WorldMap
a Spatial Perspective for Collaborative Research & Education

Build your own mapping portal and publish it to the world or to just a few collaborators. WorldMap is open source software.
Why WorldMap & what are its features?

A brief history of WorldMap
  • Purpose & Features – visitation & userser

Basic Concepts & Definitions
  • Layers – a virtual stratigraphy
  • Spherical Mercator – the Google/Bing projection
  • Base map options – Google & OpenStreetMap

Simple Examples
  • Georeferenced aerial photos – Tunisia 1974
  • Georeferenced topographic maps – Giza
  • Political boundaries – Cyprus 1975

Online Georeferencing – warp.worldmap.harvard.edu
Large Scale Maps with extensive micro data
Web Services

Sites & Documentation – integration with the Dataverse Network
  Mediterranean Coast GIS -Phoenician Harbor in Cyprus
  Middle East Spatial Collaborative

Jeff Howry - Harvard University - May, 2012
WorldMap provides researchers with the ability to:

- [http://about.worldmap.harvard.edu](http://about.worldmap.harvard.edu)
- **Upload** large datasets and overlay them up with thousands of other layers
- **Create and edit maps** and link map features to rich media content
- **Share edit or view access** with small or large groups
- **Export data** to standard formats
- Make use of powerful **online cartographic tools**
- **Georeference** paper maps online
  - [http://warp.worldmap.harvard.edu](http://warp.worldmap.harvard.edu)
- **Publish** one’s data to the world or to just a few collaborators

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Since the release last July 2011:

- 3,891 registered users
- 4,216 data layers – 61,180 fields
- 1018 maps published
- 138,000 visitors from every country in the world
- 700 visitors / day average
Africa Map – 2009 release of Phase 1 provides demonstration of concepts and some functionality

**Purposes**

- Make data available for research projects and public use
- Provide a repository for maps and data that would be difficult to access after a project is completed.
- Encourage collaboration among researchers
- Provide resources not easily found and readily
- 1 million place name gazetteer that is searchable
- Locational reference to online images, videos & web services
- Provide political, ethnographic and language data previously scattered in many sources.

**Demonstrate the uses for web-based GIS** – no longer requires sophisticated desktop software to accomplish fundamental tasks like georeferencing maps [warp.worldmap.harvard.edu](http://warp.worldmap.harvard.edu)

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What is WorldMap?

• A new way to share geospatial information
• Blends library and workbench
• Online creation and publishing
• Fine-grained access control
• Service oriented architecture
• Collaboration at levels of code, hosting, and functionality
• Online analysis ... coming soon
WorldMap Allows One to...

- **Discover** data and visualize it in new ways
- **Organize** one’s own (large) mapping datasets online
- **Mashup / Overlay** one’s data with those of others
- **Animate** change over time for large datasets
- **Collaborate** by letting several people edit the same map
- **Publish** your data to the world or to just a few collaborators

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Names and Concepts across the Geography Spectrum

- Cartographers – among the first ‘geographers’
- Arab & Greek Geographers – Ptolemy (2nd Cent. C.E.)
- Central Place Theory
- Economic Geography
- German vs. British schools of geography
- Location Theory
- Political Geography
- Tourism Geography
- Human Geography
- Ecotourism
What is the result of the overlay of 3 maps? Logical combination (overlay) of information layers (thematic maps) to derive new spatial information.
Geographic Information Software

... Is Evolving

- Server Centric
- Networked
- Many Clients
- Internet Based
- Loosely Coupled

http://140.112.64.84/course/GIS_Intro/Week01/concept/1-2.htm
• **Cloud Services** – application hosting in a remote data center with high-availability and the ability to expand (add more servers) or reduce resources depending upon user demand.

  *WorldMap* runs on Amazon’s Cloud [aws.amazon.com/ec2](http://aws.amazon.com/ec2)

• **Web-based application** deployment requires no on-site IT support except a broad Internet connection and user laptops/desktops.

  *WorldMap* – uses Firefox, Internet Explorer & Chrome
Georeferencing – a system for referencing information to a position on the earth’s surface

Coordinate System – Universal Transverse Mercator (first adopted in US 1930’s)

The transverse Mercator projection orients the ‘equator’ north-south (through the poles), thus providing a north-south oriented swath with *little distortion.*

geology.isu.edu/geostac/Field_Exercise/topomaps/utm.htm

#1 Story Street, Cambridge, MA
(from Google Earth)

42°22'26.89"N  71° 7'18.59"W
42.374136      -71.121831

The decimals can be carried out to four places, resulting in a notation of “DD.XXXX”. When using four decimal places, the decimal degree system is accurate to within ± 36.5 feet (11.12 m).

*Google and Bing* both use a ‘spherical projection’ of *imagery tiles* which differs from the traditional ‘flat’ projection systems commonly used on maps.
Images

**Raster Image** - made up of a specific number of dots. If you blow up a raster graphic it will look blocky, or "pixelated."

Common formats - .BMP, .TIF, .GIF, .JPG – Typical file formats

[www.techterms.com/definition/rastergraphic](http://www.techterms.com/definition/rastergraphic)

**Vector** - comprised of paths, which are defined by a start and end point, along with other points, curves, and angles along the way. A path can be a line, a square, a triangle, or a curvy shape.

.AI, .EPS, .SVG, .DRW - Typical file formats.

[www.techterms.com/definition/vectorgraphic](http://www.techterms.com/definition/vectorgraphic)

In GIS work, **raster images** are the basic type of images that are georeferenced and then added as a layer in a GIS project.

GIS applications often produce **vector images** that are the end result of creating polygons or other areas.

[http://www.stonecourses.net/environment/gis2.html](http://www.stonecourses.net/environment/gis2.html)
GPS – Global Positioning System

There are at least 24 operational GPS satellites at all times plus a number of spares. The satellites, operated by the US DoD, orbit with a period of 12 hours (two orbits per day) at a height of about 11,500 miles traveling at 9,000 mph (3.9km/s or 14,000 kph). Ground stations are used to precisely track each satellite's orbit.

http://www.pocketgpsworld.com/howgpsworks.php
WorldMap Foundation:
Open Source Code

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Basic Architecture

WorldMap Architecture V.1.1

- Items in bold are areas of concern for scaling.
- Dotted items will be implemented later.

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WorldMap in the Classroom

- “World Religions and Multicultural America” taught by Diana Eck
- “Reinventing Boston: The Changing American City” taught by Rob Sampson and David Luberoff
- “Societies of the World 28” taught by Kelly O’Neill
- “Environmental Management of Tourism Development” taught by Megan Epler Wood
  - Ile-Ife http://worldmap.harvard.edu/maps/834/DX2
- “Chinese History 200R”, “Societies of the World 12”, “Culture and Belief 26” taught by Peter Bol
- Approx 8 more coming
**Backgrounds** – Google: Terrain, Streets, Satellite

OpenStreetMap – ESRI Imagery - Bing Maps with Labels

Hint: Windows+Shift key permits selecting a zoom window | Mac uses Shift+Command+Left Click
Build your own mapping portal and publish it to the world or to just a few collaborators. WorldMap is open source software.

http://worldmap.harvard.edu/maps/search?sort=last_modified&dir=DESC

JUMP TO LIVE DEMO
Georeferencing Images
Tunisia 1974 – Aerial Imagery

http://worldmap.harvard.edu/maps/neareastcollab/DX6

Ariana 132
Right Corner of Aerial
Mosaic view
Georeferenced topographic maps – Tunis
http://worldmap.harvard.edu/maps/mideastcollab/BJC
Political boundaries – Cyprus 1975
http://worldmap.harvard.edu/maps/neareastcollab/DYX
Kition – close-up of the port’s original location
http://worldmap.harvard.edu/maps/MedCoastGIS/BZo

Clicking on “Link” button in the WorldMap navigation bar and then the Kition marker provides metadata, including a URL to the publication of a study about sailing the Cypriot coast:
http://hdl.handle.net/1902.1/15837
Connecting to the Mediterranean Coast GIS Dataverse

http://dvn.iq.harvard.edu/dvn/dv/MedCoastGIS/faces/study/StudyPage.xhtml?globalId=hdl:1902.1/15837

"Navigating from Salamis to Kition, Cyprus"
Click on Data & Analysis tab.
Viewing of Layers is controlled by “Permissions”

**Phoenician Ports-Mountains-Sites**

Abstract: Phoenician Ports-Mountains-Sites

| Type: Vector Data |
| Keywords: Phoenician Ports Mountains Sites |
| Category: Place Locations |
| Citation: copyright |
| Owner: howry |
| Point of Contact: howry |
| Attributes: Id, Lat, Diverse_Lin, Long, Site_Type, Site_Name, |
| Bounding Box: SRID=EPSG:4326;POLYGON((-8.666022 35.905584, -8.666022 38.640646, 33.3940065811141 33.640846, 33.3940065811141 35.905584, -8.666022 35.905584)) |
| Native SRS: EPSG:4326 |

**Download**

Data: Zipped Shapefile GML 2.5 GML 3.1.1 CSV Excel GeoJSON GeoTIFF JPEG PDF KML View in Google Earth

Layer Metadata: TG21

Maps Which Use This Layer

- Antiquity and Today - Training for WorldMap
- Mediterranean Coast GIS

Layer Views

This layer has been viewed 131 times by 91 users.

Layer Styles

The following styles are associated with this data set. Choose a style to view it in the preview to the left. Click on a style name to view or edit the style.

- Ports_Milton_Dyn_Far SLD
  - Default style: Ports_Milton_Dyn_Far
  - Google new style

**Manage Layer**

- Update the description of this data
- Upload a new version of this data
- Remove

**Permissions**

Who can view or download this?
- Anyone
- Any registered user
- Harvard Users
- Only users who can edit

Who can edit this?
- Anyone
- Any registered user
- Harvard Users
- Only users who can edit

Who can manage and edit this?
- Anyone
- howry

Who can manage and edit this?
- Add user...
WorldMap and the Dataverse Network can be restricted to selected individuals or shared with the world.

The control remains with creator of the WorldMap or individual layers can be selectively displayed or shared.
Features in Development…

- Time Animation of large datasets
- Mobile client
- Annotation
- Ranking commenting tools
- Place name gazetteer
- Spatial analysis tools
- Heatmap visualization tools
- Integration with Dataverse Network

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More info – about.worldmap.harvard.edu

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Resources

Center for Geographic Analysis  cga.harvard.edu
Harvard Geospatial Consortium
http://calvert.hul.harvard.edu:8080/opengeoportal/
Worldwide data (free)  www.diva-gis.org/gdata
Eden Project (free)  ergodd.zoo.ox.ac.uk/eden/index.php?p=57
QUANTUM GIS –  www.qgis.org  – desktop GIS software for creating layers to upload to WorldMap
    Windows, Max OSX, Linux  www.qgis.org/wiki/Download
DIVA GIS –  www.diva-gis.org  – desktop GIS software
    PC or Mac OSX  http://www.diva-gis.org/download]