

## Assignment 12: Create a Transportation to Work Dashboard

### Dashboard overview

In the previous assignments you learned about map design, creating online maps, and sharing maps via Story Maps. GIS dashboards are excellent tools for making strategic decisions by comparing data in one easy to read location. Before creating a GIS dashboard it's important to understand how maps and data for dashboards are created as well as where dashboards fit into Esri's ArcGIS Platform. An Esri dashboard is a client application that is easy to create with no programming experience. Data depends on the dashboard's purpose and will come from maps, tables, lists, and surveys.

The workflow for creating a dashboard starts with data that becomes a web layer that is deployed through a web portal. Each topic for a dashboard can be stored in its own web layer. For example, a healthcare dashboard used to inform the public about a pandemic might include vaccine distribution sites, clinic or hospital locations, and the number of reported cases as separate layers. The individual web layers are combined into one web map that is brought into the ArcGIS Dashboard application. Data sources for a web map and dashboard are spread sheets, GIS layers that you create or obtain from sites such as Esri's Living Atlas, open data sites, or from surveys.

In these tutorials you will create a dashboard to help city and county officials better understand means of transportation and commute times by municipality or neighborhood in Allegheny County, PA.

### Dashboard data

Dashboard data will reside in ArcGIS Online, in the Content section. As with data you will need to share your web layers with the public or with others in your organization. You will use ArcGIS Online or ArcGIS Map Viewer to configure the symbols and visualization of your maps and data before adding them to a dashboard. Map layers for the dashboard were originally created in ArcGIS Pro. Data by block group was aggregated to neighborhoods and minor civil divisions using ArcGIS Pro's geoprocessing tabulate intersection tool. Additional map layers for

rivers and an outline of the City of Pittsburgh are used for spatial reference. A

“HealthyWorkContour” layer created from a kernel density (assignment 10) could be used to see the data around the areas of healthy to work transportation variables.

## Download data

### 1. Download the following data from Canvas under Assignment12:

- **CityCountyWork.ZIP** – a compressed polygon shapefile of Allegheny County municipalities and City of Pittsburgh neighborhoods. Fields of interest are types of workers, means of transportation to work, and time to work by means of transportation. Data was provided by US Census Bureau, American Community Survey (2016-2020).
- **Pittsburgh.ZIP**– a compressed polygon shapefile of the outline of the City of Pittsburgh for labeling and reference.
- **Rivers.ZIP**– a compressed polygon shapefile of rivers in Allegheny County for reference.
- **HealthWorkContour.ZIP**– a compressed polygon shapefile of concentration of healthy to work variables.
- **SidebarText.docx** – text for sidebar element.

## Add data in ArcGIS Online

1. In ArcGIS.com, under Contents, create a folder called **Assignment12**.
2. Upload the compressed shapefiles to your **Assignment12** folder, adding “\_YourName” to each title.
3. Add tags and a summary for each file. You decide the appropriate tags and summary descriptions.

## Create a map for a dashboard

Esri’s dashboard uses Web Maps that you create before creating a dashboard. These maps use data or layers that you create or from layers found in sites such as Esri’s Living Atlas. Before creating the dashboard, you will create a choropleth map showing the percentage of essential workers by municipality and neighborhood. The main layer for the map is polygons of city neighborhoods and county municipalities with detailed data about commuting to work. The

choropleth map you create will focus on the percentage of essential workers and the dashboard will compare other means to work data and commute times.

## Launch Map Viewer and add a map layer

1. In a web browser, go to [www.arcgis.com/apps/mapviewer](http://www.arcgis.com/apps/mapviewer) and sign in if necessary.
2. If you are already signed in with the previous map open, click Create New Map.
3. Add the layer [CityCountyWork\\_YourName](#).

## Edit field names

Because the map you create here will be used by officials who might not be familiar with the field names in your attribute table it is a good idea to change the attribute names. This will take some time but it's important to make the dashboard easier to use.


1. From the right menu click Configure Fields.
2. Click on one field at a time and type new names as follows.

Name {Name}	abc	Total Bicycle, Motorcycle, Taxi {T_BkCycTax}	int
% Bike, Motorcycle, Taxi {P_BkCycTax}	123	Total Car, Truck Van {T_CarTrkVn}	int
% Car, Truck Van {P_CarTVn}	123	Total Essential Workers {T_Essen}	int
% Essential Worker {P_Essen}	123	Total Female Workers {T_Female}	int
% Healthcare Worker {P_Health}	123	Total Healthcare Workers {T_Health}	int
% Work from Home {P_Home}	123	Total Work at Home {T_Home}	int
% Non Essential Worker {P_NonEssn}	123	Total Male Workers {T_Male}	int
% Other {P_Other}	123	Total Non Essential Workers {T_NonEss}	int
% Public Transportation {P_Public}	123	Total Other Workers {T_Other}	int
% Walk {P_Walk}	123	Total Public Transportation {T_Public}	int
% Time 25 to 44 minutes {PTime25_44}	123	Total Transportation Workers {T_TransWor}	int
% Time over 45 minutes {PTime45_}	123	Total Walk to Work {T_Walk}	int
% Time under 24 minutes {PTimeU24}	123	Total Workers {T_Worker}	int

Time to work less than 10 minutes {Time10}	int
Time to work 10-14 min {Time10_14}	int
Time to work 15-19 minutes {Time15_19}	int
Time to work 20-24 min {Time20_24}	int
Time to work 25-29 min {Time25_29}	int
Time to work 30-34 min {Time30_34}	int
Time to work 35-44 min {Time35_44}	int
Time to work 45-59 min {Time45_59}	int
Time to work over 60 min {Time60}	int
Time Work Total {TimeWrkTot}	int

## Symbolize layers



1. Click the Style button  > + Field > % Essential Worker > Add.

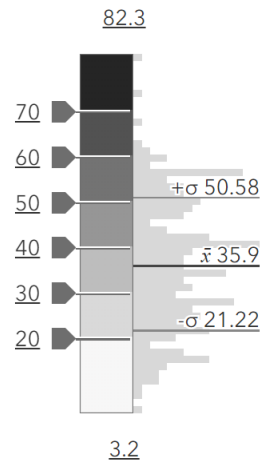
This is the percentage of essential workers defined in the US Census as healthcare, protective services, food handlers, transportation, etc.

2. Under Counts and Amounts (color) click Style options.

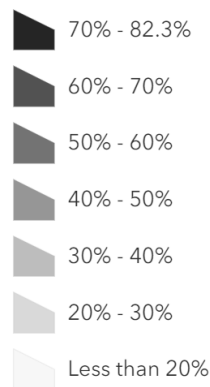
3. Turn on Classify data and choose 7 classes

Under Symbol style, choose color ramp Gray 1.

4. Starting from the bottom class, enter the following values.



5. Edit the legend to reflect the following.



6. Rename the layer **Essential Workers**.

## Your Turn

Add the following layers

- **Pittsburgh\_YourName (renamed City of Pittsburgh)**
  - symbolized as no fill and a medium/dark orange outline, stroke size 3.
- **Rivers\_YourName (renamed Rivers)**
  - symbolized as semi-transparent blue fill and no outline.
  - renamed “Rivers”
- **HealthyWorkContour (renamed Pittsburgh Healthy Transportation to Work Contour)**
  - symbolized as no fill and a dark red outline, stroke size 1.

## Label municipalities and neighborhoods by Name

1. From Layers, click Essential Workers > Show Properties.

2. Click the Labels button



3. Click + Add label class.

4. From Label field, choose Name to replace the existing value and choose the visibility range to show below the City level.

Label features
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Label field

Name
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</>

Filter

Edit label filter
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Label style

Edit label style
▼

Visible range

City
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Rooms
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What is this rooms?

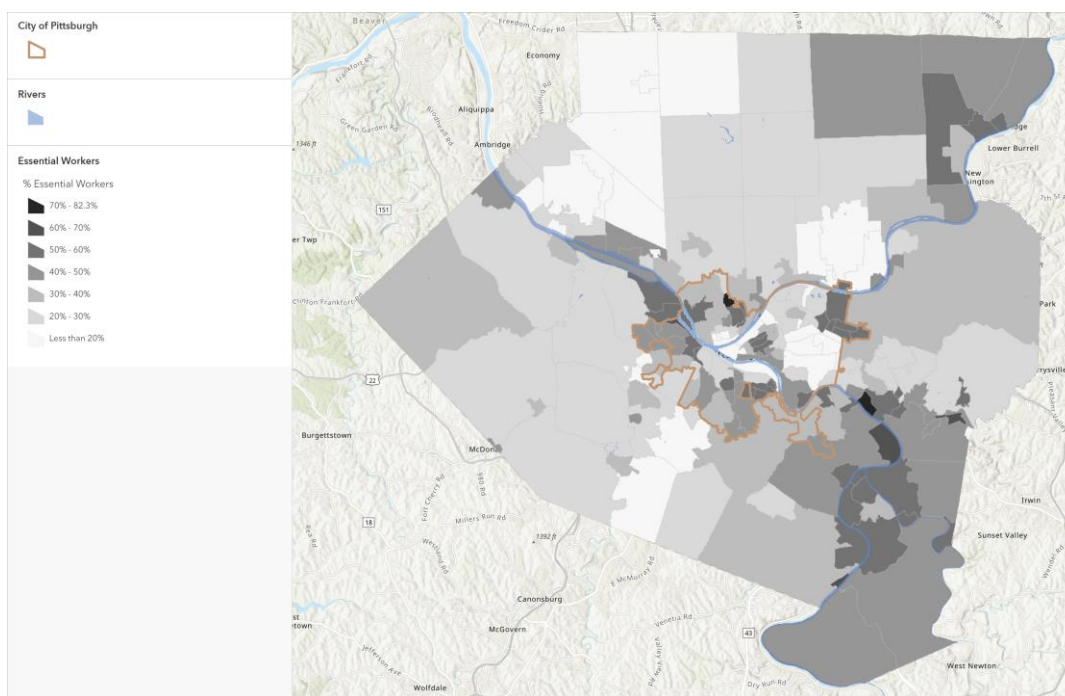
## Change the basemap and create bookmarks

1. Zoom the extent of Allegheny County and create a bookmark called **Allegheny County**.

2. Zoom to the extent of the City of Pittsburgh and create bookmarks called **Pittsburgh**.
3. Zoom to the Allegheny County bookmark.
4. Move the City of Pittsburgh layer to the top of contents followed by Rivers and % Essential Workers.
5. Turn the Pittsburgh Healthy Transportation to Work layer off.

## Save the map

1. Click the Save button > Save As.
2. Type **Assignment12\_YourName** as the Title.
3. Create tags.
4. Type **Allegheny County Transportation to Work** as the Summary.
5. Save the map in folder **Assignment12** and click Save Map.
6. Click Share map and share the map with everyone (public).
7. Click Update if requested.



## Create a dashboard and add elements

You will create a dashboard and save it under your Esri account your Assignment12 folder.

### Create a Dashboard

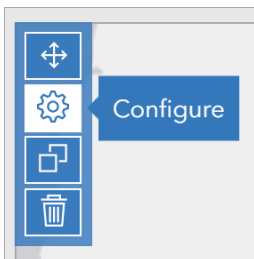
1. From the left panel, click **Create app > Dashboards**.
2. Under Title type **Assignment 12Dashboard\_YourName**.
3. Create Tags.
4. Under Summary type **Allegheny County Transportation to Work Dashboard**.
5. Under Folder choose **Assignment12**.
6. Click **Create Dashboard**.

A new dashboard is created using the current map and is ready for you to populate with additional visual elements including charts, indicators, etc.

### Configure a map element

In a GIS dashboard maps are a critical component and often a main focus and starting point to explore data. Maps can be interactive with zooming and layer on/off capabilities. They can also interact with other elements of data or from sites such as Esri's Living Atlas.

1. From the upper left corner, hover over the small horizontal blue bar and click **Configure**.





2. Under Settings turn on the following: **Default extent and bookmarks**, **Legend**, **Layer visibility**, **Search**, **Zoom In/Out**.
3. Click Done.

Buttons for zooming, bookmarks, and a legend will be visible in the upper right corner.

## Test the map settings

1. Click the **Bookmark** button to zoom to Allegheny County and City of Pittsburgh.
2. Click the **Legend** button to see the legend.
3. Click the **Layers** button and turn the **Pittsburgh Healthy Transportation to Work Contour** layer on and then back off.
4. Click a municipality or neighborhood to see the other information in the pop-up window.
5. Close the pop-up window and legend.

## Save the Dashboard

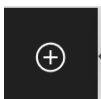
It's a good idea to save your work as you add elements to the dashboard.

1. From the navigation bar click the **save** button.

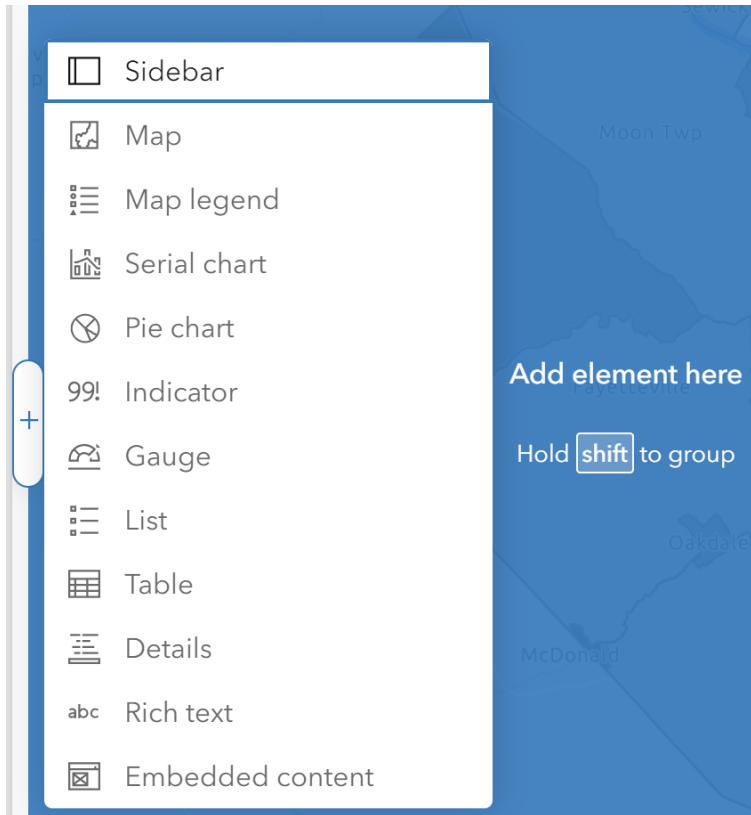
## Create a List element

While the map is visually informative a list of the municipalities and neighborhoods with the highest percentage of essential workers would help decision makers understand areas to focus on for infrastructure or transportation improvements. You will use the data from the map's attribute table to provide the list.

## Data Options



1. From the navigation bar click **Add Element + > List**.



**2. Click the Essential Workers layer.**

Data options for this layer will appear for how to filter and display the data. A preview of how the data will appear in the dashboard is to the right.

**3. Under Sort By click Add Field > T\_Worker and sort Descending.** This will show the total number of workers in each municipality or neighborhood.

**4. Under Maxiumn features displayed type 30.**

This will show the top thirty municipalities and neighborhoods with essential workers.

## List Options

**1. From the left menu, click List.**

Here you will add two fields. The first is the name of municipality or neighborhood and the second is the total number of workers for each area.

2. Delete the existing field name in brackets, click the brackets {} dropdown list, click field **Name** and press Enter.

This opens a new line below this field.

3. Click the brackets {} dropdown list , click field **T\_Worker**, and press enter.
4. Highlight the field **{Name}** and choose Bold as the font.
5. Highlight the field **{T\_Worker}** and choose medium/dark gray as the color.
6. Under Line Item Icon, click None.

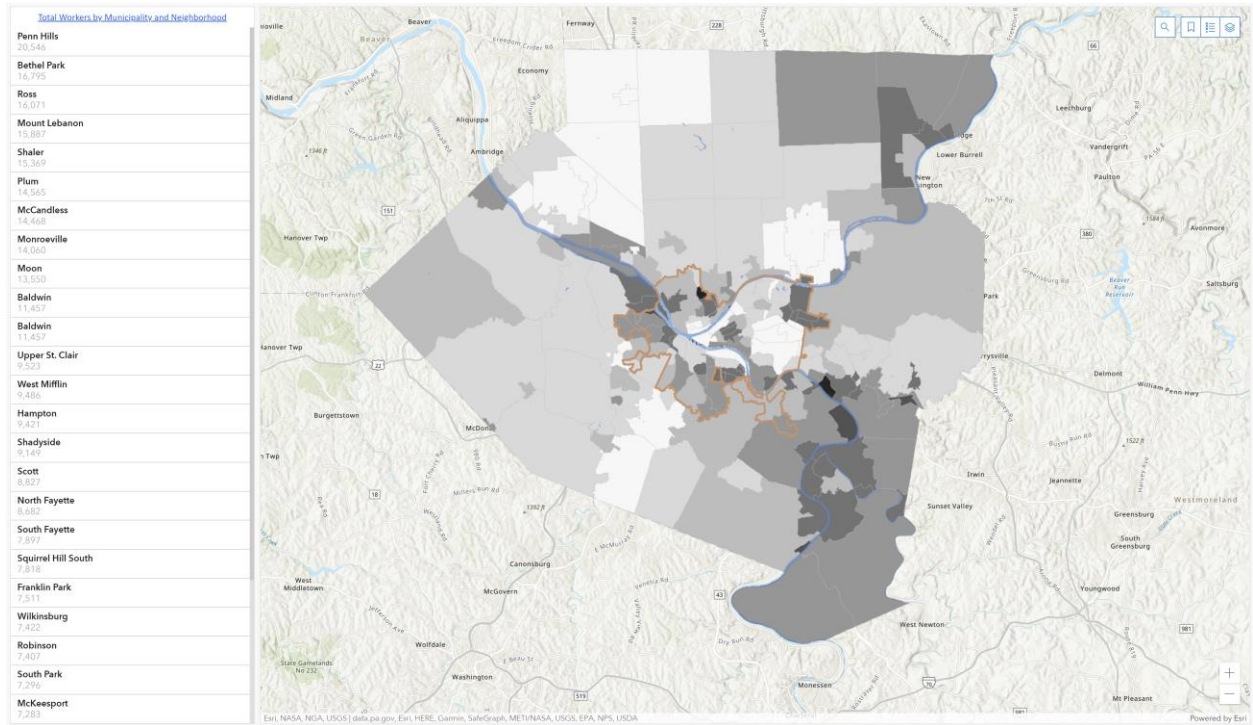
Because this is a list a symbol isn't needed and is a distraction.

## Rename and add a title to a list element

The dashboard user should have an understanding of the list they are viewing so a descriptive title is needed.

1. Under List click General.
2. Under Name type **List (Total Workers)**.
3. Under Title > Edit type **Total Workers by Municipality and Neighborhood**.
4. In the title pane, highlight the title text, choose underline, center justified and dark blue as the font color.
5. Click Done and drag the separator between the map and list to make the list pane smaller.
6. Save the dashboard.

Later you will add an interaction to the map that will zoom to the map when the municipality or neighborhood is selected in the list.



## Create a Serial Chart element

~~Serial charts~~ are useful for comparing data in various graph forms. The map shows the percentage of essential workers, the list shows the total worker in each municipality or neighborhood. Suppose decision makers are interested how long a commute time is for each area. A comparison of percentage of commute times as graphs would indicate areas where workers are having longer than normal commutes. In the US, the average commute time is 26 minutes.

1. From the navigation bar click + Add Element > Serial Chart > Essential Workers layer.
2. Under Categories from choose **Features**.
3. Under Category Field choose **Name**. This is the municipality or neighborhood name and number.
4. Click Series > Add Series > **PTimeU24**. This is the percentage of workers who travel to work 24 minutes or less.

5. **Add another series for PTime25\_44.** This will be the percentage of workers whose travel time is 25-44 minutes.
6. **Add another series for PTime44\_.** This will be the percentage of workers whose travel time is greater than 44 minutes
7. **Click Sort by > Add Field > T\_Worker.**
8. **Click the Sort Descending button.** This will sort the data by the number of workers by municipality or neighborhood.
9. **Under Maximum Categories type 15.**

This will show the top fifteen municipalities/neighborhoods.

## Edit the appearance of a Serial Chart

Serial charts have many options for how the data is shown, including bar charts, stacked bar charts, and lines. Here you will create two line series comparing the percentage of workers who drive and percentage of workers taking public transportation for the top municipalities or neighborhoods.

1. **From the left panel click Series.**
2. **Click PTimeU24 > Column.**
3. **Under Label type Under 24 min.**
4. **Change the color of the Under 24 min bar to light yellow.**
5. **Under PTime25\_44 click Column.**
6. **Under Label type 25-44 min.**
7. **Change the color of the 25-44 min bar to medium/orange.**
8. **Under PTime44\_ click Column.**

9. Under Label type **More than 45 min.**

10. Change the color of the **More than 45 min** bar to medium/dark red.

Keep in mind map design color principles that also apply here. All are warm colors but enough to differentiate the three data values.

## Change the name and title of the serial chart.

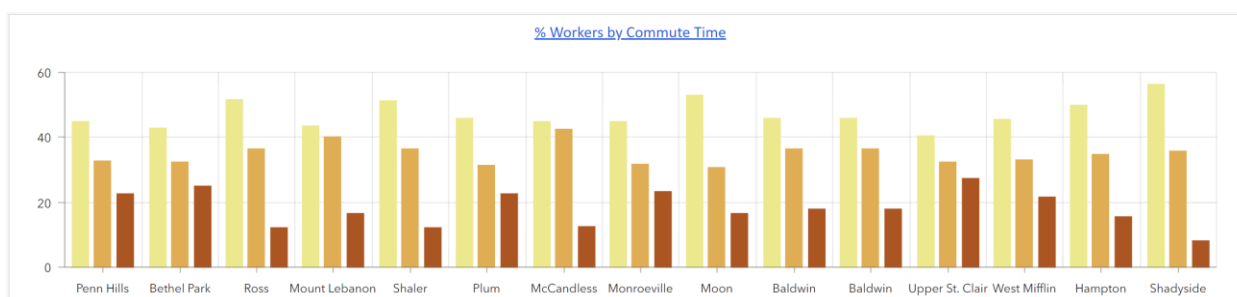
1. From the left panel click **General**.

2. Under Name type **Serial Chart (Worker Commute Time to Work)**.

3. Click Title > Edit and type **% Workers by Commute Time** as the title.

4. Choose dark blue color for the title, underline, and center justified for the title.

5. Click Done.



## Move the serial chart.

Dashboard elements can be moved to various areas of the dashboard by dragging the elements to locations on the map or elsewhere.

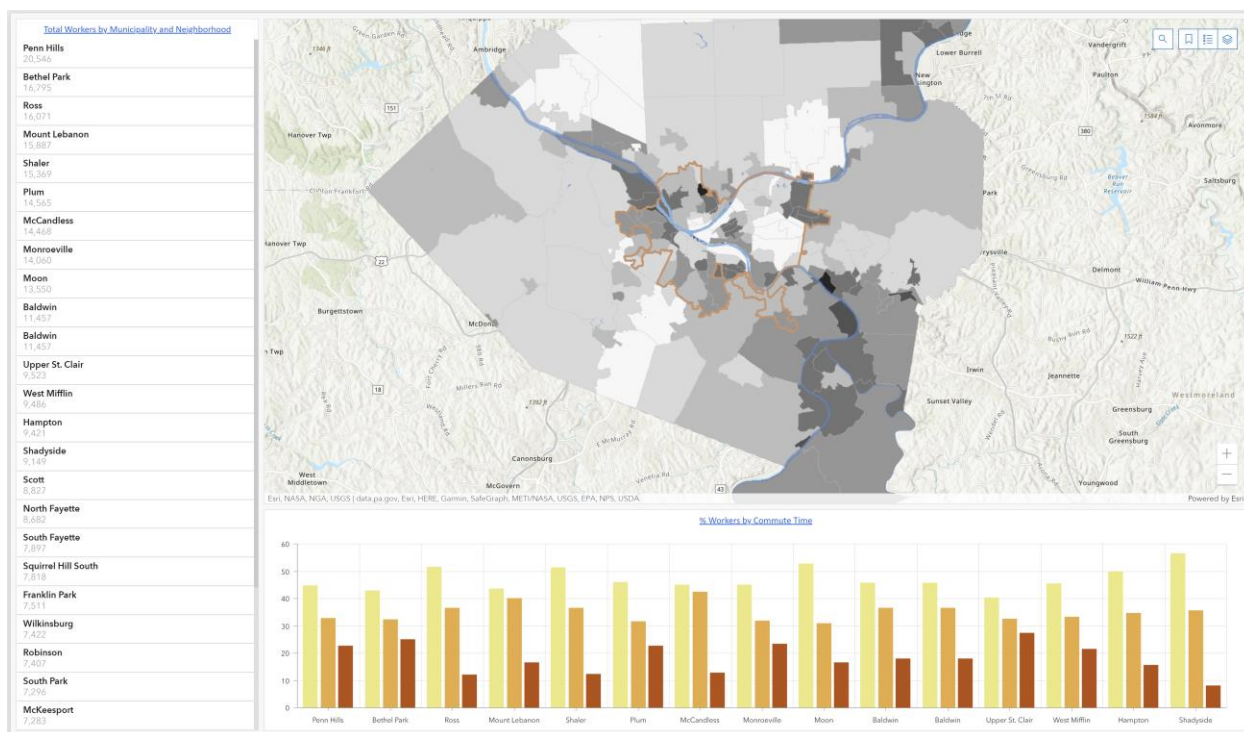
1. Hover your mouse to the upper left corner of the serial chart until the options for editing the element appear.

2. Click Drag Item and drag the serial chart to the white box in the bottom center of the map.

3. Resize the chart to be about 75% below the map.

4. Use the Allegheny County bookmark and save the dashboard.

You can now see what areas that have high percentage of those who drive to work related to those who take public transportation in areas of the most essential workers.



## Add Indicator elements

Indicator cards can be added to the dashboard to show the numeric values of fields such as sums, averages, or other calculations. Here you will add an indicators showing the total number of workers by means of transportation of each mode by municipality or neighborhoods. Later, you will change these indicators using an interaction that will change the indicator based on a map's zoomed display.

1. From the left navigation bar click **+ Add Element > Indicator > Essential Workers layer**.
2. Under Data Options click **Statistic > Sum**.
3. Under Field click **T\_CarTrkVn**.

4. Click Indicator from the left panel and under Top Text type **Car, Truck, or Van**.
5. Under Value formatting, change the decimal places to 0.
6. Click General from the left panel and type **Indicator (Drive)** as the indicator name.
7. Click Done and drag the indicator to white square to the right side of the map.

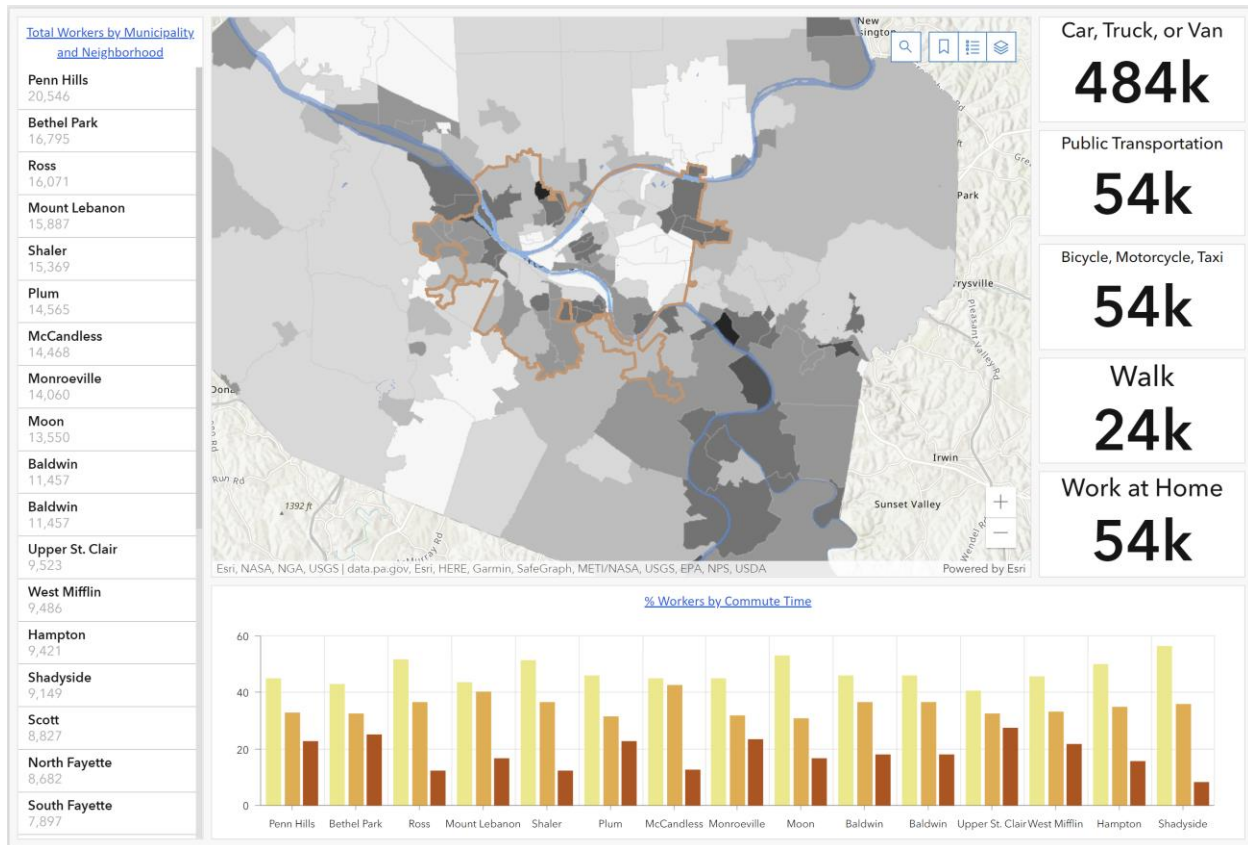
### Your Turn

Using the same steps create indicators for the other means of transportation to work variables as follows with zero decimal places for all variables:

- T\_Public; Public Transportation; Indicator (Public)
- T\_BkCycTax; Bicycle, Motorcycle, Taxi; Indicator (Bike, Motorcycle, Taxi)
- T\_Walk; Walk; Indicator (Walk)
- T\_Home; Work at Home; Indicator (Work Home)

Drag the indicators to the right side of the map showing all indicators with the approximately the same size (20%) for each panel. Save the dashboard.





## Create a Header element

Dashboard headers include titles, subtitles, logos, images, etc. Here you will create a simple header with just a title and subtitle.

1. From the navigation bar click **Layout > Header > Add Header**.
2. Type **Transportation to Work Dashboard** as the title.
3. Under Subtitle type **by Your Name**.
4. Click **Done** and **Save the dashboard**.

Congratulations! You just created a basic dashboard that includes a map, list, bar chart, and indicator elements. In the next tutorial you will add interactions and actions to the dashboard. Once the dashboard is complete you will share it with others.

## Add interactions to a dashboard

There are typically two types of dashboards. One type is an unattended display and is meant to provide information updates. For example, maps and data in an operations dashboard might update automatically by reading sensors or with real time data feeds. These dashboards might be in a command center or viewed by a user's monitor and there is no interaction between the audience and dashboard. Another type of dashboard is an interactive dashboard where the user triggers an event that results in an action. For example, selecting a record in a list (event) that produces an action in another element such as zooming to the feature of the selected record.

Examples of interactions between elements include map events producing actions on one or more elements such as charts or indicators. In a GIS dashboard map events might include extent changes from a pan, zoom, or a feature selection. A resulting action could be a filter on a list element. Dashboard interactions can also be controlled by Selectors. These are user interface (UI) controls on Side Panel and Header elements. Selector examples are dropdown lists to selected map features or date selections.

In this tutorial you will create a map trigger (changes to the map extent) that will change the values of your serial chart. You will then create an action to your list that will zoom to a feature on the map. You will also create a selector trigger by creating a dropdown list in your header that will change the values in the indicators.

## Create and test a map element action

Here you will create a map action that will change the results of your serial chart, indicators, and list based on the extent of your map features.

- 1. Navigate to the upper left corner of your Map element and click Configure.**
- 2. Click the Map actions tab > Filter and turn on all of the dashboard elements.**

**Map actions**

When map extent changes

**Filter**  
7 active targets

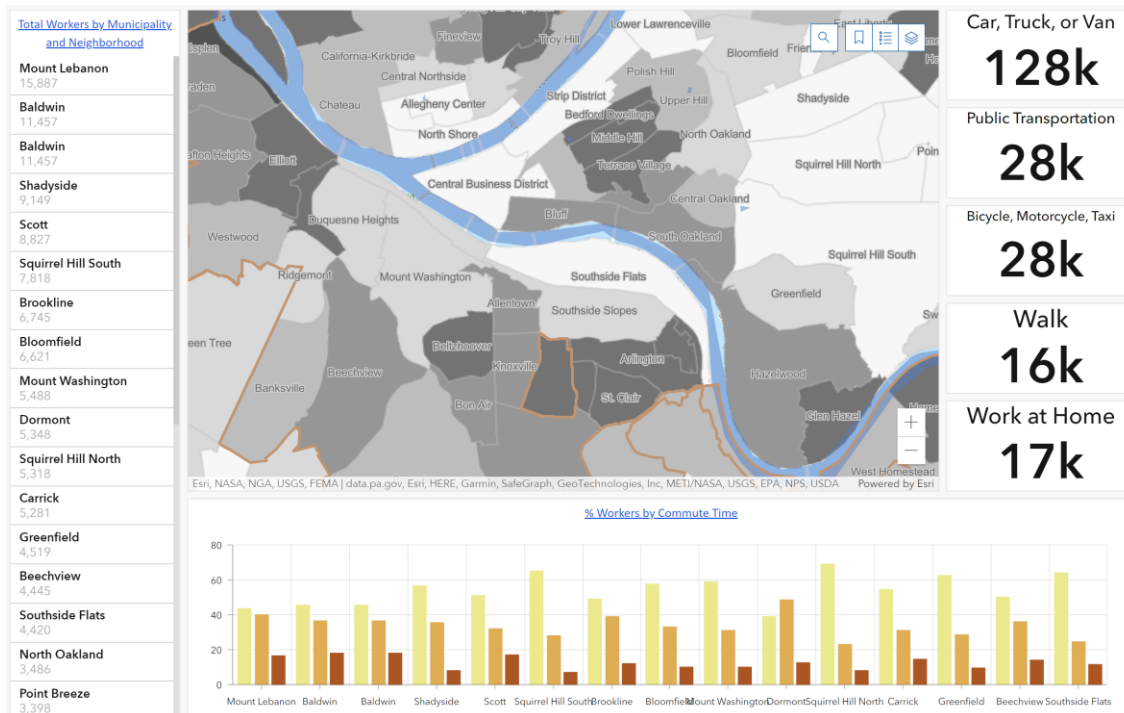
To ensure performance and scalability, map extent filters in public dashboards may produce approximate results in some scenarios. Map extent filters will produce exact results in private dashboards or dashboards shared to your organization. [Learn more about map extent filters.](#)

Search...

- 99% Indicator (Bike, Motorcycle, Taxi) ☒
- 99% Indicator (Drive) ☒
- 99% Indicator (Public) ☒
- 99% Indicator (Walk) ☒
- 99% Indicator (Work Home) ☒
- List (Total Workers) ☒
- Serial Chart (Time to Work) ☒

3. Click Done.

4. Use the Pittsburgh County bookmark and notice the change of data on all elements.



## Create and test a list element action

The next action will zoom to the map based on a trigger of selecting a municipality or neighborhood in the list.

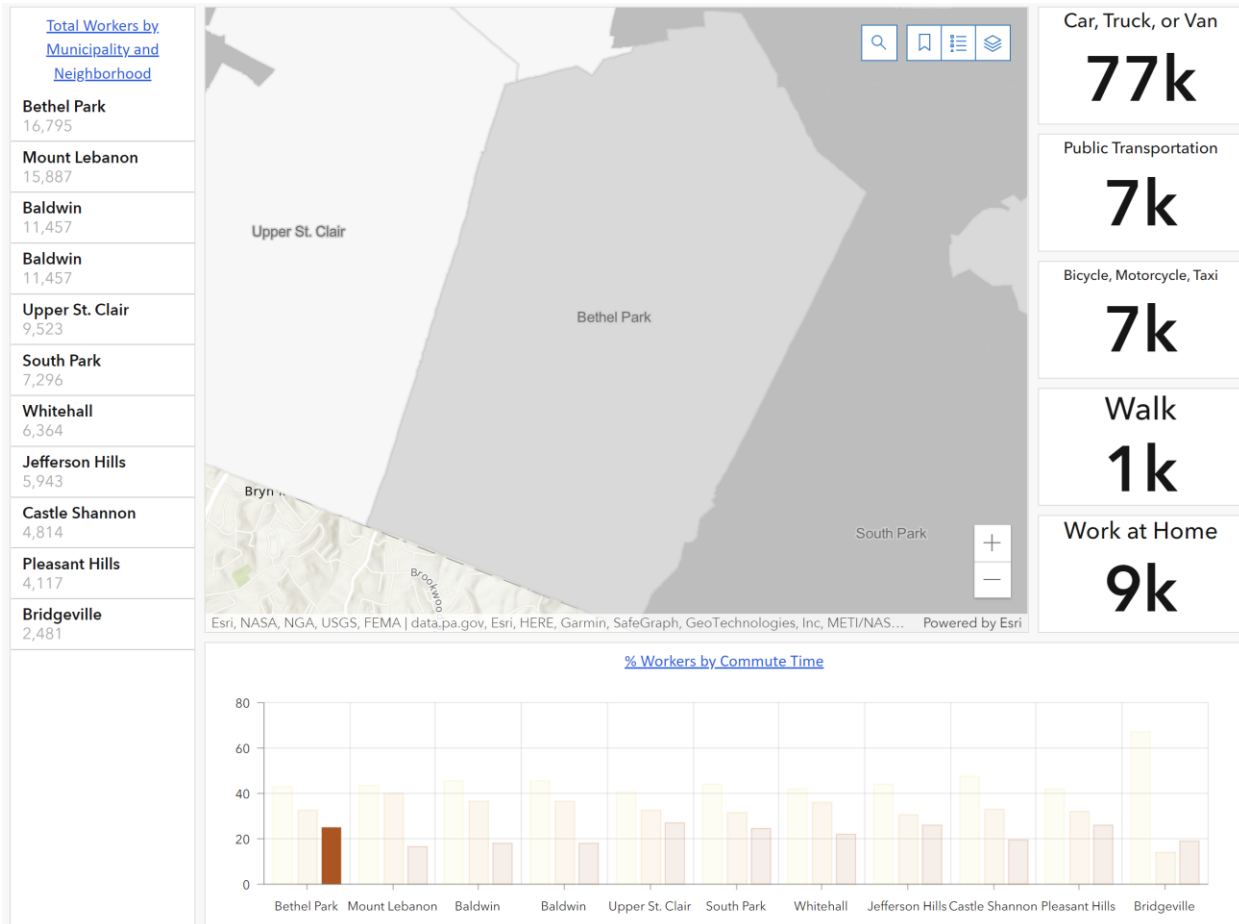
1. **Use the Allegheny County bookmark.**
2. **Navigate to the upper left corner of your List element and click Configure.**
3. **From the left panel click Actions > Zoom.**
4. **Under Zoom turn on [Assignment12\\_YourName](#).** This action will zoom to the selected area in the list for this map.
5. **Click Done.**
6. **Click Penn Hills from the list and see the map zoom to this feature.**
7. **Click a few other municipalities or neighborhoods.** Notice the change in map zoom and also data in the serial chart and indicators.

## Create and test a serial chart element action

Suppose your focus is on the commute times and you want the map to zoom as you choose values in the chart. This can be done with an action.

1. **Navigate to the upper left corner of the Serial Chart element and click Configure.**
2. **Click Actions > Zoom.**
3. **Under Zoom turn on [Assignment12\\_YourName](#).**
4. **From the serial chart click the Bethel Park, a suburb with a long commute time.**

The map zooms to that municipality and surrounding area.



5. Click above one of the bars in the chart to unselect the chart element.

6. Use the Allegheny County bookmark.






## Create and test a list element filter action

The previous actions changed the map's extent based on selections in a list and chart. The indicator values were those of the areas in the map extent. The next action will change the indicator values to those of *just the municipality or neighborhood selected from the list*.

This will be done with a filter action that changes indicator values based on a selected municipality or neighborhood and will allow decision makers to interactively see many data at once: total workers by means of transportation (list) and chart (commute time to work), and indicators (means of transportation). While you can see all the table's values in a pop-up window

for selected areas, an interactive change of indicators and serial chart data is easier to read and interpret.

1. **Navigate to the upper left corner of the List element and click Configure.**
2. **From the left panel click Actions > Add Action > Filter.**
3. **Click Filter and turn on all indicators.**

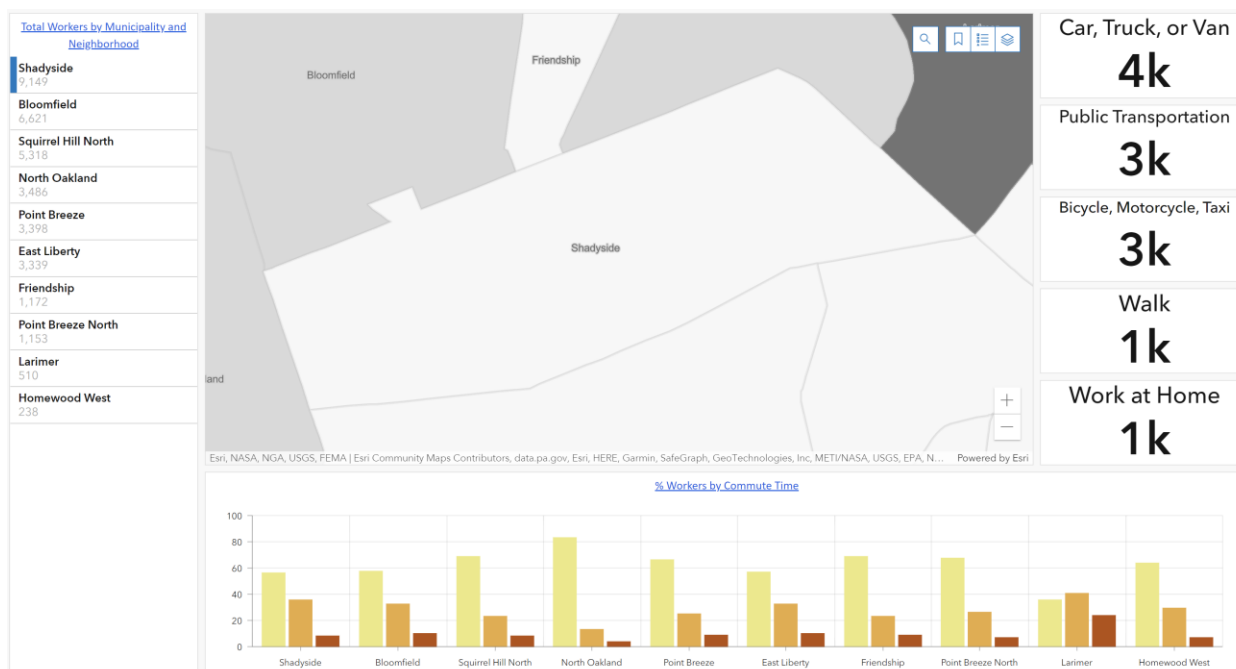
99! Indicator (Bike, Motorcycle, Taxi)	 <input checked="" type="checkbox"/>
<input type="checkbox"/> Render only when filtered	
99! Indicator (Drive)	 <input checked="" type="checkbox"/>
<input type="checkbox"/> Render only when filtered	
99! Indicator (Public)	 <input checked="" type="checkbox"/>
<input type="checkbox"/> Render only when filtered	
99! Indicator (Walk)	 <input checked="" type="checkbox"/>
<input type="checkbox"/> Render only when filtered	
99! Indicator (Work Home)	 <input checked="" type="checkbox"/>
<input type="checkbox"/> Render only when filtered	

4. **Click Done.**

## Test a filter action

The dashboard changes will show the relationship between the total amount paid for each senate district (as seen in the list), number employees and businesses (as seen in the serial chart), and total business sales and amount paid (as seen in the indicators). The serial chart also shows the relationship between employees and businesses in the areas surrounding the selected feature.

1. **Use the Allegheny County bookmark.**
2. **From the list element click Shadyside.** Note the indicators and serial chart change. The indicator values are now only for that municipality.



3. Click the polygon and confirm from the popup list that the values are the same as the indicators and for just that one selected neighborhood.
4. Click various municipalities and neighborhoods from the list and see the changes to the indicators and serial chart.
5. Zoom to the Allegheny County bookmark and save the dashboard.

## Add a Side Bar

While a side bar is an optional element of a dashboard it can serve many purposes including providing a description about the dashboard, topic, or instructions for how to use the dashboard. This side bar will include a brief overview of the map and data. Text for the side bar description is found in downloaded SideBarText.docx.

1. Open SideBarText.docx in a word processor, select all text, and press Control +C to copy the text.
2. From the left navigation bar click Layout > Side Bar.
3. Click Title > Edit and type **Transportation to Work** using a bold font.

4. Under the title paste (as plain text) the text from SideBarText.

5. Place line breaks where needed.

6. Turn Collapsible sidebar on and click Done.

Title

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Normal

Default

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Source

Transportation to Work

Work environments across the world has changed drastically in the past few years and will continue to change as organizations return to offices and physical workplaces. Hybrid modes of working from home, at headquarters, in satellite spaces, etc. are being explored. Changes to neighborhoods, central business districts, etc. will change based on worker

div p

Description

Minimize

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Source

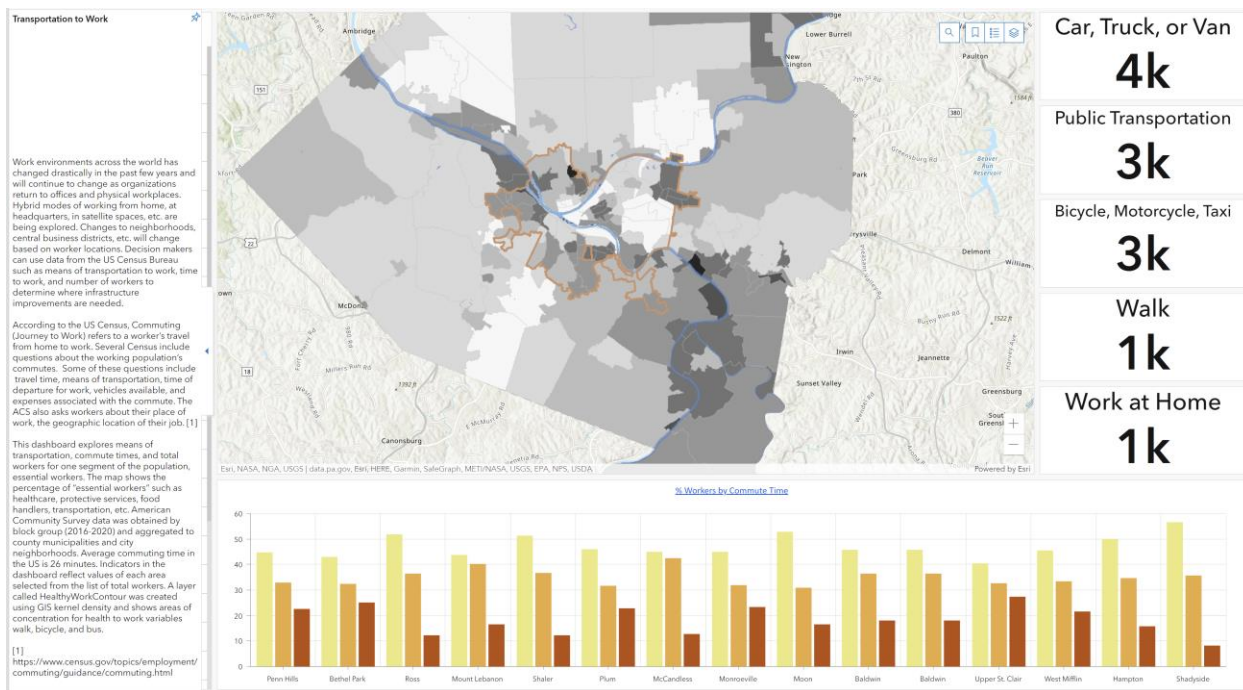
div p

Text color

Background color

Collapsible sidebar

7. Practice hiding and showing the side panel.



8. Save the dashboard.

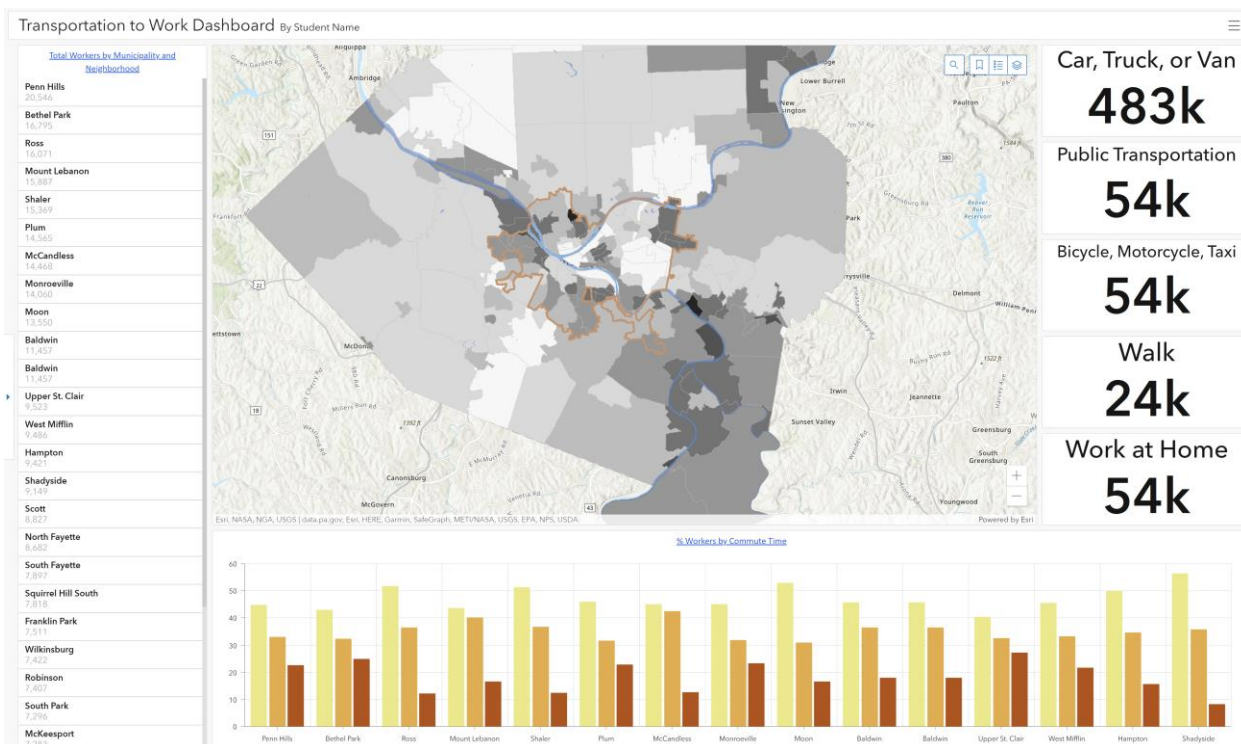


## Publish and view the dashboard

Your dashboard is now complete and ready to share. You will do so in ArcGIS Online.

1. In a web browser go to [www.arcgis.com](http://www.arcgis.com) and sign in with your Esri account if necessary.
2. Click Content > folder Assignment12.
3. Click [Assignment 12\\_Dashboard\\_YourName](#).
4. Click Share > Everyone (public) > Save.
5. Click View Dashboard.

You will see your dashboard as it was last saved. Congratulations! You created your first dashboard. to share with others. The dashbord URL can be copied and shared with others.



## What to turn in

Copy the URL for the dashboard to a file called Assignment12YourName.docx. **Include your name, date, and URL** and submit to Canvas under Assignment 12.