Watershed Sciences 4930 & 6920
GEOGRAPHIC INFORMATION SYSTEMS

WEEK ONE – Lecture 2
GIS Review & Intro to WebGIS

Joe Wheaton

TODAY’S PLAN...

I. Housekeeping
II. Review of GIS
III. Alternatives to ArcGIS
IV. WebGIS
V. Summary

HOUSEKEEPING: HOMEWORK:

Introduction
• Lab 01 – ArcGIS Refresher & Intro to WebGIS
  - You’ll make a very basic map in ArcGIS just to get you used to working in ArcGIS again ;)
  - You will create a website that will be the repository for ALL of your lab assignments
  - You will publish your map to your website...

Everything you need:
http://gis.joewheaton.org/assignments/labs/lab01

HOUSEKEEPING: THIS WEEK’S LAB

WHAT DID BOLSTAD HAVE TO SAY?

You Read Chapter One of Bolstad: “An Introduction to GIS”

I. Introduction
  I. What is GIS?
  II. GIS in Action
II. GIS Components
III. GIS in Organizations
  I. Structure of Book

HOUSEKEEPING: OTHER QUESTIONS??

• Post other questions to our Class Forum at http://forum.bluezone.usu.edu/gis
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GIS—WHAT IS IT?

Bolstad (2009) says:

• “A GIS is a tool for making and using spatial information. Among the many different definitions of GIS, we choose:
  - A GIS is a computer-based system to aid in the collection, maintenance, storage, analysis, output and distribution of spatial data and information.”

• GIS—what’s in the S?
  - Systems: the technology
  - Science: the concepts and theory
  - Studies: the societal context

MATCH VERBS FROM DEFINITION TO OUR LEARNING OUTCOMES & SYLLABUS

A GIS is a computer-based system to aid in the collection, maintenance, storage, analysis, output and distribution of spatial data and information.”

Primary Learning Outcomes

1. Understand the fundamental laws of Geographic Information Systems (GIS), concepts, and tools for making and using spatial information.
2. Utilize GIS to create, edit, manage and analyze spatial information.
3. Use GIS to address applied problems and societal issues.
4. Demonstrate the effective use of GIS to solve real-world problems.

Course Topics (by week)

Week 01: Introduction/Review of GIS
Week 02: Abstracting the World to Digital Maps
Week 03 & 04: Working with Data in GIS
Week 05: Uncertainty & Vector Analyses
Week 06 & 07: Vector Analyses
Week 08: ArcGIS Modeling
Week 09 & 10: Collecting Your Own Data

EXAMPLES OF APPLIED GIS

- Urban Planning, Management & Policy
  - Zoning, subdivision planning
  - Land acquisition
  - Economic development
  - Housing renovation programs
  - Emergency response
  - Crime analysis
  - Tax assessment

- Environmental Sciences
  - Monitoring environmental risk
  - Modeling stormwater runoff
  - Management of watersheds, floodplains, wetlands, forests, aquifers
  - Environmental Impact Analysis
  - Hazardous or toxic facility siting
  - Groundwater modeling and contamination tracking

- Political Science
  - Redistricting
  - Analysis of election results
  - Predictive modeling

- Civil Engineering/Utility
  - Locating underground facilities
  - Designing alignment for freeways, transit
  - Coordination of infrastructure maintenance

- Business
  - Demographic Analysis
  - Market Penetration/Share Analysis
  - Site Selection

- Education Administration
  - Attendance Area Maintenance
  - Enrollment Projections
  - School Bus Routing

- Real Estate
  - Neighborhood land prices
  - Traffic Impact Analysis
  - Determination of Highest and Best Use

- Health Care
  - Epidemiology
  - Needs Analysis
  - Service Inventory

WANT A LITTLE MORE...

Additional Resources

- GIS Publishing (a site with links to more resources on GIS)
- GIS News
- GIS Links
- GIS Tutorials

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DESPITE WHAT IMPRESSION ESRI GIVES

- They are not the ONLY game in town
- There are lots of commercial and open source alternatives
- If you have interest in these, you may consider WILD 6990 -

SOFTWARE FOR GIS:

**Full GIS**
- ESRI, Inc.
- MapInfo
- MapWindow
- LandSerf
- Saga GIS
- Quantum GIS
- Intergraph
- Bentley Systems (MicroStation)
- Auto desk (AutoCAD MAP)

**Raster GIS**
- ERDAS/imagine
  - Long established leader in remote sensing
  - Acquired by Leica Geosystems in 2001
- ER Mapper
  - Aggressive newcomer originating in Australia
- ENVI,
  - Relative newcomer, radar specialization
  - Acquired by Kodak in 2000
- PCI – Geomatica
  - Long-term Canadian player
- CARIS
  - Newer Canadian entry
- GRASS (Rutgers Univ.)
- IDRISI (Clark Univ.)
  - Pioneering, university-developed package

**Vector GIS**
- Smallworld Systems
- Manifold
- MapInfo

FULL GIS
- IDRISI
- Quantum GIS
- Intergraph
- Bentley Systems
- Auto desk

**FREE! Open-source GIS**
- Developed both here at USU and up at ISU
- Like lots... Extendible, Simple

http://www.mapwindow.org/

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**LandSerf**
- http://www.soi.city.ac.uk/~jwo/landserf/

SOME MORE REFERENCES...

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**Web GIS QUESTIONS**

- What is it?
- What’s out there?
- What’s it used for?
- How does it differ from desktop GIS?
- How is it deployed?
- How could you deploy it?

**WHAT IS IT?**

- Return to our definition of GIS... Just implemented and delivered over the web
  - Typically simpler user interface then desktop GIS
  - Typically more complicated backbone...
  - Often free for users

  "A GIS is a computer-based system to aid in the collection, maintenance, storage, analysis, output and distribution of spatial data and information."

**WHAT'S OUT THERE?**

- The common map/directions sites
  - Google Maps
  - Bing Maps (Live)
  - Mapquest
- Data viewers
- Data distribution centers
- Personal data repositories
- Project sites...
- Commercial Sites
- Web mapping services (WMS)

**RANGE FROM SIMPLE...**

- Soil Web via Gmaps

**TO COMPLEX...**

**MAPQUEST**

- One of the first... lost its marketshare
BING.COM/ MAPS (FORMERLY LIVE MAPS -> Microsoft)

- Microsoft had to do something to fight back Google

BING.COM - COOL FEATURES

- Built in 3D Viewer: Virtual Earth (w/ plugin; analogous to Google Earth)
- Birds Eye View

WHAT'S IT USED FOR?

- Just directions?
- A better question is: what is it not used for?

Web GIS QUESTIONS

- What is it?
- What's out there?
- What's it used for?
- **How does it differ from desktop GIS?**
- How is it deployed?
- How could you deploy it?

HOW DOES IT DIFFER FROM DESKTOP GIS?

- You can answer this...
- What of the ArcGIS family of products is WebGIS?

ArcGIS EXPLORER ONLINE

- Improved dramatically...
WHAT IS A WEB MAP?

• What is it?
• What’s out there?
• What’s it used for?
• How does it differ from desktop GIS?
• How is it deployed?
• How could you deploy it?

HOW IS IT DEPLOYED

• What platforms is WebGIS consumed in?
  - Web applications (i.e. browsers)
  - Web services (i.e. desktop GIS)
  - Mobile applications (i.e. your smart phone)
• What software does a user need to use it?
• How is it deployed at the back end?
  - WMS Web Map Services (for user interactivity)
    • Allows creation of web maps that can call up data from multiple servers and sources
  - GIS server(s) for hosting GIS data
  - Other services for doing heavy lifting (number crunching)

YOU SHOULD BE AWARE OF ARCGIS SERVER


OPEN TOPOGRAPHY… SYSTEM ARCHITECTURE
**SOME OTHER CARTOONS...**
The arrows and components can vary, but on the outside... there is always the client... blind to the details of the blackbox behind their browser:


**Web GIS QUESTIONS**

- What is it?
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**HOW COULD YOU DEPLOY IT?**

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**YOUR QUIZ FOR TUESDAY**

- Find an example of a good map and a bad map and explain why in terms of the 6 C’s
- Post these two examples as URL’s or images and your justification to the class forum at:
  - GIS Questions & Discussions -> Week 02 -> Quiz 1
  - Post before Tuesday’s Lecture
  - Feel free to comment on others...
  - Also SUBMIT your links to CANVAS under Quiz 1 So I can give you credit

- PURPOSE:
  - Develop a critical eye about other’s maps, so that you can make your own maps better
  - Familiarize you with grading criteria

**READING FOR TUESDAY**

- Read Chapter Three of Bolstad: “Map Projections & Coordinate Systems” (pp. 69-122)
  - Skim 70-72 (History)
  - Read pp. 72-119 in detail
On Tuesday:
• Projections & Coordinate Systems