In the Beginning

- GIS was independent
- The GIS analyst or manager was typically a one-person shop
- He/she created the data, analyzed the data, and printed the maps

Along Came the Internet

- The proliferation of networks and the Internet caused a chain-reaction
  - GIS data became easier to share
  - Increasingly larger datasets were shared
  - GIS data was stored (self-service) on the network
Old Habits are Hard to Break

- Centralized GIS on the network
  - Clearinghouses
  - One-stop-shops
- Someone was in charge

But the One-Stop-Shop Broke

- What now?
- Re-invent the one-stop-shop
  - There are now more than 100,000 GIS clearinghouses
  - Each state, large agency, and large company
  - Why so many one-stop-shops?
    - Data incompatibilities
    - Data standards
    - (Control issues)

Control Issues and Fallacies

- Protect trade secrets
- Ensure data security
- Retain intellectual property
Prove It!

• IBM
• Boeing
• What do they have in common?
  – Mass-collaboration
  – Open structure
  – De-centralized organization
  (for more, read “Wikinomics”)

The Web 2.0

• The Next Generation
  – All about mass-collaboration
  – Mash-ups
  – Synergy
  – Distributed, de-centralized systems
  (for more, read “The Starfish and the Spider”)

Collaboration is New?

• Traditional collaborations were:
  – A selected team of colleagues
  – Hierarchical in structure
  – Breadth of knowledge relatively narrow
• Mass-collaboration is:
  – An open set of contributors
  – De-centralized in structure
  – Breadth of knowledge will be broad
Web 3.0

- Semantic web
  - coined by Tim Berners-Lee, the man who invented the (first 1.0) World Wide Web.
  - Machine-readable Web pages and semantic metadata
  - Support for future AI applications
  - “Turns the Web into one big database”
- IoT, Internet of Things
  - Machine learning and sensor integration

How Might it Work?

A Grand Experiment

- Can Web 2.0 and 3.0 concepts be applied to GIS and spatial analysis... spatial problems?
- Can the GeoWeb be built and leveraged to provide real-time decision support?
- A step in this direction:
  - Esri’s Insights for ArcGIS
The Role of GIS

• What are we GOOD at?
  – Collect spatial data
  – Prepare maps and models
  – Perform spatial analyses to discover trends, spatial patterns, and relationships

The Role of GIS (cont’d)

• Use ArcGIS and web services to make geo-spatial data available to everyone
• Transform these data into actionable information to communicate with everyone
• Help build the Geo-Web

Focusing our Role in IT4GIS

• ArcGIS and web services
ArcGIS Enterprise: Architecture

• Requirements:
  – Network connectivity
  – 64-bit Windows Server OS
  – ArcGIS Desktop software
  – ArcGIS for Server software

ArcGIS Enterprise Requires...

• Server hardware
  – Sufficient hard drive space
  – Consider number of expected hits (transactions) when selecting CPU and cache

ArcGIS Enterprise: Architecture (cont’d)

• ArcGIS Pro and ArcGIS Enterprise
  – ArcGIS Pro is your desktop software
  – ArcGIS Enterprise is your server software
  – These software technologies are connected via ArcGIS Portal
ArcGIS Portal

• Server software providing a user interface
  – AGOL is an instance of Portal
• Installed and configured as part of ArcGIS Enterprise
  – (TIP: Use Esri’s Builder tool to make installation/setup easier)
• Designed to support GIS demands of your enterprise

ArcGIS Server is…

• Also part of ArcGIS Enterprise
• Scalable
• Flexible (variety of SDK’s [e.g., Java, Flex and HTML5])
• Resulting services are easy for clients to use (easier than ArcGIS Desktop)
• Can be used with or without Portal for ArcGIS

ArcGIS Server can deliver…

• Image services
• Geodata services
• Map services
  • Geocoding services
  • Indexing/Search services
• WMS Services
• KML Services
Using a Mash-up of Services…

• Map services can be used to deliver web map applications

Image Services

Best Practices

• Serve either a:
  • Single image file (e.g., GeoTIFF), or
  • Raster mosaic dataset with IGDB

Raster Mosaic Datasets

• A great solution to serve raster data
• Performance
  – Response
  – Cache (no longer needed/used)
  – Overview size
  – Developing a map service from these data
Web Image Layers

• Service produced when publishing raster data from ArcGIS Pro
• New term used for an “Image Service”

Map Services

• Effectively, Map Services (Web Map or Web Layers) are a type of web service to display an ArcGIS Pro map
• Advantages
  – Can include numerous layers
  – Raster and Vector
  – Retains symbology, scale thresholds, and other settings
    (note: images with ColorMaps, served as image services, will retain symbology also)

Process of creating an ArcGIS Web Map and App

1. Author a map
   – Using ArcGIS Pro
2. Create your project’s Web Map or Web Layer Service
3. Create a Web application
In IT4GIS…

- Our exercise will give you experience with:
  - Image services
  - Map services
  - And later, Web Map Applications

Web 2.0 and 3.0 Revisited

- It should be clear how the GeoWeb fits and supports the concept of Web 2.0
- How might it support the semantic web? (Web 3.0)
  - Two minute write!

Key Concepts

- GIS is everywhere
- The Internet is a great way to deliver GIS
- Today — and in the future — web enabled GIS will be increasingly important
- Students need to know the fundamentals of serving GIS data and maps on the web and the practical application of this technology
Questions…Assignment

Demo…connecting to Portal