Data Visualization in Google Charts

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Ball State University CBER

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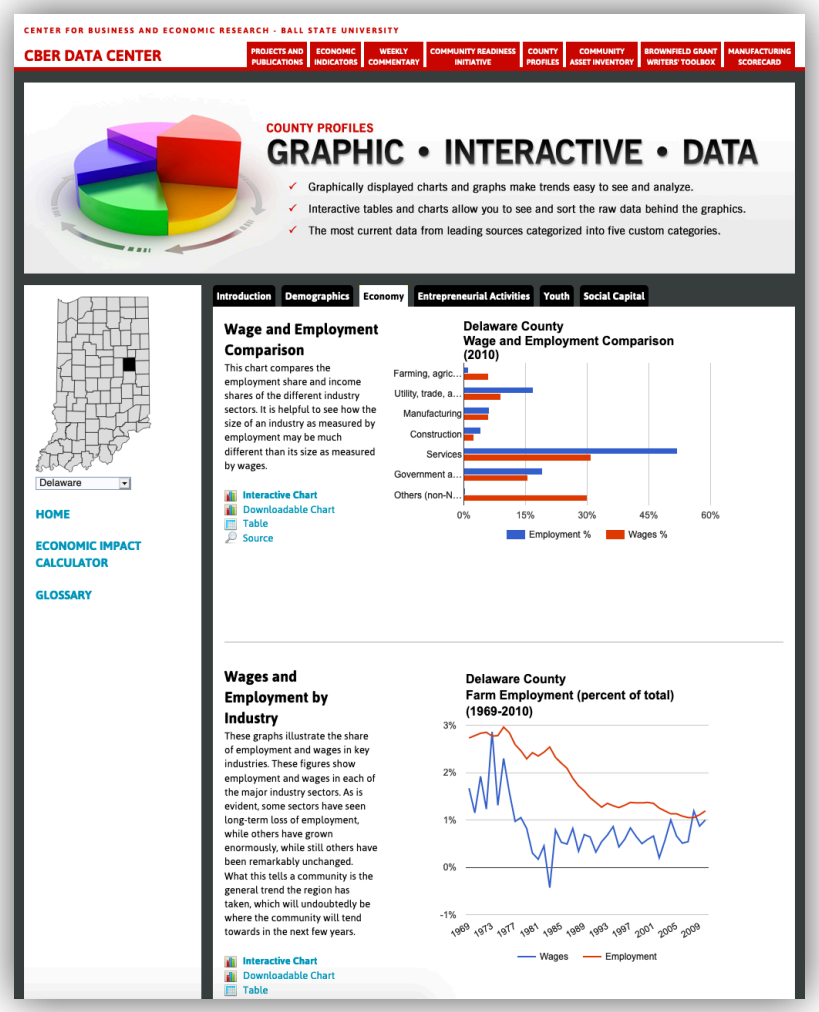
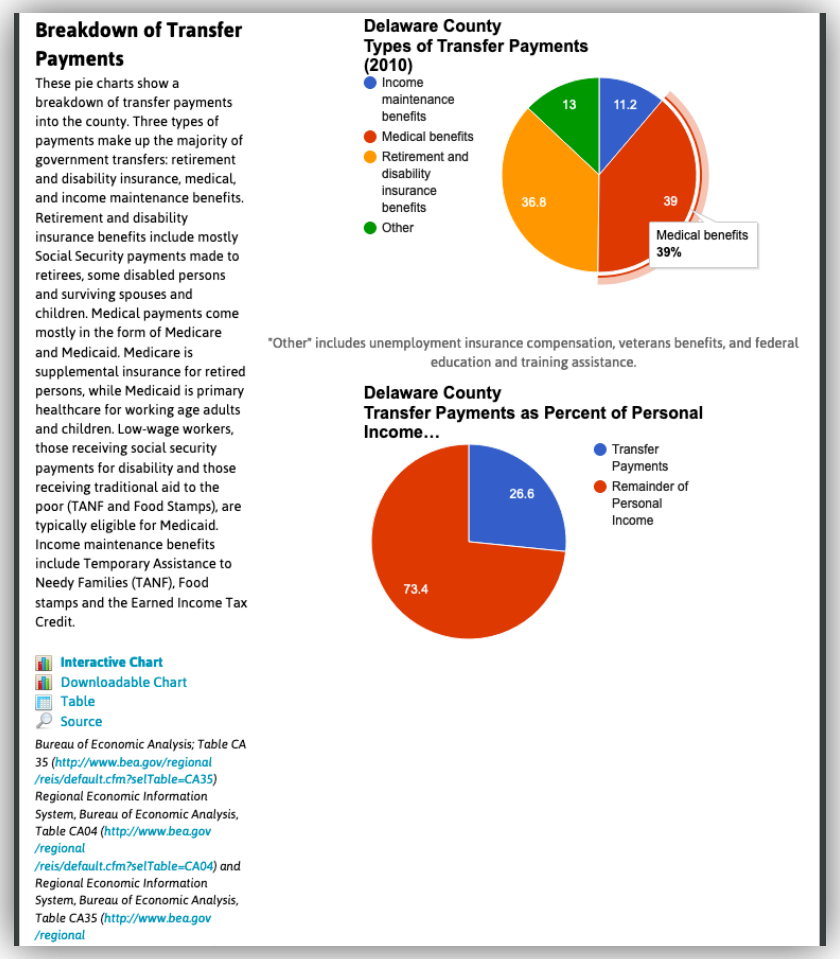
1. Show examples from **cberdata.org**
2. Describe data viz process
3. Explore other features

Examples

from the CBER Data Center

County Profiles





profiles.cberdata.org

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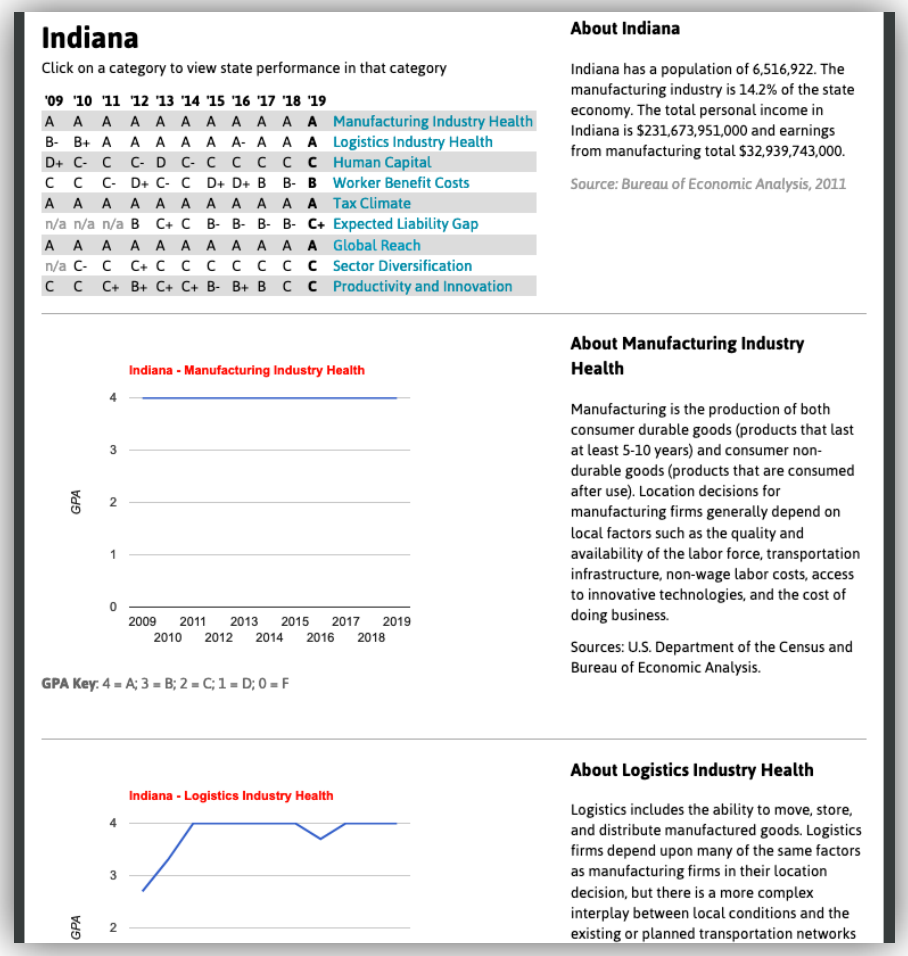
Manufacturing Scorecard



Indiana

Click on a category to view state performance in that category

'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	
A	A	A	A	A	A	A	A	A	A	**A**	Manufacturing Industry Health
B-	B+	A	A	A	A	A	A-	A	A	**A**	Logistics Industry Health
D+	C-	C	C-	D	C-	C	C	C	C	**C**	Human Capital
C	C	C-	D+	C-	C	D+	D+	B	B-	**B**	Worker Benefit Costs
A	A	A	A	A	A	A	A	A	A	**A**	Tax Climate
n/a	n/a	n/a	B	C+	C	B-	B-	B-	B-	**C+**	Expected Liability Gap
A	A	A	A	A	A	A	A	A	A	**A**	Global Reach
n/a	C-	C	C+	C	C	C	C	C	C	**C**	Sector Diversification
C	C	C+	B+	C+	C+	B-	B+	B	C	**C**	Productivity and Innovation

About Indiana

Indiana has a population of 6,516,922. The manufacturing industry is 14.2% of the state economy. The total personal income in Indiana is $231,673,951,000 and earnings from manufacturing total $32,939,743,000.

Source: Bureau of Economic Analysis, 2011

GPA Key: 4 = A; 3 = B; 2 = C; 1 = D; 0 = F

About Manufacturing Industry Health

Manufacturing is the production of both consumer durable goods (products that last at least 5-10 years) and consumer non-durable goods (products that are consumed after use). Location decisions for manufacturing firms generally depend on local factors such as the quality and availability of the labor force, transportation infrastructure, non-wage labor costs, access to innovative technologies, and the cost of doing business.

Sources: U.S. Department of the Census and Bureau of Economic Analysis.

About Logistics Industry Health

Logistics includes the ability to move, store, and distribute manufactured goods. Logistics firms depend upon many of the same factors as manufacturing firms in their location decision, but there is a more complex interplay between local conditions and the existing or planned transportation networks

mfgscorecard.cberdata.org

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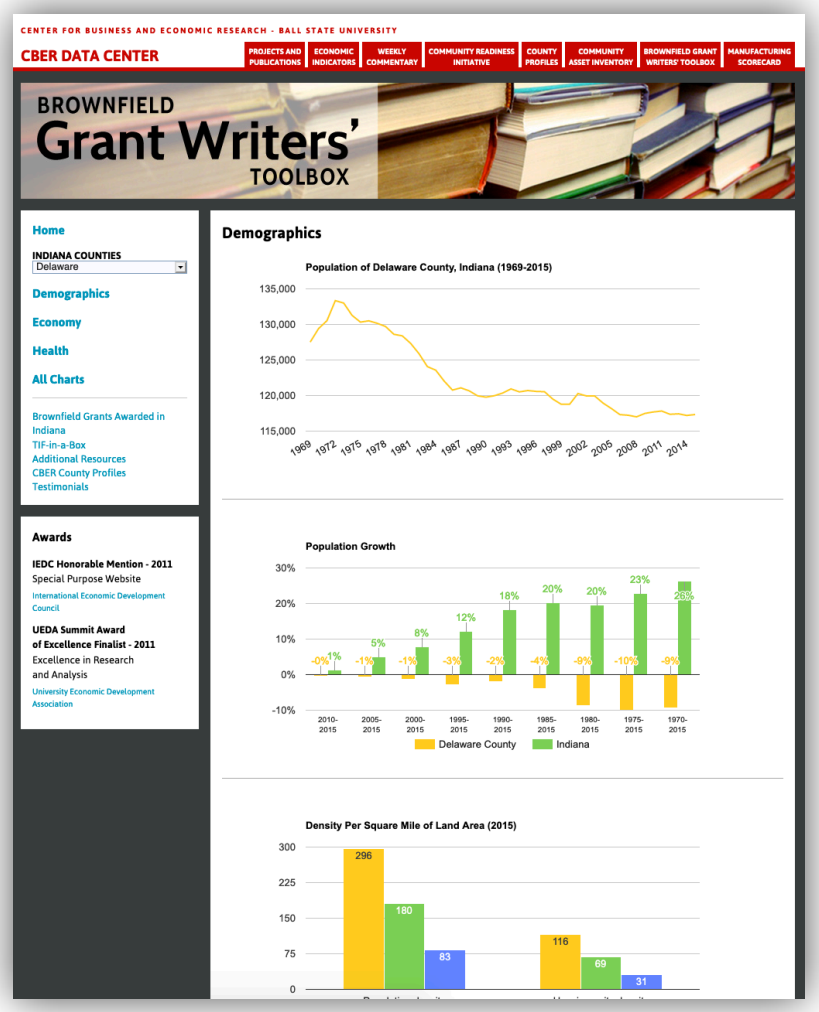
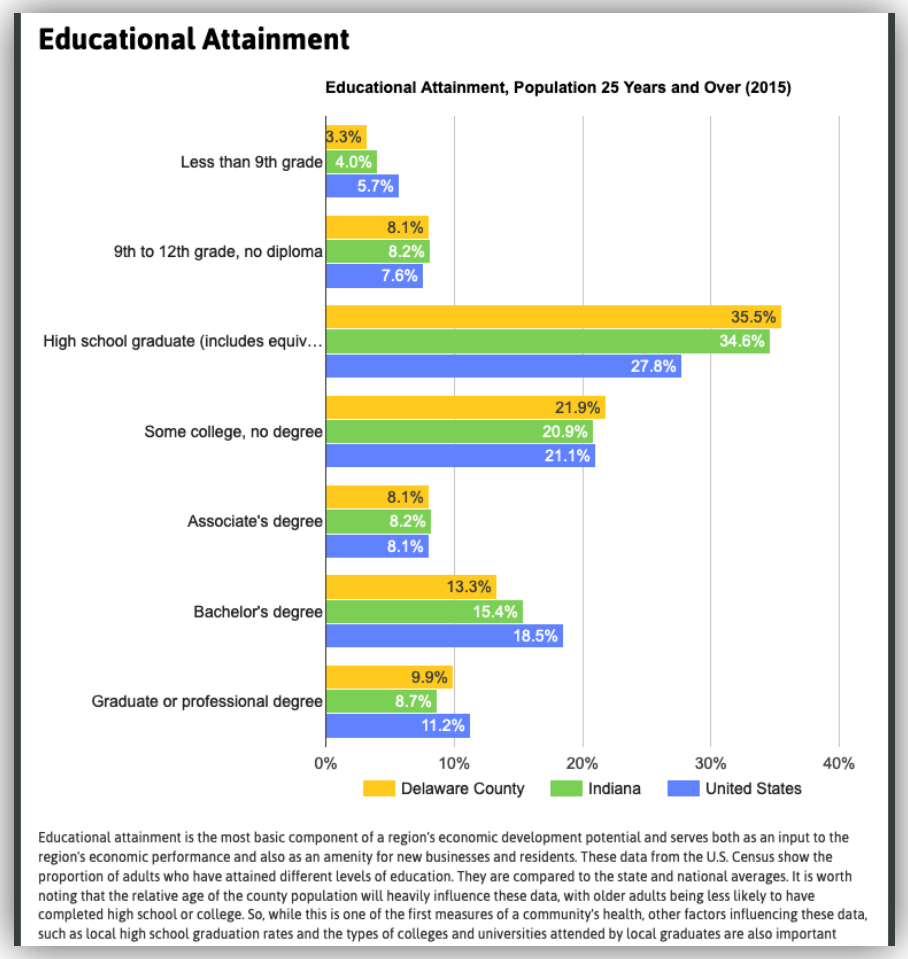
Brownfield Grant Writers' Toolbox





brownfield.cberdata.org

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Data Viz
@ Ball State CBER

Our process from spreadsheet to web graphic

Data Team @ Ball State CBER

Srikant Devaraj, PhD

Research Assistant Professor

- Data analysis

Graham Watson

Web Development Manager

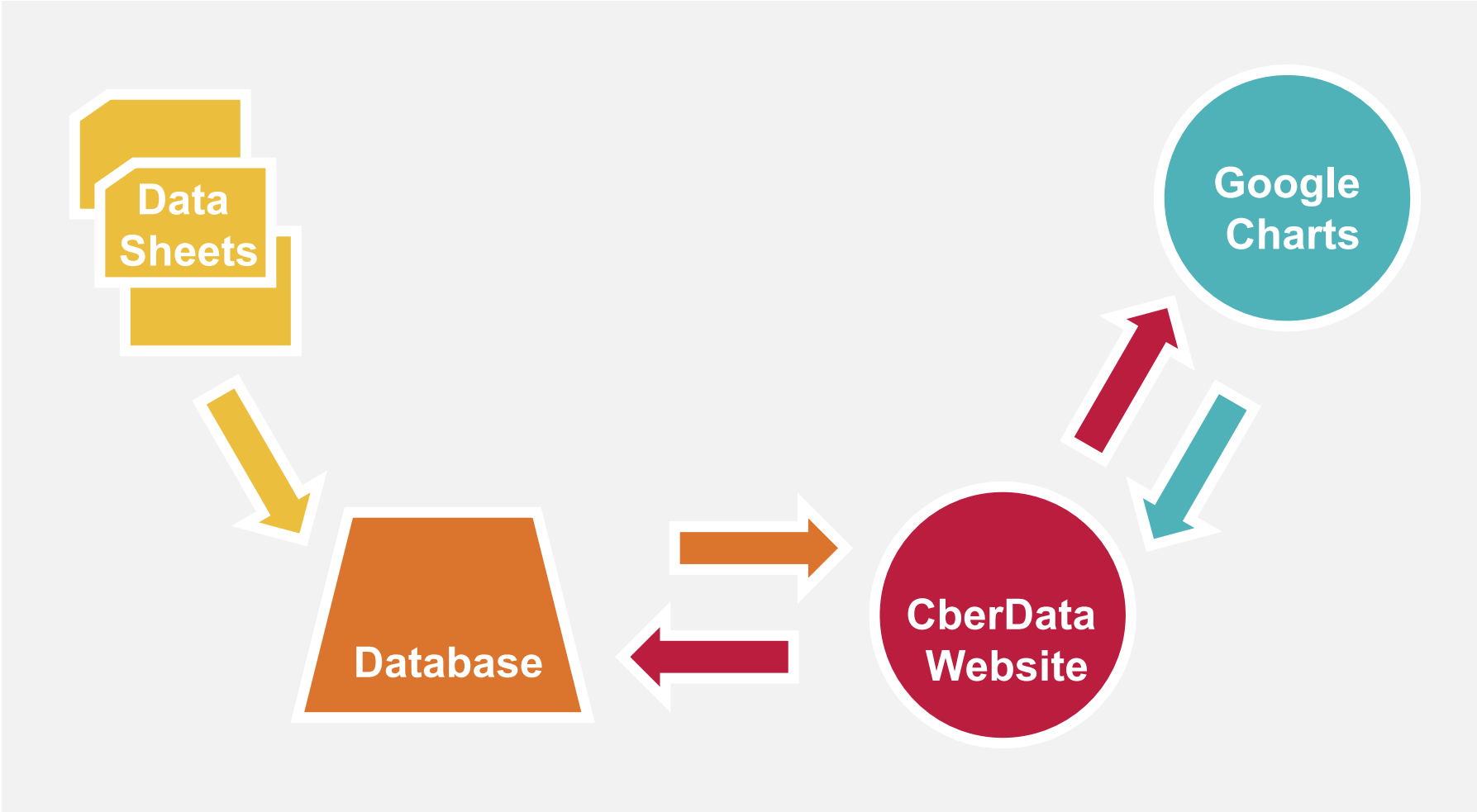
- Development

Victoria Meldrum

Publications & Web Services

- Design & usability

Process from Data to Graphic

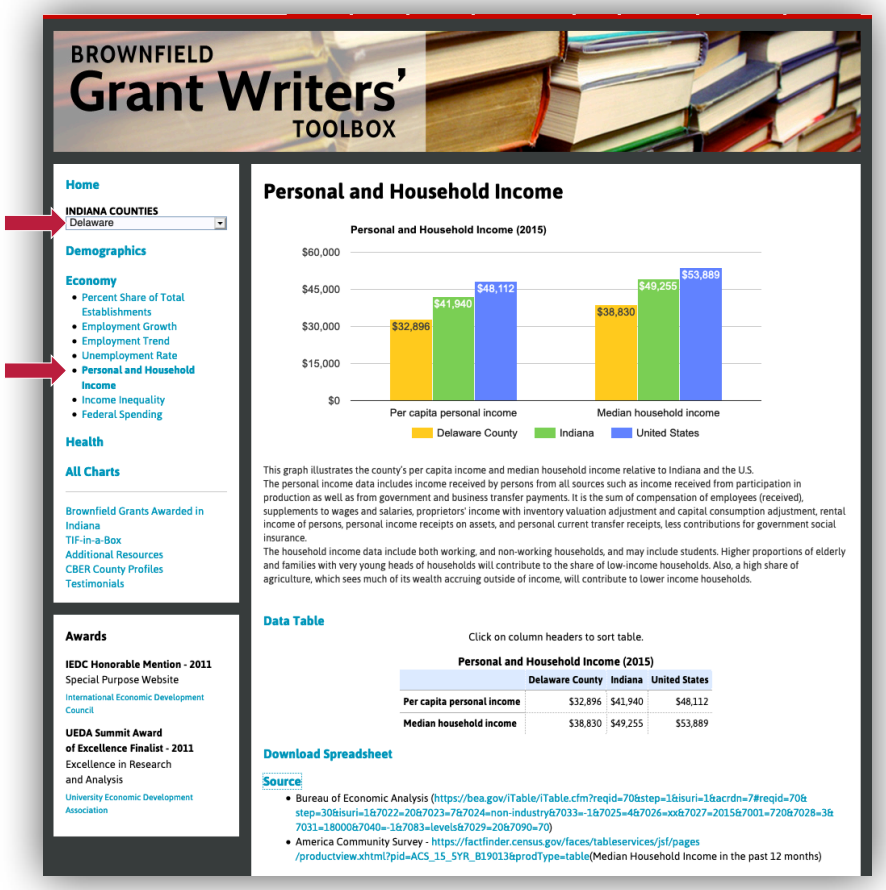


Prepping the Data

- Srikant sends data spreadsheets to Graham
- Graham imports data into database
  - PHP script identifies categories & variables, assigns locations for website recall
  - Script to check for errors
  - Link multiple data sets together

Determine Features

- Srikant, Graham, & Victoria discuss project parameters
- Visualization through Google Charts



brownfield.cberdata.org

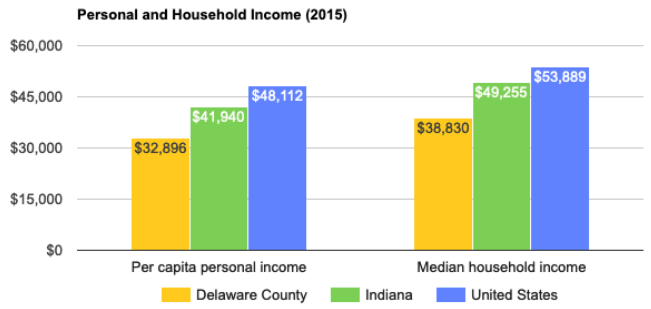
Using Google Charts

Google Charts uses JavaScript to read data and generate charts directly on your HTML5 webpage

1. Embed Google's JavaScript into the page
2. Specify chart type and appearance parameters in your code
3. Page code sources data points and generates graphic

Page Code

Personal and Household Income



This graph illustrates the county's per capita income and median household income relative to Indiana and the U.S.
The personal income data includes income received by persons from all sources such as income received from participation in production as well as from government and business transfer payments. It is the sum of compensation of employees (received), supplements to wages and salaries, proprietors' income with inventory valuation adjustment and capital consumption adjustment, rental income of persons, personal income receipts on assets, and personal current transfer receipts, less contributions for government social insurance.
The household income data include both working, and non-working households, and may include students. Higher proportions of elderly and families with very young heads of households will contribute to the share of low-income households. Also, a high share of agriculture, which sees much of its wealth accruing outside of income, will contribute to lower income households.

Data Table

Click on column headers to sort table.

Personal and Household Income (2015)

	Delaware County	Indiana	United States
Per capita personal income	$32,896	$41,940	$48,112
Median household income	$38,830	$49,255	$53,889

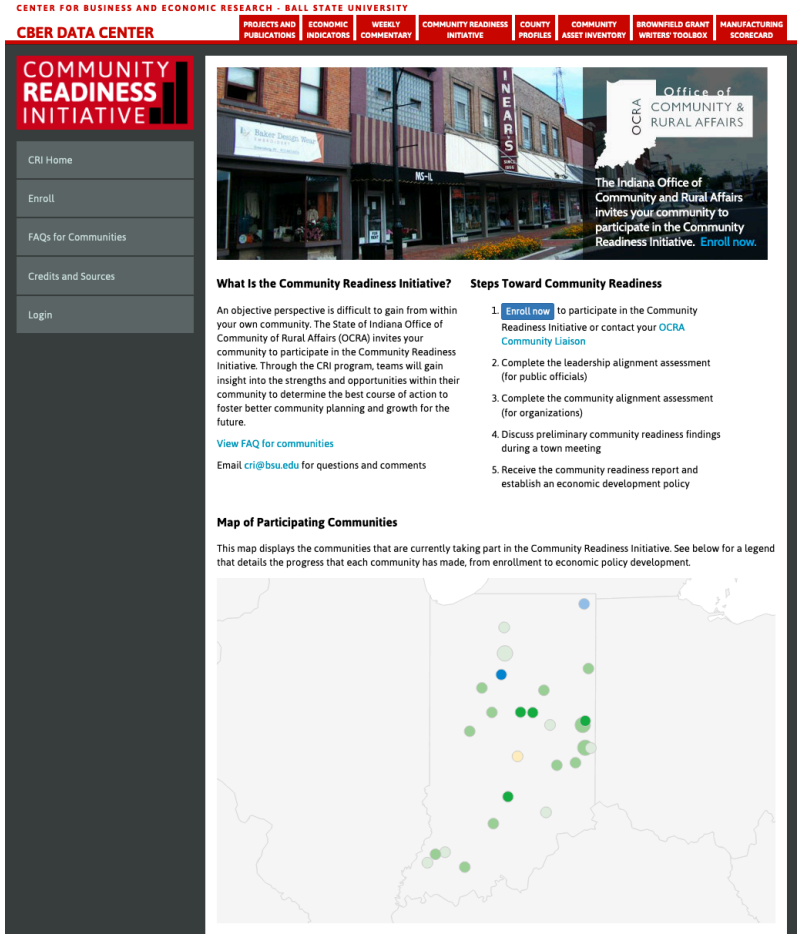
Download Spreadsheet

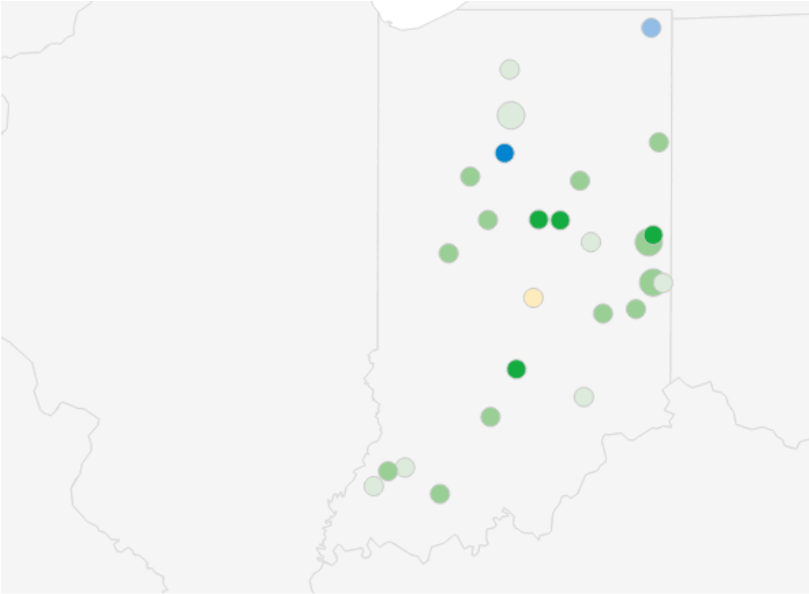
Source

- Bureau of Economic Analysis (https://bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=7#reqid=70&step=30&isuri=1&7022=20&7023=7&7024=non-industry&7033=-1&7025=4&7026=xx&7027=2015&7001=720&7028=3&7031=18000&7040=-1&7083=levels&7029=20&7090=70)
- America Community Survey - https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_5YR_B19013&prodType=table(Median Household Income in the past 12 months)

```
// Download Google's code used for generating Google Charts
<script type="text/javascript" src="https://www.google.com/jsapi"></script>
<script type="text/javascript">

  // Initiate the Google Charts loader that will interpret the rest of our code
  google.load("visualization", "1", {packages: ["corechart"]});
  $(document).ready(function () {

    // Begin defining a chart and identify where on the page it will be placed
    const chartContainer = document.getElementById('chart_div');
    const chart = new google.visualization.ColumnChart(chartContainer);

    // Configure the appearance of the chart
    const chartOptions = {
      "width": 725,
      "height": 300,
      "title": "Personal and Household Income (2015)",
      "titleTextStyle": {"color": "#000"},
      "legend": {  "position": "bottom",   "alignment": "center"
        },
      "vAxis": {  "minValue": 0,   "format": "$#,###"
    },
    "colors": [ "#FFCC33", "#81CF5A", "#5F8AFF" ]
  };

  // Define the data that will be displayed in the chart
  const chartData = new google.visualization.arrayToDataTable([
    ['Category', 'Delaware County', 'Annotation', 'Indiana', 'Annotation', 'United States',
'Annotation'],
    ['Per capita personal income', 32896, '$32,896', 41940, '$41,940', 48112, '$48,112'],
    ['Median household income', 38830, '$38,830', 49255, '$49,255', 53889, '$53,889']]);

    // Tell Google Charts that some of the values should appear superimposed over the bars
    chartData.setColumnProperty(2, 'role', 'annotation');
    chartData.setColumnProperty(4, 'role', 'annotation');
    chartData.setColumnProperty(6, 'role', 'annotation');

    // Tell Google Charts to display each value as a dollar amount in popup windows
    const formatter = new google.visualization.NumberFormat({pattern: '$#,###'});
    formatter.format(chartData, 1);
    formatter.format(chartData, 3);
    formatter.format(chartData, 5);

    // Generate and display the chart
    chart.draw(chartData, chartOptions);
  });
</script>
```

Community Readiness Initiative





CRI Phases

1. Prospective community
2. Enrolled
3. Leadership alignment survey phase
4. Leadership alignment analysis phase
5. Leadership alignment complete
6. Community org alignment survey phase
7. Community org alignment analysis phase

cri.cberdata.org

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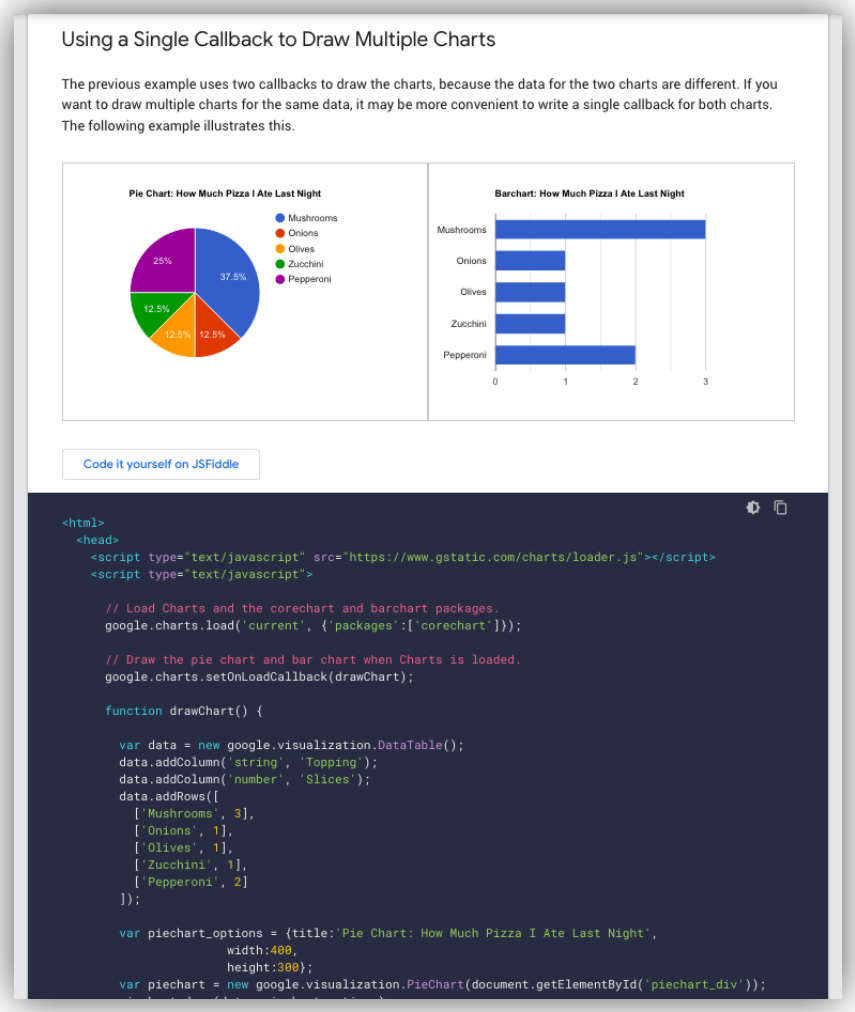
GeoCharts

1. Determine list of counties & municipalities
2. Write query to retrieve GPS coordinates from Google Maps API
3. Modify chart appearance
4. Source data points and generate map

Why Google Charts?

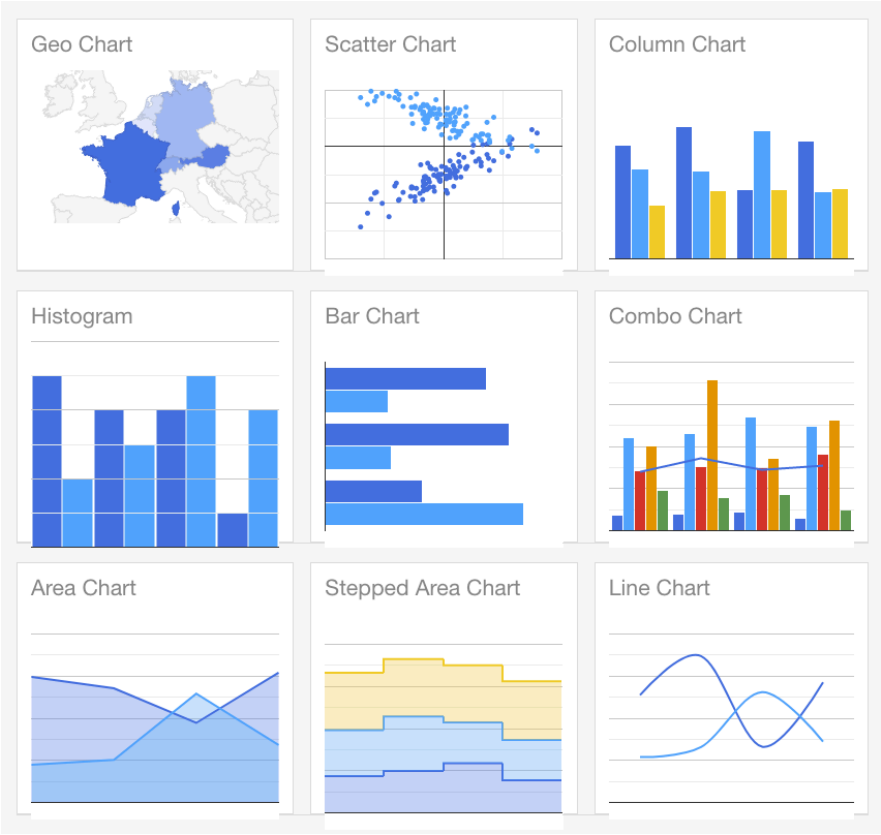
- Rich set of features
- Longevity b/c Google product
- Free, open-source tools
- Robust developer guide
- Large developer community



More from Google Charts

Other options and features

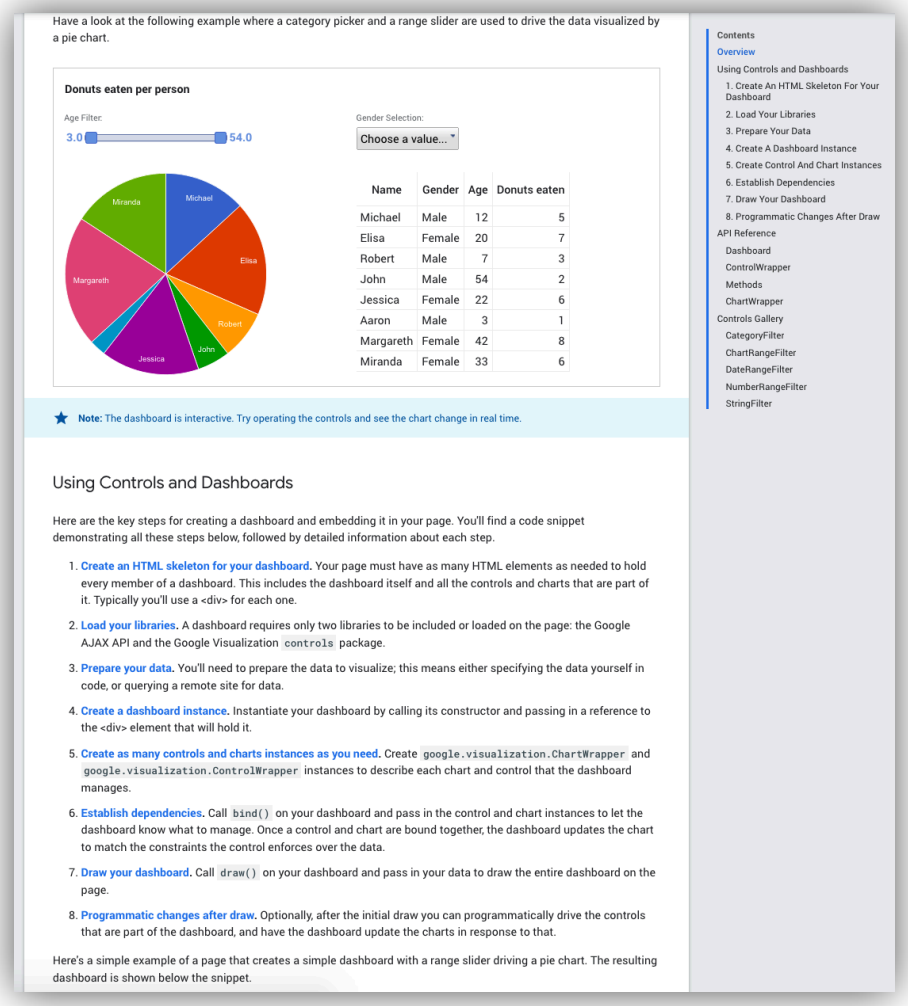
Chart Types



developers.google.com/chart

Other Features

- Robust “how-to” guide & examples
- Animation
- Dashboards
- Interactive controls
- Export options
- Printable PNGs



Have a look at the following example where a category picker and a range slider are used to drive the data visualized by a pie chart.

Donuts eaten per person

Age Filter: 3.0 – 54.0

Gender Selection: Choose a value...

Name	Gender	Age	Donuts eaten
Michael	Male	12	5
Elisa	Female	20	7
Robert	Male	7	3
John	Male	54	2
Jessica	Female	22	6
Aaron	Male	3	1
Margareth	Female	42	8
Miranda	Female	33	6

★ **Note:** The dashboard is interactive. Try operating the controls and see the chart change in real time.

Using Controls and Dashboards

Here are the key steps for creating a dashboard and embedding it in your page. You'll find a code snippet demonstrating all these steps below, followed by detailed information about each step.

1. **Create an HTML skeleton for your dashboard.** Your page must have as many HTML elements as needed to hold every member of a dashboard. This includes the dashboard itself and all the controls and charts that are part of it. Typically you'll use a for each one.
2. **Load your libraries.** A dashboard requires only two libraries to be included or loaded on the page: the Google AJAX API and the Google Visualization `controls` package.
3. **Prepare your data.** You'll need to prepare the data to visualize; this means either specifying the data yourself in code, or querying a remote site for data.
4. **Create a dashboard instance.** Instantiate your dashboard by calling its constructor and passing in a reference to the element that will hold it.
5. **Create as many controls and charts instances as you need.** Create `google.visualization.ChartWrapper` and `google.visualization.ControlWrapper` instances to describe each chart and control that the dashboard manages.
6. **Establish dependencies.** Call `bind()` on your dashboard and pass in the control and chart instances to let the dashboard know what to manage. Once a control and chart are bound together, the dashboard updates the chart to match the constraints the control enforces over the data.
7. **Draw your dashboard.** Call `draw()` on your dashboard and pass in your data to draw the entire dashboard on the page.
8. **Programmatic changes after draw.** Optionally, after the initial draw you can programmatically drive the controls that are part of the dashboard, and have the dashboard update the charts in response to that.

Here's a simple example of a page that creates a simple dashboard with a range slider driving a pie chart. The resulting dashboard is shown below the snippet.

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7. Draw Your Dashboard
8. Programmatic Changes After Draw
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Dashboard
ControlWrapper
Methods
ChartWrapper
Controls Gallery
CategoryFilter
ChartRangeFilter
DateRangeFilter
NumberRangeFilter
StringFilter

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