

## Managing Your Model in Vensim PLE

### Know your Model!

Teachers often encourage writing students to know their audience. The same holds true in modeling. Before you even open Vensim PLE, you should be able to answer all of the following questions:

- What am I trying to model, and why?
- Who will be using the model?

For the first question, you must know your content. Is this a model of disease spread, of finance, of a falling object? What will you include in your model? What will you leave out? How much accuracy is necessary? How long can it take to simulate my model?

All of these questions point towards the next issue: knowing the model's audience. A model designed for a sixth grade science class is likely to differ from a model used by an industrial researcher. A model introducing software to a novice will probably be less complex than a weeklong student project. Knowing your audience gives direction to a model. Considering the purpose of a model will generally reveal much accuracy is necessary. It can also help determine what sorts of interface, explanation, and documentation to include in a model.

Once you know what you plan to model and how you plan to model it, you can begin working with the software

### A Mode-based Interface

The general idea behind the Vensim PLE interface is that selecting buttons on the tool bar puts you in a particular mode. So, you keep working in the same vein, adding the same sort of object, for example, until you select a new button from the tool-bar, and thus a new mode. This isn't a hard and fast rule, but it does describe how a user generally interacts with Vensim PLE.

To put this in context, a contrasting approach would be a drag-and-drop motif, where by default you only select objects, but can drag icons from a tool area and drop them in a workspace, at which point the cursor reverts to only selecting objects.








Select		Choosing the icon with a hand allows you to select, move, and resize objects in the workspace.
Locked		When the lock is selected, no changes can be made to the workspace.
Build		All of these buttons allow you to add objects to the workspace, from variables to input/output devices.
Delete		When this button is selected, you can click on objects in the workspace and delete them.
Equations / Input		This button allows you to click on an object and define the values associated with it. Undefined objects appear filled in black.
Analysis		Select one of these buttons and click on an object to bring up some analytical information about it: a table or graph of its values, a tree of its causes...
Running		These buttons simulate the current model. The second button enters <i>SyntheSim</i> , an interactive simulation mode. For more information, see Advanced I/O or the <i>SyntheSim</i> Reference.

Figure 1: Some common modes and their corresponding toolbar buttons

### As Your Model Grows...

For simple models, you may not need any more window space than you can see at one time. But, as your models grow in complexity and size, you are probably going to want to expand. There are two options:

## Single View Space

There is no limit (other than memory) on the size of what you build within a single Vensim PLE view. Continue to add new objects and the window will continue to expand. Using the scroll bars on the right and bottom of the window, you can navigate the window like a giant map. You may also zoom in or out by going to *View* on the top menu, and selecting *Zoom*.

## Multiple Views

Although having room to expand is useful, scrolling and zooming around the model can become cumbersome. A tidy alternative is to create multiple windows, or views, for different parts of the model. To create a new view, simply choose *View* on the top menu and select *New*. You can create as many views as necessary for your model. Note that you can also reorder and rename your views from the *View* menu at the top. More controls for navigating between views are located near the bottom left of the screen.



The arrows on either side move from one view to the next. Clicking on the button (labeled *View 1* here) opens a pop-up menu that allows you to open a particular view or create a new one.

## **A Place for Everything and Everything in its Place**

Now that you know a little more about your options, the time has come to organize your model. Layouts will vary from model to model, but the following categories cover most objects that will find in a model:

- Flowchart
- Documentation
- Interface
- Output

The larger and more complicated a model, the more important it becomes to organize and separate these aspects. The flowchart is the visual model composed of box variables, rates, auxiliary variables and connectors. Documentation covers everything from comments to the underlying mathematical model, a system of differential equations. Interface in Vensim PLE comes in the form of slider bars associated with variables.

Output refers to tables and graphs; the means by which data computed while running the model is accessed. What follows are three ideas for organizing a model, first using a single-window, then with multiple views. Of course, there are infinite possibilities for how to organize a model. One of Vensim PLE's strongest aspects is its flexibility.

### Single View Layout

One way to take advantage of extendable window size is to separate the flowchart from the interface and output. Position the flowchart so that you can scroll it completely off of the visible screen. Examine Figures 1-2 for an example. What does this arrangement offer?

- Models built this way allow you to explore the effects of changing one or more variables without having to explain or even look at the flowchart model.
- If you have added sliders to your window, and because *SyntheSim* mode places temporary slider bars on certain variables, you can avoid the confusion of having two sliders on the same screen linked to the same variable.

### Multiple View Layout

For larger models, or models with a large amount of sliders and/or output, the single view layout is too cumbersome. Instead, collect all of the interface (sliders, tables, graphs, and relevant comments) on one view. Build the flowchart model in the next view. A third view could contain the documentation. Long comments explaining the model and its sources, an object displaying the equations in the model would be appropriate in this view. Figures 4-5 illustrate a model organized this way. Separating your model into several views offers several advantages:

- The clean separation of multiple views makes it easy to focus on one aspect of a model at a time.
- When teaching, the separation of interface, flowchart, and documentation can correspond to presentation, problem solving, and explanation. Close attention to these three skills leads to excellent modeling and visualization.

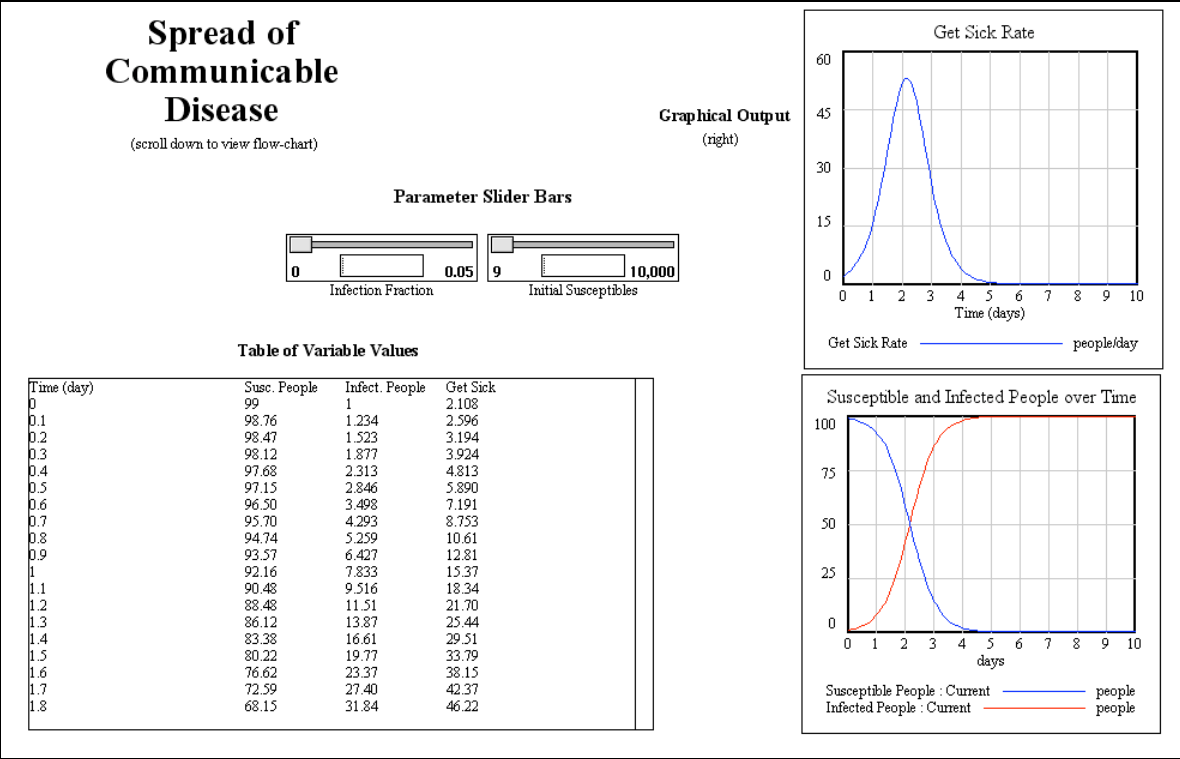


Figure 1 – At first you only see the interface...

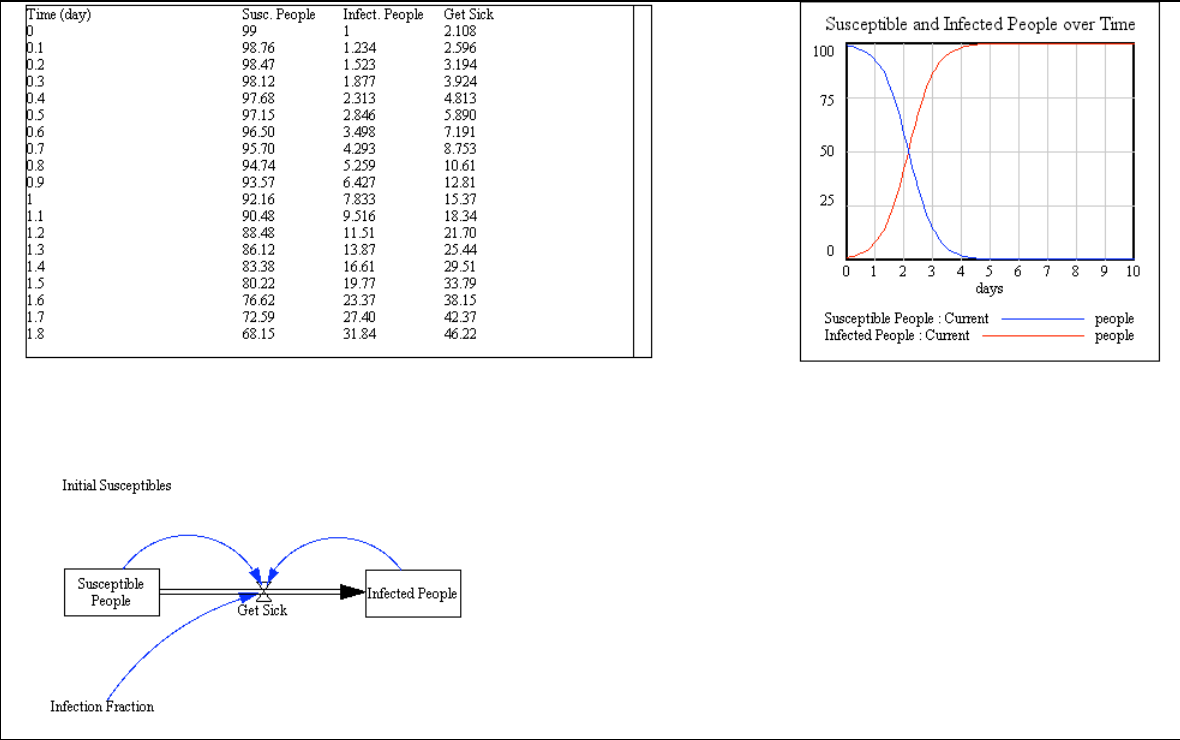


Figure 2 – But scrolling down reveals the model!

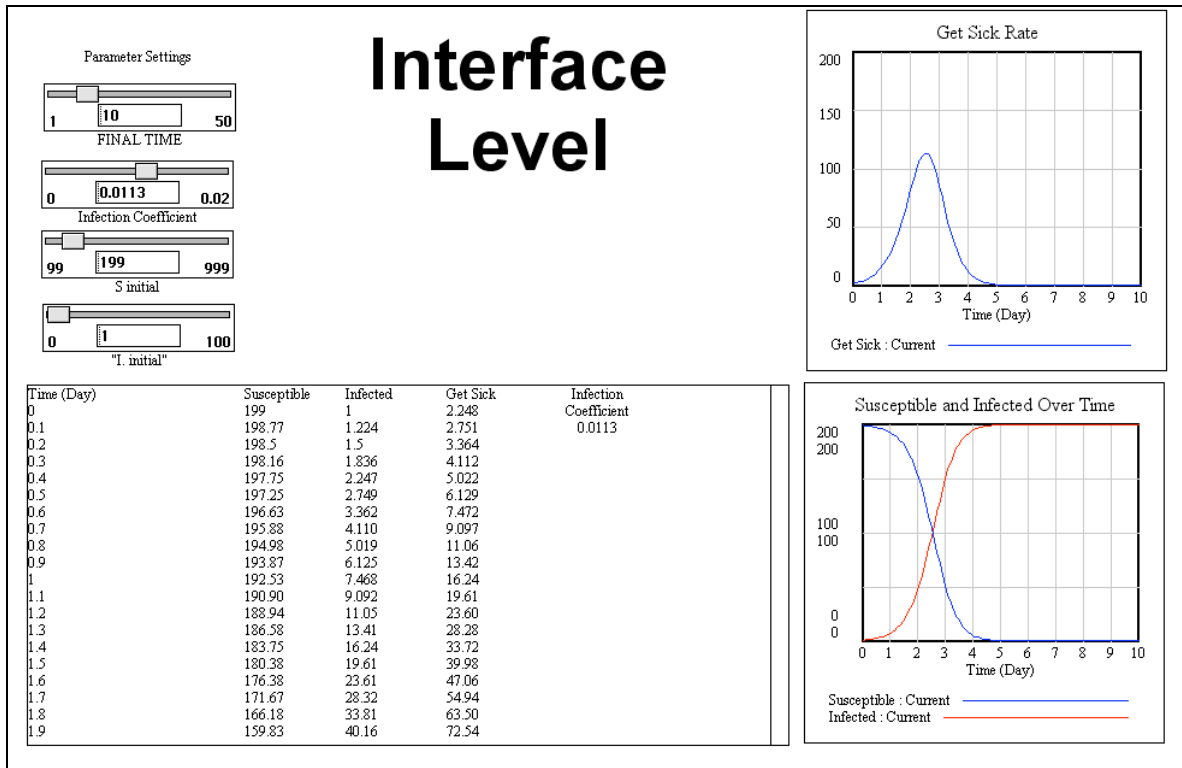


Figure 3: Input and Output View

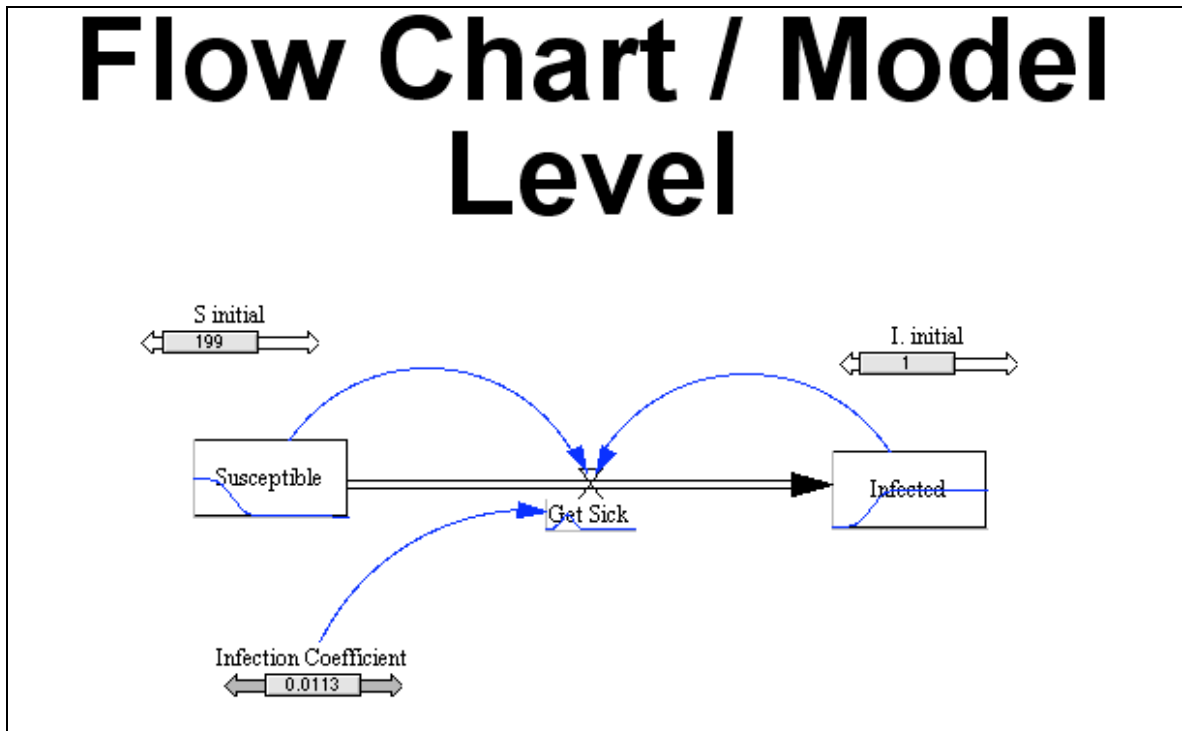


Figure 4: Flow Chart Model View

```

(01) FINAL TIME = 10
      Units: Day
      The final time for the simulation.

(02) Get Sick=
      Infected*Susceptible*Infection Coefficient
      Units: **undefined**

(03) "I. initial"=
      1
      Units: **undefined**

(04) Infected= INTEG (
      Get Sick,
      "I. initial")
      Units: **undefined**

(05) Infection Coefficient=
      0.0113
      Units: **undefined**

(06) INITIAL TIME = 0
      Units: Day
      The initial time for the simulation.

(07) S initial=
      199
      Units: **undefined**

(08) SAVEPER =
      TIME STEP
      Units: Day [0,?]
      The frequency with which output is stored.

(09) Susceptible= INTEG (
      -Get Sick,
      S initial)
      Units: **undefined**

(10) TIME STEP = 0.1
      Units: Day [0,?]
      The time step for the simulation.

```

# Equations Level

Figure 5: Documentation View

## Custom Visuals

Right/control clicking on basic building blocks in the workspace will bring up menus with options for customizing the objects' appearance. If you have trouble getting these menus, use the select button and control click on the little circles next to the object.

There are three customization menus:

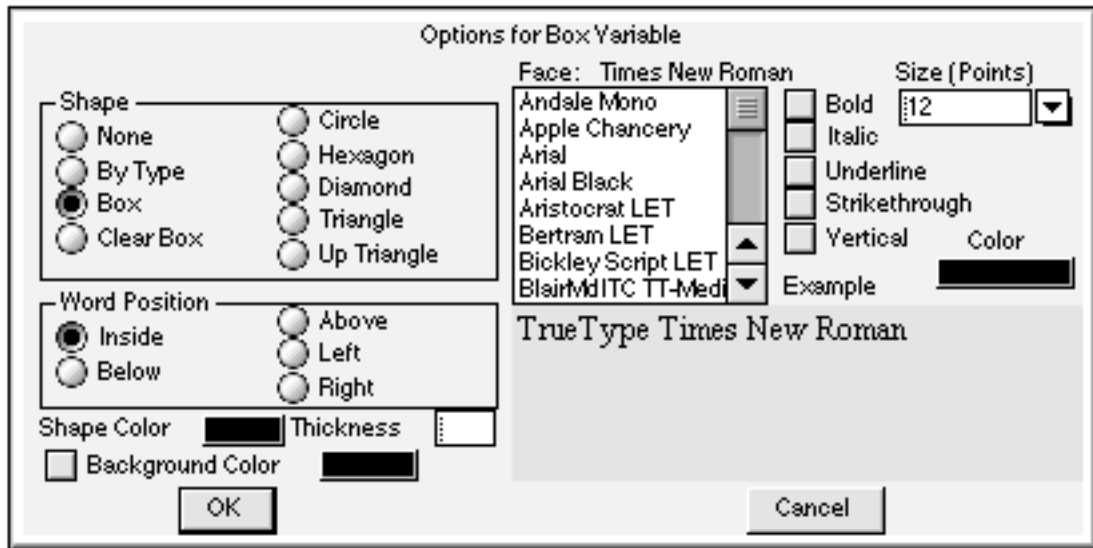


Figure 6

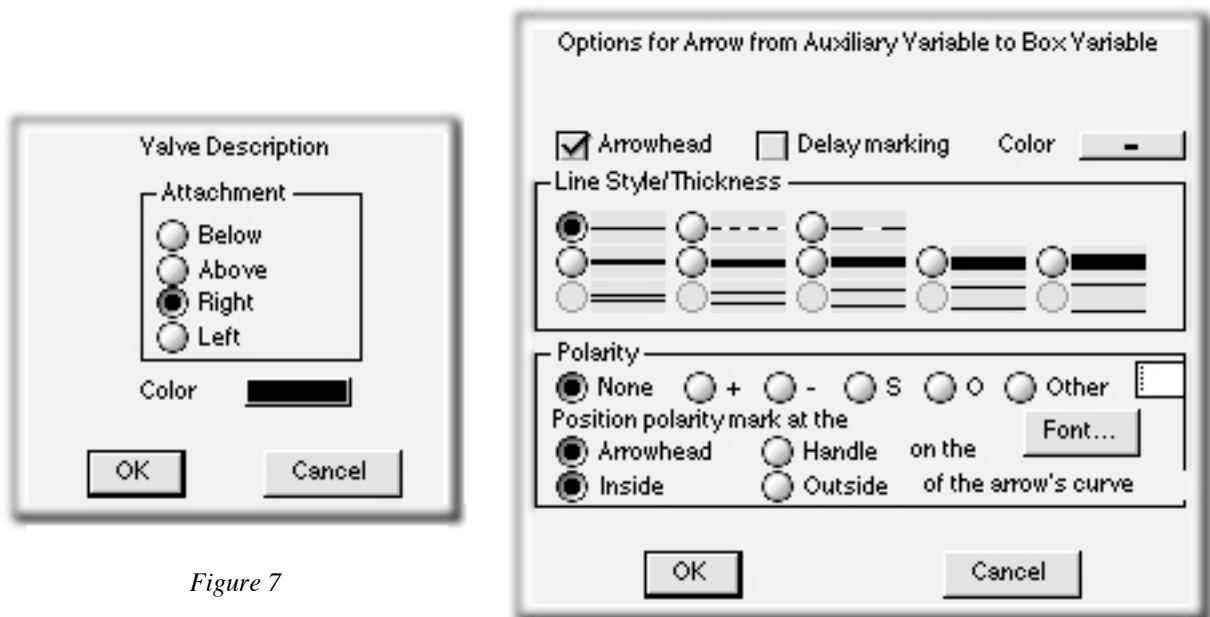


Figure 7

Figure 8



Reach the menu in Figure 6 by right/control clicking on a box variable, an auxiliary variable, or the name of a rate. The menu in Figure 7 appears when you right/control click on the hourglass-like icon in the middle of the rate. Right/control click on a connector arrow, or the arrow portion of a rate to access the menu in Figure 8. Note that the parts of a rate before and after the hourglass can have different graphics, as illustrated in Figure 9.



*Figure 9*

Use these options to customize and clarify your graph, but do so purposefully. Adding a bunch of different fonts, colors, and inconsistent shapes will only make your model more confusing. Consider your model's purpose and audience, come up with a scheme, and stick to it. This will ensure that your changes enhance the model.