Map Layout and Cartographic Design with ArcGIS Desktop

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Seminar overview

- **General map design principles**
- **Working with map elements**
- **Using ArcMap templates**
- **Tips and tricks for improving maps**
Affective and substantive design

- ‘Think before you draw’
  - Map design is a time-consuming process

- Affective
  - What is the ‘look’ or ‘feel’ of the map?
    - Historical, modern, technical

- Substantive
  - What is shown on the map and for what purpose?
    - Text blocks, charts, tables, images

Layout design

- Balance
  - Margins
  - White space
  - Bounding boxes
  - Alignment

Unbalanced layout
Layout design

• Balance
  – Margins
  – White space
  – Bounding boxes
  – Alignment
Layout design: Figure Ground Relationship

- **Figure:**
  - object in front of the background

- **Ground:**
  - Underlying plane behind elements

- **Figure-Ground Relationship**
  - Separating figure from ground
  - Enhanced using
    - Drop shadow
    - Draw order
    - Contrast

*Map image from the Atlas of Oregon (2nd. Ed.)
Copyright 2001 University of Oregon Press*
Layout design

• Visual contrast
  – Separates figure from ground
Layout design

- Visual contrast
Layout design

- Visual hierarchy
- More attention paid from top down

- Top:
  - Important items
  - Larger items

- Bottom
  - Less important items
  - Smaller items

Map image courtesy of Indy Hurt
University of Redlands, MS GIS Program
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Data frames

- Manage multiple views of same data
- One or more per map page
- Most map elements are data frame properties
  - North arrow
  - Scale bar
  - Grids and graticules
  - Text as graphic element
Map elements

- ‘Smart’ graphics
  - Maintain dynamic link with Data View
- Select what’s appropriate for the map objective
  - Is north arrow necessary for population density?
  - Is scale consistent across entire map?
  - Do base map colors need to be included in legend?
Text elements

• Four categories
  • Descriptive, Positional, Analytical, Metadata
• Text elements include:
  • Title
  • Author(s)
  • Organization
  • Data source
  • Date of data and map
  • Projection
  • Disclosures
• Except for title, none should be prominent
• Limit use of different fonts
  • Text elements have visual hierarchy
Add locational information

- Graticule, Reference and Measured grids
  - Add from Data Frame Properties > Grid tab
Tip: edit default legend properties

Default settings:

Population per sq km
- 0.008611 - 10.00
- 10.54 - 50.00
- 50.19 - 100.0
- 117.2 - 200.0
- 224.1 - 16610

No Data

Edited settings:

Population per sq km
- 0 - 10
- 10 - 50
- 50 - 100
- 100 - 200
- 200 - 1,610

No Data
Tip: edit scale bar properties

- Set increments that are easy to measure
- Left-of-zero divisions should be easy to use

**Default settings**

\[ 5700 \div 3 = ? \]

- Diagram showing scale bar with divisions at 0, 950, 1,900, 3,800, 5,700, and 7,600 kilometers.

**Enhanced settings**

\[ 2000 \div 5 = \smiley \]

- Diagram showing enhanced scale bar with divisions at 2,000, 0, 2,000, and 4,000 kilometers.
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What are templates?

- Re-usable documents that:
  - Contain static elements
  - Speed map creation
  - Are stored as .MXT file
  - Are useful for creating map series
  - Standardize layouts
  - Can be shared with other users
Template contents

- Graticule
- Neatline (border)
- Map Body
- Scalebar
- Legend
- Logo
- Projection
- North Arrow
- Title
- Source, Author
Create new maps

• Use existing template
  – ArcMap supplies 28 in 4 categories
• Create new template
  – e.g. different page sizes
• Modify existing
• Create new tab
  – Add folder to directory
  – Store your own ‘library’

• Within layout view, switch to another
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Limit colors and shades

12 distinct colors

7 or 8 distinct shades

Same color?
Know the map viewing distance

- Select text and symbol size based on viewer perspective
  - ICA (International Cartographic Association) legibility standards:

<table>
<thead>
<tr>
<th>Viewing Distance</th>
<th>Size (mm)</th>
<th>Viewing Distance (in.)</th>
<th>Size (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 m</td>
<td>0.30</td>
<td>1.5 ft</td>
<td>0.01</td>
</tr>
<tr>
<td>2 m</td>
<td>1.15</td>
<td>5 ft</td>
<td>0.03</td>
</tr>
<tr>
<td>5 m</td>
<td>2.90</td>
<td>10 ft</td>
<td>0.07</td>
</tr>
</tbody>
</table>
Change data frame background color

• Colored background emphasizes visual hierarchy
  – May take longer to print on larger page sizes
Use Grids and Guides

- Graphic element alignment tools
- Set ArcMap Options for units and snapping
- Aids visual balance, alignment
Advanced Techniques

- Clip data frame to shape
Advanced Techniques

- Rotate data frame

Data view

Layout view with rotation (note north arrow)
Advanced Techniques

• Extent Rectangles
Advanced Techniques

• Masking effects
Advanced Techniques

- Text boxes

Text can be placed within a graphic shape. Two of the benefits of this function are: 1) it allows you to easily add information in areas which might otherwise be just white space; 2) helps you maximize the communicative power of your map where space might be limited.
For more information

**ESRI Mapping Center**

http://mappingcenter.esri.com

Map examples, Ask A Cartographer, Blog, and more

**Virtual Campus**

*Cartographic Design Using ArcGIS 9* (7 module course)

*Making Better Map Layouts with ArcGIS* (free training seminar)

**Instructor Led Training**

*Cartography with ArcGIS*

*Managing Cartographic Data in the Geodatabase*

**ESRI Press**

*Designing Better Maps: A Guide for GIS Users* – Cynthia A. Brewer

*Cartographies of Disease: Maps, Mapping and Medicine* – Tom Koch
Questions ?