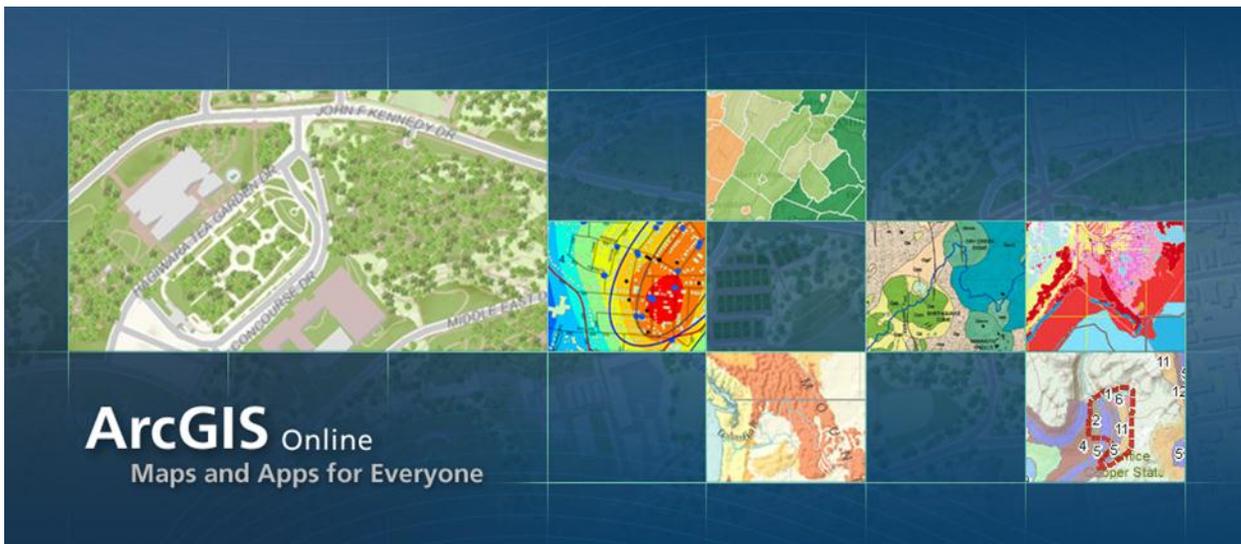


GARP 0544: Cookbook 6 May 2013

Web Mapping and Web GIS

Overview

1. Web Mapping Applications
2. Is Google Earth a GIS?
3. Cool Stuff with Google Earth!
4. ArcGIS Online
5. Homework Assignment #2



1) Web Mapping Sites and Applications

Web mapping applications are websites where you can create dynamic and interactive maps or where you can explore variables of interest in map form.

There are basically three different types of web mapping applications:

1. Web mapping applications that allow you to create dynamic maps, but do not provide you with the underlying data.
2. Web mapping applications that allow you to create dynamic maps and allow you to access/download the underlying data.
3. Web mapping applications that allow you to create dynamic maps using your own geographic information.

Many web mapping applications simply run inside your Internet browser – no special software or apps required. Others, such as Google Earth and ArcGIS Explorer Desktop, require you to download and install a free program or app. Most web mapping applications also provide a series of tools for quantitative analysis.

There are literally 100s of Web Mapping Applications out there! Compilations:

- <http://edcommunity.esri.com/software/webmapping/>
- <http://www.westfield.ma.edu/cbraun/resources/gis-resources/>

Microsoft Research Maps

URL: <http://msrmaps.com/>

Microsoft Research Maps (formerly TerraServer) is a great website and provides fast and easy access to topographic maps and aerial photographs anywhere in the USA. The maps and photographs can be displayed in different sizes and downloaded as JPG files. Microsoft Research Maps is not as ‘fancy’ as Google Earth or Bing maps, but provides what you want without a flashy interface.

bing Maps

URL: <http://www.bing.com/maps/>

Microsoft’s answer to Google Maps with stunning imagery, cool Bird’s eye view, and a 3D view option (requires free browser plug-in). Bing also allows interactive, personal mapping and content, similar to Google My Maps.

Historic Topographic Maps of New England and NY

URL: <http://docs.unh.edu/nhtopos/nhtopos.htm>

This is a great website hosted by UNH with a complete digital collection of historic topographic maps for New England and New York. Westfield, for example, goes back to 1895!

Open Street Map

URL: <http://www.openstreetmap.org/>

OpenStreetMap is a free editable map of the whole world. It is made by people like you. OpenStreetMap allows you to view, edit and use geographical data in a collaborative way from anywhere on Earth.

MassDOT Pictometry

<http://www.massdot.state.ma.us/planning/Main/MapsDataandReports/Maps/InteractiveMaps/Pictometry.aspx>

This is the MassDOT web-based Oblique Imagery Viewer and provides access to the entire Massachusetts statewide digital color oblique image library. MassDOT purchased an image library, captured in 2008, comprised of 8-inch resolution oblique imagery (images taken at approximately a 45 degree angle), captured from four directions (north, south, east, and west), plus the nadir (overhead view).

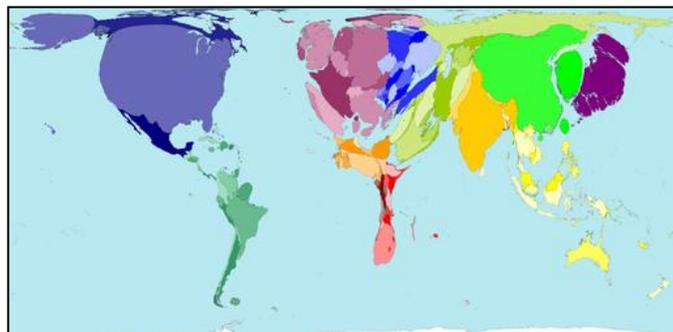


Worldmapper

URL: www.worldmapper.org

Worldmapper is a collection of world maps, where the countries are re-sized on each map according to the subject of interest. Map categories of interest related to energy are:

- Resources
- Fuel
- Pollution
- Production
- Transportation



Best of all: The data used for each of the maps is included for download as MS Excel files for further analysis.

Gapminder

URL: <http://www.gapminder.org/>

Gapminder is a non-profit venture promoting sustainable global development and achievement of the United Nations Millennium Development Goals by increased use and understanding of statistics and other information about social, economic and environmental development at local, national and global levels. Gapminder allows you to visualize data for countries as charts, maps, and time-animations thereof.

MassGIS OLIVER

URL: http://maps.massgis.state.ma.us/map_ol/oliver.php

OLIVER is MassGIS' premier data viewer and download application. You can:

- Interactively display and query nearly all of MassGIS' data
- Download up-to-date shapefiles from our database, with legend files
- Overlay MassGIS data onto other basemaps such as Google Terrain

USGS The National Map

URL: <http://viewer.nationalmap.gov>

The National Map is a collaborative effort among the USGS and other Federal, State, and local partners to improve and deliver topographic information for the United States. It has many uses ranging from recreation to scientific analysis to emergency response. The National Map is easily accessible for display on the Web, as products and services, and as downloadable data. The geographic information available from The National Map includes orthoimagery (aerial photographs), elevation, geographic names, hydrography, boundaries, transportation, structures, and land cover.



The National Map provides a series of sophisticated viewers to visualize the data, create custom maps, and download data: <http://nationalmap.gov/viewers.html>

The National Atlas

URL: <http://nationalatlas.gov/mapmaker>

Nationalatlas.gov is the new National Atlas of the United States.

Congress authorized the preparation of a newest national atlas in 1997 and the USGS was assigned to coordinate and lead the effort of more than 20 Federal agencies. Like its predecessor, this new atlas provides a comprehensive, map-like view into the enormous wealth of geospatial and geostatistical data collected for the United States. It is designed to enhance and extend our geographic knowledge and understanding and to foster national self-awareness.



The website provides access to a dynamic map maker application, map layers, printable maps, information, and the underlying geographic data.

NationMaster

URL: <http://www.nationmaster.com/index.php>

Data and maps for countries based on data from the CIA World Factbook. You can easily compare countries and assess data relative to population.

StateMaster

URL: <http://www.statemaster.com/index.php>

StateMaster is a statistical database which allows you to research and compare a multitude of different data on US states. StateMaster compiled information from various primary sources such as the US Census Bureau, the FBI, and the National Center for Educational Statistics. More than just a mere collection of various data, StateMaster goes beyond the numbers to provide you with visualization technology like pie charts, maps, graphs and scatterplots. StateMaster also has thousands of map and flag images, state profiles, and correlations.

Hypercities

URL: <http://hypercities.ats.ucla.edu/>

HyperCities is a research and educational platform for traveling back in time to explore the historical layers of cities in an interactive web mapping application.



Social Explorer

URL: <http://www.socialexplorer.com/pub/home/home.aspx>

Social Explorer is an online research tool designed to provide quick and easy access to current and historical census data and demographic information. The easy-to-use web interface lets



users create maps and reports to better illustrate, analyze and understand demography and social change.

The free edition is nice, but Westfield State offers the full access to all Census and American Community Survey data from 1790 to today at any geographic level as dynamic maps or MS Excel tables. Access is automatic from anywhere on-campus.

Off-campus login for Social Explorer:

- <https://scroll.lib.westfield.ma.edu/login?url=http://www.socialexplorer.com/> or
- <http://lib.westfield.ma.edu/quicklinks.html> and click-on Social Explorer

WorldMap

URL: <http://worldmap.harvard.edu/>

WorldMap is a collaboratively edited, multilingual, free internet mapping electronic media site open to everyone that is housed at the Center for Geographic Analysis at Harvard University and accessible at the WorldMap website. It makes it possible for those who are not experts in GIS and web mapping to explore, visualize, and share their research materials in a GIS spatial framework, enhancing their ability to conduct academic research, community service projects, and instructional activities.



ArcGIS Explorer Desktop

URL: <http://www.esri.com/software/arcgis/explorer/index.html>

ArcGIS Explorer Desktop is a free GIS viewer / virtual globe / geo-browser that gives you an easy way to explore, visualize, and share GIS information. ArcGIS Explorer adds value to any GIS because it helps you deliver your authoritative data to a broad audience.

With ArcGIS Explorer, you can:

- Access ready-to-use ArcGIS Online basemaps and layers.
- Fuse your local data with map services to create custom maps.
- Add photos, reports, videos, and other information to your maps.
- Perform spatial analysis (e.g., visibility, modeling, proximity search).

With ArcGIS Explorer Desktop is essentially ESRI's response to Google Earth. It offers some additional capabilities because you can easily use real GIS data and maps.

Microsoft WorldWide Telescope

URL: <http://www.worldwidetelescope.org/Home.aspx>

Web Client: <http://www.worldwidetelescope.org/webclient/> (runs best in Internet Explorer)



Microsoft WorldWide Telescope is Microsoft’s answer to Google Earth or ArcGIS Online, but optimized for space and astronomy. However, you can also explore the Earth using the Bing images.

There are two different client applications that allow you to access the features of WorldWide Telescope. The Windows Client runs on a Windows. The Web Client is a browser-based version of WorldWide Telescope for Windows PC and Intel Mac OS X user. The Web Client version of WorldWide Telescope offers a subset of the features from the WorldWide Telescope Windows Client.

<http://www.worldwidetelescope.org/WhatIs/WhatIsWWT.aspx?Page=WebClient>

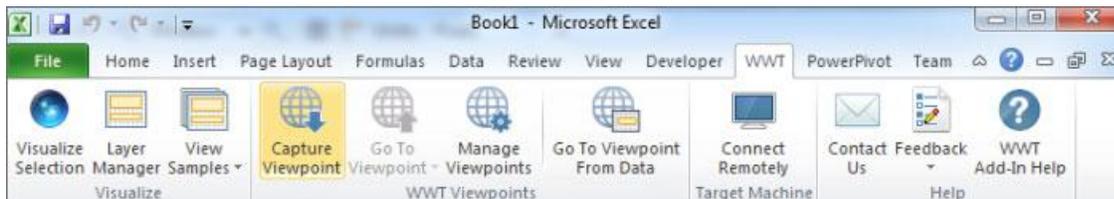
Microsoft Layerscape

URL: <http://www.layerscape.org/Home/Index>

The WorldWide Telescope (WWT) Layerscape application enables the seamless viewing of the earth, the solar system, and outer space. WWT enables your computer to function as a virtual telescope - bringing together imagery from the world’s best ground- and space-based telescopes for the exploration of the earth and universe.

- WWT in combination with the Excel Add-in makes it easy for you to bring your data into a powerful visualization engine
- Helps transform your data into information by combining freedom of perspective with spatial/temporal rendering and playback
- 3D environment with transparency control supports data whether it be on, below, or above the Earth’s surface
- Time-series data support allows ephemeral data to appear and disappear as time elapses for upwards of 500,000 data points
- Supports point, vector and raster data including map overlays, well known text, shape files, Excel spreadsheets, CSV and more
- Story-authoring tools allow you to create rich interactive 3-D visualizations and narratives

Suppose you have spatial data that is time-tagged, so your minimum data set is a location—latitude and longitude - and a date. And suppose your data is in an Excel spreadsheet. By installing the WorldWide Telescope Add-in for Excel, you can highlight and “push” your data into the visualization environment in seconds. Update your data, and the visualization updates automatically. Save the data, send it to a colleague, and they can see what you’re working on and add their data. The collaboration possibilities are many after just a few minutes of learning about the new Excel ribbon.



2) Is Google Earth a GIS?

The answer depends on your point of view...the consensus seems to be that Google Earth is not a real GIS, but instead a 'GIS light' A few comments:

- You cannot perform real quantitative data analysis in Google Earth, beyond measuring simple distances and area (which is actually very useful!).
- The available data in Google Maps are limited and a bit old at times. That's a big contrast to a real GIS for which there are (almost) unlimited data available.
- Google Earth is more advanced (with 3-D views, animations, and more recent images), but otherwise very similar to Google Maps.

However, Google Maps and Google Earth are not supposed to be real GIS, so they do what they are supposed to do extremely well in my opinion. Google Maps is a bit simpler than Google Earth, but you do not need to download any software – all you need is a web browser and you can share your maps with everyone.

Background Information

The main player in the GIS market is a company called ESRI (www.esri.com) – they dominate the GIS world a bit like Microsoft dominates the PC world. Their main software product is ArcGIS, which we are using here at Westfield State.



An alternative to ESRI products and ArcGIS are free open-source GIS software programs:

- Quantum GIS (<http://www.qgis.org/>)
- Map Window GIS (<http://www.mapwindow.org/>)

Try those – they work quite well, but are currently no match for ArcGIS in terms of functionality.

Some people think that Google may develop a free online GIS by adding tools and analysis functions to Google Maps and/or Google Earth. The argument is that the majority of GIS users only need perhaps 1 percent of the capabilities of ArcGIS, so Google may create an online GIS that is sufficient for many applications.



That would be appealing, for example for small towns who cannot afford to keep a GIS Analyst on staff, but need some GIS mapping, for example to delineate building parcels. A simple 'Google GIS' may be sufficient for them, much cheaper, and much easier to use. On the other hand, for us, the dominance of ArcGIS means that there are plenty of job opportunities for you when you graduate, especially if you complete the GIS Minor.

I tend to combine ArcGIS and Google Maps/Earth. The real GIS mapping and analysis is done in ArcGIS, but it is often helpful to export the maps into Google Maps/Earth to share them with people that I collaborate with who do not have the ArcGIS software.

3) Cool Stuff with Google Earth!

Google Earth is a free virtual globe or geo-browser (<http://www.google.com/earth/index.html>)

The Fun Side of Google Earth

- Explore the world.
- 3D Buildings
- Get Directions
- Google Street View, Flight Simulator

The Quantitative Side of Google Earth

- View Historical Imagery.
- Measure Distances (straight-line and path)

The Creative Side of Google Earth

- Create your own maps.
- Make your maps fun with 3D effects, animations, embedded photographs, and embedded videos.
- Save and share your own maps.

Google Earth Help

<http://support.google.com/earth/?hl=en>

Google Earth Tutorials

<http://www.google.com/earth/outreach/tutorials/index.html>

<http://support.google.com/earth/bin/answer.py?hl=en&answer=176576&ctx=cb&src=cb&cbid=-n20glcotm558>

Google Earth vs. Google Earth Pro

Google Earth Pro includes additional features, data, and tools, for example:

- Advanced Measurements: Measure parking lots and land developments with polygon area measure, or determine affected radius with circle measure.
- High-resolution printing: Print Images up to 4800x3200 px resolution
- Exclusive Pro data layers: Demographics, parcels, and traffic count
- Spreadsheet Import: Ingest up to 2500 addresses at a time, assigning placemarks and style templates in bulk
- GIS import: Visualize ESRI shapefiles (.shp) and MapInfo (.tab) files
- Movie-Maker: Export Windows Media and Quicktime HD movies, up to 1920x1080 resolution

More Information:

<http://support.google.com/earth/bin/answer.py?hl=en&answer=189188&topic=2376997&ctx=topic>

Unfortunately, this comes at a cost for \$399 per license, but WSU has a grant for Google Earth Pro!

4) ArcGIS Online

URL: <http://www.arcgis.com/home/>

= *Maps for Everyone!*

Here you can create maps that can be viewed in a browser, ArcGIS Desktop, or on mobile devices. You can share your map via Email, on a blog, or embed it in a website.

Three ways to access ArcGIS Online

1. Create an ESRI Global Account at <https://webaccounts.esri.com/cas/index.cfm> and then register the account for ArcGIS Online at <https://www.arcgis.com/home/signin.html>
2. Create a Personal Account here: <https://www.arcgis.com/home/signin.html>
3. Use without an account at <http://www.arcgis.com/home/index.html> (you need an account to save and share maps).

Two great ways to use ArcGIS Online

- Use the simple and effective map viewer at <http://www.arcgis.com/home/webmap/viewer.html>
- Use the more sophisticated ArcGIS Explorer Online: <http://explorer.arcgis.com/> (requires Microsoft Silverlight = does not run on iOS).

Great Resources

- Video Tutorials:
<http://help.arcgis.com/en/arcgisonline/help/index.html#/Videos/010q00000003000000/>
- Help and Support:
<http://help.arcgis.com/en/arcgisonline/help/index.html#/Overview/010q00000002000000/>
- More resources and tutorials:
<http://www.westfield.ma.edu/cbraun/resources/gis-resources/>



5) Homework Assignment #11

This assignment consists of three parts: a Google Earth map, an ArcGIS Online map, and a series of questions to provide bigger picture context in terms of applications – what can you do with this?

Part 1: Create an interactive 3D Google Earth map with embedded photographs and videos.

- Your map has to have at least five placemarkers, lines, or polygons.
- Your map has to have animated 3D effects.
- At least one feature has to be linked to a photograph.
- At least one feature has to be linked to a YouTube video.
- At least one feature has to be linked to a website.
- Share this map with me as a KMZ file as an Email attachment.

Part 2: Create a map with ArcGIS Online.

- Choose the baselayer(s) you want.
- Add at least 5 spatial features (you have to have at least 1 point, 1 line, and 1 polygon feature).
- At least 2 of these spatial features have to include an image that is linked to a website.
- Share this map with me as a link via Email.

Part 3: Consider the following questions.

1. What are the differences between Google Earth and ArcGIS Online?
2. Think about applications – what can you do with Google Earth and ArcGIS Online? Consider private use, commercial use, use for other classes at WSU, and use in research projects and provide at least one example for each application.
3. Measure the length of Bates Hall in Google Earth and ArcGIS Online as precisely and as accurately as possible and compare your results. Is there a difference between your Google Earth and ArcGIS Online measurements? If so, why? If not, why?
4. In your opinion: Are Google Earth and ArcGIS Online a GIS? Explain your reasoning.

Deliverables

Please submit professional, well-written report using proper English language and professional formatting and layout that covers all four questions. Think in terms of using this report as a writing sample of your work for a job interview.

- Include a cover page and page numbers in the page footer.
- Your report will have about 3 pages in total (cover page and ~2 pages of writing).
- Due Date: Monday 13 May 2013 at the beginning of class.
- Grading: 10 points for each of the four questions = 40 points, 30 points for the Google Earth map, 30 points for the ArcGIS Online map, 100 points maximum.

➔ Contact me for help or clarification of this assignment or my expectations as needed.