Designing and Using Basemaps

Jennifer Hughey
Agenda

- The ArcGIS System
- Basemaps are a key component of your system
- Cartographic design considerations
- Using basemap layers in ArcMap
- Best practices for designing basemaps for the web
- Design considerations for mobile applications
ArcGIS 10 — A Complete System

Easier
More Powerful
and Everywhere

• Discover
• Create
• Manage
• Visualize
• Analyze
• Collaborate

Cloud
Enterprise
Local

Desktop
Mobile
Web
How do basemaps benefit my organization?

- Reusable maps that can accessed as part of the ArcGIS system
- Provide common cartography
- Deliver fast performing geographic context for applications
- Are part of a pattern for using GIS information
  - Operation layer(s)
  - Basemap layer(s)
Operational layers

- Show a focused item of interest
- Support functionality of the application
- Displayed on top of basemap
Basemap layers

- Provide geographic reference
  - Serve as a background for operational layers
- Communicate clearly and effectively
  - Text
  - Symbols
  - Colors
- Simple in design
  - Limited to task-specific layers
- Perform well
Designing versus acquiring basemaps

- **Acquire**
  - Many basemap resources
    - ArcGIS Online
    - Microsoft Bing Maps
    - And more…

- **Design**
  - Use your authoritative data
  - Incorporate end user needs
  - Use a map template to get started
Design and technical considerations

• What size will it be?
• What geographic extent will I show?
• What map scale will that make it?
• What map projection will I use?
• Will it be in color?
• What print resolution can I use?
Types of basemaps

- Aerial
  - Imagery only

- Traditional
  - Streets, parcels, municipal boundaries

- Hybrid
  - Combines aerial and traditional layers
  - Designed as two map services or one
Common design principles

• End-user requirements
  - Provide only relevant data
• Combining with other services or data
  - Utilize subtle symbology and text
• Optimize your basemaps performance
  - Caching
  - Desktop
Suggested basemap data

- Contours
- County Boundary
- Hillshade
- Landmark
- Municipal Boundary
- National Park
- Park
- Railroad
- Road Centerline
- State Boundary
- State Park
- Waterbody
- Waterline
ArcGIS Desktop - basemap layer

- New in ArcGIS 10
- Is a user-defined group of static layers that draws continuously during navigation
- Provides optimal drawing performance
- Use a high-performance drawing engine
  - Improves the display speed and response time of the map
  - Provide a continuous visual context for data that you're viewing, editing, or analyzing.
Adding a basemap layer in ArcMap

- Create a new basemap layer by right-clicking on the Dataframe
  - Add your layers to the basemap layer
Adding data

- Basemap layer appear like a group layer
- Add your data layers to the basemap layer
- Add relevant data layers based on the basemaps purpose
  - Topographic map layer example
    - contours, hillshade, elevation points, physiographic feature names
Optimizing performance

- Analyze your basemap layer
  - Determine performance problems and recommendation on how to improve
Sharing your basemap layers

• Save as a layer file
  - User needs to have access to the data

• Save a layer package
  - Data is zipped up with the layer file
  - Share data and the basemap layer online
Demo
Delivering basemap services using ArcGIS Server

- Cached Map Service
  - Images pre-created for faster application performance
- Image Service
  - ArcGIS Server Image Extension
  - Image service provides dynamic access to imagery
Cached map services properties

- Precomputed map image tiles
  - Stored on server for a range of levels of detail
- Full access to attribute data
  - Identify, Query, etc.
- Provides best performance and scalability
- Decision whether to cache basemap affects its design
  - Cached map accessible at specific levels of detail only
Cached map design considerations

• Determine projection of your cached map
  • All cached services in Web map must have the same projection

• Determine scale levels based on:
  • Scales at which users need to view the map
  • Other cached services that are part of the Web map
    • Only those services that exist at particular scale will display
### Choosing output image type

<table>
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<th>Transparency</th>
<th># of colors</th>
<th>Storage</th>
<th>Best for</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>16 million</td>
<td>Lossy (1%-100% compression)</td>
<td>Raster / Vector*</td>
</tr>
<tr>
<td>Yes</td>
<td>256</td>
<td>Lossless</td>
<td>Simple vector</td>
</tr>
<tr>
<td>Yes (No in IE 6)</td>
<td>16 million</td>
<td>Lossless</td>
<td>Raster / Vector</td>
</tr>
<tr>
<td>Yes</td>
<td>16 million</td>
<td>Lossless</td>
<td>Raster / Vector</td>
</tr>
</tbody>
</table>

*JPEG format with quality ratio of 90 is utilized in ArcGIS Online*
Map Templates

- Contain best practices for publishing your data
- Are used in ArcGIS Online maps
- Are well designed for Web and mobile applications
- Are downloadable, ready to use, plug-in your data
- Include documents, sample data, and styles
Labels vs Annotation

- Two dynamic placement options
  - Standard label engine or Maplex
- Maplex is recommended for cached maps
  - Sophisticated label placement rules
  - Supported with MXD
- Geodatabase annotation
  - Fixed for a particular scale
  - Additional workflows may be required
  - More data to manage in geodatabase
Traditional basemap design considerations

• Design layers for the cache scales
  - Utilize group layers to set up symbology for each cache scale
  - If layer properties are consistent (e.g., symbol size), reuse layer for multiple scales

1:18,000

1:9,000
Hybrid basemap design considerations

- Map designed to overlay on top of imagery
  - E.g., avoid polygon fills on layers
- Choose effective font properties for text
  - Visible over dark backgrounds
- During design, add imagery to ArcMap as a guide
Demo
Mobile basemaps

• Are added as a basemap layer to the application
• Provide geographic reference, but do not require synchronization of data
• Can use services from ArcGIS Server and ArcGIS Online, or using a mobile cache
Design considerations for mobile basemaps

- Environmental conditions play an important part in the design
- Chose colors and symbols that can be easily read under different lighting
- Contrast of colors and simplicity is the key to the design
- Limit the amount of text in the map
- Test the maps under different lighting
What device are you deploying your maps on?

- What is the size of the screen
- Create scale dependency
- Limit the amount of data
- Test performance
- Choose simple symbols
- Avoid fill colors
Mobile basemap deployment

• **Create Mobile Map**
  - Use the Create Mobile Map tool in ArcGIS Desktop
  - Creates a mobile project file (.amp), and a mobile cache
  - Does not use ArcGIS Server services
  - Synchronize using the Synchronize Mobile Cache tool

• **Publish as a service**
  - Create a map service using ArcGIS Server
  - Build an out-of-the-box application using the ArcGIS Mobile Project Center
Demo
Conclusions

• Basemaps underpin a new web map paradigm
  - Simplify mapping for non-GIS users
  - Simplify mapping for GIS users
• Basemaps contextualize in several ways to help create new maps when combined with other content
Questions