Hi everyone, my name is Kyle Pennell and I am a solutions engineer at a companycalled CARTO, which is primarily based inNew York and Spain, and we were recently invited by the GovLab to submit a module as part of their
Collective Crisis Intelligence collection of COVID-19 related courseware and data and open access to tools, and just a a collective effort in order to empower people to take action during this time in this pandemic.
The course that we would like to present to you or submit or contribute to this is on data visualization and mapping, which is our world.
CARTO, if you haven't heard of it, used to be called CartoDB and it was an open source mapping project, actually it still is open source, and it since has also evolved into a platform called CARTO (sans DB). And CARTO helps a variety of companies to gather and gain business insights or insights that will change to have business outcomes from geospatial data.
So we allow people to pull insights out of their data that is called geospatial data or spatial data or you could probably just say as data that has a location or a place component. So that's CARTO.

What like I mentioned we would like to contribute to this effort is a sort of mini course around data visualization and mapping and especially because this course is focused on Covid-19, focused around Covid-19 map and data viz projects.
So in this short, hopefully roughly 10 or so minutes, I'd love to cover a bit of background on data visualization and mapping during this pandemic,
what we've seen, what role it plays, why it's useful, the background etc, and then I'd love to just give you - the viewer - a few ideas on how you can make your own maps and data visualizations in terms of where to get data, the types of tools you can use, and then without hopefully focusing too much on my own company, I'd love to just tell you about the kinds of projects that we've seen done.
We, in early March, released a grants program that allowed people to use CARTO for free for Covid-19 related projects and we've seen now 140 plus different projects from 45-ish countries get launched.
So I've just seen an amazing number of projects get launched and just such cool creativity come out of our grants program, so we're very proud of that, so I'd love to just tell you a bit about the kinds of projects we've seen,
with the thinking being that you could possibly apply it to our grants program and/or if you want to use other toolsyou could maybe get some inspiration of around the types of data visualizations and maps that you might be able to make for your own community.

So yeah in roughly 10 ish min minutes I hope I can inspire you, empower you, and encourage you to make your own maps and data visualizations and yeah solve something related to Covid-19 in your

community or tell a story that you think needs to be told or otherwise make data available and knowledge available that you think should be more available.
So yeah, I hope you find it useful. Let's jump in. So right now we're looking at some raw data that comes from a site or a project called the COVID Tracking Project.
And this is a project that came out of The Atlantic magazine and it was just, as I understand it, meant to help there be one central repository of all the different state reported COVID related case data and mortality data and testing data and otherwise so rather than have it lived in all these disparate different state locations of different quality
and different update frequencies the COVID tracking project is an effort, I'm pretty sure it's partially funded by Zuckerberg and Chan, but it's run by The Atlantic magazine and it's an amazing resource of Covid-19 data at least for the US.
And so why am I looking at this? So looking at this recent COVID data this is from their endpoint current state data and I'm showing this because it really, data on its own doesn't tell much of a story. Right?
I mean for most people looking at just rows or columns of data, it might be interesting and you might be able to see some visual differences, like okay well you know Arkansas has a data quality of A according to them versus Arizona's B so you could sort and find a C. Washington State actually where I'm located right now has a C. So it's interesting but it doesn't tell actually that much of a story and so that's why we come up with data visualizations.
We came up with better ways of displaying this data and helping people understandit and make sense of it and you know tell stories with it.
And so really these data visualizations I mean this has been an amazing moment for data visualization even though it's in a horrible historical time, but these data visualizations have changed how we understand who needs to lock down where,
what's happening with testing, how much cases are ramping up relative to mobility changes, I mean there's so, so many insights that we've needed have come out of these sort of dashboard things that have been built by variety of people.
And it's it's just they're essential at this point and I can't imagine having Covid-19 without these.

So a couple of my favorites are one is called Covidly - I actually don't know where - I haven't looked at their FAQ in a while so I can't remember off the top of my head where their data comes from but I think it's a really nice visual way to display the tables and then you can jump in and see what's happening with the different states in the US, for instance, and sort and and filter.
So that's really nice. The Johns Hopkins map has gotten a ton of traction. Johns Hopkins, I actually don't know the difference between Johns Hopkins and the COVID Tracking Project off the top of my head but many of the data visualizations actually default to the Johns

Hopkins' most updated account.
So this repository of data is informing many other visualizations and actually in turn informing policy. Worldometer has gotten a lot of traction as well for displaying COVID-19 related counts.
The IHME model is an interesting one and arguably semi controversial one because it at one point was informing White House policy, and I don't want to get into the politics around that, but the projections initially were around and then now they bumped it up to 147,000 and you know for all its shortcomings this is actually a really nicely done dashboard in terms of tracking how testing is is varying by state and whatnot.
And they offer a number of countries as well, regions within countries too. So this one actually was it for a while informing White House policy, it just shows the impact of data viz. And another one I just want everybody to know about is, I'm not sure if I'm pronouncing this, Reich Lab.
This is a collection of a variety of different models. You can turn them on or off depending on whether you want to whether you want to see them. And you can see where the models agree or disagree depending on which state you're looking at or whether you're looking at the nation as a whole.
It's just really interesting to see and you can dive in right there and read about what is actually built into the model, what assumptions, what data they're using, and so you can come up with kind of like a a crowdsourced or a best guess estimate because probably the number is gonna end up being somewhere between one of these models so it gives you this this different sense and different guesses and different assumptions that go into trying to guess where the mortality figures are going to change over the next four weeks. So really interesting stuff. I mentioned this all just to emphasize the point that these dashboards these visualizations these maps they changed how the public understands this thing and they're essential.
And what I want to focus on now is that you can build your own, and you don't have to just consume the visualizations that these organizations put out. You can take open tools and open datasets and choose to tell a different story or a more nuanced story or a more localized story and that's what's really cool about open data and open tool access.
Now I'd like to cover some spots where you can find open datasets in order to build your own visualizations. The first spot I really recommend checking out, this is most shameless and proud plug I could possibly offer, is that the GovLab actually made this amazing Google Doc with just some crazy number of datasets and links and descriptions.
I mean we're talking 297 pages I think it's like 240 different sets of data, so you very, very, very, likely can find what you need starting just right here. Amazing resource these guys put together and it will be linked with this video.
Another one that I mentioned already was the COVID Tracking Project they have really good up-to-date case data testing data, mortality

data, etc and a nice API for how to how to use it. So definitely check them out. Postman makes this nice product called Postman.
They became a company later but Postman was this really nice Chrome plug-in and now they have a variety of products but developers use it to test APIs and so Postman really believes in APIs and API economy or a API community or ecosystem.
And Postman made a nice list of COVID-19 related data sets and then they make it so that you can run it in Postman if you want to, which is really nice, and they document all the end points.
And if you want to use it within Postman that's a great product but if you want to use it otherwise then you can they usually just tell you where the data set is coming from. So I think of postman as just a really nice curation of data resources.
It's a nice tool and then it's like an endpoint documentation for a variety of other APIs. Next one I'm going to mention - this one is just the New York open data portal in particular but most US cities at this point will have something similar.
So literally just can search city space open data and it's going to lead you to a similar sort of site compared to the or similar to the New York site where you can access geospatial data, a variety of public data sets, and they make it pretty straightforward to download those, to preview them, to visualize them without having to download them, and that's just the go-to for US cities now.
It's amazing. Analyze Boston is Boston's one in particular. So that would be another resource I recommend checking out. I know the US market really well in terms of open data portals but I don't know, to be honest, the rest of the world.
I know I ran into some problems when I was doing when I've done international projects but I'm guessing you're probably not more than a Google or DuckDuckGo search away from finding what you need.

So that's where I recommend starting in terms of finding datasets I'm going to now cover a few tools that I think you should check out if you would like to make data visualizations and/or maps which are kind of visualizations if you think about it.
I'm gonna cover three tools here by no means is this a comprehensive list. I'm guessing you probably could already guess but these ones I think are very useful, very open, and I think non-technical user friendly as well.
Shareable and have clear documentation so these are a great source.
The first one I want to cover is called CARTO builder. Full disclaimer - that is one of our core products here at CARTO. What you're looking at here is a map visualization that I built as part of a course that I actually recently gave on Builder and I know it probably doesn't look like too much, but I will walk you through what's going on here.
So from the New York Open Data Portal, I actually brought in all 600,000 trees from the 2015 tree census that New York did in terms of which tree is where what type of tree was it how big of diameter did it have at breast height it's called.
So this is their tree census - so I brought these in. These are

individually points and the color difference you're here you're seeing here is the species. Snd so just to show you how easy it is, in order just to style that, if I were just to style it using just a, you know, one color that's what I would look.
But if I style it according to data - this is the data that's behind that, this is the 600,000 trees - I want to style it according to this specific column. There it is - cool. So this is spc_common and this is the common species name for this tree.
And they have it for a lot of them, not for all of them, but what I can actually choose the point color based off of this tree species here, and so it's finding the most common ones - London plain tree, honey locust, callery pear, et cetera, and then styling the point accordingly. So I don't want to go too into these trees or CARTO builder but just want to kind of give you a little tour of what's going on here.
I also have a New York City buildings layer that I brought in actually from OpenStreetMap, and so these are individual polygons for each of these buildings. You can kind of see how they they literally just fill in the existing base map with an actual shape and so that's pretty cool because it allows you, I can color these according to what the building's being used for etc.
Yeah so looking here at the buildings as well as the trees I also bring in a layer here called my Bike Routes and that shows me these what are called line strings or just lines, these green lines. Those are the different bike routes and sharrows and protected lanes that go around New York.
And so don't need to focus on you know what this map is I just want to really show you just how easy it is to use builder and you can import data sets from a variety of different types CSV's, GEOJSON's, Excel files, shapefiles, GPX's would be something like your phone would record on an app like Strava or a different tracker app, zip files. You can bring in just about anything that is a common data type and CARTO Builder is going to know how to read it. And so it makes it really straightforward to create maps like this. I can also create a variety of widgets in order to allow someone to better filter this data, so for instance, on the trees.
If I wanted to say, it's giving me this suggested feature, you see what happens. I check this checkbox here for "add as a widget." It's going to take a second to do the calculation but now it's doing a count of how many trees are currently within this viewport, currently within this box on the map.
So as I zoom in you can see that goes down, and it actually shows me that like I'm currently looking at 569 trees in my view. And so again, don't feel like you need to overly focus on that specific feature. I just kind of wanted to show how easy it was for me to literally point-and-click and set up a filter - something that's going to tell me more about what's going on on the map.
If I want to I can, for instance, create a little legend in order to make it easier for somebody to see what species is what in terms of in terms of the colors you're seeing on these points. So it's really

straightforward to use, really straightforward to create these maps, and then last point I won't focus on too much, is that I can make this public with a link.
So make it only accessible in case you have the link, make it public for anybody, so they can probably find it on Google that way, and I can make it public with a password in case you maybe you don't want to release this publicly or you want to, for instance, have it password protected while it's still in draft mode because you don't want people to see it until it's done.
That sort of thing. So really easy to share these so let me just show you here. If I make this public, I publish it, and it asked me if I do want to make that public. Indeed. And I open this within an incognito window so I'm not logged in currently to my CARTO account then I have access to this map.
So then that would allow you to share with somebody else who doesn't have access to CARTO and would allow you to embed it for instance in a blog post or otherwise.
Cool. So it's a bit about CARTO Builder. That's definitely not everything, and so I want to point out if you go to CARTO.com/help/tutorials I will put this link in the video description or the page where this video gets put. We have a variety of really great tutorials that will help you get the most out of Builder, and really there's just a ton of great info in here, just about everything you're gonna want to do with a basic map you can do with Builder.
And these tutorials will teach you how to do that. So that's that's a bit about CARTO, CARTO Builder. Last point I'll make, about CARTO rather, is that if you go to carto.com/developers you can see all of our different libraries, different API's for building maps, that's that's what we do and we have a variety of tools to do it.
And I will cover a bit more later about how you can apply to our Grants Program to get free access to all these tools and be able to store your data and, you know, make different visualizations around COVID. That's CARTO.

Next one I want to show, I'm not gonna dive as deep into these because I actually haven't used them as much of course as I've used CARTO, and just because I don't work there and don't know them as well I don't want to misrepresent them in any way. But these are awesome tools.
This is Datawrapper. If you've read The Guardian or I think BBC as well, a variety of newspapers use Datawrapper to build little embedded visualizations that go into news stories. So Datawrapper originally started as I understand it, again I don't want mischaracterize, them started as more of a journalism focused data visualization tool and has since they've grown and opened their platform for other users. But really it's meant to basically allow journalists to create visualizations without having a graphics team or are a data science team or graphic designers or anything like that. So that was like the purpose of it from what I understand.
You can again drag Google Sheets and other data sources, CSV's, Excels, which are very common data sources. Create maps, create

different charts, as you can see here. Really well done and they make it also really easy to sort of fork different applications or different visualizations.
So I really like that one, I want to create something similar to tell for instance something to do with COVID or some specific pandemic related data set. I can fork this and then it just automatically inputs the type of visualization as well as the dummy data and kind of walks me through the whole process of creating this visualization.
So they have they have a nice free tier. If you go to their pricing they have a nice free tier. I'm sure they've done way more than I'm even describing here in terms of COVID-19 related work. But Datawrappers is a great resource, awesome tool. Again I'm biased. I think if you're gonna build a map go with CARTO but if I was gonna build a chart or something else to tell a story, I would probably go to Datawrapper or I would go to Tableau.
So Tableau is very very powerful, one popular BI library (business intelligence library). They were bought by Salesforce in the last year or so and so I imagine they're gonna get more incorporated into the Salesforce world.
They're a Seattle-based company. I'm from Washington State and so of course love to see a successful Seattle company. Another successful company there's many now - but Tableau is their proprietary, you know, SAS product.
Very expensive, very very well regarded in the industry. Tableau Public is their public facing tool that has existed for a while now and allows you to create public facing data visualizations. They obviously don't want Tableau people - their existing user base - to just use Tableau Public so in order to save your work in Tableau Public it has to be public.
So that prevents the cannibalization between Tableau and Tableau Public. Anyway, Tableau is a really nicely done data visualization tool. Very powerful. Kind of, I wouldn't want to necessarily call it Datawrapper on steroids because I'm not sure if I would really love that phrase to begin with, but it is in some ways that.

It is a very, very powerful data visualization library. Drag-and-drop, point-and-click, really intuitive. Tons of different ways using you can use it. Tons of different great suggestions, or they'll look at your data and suggest a type of visualization that you might want to build. So really cool and you can just see amazing visualizations that come out of here. Again, for what you might need, you could take public data, download Tableau Public, sign up, create your dashboards or your visualizations, publish them, share them, and not have to pay a thing.
So all these three tools that I just showed you, as far as, you know in mid-May when I am recording this in 2020, they're open access, free tools to use, and really easy for non-technical people to use and benefit from.
So I recommend starting here but by no means is this an exhaustive list of three. There's many other cool resources you could use. Just

my bias and I recommend starting here. So up to this point I've explored some of the open datasets and I've also shown you some different tools you can use to make maps and other data visualizations and so now you should know where to find data and you should know some different tools that you can use to visualize or tell a story with that data. The thing I'd like to focus on now is CARTO's COVID-19 grants project that was launched in early March.
Back when the pandemic really seemed to be getting a lot more serious, we asked ourselves how we could help and how we can, you know, what role or what kind of contribution we can make during this time. And we actually have an existing grants program that's been around for many years to allow nonprofits to use CARTO for things that you know would not otherwise happen because they just would not have the funds to pay for the platform, but we still want that project to exist and to happen.
And so we we extended our our Grants program here in early March like I mentioned to allow for a variety of groups, both for-profit and nonprofit groups, to use the platform to launch COVID-19 related projects. We've as of this recording which is around mid-May in 2020, we've approved over 140 different grantee applications and that those come from 45 plus different countries. So it's amazing. We've seen people from all over the world use CARTO for good and for this very focused reason.
We, as far as I know from my recent check, we haven't denied any applications. We've approved all of them. If you go to this site which I'll link in the bio - or not in the bio, in thedescription - carto.com/covid-19 you can see some of these projects and you can also apply for the grant.
We, like I mentioned, have seen such a cool array of projects get launched using this grants program.
They are documented in this regularly updated blog post and we have several dozen of these projects all documented here with a link after the project and often a little embed to where the project is. I'll talk through now a couple of the cool projects we've seen.
This is actually made by the government of Ecuador. Ecuador had one of the earliest of and worst outbreaks in South America now I'm not really sure where they stand relative to their neighbors but Ecuador got hit very soon and very hard especially around as I understand it, this area in the coast so the government of Ecuador wanted to use their case data to tell more about localized and nuanced story in terms of which regions and which cities are the hardest hit and so I think this cool.
We were really proud of this it got mentioned in this El Comercio magazine or newspaper. I'm nearly positive it's Ecuador based. And yeah we're very proud of the fact that the literal government of Ecuador used CARTO for data visualization. So this is one example we see a lot where people want to tell a more localized story like I said. As cool as Worldometer and bigger dashboard are it's also really nice to see what's happening more at a country level or county or state level.

That sometimes gets you more color and more context on what's happening near you. This is another cool project actually also based in South America and what you're looking at here is a map of the city of Bogota, Colombia. Colombia's in the north, just north of Ecuador in the northwest part of the continent, and Bogota is their capital. It's about a nine million person city, very large city, and has this transport system called TransMilenio, and this is a bus rapid transit system. So they give the buses their own lane rather than making a full metro that's really expensive because it involves so much tunneling. The bus rapid transit system reuses your existing lanes to allow the buses to flow on their own unencumbered by you know taxi or car or other bus traffic.

So where's what you're seeing here now that you have quite a bit in context is a map that shows how much did the usage decrease of at these different stations so relative to before how much has the how much has their use or their true their foot traffic decreased. And then we're also looking at this Estratificacion is - my Spanish is getting rusty - but it's a map of the wealth. Really the wealth of that neighborhood.
So you have from six, which is the highest strato, though all the way down to one which tends to be the poorer or lower-income part of the city. And you pay different rates for electricity or for water according to where you live in the city. And so it's just sort of a proxy for that neighborhood's wealth. Not perfect - there are wealthy people who live in Strato 1 amd there's vice versa people who live in in the higher stratos.
But what I wanted to show here, and finally getting to my point, is that basically the less wealthy neighborhoods tended to not decrease their usage of public transit as much. So to put that hopefully more simply, the wealthier the neighborhood, the more that people stopped taking public transit.
So you can see a pretty nice strong correlation here where the wealthier you go in the city, which would be four five and six, the green, the sort of pink and blue here, those places tended to stop using public transportation at a rate of roughly sixty percent or greater than sixty percent in this case, whereas these lesser means neighborhoods tended to not decrease their usage as much. That would support the argument that locking down or quarantining is a luxury item, which is a whole political discussion I can't get into here. But it's just a very interesting story that they're able to tell with this fairly simple data visualization. And this is built in builder and you or really anyone who doesn't even have that much geospatial experience could tell a similar story with the bus or subway data near you, as well as the neighborhood wealth disparities and whatnot.
That's a cool project as well. This one I can't really show you as much and I'll tell you why. It's called Students Against Corona. This is a project basically you're seeing here that's facilitated aid for 114,000 people and what they did was to create a helping or volunteering marketplace wherein people who need help can sign up and

people who want to help can also sign up and a common use case of this would be an elderly person maybe doesn't feel safe going to the grocery, store they don't want to expose themselves unnecessarily to getting infected with the virus.
And so someone younger who probably has an immune system that can withstand the virus better volunteers to do their grocery shopping for them. And this Students Against Corona creates that connection.
And so the reason I can't show you anything is because they can be very conscious of privacy data and you have to be accepted after applying and vouched for in order to access their platform and see for instance which of your neighbors need help.
They've gotten a number of great news articles written about them and we're extremely proud of this team. They're high school students that put this together and started in the UK and then now has been replicated in India, a couple places in the US, and several other countries.
It's just awesome. So yeah that's one just another use that we saw come out of our grants program. And I can keep going on but I want to keep this as short as possible. I feel like this lecture has gone a little over what I intended it to be so please check out our grants program landing page page here.
It'll be linked with the video then this blog post, which will also be linked, describes the variety of types of projects that we've seen launched and I'm guessing that you'll probably find them something here that inspires you to create something in your community.
So that's that and I hope that you found this helpful and again to reiterate I hope this gave you a sense of what's possible where to get tools where to get the data and encourages you to create a similar visualization for your community.