



Map Layout and Design with ArcGIS

Estimated time: 15 minutes
Estimated time: 30 minutes

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Work with ArcMap Layout View

Estimated time: 15 minutes

In this exercise you will edit an existing map template, and review the ArcMap Layout toolbar and basic map layout management techniques.

Step 1: Edit an existing template

- Open ArcMap, and choose to open an existing map
- Navigate to the seminar data folder C:\EdUC\MAPS\
- Open Mollweide.mxd

Question 1: What is the page size and the layout units?

- Click the Change Layout button , located at the far right of the Layout toolbar
- Click the Traditional Layouts tab, and select the LandscapeClassic.mxd
- Click Finish
- Observe the changes in the page size and some of the surrounding map elements.

Question 2: What is the new page size?

You see how easy it is to switch between layout templates. However, there are obvious changes that need to be made to improve this map, you will do this in the next step.

Step 2: Edit map elements

You will change a few of the settings for the combined Mollweide / Landscape Classic template to make the map look better.

- Double-click on the white, vertically oriented text to open the text properties dialog
- Change the text to **World Map - Mollwiede Projection**

- Click OK to close the Properties dialog

The Legend is very difficult to read against the 'Dark Umber' background. You will change the background of the Legend frame itself.

- Double-click on the Legend
- Click the Frame tab, change the Background color to: Grey 10%.
- Click OK

- Move the Legend box so that it is better centered within the title area

The data frame containing the world data is very blue. Considering the size of this page, it might take a long time and a lot of ink to print. You will remove the default background blue for this data frame.

- Select the data frame by clicking on the darker blue area
- Right-click and select Properties
- Click the Frame tab
- As you did with the Legend, you will change the background color. This time change it to: **<None>** (scroll to the top of the color dropdown list)
- Click OK

In three quick steps you have made this map easier to read.

- From the File menu, click Save (or Ctrl+S) to preserve the changes to the map document.

At this map scale, do you feel the point marker symbol size for the world cities is appropriate? When the map was first created for an 8" x 11" page, the symbols were probably cartographically balanced. Now that you have changed the page size by switching the map template, the city points are too large. Next, you will enhance your map slightly by reducing the size of the city point symbols.

- In the ArcMap Table of Contents, click on the point symbol for the City layer.
- Change the symbol size to **4 points**

- Click OK to close the Symbol Selector

This may seem small, but consider how large the page will be. To confirm how symbols and text will appear on a final map, you should always preview your layout view at its actual size.

- On the Layout toolbar, click the Zoom to 100% button 

The city point symbols are not too large for this map.

- Zoom to the full page extent 

- Save the map document, and close ArcMap.

Conclusion

This is the end of the first exercise. If you have finished before the next lecture has begun, feel free to continue with the next exercise or explore the software.

Answers to Exercise 1A Questions

Question 1: What is the page size and the layout units?

Answer: 8.5 x 14 inches (Legal size sheet)

Question 2: What is the new page size?

Answer: 22 x 34 inches (ANSI D)

Layout Tips and Tricks

Estimated time: 30 minutes

In this exercise, you will use good cartographic principles to improve an existing map. You will also be introduced to some advanced layout techniques which are available with ArcGIS 10.

Step 1: Visually balance the layout

- Open ArcMap, and choose to open an existing map document
- Navigate to the seminar data folder (C:\EDUC\MAPS) and open FixMap.mxd
- Confirm that ArcMap is showing the Layout view for this map

This map is cartographically poor, and has a number of errors and omissions which you will correct. By the end of this exercise you will:

1. Balance the layout elements,
2. Improve the visual balance and hierarchy of color and text,
3. Add meaningful map elements,
4. Use some advanced layout techniques

What is the purpose of this map? It might be difficult to discern, based on the current relationship between the data frames. However, the intention is to show the locations of the main cities in South America.

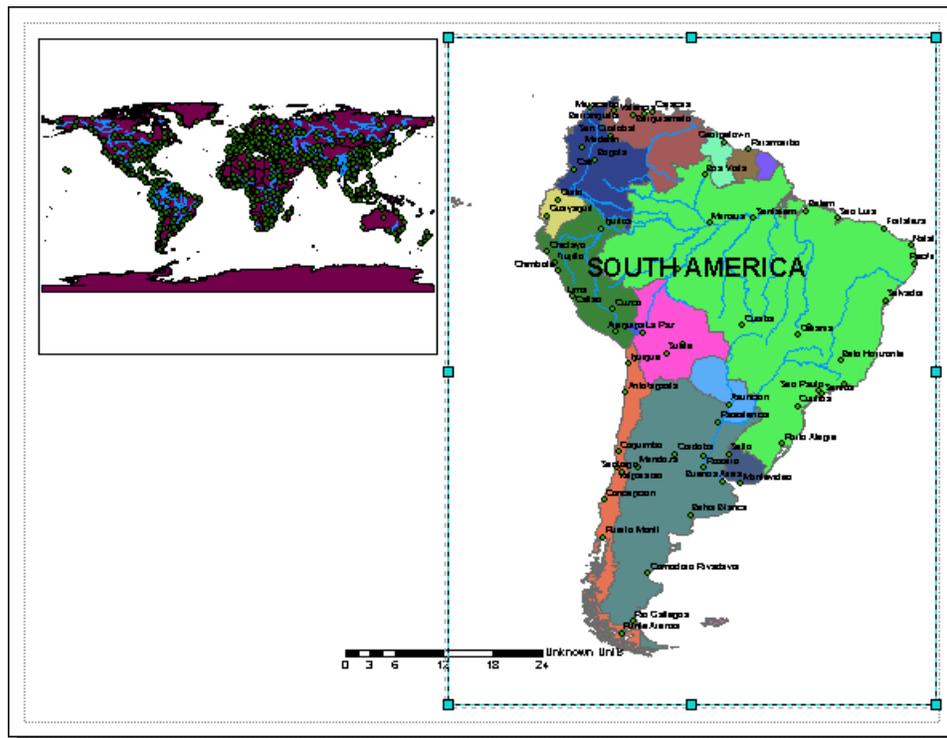
- Select the data frame for the World, make it smaller and move it to the top left corner.

Note: If you haven't re-sized or moved graphic elements in ArcMap before, first click on the data frame, you will see the outline of the box change symbol to a blue dashed line and blue boxes. These boxes are called 'handles', as you pause the cursor over the handles, it will change to another cursor symbol. This is when you re-size or re-shape the data frame box

- Select the data frame for South America and increase its size to take up about half the page
- As necessary, zoom in on the data for South America so that it fills the data frame

You will notice that some of the map elements changed drastically when you changed the South America data frame: the label text, though it remained at an 8 point font, is now much more legible, and the scale bar divisions changed.

Your map should now look something like this:



You have slightly improved the communicatory power of this map; it is now more obvious that the purpose of this map is to show cities in South America.

Now that you have made the relationship between the data frames more clear, the city, rivers, and lakes information in the World data frame is difficult to read, and should be removed to reduce clutter on the map.

- In the ArcMap Table of Contents, for the World data frame, turn off the display for the City, rivers, and lakes layers.

The data frame does not have to be active for you to turn these layers off.

Now that you have improved the visual balance of the map, you need to change some of the color and text.

Step 2: Enhance color and text balance

ArcGIS 10 provides you with a comprehensive set of tools to control the "graphic" part of "cartography". You will next use some of these tools to further improve the layout. First, you will change the color of the World countries. The darker color gives too much visual weight to the data frame, and also makes it difficult to discern the country boundary lines.

- In the ArcMap Table of Contents, click the symbol box below the Countries layer for the World data frame.
- Change the Fill Color to a beige or olive green (Tecate Dust, a beige-like color at row seven, column four is a nice choice)
- Change the Outline Color to Grey 40%
- Click OK

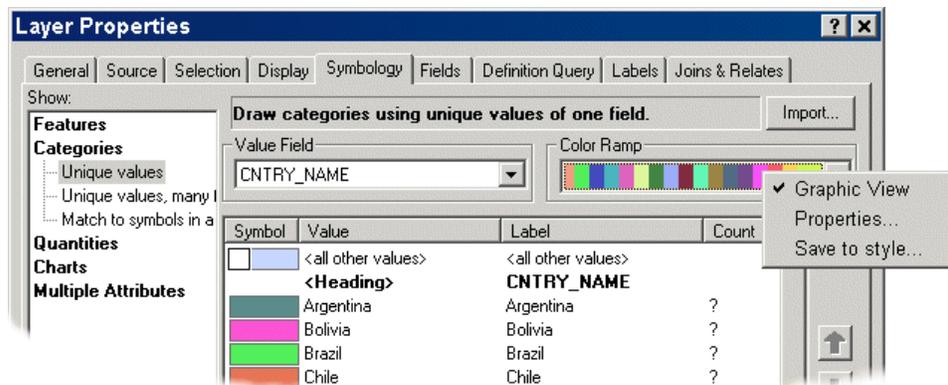
It should be immediately apparent that lightening the color of the World map has the effect of making the South America map appear more prominent.

Now that you have improved the color balance of the World data frame, you will change the color scheme of the South America data frame, so that the City labels are more easy to read.

- In the South America data frame, right-click the Countries layer, and click Properties
- Click the Symbology tab
- From Show: click on Categories>Unique values
- Verify for Value Field CNTRY_NAME is selected, click Add All Values

The current Color Ramp is "Basic Random", you will change it to a more muted scheme.

- Switch between the graphic display and textual description of the various color ramps by right-clicking in the Color Ramp window and turning Graphic View off



- Select a color ramp that is less intense than the current one - as you are viewing the text description of the color scheme, select one with the word "Pastel", "Muted", or "Cool" in the name.

- Click OK

The next change you will make is to improve the legibility of the text.

- Switch to the ArcMap Display view (at the bottom left of the map window)

- If necessary, activate the South America data frame

Note: You have two methods of doing this from the ArcMap Table Of Contents: one is to right-click on the data frame and click Activate; the other is to press the Alt key while selecting the data frame with your mouse

- Add the Labeling toolbar (Customize > Toolbars > Labeling).

This toolbar provides you with a single interface from which you can control the label properties for all of the layers within a single data frame. Given the limited time available here, you will use only one tool.

- Click the Label Manager 

- Click the Default label classes for each of the layers. Note that the label placement options change for each different geometry type.

- Click the City - Default label class

Change the Text Symbol settings to: Arial, Bold, font size 9

Click OK

The city text is now a bit more prominent, and therefore easier to read. This change also pushed the city text upward in the 'visual hierarchy' of the data frame. However, the 'South America' text is still a bit too heavy; also note that this is graphic text, and not associated with a feature.

Add the Draw toolbar (Customize > Toolbars > Draw).

Use the Select Elements tool on the Draw Toolbar  to select the 'South America' text.

Double-click to open the text properties dialog.

Click Change Symbol

In the Symbol Selector dialog, select the Country 2 font type

Change the font size to 20, Bold, and click OK

Click OK to close the text properties dialog.

Switch back to Layout View

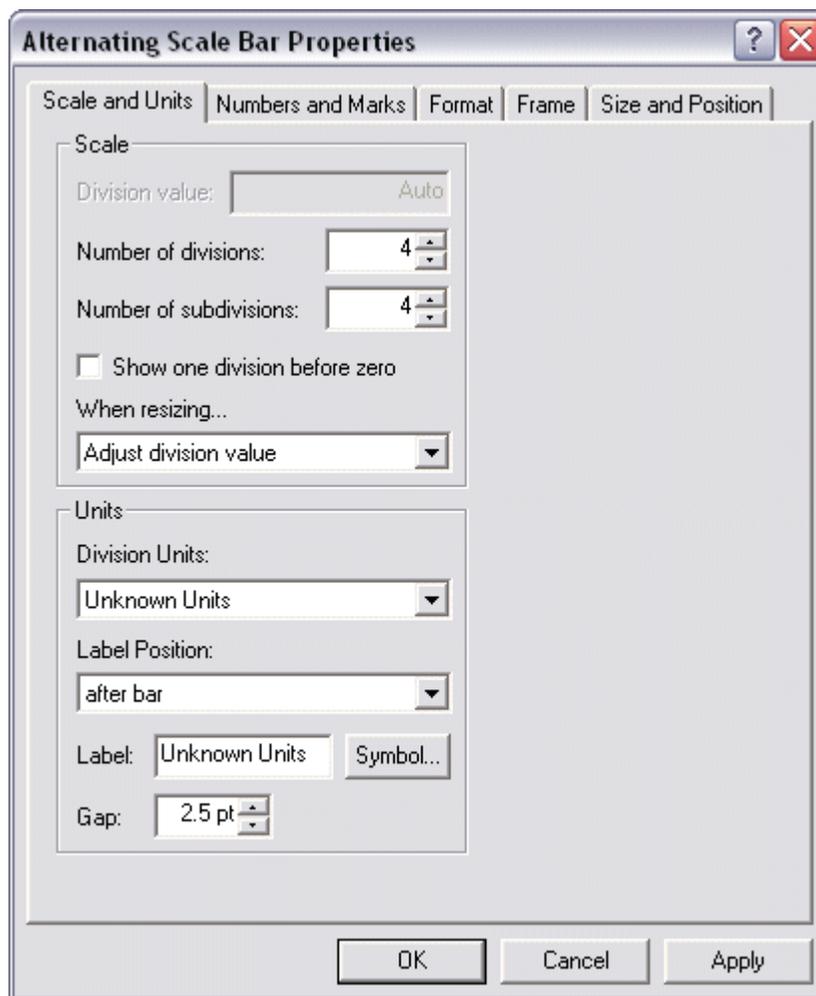
The text elements for this map now have a bit more balance, and more clearly reflect what the priority of the map is supposed to be. Next you will change some other map elements.

Step 3: Work with map elements

Considering that the map is intended to show the locations of cities in South America, is it critical to include a north arrow? How important is it to add a scale bar? Will this map be used to make distance measurements? If so, how accurate would they be at this scale on this size of paper? For this map and its intended purpose, you will not add a north arrow. However, you will change the existing scale bar, and add a graticule to the South America data frame which will display the Latitude and Longitude coordinates.

Double-click on the Scale bar to select it and open the properties dialog.

- Select the 'Scale and Units' tab



Notice that the Division Units are currently 'Unknown Units'.

- From the *Division Units* drop down list, select **Kilometers**
- From the *When resizing...* drop down list, switch to: **Adjust Width**
- Notice that the Division Value window is now active: change the value to **500 km**
This is a nice round number and easy to divide or multiply against the map.
- Change the number of divisions to **4** (if necessary)
- Change the number of subdivisions to **0**

- Click OK to close the scale bar properties dialog.
- Select and move the scale bar so that it is centered and just below the South America data frame.
- Next, right-click the South America data frame, and click Properties
- Click the Grids tab, and click New Grid.

This will start a wizard which will step you through the graticule creation process. You will accept the default settings, but take the time to examine the various parameters that you can set with this wizard.

- In the first panel, select Graticule, then click Next
- Click Next again in the Create a graticule panel - note the settings you can change here
- In the Axes and Labels panel, click the button for Labeling > Text style
- Change the text to Times New Roman, size 6, and click Bold
- Click OK
- Click Next
- Click Finish
- Click OK in the Data Frame Properties dialog.

The graticule is added to the data frame. You may need to move the South America data frame in order to fit all of the graticule text on to the page.

You can add text elements with a variety of layout behaviors. Take a moment to hover your mouse over the various text tools located on the Draw toolbar in order to see the different text creation options that are available.

- Select the Polygon Text tool
- On the white space of the map, draw a polygon with any irregular shape you choose - double-click to finish the drawing
- Right-click inside the graphic outline of the New Polygon Text box that you have just drawn, and click Properties

- Click the Text tab, and enter a sentence or two of text - the amount of text you enter will be determined by the size of the polygon which you drew.
- When you have finished entering some text, click the Frame tab
- Click the dropdown list arrow for Border, and add a 1.0 Point line
- Click OK

You can add new polygon text anywhere on a map. Where white space is limited, and you have important textual information which you need to include, you can use this technique to maximize the available space on your map.

There are many more details which need to be addressed to make this map complete. The goal of these exercises was to give you a brief introduction to some of the map layout tools and techniques available in ArcMap 10

Step 4: Challenge Step: Advanced Layout Techniques

Each of the following techniques are located within the data frame properties. The following instructions will give you the location of the settings, but you are left to your own creativity when experimenting with these parameters.

- Rotate data frame - use this technique where the extent of the data doesn't fit well inside a rectangle or square.

If you have placed a north arrow inside of the data frame, it will rotate as well. The rotate data frame input is located at the bottom section of the Data Frame Properties > General tab.

- Extent rectangle - is located on its own tab in the Data Frame Properties.

You have control over the symbology for both the extent rectangle, and the leader lines which link the corners of the related extents. Keep in mind the nature of the relationships between the data frames on your map. For example, in today's subject map, you would not be able to show the extent rectangle for the World data frame in the South America data frame

- Clip data frame to shape - use this technique to mask data that falls outside of a specified area.

This is a graphic operation only, and does not affect the source data. You will find this setting at the bottom of the Properties > Data Frame tab. Investigate the different options for defining the shape that you use to clip.

Conclusion

This is the end of exercise 2. If time allows, feel free to explore other layout properties. Consult your seminar presenter for suggestions or demonstrations.