

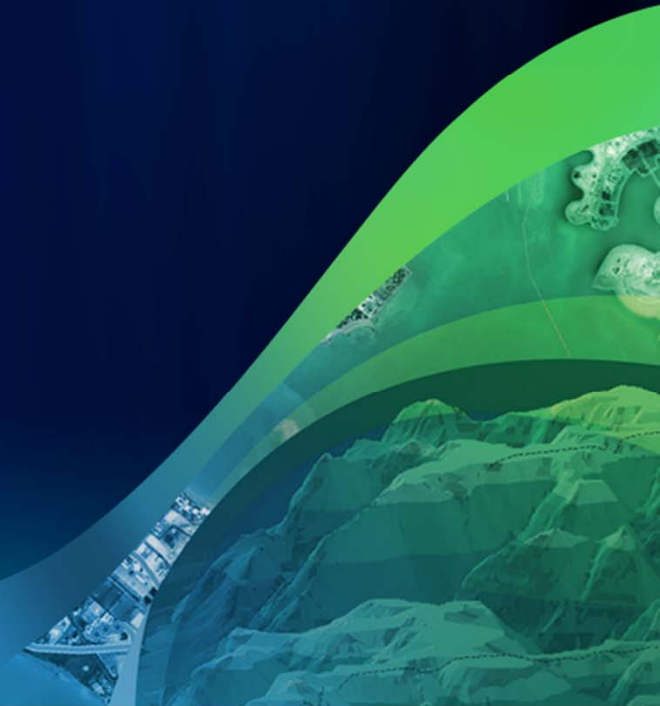
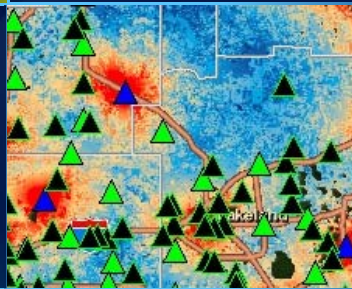
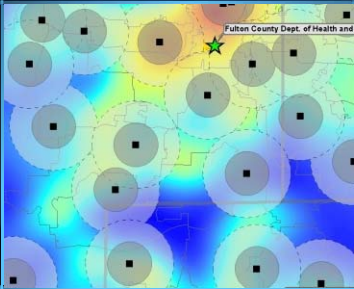
Center for Urban Research & Learning
Friday Morning Seminar
October 28, 2011

The New Paradigm in Mapping and Geographic Information Systems: Web-Enabled Community Empowerment

Presented by David J. Treering, GIS Specialist

Loyola University Chicago

Center for Urban Environmental Research & Policy

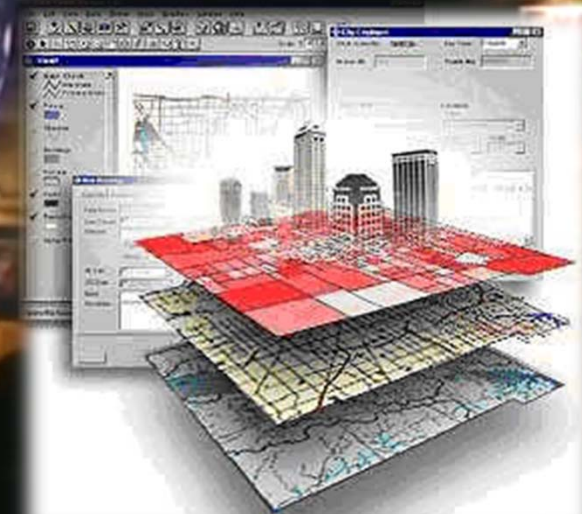
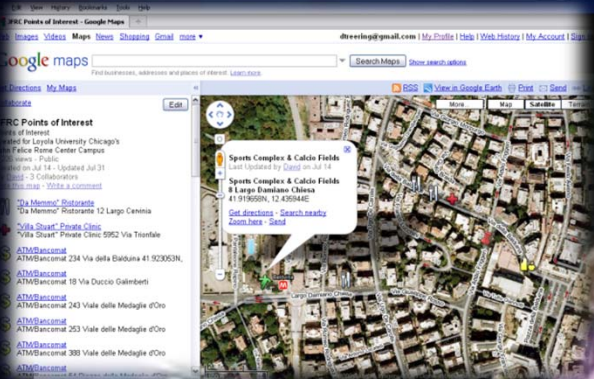




Agenda

- **Introduction to GIS**
- **Intelligent web maps**
- **Creating & Sharing web maps**
- **Building web applications**
- **ArcGIS Server**
- **Community Analyst**

GIS: You already know...



You see it used everywhere...

Locate

Streetmap Satellite Imagery Topographic Map

Explore

- News
- Ushahidi
- YouTube Videos
- Tweets
- Threatened Sites
- Nautical Chart
- Environmental Sensitivity
- Sensitive Habitat
- Estimated Spill Areas
- Shared Content

Shared Content

Add Search

Select a feature type and place it.

- Web Link
- Photo
- Video
- Notes

NolaBusiness says

NB

RT @Oil_Spill_2010: # oilspill Daily Update: The Ongoing Administration-Wide Response to the Deepwater BP Oil Spill <http://bit.ly/cPiAr>

Tropical Storm MARIA Advisory #028A
12:00 PM EDT Tue September 13, 2011

Select Advisory: Load Data Cone: Track:

STATE OF GEORGIA

GEORGIA DEMOCRATIC PRIMARY PRESIDENT'S CANDIDATE PREFERENCES

BOUNNEY	2,819	25%
WICKHAM	1,819	16%
PAUL	351	3%

CNN-AMERICA VOTES 2008

Map Satellite Hybrid Terrain

Quebec New Brunswick Prince Edward Island

Ottawa Montreal Maine Nova Scotia

Toronto New York Vermont New Hampshire

Cleveland Pennsylvania Philadelphia Massachusetts Rhode Island

West Virginia Virginia Connecticut New Jersey

North Carolina Delaware Maryland

South Carolina District of Columbia

Alabama Georgia

Louisiana Florida Jacksonville Orlando Miami

Gulf of Mexico Cuba Dominican Republic Puerto Rico

Mérida Cancún Campeche

500 mi 500 km

Imagery ©2011, Map data ©2011 - Terms of Use

Map Satellite Terrain

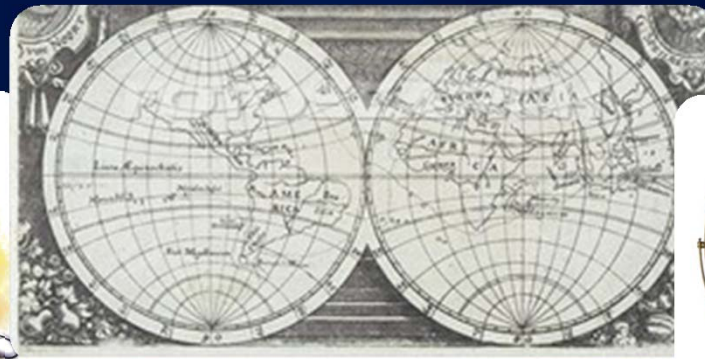
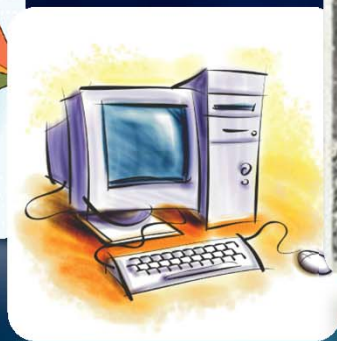
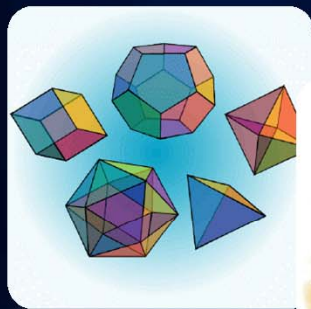
Chicago

Uncheck all

- C-Man Stations(48)
- Weather Station(5)
- Water Level Station(27)
- GLOS Buoy(10)
- USGS Water Gauge(40)
- GLOS Weather Station(3)
- 3-meter Discus Buoy(14)
- Canadian Buoy(14)
- NERRS Weather Station(1)
- ASOS Station(117)
- Other Marine

What is GIS?

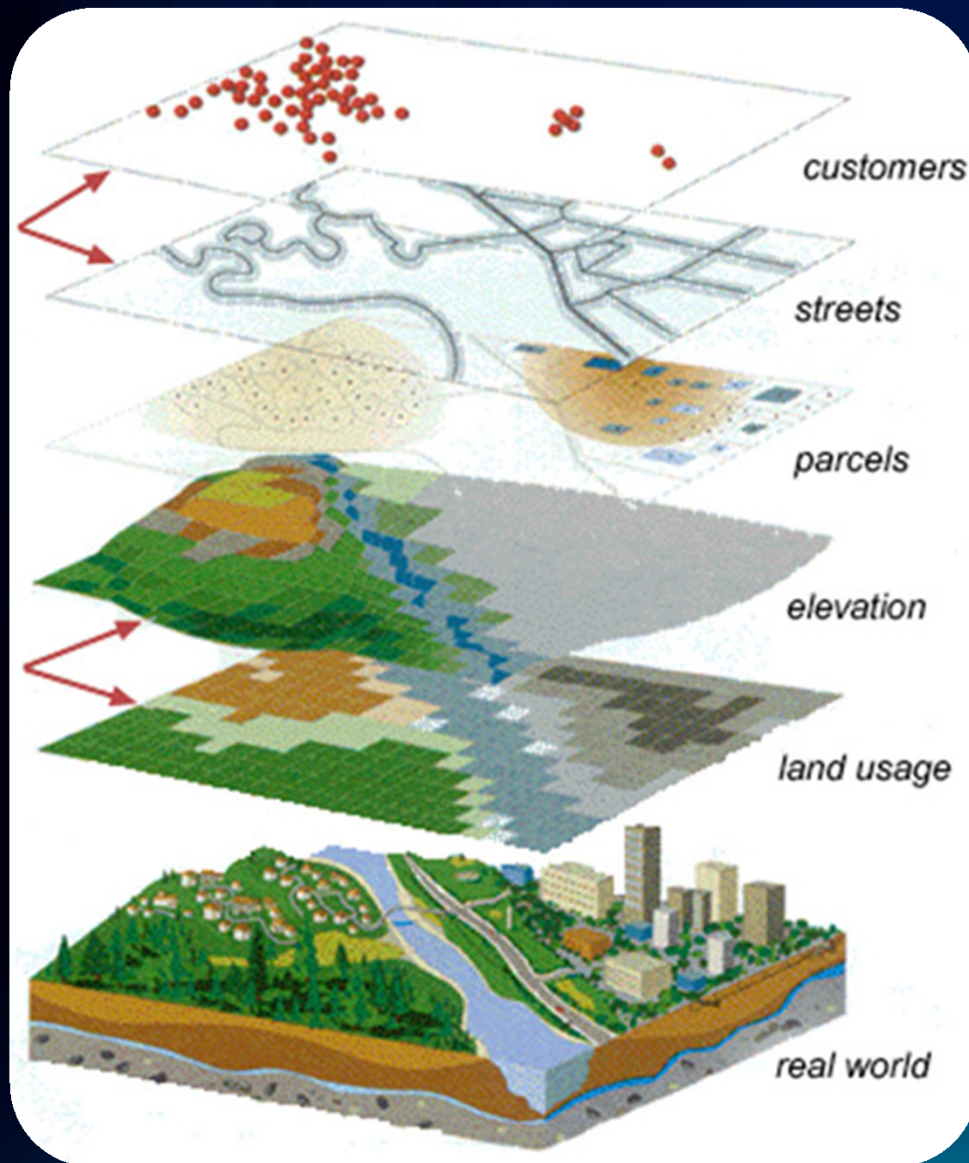
- **Geographic Information Systems / Science**
- GIS is built upon knowledge from geography, cartography, computer science and mathematics.
- A GIS at least consists of a database, map information, and a computer-based link between them



Feature Attributes

- Geographic information links a feature with some property of that feature.
 - In GIS we call these properties **attributes**
 - Attributes can be, for example:
 - Physical: Land surface area in a city
 - Social: Political affiliation of a congressional district
 - Economic: Market potential of businesses
 - Demographic: Minority enrollment in schools
 - Environmental: Amount of toxins in the air
 - etc...
 - Attributes give GIS its power by combining data tables with mapping displays

Measuring and Integrating the Parts...



- Population & Social Factors
- Natural Features & Hydrology
- Biodiversity Hotspots
- Engineering and Utilities
- Land Use & Ownership
- Environmental Considerations
- Many other aspects & features....

...Means Seeing the
Whole of Reality
(Close, anyway)

What can we do with GIS?

Analysis Tools

- With a GIS we can determine:
 - Location, Distance, Direction
 - Quantity, Density
 - Adjacency, Proximity
 - Change over time
- GIS enables us ask questions about spatial relationships
- Many questions require a combination of more than one technique to answer

ArcGIS Online

Find, create, and share geographic information

- GIS for everyone
 - Empowering the non-GIS expert!
- Public and Private Groups
- Hosted Web applications:
 - ArcGIS.com Viewer
 - ArcGIS Explorer Online
- Map templates

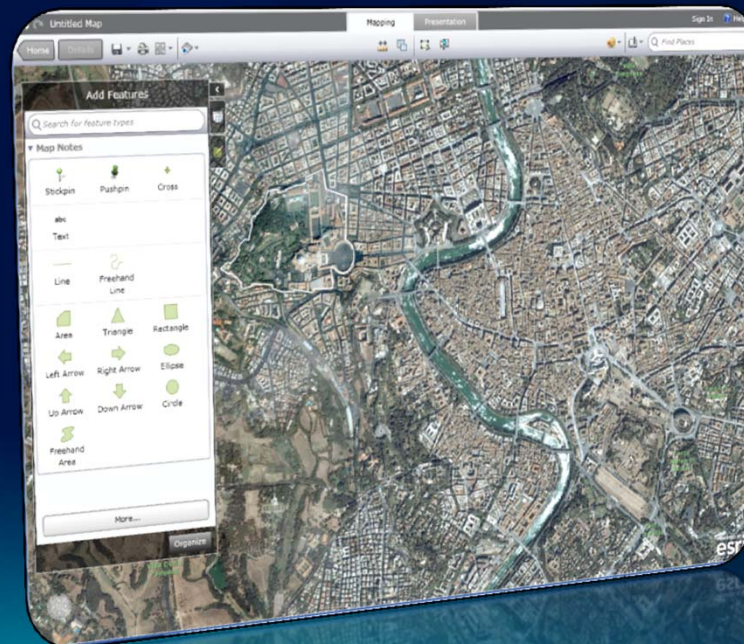
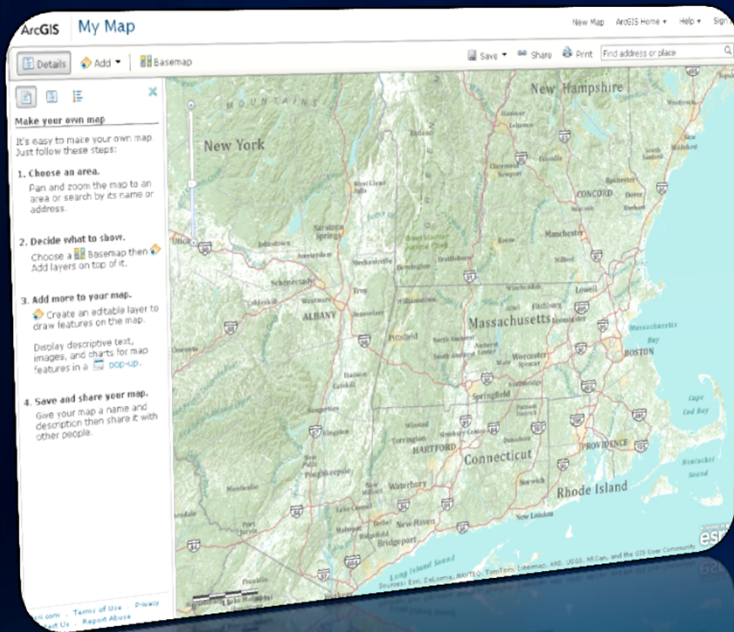


ArcGIS.com viewer & ArcGIS Explorer Online

Two viewers – similar functionality

- **ArcGIS.com viewer**
 - JavaScript Application
 - View presentations

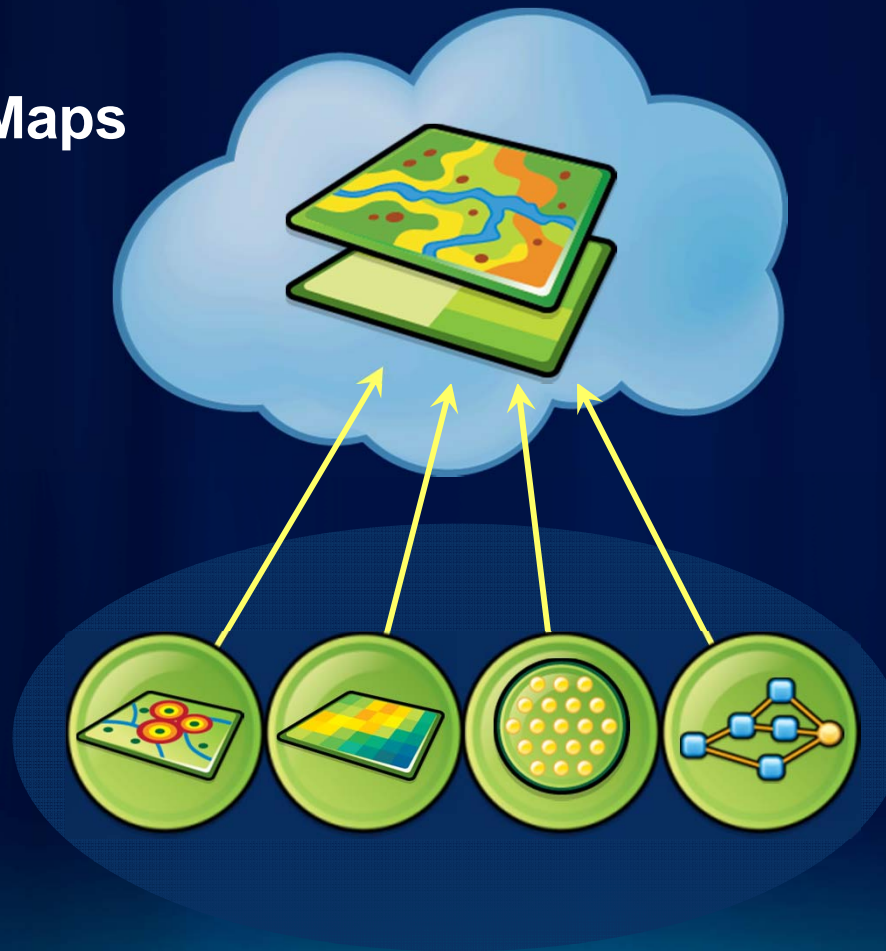
- **ArcGIS Explorer Online**
 - Silverlight Application
 - Create and view presentations
 - Dashboard



What is a web map?

The foundation for your maps and applications

Intelligent Maps



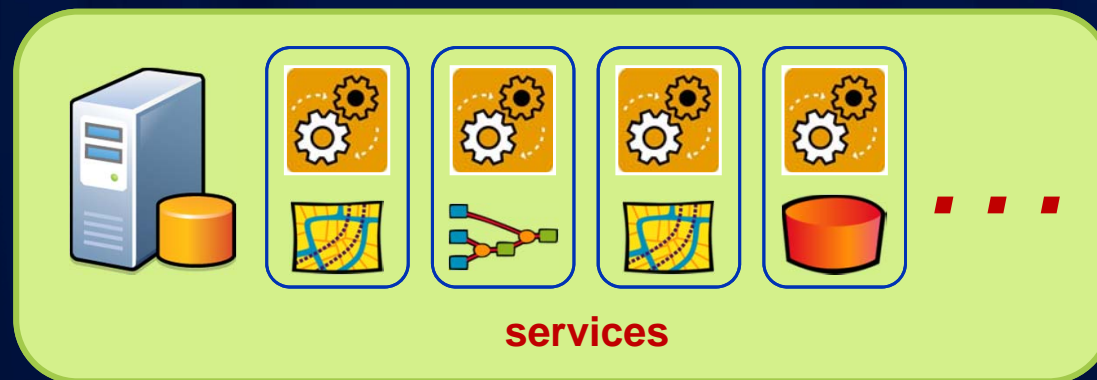
Services
And Data

Supporting:

- Visualization
- Editing
- Popups
- Analysis
- Time

What are GIS Services?

- **GIS Service = GIS resource running on a server**
 - vs. GIS application on your local computer
- Almost any GIS operation that you can do locally can also be run using a service



- Enables sharing of GIS resources across the Web

Data Content in a Web Map

Common design pattern

- **Base Maps**
 - Geographic frame of reference
 - Contain static data or services
- **Operational layers**
 - Information overlays that end users interact with
 - Contain dynamic data or services
- **Operational layers display on top of Base Maps**



One web map can be used anywhere

**Any
Device**



Share your web map

- Link to another web site or blog
- Facebook or Twitter



Facebook



Twitter

One web map – many uses

ArcGIS Online templates

- Easily create a web application for a web map with predefined templates
- Deploy it, **live on the web**, with a click

The screenshot displays the 'Share' window in ArcGIS Online, specifically the 'Make a Web Application' section. The interface is titled 'Share' and 'Make a Web Application'. Below the title, it says 'Select a template to preview or download.' There are eight template cards arranged in two rows of four. Each card shows a preview of the web application and a 'Download' button. The templates are:

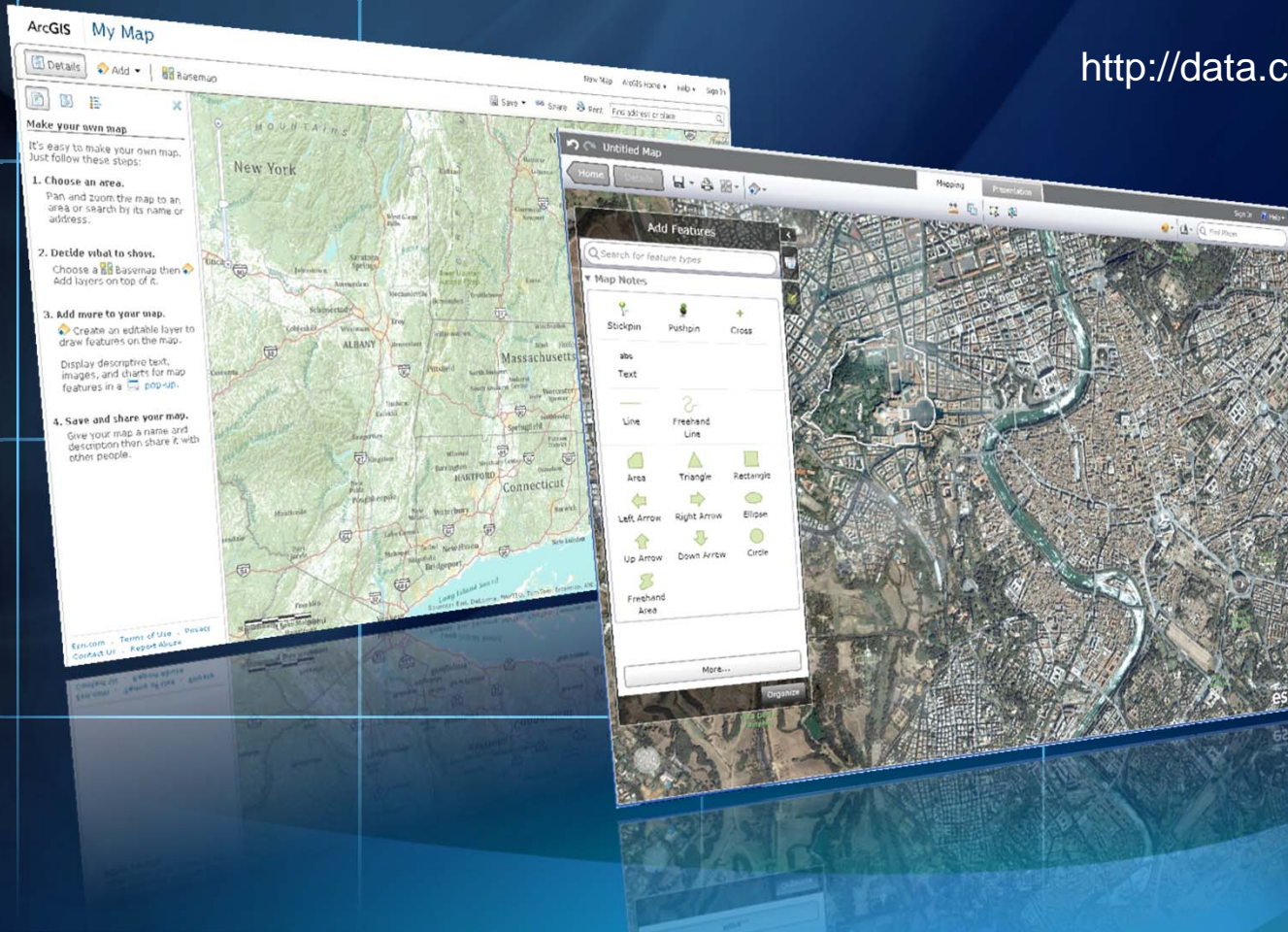
- Chrome
- Chrome - Header & Footer
- Chrome - Identify
- Chrome - Legend
- Chrome - Twitter
- Chrome - Two Panel
- Compare maps
- Contemporary - Blue

At the bottom of the template grid, there are four numbered buttons: 1, 2, 3, and 4. Below the grid, there is a '< Back' button.

Demonstration

[ArcGIS.com](http://data.cityofchicago.org/) & [ArcGIS Explorer Online](http://data.cityofchicago.org/)

<http://data.cityofchicago.org/>



Summary



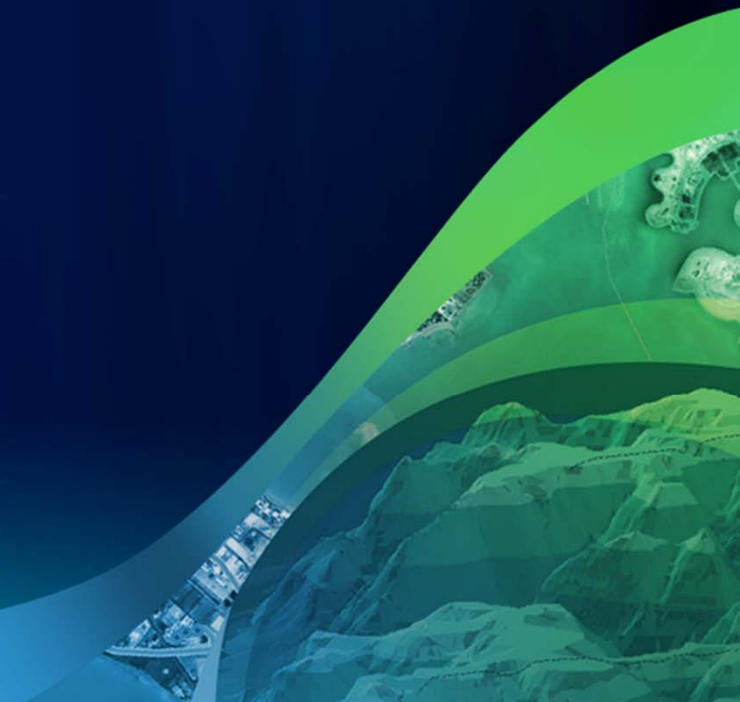
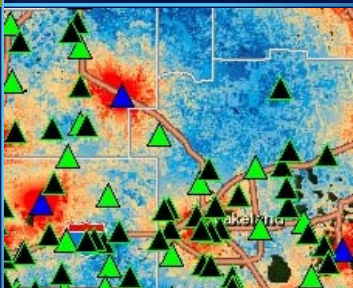
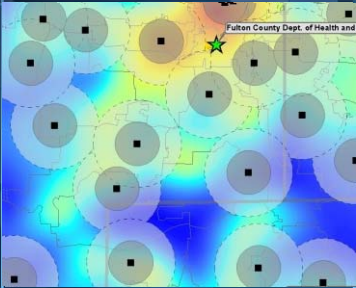
- **Intelligent Web Map**
 - Foundation for your maps and apps
 - Can be leveraged in many ways
- **ArcGIS offers many ready-to-deploy solutions for creating Web applications**
 - All of them work with Web Maps
 - Other desktop and web GIS solutions are available and capable

DeKalb County Board of Health

Fulton County Dept. of Health and Wellness/District 3, Unit 2: GIS

ArcGIS Server

Publishing GIS Services



ArcGIS Server

Delivering GIS with powerful services and applications

Server software gives you the ability to create, manage, and distribute GIS services over the Web to support desktop, mobile and Web mapping applications



ArcGIS Server

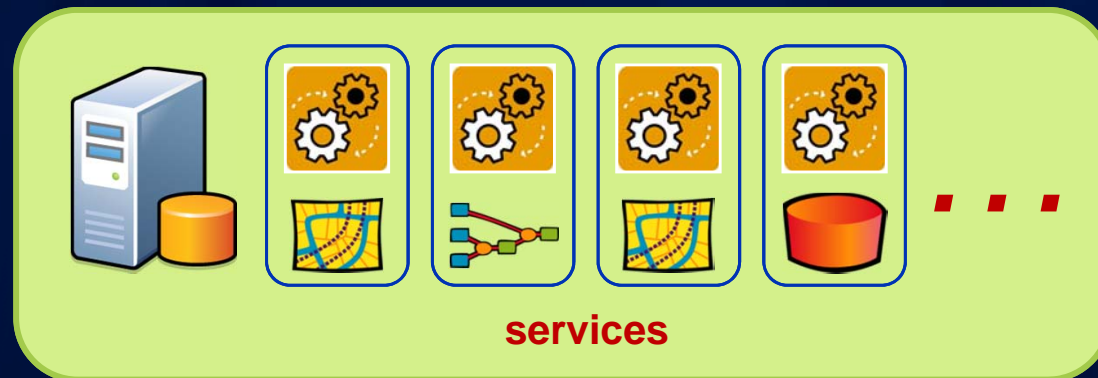
Delivering GIS with powerful services and applications

- **Complete, out-of-the-box Web based GIS**
 - Ready to use applications and GIS services for
 - Spatial data management
 - Visualization
 - Analysis
- Platform for developing Web and enterprise applications and services
 - Available for **.NET** and **Java** platforms



What are GIS Services?

- **GIS Service = GIS resource running on a server**
 - vs. GIS application on your local computer
- Almost any GIS operation that you can do locally can also be run using a service



- Enables sharing of GIS resources across the Web

Types of Services in ArcGIS Server



Map

View or query a 2D map on the server



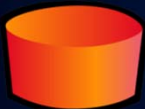
Globe

View or query a 3D globe on the server



Geocode

Perform address matching on the server



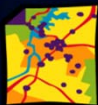
Geodata

Perform data replication, extraction, or query over the intranet or Internet



Geoprocessing

Run a tool or model on the server and get the results back



Image

Provide access to raster data through a Web service

Clients to ArcGIS Server

Many options available

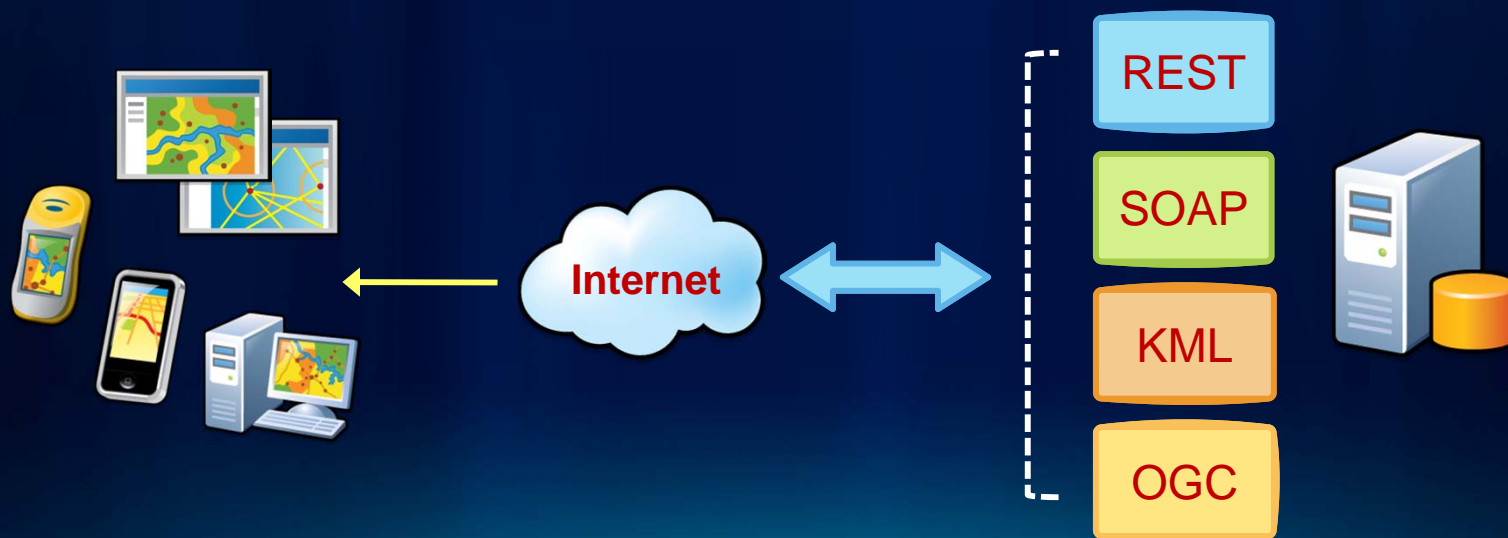
- **ArcMap, ArcGIS Explorer, ArcReader, and ArcGIS Engine** applications
- **Web Applications**
 - ArcGIS Online: ArcGIS.com Viewer, ArcGIS Explorer Online
 - Browser based: JavaScript, Flex, and Silverlight
- **ArcGIS for SharePoint**
- **Mobile clients**
 - ArcGIS Mobile, ArcGIS for iOS, Android
- **OGC clients**
 - Access via Open Source standards
 - E.g., OpenLayers, Gaia, Google Earth ...



ArcGIS Server – Web protocols

Support industry standards

- Its GIS services can be accessed via
 - Representational State Transfer (**REST**)
 - Simple Object Access Protocol (**SOAP**)
 - Keyhole Markup Language (**KML**)
 - Open Geospatial Consortium (**OGC**)



Summary

ArcGIS Server: Complete, out-of-the-box Web based GIS

- Enables sharing of GIS services
 - Publishing map services
- ArcGIS Server has many different clients
 - Desktop & Mobile
- Web Mapping APIs
 - JavaScript, Flex, and Silverlight, SharePoint

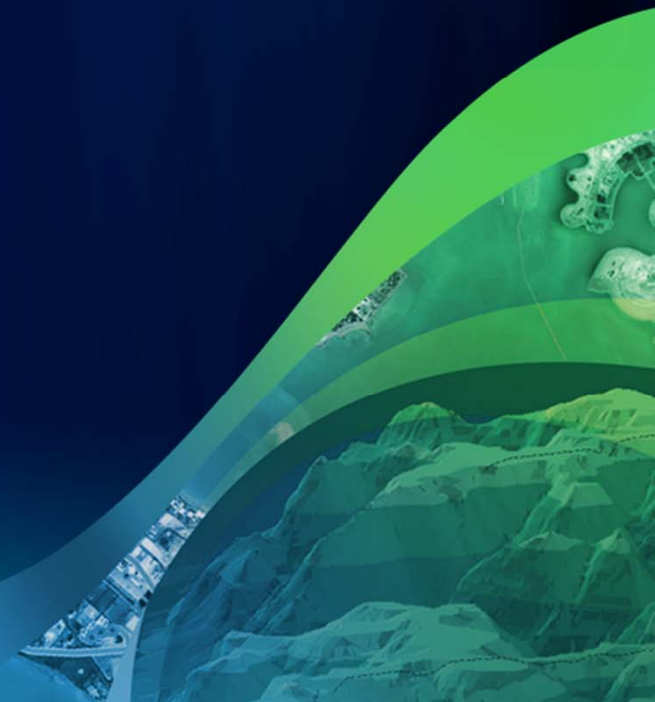
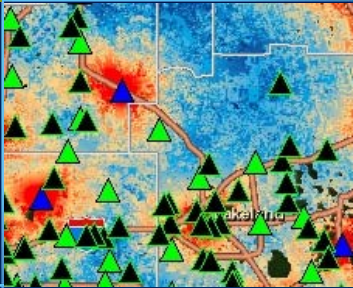
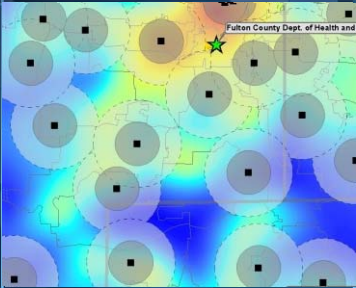


DeKalb County Board of Health

Fulton County Dept. of Health and Wellness/District 3, Unit 2: G

Community Analyst

Community & Demographic Analysis



What is Community Analyst ?

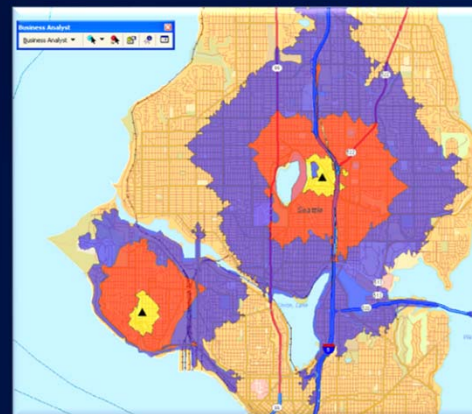
- **A set of data, analysis methods & application development toolkits**
 - **To Create Applications**
 - Support a large number of users from a central location
 - No individual desktop applications or GIS knowledge.
 - Web, mobile, *anywhere*
 - **Applications, dashboards, analyses, and models**
 - Shared across the organization
 - **Provide a common platform**
 - decision-making and planning



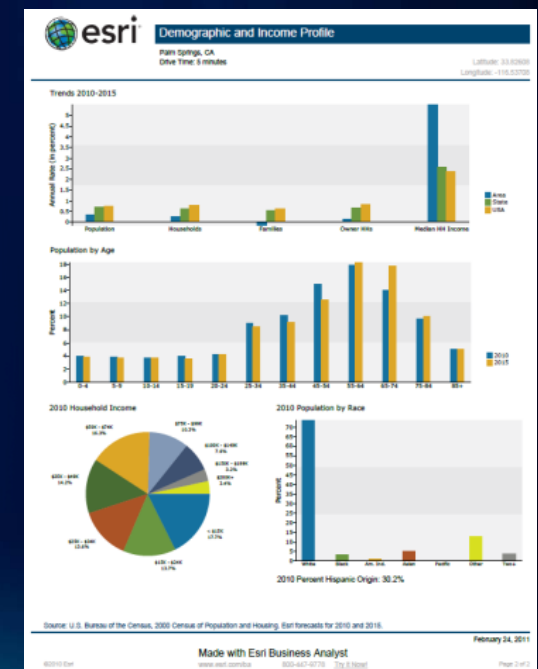
Community Analyst API

Quickly incorporate in your web or mobile application

- People, Places, Business
- Suitability Maps \ Reports
- Maintained by Esri

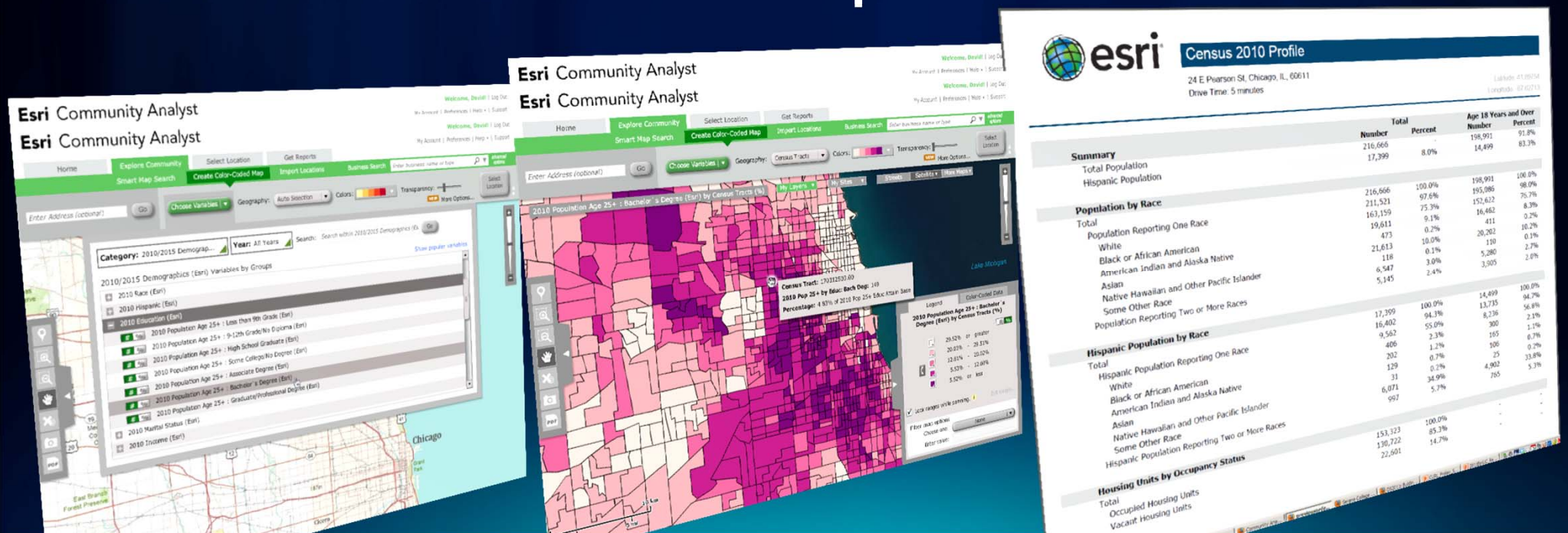


- Population
- Households
- Age
- Income
- Family Size
- Education
- Net Worth
- Consumer Spending
- Lifestyles
- Market Segmentation
- Businesses
- Products & Services Use
- Supply & Demand



Common Input Parameters

- **Study Locations & Areas**
 - Standard Geography or Administrative Boundary Areas
 - Locations Defined by Address or Point Coordinates
 - Drive-Time Polygons
 - Areas Defined by Custom Geometries
- **Desired Variables & Reports**



Demonstration

Community Analyst

The image displays three overlapping screenshots of the Esri Community Analyst web application interface.

Left Screenshot: Shows a map of Chicago with a highlighted area. The interface includes a search bar, a map navigation toolbar, and a legend.

Middle Screenshot: Shows the 'Comparison Report Setup' interface. It includes a navigation menu (Home, Explore Community, Select Location, Get Reports) and a 'Selected Sites' list with two entries: 1032 W Sheridan Rd, Ch. (5 minutes) and 24 E Pearson St, Chic. (5 minutes). The 'Comparison Report Setup' section has four numbered steps: 1. Choose the sites to compare from the site panel above. 2. Select geographies to compare to your sites (optional). 3. Select a site or geography to use as a benchmark (optional). 4. View graphs and tables for popular variables. The 'Income' variable is selected.

Right Screenshot: Shows the 'Income Comparisons' bar chart. The chart compares three sites against a Chicago benchmark. The Y-axis represents income, ranging from 0 to 120,000. The X-axis lists the sites: Chicago Geography, 24 E Pearson St, C... (5 minutes), and 1032 W Sheridan ... (5 minutes). The legend indicates the data series: 2015 Per Capita Income (orange), 2010 Median Household Income (green), and 2010 Average Household Income (blue). The Chicago benchmark is shown as a grey bar at approximately 100,000. The 24 E Pearson St site has a value of 102,597.

Category	2015 Per Capita Income	2010 Median Household Income	2010 Average Household Income
Chicago Geography	~60,000	~70,000	~100,000
24 E Pearson St, C... (5 minutes)	~65,000	~75,000	~102,597
1032 W Sheridan ... (5 minutes)	~35,000	~50,000	~60,000

A New Paradigm?

The Current / Old Way

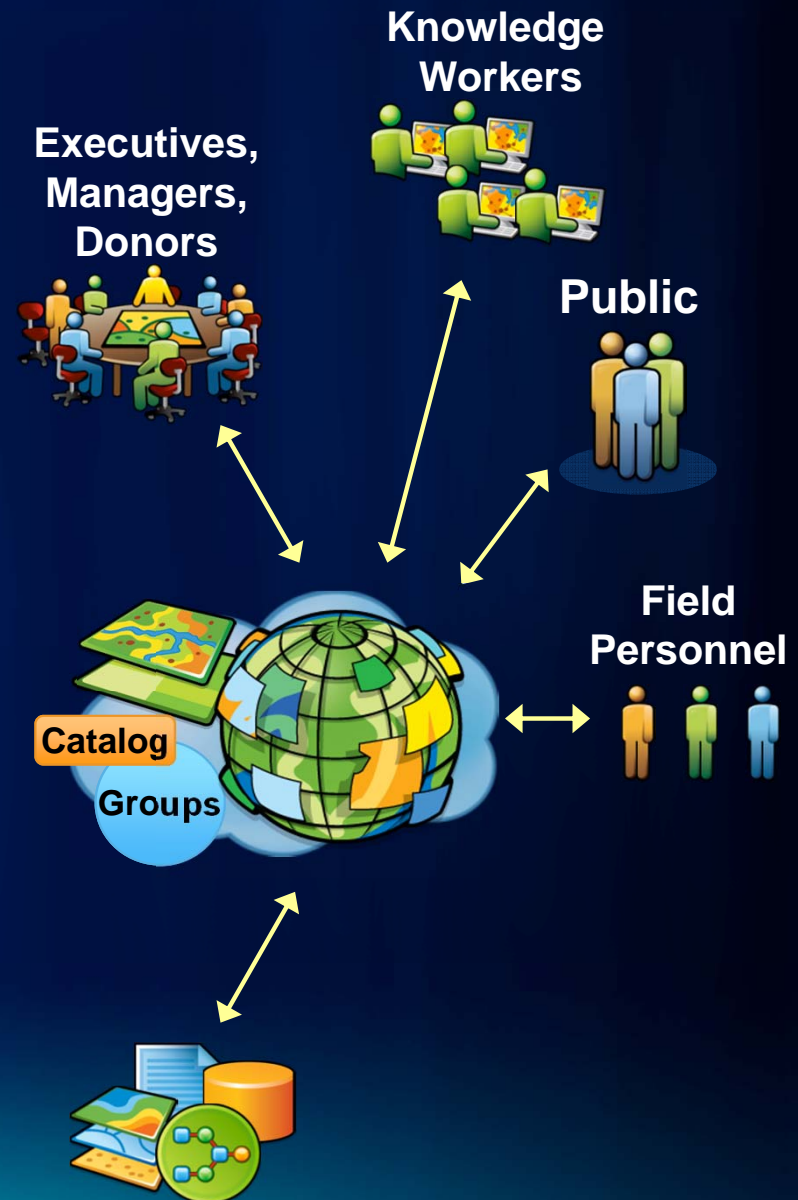
- **Find** existing data that may cost or not be publicly available
- **Create** content using own methods, not standards
- **Maintain** geographic datasets and expensive software
- **Disseminate** analysis results slowly, not discoverable
- **Continue** the project if you have time

...no one else can access the files

A New Paradigm?

The Emerging / New Way

- **Search, discover & access** authoritative & ready-to-use content
- **Upload & style** geographic datasets for public reuse
- **Create** intelligent web maps & visualizations
- **Interact** with these maps on any device
- **Embed** them in websites, blogs, and integrate with custom applications
- **Share, store & manage** maps, data & analysis tools in the cloud
- **Collaborate** using public & private groups



Conclusion

- **Enable** yourself and your audience with the powers of discovery, access, visualization, integration and analysis
- **Gain** new and additional insights into your clients, communities, and constituencies
- **Leverage** quality data that would be prohibitively expensive to accumulate, process, update, and maintain
- **Use** standards-based Web services to tap into the cloud
- **Make** better decisions in your work and attract investment into your communities

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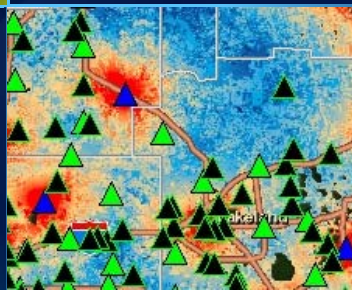
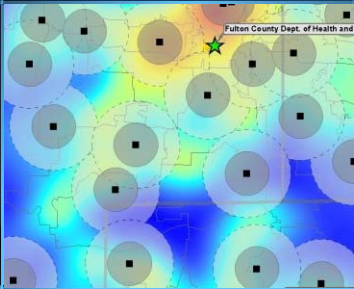
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Email: dgoldb2@luc.edu | Phone: (773) 508-8254



Many thanks to ESRI for many of the graphics and text used here.