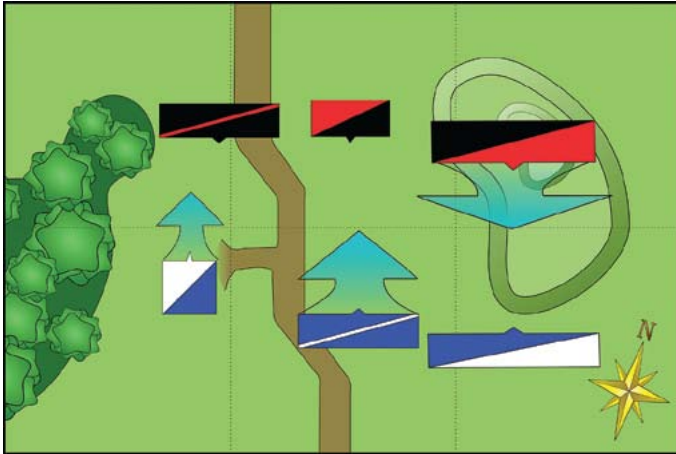# Computer cartography for wargamers

A simple introduction to producing maps using *free* software

by Tyler Provick

I f a picture is worth a thousand words, a map is worth a thousand more. In its most basic form, a map is simply the visual representation of spatial data: how far the coast is from the mountains. At the same time, a map can be a beautiful work of art, worthy of framing. For the wargamer, maps serve many practical purposes. They are used to designate deployment for scenarios or tell the story of a battle in a battle report. Ambitious wargamers even use maps to run complex map-based campaigns.

With well-documented historical periods, it is possible to find maps that can be used by the wargamer. Like most of the hobby, however, it falls to the wargamer to make it themselves if the appropriate map isn't available. While pencil and paper, pen and ink are still staples in the creation of maps (see those produced by the Editor in previous issues), computers are becoming a popular choice for the creation of maps. A computer allows a wargamer to quickly colour a large area with a single click. It is much easier than dragging out the pencils, crayons or watercolours.

This article will focus on the use of a specific graphics program that is *free* and can run on almost *any* computer whether it is running Windows, Linux or Mac. Specific steps will be provided, so that even someone new to computing can follow along. It is assumed that the reader is already familiar with map-making without a computer and will have some idea of the type of map they want to make.

Introduction to Inkscape

The first step in creating a map on the computer is finding the right program to use. There are professional cartography programs, amateur cartography programs made by wargamers for wargamers, and generic graphics programs available. Both the professional and amateur cartography programs cost money, with the amateur programs being much more affordable. Personally, I find that all the maps made by one popular amateur cartography program end up looking the same.

A graphics program, while not designed specifically for map-making, is designed to make all types and styles of graphics. These programs are tools, like a pencil, which can be used to create anything the user wants to create. Another advantage to generic graphics programs is their price. While it is possible to spend a great deal of money on a graphics program, there are many free applications that are very powerful. *Inkscape* is one of them. Though free, it works on most Operating Systems, is easy to use, and is a perfect tool for the wargamer who wants to quickly create a map for their webpage or club campaign.

There are other free graphics applications, but it is the fact that *Inkscape* uses vectors in order to create its graphics that makes it special to the amateur cartographer. Vectors are mathematical expressions of geometric shapes. There is a lot to vectors and their colleagues, rasters, but it isn't necessary to take up space explaining them here. It is sufficient to say that vector images are easier to create and edit than more common raster images, making it more suited for mapping. [*Think of vectors as filled drawings, like cartoons or animations, and rasters or 'bitmaps' as photographs, consisting of millions of tiny dots or pixels.* Ed.]

Inkscape can be downloaded for free from **www. inkscape.org**, so go right ahead and do so as your first step! [Editor's note: Mac users will need to be using at least Mac OSX 10.4 (Tiger) and ensure that they have the *X11* platform installed, which is one of the Developers' Tools supplied on your installation disc.]

Creating an new image

The first thing to do after installing *Inkscape* is to open the program and take a moment to look over your new toy. Experienced computer users can probably skip this section, but it's important for those that aren't as familiar with computers. At the very top is the Menu Bar where most of the tools are accessible. Click on a menu, such as File, and you will see a list of options called a dropdown list. Items with a black triangle to their right can be clicked on or moused-over (moving the cursor over something without clicking on it) to reveal an additional dropdown list.
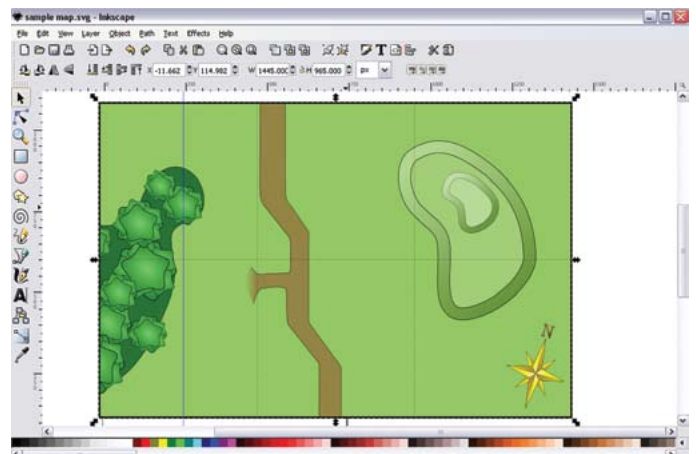
What the image looks like within Inkscape.

Below the Menu Bar are two toolbars that contain icons representing frequently used tools. It is possible to customize these toolbars, but for the purposes of this article it is best to leave them alone. The top toolbar is the Command Bar which performs commands such as Grouping and Ungrouping Objects, Undoing mistakes or Editing Objects. The Tool Control Bar is used the change the properties of the specific tool you are using. It will change depending on which tool is chosen from the Tool Box.

Along the left side of the screen is another toolbar called the Tool Box. It contains tools specifically used for creating and manipulating vector objects. Any icons in a toolbar can be moused-over in order to bring up a tooltip (a short explanation of the specific tool).

The Workspace is the large white space with the rectangular box in the middle. On the top and left of the Workspace are two rulers that can be helpful for keeping things to scale.

The multi-coloured bar below the Workspace is the palette, where you can quickly choose colours. Clicking on a colour selects it as the fill colour; holding Shift while clicking a colour selects it as the stroke colour. The currently selected fill and stroke colours can be seen in the top-right corner above the Workspace.

At the very bottom of the screen is the status bar. It shows important information about the tool you are using or the object you are manipulating. The left of the status bar shows the fill and stroke colours of the object currently selected. The middle suggests keys that can be pressed to change how the tool behaves. For example: with many tools holding Ctrl while using the tool will constrain any action to just the horizontal or vertical.

Inkscape uses the left-click for the majority of actions. Double-clicking, if called for, is always with the left mouse button. Multiple objects can be selecting by holding Shift and clicking each one in turn, or by clicking and holding the mouse button while moving the mouse over the objects to be selected. A box will appear with one corner located where you first clicked with the opposite corner following the mouse.

When *Inkscape* is first opened, it automatically creates a new image based on the program's defaults. These defaults can be modified in the Document Properties editor located in the File menu. They can be edited at any time. The page size will not constrain the size of the image on the screen; it is only a reference for printing. Begin by playing around a bit and clicking on some of the buttons or menus that you see. Don't worry, there's nothing there that will cause your computer to explode!

Now that you've thoroughly messed-up the Workspace it is time to get rid of it and create a new, fresh Workspace. Click on either File/New/Default or the Create New Document command in the Command Bar. If you decide that what you've created is worth saving, click File/Save As or the Save Document command. Save As saves the image as a new file. Save or Save Document will save the image as a new file if it hasn't already been saved, otherwise it will overwrite the existing saved file. Pay attention to the difference, as sometimes it's important to Save As in order to keep the original file intact.

When saving files a window will appear asking you what you want to save the file as, what you want to name the file, and where you want to save it. If the folder shown in the Save in folder prompt is not the folder you want to save the file in, click on the plus sign next to Browse. This will expand the window and show more options. The left box is a selection of frequently used folders. Double-click on one of these folders to move to it. The middle box shows you the contents of the folder you are currently looking at. The right box will show a preview of the currently selected file if one is available. Below that is a dropdown list where you can choose the file type. Best leave it as "Inkscape SVG"; other file types may change the way the image works. For example, saving the file as a JPG will automatically convert the image into a raster image, which negates the advantage of using vectors.
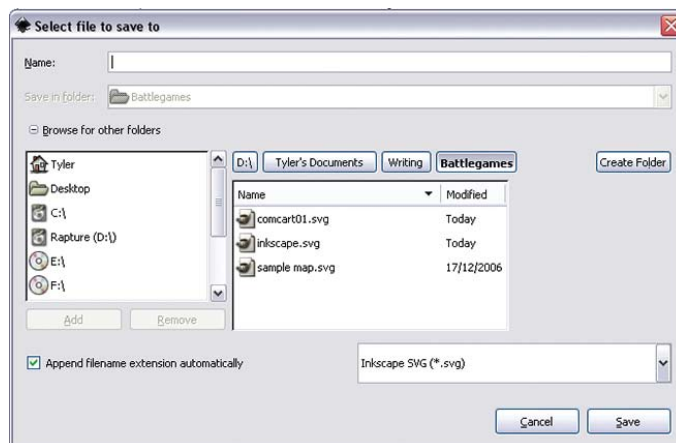
The Save dialogue is neither Windows- nor Mac-standard and may be confusing to some users, so take your time!

Loading files works in exactly the same way, either through File/Open or the Open Existing Document command. The difference is that you are opening an existing file instead of saving one. Opened files will open in a separate window so that you can still access the file you are currently working on. Objects can be copied between two open files. If you want to open a file as part of the image you are currently working on, choose File/Import to do so.

That's the basics of *Inkscape* without getting into object creation and manipulation.
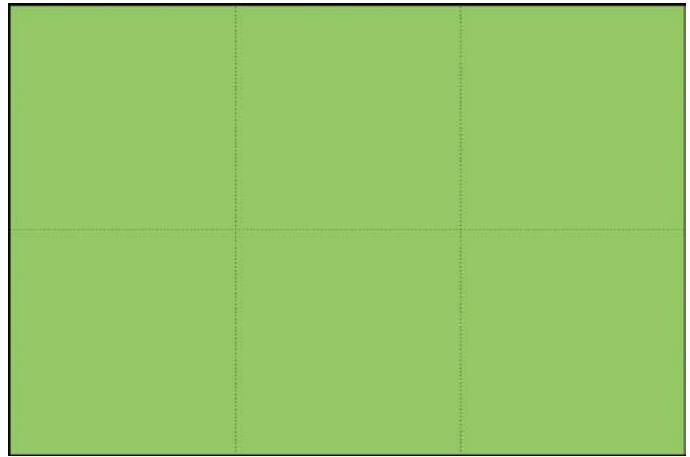
STARTING A MAP

Now comes the fun part: creating the map. Throughout the article I will describe different techniques for creating objects used in a single map. Readers can follow along to create their own map while learning the application.

There are three types of maps commonly used by wargamers: campaign maps, scenario maps and battle-report maps. The last two are fairly similar, battle-report maps having additional information such as troop movements and status. I will create a map that can be used as the basis for a scenario or battle-report map, which will allow me to create basic shapes without having to do too much work deciding where to place mountain ranges, towns, etc. It can be helpful to begin with a sketch, especially if re-creating a battle, but it isn't necessary.
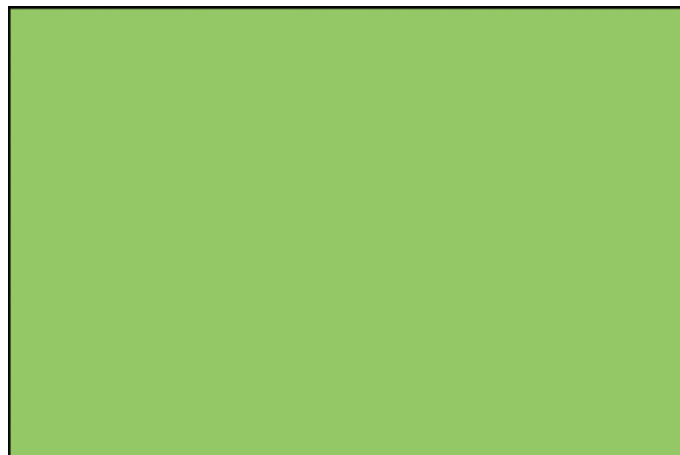
THE BATTLEFIELD

The first step is to define the battlefield. Click on the blue square in the Toolbox to select the Square/Rectangle tool. Draw a large square; this will be the border and background of the map. It doesn't really matter how big it is, as we can scale and zoom later, although as

everything will be inside this square, make it fairly big. If you haven't made it big enough, there are tiny squares in the top-left and bottom-right corners of the box, called handles. Grabbing one of these handles will allow you to resize the box. In the Tool Control Bar there is an option to change the width and height. You can enter numbers there to precisely control the size of the box. In this case, we'll specify the size of the box to make it the dimensions we want. We'll use pixels as our unit of measurement in *Inkscape.* There are usually 72 pixels to the inch when viewing on your computer screen. To change what unit of measurement is used, open File/Document Properties and set Default Units to px for pixels. We'll use a scale of 1" on the tabletop = 20px. Our 6' x 4' table therefore becomes 1440px wide and 960px high. This scale is arbitrary; the image can be enlarged or shrunk as needed.

The basic battlefield, before anything is added.

Now you have a rectangle which, depending on whether you played with the Palette or not, may be any combination of Stroke and Fill colours. To change the colours, click the Edit Object's Style command in the Command Bar. A new window will open allowing you to edit the Fill and Stroke of an object. For Fill, there are a number of options: Solid, Linear Gradient, Radial Gradient, Pattern and No Fill. We'll choose Solid Fill for now.

Most wargamers have green tables, so we'll use that colour for our battlefield. There are four ways to choose colours, each with their own quirks. We will use HSL which stands for Hue, Saturation, and Lightness. It's a quick and easy way to choose colours. At the bottom is an RGBA number which is a code for the specific colour. Below that is the Master Opacity slider which will change the opacity of the fill and stroke colours, allowing objects below to show through. I chose 95c665ff, a mid-green, for my colour; you can copy that into the RGBA field or choose your own.

The stroke or border for our battleground should be black. On the Stroke Paint tab select Solid Stroke and black as the colour; slide the L slider all the way to the left. We want the Stroke Style to be fairly thick, so let's set the Width to 5px.

ADDING A GRID
A grid will help when determining where a unit or terrain item should be placed on the map. Click on Draw Bezier Curves in the Toolbox and draw a straight, vertical line at least 960px long. The length is shown in the status bar; holding Ctrl while drawing will keep the line vertical. Click once to start the line, click again to end it, and press

A grid is a standard map item, and will make placing terrain on the wargames table easier.

Enter to finalize it. Copy this line by using the Select tool to select the line – a dashed box will surround it – then clicking Edit/Copy followed by Edit/Paste. This will create two vertical lines. To align these lines with the battlefield, select one line and set the X to 480. Select another line and set X to 960. Select both lines, either by clicking and dragging a box around them, or by holding shift and clicking on each in turn. Set Y to 0 and the H to 960.

Repeat the process, but this time for a single horizontal line 1440px wide located at 0X, 480Y. Select all three lines and click Path/Combine. This merges all three lines into one object. Select the grid and the battlefield, click on Align and distribute objects in the Command Toolbar. In the Align window, select Center on Vertical Axis and Center on Horizontal Axis. This will position the grid directly above the battlefield. Later we can modify the line width and style. We can make it dashed, dotted or slightly translucent.

A BASIC HILL
A basic hill is our first complex shape. Again we will use the Bezier tool; this time we will use it to draw curved lines. Drawing curves with the Bezier tool is more complicated than drawing straight lines. To curve a line you must adjust

A few layers and a gradient makes the shape recognizably a hill.

the handles of the nodes you are drawing. Nodes are the points that *Inkscape* uses to create shapes. The box we created had a node at each corner; the lines, a node at each end. The line between the nodes is a segment. Clicking and dragging when creating a node will drag the handle and curve the line. It's a little tricky at first, so take a little time to

practice. You can add, delete and edit nodes to get the shape you want using the Edit Paths tool. If you need more nodes you can add more by either selecting the entire shape and click on Insert Node in the Tool Control Bar to add a new node splitting each segment, or by selecting a segment by clicking on it, or shift-clicking on the two nodes bordering it, and clicking Insert Node. Clicking and dragging a segment will affect its curve, allowing you to shape the object. In the Tool Control Bar there are other controls that you can modify to change the shape. You can make the node a corner or smooth point, make the segment straight or curved, etc.
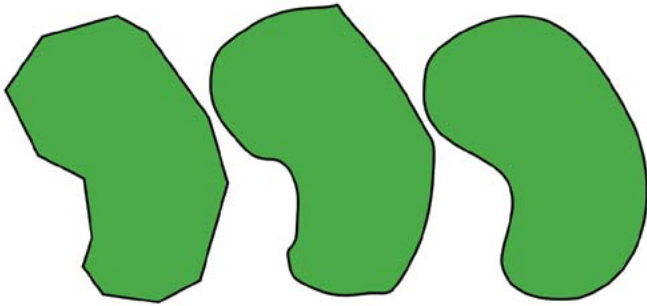
From left to right: the basic shape drawn with straight lines, the same shape with the lines curved, and finally, the shape with extra nodes removed.

A quick way to rough in basic shapes is to just use straight lines to draw the shape. Once it's drawn, select all the nodes and click the Make Smooth button to round them all. Delete and move nodes, curve segments and refine the shape. There's also a Draw Freehand Lines tool, which can be used with node editing and the Path/Simplify command to refine the shape.

To show that this is a hill we should show the slope. Create a copy of the hill and click Path/Dynamic Inset. Make sure you are using the Edit Paths tool to see the white diamond handle which controls the inset. Drag this inward to shrink the shape. This is different from scaling the shape, as the edge will keep a consistent distance from the original location. Once you've started insetting the shape, you can select both hills and align them like we did the grid over the battleground. It is easier to judge how far the inner shape should be inset when the two shapes are aligned.

Now we can edit the colours. To make the hill stand out from the battleground, we want to make the hill the same colour but slightly lighter than the surface. We can either eyeball the colour, or copy the RGBA value from the battleground object and paste it into the smaller hill shape. Moving L slider to the right will lighten the colour without changing hue or saturation. To copy and paste use the keyboard shortcut Ctrl-C for copy and Ctrl-V for paste.

For the larger hill shape, I created a gradient to give the illusion of light hitting the slope. Click on the Create Gradient tool in the Toolbox and select the larger hill. Click and drag to start the gradient. It won't look like much right away. Still using the Create Gradient tool, select one of the stops of the gradient and edit its colour. Use the same colour as the battleground, but make one stop lighter than the hill, the other stop darker than the battleground. The stops of the gradient are like nodes on a shape. They have a colour value which the computer automatically blends together to create the gradient.

The final step is to group the smaller and larger hills

together so they don't move in relation to each other. After grouping you can use the Select tool to move, scale, rotate or skew the shape as needed. For example, if the shape is too small, select the shape and click on one of the double-arrows in the corner. Drag this handle while holding Ctrl to scale the object evenly. Click in the center to change the handles from scale to rotate. Use the handles to rotate the object. If you want a two-tiered hill, follow the same steps but make the second tier smaller and slightly lighter in colour. Group the two hills to keep them together.

Making a forest

Making the forest starts in much the same way as making the hill, except we're not creating an inset, just the outline of the forest. Make a dark, forest-green fill, then size and place the forest where you want. To create trees we'll use a new tool, the Star/Polygon tool. Click and drag to draw a star. Don't worry too much about the size or number of points. These can be edited just like everything else. Use the Tool Control Bar to change the number of corners to five or six. There are a couple of handles within the star, one on the inner corners and one on the outer corners. Clicking and dragging these will change the shape of the star. For now, drag the inner handle out until the rays of the star are small and stubby. Hold Shift and drag the handles to make the star rounded. Finally, hold Alt and drag the handles to make the
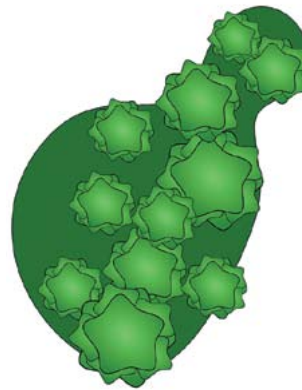
I didn't bother filling out the back of the forest since I knew it would be outside the map later.

star randomized. We want to create an irregular tree canopy shape. Use the Create Gradient tool to create a radial gradient within the star, light in the middle, darker on the outside, but with the darkest parts lighter than the forest floor we created earlier. This is our tree. To make the tree more interesting, we can copy the tree several times, scale the copied trees down and arrange them inside the tree to make it look bushy. Use the rotate feature or play with the randomness of the star to make them all different. Group them all together so they can be moved as one.

Now, duplicate that tree two or three times and make each one slightly larger or smaller. Make copies of those trees to fill the area defined by the forest. This effect can be enhanced by varying the shades of the components that make up the trees and varying the shades of the trees themselves. Group the whole forest together. If you have difficulty selecting objects because a larger object below it keeps getting moved, hold Shift while dragging to tell *Inkscape* that you're making a selection, not moving an object.

The road

To make a road use the Bezier tool again and draw a selection of paths or lines forming the borders of the road. In order to create the illusion of the road fading off into the grass we will not close the object. This will allow us to have the stroke broken where the road fades away. Draw the borders of the road as individual objects. Select all the paths making up the road and group them. Make a copy

of the group, click the Edit Nodes tool and click Path/Combine to make all the paths in the group part of one object. Make the fill colour a nice brown road colour. Unfortunately, it's filling the wrong sections of the road because the object is not closed. Find the open points of the object and close them by selecting the two end nodes and clicking Join Selected Endpoints with Segment. Once the object is closed, the fill will jump to the inside.

Combine the first road we created, but don't add a fill. Center the two roads over each other with the unfilled road on top. You may have to adjust the position of the roads as they may not be perfectly centered. Using Edit Object's Style, remove the stroke for the filled road. You can also make a gradient for where the road fades out.

Cleaning up
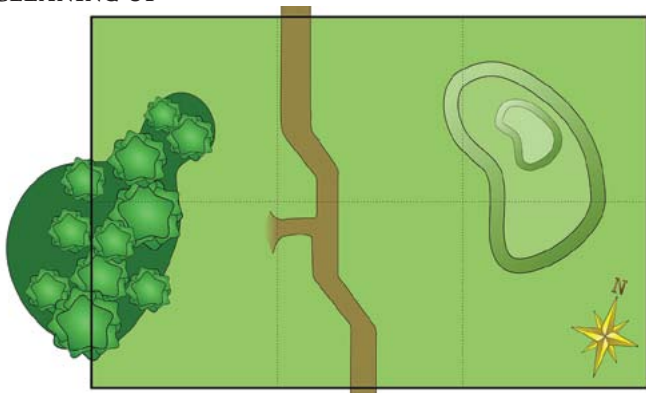
All the items that overlap the border are clipped with the 'Object/Clip/Set' command to give a nice, clean edge. This is much easier than trying to build them to match the edge earlier.

The final step is to clean up the map, to make sure no objects reach outside the border of the table and add some final details. First, let's clip off any objects overlapping the border of the table. Copy the battleground and remove the fill. Align the new border over the battlefield. Select any item that is overlapping the border, then the border itself, and click Object/Clip/Set. This should clip the outside of the objects, leaving a nice, neat map. You may want to pull the gridlines forward. Select the grid and use Raise Selection to Top to put it above everything else. Now's a good time to play with the opacity and style of the grid and adjust it so that it's visible but not disruptive. I like a dotted, slightly translucent grid.

Finally, I added a compass rose that I'd previously created. I now have the basis for a map that can be used for a scenario or battle report. I can grab the hill and save it as a separate SVG file, then import it into another map. In this way I can create an object for every piece of terrain in my collection to quickly throw a scenario or battle report map together.

Saving

Once the map is finished it should be saved as a SVG file. This is the file *Inkscape* uses and will keep the map exactly as you left it. Not all applications can read SVG files, so it may be necessary to make a copy in a JPG or PNG format. Use the Save As or Export function to create the copy. Now the image can be uploaded to a website or sent in an email, and anyone with a web browser installed on their computer will be able to view it.

Conclusion

Map-making with *Inkscape* allows the easy creation of campaign maps, scenario maps, maps for hidden deployment and movement, and for battle reports. The simplicity and price of the program leaves more time and money for the wargamer to buy and painting miniatures, since that, and not map-making, is the focus of the hobby. Wargamers, by nature, are visual animals, and any wargamer that maintains a website can stand to have a bit more visual interest on their site.

Experiment and have fun. Hopefully you will end up with some great maps that will enhance your wargaming experience without taking away too much of your wargaming time. The skills learnt making maps could also be applied to the art of designing waterslide transfers and flags. The scalability of vector images makes them very powerful. Adding a free tool like *GIMP* (www.gimp.org) that can handle rasters will allow even more complex maps.