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

Presented by David J. Treering, GIS Specialist  
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• 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...
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

Supporting:
- Visualization
- Editing
- Popups
- Analysis
- Time

Services And Data
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

Smart Phones

Tablets

Desktop

One Map

ArcGIS Online

Blogs

Web Sites

Browsers
Share your web map

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

ArcGIS.com & ArcGIS Explorer Online

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
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
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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 though 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
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

![Better Communities through Geography](image)
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
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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