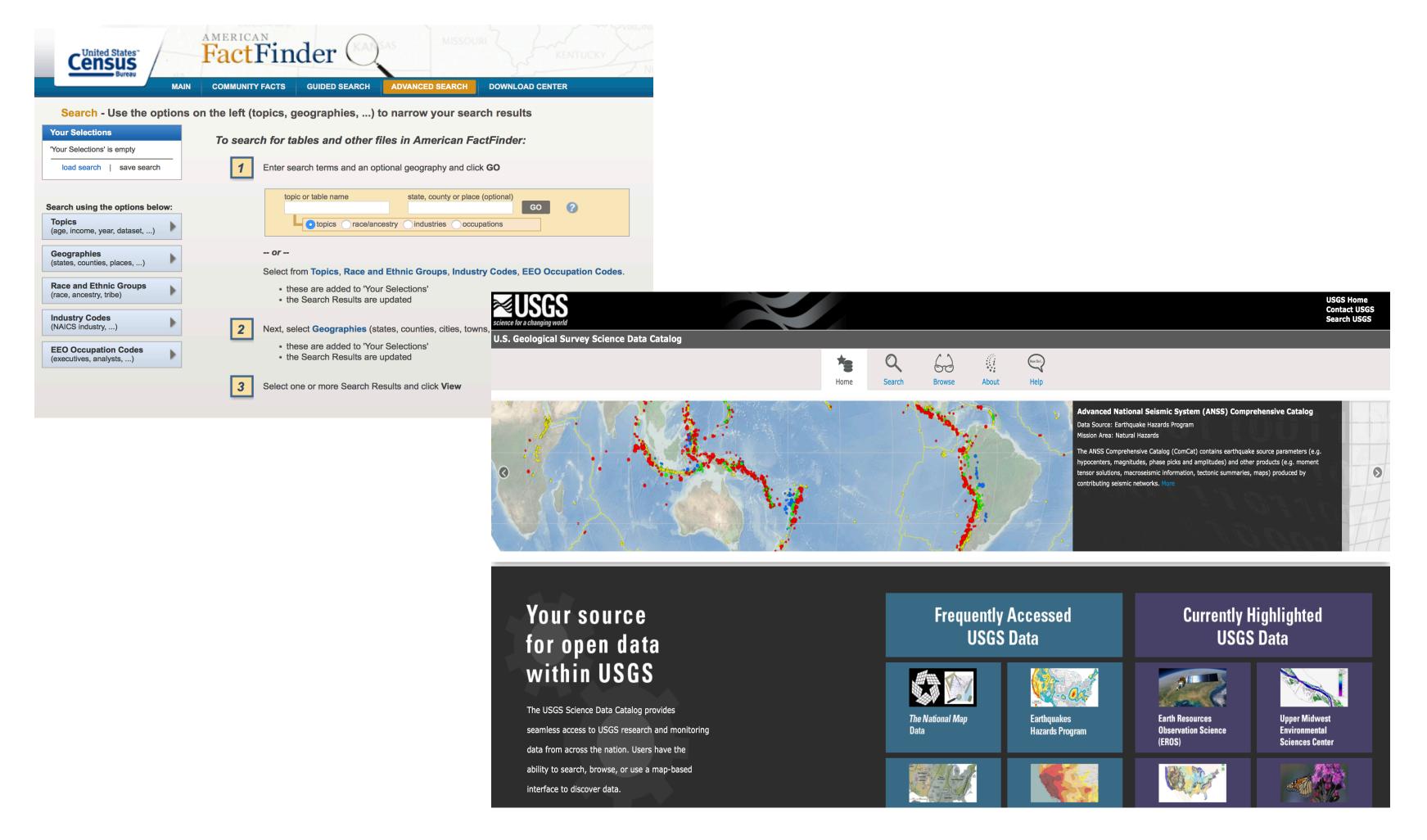# Data Literacy for College Students

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Background: The goal of library instruction is to improve information literacy, and students are increasingly called upon to be information producers as well as consumers (Shorish, 2015). This bidirectional exchange is central to the concept of data literacy, also referred to as data information literacy (Carlson et al., 2011). More data is being collected about us than ever before, with life-saving but also privacy-eroding consequences (Fontichiaro & Oehrli, 2016). Even democratic participation requires that students become "data-competent citizens" (Ercegovac, 2015), yet K-12 librarians have noted the glaring absence of data literacy from most high school curricula (Fontichiaro & Oehrli, 2016). Moreover, employers say college graduates lack important analytical and communication skills relating to data (Macy & Coates, 2016). There is an urgent need to address data literacy in undergraduate library instruction.
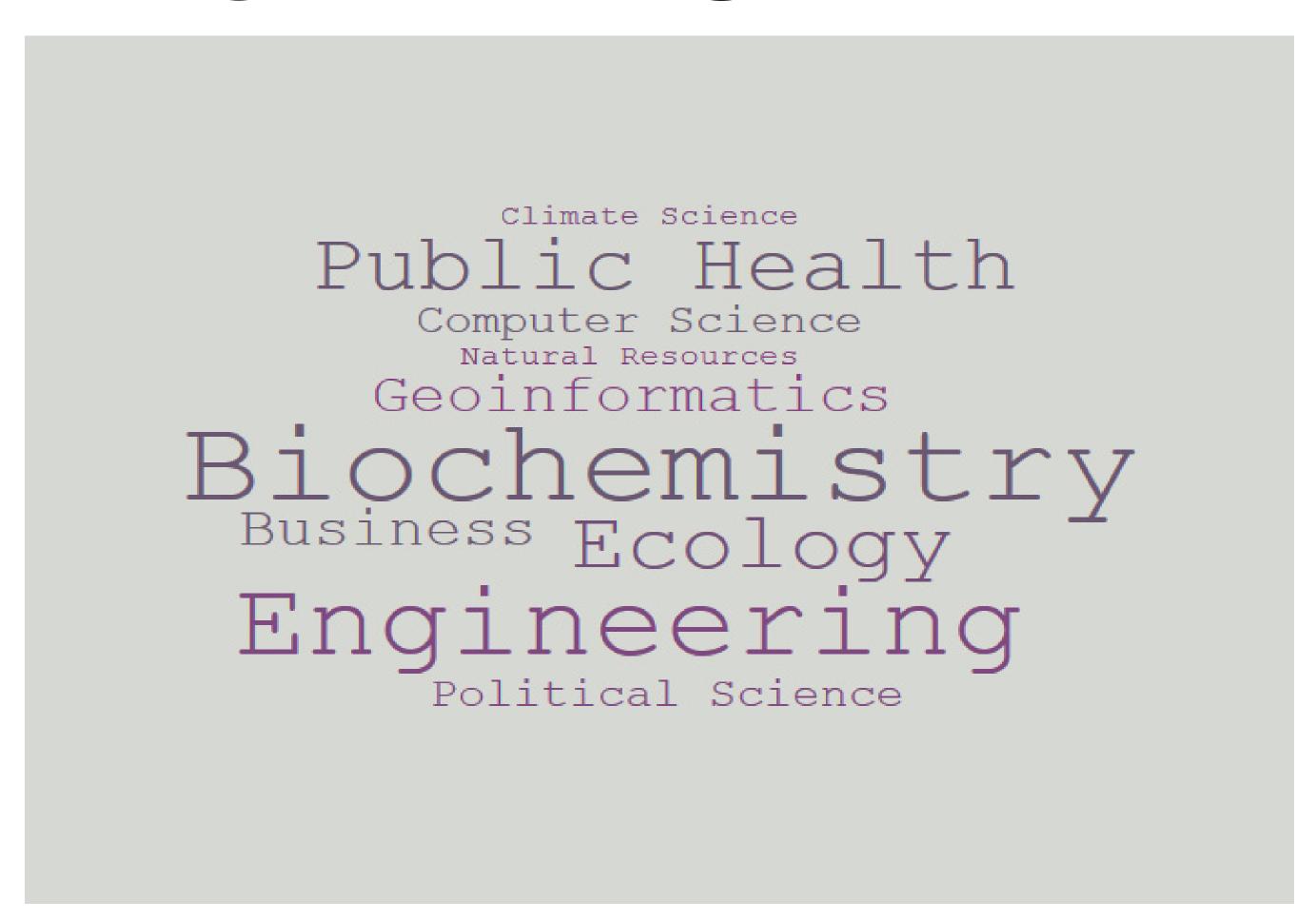
Calzada Prado and Marzal's (2013) conceptual framework for data literacy presented five core competencies: finding and obtaining data, understanding data, reading/interpreting/evaluating data, managing data, and using data effectively. Below, this framework is adapted, with the ability to interpret and evaluate data implicit in the other four competencies. For each dimension of data literacy, examples of tools and programs librarians can use as part of instruction are given.
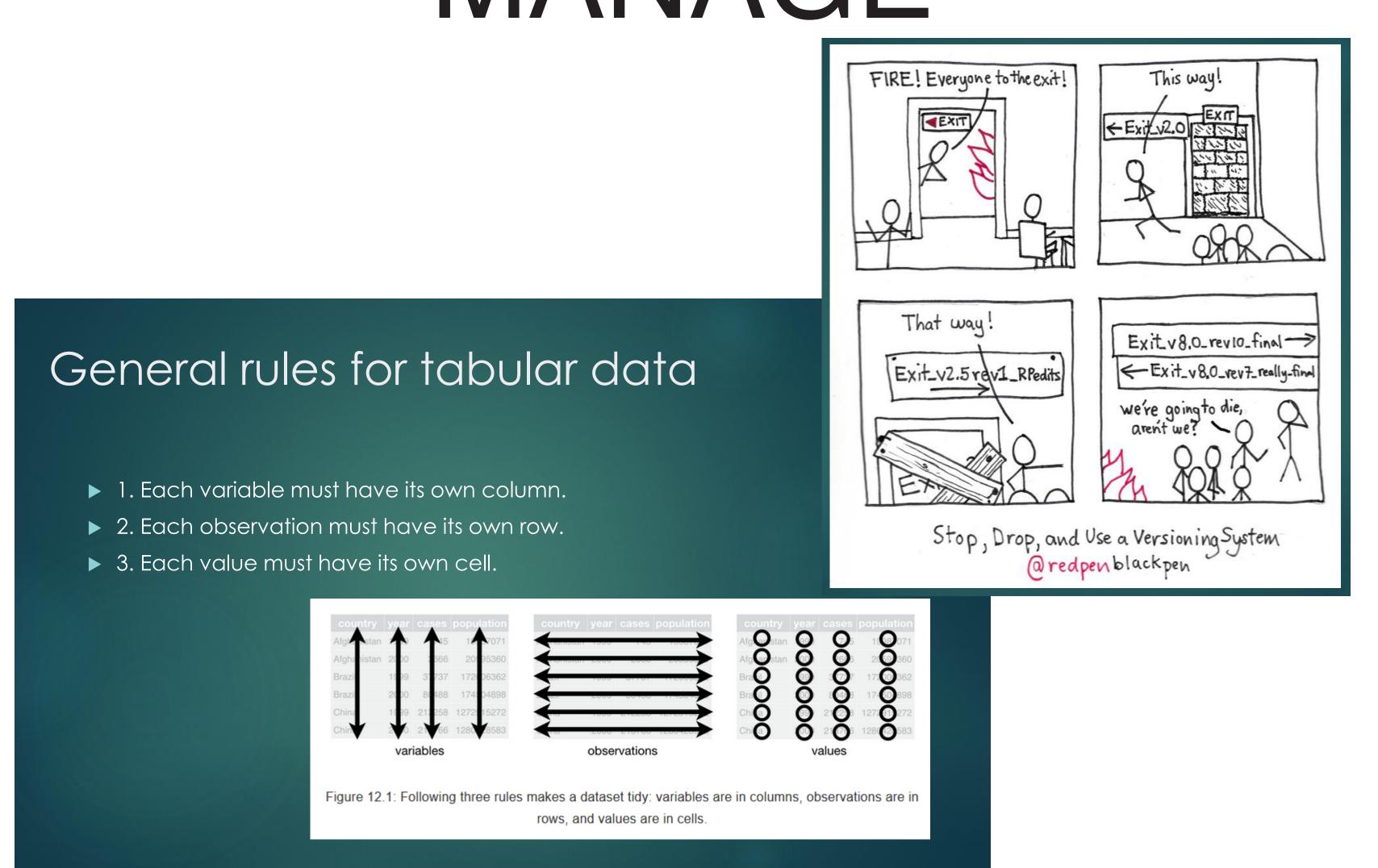
FIND

Teaching students to find datasets is similar to teaching catalog or subject database use. Introduce students to data portals to search for public data to explore and manipulate. Depending on the portal, features like faceted and federated search might be available, and some data portals allow users to view and analyze data directly in the browser without downloading it.
Examples: American Fact Finder (census data), USGS Open Data
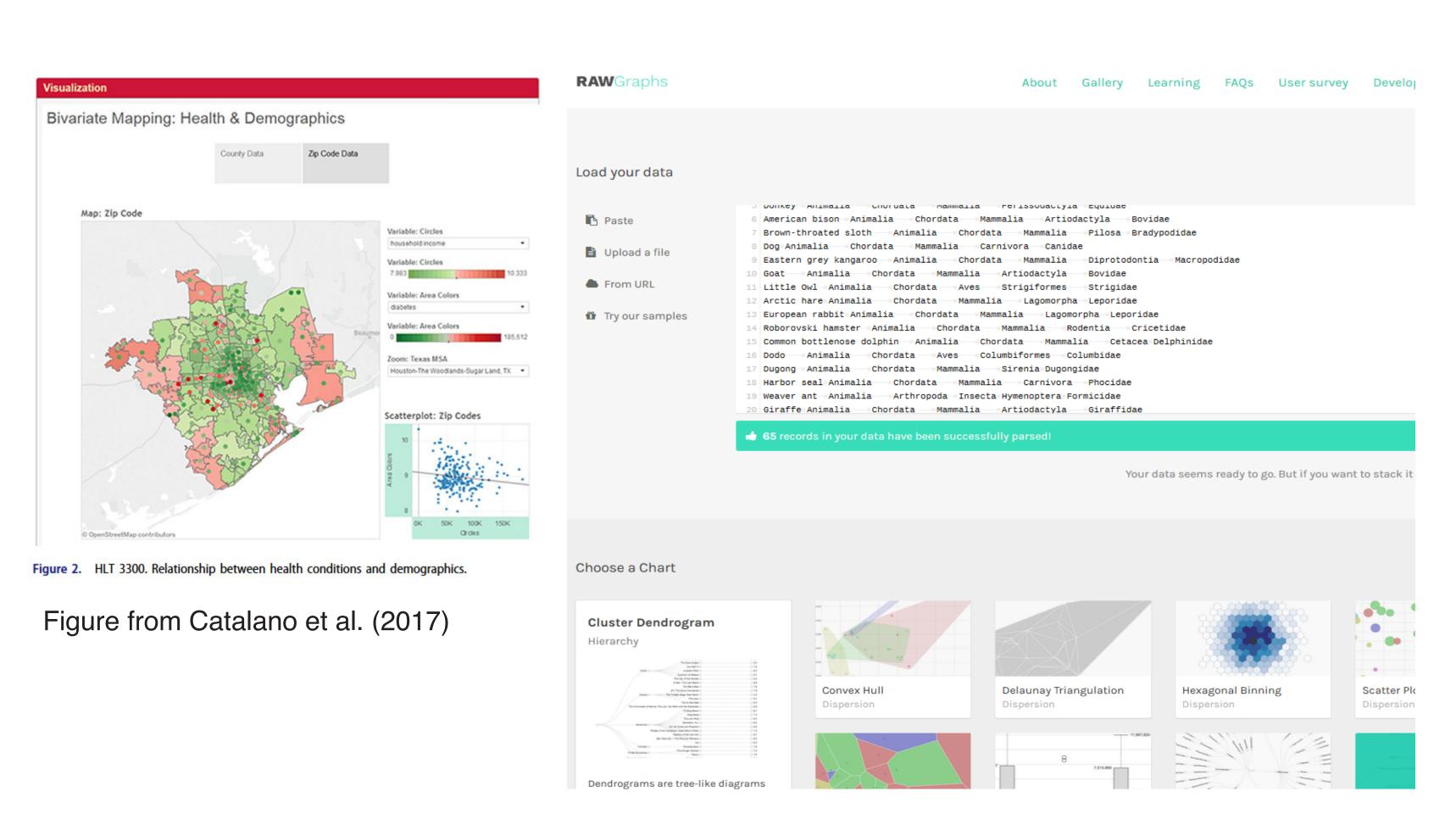
UNDERSTAND

To help students use and critically evaluate data, instruction tailored to the subject matter is preferred. The graphic above lists selected fields where librarians have worked closely with disciplinary faculty to develop course modules focused around the analysis and interpretation of data. Although it is not required, it is to the librarian's advantage to have some subject expertise when engaged in this type of collaboration with class instructors.

MANAGE

The library can offer stand-alone data management workshops for students. These provide a general overview of issues in research data management and help students to set up their personal information environment. Introducing best practices in file naming, folder organization, remote backup, and collaboration tools saves students time and effort when they tackle projects such as a thesis or portfolio.

CREATE

Figure from Catalano et al. (2017)

Data visualization tools can be used to get students communicating with data quickly and without extensive technical knowledge. Some such activities are focused tightly around a course assignment, such as creating maps based on specific, pre-loaded data. On the other hand, students can be introduced to open sandbox environments run in a web browser and shown how to make graphs out of data they provide with just a few clicks.
Examples: Tableau, Rawgraphs

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