Is My Research Mappable?

Intro to map-making & GIS for researchers

Michele Tobias, PhD • GIS Data Curator • UC Davis Library

Today's Plan:

1. Introductions
2. Introduction to GIS & Spatial Data
3. Research examples
4. Discussion
5. How to get started

GIS is both a...

Method of Investigation

Geographic **I**nformation **SCIENCE**

Asks questions about spatial relationships between data

Theoretical framework for understanding spatial relationships

Software System

Geographic **I**nformation **SYSTEM**

A **tool** to make spatial data & investigate spatial relationships between data

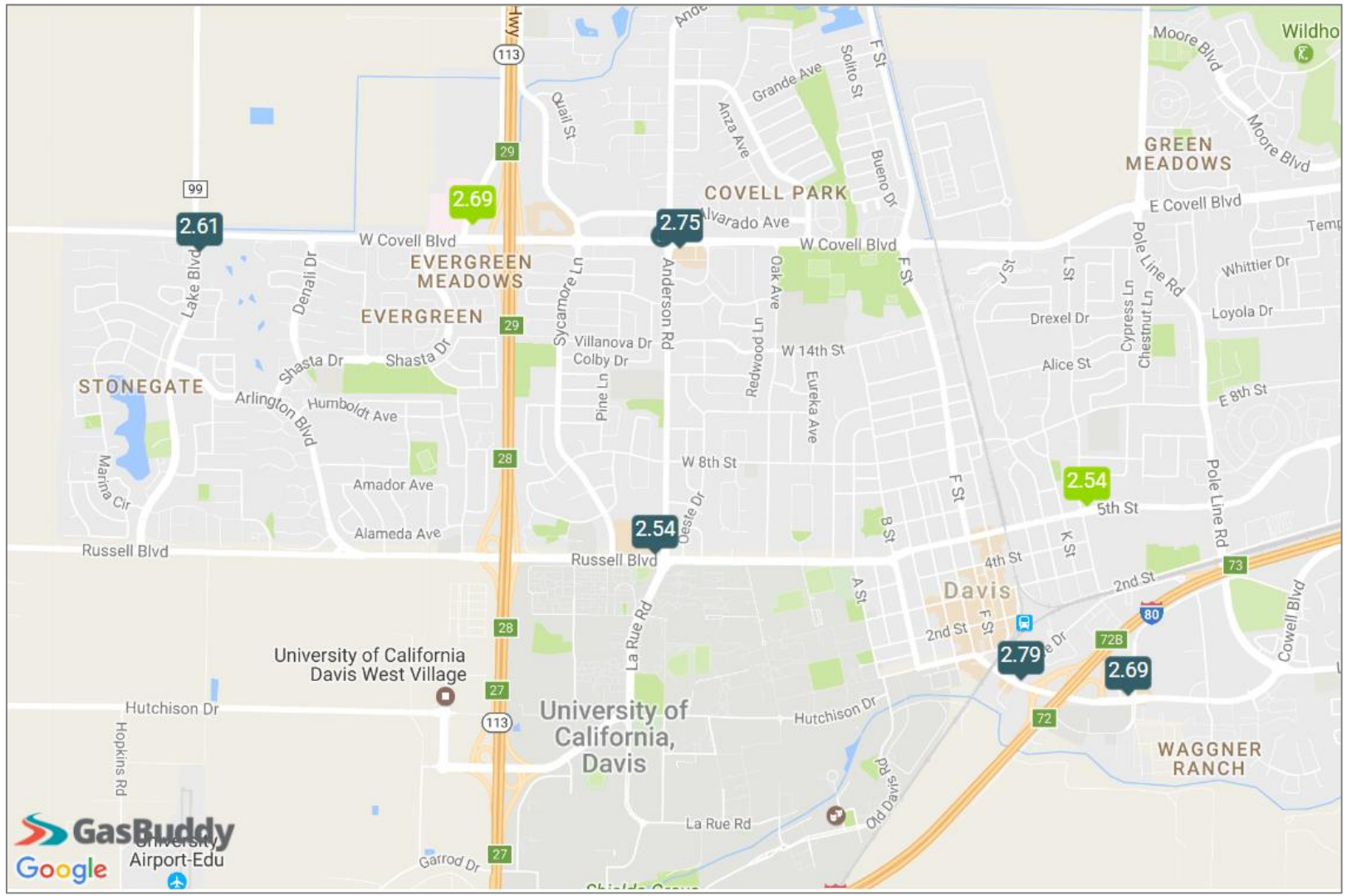
GIS Data = Location + Information

= Where + What

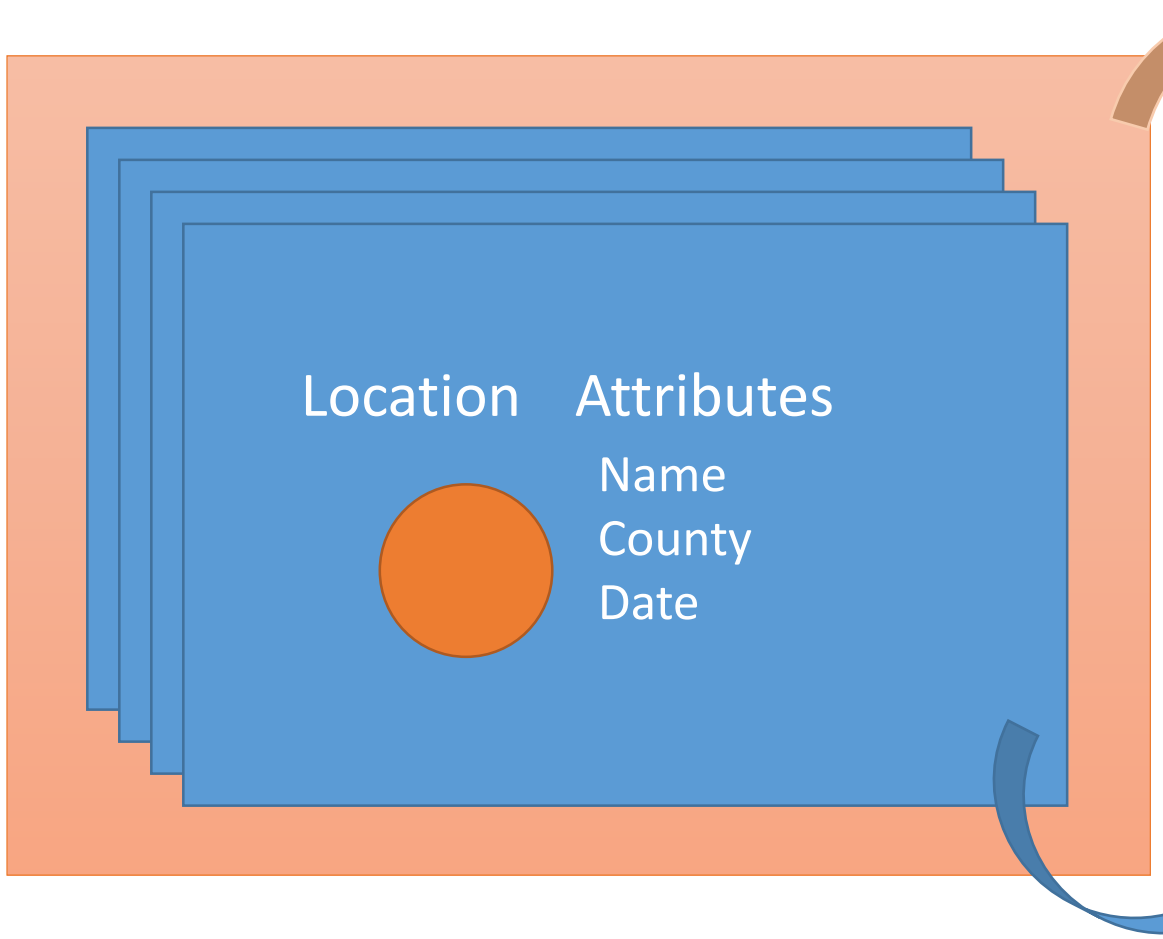
= Location + Attribute Information

Lowest Gas Prices in 95616

2.54	**ARCO** 705 Russell Blvd & Anderson Rd Davis
2.61	**Circle K** 1930 Lake Blvd & W Covell Blvd Davis
CASH 2.69	**76** 2002 Lyndell Terrace & John Jones Rd Davis
2.75	**Shell** 1944 Anderson Rd & W Covell Blvd Davis
2.79	**Shell** 1010 Olive Dr & Richards Blvd Davis



Attribute Data vs. Metadata



Metadata: Information about the collection of attributes, i.e. the whole dataset

Attribute Data: Information about an individual location

Everything* is mappable.

It just needs a location.

Location Examples:

- Address
- Place Name
- GPS Point
- County

* Ok, maybe just MOST things are mappable.

Placing Literature

Explore

Place / Author / Title

Log In

The Joy Luck Club

by Amy Tan

The China Gem Company

Waverly taunts a tourists who takes her picture and hides in the entry to the China Gem Company.

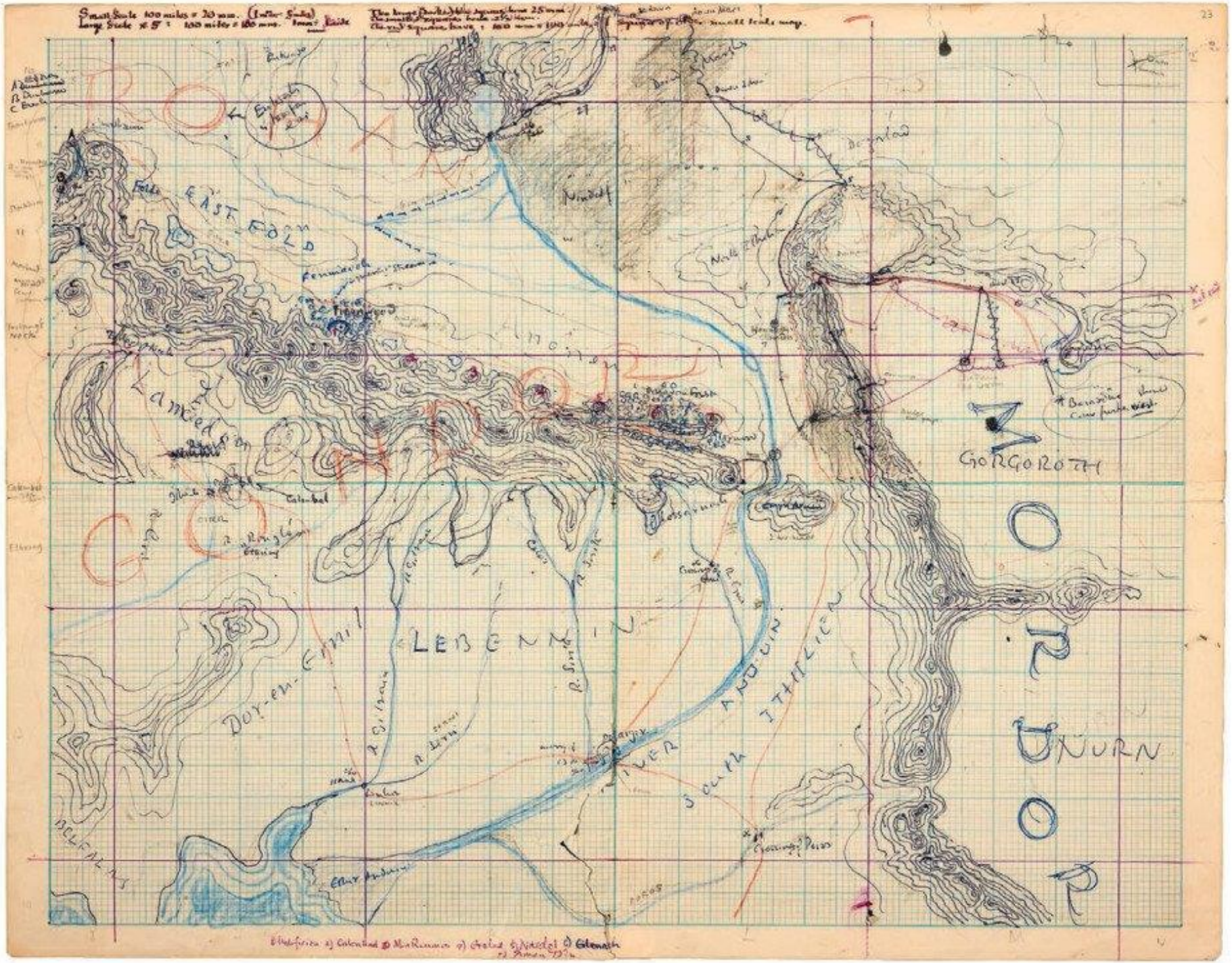
Scene | Place | Actions

add scene

Fictional entities can be mapped as long as they have a real-world location.

https://www.placingliterature.com/

http://dx.doi.org/10.1080/17445647.2013.867544



If there's no real-world location, you can still map it, but analysis gets more difficult.

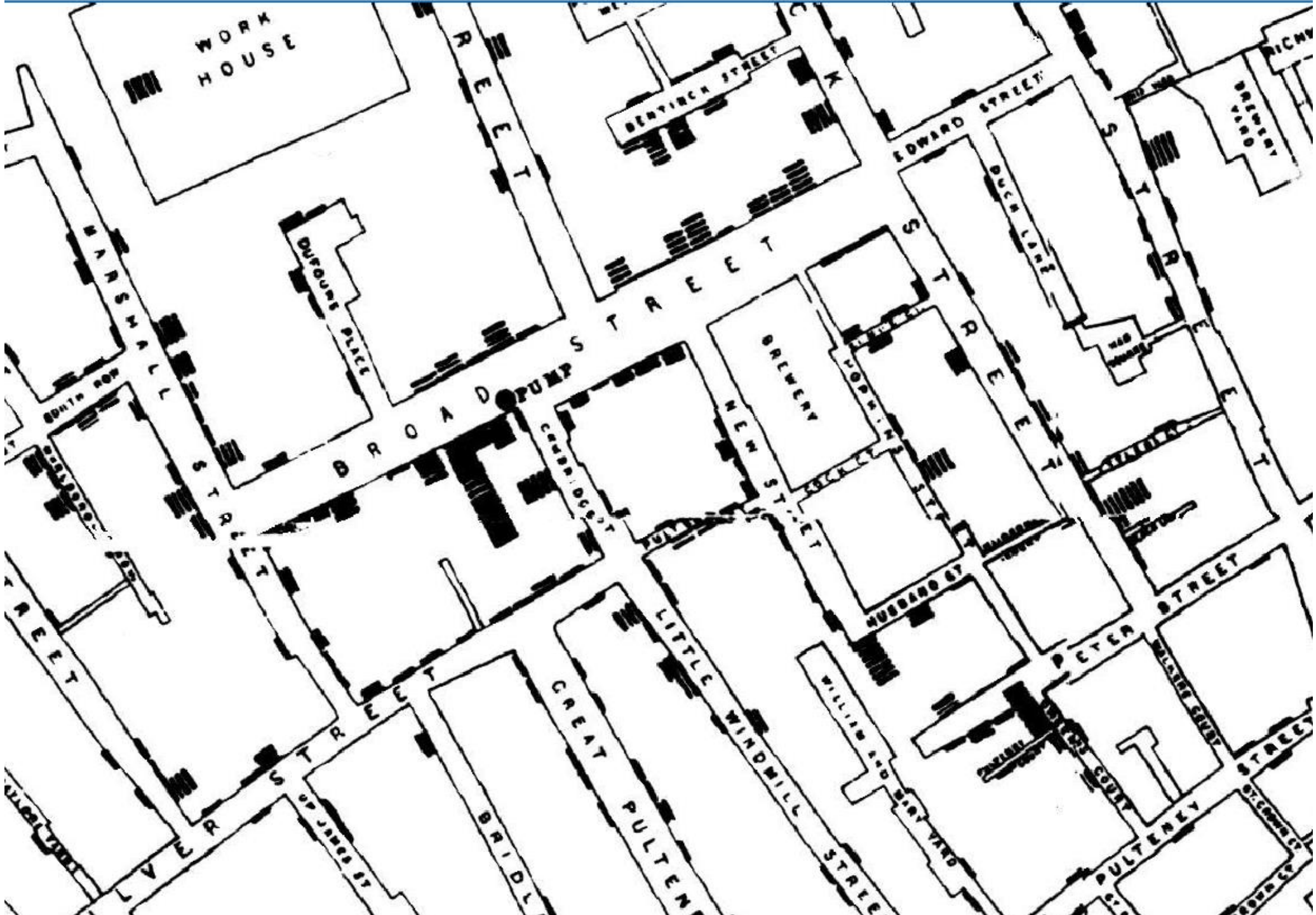
Example:
J.R.R. Tolkien's hand drawn map of Mordor & Condor

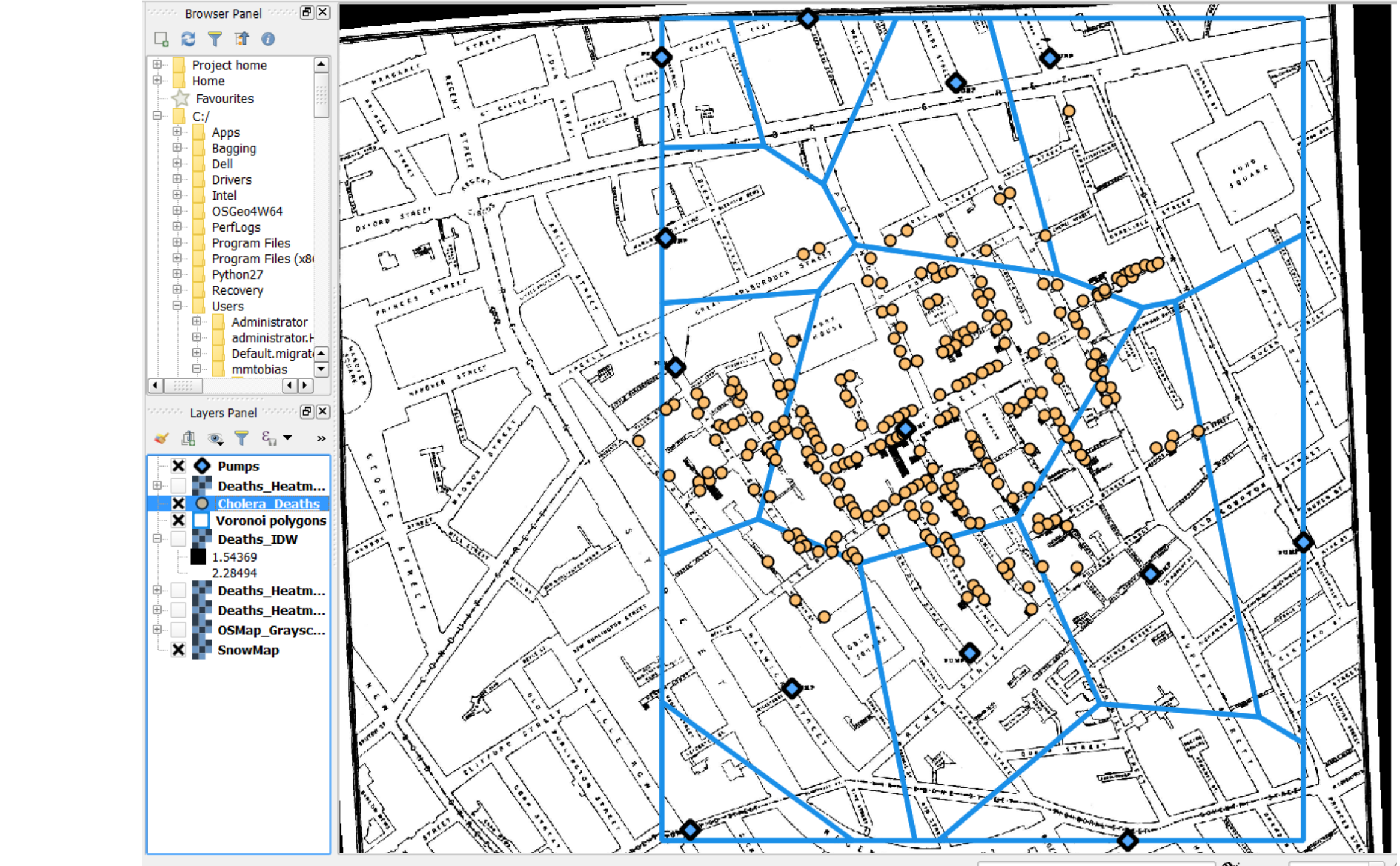
https://twitter.com/BLMaps/status/836537963907530753

It’s not just about making maps!

Spatial Analysis = performing operations on coordinate & attribute data, often to answer a question.

Example: John Snow’s cholera deaths & wells in London 1854


WORK HOUSE
BERWICK STREET
DUFOUNT PLACE
BROAD STREET
PUMP
BREWERY
EDWARD STREET
DUCK LANE
MARSHALL STREET
NEW STREET
HUSBAND ST
PETER STREET
LITTLE WINDMILL STREET
GREAT PULTENEY STREET
PULTENEY


Browser Panel
Project home
Home
Favourites
C:/
Apps
Bagging
Dell
Drivers
Intel
OSGeo4W64
PerfLogs
Program Files
Program Files (x8
Python27
Recovery
Users
Administrator
administrator.H
Default.migrat
mmtobias
Layers Panel
Pumps
Deaths_Heatm...
Cholera_Deaths
Voronoi polygons
Deaths_IDW
1.54369
2.28494
Deaths_Heatm...
Deaths_Heatm...
OSMap_Graysc...
SnowMap

Is it good data or bad data?

- Not all data is good
- Not all good data is usable in it’s current form

GIS ≠ just one software

Proprietary Software	Open Source Software
ArcMap	QGIS, GvSIG, OpenJump, Udig
Geoprocessing	QGIS Processing Toolbox, GRASS, SAGA, Postgis, Spatialite
Spatial Analyst	QGIS Processing Toolbox, GRASS, SAGA
Geodatabase	Spatialite
ArcSDE	PostGIS
ArcGIS Server	QGIS Server, Geoserver, Mapserver
ArcGIS Online	OpenLayers, Leaflet, Geomoose, Mapbender, Cartaro
GPS Analyst	Time Manager Plugin, EVIS Plugin
Imagery Analyst (ERDAS)	Orfeo, Opticks, ILWIS, OSSIM, GRASS
Geoportal, Metadata Catalog	Geonetwork, Geonode, CKAN
Geostatistical Analyst	R, GRASS, SAGA
.Net, Python scripting	Python, Java, Php, C, C++, .Net, JS

GIS is everywhere

- Weather forecasting
- Google Maps
- PG&E power outage reporting tool
- Apps like eBird, Yelp, uber/lyft
- Online advertisement marketing – which ads do you see?

Take-Home Messages

GIS = a method and a tool

GIS Data = Location + Attribute Information

Attribute Information ≠ Metadata

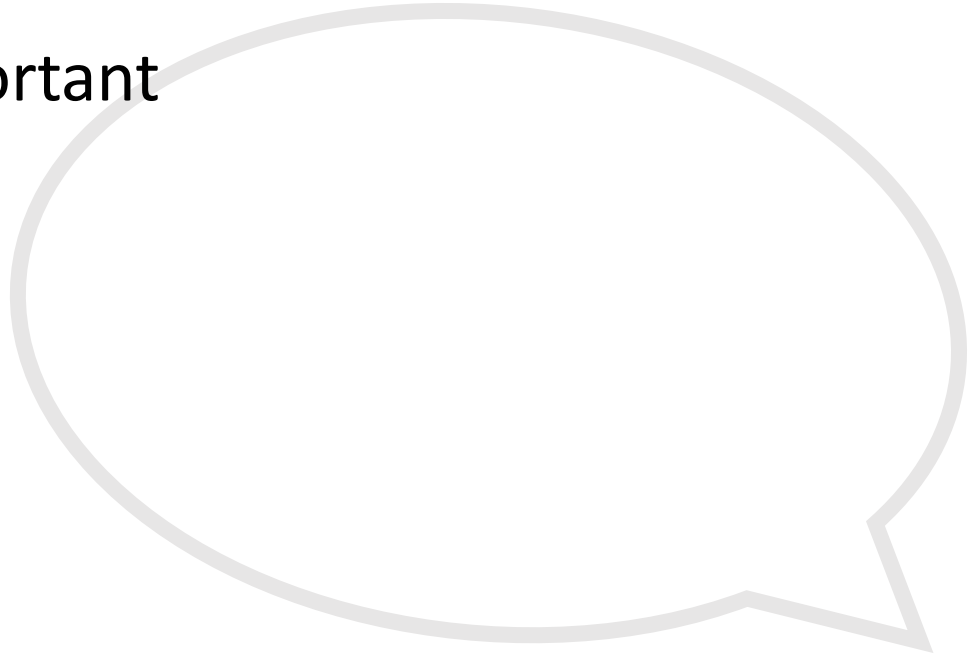
Anything with a location is mappable

It’s not all maps – spatial analysis is important

Not all data is created equal

Lots of software options

Examples of GIS are everywhere!




Questions?

Research Examples

Matt Conner

UC Davis Library

Mapping Social Media

- Snap Chat's Snap Map: https://www.inverse.com/article/43213-snap-map-police-activity-youtube-headquarters

- Twitter (via Carto): https://carto.com/integrations/twitter-maps/

Mapping Academic Literature

- Michele Tobias' research web map: http://micheletobias.github.io/maps/LiteratureMap.html

Ask the Twitterverse:

https://twitter.com/MicheleTobias/status/981609664709197824

Let’s chat!

Groups of 3-4

Preferably with people you don’t know well

Chat about…

- Introduce yourself:
  - Name
  - Department
  - Research topic
- Brainstorm ideas for using maps & spatial data
  - What data do you have that you can make spatial?
  - What kinds of maps would you make? What would they look like?
- What questions do you have?

Report Back

What ideas did your group have?

How to get started…

Tools & Resources

Learning

Options

Traditional Courses: UCD's LDA 150, Geo 200CN; see also American River College

Online Courses: Coursera, Lynda

Workshops: #maptimeDavis, Davis R Users Group

Tutorials, GIS Drop-In Hours

On Your Own: Open Software, give it a try

Formality

Structured, Graded Course

Casual Learning

Software

Software	Fee Structure	Type	Native Operating Systems	Notes	Website
QGIS	Open Source	Graphical User Interface	Mac, Windows, Linux	Growing market share; powerful tools; extensive network of users & tutorials	qgis.org
ArcGIS	Yearly License	Graphical User Interface	Windows	Popular with state & federal agencies in the US; Free tutorials from UCD agreement	arcgis.com
R	Open Source	Programming (R)	Mac, Windows, Linux	Davis R Users Group on campus; D-RUG email list; powerful data processing	r-project.org
PostGIS	Open Source	Database (SQL)	Mac, Windows, Linux	Powerful data processing; no native visualization	postgis.net
ENVI	Yearly License	Graphical User Interface	Windows	Specialized software for Remote Sensing & aerial image processing	harrisgeospatial.com

… these are just a few options.

Ask for help!

Help Resources

GIS Drop-In Hours – Wednesdays 2:00-4:00 – Shields Library Map Room

One-on-One Consultations with GIS Data Curator – email mmtobias@ucdavis.edu

#maptimeDavis Geospatial Skills Workshop Series – Tuesdays 1:00-3:00 – DSI Classroom (room 360 Shields Library)

Geospatial Email List – https://lists.ucdavis.edu search: “geospatial”


Questions?
& evaluation forms