A New Pattern for Implementing GIS Clint Brown Director of Software Products, Esri

Computing is evolving GIS is moving out and onto this new landscape

- Mobile and Tablet Devices
 - Hi-res Graphics with Touch
 - Location-aware
 - Connected (but not always)
- Ubiquitous Mapping & Information Sharing (e.g., Consumer Maps)
- Cloud Computing

Getting connected everywhere

GIS is evolving

- Opening up
- Web-based Information Access
- GIS users are beginning to share their information in new ways . . .
- Using new interactive, intelligent maps

Maps that go anywhere. . .

We Are Entering a New Era

- Before GIS (... ~2000)
 - Surveying, mapping, cartography, planning, etc.
- The GIS Era (1985- ...)
 - Integrated systems for managing geographic information
- The new era (2005 ...)
 - 1. Geographic Information Everywhere
 - 2. Professional GIS
 - 3. The bridge between the two

The New Era



Maps are useful information products that can be used in many Geospatial contexts

- Millions use maps and apps every day
 - Google maps, Bing maps, Nav. maps in cars and on mobile devices, etc.)
 - Including you, your boss, your staff, . . .
- Simple GIS maps can be used like consumer maps
 - That support work tasks and missions
- There are many critical scenarios and tasks supported by this pattern

The World Has Been Trained

- To Use Consumer Maps on the Web
- Your staff too
- Your co-workers, citizens, customers need maps that "do more"
- Meanwhile -- the Geospatial community is creating critical, authoritative information that can be used to fuel this use

"There's a map for that"

- ArcGIS lets you create maps for any application:
 - Basemaps
 - Maps for presenting information
 - Cartographic <u>publications</u> for printing
 - Maps for <u>analysis</u> and <u>decision</u> making
 - Maps designed for editing, collecting, and updating data
 - Real-time maps for situational awareness: Dashboard
 - Dynamic, time-based maps
 - <u>Mobile</u> maps
 - <u>3D maps</u> for visualization and analysis
 - And much more

Everything either supports or stems from intelligent maps

A new pattern for implementing GIS

- Lightweight, focused maps and apps to support specific tasks
- Targeted at people and their work (mission planners, intelligence analysts, invehicle personnel, soldiers)
 - Focused maps and apps
 - Not generic apps
 - Not large, complex apps with numerous tools, etc.
 - Not "One Map" for everything
- Maps are a key medium in the new Web / Mobile / Embedded Paradigm
 - Maps that present useful, clear, engaging information

Your GIS is a *destination*

For making geographic information available to everyone

- For creating and sharing intelligent maps and related geographic information.
- For discovering and using maps and geographic information



Ready-to-Use GIS Content as Maps and Apps

Your GIS will provide an information surface Of useful maps, apps, and related services



This same web-centric pattern will be deployed on private, secure networks and within enterprises

ArcGIS is a map (and geographic data) publishing system

- Your content is rich and deep -- and much more interesting
- Dynamic -- undergoing continuous update and churn. It is curated and cared for. It matters
- You can easily learn to apply the new maps and apps pattern
- This pattern works inside of secure enterprises just as well as it works on the open web.

... And also for <u>Using</u> Geographic Information

Making GIS accessible everywhere

The Method

•Build data

- Foundation Layers
- OperationsPublish and share
 - As GIS packages
 - Services

•Make web maps

- Base maps
- Mash up operational information
- Add tools and analysis results, etc.
- •Feed these to special apps



What is a web map?

- An intelligent online map used for working with geographic information
 - An ordered series of layers (services), data, popups, and tools
- A way to encapsulate information for a specific audience or user
- Examples
 - Simple web map
 - Add a popup
 - Add editing
 - Add analysis
 - Add a presentation (Explorer Online)
 - Add time
 - Build a federated app
 - Give to an app or a device

What is the Pattern for Creating Useful Maps and Apps?

- 1. Create/extend the useful, harmonized information model that many organizations use to accomplish their work.
- 2. Identify staff and their common tasks who will use the maps and apps
- 3. Create a good web map for doing each task (See Web Map Checklist for guidance)
- 4. Deploy the web map
 - By using an out-of-the-box (ready-to-use) app
 - By creating a missing app
 - By adding to or extending an existing app
 - By integrating other systems and technologies

Examples

Intelligent Web Map Examples

- Land Parcel Viewer
- <u>Convention Center Map</u>
- Earthquake Dashboard
- Fort Sumter
- Polling Place
- Geology Maps
- Mobile Maps
- <u>Salinity Time Series</u>
- Pronghorn Tracking
- High Water



Creating a GIS Web Map

- 1. Multi-scale Basemap(s)
- 2. Operational Overlay(s)
- 3. Tools for working with specific layers
- 4. A GIS app to bring this to life



Community Basemaps

You don't have to build it all yourself. Your map can be part of a community map.

- You need a set of multi-scale base maps to deliver your work
- No user can assemble their complete map.
- Community Maps Program
 - Collective information as a series of free, ready-to-use, great base maps



A unified, harmonized series of basemaps authored and shared by the ArcGIS community



Operational Layers

The focused set of layers that users work with

- Editing and data access layers
- Observations, sensor feeds, incidents
- Query results
- Result layers that are derived from analytical models



Earthquakes



Inundation Areas & Affected Buildings



Incidents, Customer Calls, Work Orders

Operational layers

• Access interesting information behind your maps. Use tools to reach into that data.

"What can you do with a single mouse-click?"

 Maps as interactive reports enable you to simplify the cartography (e.g., fewer and simpler labels)

Operational Layers are used for information access

Layers as interactive, georeferenced reports



Simplest Tool is an Information Popup

The most common layer report method





- Avoid use of
 - Feature and Object IDs
 - Abbreviated / technical field names
 - Code values
 - Poorly formatted real numbers
 - Etc.

Web Map Checklist

• A simple guide for creating great web maps

Helpful for all of your maps

Web Map Check List

Turn it green!

1. Implements the base maps plus operational overlays web map pattern?

Yes No

2. Good use of appropriate base map(s) - base maps provide a relevant context for the operational layers?

Yes No

3. Operational layers used are appropriate and suitable for map purpose (data representation and content is useful -- not based on nonsense)?

Yes No

4. Good popup reports contain useful item captions instead of DBMS field names?

Useful captions DBMS names

5. No missing data in report fields that generate empty report items?

Yes No

6. Only useful items in the popup report and no fields such as Object ID's or coded values?

Useful items only Use of irrelevant items

7. Point and line operational information is overlaid on top?

Yes No

8. Polygon or raster information overlaid on top or use of map sandwich?

Map sandwich Overlay

9. Operational overlays have strong symbology?

Yes No

10. Operational overlays are designed for use at multiple map scales and turn off at inappropriate map scales?

Yes No

11. Editing layers are focused and have strong symbols and editing rules?

Yes No

12. Editable features have clear attribute items and useful entry forms?

Yes No

13. Feature creation palette is well organized?

Yes No

14. For many operational layers, they can be time-aware (e.g., a time series of seismic events) and apply useful tools such as the time slider. Have you leveraged this appropriately? Are you using a good time window and time steps?

Yes No

15. Many maps can be presented using a *map presentation*, which can be built using Explorer. Do you have a narrative presented in a series of vignettes (structured like a good PowerPoint presentation)? Are you composing each "slide" as a great map that follows the other criteria listed here?

Yes No

16. Many web maps are used to create web apps and mobile apps. Are you leveraging and extending the app templates at ArcGIS.com when possible?

Yes No

17. Web maps and apps are made to be shared. Have you created a complete and clear map description with proper tags and a nice thumbnail? Have you made good decisions about with whom your map will be shared? Have you developed your strategy for how you want to share your web map outside of the ArcGIS community (e.g., embedded in your own web page, a blog, shared via email, etc.)?

Yes No

Esri Is Collaborating with Our Users to Build and Serve Critically-Important, Useful GIS Content

- Phase 1 Base Maps
 - Topo, Streets, Imagery, Oceans, NatGeo, Statistical Mapping
- Phase 2 Data and Feature Services
 - Key Foundation Layers: Parcels and derivatives, Streets, Addresses, Admin Boundaries

Why are community maps important?



Why are community maps important?

- They enable great web maps and apps
- Provide a Series Foundation Layers that enable a huge range of maps and apps
 - For mashing up your operational information
- Continuous Improvement of Geographic Resources Using Best Available Data
- Compiled and maintained by User Communities and Authoritative Data Providers
 - Best available content
 - Consistent Stewardship and Curated Foundation Layers
 - Complete, Continuous Coverage (In both Extent and Scale)
- Can be used by everyone
- Provide a Common, Shared, Continuous Map Experience

You should participate in the Community Maps Program

- Information will flow into your operations and extend the reach of your GIS
- Sharing: Put your information *into ArcGIS* to open it up
- It's still Your Information
- Best practices data model and workflows
 - Example: Editing Maps in ArcGIS include shared editing workflows, data quality checks, and validation rules

What is ArcGIS for Local Government?



• A Growing Collection of Free Maps and Apps

- For Workers and Citizens
- Easy to Configure

A Repeatable Pattern





Why is a harmonized information model important?

- Apps work across systems and sites
 - Local Government, Water Utilities, Defense, Etc.
- Efficiency
- Make it easier to deploy ArcGIS
 - Deliver applications quickly to your organization
 - Stay current with future releases / avoid legacy technology
 - Create a platform of geospatial data that can be leveraged by many
- Address common constraints in local government
 - Size and skills of staff
 - Budget and time available to implement
- Empower the community to contribute
 - Users
 - Partners

Many national, state, provincial, and regional GIS organization want this *National and Global Initiatives*

Elevation for the Nation



Imagery for the Nation



Imagery for the Nation "Insist & Efficient Government, Cool Public Service, and Tangaser Savings"



Soils for the Nation

Addresses for the Nation



Boundaries for the Nation

Parcels for the Nation



Transportation for the Nation



Hydrology for the Nation

National Hydrography Data



This Builds On and Extends Your Traditional GIS Work

- Work *with* users to build and sustain *their* systems
- Minimize One-Off Implementations
 - No longer -- just teach technology, and leave it up to users
 - To do their own data models, maps, analytics, apps . . .

Your Work

You will

- Continue to use ArcGIS to create and apply rich, up-to-date, authoritative geographic information
 - Your Traditional Work
- Begin to share your work "online"

- Your work is important
- You are collectively building and maintaining critical geographic information
- Effective use of your information can be realized on the Web
- New Intelligent Map paradigm (Map Packages and Web Maps)
- The Cloud will provide the enabling infrastructure
- Real Impact: Transformational -- If we can combine our information using intelligent maps

- Moving from client-server to web-centered systems
- In many cases, the focus will be on
 - Easy-to-use, web-based modality
 - Making information available to devices
 - iPhones
 - Tables
 - As well as workstations
- A collaborative environment for a community

- Adopt/follow the consumer maps pattern for delivering GIS to your users
- Create maps that use this pattern and add in GIS capabilities
 - Editing, analytics, time, presentations, great popups, workflows (e.g., Bus. Analyst)
 - More custom apps
 - "Do more" equals what GIS is all about.

- Use COTS
- Engage with other government agencies
 - Communities (Like Community Maps)
- Recognize that you are not so unique that you must do it all on your own.
- Manage
 - Time
 - Risk
 - Complexity
- Maximize
 - Re-use
 - Sustainability
 - Adoption of new approaches
 - Keeping up with current technology

GIS Technology enables your organizations to do its work



ArcGIS for Your Organization

ArcGIS Platform plus integrated maps & apps



Does this compete with Systems Integration Providers and Esri Partners?

- No, it actually increases the need for services work. <u>However</u>, traditional work will change
 - Implementation services
 - Customization and integration
 - A platform for even more apps, including more sophisticated apps
- There are possibly hundreds of apps in any local government / authority. Esri cannot possibly create all apps
- There are many additional domains (utilities, forestry, defense, environment, transportation, business, emergency response, facilities management, hydrology, climate, health, energy, etc. etc.)



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