

Visual Madonna User's Guide

Version 2.0.9

January 21, 1999

Introduction

Visual Madonna is an enhanced version of our Madonna simulation software. It provides a graphical front-end for constructing models. Instead of typing in equation text by hand, you construct models by dragging icons from a toolbar onto a diagram, then connect these icons with arcs and flows to represent dependencies and flows between reservoirs. As you construct your model graphically, Visual Madonna generates textual equations representing your model's structure. When it comes time to run your model, you make use of the usual Madonna facilities such as the Run command, graph windows, etc.


This guide explains only how to construct and edit models using Visual Madonna; you should refer to the Madonna User's Guide for detailed information about running models. Keep in mind that Visual Madonna contains all of the regular Madonna functionality, so you don't have to use the graphical front-end if you don't want to.

Visual Madonna's graphical front-end is written in Java™ to make it easier to support both Macintosh and Windows platforms. However, this means that Java support must be installed on your system. Since Java implementations vary greatly between platforms, we have created separate installation guides Macintosh and Windows. Refer to the appropriate guide to install Visual Madonna on your system. These guides also contain important notes regarding platform-specific behavior which you should be aware of.


Tutorial

After installing Visual Madonna for the first time, you should work through the following tutorial to familiarize yourself with basic model-building techniques. In this tutorial, we'll build a very simple model of an exponentially-decaying population. This model will consist of three elements: a reservoir icon (integrator) representing the population, a flow icon representing deaths in the population, and a formula icon representing the rate of decay.

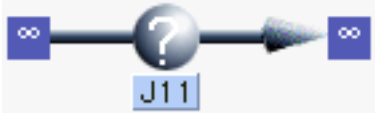
1. Launch the Visual Madonna application and choose "New Diagram" from the "File" menu. An empty diagram window will be created.

2. Position the mouse over the reservoir tool , press the mouse button, drag the reservoir to the diagram, and release the mouse button. You've now placed a reservoir named "R1" on the diagram. Note that the reservoir is colored red which means it's selected.

3. Change the name of the reservoir to "Population" by typing the new name. It is not necessary to first click the reservoir since it is already selected.


4. Click the flow tool , move the mouse over the Population reservoir, press the mouse button, drag the mouse to the right a few inches, and release the mouse button. This places a flow icon on the diagram which drains the Population reservoir into an infinite sink.


5. Make sure the reservoir is connected to the flow. If the flow looks like this:



it's source end is not connected to the reservoir. In this case, drag the infinite source icon to the reservoir and drop it. This connects the source end of the flow to the reservoir instead of the infinite source.

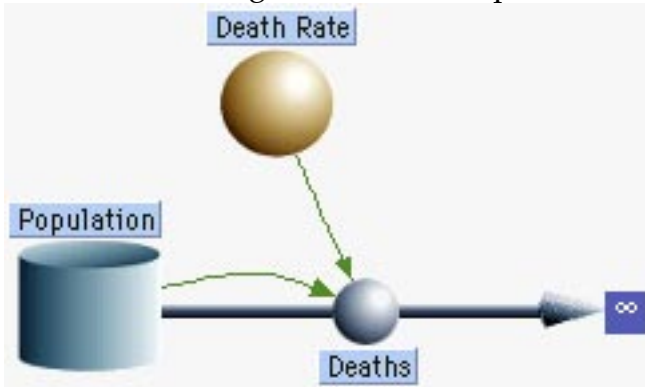
6. You may find that the flow icon and/or sink are not positioned the way you want. If so, you can reposition them by simply clicking and dragging. Note that Visual Madonna maintains the connection between the reservoir, flow icon, and sink.
7. Change the name of the flow to "Deaths" by clicking the flow if it is not already selected and typing the new name.

8. Place a formula icon  on the diagram approximately halfway between the reservoir and flow icons (use the same click and drag technique as you did for the reservoir). Change the name of the formula icon to "Death Rate".

9. Click the arc tool  and create an arc going from the reservoir icon to the flow icon (use the same technique as you did for the flow). This creates a dependency relationship between the flow and the reservoir: the flow "Deaths" depends on the value of the reservoir "Population".
10. Create another arc going from the formula icon to the flow icon. This means that the number of deaths also depends on the death rate constant.
11. Double-click the Population reservoir. This opens a dialog box for the reservoir. In this dialog, you specify the reservoir's initial value. In this case, enter 1000 and click OK. Note that the question mark inside the reservoir icon disappears after the dialog has been dismissed. This means that the equations for this reservoir are fully specified.
12. Double-click the Death Rate formula icon. In the icon dialog that appears, enter 0.02 for this formula's right-hand side and click OK.
13. Double-click the Deaths flow icon. In the icon dialog, note that "Population" and "Death Rate" are *required inputs*. This means that these variables must be used in the

right-hand side of the equation defining this icon's value. Enter the following formula for the right-hand side: "Population * Death_Rate". Note that instead of typing names of required inputs, you can simply click on the input's name in the list to insert that name. And you can use the calculator keypad to insert digits and common arithmetic operators. Click OK when done.

14. Your model's diagram is now complete and should now appear something like this:



Now try running your model by choosing "Run" from the "Model" menu. In the "Choose Data" dialog that appears, add the "Population" variable to the Y axis and click OK. Madonna runs your model and displays the results.

15. You can change the curvature of the green "dependency arcs" by dragging their control points. To do this, first select an arc by clicking somewhere along its trajectory. The arc will be colored red and a small square handle (control point) will appear. Click and drag the control point to change the arc's trajectory.
16. Icons and arcs can be removed by selecting them and choosing "Clear" (Macintosh) or "Delete" (Windows) from the "Edit" menu. You can also delete the selected objects by holding down the control key while pressing the delete key. Try deleting the arc from the Population reservoir to the flow icon. Note that a question mark reappears in the flow icon. That's because the icon's equation refers to the Population variable which is no longer a dependent. You can easily reestablish this dependency by drawing a new arc from the reservoir to the flow.
17. Now that you've seen how easy it is to create a model, you should take a look at the equations Visual Madonna generated for you. To do this, choose "Equations" from the "View" menu. Position the equations along side the diagram so that you can see both windows simultaneously.
18. Activate the diagram window by clicking it, then select an icon by clicking on it. When you select a single icon, Visual Madonna highlights this icon's equation(s) in the equation window. This makes it easy to see an icon's equations without opening its icon dialog.
19. Visual Madonna can show you which icon corresponds to an equation in the equation window. Try this by activating the equation window, clicking within one of the equations, and choosing "Show Icon" from the "Edit" menu. Visual Madonna activates the diagram window and selects the corresponding icon.

20. Now activate the equation window and try changing your equations. Visual Madonna won't let you. When working with a model that has a diagram, you cannot edit the equations directly in the equation window. Rather, you edit them by double-clicking the appropriate icon in the diagram. You can also open the icon dialog directly from the equation window by double-clicking an equation. For example, double-clicking anywhere within the line "Deaths = Population * Death_Rate" opens the icon dialog for the "Deaths" formula icon.
21. Activate the diagram window, select the "Population" icon, type "Molecules" and press return. When you press return, the name of the icon changes and Visual Madonna updates the name in all equations that depend on it. To see this in action, change the name again and keep your eye on the equation window as you press return.

That's it for this tutorial. You now know enough to get started building your own models using Visual Madonna's diagram editor.

Aliases

As your models grow more complex, you'll encounter situations where you want to make a connection (arc or flow) between two icons that are spaced far apart on the diagram. If you make the connection between these icons, you'll end up with a long arc or flow line that crosses over a bunch of unrelated icons and connections. Not only does this look messy, but it makes it harder to see the essential structure of your model.

One solution to this problem is to move one of the icons you want to connect closer to the other. However, if both icons already have a lot of connections, moving either one will make your diagram even more disorganized.

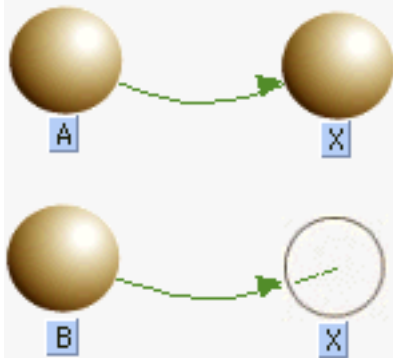
A better solution to this problem is to use an alias. Instead of moving one icon closer to the other, you can create an alias for one of the icons and place it next to the other icon. Then you connect the alias to the other icon with a short, simple connection.

An alias is an icon that provides another way to access an existing "original" icon. The most important thing to remember is that an alias **always** refers to an original. You can locate the original by selecting an alias and choosing "Find Original" from the Diagram menu. Aliases look like hollow versions of their originals.

To create an alias, select one or more existing icons and click the Alias button in the toolbar. Visual Madonna will create one alias for each icon you selected. However, note that aliases will only be created for reservoir, flow, and formula icons. You can create as many aliases for a particular original as you want by repeatedly clicking the Alias tool. These aliases can be placed anywhere in your diagram.

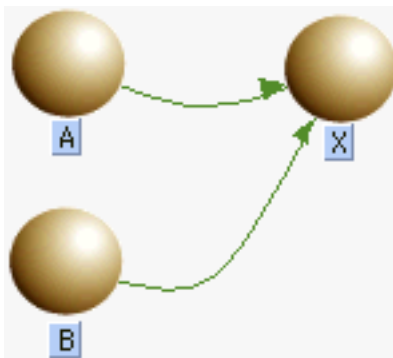
An alias always has the same name as the original to which it refers. If you change the name of an alias, it changes the name of the original and **all** of its aliases. If you double-click an alias, it opens the icon dialog for the original.

If you make connections to an alias, the effect is identical to that resulting from making the same connections to the original. For example, suppose you have an original formula named X and one arc going from another formula A to X. Also, suppose that you have an arc going from another formula B to an alias of X, like this:



In this case, formula X depends on formula A and formula B, just as if an arc had been drawn from formula B to the original formula X.

When you delete an alias, any arcs connected to it are also deleted. And if it is a reservoir, any flows connected to it are detached and replaced by infinite source/sinks. However, it is possible to delete an alias while preserving its connections. This is called “alias merging” and is accomplished by dragging the alias you want to remove to its original (or another one of its aliases) and dropping it. Upon dropping the alias, it disappears and its connections are merged into the icon on which it was dropped. For example, in the above diagram you can drag the alias X to the original X and drop it. Visual Madonna deletes the alias and connects the arc from formula B to the original X, like this:




Alias merging is very useful when working with submodels as you will soon see.

Submodels

You’ve already seen how aliases can help make complex models easier to construct and maintain. But as your models continue to grow, you’ll soon realize that there simply isn’t enough room on a single diagram page to contain all of your model’s elements. And even if you were able to cram your entire model into one full-screen window, it would be difficult to see its overall structure through the forest of arcs, flow lines and icons.

Visual Madonna allows you to break your model down into functional parts by placing them in submodels just as you would place related groups of files into a folder or directory on your computer. Submodels appear as icons in your diagram. The diagram containing a submodel is referred to as the submodel's parent diagram. When you double-click a submodel icon, a separate diagram window is opened showing the contents of that submodel.

Creating and Deleting Submodels

To create a new, empty submodel, click the submodel tool  on the toolbar, drag the mouse over your diagram and release it. Visual Madonna places a new submodel icon on your diagram containing an empty diagram.

Often, you'll want to create a new submodel containing some icons that already exist on your diagram. To do this, select the icons and choose "Group" from the Diagram menu or click the submodel tool. Visual Madonna creates a submodel icon on your diagram and places the previously selected icons inside that submodel. Note that when icons are moved into a submodel, aliases may be created in order to preserve the connections that existed before the submodel was created. See "Moving Icons Between Submodels" for details about how this works.

To edit the contents of a submodel, you must first open its diagram window by double-clicking the submodel's icon. Once opened, you can edit the submodel's diagram in the same way you edit your model's top-level diagram.

When you delete a submodel icon, you delete not only the icon but all of the icons it contains. By using the "Ungroup" command on the Diagram menu, you can delete a submodel icon while preserving the icons and connections it contains. To do this, select one or more submodel icons and choose "Ungroup". Visual Madonna removes the submodel icon and moves all the icons it contained into the parent diagram.

Making Connections Between Submodels

Submodels wouldn't be very useful if you couldn't make connections between icons in different submodels. For example, you may have an icon X in the top-level diagram and you want to connect an arc from X to an icon Y in submodel S. You might try to do this by opening the top-level diagram and the submodel, placing their windows side-by-side, and dragging an arc from one icon X to icon Y. As you can see, this doesn't work because Visual Madonna doesn't let you create a connection across two windows.

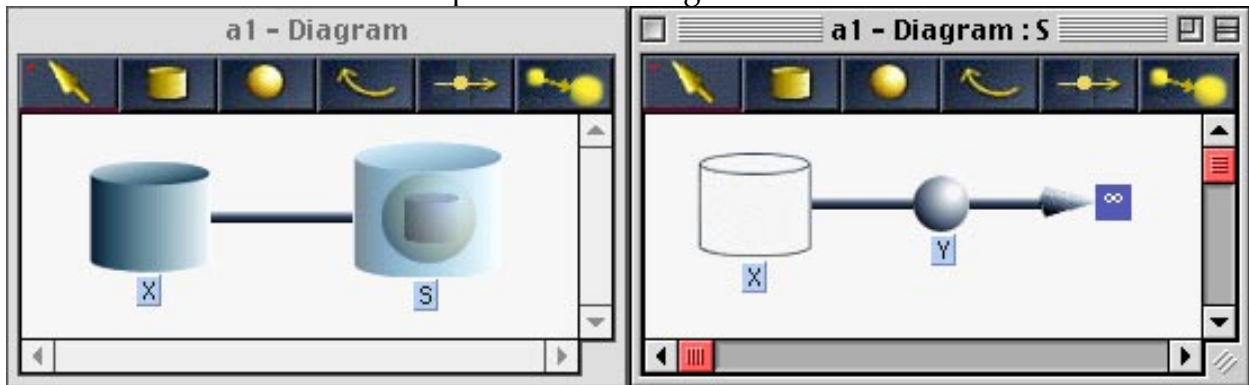
So, how do you make a connection between two icons in different submodels? You use an alias. Using the current example, select the X icon and make an alias. Then, drag this alias to the submodel S icon. This moves the alias from the top-level diagram into submodel S. Then you can make the connection from X's alias to icon Y in the

submodel's diagram. Try it. Your diagrams should end up looking like this:



Notice that when you created the arc from X's alias to Y, another arc was magically created in the top-level diagram going from X to submodel S's icon. Visual Madonna does this to remind you that something in submodel S (in this case, Y) depends on X. This "magic" arc is referred to as a "bundle" since it can represent more than one dependency between X and icons within S. For example, if you create icons A, B, and C within S and connect arcs from X's alias to these icons, the top-level diagram's appearance will not change. The bundle (arc) from X to S now represents all of the connections from X to icons within S (Y, A, B, and C).

Visual Madonna also creates bundles representing one or more flows connected to reservoirs. For example, try this: create a reservoir X in the top-level diagram. Create an alias to X and move it into S. Then create a flow Y within S going from X's alias to an infinite sink. You should end up with something like this:



When you created the flow Y going from X, Visual Madonna created a bundled flow or "pipe" in the top-level model connecting the original X icon and the submodel. This bundle reminds you that something in S is moving material in or out reservoir X. You could create additional flows in S connected to X and the appearance of the top-level diagram would not change.

Visual Madonna uses a bunch of complex algorithms to ensure that these bundles represent actual flow and arc connections you've made. Explaining these algorithms would be difficult and not very useful. There are a couple of simple rules to remember that will help you avoid confusion:

1. Bundles are **always** connected between a reservoir, flow, or formula icon and a submodel icon. Whenever you see an arc connected to or from a submodel icon, it is a bundle created automatically by Visual Madonna. The same holds for flow bundles (pipes), but they are easier to distinguish since they have no flow icon or label associated with them.
2. You cannot directly create or delete bundles. For example, you can't draw an arc from a submodel to another icon. The only way to delete bundles is to remove the underlying connection(s) they represent.

One final note about bundles. If Visual Madonna needs to create a bundle from a submodel icon to another icon that has no representation in the same diagram window, it will create an alias to that icon. This automatic alias creation is harmless but can be distracting. To minimize the need for additional aliases, try to keep your connections between neighboring submodel levels (from parent to child and vice-versa) as we did in the above examples.

Moving Icons Between Submodels

You've already seen that you can create connections between icons in different submodels by creating connections between aliases. But you can achieve the same effect by moving icons from one submodel to another **after** connections to them have already been created. In some ways, this technique is simpler because it enables you to construct parts of your model within a single diagram window where all icons are accessible at once. Then, you can isolate parts of your diagram within their own submodels and let Visual Madonna worry about preserving connections between them.

To illustrate how this method of construction differs, let's try to recreate the example model we discussed earlier. Create a new diagram window and place two formula icons named X and Y. Draw an arc from X to Y. Now, you decide that you want to place Y in its own submodel. To do this, select Y and either choose "Group" from the Diagram menu or click the submodel tool. Now Y has been replaced by a submodel icon named "S2". If you open S2, you'll see it has the same structure as when you created the alias to X yourself. If you want to make things look exactly like they did before, you can change the name of the submodel to "S".

Once you've created a submodel or two, you may want to move icons from one submodel to another. Visual Madonna supports this kind of rearrangement in two ways. First, you can move a set of icons from a diagram into one of its direct submodels (children) by dragging the icons to the submodel icon and dropping them inside. Second, you can move a set of icons from a submodel into its parent diagram (the diagram containing that submodel's icon) by selecting the icons and choosing "Move To Parent" from the Diagram menu.

As you begin to move icons around between submodels, you'll find that Visual Madonna can create a lot of additional aliases along the way. Or you might find some icons moving that you didn't want moved. Here are some tips that will help you understand what's going on:

1. When you drag icons from a parent model into a child, any connections (arcs and flows) attached to these icons are also moved. For example, if you drag a reservoir to a submodel and it has three flows attached to it, these flows are also dragged into the submodel. You can move the flows back into the parent model if you want, but this isn't too helpful as Visual Madonna will have to create aliases in the parent to represent the reservoir you moved. The rule to remember is that the reservoir(s) attached to a flow should appear in the same diagram as the flow itself or in the parent diagram.
2. When you move icons from a submodel into its parent model, Visual Madonna will create aliases in the parent model to preserve any connections that were moved. This behavior can lead to a proliferation of aliases in the parent model. These aliases can often be moved back into the submodel and then merged with their originals to reduce clutter.
3. When deciding where to place original icons in your model, remember that it's best to put originals high enough in the hierarchy so that all their references come from other icons in the same diagram (including submodels). Try to avoid putting icons down in a submodel when they are referenced by other icons in the parent model or sibling submodels.

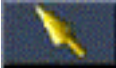



Take a look at the "VM Axon" model included with Visual Madonna. It is fairly complex, but each submodel is easy to understand and you can get a good view of the model's overall structure just by looking at the top-level diagram.







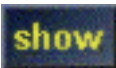

Reference

Toolbar

The toolbar appears at the top of every diagram window in Visual Madonna. The current or active tool is indicated by a red bar drawn beneath it. When you click the mouse in the diagram, the function performed depends on the active tool as described in the table below. After using most tools, the "Select" tool becomes the current tool. However, you can make certain tools "sticky" by holding down the control key when selecting the tool. When the current tool is sticky, it is denoted by a thicker red bar and it remains active after it's used.

Tool	Description
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Tool	Description
 Select	<p data-bbox="586 275 1523 625">Use the select tool to select one or more icons. Clicking on an icon selects it and deselects any previously-selected icons. Shift-clicking an icon toggles its selection status without deselecting previously selected icons. You can also drag a selection rectangle around a group of icons to select them. To deselect all icons, click an empty space in the diagram. Normally, you don't need to explicitly choose this tool since it is automatically activated after using any of the other tools. However, if you use the "sticky tool" feature described above, you'll need to explicitly choose the Select tool when you're done using the current sticky tool.</p>
 Reservoir	<p data-bbox="586 657 1523 1010">Use the reservoir tool to create a new reservoir on the diagram. There are two ways to do this. One is to select the tool by clicking once, then moving over the diagram and clicking again to create the reservoir. The other way is to click the reservoir tool, drag the mouse over the diagram, then release the mouse to create the reservoir. If you want to create many reservoirs rapidly, control-click the reservoir tool to make it sticky, then repeatedly click in the diagram to create as many reservoirs as you need. Remember to click the select tool when you're done using the sticky reservoir tool.</p>
 Formula	<p data-bbox="586 1039 1523 1148">Use the formula tool to place formula icons on the diagram. You can use either the two-step, one-step (drag), or sticky methods as described for reservoir tool.</p>
 Arc	<p data-bbox="586 1178 1523 1493">Use the arc tool to create a dependency relationship between two icons. After selecting the tool, move the mouse to the source icon, click and drag the mouse to the destination icon, and release the mouse. This creates an arc pointing from the source to the destination icon which represents the destination icon's dependency on the source icon. The source icon must be a reservoir, formula, or flow. The destination icon must be a formula or flow. You can use the sticky tool feature if you need to create many arcs in a row.</p>

Tool	Description
 Flow	<p>Use the flow tool to represent a flow of material between a reservoir and an infinite source/sink or between two reservoirs. After selecting the tool, click the mouse on the source, then drag the mouse to the destination and release it. If you want the source or destination to be an infinite source or sink, respectively, start or end the drag at an empty area of the diagram and Visual Madonna will create the source/sink for you. If a source/sink is created but you intended to connect that end to a reservoir, drag the source/sink to the reservoir to make the connection. You can use the sticky tool feature to create a number of flow connections in a row.</p>
 Submodel	<p>Use the submodel tool to organize portions of your model into a hierarchical structure. This feature is described in the section titled "Submodels".</p>
 Text	<p>Use the text tool to create text labels on the diagram. After selecting the tool, click on the diagram to place an empty text box. You can then type in your label text. Unlike other tools, this tool is always sticky. When this tool is active, you can click on any text label (including those associated with icons) to position the insertion point for editing.</p>
 Align	<p>Use the align tool to align the top, bottom, left, or right edges of the selected icons. The direction of alignment depends on where you position the mouse within the tool. Watch the help text as you move the mouse within this tool.</p>
 Grid	<p>Use the grid tool to turn the grid on and off. When the grid is on and you move an icon, its position is adjusted so that the edge closest to a gridline coincides with that gridline.</p>
 Alias	<p>Use the alias tool to create an alias for the selected icon(s). An alias is simply a separate representation of the original icon. Alias icons appear as hollow versions of their originals. See the section "Aliases" for information on how to use aliases.</p>
 Show Formulas  Hide Formulas	<p>Use the show/hide formulas tool to toggle the visibility of formulas (and their connecting arcs) in the diagram. Hiding formulas and their arcs can make a complex diagram easier to understand.</p>

Menu Commands

The "Diagram" menu appears in the menu bar whenever a diagram window is active. In addition, there are a few other diagram-specific commands which appear in the

regular Madonna menus. Commands shown in the following table appear in the Diagram menu unless otherwise specified.

Command	Description
Icon Info...	Displays the icon dialog for the selected icon. This command is available only when a single icon is selected.
Find Original	Locates and selects the original icon for the selected alias icon. Available only when a single alias icon is selected.
Search...	Displays the Search dialog which allows you locate an icon based on its name and/or type. This feature does not function properly at this time.
Group	Places the selected icons into a submodel. See "Submodels" for more information.
Ungroup	Moves icons from the selected submodel into its parent model, then deletes the submodel. See "Submodels" for more information.
Move To Parent	Moves the selected icons to the parent model. See "Submodels" for more information.
Show Parent Window	Activates the parent window of the active window. See "Submodels" for more information.
Redraw	Redraws the diagram window. Useful when a portion of the diagram window appears corrupted.
Change Color...	Displays a dialog which enables you to change the diagram window's background color.
Import Image...	Replaces the selected icon's default image with a custom image from an external file. The file must be in GIF or JPEG format. If no icon is selected, the image is stretched and used as the diagram's background.
Remove Image	Removes the custom image from the selected icon. If no icon is selected, the custom background image is removed.
Icon Visibility...	Displays a dialog which enables you to selectively hide different parts of the diagram.
Tools	This submenu provides another way to select various tools in the toolbar.
Arrange-Front	Makes the selected icons appear in front of all other icons.
Arrange-Back	Makes the selected icons appear behind all other icons.

Command	Description
Arrange-Align	Aligns the top, bottom, left, or right edges of the selected icons. Same as the align tool on the toolbar.
Arrange-Distribute	Distributes the selected icons evenly across in the diagram in the horizontal or vertical direction.
Arrange-Snap To Grid	Aligns the selected icons with the gridlines. Works even when the grid is not visible.
Diagram Prefs...	Displays the Diagram Preferences dialog. See "Diagram Preferences".
Cut (Edit menu)	Copies the selected icons to the clipboard then deletes them from the diagram. Note: clipboard does not function reliably at this time.
Copy (Edit menu)	Copies the selected icons to the clipboard. Note: clipboard does not function reliably at this time.
Paste (Edit menu)	Pastes the icons on the clipboard to the active diagram window. Note: clipboard does not function reliably at this time.
Clear / Delete (Edit menu)	Removes the selected icons from the active diagram window.
Select All (Edit Menu)	Selects all icons in the active diagram window.
Show Icon (Edit menu)	Selects the icon corresponding to the specified equation in the equation window. The specified equation is indicated by position of the insertion point or the beginning of the selected text. Available only when the equation window is active.
New Diagram (File menu)	Creates a new visual model and opens its diagram window.
Diagram (View menu)	Opens the active model's top-level diagram window. If the active model is not a visual model, Visual Madonna asks if you want to create a new diagram. If you choose to do so, all existing equations are destroyed and a new, empty diagram is created.
Discard Diagram (Model menu)	Removes the diagram from the active visual model which converts it to a plain text model. Once this is done, the diagram cannot be recovered. However, you can continue to edit the equations as plain text.

Diagram Preferences

The behavior of Visual Madonna's diagram editor can be customized to some extent using the "Diagram Prefs" command. Since this command is found in the Diagram

menu, it cannot be accessed unless you activate a diagram window (or create one if none exist) beforehand.

Preference	Description
Bezier style	Specifies the type of curve used for dependency arcs between icons. The default is a “single point” Bezier curve whose trajectory is adjusted via a single control point. “Double point” bezier curves provide more control over the trajectory but require twice as much fiddling to position since they have two control points. The “straight line” option makes all the arcs straight lines.
Drag outlines	When checked (the default), an icon’s outline is shown during dragging and the icon is not moved until you release the mouse. When not checked, the icon itself is moved during a dragging operation. While this looks cool, dragging the entire icon is much slower. Also, certain drag/drop operations such as dragging icons into submodels do not function properly unless outline dragging is enabled.
Show drag alerts	When checked (the default), error messages are displayed if you attempt to make an invalid connection with a flow or arc, for example, trying to draw an arc from one reservoir to another. Turning off this preference prevents these error messages from being displayed.
Small icons	If you uncheck this option (it is checked by default), Visual Madonna uses somewhat larger icons in your diagram.
Grid on initially	If checked, the grid in diagram windows is turned on when they are first opened.
Diagram page width/height	Specifies the width and height of a diagram “page” (white area) when its window is first opened. You cannot change the width and height of a diagram page after it has been opened, but the size will change if you close and then reopen the diagram window.
Grid distance	Specifies the distance between gridlines in the diagram.
Max distance text to owner	Specifies the maximum distance between an icon and its text label. Visual Madonna will ensure that the distance between the icon’s enclosing rectangle and its text label is not greater than this distance.

Preference	Description
New diagram window size	Specifies the size of a diagram window when it is first opened. The default is "page size" which makes the window large enough to show the entire page area. When set to "full screen", the window initially fills the entire screen. When set to "parent window size" and a submodel is being opened, the window size is the same as the parent window's size (or full screen if it is a top-level window).

Unsupported Madonna Features

The diagram editor cannot yet generate equations employing some of Madonna's more advanced equation features. These include:

1. Vector equations.
2. Upper and lower bounds (LIMIT statement).
3. Difference equations.
4. Built-in root finder equations.
5. Renaming system symbols (RENAME statement).
6. Exposing a limited subset of a model's symbols (DISPLAY statement).

We expect to add support for many of these features in a future release of Visual Madonna.

Known Bugs

1. The clipboard commands (cut, copy, paste) do not work reliably with icons in the diagram. We recommend you avoid using them until they are fixed.
2. The icon dialog allows you to define graphical functions using Madonna's GRAPH() built-in. However, the Graph Input dialog (accessed from within the icon dialog) is fairly buggy and difficult to use, especially on the Macintosh.
3. Operations involving the dragging of one or more source icons to a target icon do not work when the "Drag Outlines" preference is turned off. These operations are alias merging, connecting flows to reservoirs, and moving icons to submodels. We recommend leaving this preference enabled until this problem is fixed.
4. The Search dialog does not function properly.
5. Many dialogs have visual problems such as overlapping or clipped controls.

In addition to these bugs, there may be additional bugs that are found only on the Macintosh or Windows platform. Please refer to the appropriate installation guide for a list of platform-specific bugs.