Open Data: A Tool for Everyone in Every Community

A curriculum for community members

Teaching Guide for Beta Tester Libraries

A Product of the Data Equity for Main Street Project

Version Current as of 1/28/2018

Data Equity for Main Street:
Bringing Open Data home
through local libraries

Images by Eric Fisher (https://flic.kr/p/8Acc7V) and Open Knowledge (https://flic.kr/p/aMitlgz)

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Open Data: Data Equity for Main Street

Data Equity for Main Street is a grant-based project to promote data literacy by training librarians and community members how to find, use and give feedback about open data. What is open data, why does it matter, and how is it used? This work has been made possible through a grant from the John S. and James L. Knight Foundation and by a talented and passionate community of supporters who have helped write, edit and present it.

As the open data movement matures, we must ensure everyone has the opportunity to participate in the benefits that it creates: more informed public decisions, new businesses and new projects. Organizations with large budgets and people with advanced technical skills will more readily find and use this information; smaller groups and less technical people will need help getting started. Public librarians are skilled, trusted professionals embedded in urban and rural, large and small communities across the country, so it makes sense to integrate open data training and knowledge into libraries. By both empowering librarians with the knowledge to find and use open data, and creating tools for libraries to teach their communities to find and use open data, this project will build foundational learning materials in which everyone shares in the benefit and promise of open data.

How to use this curriculum

The curriculum and teaching guide that follows is intended to help community members and organizations learn about how to find and use open data.

This curriculum is a six to eight hour training divided across four classes. Libraries can add these hands-on open data lesson plans to existing digital and information literacy programs, or offer them as stand-alone classes or workshops. These lessons will help members of the community and community organizations learn what open data is, how to find it, easy ways to use it, and why it is important to provide feedback to the governments and organizations that created the data. These lesson plans focus on where to find data, how to leverage existing tools and where to find potential partners that local organizations can contact if they need help analyzing or visualizing data in different ways.

Each Class is divided into several sections (1a, 1b, 1c, etc.). Each section has the following components:
- *Estimated Time for Completion*: The average amount of time required to complete the section
- *Learning Objective:* What each learner will know or be able to do by the end of that section

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- *Discussion*: Overview of the activities and notes for any lecture section of the class as well as suggestions based on our experience teaching the material
- *Activities*: Videos or hands-on learning exercises
- *Alternate Activities* (if applicable): Activities that either may require fewer technology resources or that learners who finish the basic material can undertake

A list of any handouts needed appears at the end of the final section for each class.

Those instructors already comfortable with open data may be able to simply familiarize themselves with the curriculum before teaching it. Others should take our open data training class for librarians. Feel free to use the curriculum in whole or in part, but please bear in mind that the sessions build upon each other and are designed to be completed sequentially.

Evaluations

We are very excited about your feedback. We have created both student and instructor evaluations and ask that you complete these at the at end of each class. You can use either paper forms or the online survey. If you choose to use the paper forms, please transcribe the data into the google form. Links to paper and digital evaluations are located here: https://goo.gl/PXZRsw.

Materials Needed

For all classes, we recommend having access to a projector or large monitor, instructor laptop and timekeeping device, screen, speakers, student computers (at least 1:2) and internet access. The curriculum assumes some technology access and knowledge, and provides alternative activities for classes that have access to additional resources or classes that have more limited resources. Because open data is updated regularly, instructors should check links before class starts. The Data Equity website will provide alternative datasets to replace those that are no longer up-to-date.

Class Norms

If you do not already have standard guidelines for your classes, the following may be helpful. Ask learners to mute cell phones; allow people to stand, stretch, or excuse themselves for a few minutes; treat others respectfully and allow for differences of opinion; allow each participant an opportunity to speak without interruption.

Use and Reuse

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We also ask that you apply an open license to the new derivative work, with the least restrictive open license possible that is not in conflict with existing licenses. This will allow the public to realize the educational impact from the substantial investments states and private foundations have made in educational resources.

Please note: This curriculum contains links to some external content that may be produced under a different license. That information is clearly indicated in the curriculum and is accurate as of the most recent publication date.
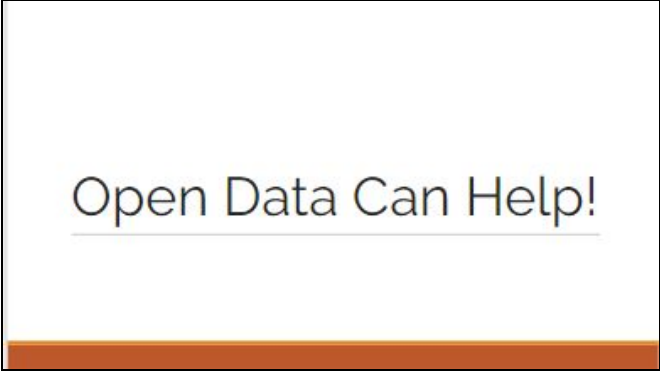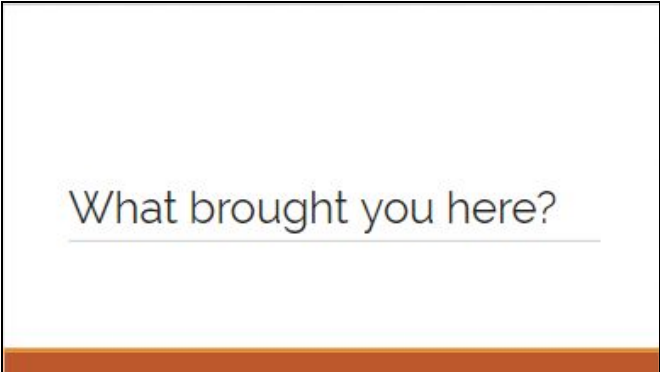
Acknowledgments

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Community Curriculum: Class 1

1.	

2.	**Class 1a: What Brought You Here?**
	
	Estimated Time: 10 minutes
	
	Learning Objective: Demonstrate curiosity and motivation to learn more
	
	Discussion: In this section you will be welcoming students to the class, finding out why they are here, and assessing the level of understanding around open data.
	
	Activities:
	    1. Welcome and introduction
	        a. Welcome students to the library.

	b. Ask them the teaser questions "What do they have in common"
3. Open Data Can Help!	The answer to the teaser question "What do they have in common?" is… Open Data Can Help! (answer these questions)

4.
 	
What brought you here?
	Activity 2. Collect background on class participants. Ask the class a few of the questions below to find out more about their level of knowledge and what brought them to the class. Record the answers if possible. The amount of time spent on this activity may depend on how many people are in the class.
	
	    ○ How many of you have heard of open data before seeing this class announcement?
	    ○ Does anyone know what open data is? *(if yes)* Can you tell us what your definition and understanding is?
	    ○ Why did you come to this class?
	    ○ What do you hope to learn from taking this series of classes?
	    ○ Does anyone have a specific question they're hoping open data will help them answer?

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5. **The Big Picture** • This is an introductory class. We'll talk about a new tool - open data - you can use to help answer your questions. • This is the first of four classes. In other classes you'll: ○ Answer questions using open data; ○ Make charts and maps; ○ Learn tips for analyzing data; and ○ Find out how to give feedback and improve open data.	Activity 3. Give a breakdown of what this class series is and why it's important: ○ This is an opportunity to learn about new tools and to better understand what's taking in place in your community ○ We will first explore what open data is, where you can find it, how to use it, and why it's important to give feedback to the people and organizations that publish it. ○ There are four one- to two-hour classes, including this one, which will set you on the path of becoming an open data user. At the end of this class you will have a solid understanding of what open data is, see examples of how and where it is used, be able to form open data questions, and be able to find open data on your own.
6. **Objectives** • Define open data and understand some ways in which it is used. • Explain whether or not datasets meet open standards. • Brainstorm questions that can be answered through open data. • Explain where open data can be found. Find open data by yourself.	Activity 4. List the objectives of the class.

7.	**Class 1b: What is Open Data?** ***Estimated Time:*** *30 minutes* ***Learning Objective:*** Define open data. Explain whether or not datasets meet open data standards. ***Discussion:*** In this section you'll begin to dive into the definitions and standards that separate open data from other data sets. You'll cover an in-depth explanation of open data, share examples of open data sets, and then have the class evaluate datasets, sharing why they are or are not open. ***Activities:*** 1. A brief introduction: Choose one (or more) of the videos here to show your class: ● Video 1: From CNN. Broad-based (1:49, requires watching a short ad) http://money.cnn.com/2017/04/11/technology/government-open-data-life-decisions/index.html ● Video 2: From City of Philadelphia. Has some specific Philadelphia information, but explains open data broadly (2:03) https://www.youtube.com/watch?v=SpOD0ab1T8A ● Video 3: From County of Grande Prairie, No. 1 (Canada). Is general and has a more rural orientation. (3:02) https://www.youtube.com/watch?v=PzWpcVzuwV0

8.	Activity 2. Provide the open data definition. If someone has already given a definition in class you can let the students know that you're going to expand upon that and go into more detail.
What is Open Data? *"Open data and content can be **freely used, modified**, and **shared** by **anyone** for **any purpose.**"* http://opendefinition.org/	○ Most definitions agree on the key points listed in the Open Definition: "Open data and content can be freely used, modified, and shared by anyone for any purpose." What does this mean? Activity 3. Write each element on the whiteboard or large post-it paper, or bring it up on the screen. Together you'll go over each of the key elements that define open data. Write the key elements down on the whiteboard or post-it notes. The class will refer to them later when reviewing data sources to see if they are open or not. (Suggested time: 5 min)
9.	- Freely used ○ Open data should not cost any money to access ○ Assumes ability to access it ○ No restrictions on use ○ The data can be shared with other people and no requests for use or copyright permissions are needed to share open data.
can be freely used … *"Open data and content can be **freely used**, **modified**, and **shared** by **anyone** for **any purpose.**"*	

10.	EXAMPLE: Maps: Have you used a map that shows you where you are and gets to you where you're going? You've used GPS. GPS stands for Global Positioning System and is provided for free through the U.S. Department of Defense.
11.	● Machine Readable 　○ Data is made in a format that your computer can read such as a csv file. (*Show an example of a csv file and one of a pdf. Explain that the pdf is a locked document and the computer is unable to read any of the information on the page, even though you can.*)

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12.	
	- Can be… modified - Able to be modified and used for any purpose - No restrictions on how the data is used and can be modified to be used in new ways. It might be combined with other data to create something new and useful. - The data can be used for educational purposes but can also be used by businesses to create services that may be commercial and may require fees. The data itself is free and can be used for any purpose.
13.	Example of "can be modified" Neighborhood Walkability: WalkScore bike methodology uses data made available from local governments, the National Elevation Database from the US Geological Service, and commute data from the U.S. census. It creates an image like this. If you have time, try putting in an address and see what it says about bikeability or walkability.

14. shared by anyone for any purpose *"Open data and content can be **freely used**, **modified**, and **shared** by **anyone** for **any purpose**."*	● Shared by anyone for any purpose i. When a government or organization makes data "open" it allows anyone to use it - for any purpose. Open data publishers often include a license that clearly tells you that you can use the data. While you can use it for any purpose, they sometimes they ask you to attribute the original source or to use the same license for any new product you make.
15. How do you know data can be shared by anyone for any purpose? Look for these images… (cc) These licenses tell you it's ok to use the data	● Shared by anyone for any purpose ii. Open Data Licenses will often include these icons. The most well-known of these is the Creative Commons license. The other license, which is more recent and was designed specifically for databases, is from the is from the Open Data Commons. One such example of a license is called a Creative Commons license. *(You can refer students with more interest in this to Handout 4 Open Licenses for Data and Content or a Creative Commons video.)*

16.	● Shared by anyone for any purpose: Licensing
	iii. Show an example of a license on a live website. ForeignAssistance.gov: The U.S. Government collects foreign assistance spending information from several departments and makes them available through this tool. The map and graphic visualizations are supplemented with machine readable data which is available via the "Download" option in the top menu. License information is displayed beneath the data download options.
17.	4. Share one or more examples of open data.
	○ Education: Parents and community groups can use the data in school quality report cards to compare their school to others. College Scorecard: U.S. Department of Education: Dataset, Interactive. The site allows visitors to sort and filter their search results to easily compare schools and decide which college makes the most sense when considering the location, typical costs, average student loan amount, student's ability to repay their loans, and their future earnings. You may wish to do a search for your location and limit by various factors such as 2 year vs. 4 year degrees and

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<table>
<tr>
<td></td>
<td>public vs. private schools. Compare costs and anticipated salaries for the schools.

Note to instructor:
- To download the data from the College Scorecard site, select the College Scorecard Dataset link at the bottom to learn more about the underlying open data that powers this site. Scroll down to the heading "Download the Data".]
- If you have trouble accessing College Scorecard,but want to use the data, you can view the data from data.wa.gov. You can find the data here, on data.wa.gov.
- If you want to highlight some businesses that use open data to create their product, see: https://www.data.gov/impact/</td>
</tr>
<tr>
<td>18.

Commonly-Published City and State Data

Crime, 911, 311, Code Enforcement
Zoning
Budgets, Contracts, Spending
Property Assessments and Deeds
Transit Safety, Schedules, Timeliness
Parcels and Address Points
Restaurant Inspections
Construction Permits

School funding and demographics
Vehicle Crashes
Population projections
Immunization rates and other health outcomes
Daycare, Assisted Living and Nursing Home Safety
Water, Broadband, Electricity Information

Check out http://us-city.census.okfn.org/ and https://census.usopendata.org/ for more details.</td>
<td>- Now that we've seen some examples, let's discuss some of the common types of open data you might find.
- Show the commonly-published data from local, state and national sources. Most of these examples are from http://us-city.census.okfn.org/ and https://census.usopendata.org/</td>
</tr>
</table>

19.	● The Federal Government's open data site is https://www.data.gov ● It contains information about all the open data released by different government agencies. Some local governments have also posted data to the site.
20.	● If your local community has an open data success, include that example here. (Note: This is covered in the Train-the-Trainer training and may include local, county or state resources.) For help contact your state's Open Data Program, Chief Data Officer or the Data-Equity team. Examples might include: ○ Crime: Crime statistics allow people to compare their neighborhood to another and advocate for more or different resources from the police. ○ Transportation: data that contains bus or train schedules can be merged with other information to help residents better plan their travel.

21. 	5. Open Data or Not? View the slides with data examples and let the group decide whether or not they meet the criteria for open data. Discuss why or why not.
22. 	● Example 1: LexisNexis Community Crime Map Not open data (its license is restrictive and you can't download it), though certainly still useful. Check to see if your community makes crime data available. Open data can be used for commercial purposes, but it may no longer be "open" once it's part of a new product. It would be useful to check to see if your community makes crime data available, and if so, compare it.

23.

- Example 2: Energy use for someone's home

  Not technically open data (you have to log in to access it, but it is open and available to download for that person). (This is also a good opportunity to compare the data formats: line graph, Excel on the next slide and csv on the slide after Excel example.)

24.

Individual electricity usage (downloaded from the same site) viewed in Excel (CSV format)

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25.	Another view of the CSV file, this time viewed in a text editor without Excel.
26.	● Ask the class about what kinds of similar data they already have about themselves or their family. (Examples may include fitbit, calorie counting, height/weight of children in a baby book, DNA, health information, electricity data.) ● Good place to mention privacy. Open data isn't about releasing your personal data publicly. The practices by this energy company are good; it's your data, so you can download it, but no one else can. Do you know about your other personal data (fitbit, DNA, etc.)? Provide Community Curriculum Handout 1: Open Data: What is it as a handout for participants to take with them.

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27.	**Class 1c: What Questions Can I Answer Using Open Data?**
What questions can I answer through open data?	**Estimated Time:** *10 minutes*

Learning Objective: Brainstorm both institutional (relevant to community) and personal questions that can be answered through open data.

Discussion: The class has just discussed what open data is and reviewed examples of what is not open data. Now it's time to brainstorm questions that might be answered through open data, both for the community and in their personal lives.

Activities:
1. Brainstorm institutional/community and personal questions that open data might be able to answer.
   a. Have large post-it notes or a whiteboard available to post responses. Give each person in the class a small stack of post-it notes and a pen or marker. Tell the class they will have two minutes to write as many questions as they can think of. When they're finished have the class post them on the board. Look at and discuss the questions posted, grouping them together into categories if they are similar.
   b. If the class isn't giving any answers to the brainstorm you may need to prompt them with questions. Ideas for questions:
      i. Something you'd like to know about your child's school?
      ii. Questions about housing or rental prices?
      iii. Crime in your neighborhood?
      iv. Weather in your area (hotter, colder or rainier than average)?

28.	**Class 1d: Where Can I Find Open Data?**
Where Can I Find Open Data?	*Estimated Time:* 15 minutes
	Learning Objective: Explain where open data can be found. Find open data by yourself.
	Discussion:
	Many cities and states, and the federal government have been placing their open data online on one website, often called a portal. Sometimes a department or agency has open data, but they have not put it on the portal.
	Governments use different methods to determine which data they put online. They're often prioritizing what to publish based on public feedback. So one of the items we'll cover in these classes is how to give feedback if you're not finding the data you need. Keep this in mind if it turns out that the specific data you're looking for is not available.
29.	*Activities:*
[Insert local, state or federal open data portal or site] Click to add text	1. Start by showing the nearest city/county/region open data portal (if you have one). If your city doesn't have an open data portal, refer to the list of local resources in Community Curriculum Handout 2: Where can you find open data? (Trainers personalize this handout during the Train-the-Trainer or on their own.)
	2. Show how to find that data portal by performing a Google search. "*Your city* open data" is a good search query. Talk about looking at the web address as an indicator of finding a government open data

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portal. Often it will look like "data.*yourcity*.gov".

    a. Refer back to the questions the class brainstormed. Can they think of how to form a search query to get the open data set that will answer their question?

    b. Note: Many areas will see "opendatanetwork.com" listed as the first or second search result. This is website maintained by an open data vendor, Socrata, and uses Census and FBI data to create easy to use visualizations. This is not an open data portal in that it does not contain local or state information released by those entities.

3. Once you find what you think is an open data portal, use your definition as a guide to make sure it really is open.

30.

Choose Your Own Adventure (2-3 min)

Click to add subtitle

4. Using what you know about class participants, choose an open data site that might be of interest. Give the class 2-3 minutes to search on their own and ask everyone to provide one take-away that they learned and share if there was missing information or questions.

    a. Use the discussion to raise the idea that if the open data site could be improved, we all would have an opportunity to give feedback.

    b. Let the class know that charts, graphs and other types of displays are often a great first step. If participants are looking at these types of visualizations and are unsure of some

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	definitions, see if the site has a data dictionary, or glossary. Often, data is already packaged in a way that will make it fairly easy to quickly make charts, graphs, etc. (Next class we will cover downloading and expressing data in different ways.)
31. **Can you do this?** ● Define open data and understand some ways in which it is used ● Recognize whether data is open ● Explain where open data can be found	Review the objectives for this session.
32. **Next Time...** ● What's behind the data? Easy ways to understand if the data has what you're looking for ● Hands-on: Learn how to answer questions using open data (Google Account will be needed)	At the end of Class 1 let participants know that they will need a Google Account for Class 2. Let them know that you are available to assist anyone who needs help setting one up. Ask class members to fill out an evaluation (https://goo.gl/PXZRsw). This will take no more than 5 minutes. Let the class know: ● This class is a pilot and we want to know whether the class met your expectations and how we can improve. ● We'd like you to answer a few questions to see if the class is the curriculum was able to communicate information well enough.

33. 	

Materials Needed:

- Community Curriculum: Class 1 Slides
- Community Curriculum Handout 1: Open Data: What is it
- Community Curriculum Handout 2: Where can you find open data?
- Community Curriculum Handout 4 (optional): Open Licenses for Data and Content (optional)
- Evaluation: https://goo.gl/PXZRsw
- Videos (Choose 1):
    - Video 1: From CNN. Broad-based (1:49, requires watching a short ad)
      http://money.cnn.com/2017/04/11/technology/government-open-data-life-decisions/index.html
    - Video 2: From City of Philadelphia. Has some specific Philadelphia information, but explains open data broadly
      (2:03): https://www.youtube.com/watch?v=SpOD0ab1T8A
    - Video 3: From County of Grande Prairie, No. 1 (Canada). Is general and has a more rural orientation. (3:02)

      https://www.youtube.com/watch?v=PzWpcVzuwV0

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Community Curriculum: Class 2

1.

Unlocking the
Power of
Open Data

Class 2

Data Equity for Main Street:
Bringing Open Data home
through local libraries

2.

Review from Session 1

- Understand and define "open data."
- Explain where open data can be found and show others how to find it
- Names some common types of open data
- Identify if data has any limitations on use

Class 2a: Welcome and Review of Class 1

Estimated Time: 10 minutes

Learning Objective: Demonstrate familiarity with topics from Class 1

Discussion: Review key points from Class 1. Ask questions of the class. If they are unable to answer any of the questions, provide the answers.

- Who can tell me what open data is?
- What's the difference between closed and open data?
- Where are some places I might find open data?
- What kind of questions can open data answer?
- What is metadata?

In this class we'll gain a deeper understanding of metadata and how it impacts the quality of data you find. You'll also take a take a treasure hunt, discovering where to find data to answer questions.

Activities:

1. Ask the class if anyone did any searches for open data after Class 1. Have them share their findings.
2. Ask the class if anyone thought more about a question they'd like to answer with open data. Have them share.

3. **Objectives for Session 2** ● Find data quality information for different datasets ● Use open data in a variety of formats to answer specific questions.	**Objectives** In this class we'll gain a deeper understanding of metadata and how it impacts the quality of data you find. We'll create visualizations and compare multiple datasets to tell a story.

4.
 	
The Details Behind the Data
 	
What is Metadata?
● Data (or information) that describes the data
 	
Why is it important? QUALITY…
● For the same reason that you…
  ○ look at the date on a news article
  ○ trust some websites more than others
  ○ read the instructions before putting together a piece of furniture
	Class 2b: The details behind the data
	
	Estimated Time: 30 minutes
	
	Learning Objective: Find data quality information in the metadata or elsewhere (e.g., how it was collected, who collected it, level of geography, sample size, release date, known limitations)
	
	Discussion: During the opening few minutes of the class, participants have reviewed the definition of open data and the key points from the first class. Remind participants that during the first class, they looked at datasets and discussed whether they were open or not. To do that, they already used metadata. Licenses are one part of a dataset's metadata. More broadly, metadata is data that describes the data. It is a summary of basic information that describes various data attributes. It helps a user decide whether they trust the data and whether it can answer their question.
	
	When research organizations, journalists, governments, nonprofits and private companies publish data for public use, many provide metadata so

	that others can use the data more easily and effectively.
5.	While organizations publishing data might describe their metadata differently, and often use some jargon, an easy way to remember is to go back to the 5Ws (Who, What, Where, When, Why and How). ● WHO is the **Publisher?** - the individual or team responsible for a data resource. ● WHO/WHAT is the **Source?** - where the data comes from, e.g. government database, etc. ● WHAT **Type** of data? - the nature of the resource, for example, type(s) of data, including text, numbers, photo images, spatial location, etc. ● WHAT **Format** of data? - the type of file or media format, e.g. SHP, PDF, TXT. ● WHAT is it? **Description** - a text description of the data source, using keywords that are descriptive and show up in search results. ● WHEN were the data published? **Date** - the date the data was created. ● WHERE/WHEN are the data from? **Coverage** - what the data covers. For instance, the geographic region or jurisdiction, or the time period during which the data was collected. ● How can I use it? **LICENSE** (as discussed in the first class) ● WHY publish? **DESCRIPTION** (IF this is included, which is often not the case)

6.	While you might not have known what it was called, you already use and are familiar with metadata. It's not as scary as it sounds. One of the most common ways we interact with metadata is through things like iTunes song information. These data are stored in various ways. The data in this class will be available on an organization's website or data portal.
7.	**Activities:** ● Seattle Open Data a. Show slide with intro page: https://data.seattle.gov/
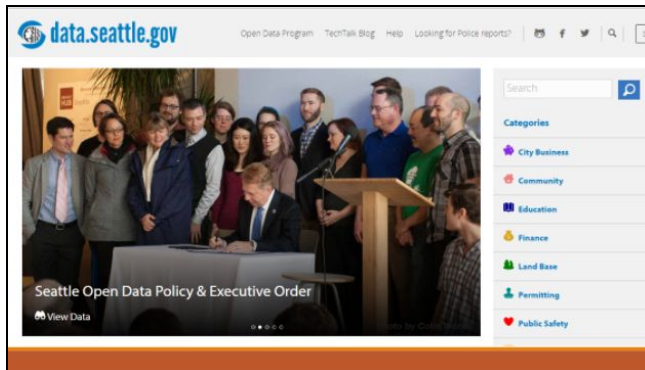
Link to this document: https://goo.gl/oiZg1d
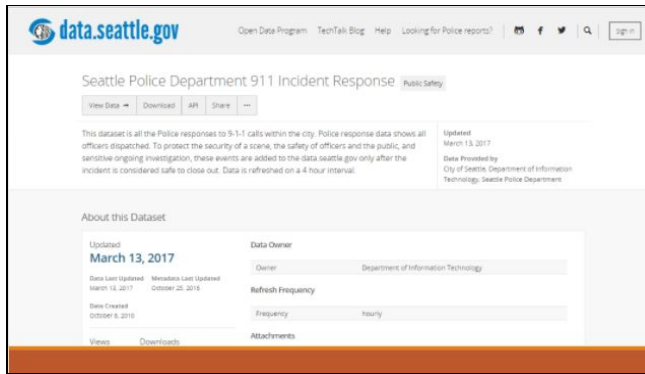
8.	b. Go to Police Department 911 Incident Response data https://data.seattle.gov/browse?category=Public+Safety
	Note: To navigate from the home page: Click on Public Safety Click on Police Department 911 Incident Response Try to answer the following questions: i. Who published the data? ii. When was it last updated? iii. What kind of license does it have? Are there limitations on what you can do with it? iv. How often is it updated? v. What kind of questions can this data answer? vi. What kind of questions can't it answer?
9. 	● Have participants run through your local, state or county open data portal. They should find a set of data and then answer the questions: a. Who published the data? b. When was it last updated? c. What kind of license does it have? Are there limitations on what you can do with it? d. How often is it updated? e. What kind of questions can this data answer? f. What kind of questions can't it answer?

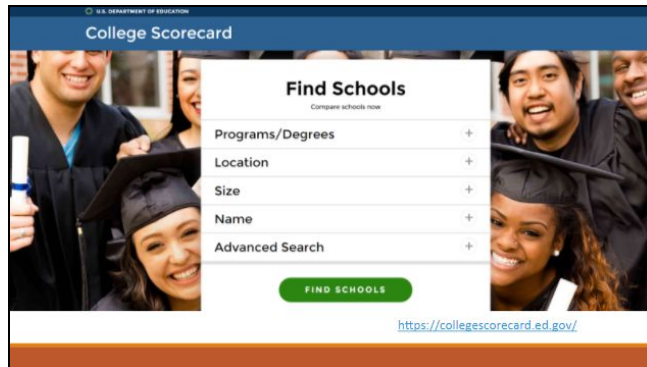|	
10.	● College Scorecard: Navigate to the data (see next slides)
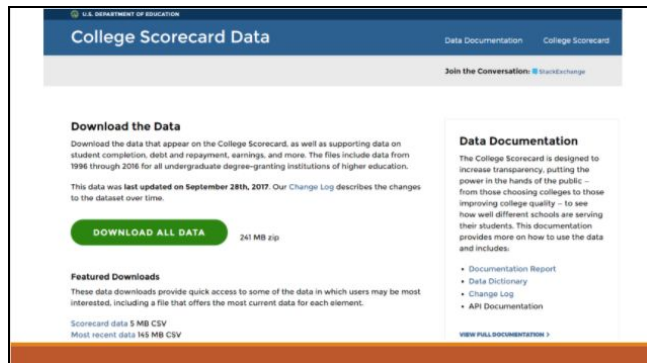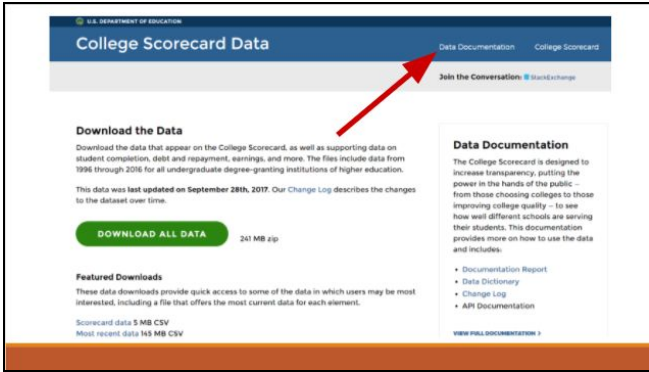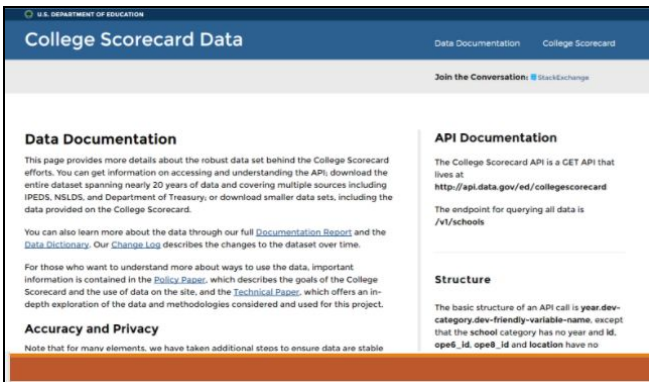
11.	● College Scorecard
	   ○ We looked at this site for a few minutes in the first class. Let's take a quick look here and find the metadata.
	   ○ Show slide with intro page of: https://collegescorecard.ed.gov/data/
	   ○ Have participants go to the College Scorecard Data page on their computers https://collegescorecard.ed.gov/data/.
	
	Explain:
	This is a large dataset that received a lot of interest when it was published. This looks a little different from the Seattle data. Here's why:
	   ● The publisher (the US Dept of Education) knew that this would be a controversial dataset and that many people would use it. They would want to know about limitations, methodology etc. Given this, US DOE wants to be clear about what you - as a user - can and cannot expect to find in the data.
	   ● When the USDOE released this data, they also released

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<td>analysis. They want to ensure that the numbers behind the analysis are transparent, which will increase the likelihood that people will trust the data.</td>
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<td>12.
</td>
<td>○ Ask participants where they think the metadata is located. Hint to the documentation text if no one sees it.</td>
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<td>13.
</td>
<td>○ Open slide with data documentation page (https://collegescorecard.ed.gov/data/documentation/) and ask participants to spend a few minutes looking through the web page and see if they can answer the following:

■ How many years does the dataset cover? (Answer: 20)

■ What are some of the categories of data? (Answer: Root, School, Academics, Admission, Student, Cost, Aid, Repayment, Completion, Earnings)

■ When was the latest update to the data made (Answer: Look at the "Change Log" (https://collegescorecard.ed.gov/data/changelog/)

■ What kind of questions can this data answer? Examples:</td>
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○ What is the average annual cost of attending a particular college/university?

○ -What are the average SAT test scores for students who are admitted?

○ -What is the average amount of student debt for students at this institution?

○ -How much do students typically earn after graduation?

■ What kind of questions can't it answer?
Examples:

○ Who are the notable faculty members at a particular university?

○ What is the level of student satisfaction with campus climate?

○ How many years does it take for most students to earn a bachelor's degree?

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14.

Treasure Hunt: Answer Questions with Data

NIH NATIONAL CANCER INSTITUTE
Surveillance, Epidemiology, and End Results Program

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Formerly the National Climatic Data Center (NCDC)... more about NCEI »

DATA.GOV

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Class 2c: Treasure Hunt: Answer Questions Using Data

Estimated Time: 30 minutes

Learning Objective: Use open data in a variety of formats to answer specific questions.

Discussion: see activity below

Activities:
The main goal is exploration! Using one of the Treasure Hunt Handouts (General, Fun, Business, or Environment or Agriculture) take about 20

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minutes and try using open data to answer the questions The links provided will lead to data which will answer the questions. If some participants want to answer their own questions on these sites, they are welcome to do so.

Alternate Activities:
If none of the above look interesting, or you want to explore new territory, feel free to look for your own dataset and poke around as an alternative to using the ideas above!

Here are some lists of datasets:
Data.gov Datasets
Awesome Public Datasets
Free Public Data Sets for Your First Project
Carnegie Mellon Datasets
Calvin College Datasets

Be aware of the following issues when choosing datasets (outside of the Treasure Hunt) to analyze in a 20 minute time span, on public computers:

- *Excel capabilities:* Excel has some calculating capabilities, but it is not a full statistical package, so it can't get very complex
- *Download speeds:* Some of these datasets are extremely large, and can take a long time to download
- *Permission to download data:* Some datasets are available *freely outside the US, but not inside.* Additionally, some libraries do not generally allow people to download files.
- *Complexity of dataset and data:* If you aren't sure how the data were collected and what they mean, it's worth taking more time to study them, after this class.

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	● *Persistence of links:* While we continuously update this curriculum, you may find that some of these data sets are no longer available. ● *File Type/Size:* It may not work in this setting to try using data that comes as a zipped file, or even a large file ● *Data Cleaning:* Sometimes you will find that data is separate from labels for each column. It's probably best to work on this kind of data when you have more time.
15. **Next Time...** ● Learn about different ways to present your information (and some common pitfalls!) ● Hands-on: Use open data to create charts, graphs and maps.	Quick note of what we'll do next time.
16. **Can you do this?** ● Find data quality information for different datasets ● Use open data in a variety of formats to answer specific questions.	**Class 2 End of session** Before we finish, we'd like everyone to fill out an evaluation (https://goo.gl/PXZRsw). This will take no more than 5 minutes. Let the class know: ● this class is a pilot and we want to know whether the class met your expectations and how we can improve. ● We'd like you to answer a few questions to see if the class is the curriculum was able to communicate information well enough.

17. 	
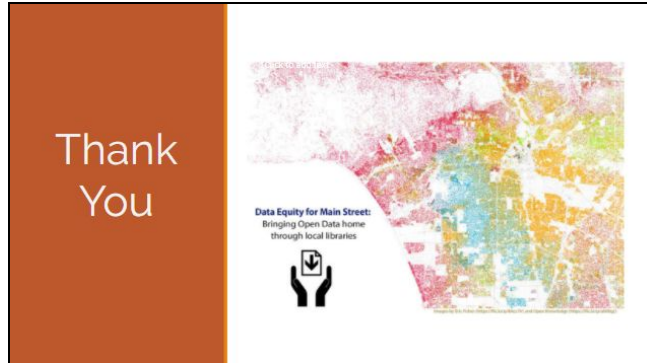
Materials Needed:

- Community Curriculum: Class 2 Slides
- Community Curriculum Handout 3:
  - Treasure Hunt - Fun Theme, or Treasure Hunt - Business Theme, or Treasure Hunt - Environment and Agriculture
- Evaluation: https://goo.gl/PXZRsw

Community Curriculum: Class 3

1.	
2.	**Class 3a: Welcome and Review of Class 1 & 2** ***Estimated Time:*** 10 minutes ***Learning Objective:*** Demonstrate familiarity with topics from Class 1 & 2 ***Discussion:*** In the last lessons you learned what open data is, where you can get it, and how it can be used. In this class we will look at how data is represented visually. Ask the class if they can answer some questions: ● What is open data? ● Where are some places you could find open data? ● What are some ways in which you might visually represent your data? ○ What are some common misrepresentations of data?

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	● How can you use data to tell a story?
3.	Class 3 Objectives Explain that in this section they will learn about telling a story with data using visualizations (charts, graphs and maps).
4.	**Class 3b: Data Visualizations** ***Estimated Time:*** 45 min ***Learning Objective:*** Identify different types of data visualizations including those that may be misleading. Create a simple map and chart based on a dataset. ***Discussion:*** Data visualizations help transform the dry, inscrutable columns and rows of spreadsheets and other text-based data sets into comprehensible, actionable information. For example, it is much easier to identify trends from looking at a bar chart than it is by scanning through a list of numbers. Visualizations can provide compelling arguments when you seek buy-in and support for your ideas. The power of visualizations to convince is a major reason why they are often manipulated to mislead their intended audience. To begin the class, show the Hans Rosling video (200 countries, 200 years, 4

minutes - link at end of lesson) to demonstrate the effectiveness of creating visualizations.(If your location doesn't allow you show a video easily, skip this and move to the next section.)

- ○ Discuss with the class why this video is so compelling. For example: the animation, the colors, the use of multiple datasets together. [It makes you feel informed. It's persuasive, even though it's really just a guy standing in front of board with charts and graphs.]
- ○ Ask the class what we learn by looking at the multiple dimensions of data simultaneously that we might not see if we were examining them individually? For example, when the color-coding indicates geography and circle diameter indicates population, we can easily see when life spans in the *poorest* countries begin to catch up to those in the most *prosperous*.

It is useful to note that many open data publishers will include charts or other visualizations for their most popular data. In some cases, the website that cities or states use to make their data public will also include tools to build visualizations such as charts and graphs.

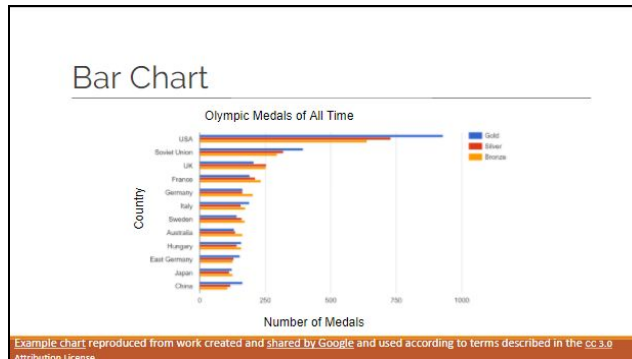| 5.	**_Activities:_** As a class, look at different types of charts and graphs as well as some common misuses of data. The key point to drive home is that if we have access to the underlying data, we can always check to see if the data is being accurately portrayed. Class participants always have the option of looking at the data underneath the chart, if it's open. A great example here is the Seattle police data. As discussed in a previous class, the city provides visualizations, but also makes the data open. 1. Review the most common types of visualizations by showing an example of each in the PowerPoint presentation and discussing the kinds of data that are most suitable to each.
6.	a. Word Cloud - Visualizes the words in a text. The more often a word is used, the larger it appears in the word cloud.

7.	b. Pie Chart - Used to display a proportion of a whole. They can be misleading if people are comparing data across multiple pie charts. Because they are relative, they are really useful for percentages. Notes:
Pie Chart Native English Speakers by Country Pie chart of populations of English native speakers CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=2377248	● All portions should add up to a total of 100% ● Sizes of the portions should represent their value.

8.	c. Bar Chart - (Basic) In a bar chart, the lengths of the bars are proportional to the values they represent. One of most basic ways to display data. [Chronological is usually done through a vertical bar chart (Jan, Feb, Mar)]
Bar Chart Olympic Medals of All Time Number of Medals Example chart reproduced from work created and shared by Google and used according to terms described in the cc 3.0 Attribution License.	

Link to this document: https://goo.gl/oiZg1d

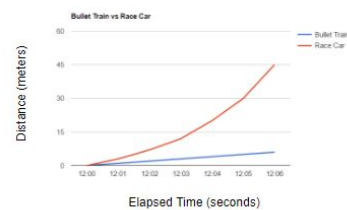|	
9. 	■ More Advanced - A histogram is a more advanced version of a bar chart. ● Histogram: A histogram uses continuous data (for example, the number of minutes callers spend in wait time on a phone (1, 2, 3..) or (1-10, 11-29, 30-49…). This is different than a bar chart, which is displaying values for the variables (number of gold medals by country). This example illustrates the measurement of the petals of iris flowers and how many petals were on each flower. The data is from Fisher's iris data set (see https://en.wikipedia.org/wiki/Iris_flower_data_set).
10. 	d. Line Graph - (Basic) Each data point is connected by a line. A great way to display data over time.

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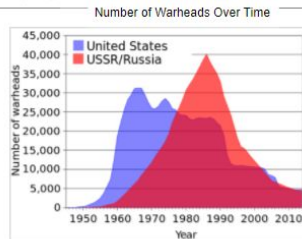
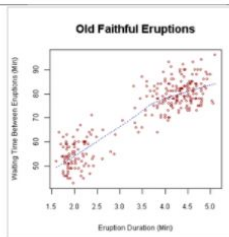| 11.	■ More Advanced: An area chart is a more advanced version of a line graph
Area Chart	Area Chart: An area chart is very similar to a line graph, but the area below the line is usually colored in. Area charts often compare two different sets of data.) "Area chart." Wikipedia. https://en.wikipedia.org/wiki/Area_chart
	https://commons.wikimedia.org/wiki/File:US_and_USSR_nuclear_stockpiles.svg Public domain
12.	e. Scatter Plot - On a scatter plot, the x axis (horizontal) and the y axis (vertical) represent different variables, and the a point is placed at the intersection of each to show the relationship between the two variables. Many people see height and weight scatter plots in the doctor's office. [This is widely used in science and when two variables change simultaneously.]
Scatter Plot	Notes about the example (from https://en.wikipedia.org/wiki/Scatter_plot): Waiting time between eruptions and the duration of the eruption for the Old Faithful Geyser in Yellowstone National Park, Wyoming, USA. This chart suggests there are generally two "types" of eruptions: short-wait-short-duration, and long-wait-long-duration. A straight line has also been added to represent the "best fit" of the data on the graph.

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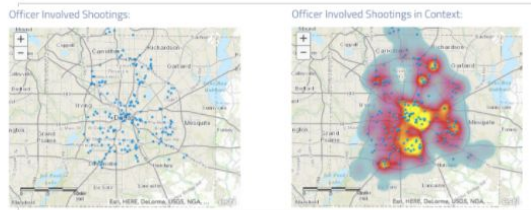
13.	f. Heat Map: In a heat map, the data points on a map are color coded. This allows a viewer to easily see concentrations of data. Heat maps are often used to show crime, extreme weather or population. On this slide, the map on the left shows the shows the locations of officer involved shootings. The map on the right shows locations of the officer involved shootings in context with a heat map of all crimes. (original image is from www.policedatainitiative.org)
Heat Map Officer Involved Shootings: Officer Involved Shootings in Context: 	
14. **Misleading Visualizations**	2. Some presentations of data can be misleading. Here are some examples that you might see in charts and graphs. (Thanks to School of Data for providing these examples.)
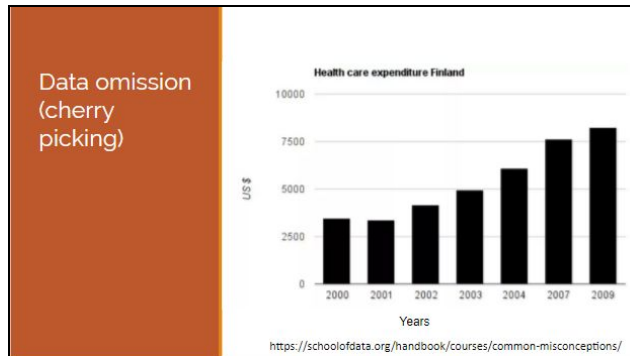
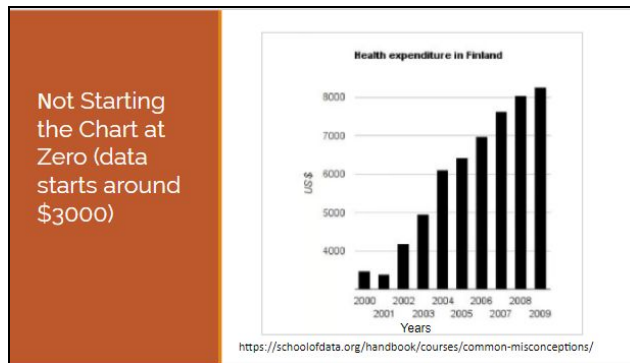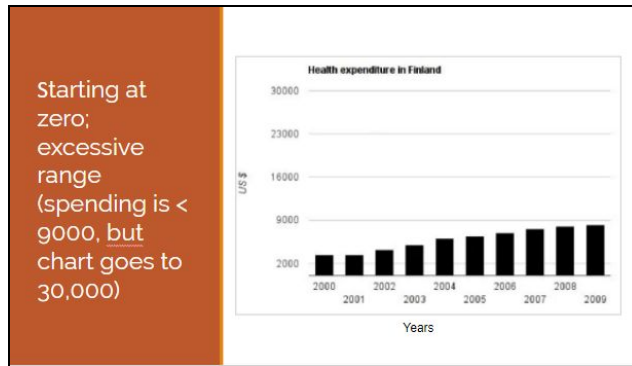| 15.	a. Data omission: Another word for this is "cherry-picking." If important data is left out, it can skew the information. In this example, some years have been omitted.
16.	b. Not starting a chart at zero, or starting it at zero when you shouldn't: The magnitude of a trend can be exaggerated when the Y-axis starts at a number other than 0. Sometimes it IS important to start at a number other than 0, especially if the change is small. Otherwise, it's hard to see the change in the chart. However, this can make a change in data feel bigger than it is. From School of Data: "In the graph […], the data doesn't start at $0, but somewhere around $3000. This makes the differences appear proportionally much larger – for example, expenditure from 2001-2002 appears to have tripled, at least! In reality, this wasn't the case. The square aspect ratio (the graph is the same height as width) of the graph further aggravates the effect." https://schoolofdata.org/handbook/courses/common-misconceptions/ (Source: "Look Out!: Common Misconceptions and how to avoid them." School of Data.) https://schoolofdata.org/handbook/courses/common-misconceptions/

Link to this document: https://goo.gl/oiZg1d

17.	c. Excessive Range: This graph represents the same data as the one on the previous slide. This one "starts with $0 but has a range up to $30,000, even though our data only ranges to $9000. This is *more* accurate than the [previous] graph …, but is still confusing." Source: "Look Out!: Common Misconceptions and how to avoid them." School of Data. https://schoolofdata.org/handbook/courses/common-misconcepti ons/
18.	d. Percent Change vs Percentage Point Change: A change from 5% to 10% is an increase of five percentage points. However, it's also a 100% percent change. Depending on what you want to say, one might be misleading. If you have the original numbers, it's always best to include those, too. (For example: 5% (700) to 10% (1400)).
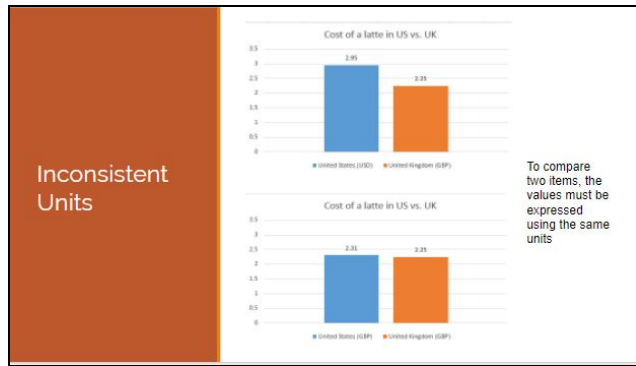
19. **Inconsistent Units**	e. In this case, to do a good comparison, both costs must either be in US Dollars (USD) or British pounds (GBP). It doesn't matter which-- they just need to be consistent! Sources: https://www.londontoolkit.com/briefing/prices_coffee_shops.html http://www.fastfoodmenuprices.com/starbucks-prices/ https://uk.answers.yahoo.com/question/index?qid=20081003014912AAvnzgO
20. **Context in Open Data**	f. Context in Open Data (Same text as on slide) Open datasets should include information about the source and limitations of the data. When people make new visualizations or combine datasets, they should provide information about the data. As School of Data says, "So explain what you are showing – explain how it is read, explain where the data comes from and explain what you did with it. If you give the proper context the conclusion should come right out of the data.

21.

Create Visuals to Help Others Understand Your Point

- Create a chart (Google)
- Create a map (Google)

3. Make a Chart and a Map
   Now that everyone has seen some visualizations, let's make some. Create a Google chart and a Google map of the 2015 California Wildfires using the provided CSV file. (Note: a Google account is required for this activity. If someone does not have an account, pair them with another participant that does have one.) Before class add the "2015 California Wildfires.csv"* file (link at end of lesson) to each computer. Step-by-step directions for this activity are available in Handout 5: How to Map and a Chart. (Depending on the class, you can walk them through step-by-step or let participants work through the directions themselves.)

   1. Ask the class if they ran into any difficulties creating the visualization. What were they?
   2. Did the visualizations reveal anything unexpected?
   3. How or why might you use a visualization like this.

*Note: If you need an alternate dataset, contact the Data Equity team.

Alternate/Supplemental Activity:
Create two Word Clouds using different U.S. President's inauguration day speeches.
   a. Go to http://www.presidency.ucsb.edu/inaugurals.php and choose an inaugural address.
   b. Copy (CTRL + C) the text
   c. Go to www.wordclouds.com and select "Wizard"
   d. Choose "type or pasted text"
   e. Paste (CTRL + V) the text. Select Apply.
   f. Students can change the shape by selecting "shape" and can see exactly how many times each word was used by selecting "Word List"

22. **Next Time... Learn how to:** • Identify common mistakes when analyzing data • Contribute your ideas and concerns to open data publishers • Find and assess the answer to your own question.	Quick note of what we'll do next time. ***At the end of Class 3 request that participants come with a data question they may want answered during Class 4.***
23. **Can you do this?** • Identify different ways to present your information (and some common misrepresentations.) • Create a map and chart based on a dataset.	Review session objectives. Before we finish, we'd like everyone to fill out an evaluation. This will take no more than 5 minutes. Let the class know that this class is a pilot and we want to know whether the class met your expectations and how we can improve. We'd like you to answer a few questions to see if the class is the curriculum was able to communicate information well enough.

24.
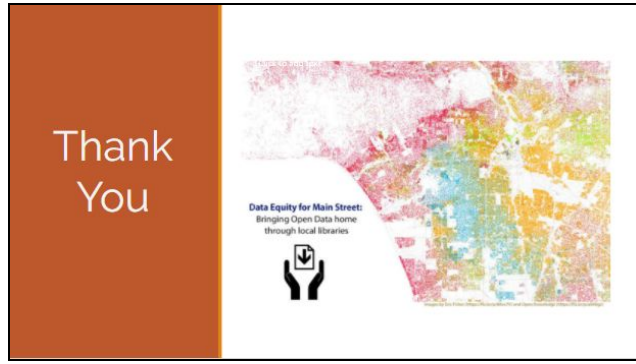
Materials Needed:

- Community Curriculum: Class 3 Slides
- Evaluation: https://goo.gl/PXZRsw
- Hans Rosling Video: https://www.youtube.com/watch?v=jbkSRLYSojo
- Community Curriculum Handout 5: How to Make a Map and a Chart
- 2015 California Wildfire Data: http://data-equity.org/wp-content/uploads/2017/08/2015-California-Wildfires.csv

Link to this document: https://goo.gl/oiZg1d

Community Curriculum: Class 4
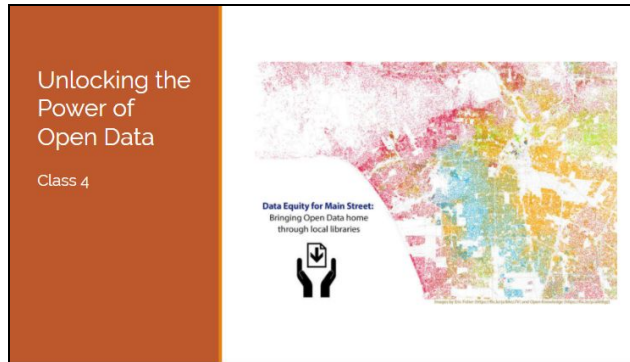
1. *Unlocking the Power of Open Data — Class 4* *Data Equity for Main Street: Bringing Open Data home through local libraries*	
2. **Review from Sessions 1, 2 & 3** • Where are some places I might find open data? • What kind of questions can open data answer? • What are some ways in which you might visually represent your data? ○ What are some common misrepresentations of data? • How can you use data to tell a story? • What are some common mistakes in representing data visually?	**Class 4a: Review Class 1-3** ***Estimated Time:*** 10 minutes ***Learning Objective:*** Demonstrate familiarity with topics from Class 1-3 ***Discussion:*** By now everyone has learned a lot about open data and is almost ready to take on using open data to answer their own questions. Ask the class: ● Where are some places I might find open data? ● What kind of questions can open data answer? ● What are some ways in which you might visually represent your data? ○ What are some common misrepresentations of data? ● How can you use data to tell a story? ● What are some common mistakes in representing data visually?

	Explain that in this section they will have the opportunity to get hands-on experience in answering open data questions and will become an active member of the open data community.

3.
 	
 Review from Sessions 1, 2 & 3 (cont'd)
 	
 -Data visualization examples since the last class?
	Activities:
	
	 1. Ask if anyone saw any data visualizations between now and the last class. What did they notice? Show the class one or two visualizations from recent news stories. Ask:
	    a. What story are they trying to tell?
	    b. What kind of chart or graph are they using?
	    c. Are they using that chart correctly?

4. **Objectives** ● Identify some common mistakes people make when analyzing data and drawing conclusions. ● Identify a question and answer it using open data. ● Contribute to the open data movement by giving feedback to the publisher(s) on issues such as data quality and ease-of-use.	Introduce the objectives for this session.

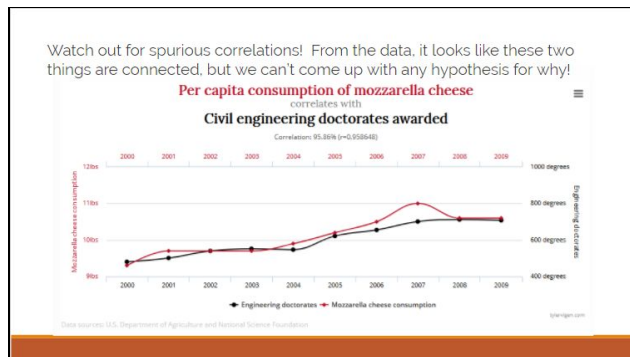| 5.	**Class 4b: Analyzing Your Data - What does it mean?**
Analyzing Your Data — Some Common Pitfalls to Avoid: -Correlation vs Causation -Average (Mean) vs Median -Percent vs Percentage Point	*Estimated Time: 15 min* *Learning Objective:* Identify some common mistakes people make when analyzing data and drawing conclusions. *Discussion*: It can be tempting to see some data and draw quick conclusions. It's important to make sure those conclusions are valid. During this segment, we'll talk about what the data means.
6.	
Watch out for spurious correlations! From the data, it looks like these two things are connected, but we can't come up with any hypothesis for why! Per capita consumption of mozzarella cheese correlates with Civil engineering doctorates awarded	**Activity:** 1. Watch out for spurious correlations! a. Check out Tyler Vigen's "Spurious Correlations" site http://www.tylervigen.com/spurious-correlations. From the data, it looks like these mozzarella and civil engineering doctorates are connected, but we can't come up with any hypothesis for why! If this were a causal relationship, either people eating more mozzarella would cause there to be more civil engineering doctorates awarded, or vice versa!

7.	b. Another example: Is the US exporting uranium because the British are coming? http://tylervigen.com/view_correlation?id=24270
	c. See additional examples: https://www.sjpl.org/blog/sources-unknown-data-literacy
8.	d. On the other hand, there might be a causal relationship… Does the fact that the maps look similar mean that poor housing quality CAUSES kids to be hospitalized with asthma? What would make that true? Is it worth researching? What else could be going on? (Possible answers—something related to income (for example, if lower income means poorer health care and access to meds such as inhalers, it may just be that these kids have more poorly controlled asthma so it rises to the level of hospitalization), something related to housing density rather than quality, something related to geography, etc.) http://www.cccnewyork.org/blog/concentrations-of-risk-asthma-and-poor-housing-conditions/ What would you need to know to feel sure it was a causal relationship? (Best answer—the positive result from an interventional study, meaning, starting with two equal groups and exposing one to the potential asthma cause; if there's a

strong difference between the two groups and IF the study was well constructed, we can finally say one thing CAUSES the other…. BUT, sometimes it's unethical to do this!)

For this example, mold has been shown to exacerbate asthma in people who have asthma or are prone to it (it causes the exacerbation, although not necessarily the underlying asthma condition). But, what if there were no evidence for causality? Strong association is also very good evidence! Something can still be important even if it hasn't been shown to be causal. For example, we know that "mouse, mold, dust mites, dog, cat, cockroach, tobacco smoke, endotoxin and nitrogen dioxide are considered to be important indoor allergens and irritants" and that such irritants exacerbate asthma in the same way as mold, although causation hasn't been shown for many of them. Get a librarian to help search for literature to show causality, if you don't want to do it yourself!

Where possible, DIVE INTO THE DATA!
http://data.cccnewyork.org/

9.

Grades	Point Equivalent
A	4.0
A	4.0
C	2.0
Sum of grade points	10.0

Average (also called Mean)

Divide 10.0 (sum of grades) by 3 (how many grades you added together)

Grade Point Average: 3.33

2. Here are two other data analysis tips to keep in mind

   a. Average (Mean): An average is the sum of a list of numbers divided by the number of items (numbers) in the list.

   Here is a simple calculation of the average of grades earned by a student in one semester.

10.

Median

Rental prices per month
700
750
800
850
900
950
1000
1050
2500

Median: 900

It doesn't matter that one of the numbers is way higher; half of the numbers listed are below 900, and half of them are above

   b. The median is the value separating the higher half of a data sample, a population, or a probability distribution, from the lower half. In simple terms, it may be thought of as the "middle" value of a data set, where half of the values fall above the median, and half of the values fall below.

   The median is the value separating the higher half of a data sample, a population, or a probability distribution, from the lower half. In simple terms, it may be thought of as the "middle" value of a data set, where half of the values fall above the median, and half of the values fall below.

   In this example, it doesn't matter that one of the numbers is way higher; half of the numbers listed are below 900, and half of them are above

Link to this document: https://goo.gl/oiZg1d

11. Explore your own open data question	**Class 4c: Answer your own open data question**

Class 4c: Answer your own open data question

Estimated time: 20 minutes

Learning Objective: Identify a question and answer it using open data.

Discussion: Participants were asked at the end of Class III to come prepared with their own open data question for Class IV. For those that did not bring a question to class, ask them to work on one or more of the questions one of the Treasure Hunts that they did not already complete.

If the class size is small enough, have the students share their questions with each other (if they feel comfortable). If any students chose the same question, ask if they want to work together.

Some students will be ready to search a government, nonprofit or other open data portal right away, and some might already know exactly where the data is located. Others might need a more directed activity.
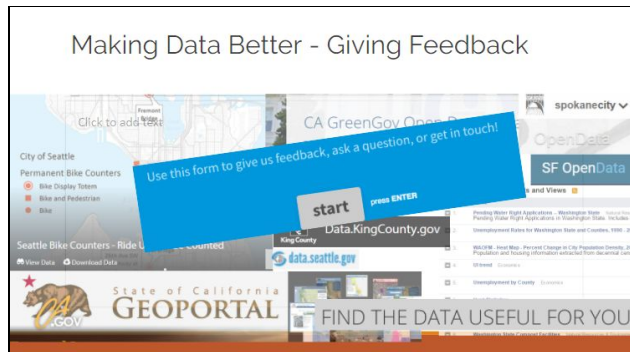
Activities:
1. Have the students write down the answer to these questions (in a group):
   a. What is the question I'm trying to answer? [Example: I'm trying to find out how much crime is in my neighborhood.]
   b. Where might the data I'm looking for be located? Example: crime data from local open data portal or a crime map that used open data. Hint: Have students review Handout 3 for this question.
   c. What is the best way to start searching? Example: search the local open data portal, Google "crime data and [city]".

	Note: If students are interested in exploring demographic information about their neighborhood, http://censusreporter.org is a good resource. In addition, students may want to access Handout 2 again, which focuses on where open data is available. 2. Regroup the class after 15 minutes and discuss what they were able to find. 3. Depending on skill level of the class members, some may want more information about assessing data quality. This is available in Handout 5 below.
12. 	**Class 4d: Making Data Better- Giving Feedback** ***Estimated Time:*** *25 minutes* ***Learning Objective:*** Become a contributor to the open data movement by giving feedback to the publisher(s) on quality, ease-of-use etc) ***Discussion:*** This session provides a significant service to government open data programs. In preparation for this module, review anything that did not work well in the previous modules; datasets that did not load, websites that have changed, paywalls and other hassles. Do a quick scan of national news stories about censorship, budget cuts or freedom of information, looking for current event examples that could provide timely context for the lesson. At the beginning of the session, ask participants: 1. Have you ever submitted feedback online? 2. What response did you get? Did it change anything?

Link to this document: https://goo.gl/oiZg1d

Explain that most open data publishers don't know who's using their data; that's part of the anonymity and transparency that publishers commit to when they offer open data. But that anonymity makes it hard for publishers to know or demonstrate the value of their published data, so there's little incentive for improvement.

Explain that students in this program can let their government know about the types of open data they would like to see published about the subjects that matter most. Use student responses to the questions in Class 1a ("What Brought You Here") as examples of what to request from the local open data publisher (or to make the case about why there should be an open data site).

Activities:
1. Use a flipchart or whiteboard to capture the top 5 topics that class participants are interested in.
    - Check your local, state, or federal open data portal to see if the dataset for the topics the class is interested in are available. Explain that if the dataset is not available there are opportunities to suggest it.
    - Check your local open data portal for a suggestion box. (Examples of sites with suggestion boxes)
        - data.wa.gov
        - data.seattle.gov
        - datasf.org
        - data.gov
    - Are the data topics represented in the portal you explored? If they all are, brainstorm some possible areas which are lacking and begin to draft a joint email from the class to the open data coordinator.
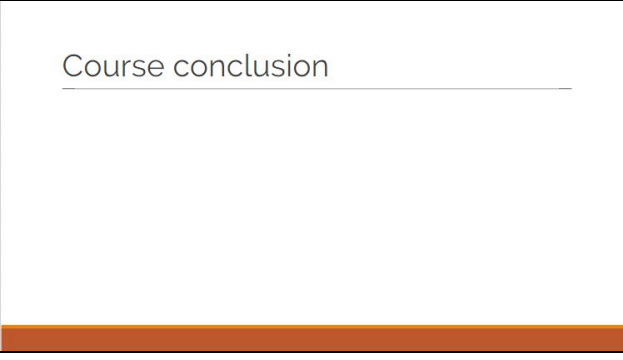
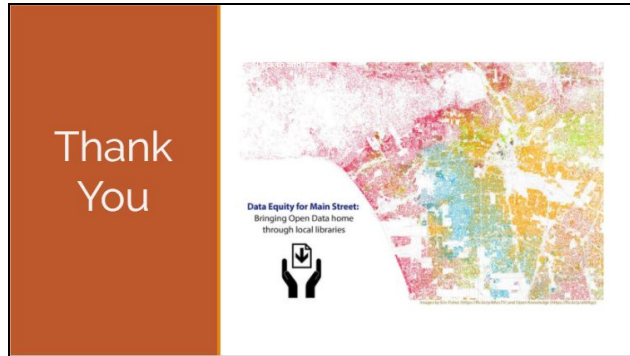|	
	■ Start with the positive. Explain in the message that patrons of your host library are interested in using open data for civic purposes and appreciate the open data available ■ Characterize the message as "suggestions" rather than "requests" ("requests" may be interpreted as "demands" and may be referred to the legal department). ■ Explain what is good, bad, or missing from a specific dataset identified by the class. Here's a sample message text (alter the text to match your interests): Dear Open Data Publisher, I'm writing to you on behalf of a group of community members at the [insert name] Public Library in [city, county, state]. We have been using some of your published datasets for civic purposes like [insert your own language: improving traffic safety, understanding our schools, or keeping our residents healthy.] Thank you for publishing this important resource. We have a few suggestions (listed below) for expanding or improving your open data offerings: ● In your published dataset on sugary dessert consumption (here's the link), we noticed that the last update was more than 5 years ago. This is a really useful dataset for us and we'd like to see it prioritized for update.

	● We couldn't find any data on your site concerning soda pop spills on public lands. Could you update your index or email us back with tips on how to find it?
	
	Alternate Activities:
	1. Post a story.
	    a. A few organizations collect and publish stories about how open data gets used around the world. As a community library your students' and patrons' use of open data matters.
	    b. Demonstrate the Open Data Impact Map (http://opendataimpactmap.org/) (to the class
	    c. Use student work product from classes 3c (answer your own question) or 2d (data visualization) as the basis for a group-driven impact story submitted either through this web form or by email, Map@ODEnterprise.org.

13. Course conclusion	***Class 4 Evaluation and Course Wrap-Up*** Review objectives from the sessions Ask the students to complete an evaluation: https://goo.gl/PXZRsw

| 14. | |

Materials Needed:

- Community Curriculum: Class 4 Slides
- Evaluation: https://goo.gl/PXZRsw
- Community Curriculum Handout 6: Data Quality **(optional)**
- (Provide again, if needed) Community Curriculum Handout 2: Where can you find open data?
- Community Curriculum Handout 7: Proprietary or Paid Data? Is it worth it? **(optional)**

Link to this document: https://goo.gl/oiZg1d

List of All Course Materials

Slide Decks for Course:

Class 1 Slides
Class 2 Slides
Class 3 Slides
Class 4 Slides

Handouts for Entire Course:

- Community Curriculum Handout 1: Open Data: What is it?
- Community Curriculum Handout 2: Where can you find open data?
  Note: Handout 2 is built to be modular and instructors should add in localized content before providing it to the class.

- Community Curriculum Handout 3:
  - Treasure Hunt - General
  - Treasure Hunt - Fun Theme
  - Treasure Hunt - Business Theme
  - Treasure Hunt - Environment and Agriculture

- Community Curriculum Handout 4 (optional): Open Licenses for Data and Content
- Community Curriculum Handout 5: How to Make a Map and a Chart
- Community Curriculum Handout 6 (optional): Data Quality
- Community Curriculum Handout 7 (optional): Proprietary or Paid data

Evaluations for Entire Course:

- https://goo.gl/PXZRsw

Videos for the Entire Course
Class 1: (Choose 1 or 2)

Link to this document: https://goo.gl/oiZg1d

- Video 1: From CNN. Broad-based (1:49, requires watching a short ad) http://money.cnn.com/2017/04/11/technology/government-open-data-life-decisions/index.html
- Video 2: From City of Philadelphia. Has some specific Philadelphia information, but explains open data broadly (2:03) https://www.youtube.com/watch?v=SpOD0ab1T8A

- Video 3: From County of Grande Prairie, No. 1 (Canada). Is general and has a more rural orientation. (3:02) https://www.youtube.com/watch?v=PzWpcVzuwV0

Class 3:

- Hans Rosling Video: https://www.youtube.com/watch?v=jbkSRLYSojo