

## How to Create Cartographic Models using the Drawing Toolbar in MS Excel

### *The Cartographic Model*

A cartographic model is a 'step-by-step-how-to' flow chart used to graphically represent the GIS data and analytical procedures that are performed in a GIS-based study. Its purposes are to:

- organize the procedures that are performed, and
- identify the data required to complete them.

A standard set of symbols and annotations (as specified in this document or adopt your own) are used to simplify the interpretation of the model, making it **a valuable source of documentation and reference for the GIS analysis**.

When developing your cartographic model, it is often most useful to start at the end; i.e. display the final product and proceed backwards step-by-step toward the existing data. This way the existing data is less likely to control the final outcome of the analysis.

1. First define the final product. What values will it have? What do they mean?
2. What input data are necessary? How might the inputs be derived from existing data?
3. Represent each input file type (e.g. tabular data, raster image, vector, database field, values file) with a different symbol.
4. Join the input(s) to the result with connectors (arrows).
5. Indicate the operations (e.g. buffer, overlay, reclassify) above or below the arrows connecting the input and output data files. Important input parameters should be noted near the corresponding operation names.

(SOURCE: Eastman, J. Ronald. 1995. "IDRISI for Windows User's Guide Version 1.0." Clark Labs, Clark University, Worcester, MA. pp. 13-28 & 13-29.)

More information on cartographic modeling can be found at:

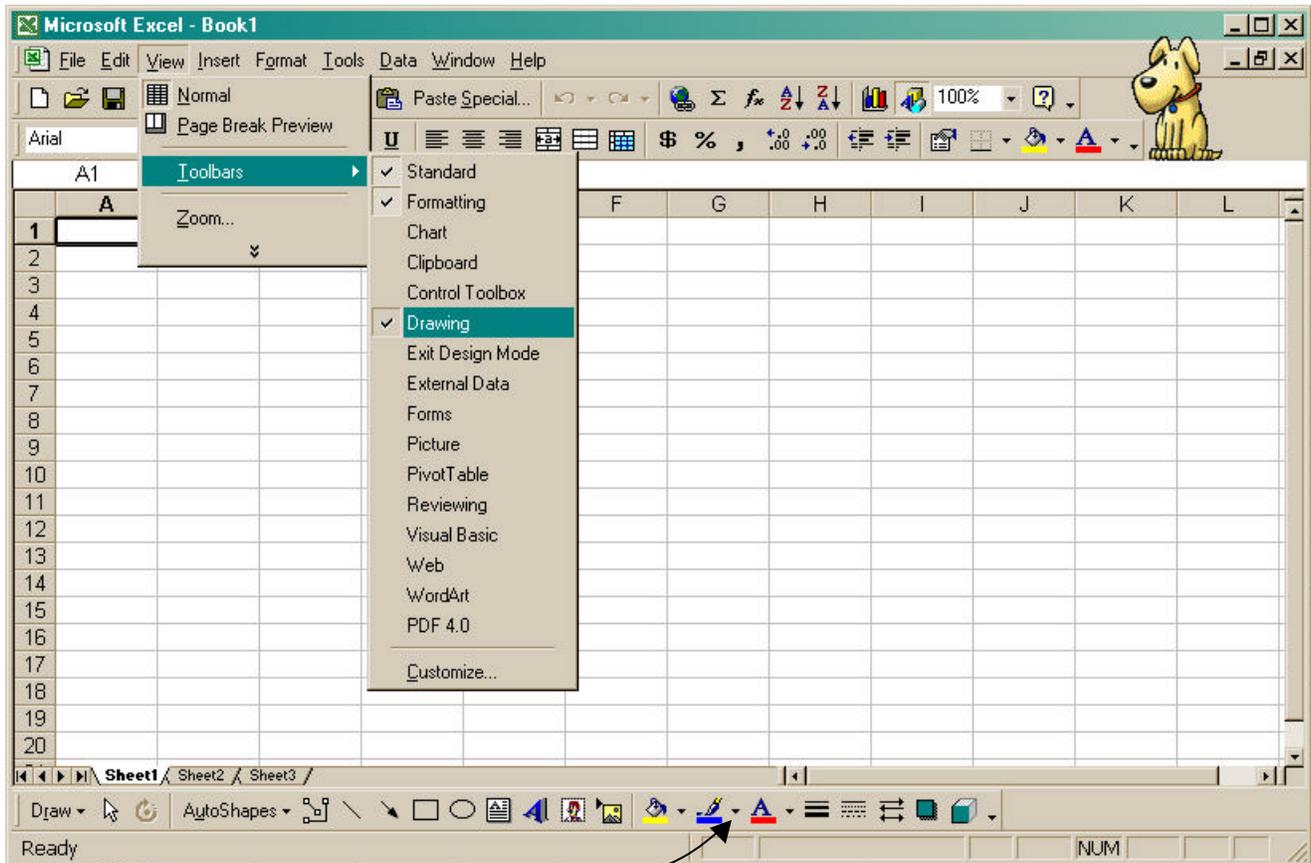
- [http://www.geography.otago.ac.nz/OnlineCourses/Intro\\_to\\_GIS/labs/labs\\_four.html#cartographic\\_modelling](http://www.geography.otago.ac.nz/OnlineCourses/Intro_to_GIS/labs/labs_four.html#cartographic_modelling)
- <http://coss.stcloudstate.edu/brichason/modeling.htm>

## Getting Started

Open MS Excel to a new worksheet

Under the View pull-down menu, go to Toolbars and check the **Drawing Toolbar** to make it visible (if not already visible – refer to **Figure 1** to see what it should look like).

You can also make the Drawing Toolbar visible by clicking on 



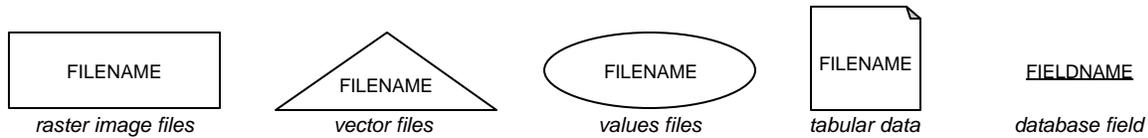
**Figure 1.** The Drawing Toolbar.

## Tips on Constructing the Model

### DRAWING:

Click on the **AutoShapes** menu on the Drawing Toolbar to select the various shapes you need for your cartographic model. Refer to **Figure 2** for more details on the shapes to use for the data files used.

For example, select the rectangle from the Basic Shapes sub-menu and draw it by clicking on the worksheet where you would like it to be positioned, then holding the left mouse button down, and dragging to delineate the size. Release the mouse button when finished dragging.

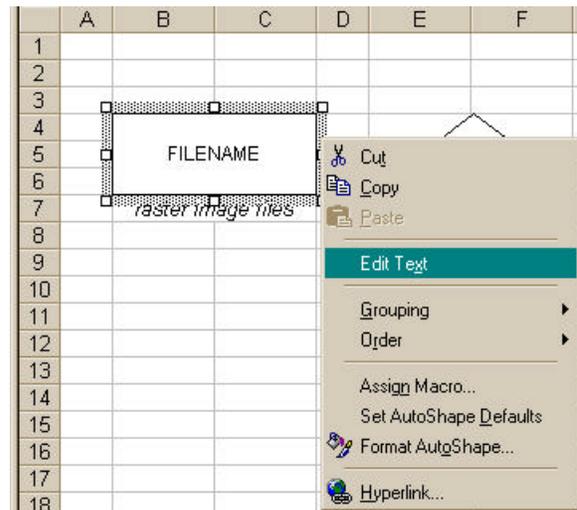


**Figure 2.** Example shapes for data file types.

**ADDING TEXT:**

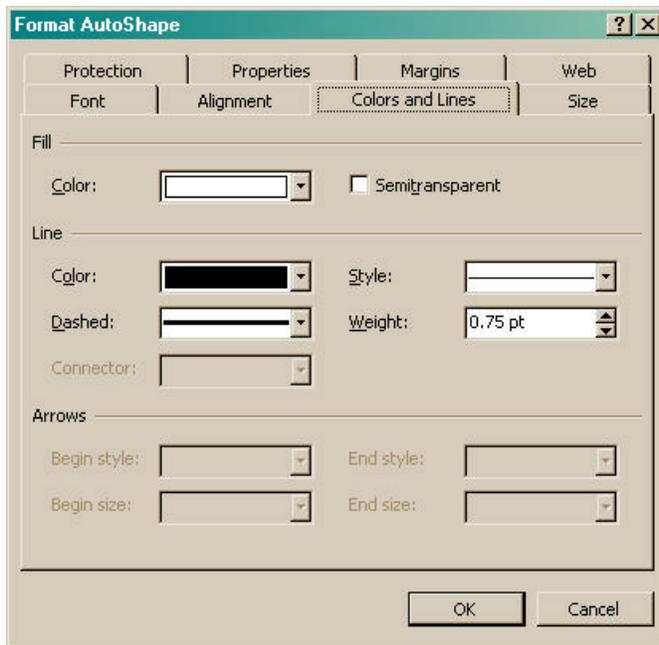
Move the cursor over the shape object you want to add text to. Right-click and then choose **Add Text** from the pop-up menu.

Type in your text (e.g. filename, operation name, or important input parameters). Notice the differing appearance of the object when it is selected to add text (slanted lines in rectangular border) or just simply selected (dots in rectangular border).



**FORMATTING AUTOSHAPES:**

Drawing objects can be formatted using the Fill Color, Line Color, Line Style, etc. icons on the Drawing Toolbar as well as Font, Font Size and Style from the Formatting Toolbar at the top of the screen. Also, Line Style and Arrow Style can be changed for the connectors.



Simply select the shape or object and click on an icon to change the appearance. You can access the complete formatting dialog box by selecting the object and choosing **Format** → **AutoShape...** from the pull-down menu, or by right clicking on the object and choosing **Format AutoShape...** Font, Alignment, and Colors and Lines can be modified according to your artistic ambition.

- Note: For your text boxes containing the capitalized, italicized *OPERATION NAMES* indicate No Line for the line style so as not to have a border around the shape like the file name shapes do.

### **CONNECTING:**

Under the AutoShapes menu, select **Connectors**. Choose a Straight, Elbow, or Curved Arrow Connector.

Move the cursor to the end of one shape you wish to connect from (blue attachment nodes will become visible).

Then simply click and drag to draw the arrow connector from that object to another object. Release the mouse button when the cursor is over the desired blue attachment node.

The nodes turn red to indicate the connection is complete. The red nodes can be clicked and dragged to move the attachment point to a different blue node

The yellow diamonds can be clicked and dragged to reposition the connector line between the objects.

- Note: Elbow Arrow Connectors provide the most versatility; i.e. you can draw straight (but not diagonal) and bent arrows depending on the positioning. You'll need two or more elbow connectors to join two or more input files to the output coverage. Connectors (as opposed to lines) will MOVE with objects that you move!

### **RESIZING:**

You can resize any shape or text box by selecting the object, moving the mouse cursor over the object until it turns from a plus to a two-headed arrow, then clicking and dragging the resize buttons to the desired width/height.

### **MOVING:**

You can move and place the drawing object by moving the cursor over the selected object until it turns into a four-headed arrow, then clicking and dragging the object to the new position.

To position objects more exactly, you may access the **Order** and **Align or Distribute** menus under Draw in the Drawing Toolbar. For example, select two objects you wish to line up, select Align or Distribute from the Draw menu, and then choose to align the objects to the top or bottom or middle, etc.

**PAGE SETUP:**

Select File → Print Preview to see how your model fits on the page(s).

While under page preview you can add text to the header and/or footer, adjust the margins, center horizontally and/or vertically on the page, etc., by clicking on the Setup... button at the top of the screen. You can also access this page setup under File → Page Setup, while under normal view.

Return to normal view, and if necessary move and resize objects so they fit within the page.

An option to get your model to fit to a page is to go under View → Page Break Preview, where you can click and drag the page breaks to surround your cartographic model.

Under Page Setup... scaling by a percent that you specify, or clicking to adjust to fit one page wide by one page tall (for example), will make your model fit to the appropriate page.

**SAVING:**

As with any computer file - save often!

**PRINTING:**

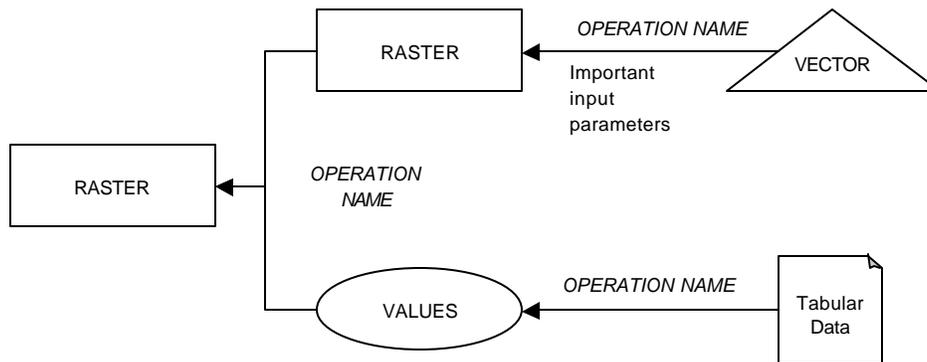
Once your cartographic model is complete, the page is set up to fit to the appropriate page width(s) and height(s), and your file is saved, click on File → Print and send to the printer.

You may also select all objects that make up the cartographic model, group them, and even copy and paste into MS Word or other software application.

**MORE TIPS:**

- Select each of the rectangle, oval, and triangle shapes from the Basic Shapes menu and draw one of each (**Figure 3**).
- Size each shape to accommodate text and do any other formatting you desire.
- Draw a rectangle for the module name, but differentiate this from the raster file rectangle by italicizing the font and removing the line border (section on Formatting AutoShapes).
- Draw a page with the corner turned over. You'll notice that Excel draws this upside down; in order to orient it to the top, select the object, click on Draw in the Drawing Toolbar, choose Rotate or Flip from the pop-up menu, and select Flip Vertical. The page corner is now at the top of this shape.

- Format each shape according to the conventions outlined in this instruction set and save the Excel file - you now do not need to draw any more shapes since you can select the object, copy it, paste it, add text, and move it to a new location each time that particular drawing object is needed.



**Figure 3.** Example of what each shape can look like in a simple cartographic model.

The example below shows how tabular data is brought into the GIS and joined with the combined forest and soils data to extract class values based on spatial location.

