Intro to GIS/QGIS

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Who am I?

Erich Purpur
Research Librarian for Science & Engineering
Brown Science & Engineering Library

-Serve as Liaison to various engineering departments at UVA
-Help people with research
    -information discovery
    -python programming
    -GIS projects
-Teaching
    -For-credit classes and workshops
        -both GIS and python

GIS Experience

-BS in Geography w/ GIS concentration

-Worked on wetlands ecology protection projects

-started offering GIS services (similar to Scholar's Lab) at previous job

-Now:

- -teach GIS related classes and workshops
- -sometimes help people with research projects
- -GIS consulting on the side
- -All QGIS all the time
  - -and other open source tools (python, PostgreSQL)

What will you learn today?

-Familiarity with GIS concepts
-Talk about project workflow
-Self Help

Shortcomings of this workshop

-Limited Time

-Not Specific to your needs

What is QGIS?

-Free and Open Source GIS Software

-An OSGeo project

-packaged with a bunch of other open source libraries and tools

-An alternative to ESRI/ArcGIS

OSGeo

Why use QGIS?

-Because it is free

-Linux and Mac compatible

-Because you are a fan of open source / are a developer

-Maybe you are an ESRI hater?

What can you do with it?

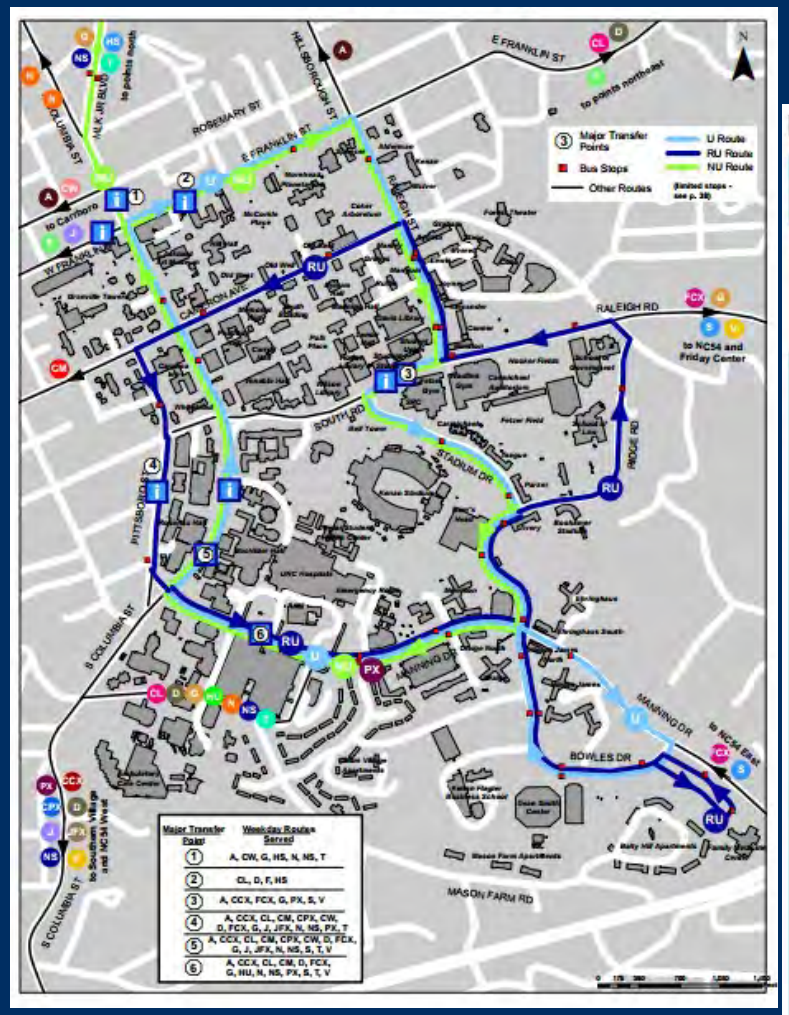
-Pretty much everything you can do with ArcMap, ArcGIS Pro, or ArcGIS online

-different functionality available as well, because people build their own

-same file types as ArcGIS, import between them

How are you using maps today?

Bus Routes



Traffic Map

Flight Tracking Map

What is GIS?

-A computer system capable of assembling, storing, manipulating, analyzing, and displaying geographically referenced information.

What does this mean?

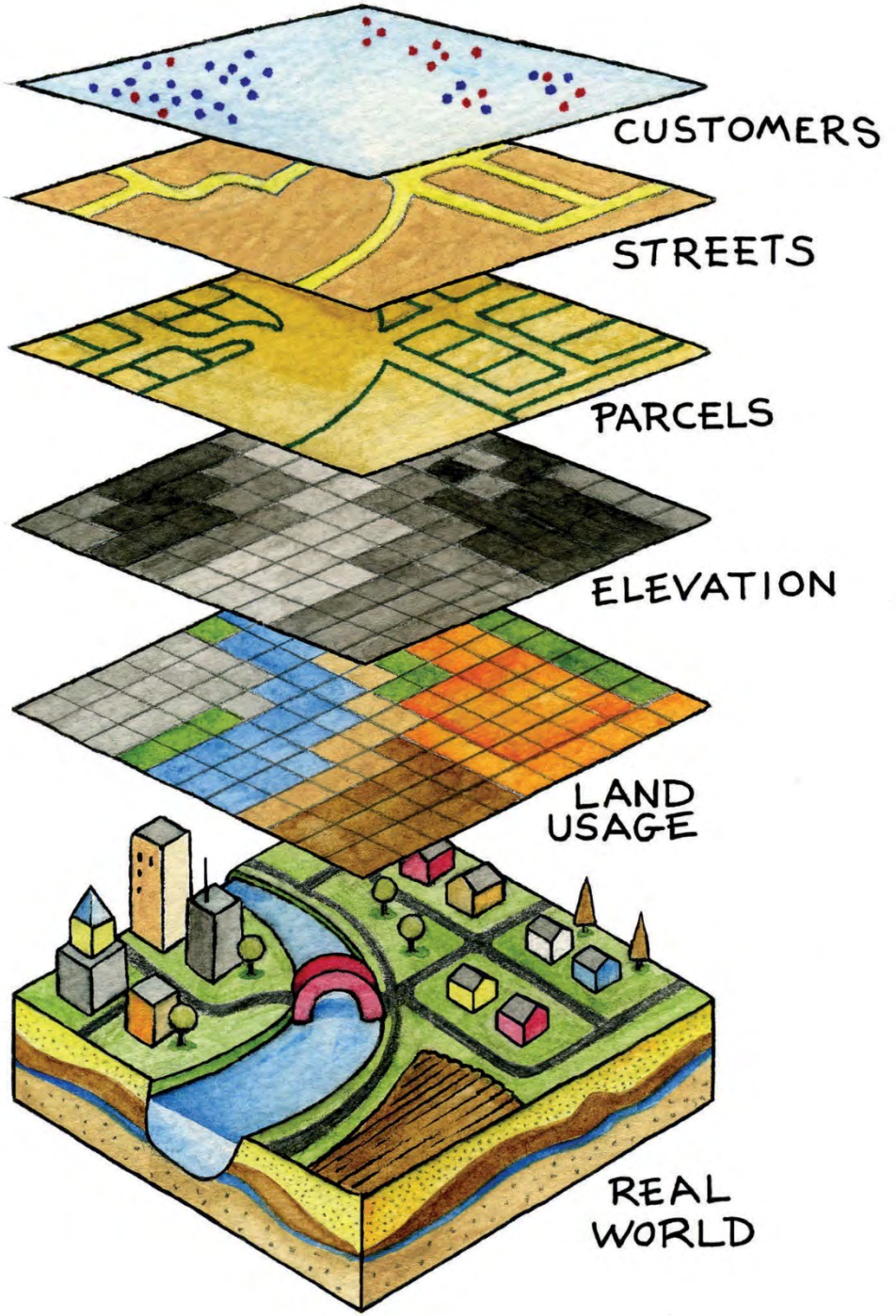
-GIS is a data visualization tool and is useful for looking at spatial relationships and patterns between objects. You can discover and communicate meaningful patterns in your data

-GIS is not scary and is not only for geographers. A GIS is a tool which applies to nearly every field including the sciences, humanities, social sciences.

-The output is a map but the power lies in the data behind the image

-GIS skills are a literacy

What does it look like?



What can you do with GIS?

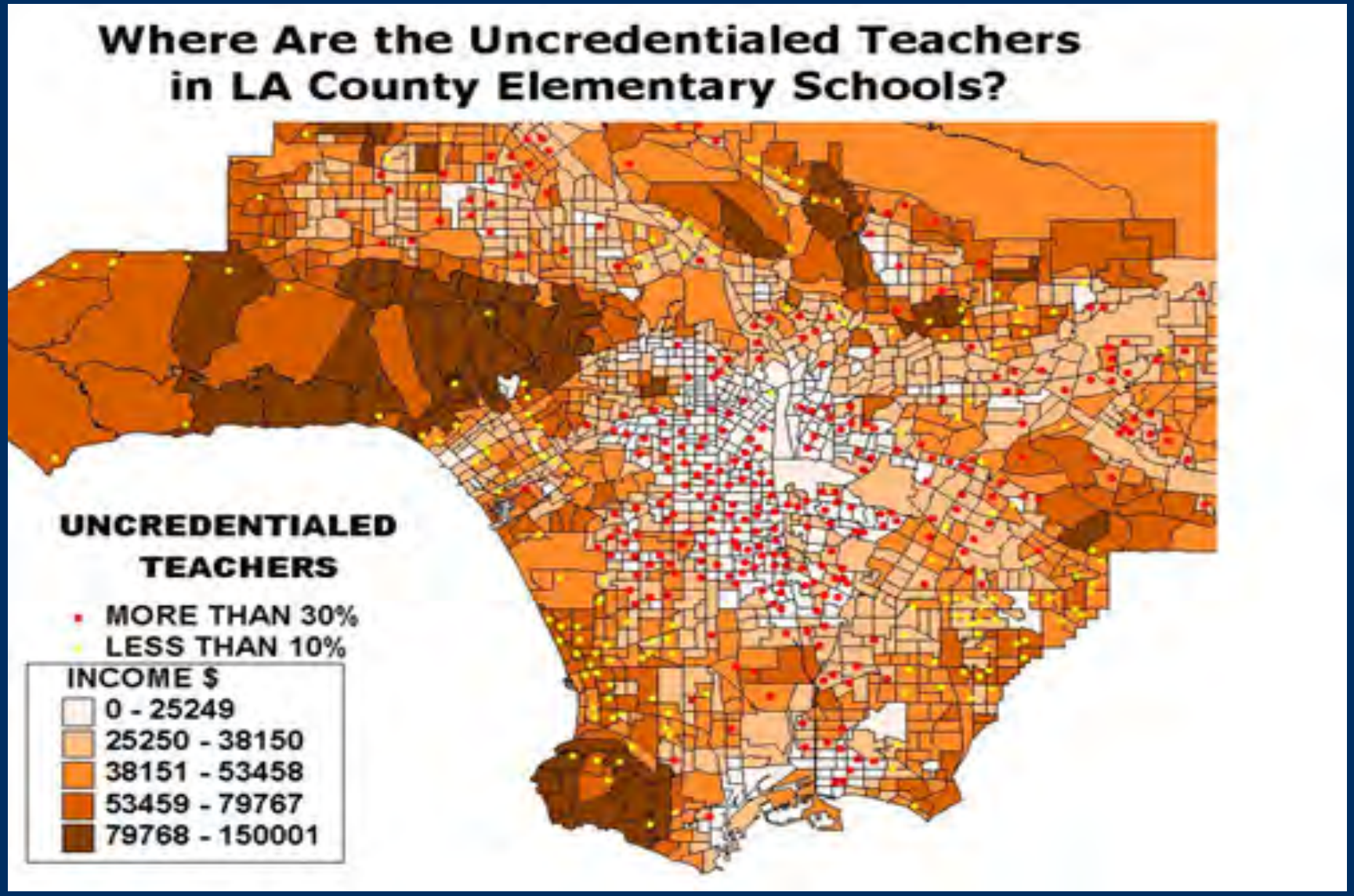
-Show where things are

-Show change over time/track changing data

-See and communicate meaningful patterns in your data

Properties of Real World Geographic Information

-Location
-Attributes
-**Spatial Relationships**



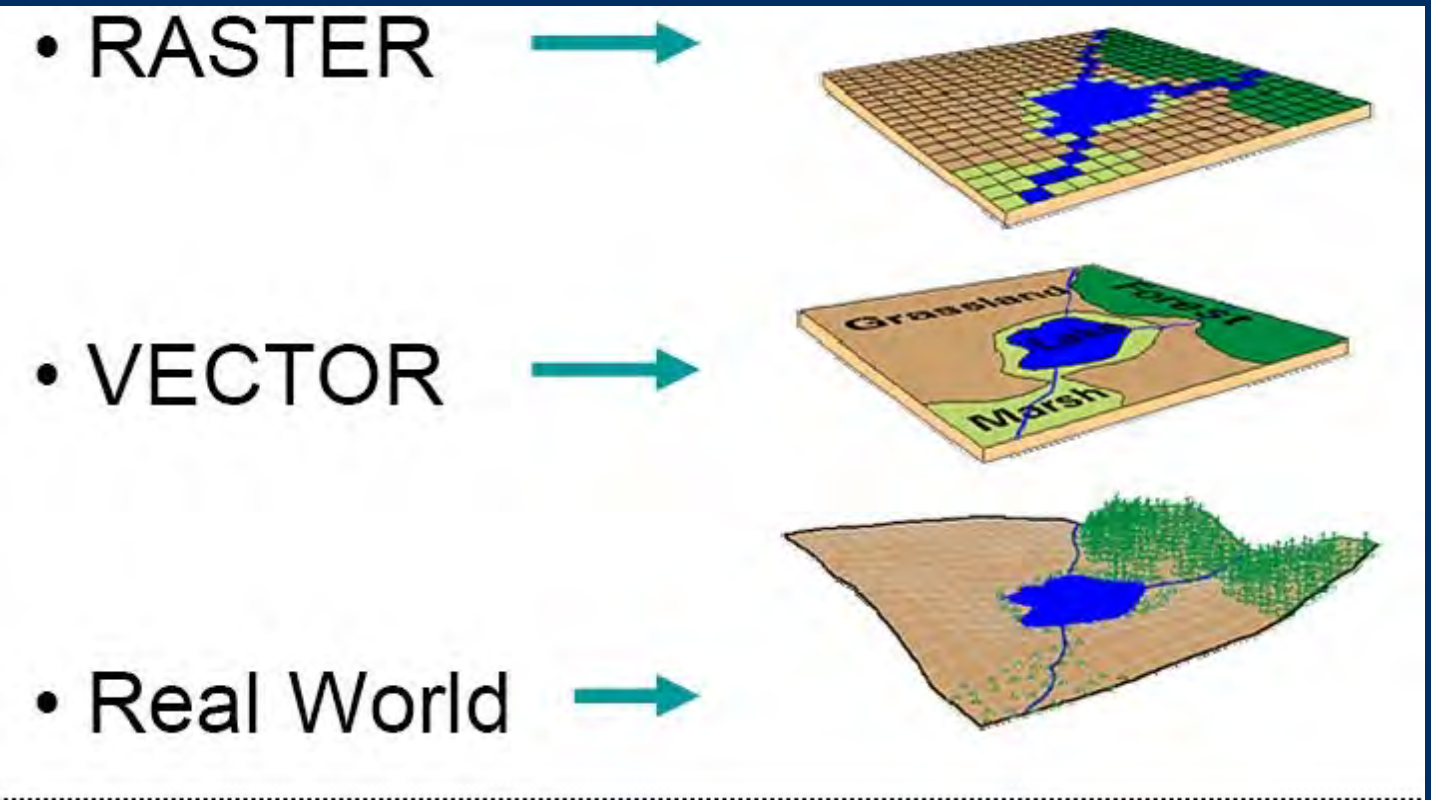
Geographic Reality

-Geographic features are recreated on the computer using Data Models

Vector Data

-Point, Line, Area (polygon)

-Values can be assigned to each point, line, or area



Raster Data

-breaks the earth down into a grid

-each cell represents an area in real life

-Spatial resolution

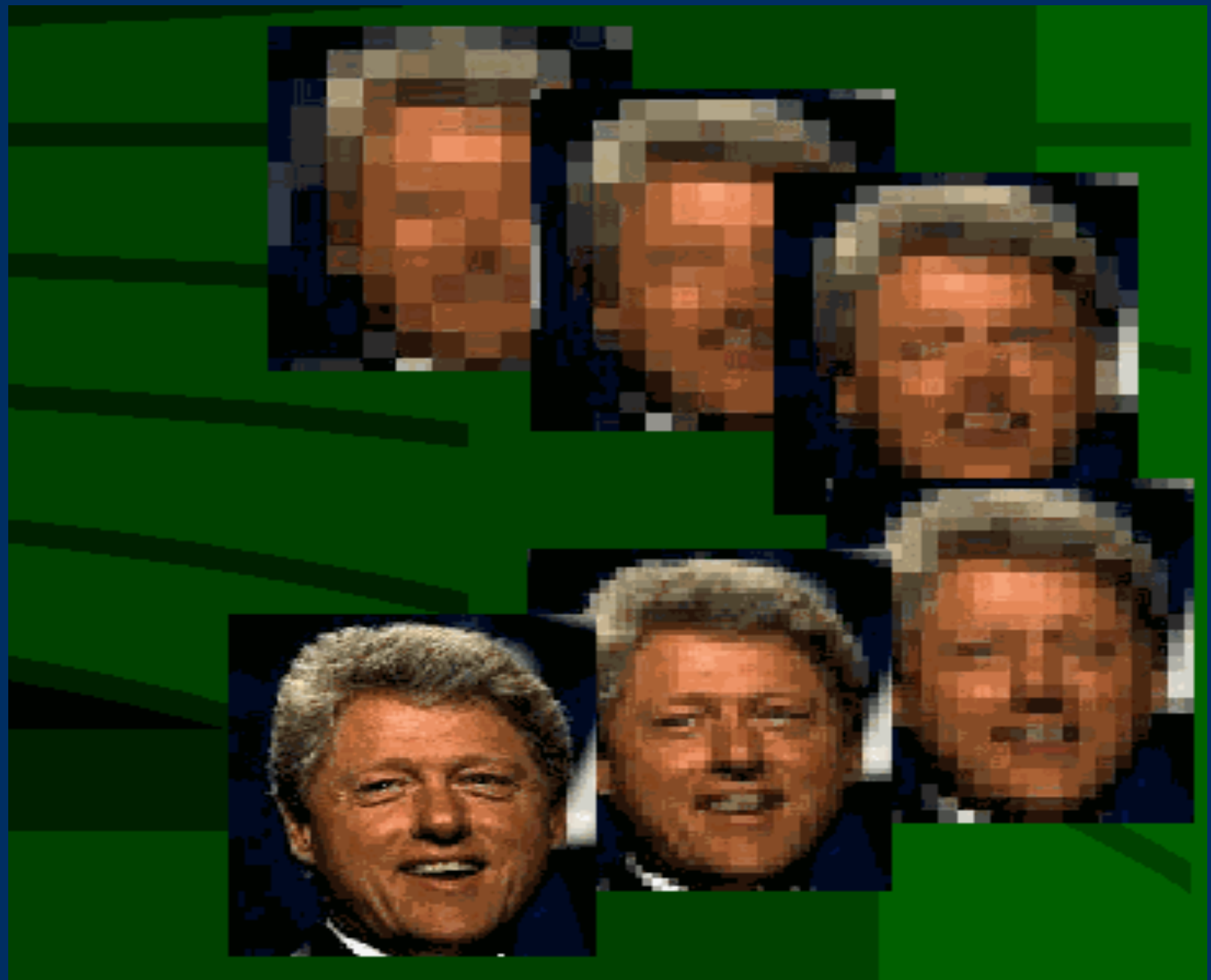
-values are assigned to each grid cell, much like values are assigned to each vector point

-common examples:

-Satellite images

Spatial Resolution

Low Resolution = large area
High Resolution = small area



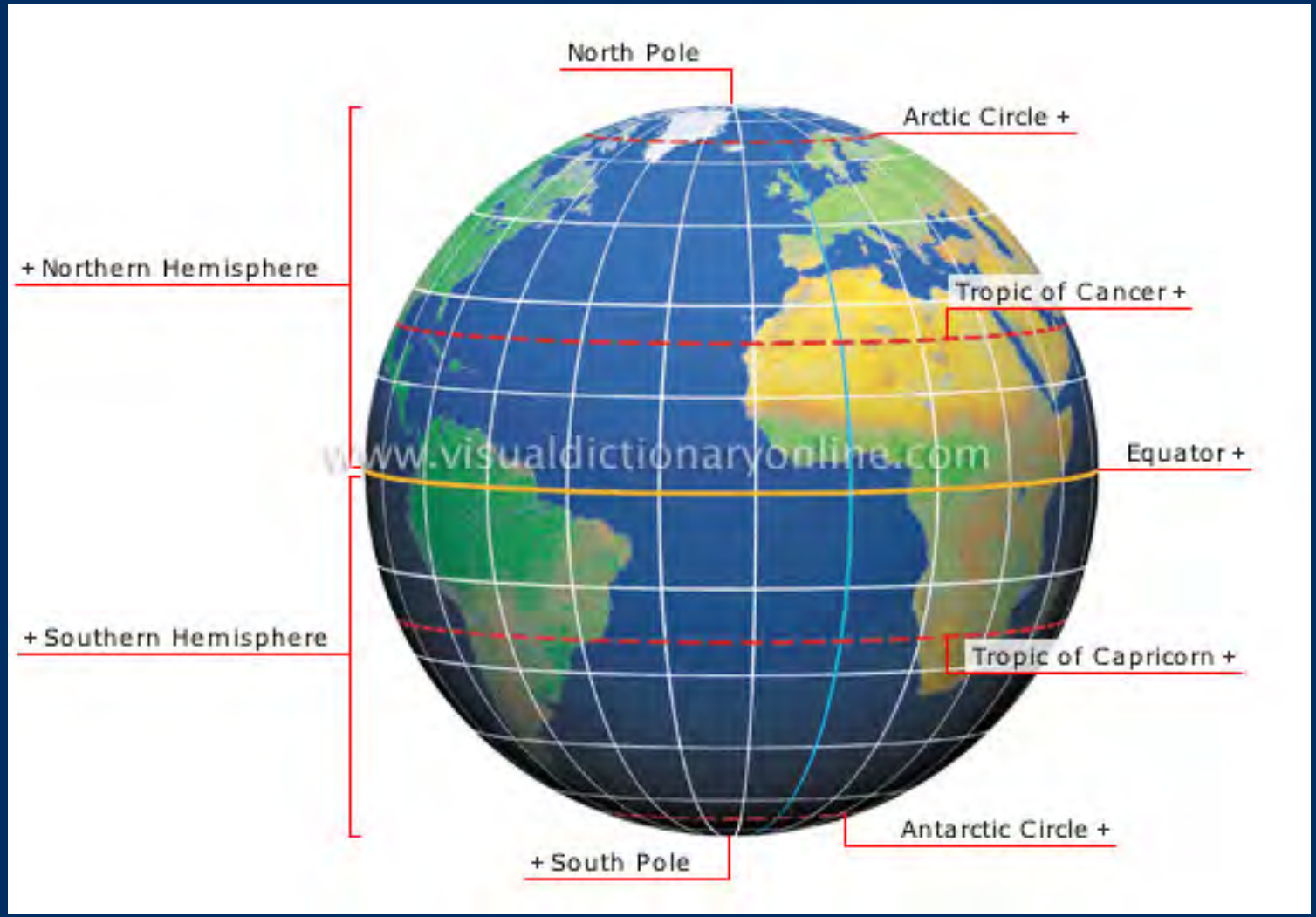
Location of Objects

-the absolute location of objects is determined by coordinate systems

Geographic Coordinate System

-a network of intersecting lines
- -latitude (North/South)
- -longitude (East/West)

-starting point at the intersection of equator and prime meridian



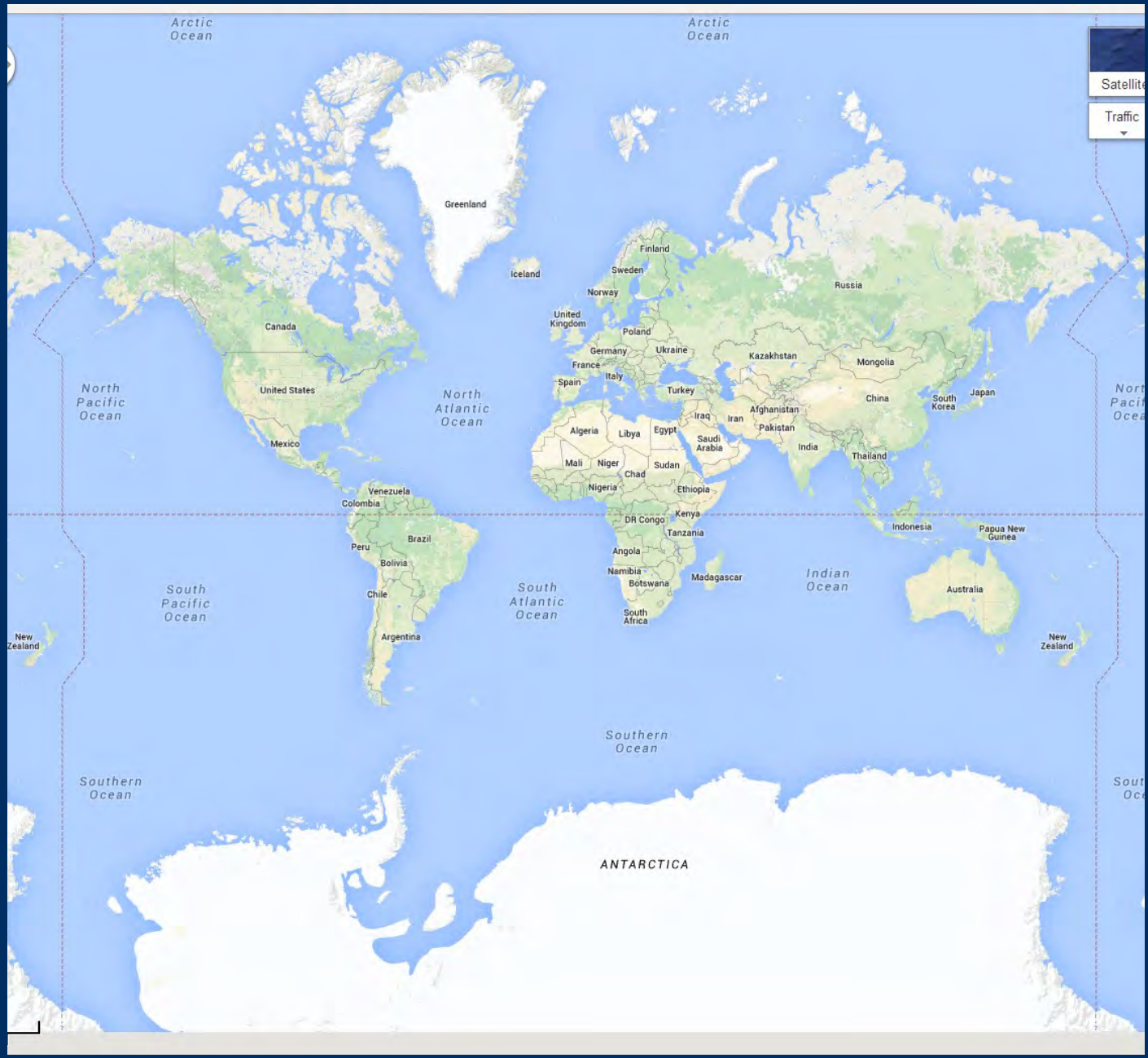
Map Projections

-Because the earth is round, displaying it on a flat surface is problematic

-The image will be somewhat skewed

-Different projections focus on different areas of the earth and attempt to eliminate skew

-Getting data to display in the same map projection is sometimes easier said than done.



www.thetruesize.com

Attributes

-Unlimited amount of attributes can be assigned to an object

-stored in an attribute table

FID	Shape	SCHID	Type	Age	Health
0	Point	00200005	Jack Pine	65	Fair
1	Point	00200305	Jack Pine	55	Good
2	Point	04230010	White Pine	10	Good
3	Point	00300010	Jack Pine	35	Poor
4	Point	00090010	Lodgepole Pine	25	Fair
5	Point	00090020	Lodgepole Pine	20	Good
6	Point	00090305	Lodgepole Pine	20	Good

GIS Projects…

Gathering Data

-often times the hardest part!

-Data can be found…

- -online data repositories (add more info and images)
  - -City of Charlottesville has a data portal
- -remote sensing
  - -taken by satellites in space
- -Digitizing/Scanning paper objects
- -gather it yourself
  - -with a GPS unit
- -sometimes it appears via some form of luck and magic

Data Storage

- -occasionally massive amounts of data are used and storage can be an issue

Self Help!

-There are a lot of resources and a huge user community online
-Your question is not unique

-QGIS Documentation
  - https://www.qgis.org/en/docs/index.html
-ArcGIS Documentation
  - https://doc.arcgis.com/en/
-Stack Exchange – An entire GIS and QGIS arm
  - https://gis.stackexchange.com/
-GeoNet – ESRI's Online Community
  - https://community.esri.com/

How to learn more QGIS

-Follow up with my workbook

-Learning QGIS 3rd Edition – Anita Graser
https://search.lib.virginia.edu/catalog/u7237739

-available through UVA library!

-Ask for more help

-me or Scholar's lab