

Web Mapping

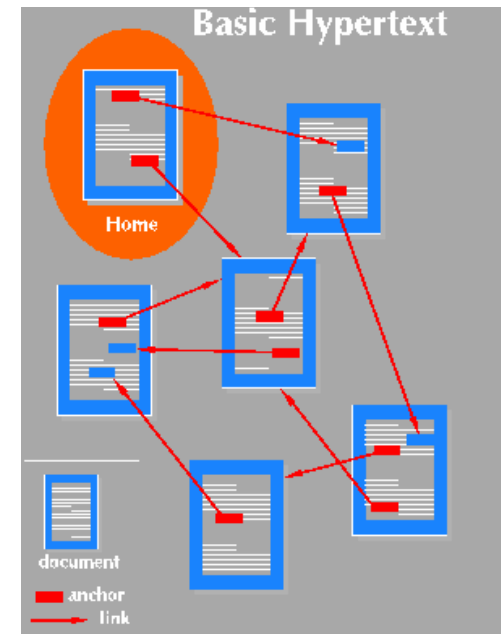
GEOG 5201 – Spring 2022

Outline

- A brief history of web mapping
 - The Internet and the World Wide Web
 - Common usage of the Web
 - The Web's importance to mapping
- Cartographic web sites: a classification
- Create web maps without programming

The Internet and the World Wide Web

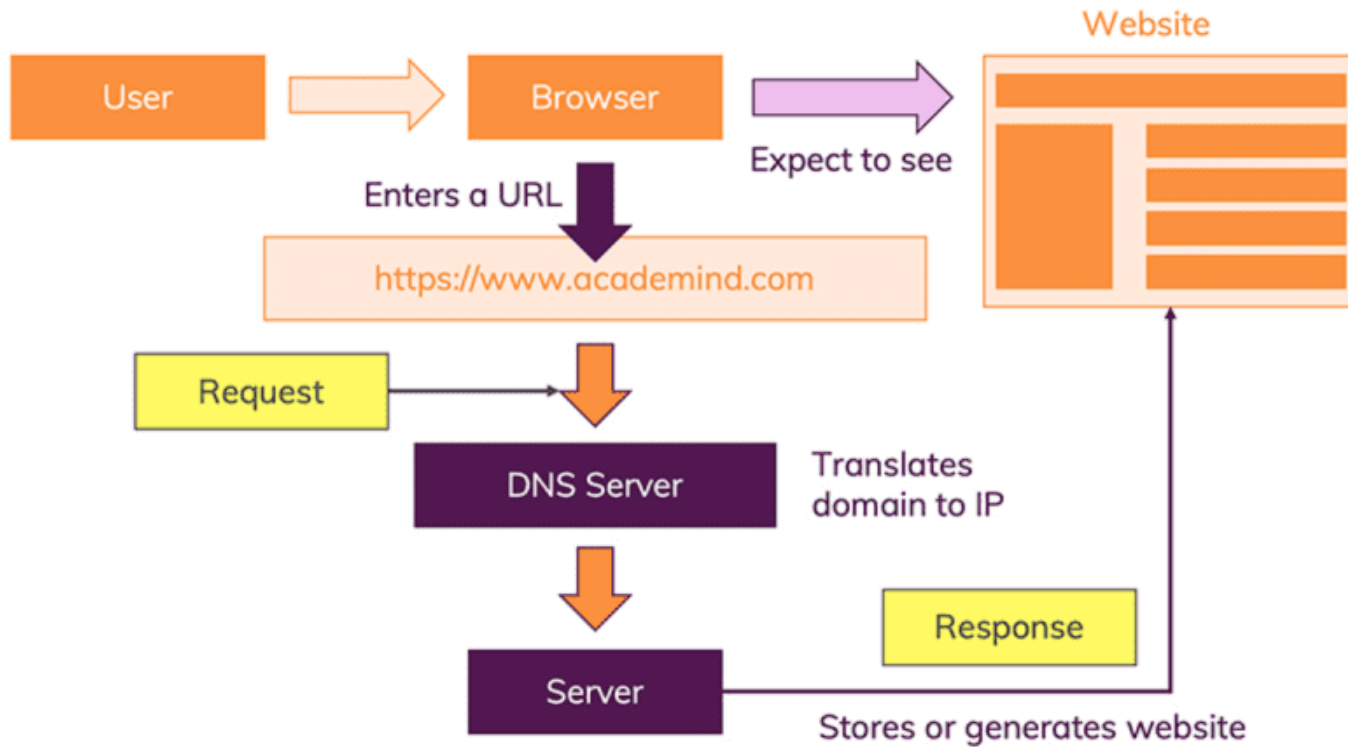
- The **Internet** is a series of interconnected **networks** whose purpose can be thought of as transferring files back and forth
 - Think of it as the roads that connect towns and cities together
- The **Web** is a series of interconnected **hypertext documents** that are shared over the Internet between a computer user and a remote computer and are viewable through a Web browser (e.g., Google's Chrome)
 - Hypertext/hypermedia: linking together of digital text docs/media via common keywords
 - Think of it to contain the things you see on the roads like houses and shops



Common Usage of the Web

1. A user (the “client”) enters a URL (uniform resource locator) into a Web browser (e.g., Google.com)
2. This request is passed to a Domain Name System (DNS) server
3. The DNS server returns an Internet Protocol (IP) address (e.g., 68.178.157.132) to locate the remote computer (the “server”) on the Internet network that hosts the page
4. The browser requests the page from the server using the IP address
5. The server delivers the requested page through HTTP (hypertext transfer protocol) back to the Web browser on the client’s computer
 - The requested page takes the hypertext markup language (HTML) and configures it so that the client’s computer can display it on-screen

Common Usage of the Web



The Web's Importance to Mapping

- **Convergence of spatial technologies**
 - Remote sensing, GIS, GPS, and digital cartography merge their capabilities and products into new kinds of map-based problem solving
- **Create maps “on demand”**
 - Users can individually tailor data sets, symbolization, data classes, color schemes, etc., and produce maps to suit their individual mapping requirements in real time
- **Democratization of cartography**
 - Permit anyone with a computer and access to the Internet the opportunity to create a variety of maps
 - Make it possible for individuals with little or no formal cartographic education to practice the art and science of mapmaking

Cartographic Web Sites: A Classification

- Preexisting maps vs. custom-tailored maps
 - Based on when the cartography is executed
- Low interaction vs. high interaction
 - Based on the level of user interactivity
- Distributed data vs. user-contributed data
 - Based on geospatial data and how they are distributed
- Updated data vs. non-updated data
 - Based on whether the data are updated on a regular schedule
- Animated maps vs. static maps
 - Based on whether the maps demonstrate a temporal change or a change in geographic position

Preexisting Maps versus Custom-Tailored Maps

- Preexisting maps
 - Web sites that provide maps that are already made
 - Only for viewing and downloading
 - Example: [Census Infographics & Visualizations](#)

The screenshot shows the United States Census Bureau website. The header includes the logo and a search bar. The main navigation bar lists categories like 'BROWSE BY TOPIC', 'EXPLORE DATA', 'LIBRARY', 'SURVEYS/ PROGRAMS', 'INFORMATION FOR...', 'FIND A CODE', and 'ABOUT US'. The page title is 'State and County Maps 2020'. The main content area features a map titled 'Poverty Rate of the Population Under 18 by County: 2020'. The map uses a color scale from light yellow to dark red to represent poverty rates. A legend on the right side of the map provides the following data:

Poverty rate by county
35.5 to 59.7
27.0 to 35.4
21.0 to 26.9
15.7 to 20.9
10.7 to 15.6
2.6 to 10.6
State

Below the map, there is a note: 'Note: The data provided are indirect estimates produced by statistical model-based methods using sample surveys, decennial census, and administrative data sources. The estimates contain error stemming from model error, sampling error, and non-sampling error. Source: U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE) Program, December 2021.'

Is this page helpful?

Question 6-1-1

Provide the link to another source where you can find preexisting maps.

Preexisting Maps versus Custom-Tailored Maps

- Custom-tailored maps
 - Allow users some control over the cartographic process
 - Specify the kinds of data shown
 - Decide on the map design
 - Choose the scale
 - Modify the coordinate
 - Example: [American Factfinder](#)

The screenshot displays the American Factfinder interface. At the top, there is a search bar and navigation tabs for 'All', 'Tables', 'Maps', and 'Pages'. The 'Maps' tab is selected. On the left, a sidebar shows '0 Filters' and a list of filters including 'Codes', 'Geography', 'Surveys', 'Topics', and 'Years'. The main content area shows '4900 Results' and a list of data tables. The first table is 'NA_EST2021_POP | Monthly Population Estimates for the United States: April 1, 2020 to December 1, 2022'. A map is displayed on the right, showing a geographical area with a search overlay. The overlay contains a search bar and three options: 'Elementary School District', 'Secondary School District' (which is selected), and 'Unified School District'. Below the map, there is a legend for 'Estimate Date By Month in 2021' with 'Geos: 0'. The map also includes a scale bar for 50 miles.

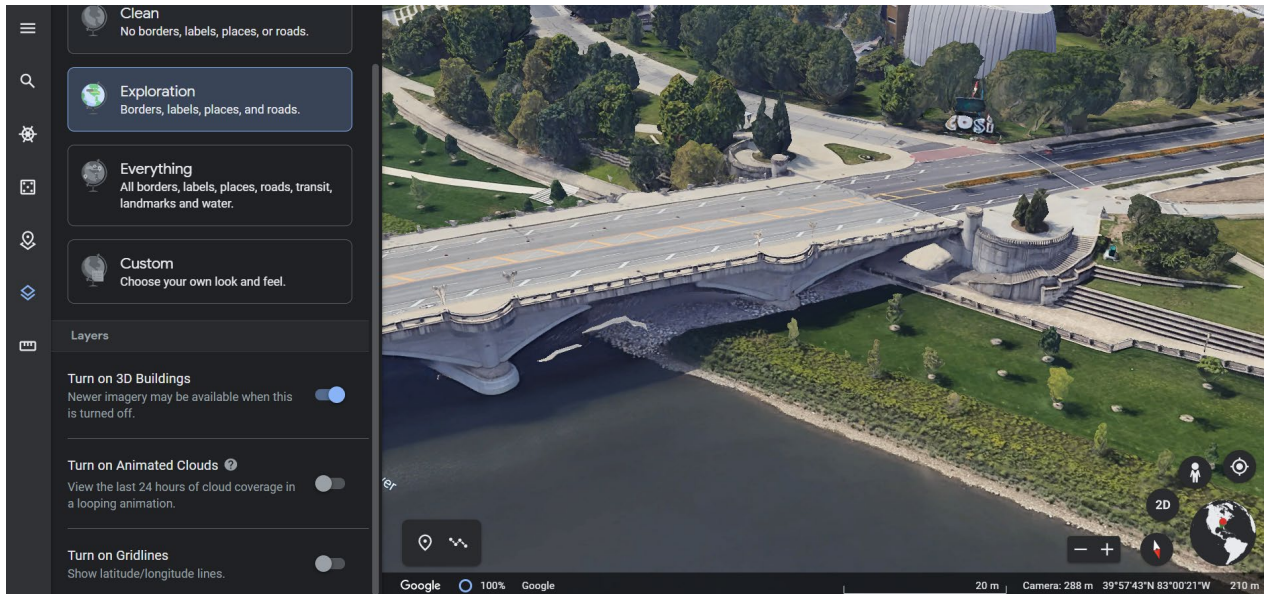
Low Interaction versus High Interaction

- Low interaction
 - Allow the user no or limited interactivity
 - Zooming in and out
 - Panning
 - Re-centering the map
 - Example: [Apartments](#)

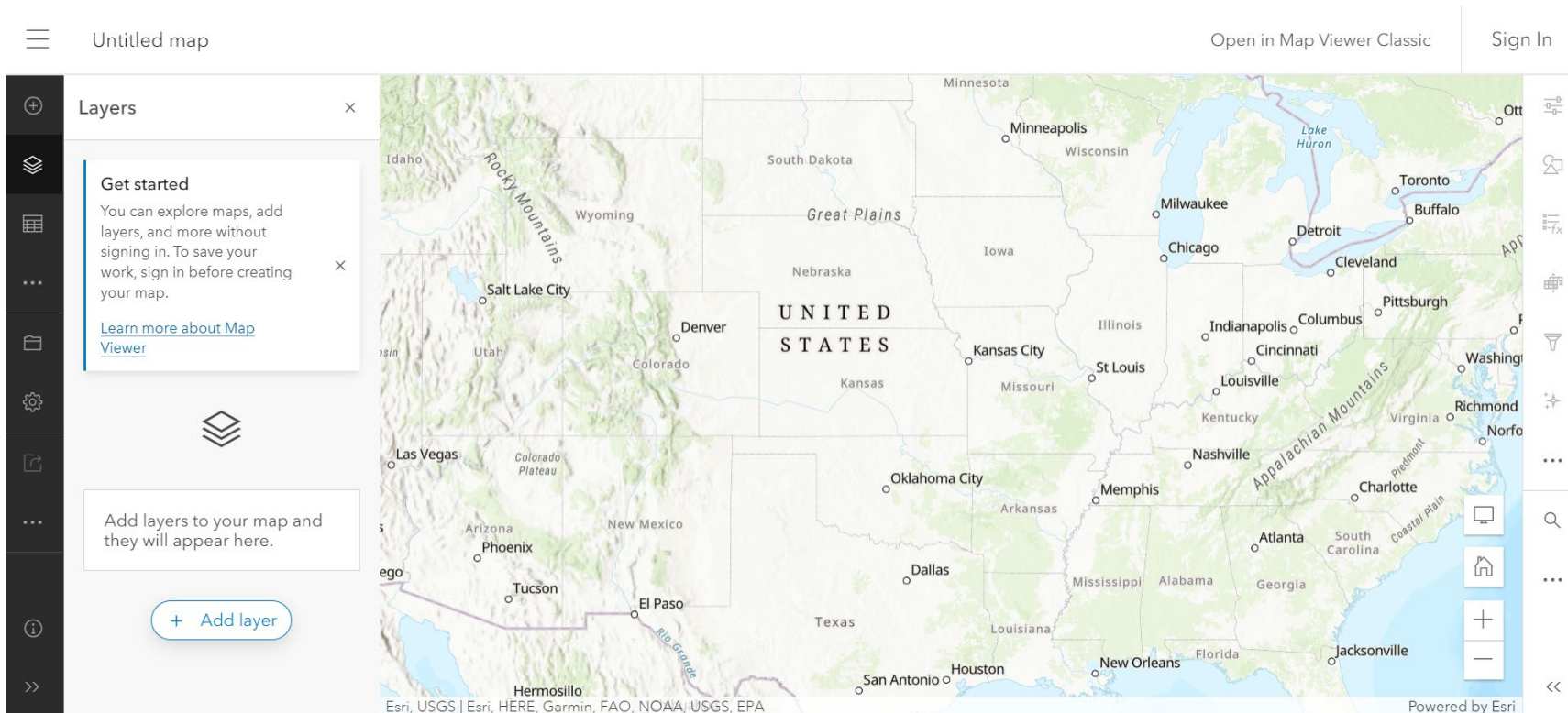
The screenshot displays the Apartments.com website interface. At the top, there is a navigation bar with a menu icon, the text 'Menu', a language selector for 'Español', the 'Apartments.com' logo, and links for 'Sign Up / Sign In' and 'Add a Property'. Below the navigation bar is a search and filter section with a text input field containing 'Columbus, OH', and dropdown menus for 'Price', 'Beds', 'Type', 'Move-In Date', and 'More'. To the right of these filters are 'Sort' and 'Save' options. The main content area is split into two columns. The left column features a map of Columbus, OH, with a large number of green diamond-shaped icons representing available apartments. A tooltip above the map indicates '10,467 Apartments Available'. The right column displays a list of apartment listings. The first listing is 'Arena Crossing' at 423-237 N Front St, Columbus, OH 43215, with a price range of \$999 - 2,539 for Studio - 2 Beds. It includes a photo of the building, a 'Virtual Tour' button, and an 'Email' button. The second listing is 'Hanover Park' at 2900 Angelo Joseph Ln, Columbus, OH 43204, with a price range of \$1,149 - 1,784 for 1-2 Beds. It also includes a photo and an 'Email' button. The bottom of the page shows a Google map footer with 'Keyboard shortcuts', 'Map data ©2021 Google', and 'Terms of Use'.

Low Interaction versus High Interaction

- High interaction
 - Include tools that are usually associated with GIS software
 - Specify a coordinate system
 - Add or remove various data layers
 - Query the data attributes
 - Measure distances
 - Example: [Google Earth](#)



ArcGIS Online



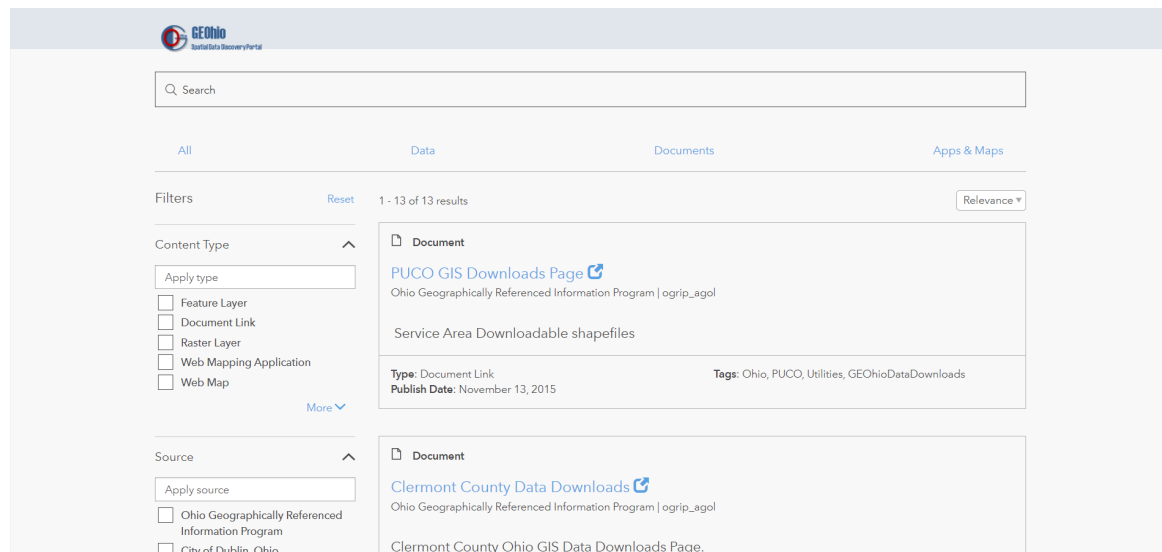
Provide users with the ability to select various thematic layers of geospatial data, essentially allowing them to construct a custom-tailored map in real time

Question 6-1-2

What makes Google Earth of high interactivity?

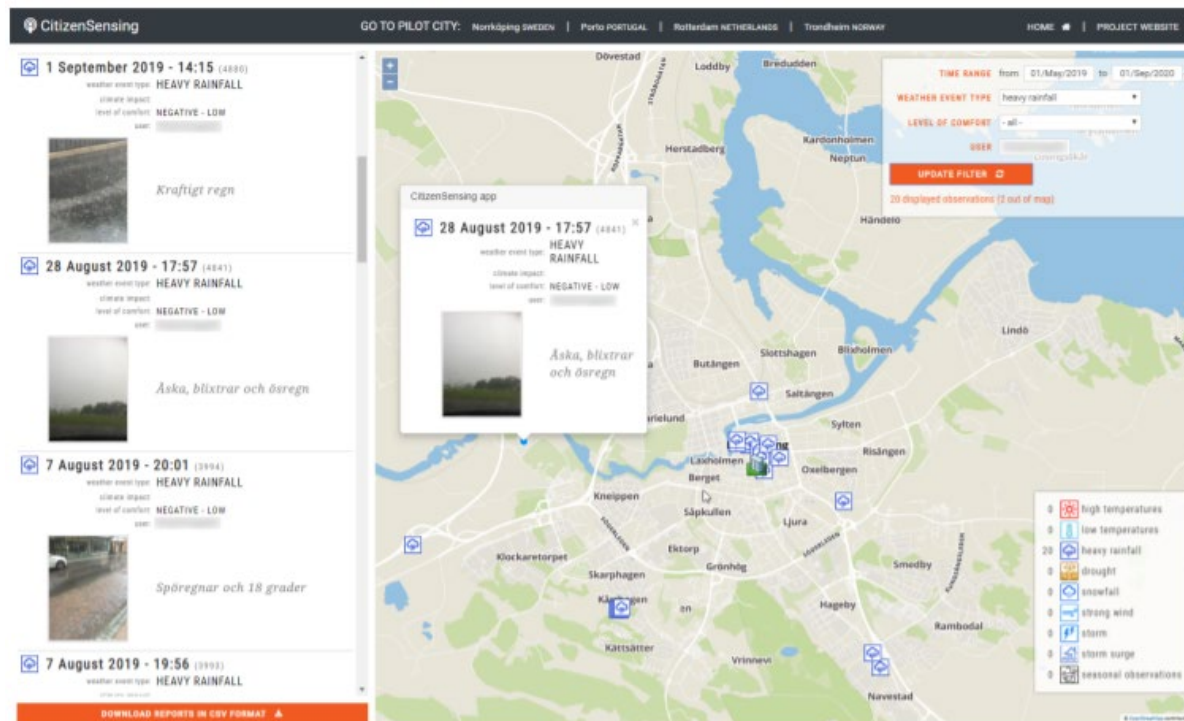
Distributed Data versus User-Contributed Data

- Distributed data (geospatial data clearinghouses)
 - Geospatial data are collected, prepared, and distributed under the auspices of a federal, state, or local government agency
 - Users of data clearinghouse sites generally have no ability to contribute their own geospatial data to the data that are redistributed
 - Example (state-level): [Ohio Geographically Referenced Information Program \(OGRIP\)](#)



Distributed Data versus User-Contributed Data

- User-contributed data
 - Allow individuals or agencies to contribute their own data for others to view and download
 - Example: [Citizen Sense](#)



Updated Data versus Non-Updated Data

- Updated data
 - The data or other map-based information are posted to a specific Web site shortly after an event took place and are updated on a regular time interval (e.g., every 15 minutes)
 - Example: [Our World in Data](#)

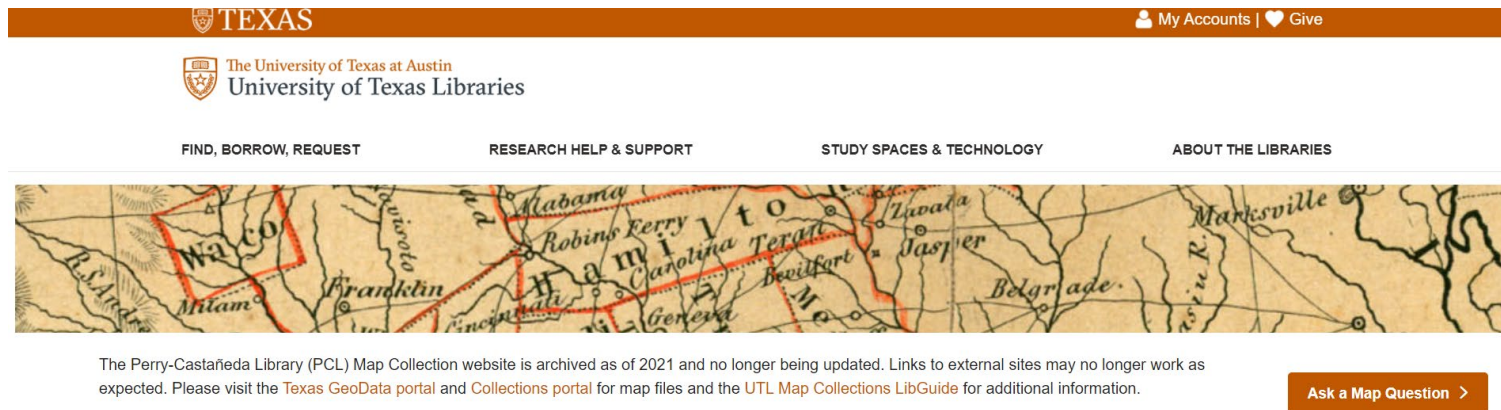


Question 6-1-3

Can you think of an example when you use maps with updated data?

Updated Data versus Non-Updated Data

- Non-updated data
 - Once a map is posted on the site, it is never changed
 - Example: [Perry-Castañeda Map Library](#)



The screenshot shows the top navigation bar of the Perry-Castañeda Map Library website. The header is orange with the word "TEXAS" in white. Below it, the University of Texas at Austin logo and "University of Texas Libraries" are displayed. A secondary navigation bar contains four links: "FIND, BORROW, REQUEST", "RESEARCH HELP & SUPPORT", "STUDY SPACES & TECHNOLOGY", and "ABOUT THE LIBRARIES". The main content area features a historical map with red outlines and labels like "Alabama", "Robins Ferry", "Hamilton", "Zuata", "Belgrade", and "Marksville". Below the map, a text block states: "The Perry-Castañeda Library (PCL) Map Collection website is archived as of 2021 and no longer being updated. Links to external sites may no longer work as expected. Please visit the [Texas GeoData portal](#) and [Collections portal](#) for map files and the [UTL Map Collections LibGuide](#) for additional information." To the right of this text is an orange button labeled "Ask a Map Question >".

PCL Maps

Africa	Americas	Asia
Australia/Pacific	Russia/Republics	Europe
Historical	Middle East	Polar/Oceans

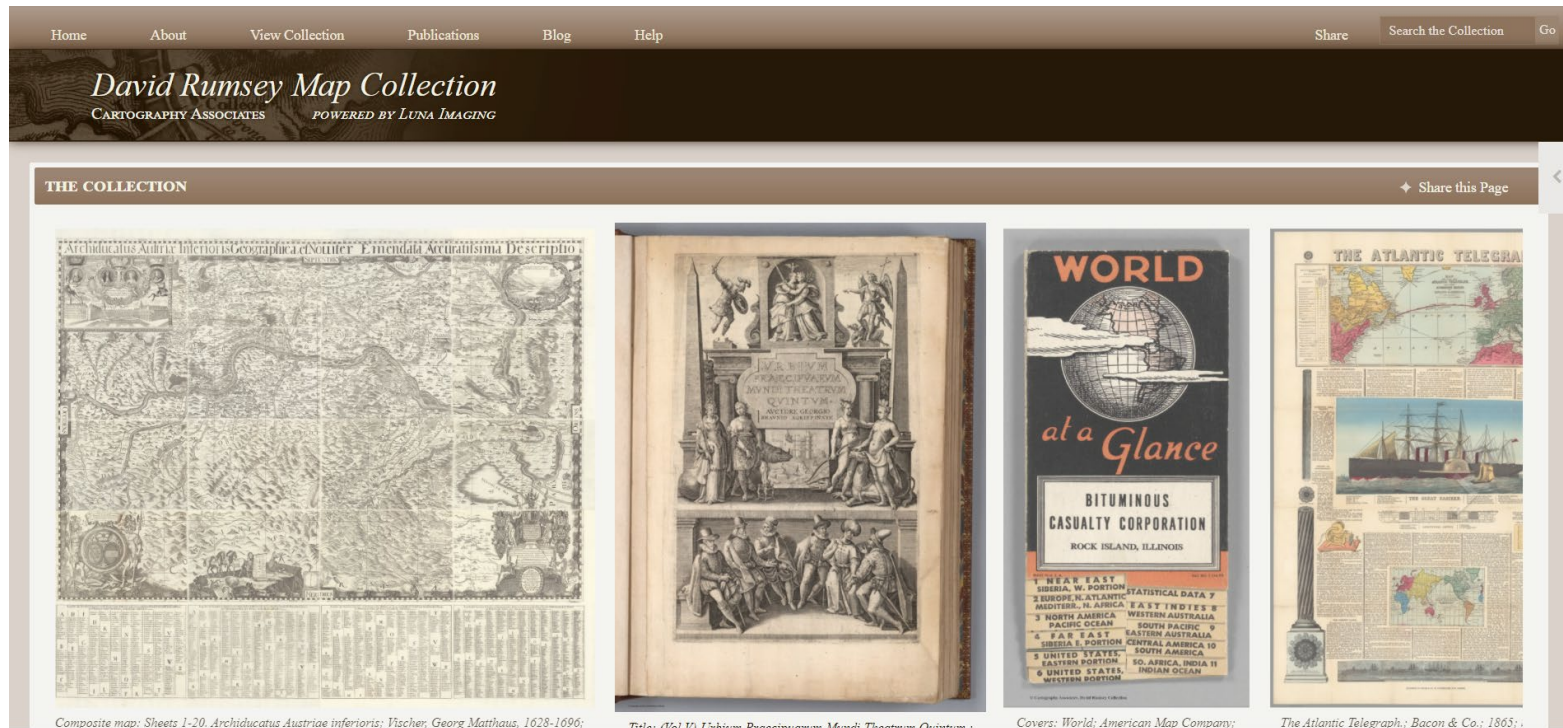
Animated Map versus Static Map

- Animated Map
 - Show changes in a data set over time or illustrate a change in geographic position
 - Example: [Our World in Data](#)



Animated Map versus Static Map

- Static Map
 - No change in the data or map focal point is depicted
 - Example: [David Rumsey Collection](#)



Create Web Maps without Programming

- What we have learned in labs...
 - ArcGIS web maps/scenes (labs 1/2/5/6)
 - ArcGIS web apps (lab 8)
 - ArcGIS dashboards (labs 3/4)
- Another useful tool is ArcGIS Story Maps

ArcGIS Story Maps

- A story authoring web-based application that enables you to share your maps in the context of narrative text and other multimedia content
 - Maps
 - Narrative text
 - Lists
 - Images
 - Videos
 - Embedded items
 - Other media
- Examples: [Winners Gallery of the ArcGIS StoryMaps Challenge](#)
- [Get started with StoryMaps](#)