3 Recovered
------------------------	-------------	--------------	------	-------------------------	----------------	-------------------

- On the Location Query, create an index column starting with 1, merge onto COVID-19 Query, then remove duplicate geographic data on the COVID query as it can be linked to the Location Query via the index column

1^2_3 LocationID	Date	1^2_3 Confirmed Cases	1^2_3 Deaths	1^2_3 Recovered
1	1/22/2020	0	0	0

- Location Query / Table Example:

A^B_C FIPS	1^2_3 LocationID	A^B_C Combined_Key	A^B_C Admin2	A^B_C Province_State	A^B_C Countries/Regions	1.2 Lat
	1	Afghanistan			Afghanistan	3