



## Getting Started with AgenaRisk

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## 1 Introduction

This tutorial teaches you the basics of using AgenaRisk. In the first part of the tutorial, you will learn how to open and use a simple model. In the second part, you will learn how to build this model from scratch.

Throughout this tutorial, various formatting conventions are used:

<b>File</b>	A term appearing in bold will sometimes refer to a menu on the toolbar that you are required to select.
<b>OK</b>	Bold is also used to indicate any button that you are required to click.
<b>23</b>	Bold can be used to indicate any value that you are asked to enter or select.
<b>Menu → Menu Item</b>	Two or more bold terms separated by an arrow indicate a path from a toolbar menu (or from the Start menu) down to a menu item that you are required to click.
Ctrl + W	The use of Ctrl, Alt or Shift in conjunction with a + symbol and a letter indicates that the key should be pressed down simultaneously with the letter to invoke a particular function.
<i>Filename.ast</i>	Names of files and directories (used during opening, saving and importing) are indicated by italics.
<i>Directory / Filename.ast</i>	Two or more italicised terms separated by a forward slash indicate a path from a directory (or folder) down to a particular file.
	This icon indicates a tip or other piece of useful information.
	This icon indicates a warning; you should pay particular attention to these.

**Table 1 Formatting conventions**

## 2 Opening and Using a Simple Model

### 2.1 Starting AgenaRisk

1. Start AgenaRisk by clicking on the AgenaRisk desktop icon or by selecting **Start** → **AgenaRisk** → **AgenaRisk**. If this is the first time you have run AgenaRisk, you will be presented with the dialog shown in Figure 1 below.

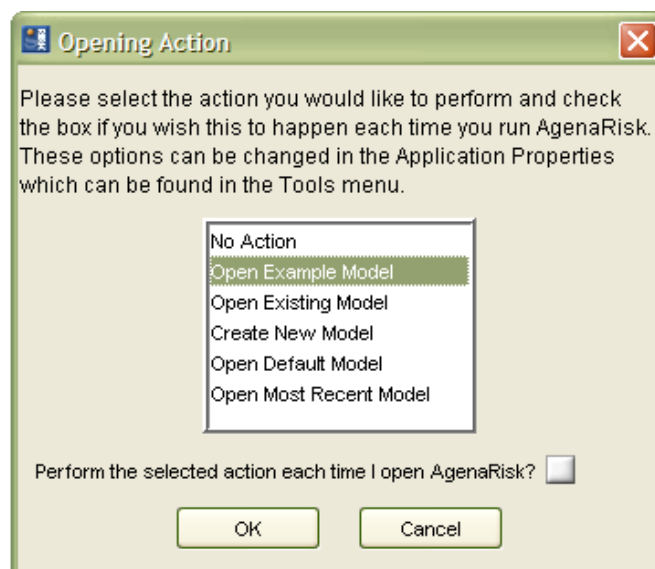
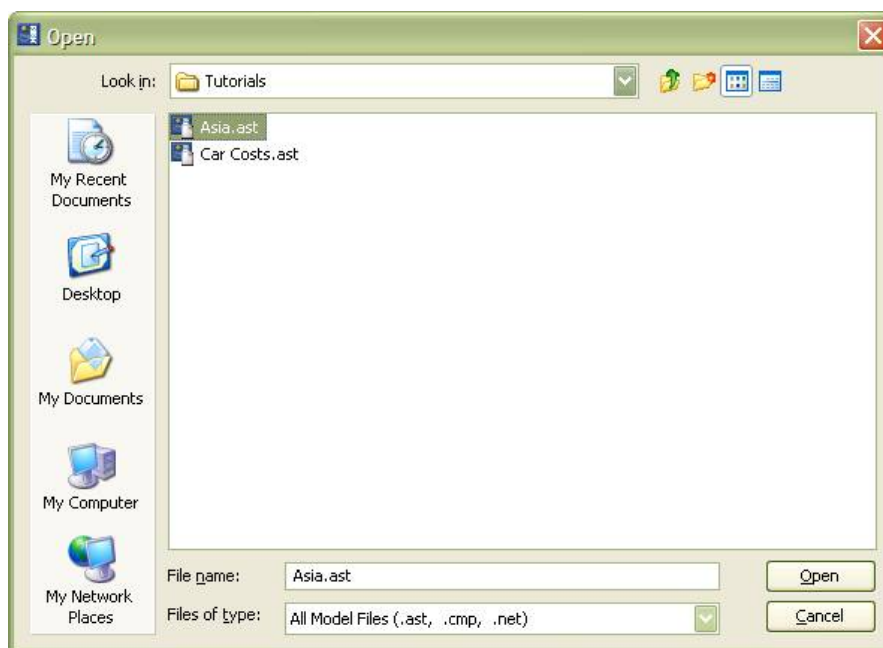


Figure 1 Opening dialog

2. Select **Open Example Model** and click **OK**.

### 2.2 Opening a File

1. You will now be presented with a dialog inviting you to select an AgenaRisk model file to open.
2. Double-click down into the *Tutorials* folder, select the *Asia.ast* file and click **Open**.



**Figure 2 Dialog for choosing file**



You will see the dialog for opening files whenever you click on **File** → **Open Model...**, **File** → **Open Example Model...** or **File** → **Import Model...**. If you choose **Open Most Recent Model** or choose one of the last 4 opened files from the **File** menu, no dialog will be shown; the appropriate file will be loaded immediately.



AgenaRisk model files either have the extension *.ast* or *.cmp*. The only difference is that *.ast* files are read-only; if you have modified an *.ast* file and want to save it, you will be prompted to save it as a new *.cmp* file.

3. When the model has loaded, your screen will look like the one shown in Figure 3.

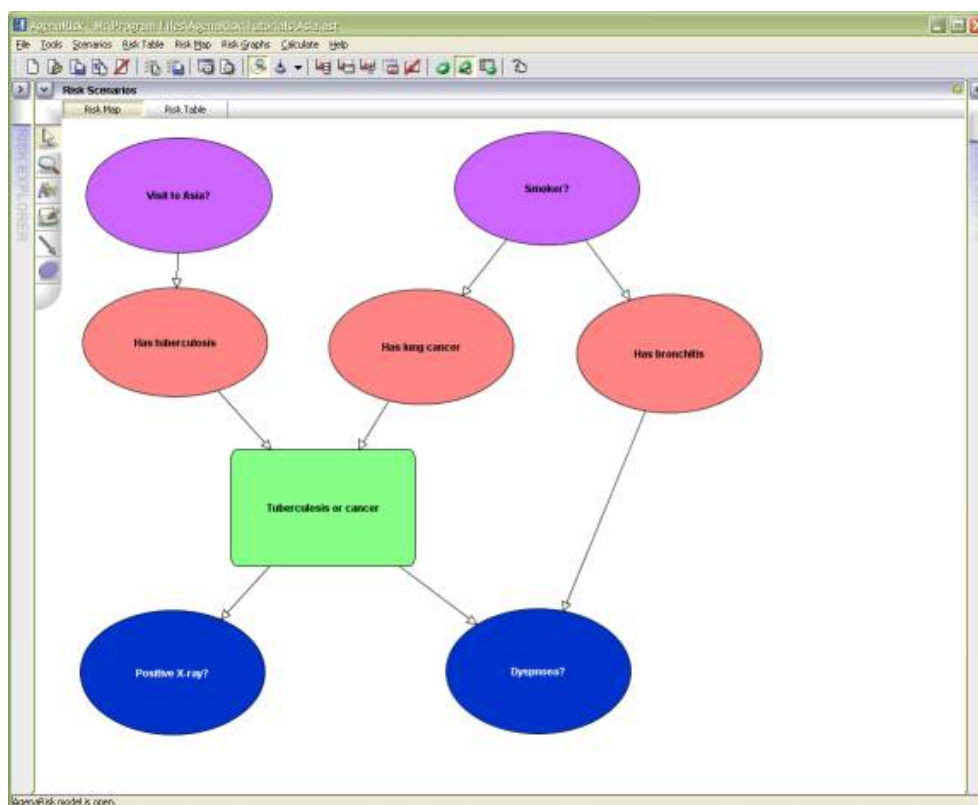



Figure 3 AgenaRisk after opening *Asia.ast*

 When a model is opened, only the Risk Map view is shown by default. The Risk Map represents a single Risk Object and it consists of nodes and edges that correspond to the nodes and edges in a Bayesian network.

## 2.3 Using Risk Maps

### 2.3.1 Selecting and moving nodes

1. You can move nodes around easily with your mouse. Click on the *Dyspnoea* node in the bottom right corner of the Risk Map and, while holding down your mouse button, drag the node so that it is aligned horizontally with the *Tuberculosis or cancer* node and vertically with the *Has bronchitis* node.
2. Nodes can also be moved around in groups. Click on the *Tuberculosis or cancer* node and then, holding down the Ctrl key, click on the *Positive X-ray* node. Both of these are now selected. Click on either of the selected nodes and move them so that the *Tuberculosis or cancer* node is vertically in line with *Has lung cancer*.
3. Your Risk Map should now look like the one shown in Figure 4.

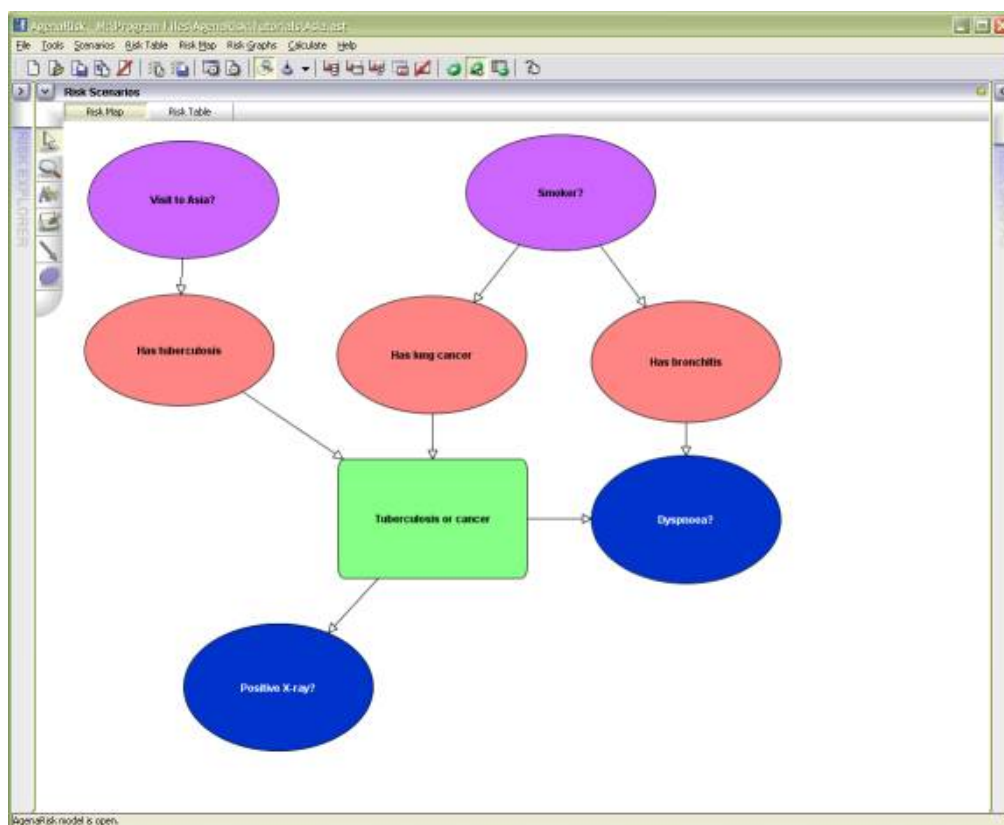



Figure 4 AgenaRisk after moving nodes

 You can also select multiple nodes by dragging a rectangle around the nodes you require using your mouse.

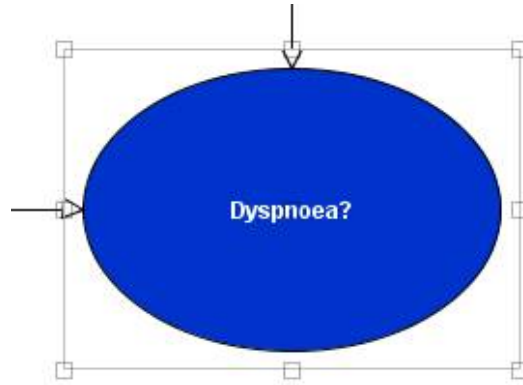
4. Continue to experiment with multiple selection and moving nodes around until you are comfortable with manipulating the Risk Map.

### 2.3.2 Aligning nodes

1. Select the *Visit to Asia?* node followed by these three nodes (using whichever multiple selection method you prefer): *Has tuberculosis*, *Tuberculosis or cancer* and *Positive X-ray*.
2. Right-click on any one of the nodes and from the pop-up menu, select **Arrange** → **Align Left**. You will see that all the nodes have now been vertically aligned with the *Visit to Asia?* node.
3. Experiment with the other alignment options in the pop-up menu until you are happy with how this functionality works.

### 2.3.3 Resizing and grouping nodes

1. Select a node and notice the grey border that appears:



**Figure 5 Node selection border**

2. Click in any of the small grey boxes and drag your mouse. You will notice that the node is resized in the direction you drag.
3. Select a number of nodes, right-click on any of them and select the menu item **Arrange** → **Group**. You will see that the nodes have been combined into a single object on the Risk Map.
4. Select the composite object and drag any of the grey squares around the border. This resizes everything in the composite object.
5. Right-click on the composite object and select **Arrange** → **Ungroup** from the pop-up menu. The nodes return to being individual objects.


### 2.3.4 Zooming in and out

1. Click on the magnifying glass icon on the vertical toolbar to the left of the Risk Map:



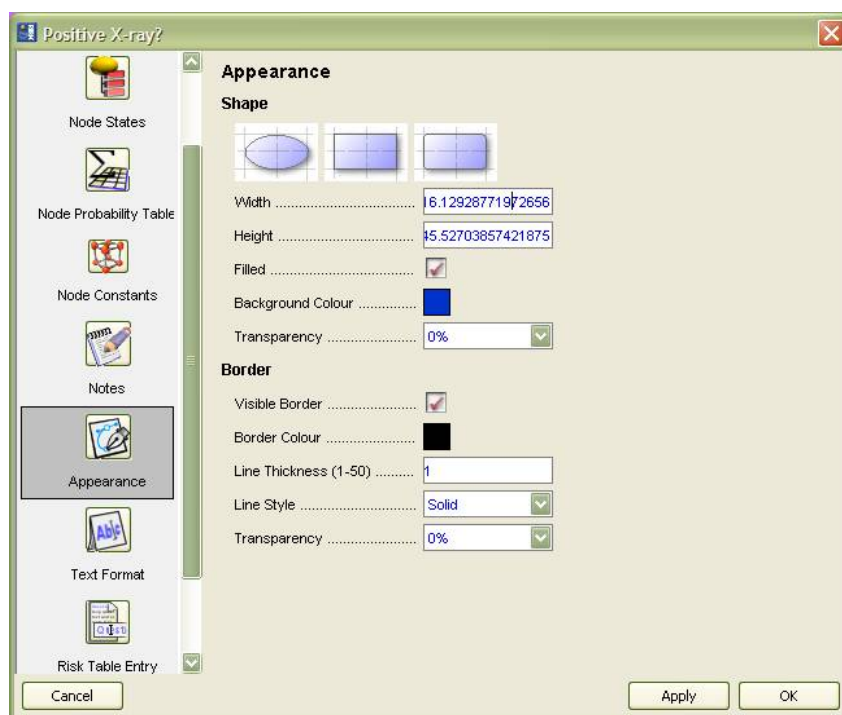
2. Click on the *Tuberculosis or cancer* node. Notice how you have zoomed in on the Risk Map.
3. Click on the same node again. You zoom in another level.
4. Click twice on the same node with the **right** button of your mouse. You will zoom out to your original view.
5. Click on the mouse pointer icon on the vertical toolbar to return to the selection mode:



 It is important that you return to selection mode after zooming; if you don't, the next time you click on the Risk Map you will end up zooming in unexpectedly.

### 2.3.5 Changing the appearance and text format of nodes

1. Right-click on the *Positive X-ray* node and select **Properties** from the pop-up menu.
2. In the dialog that appears, click on **Appearance** on the left hand side. You should be presented with a set of properties as shown in Figure 6 below.



**Figure 6 Node appearance properties**

3. Click the middle rectangle beneath the heading **Shape**.
4. Click the blue square marked **Background Colour** and in the colour chooser that appears, click on one of the small yellow squares and then click **OK**.
5. In the text box marked **Line Thickness (1-50)**, enter the value **5**.
6. In the drop-down box marked **Line Style**, choose the value **Dashed**.
7. Click on **Apply**.
8. Click on the **Text Format** tab on the left. You will see the following properties:

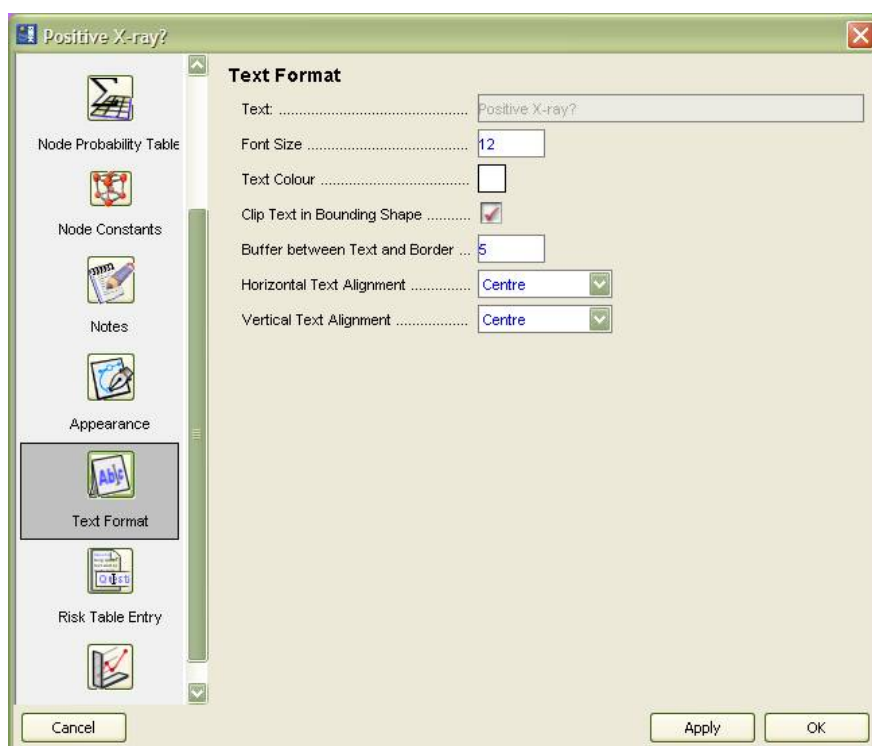


Figure 7 Node text format properties

9. Type **16** in the **Font Size** text box.
10. Click on the white square marked **Text Colour**. In the dialog that appears, select one of the small red squares and then click **OK**.
11. Click **OK** in the node properties dialog.
12. The *Positive X-ray* node should now look like this:



Figure 8 *Positive x-ray* node with changed appearance

### 2.3.6 Changing the appearance of edges

1. Right-click on the edge between the nodes *Tuberculosis or cancer* and *Dyspnoea?* and select **Properties** from the pop-up that appears. You will see the following dialog:

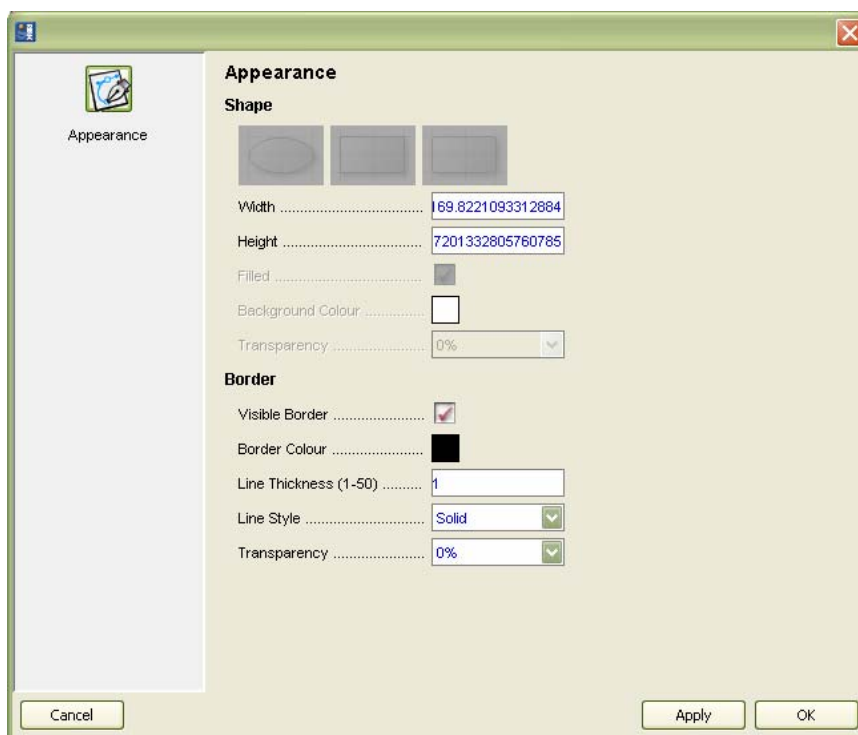


Figure 9 Edge properties

2. Click on the black square labelled **Border Colour**, click on one of the small red squares in the dialog that appears and then click **OK**.
3. Enter the value **3** in the **Line Thickness (1-50)** field.
4. Select **Dashed** from the **Line Style** drop-down box.
5. Click **OK**. The edge between the two nodes should now look like this:




Figure 10 Edge after changing appearance

## 2.4 Using Risk Graphs

### 2.4.1 Displaying Risk Graphs on the Risk Map

1. Close the current model without saving it. To do this, click on **File** → **Close Model** and then click **OK** in the confirmation dialog that appears.

 You can also close the current model by pressing Ctrl + W.

2. Reopen *Asia.ast* by clicking on the **File** menu and selecting it in the list at the bottom.

3. Before proceeding, it is worth briefly describing the *Asia.ast* model. The aim of the model is to predict whether a patient has one of three medical conditions: tuberculosis, lung cancer or bronchitis.
4. The model captures the relationships between these diseases, their causes and their symptoms. It encodes these relationships structurally; an arrow (or edge) between one node and another suggests that one node has a causal influence on the other. It also captures these relationships mathematically; each node has associated with it a node probability table (or NPT). NPTs will be dealt with in detail later on in the tutorial.
5. Each node in the model is Boolean; that is, each node has only two states or possible values: **yes** or **no**.
6. Right-click on the *Has lung cancer* node and select **Display Risk Graph** → **on Risk Map**. The Risk Graph for the node will be superimposed over it as shown in Figure 11.

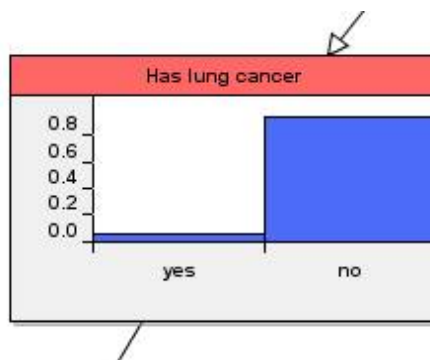


Figure 11 Risk Graph for *Has lung cancer* node



Double-clicking on a node is a very quick way of displaying its Risk Graph.

7. The risk graph shows that, in the absence of any other information, there is a very low probability that the patient has lung cancer (i.e. the **yes** state has a very small bar and the **no** state has a very large bar).
8. If you move your mouse over each bar on the Risk Graph, a tooltip will appear containing the exact probability value of the state. In this case, we can see that there is a 0.055 (i.e. approximately 0.5%) chance that the patient has lung cancer and a 0.945 (i.e. approximately 99.5%) chance that the patient does not have lung cancer.
9. Use your mouse to select both the *Has tuberculosis* and the *Has bronchitis* nodes.
10. Right-click on either of the selected nodes and choose **Display Risk Graph** → **on Risk Map**. Risk Graphs for both of these nodes will be displayed. Verify the probabilities of the patient having each medical condition by moving your mouse over the bars.

#### 2.4.2 Displaying Risk Graphs on the Risk Graph Panel

1. As well as displaying Risk Graphs directly on the Risk Map, they can be displayed in a dedicated area of the screen called the Risk Graph Panel.
2. Select **Risk Graphs** → **Close All Graphs** from the toolbar.
3. At the far right of the screen, click on the left-facing arrow that appears just above the text **RISK GRAPHS**:



4. The empty Risk Graph Panel should appear as shown in Figure 12.

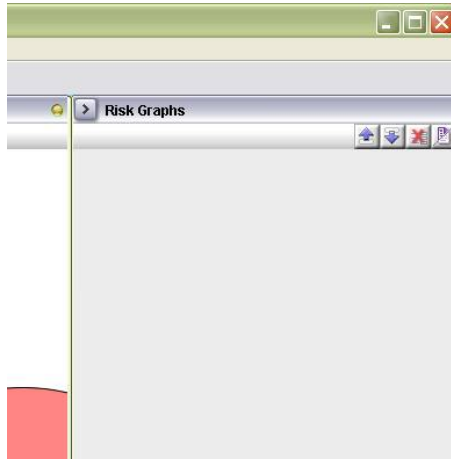


Figure 12 Empty Risk Graph Panel

5. Select all three medical condition nodes (*Has tuberculosis*, *Has lung cancer* and *Has bronchitis*), right-click on any of the selected nodes and choose **Display Risk Graph** → **on Risk Graph Panel**. All three Risk Graphs appear in the Risk Graph Panel as shown in Figure 13.

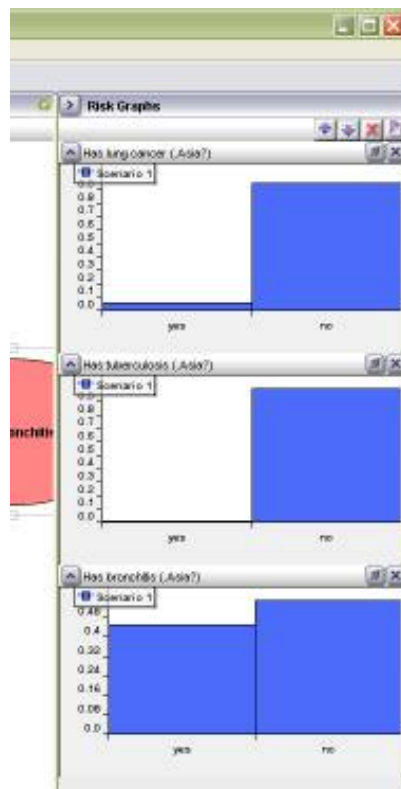


Figure 13 Risk Graph Panel showing three Risk Graphs

6. Risk Graphs can be moved around on the Risk Graph Panel using the buttons at the top right. Click on the title bar of the *Has lung cancer* Risk Graph. You will see that it becomes highlighted.

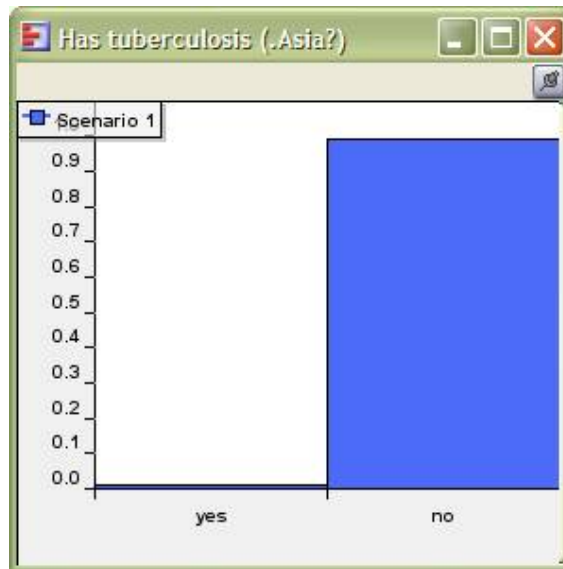
7. Click twice on the downward arrow:



8. Notice that the Risk Graph has now moved to the bottom of the list.
9. Risk Graphs can also be detached from the Risk Graph Panel and displayed in their own windows. Click on the drawing pin icon next to the X in the top right corner of the graph:



10. The Risk Graph is now displayed in its own window as shown in Figure 14 below.



**Figure 14 Risk Graph for *Has tuberculosis* shown in own window**

11. Click on the drawing pin icon again to dock the Risk Graph back on to the Risk Graph Panel.
12. Select the title-bar of each Risk Graph while holding down Ctrl so that all three title bars become highlighted.
13. Now click the red X button on the Risk Graph Panel toolbar:



14. The Risk Graph Panel is empty once more.

## 2.5 Entering Data

### 2.5.1 Entering data via the Risk Map

1. So far, you have looked at the probability outputs of the *Asia* model as they are when no other information has been entered. To exploit the power of the model, you need to begin entering data.

2. Minimise the Risk Graph Panel by clicking on the right-facing arrow at the top of the panel:



As well as simply expanding and retracting the Risk Graph Panel using the arrow icons, you can change the width of it by clicking on the bar that separates it from the Risk Map and dragging it left or right as required.

3. Right-click on an empty area of the Risk Map and choose **Selection** → **All** from the pop-up menu.
4. Right-click on any of the selected nodes and select **Display Risk Graph** → **on Risk Map** from the pop-up menu.
5. You should now see Risk Graphs displayed on top of every node.
6. Ensure that the auto-calculate button on the main application toolbar is pressed down:



This ensures that the model recalculates automatically each time you enter data.



If you are using a model that takes a long time to calculate and want to enter a batch of data, you should consider turning off the auto-calculate feature. Otherwise, the model will re-calculate each time a piece of data is entered.

7. Note the current probabilities of the patient having bronchitis, lung cancer or tuberculosis by inspecting the graphs of the three corresponding nodes.
8. Imagine that the patient we are currently examining has presented with dyspnoea (shortness of breath). We can enter that information into the model by right-clicking on the *Dyspnoea?* node and selecting **Enter Observation** → **Scenario 1** → **yes**.
9. Notice that this observation is recorded by a label on the *Dyspnoea?* node and that the probability of the state **yes** is now 1 (or 100%).
10. Look at the Risk Graphs for the bronchitis, lung cancer and tuberculosis nodes and note how the probabilities have changed. Our belief that the patient has bronchitis has increased significantly.
11. Imagine now that we find out that the patient is not a smoker. Record this information by right-clicking on the *Smoker?* Node and selecting **Enter Observation** → **Scenario 1** → **no**. The probability of the patient having any of the diseases has fallen slightly but we still believe that bronchitis is the most likely of the three.
12. Next we find out that the patient has been to Asia. Enter this observation by right-clicking on the *Visit to Asia?* node and choosing **Enter Observation** → **Scenario 1** → **yes**. The probability of the patient having tuberculosis has now increased.
13. Finally, imagine that we have carried out an x-ray and that the result is positive. Enter this information by right-clicking on *Positive X-ray* and choosing **Enter Observation** → **Scenario 1** → **yes**. Notice how the belief in the patient having bronchitis has fallen while the probability of tuberculosis has risen.

## 2.5.2 Entering data via the Risk Table

1. Up until now, we have only interacted with the model via the Risk Map. There is another view called the Risk Table that is more like a questionnaire. This is useful for entering many observations at once and is more appropriate for novice users who don't need to appreciate the underlying structure of the model.
2. Reopen *Asia.ast* by clicking **File** and then selecting the model from the list at the bottom of the menu.
3. Click **OK** when the confirmation dialog appears.
4. When the model has opened, click on the **Risk Table** tab just next to the **Risk Map** tab:

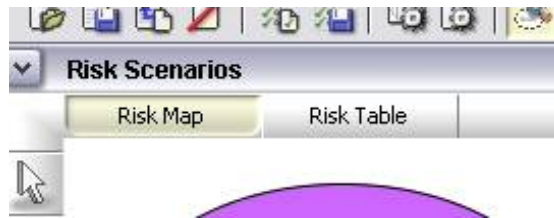


Figure 15 Risk Table tab

5. The Risk Table view now appears (see Figure 16). Note that it contains an entry corresponding to each node in the Risk Map.

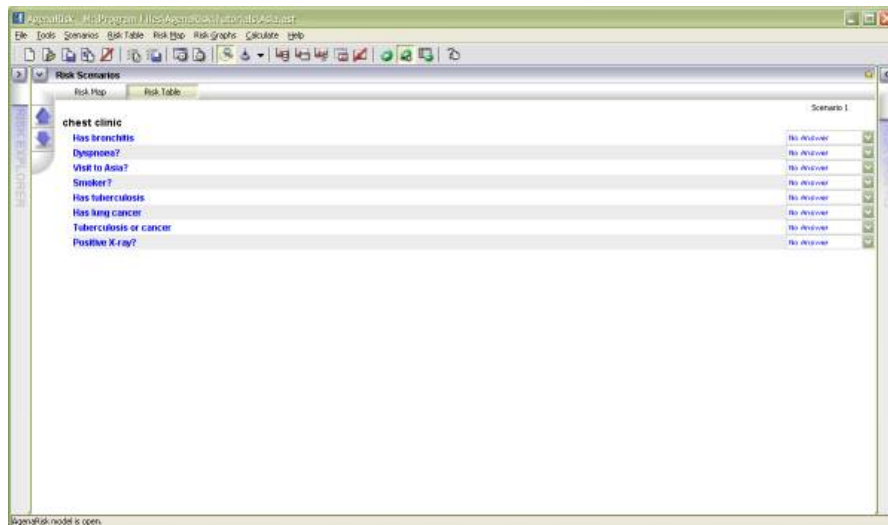


Figure 16 Risk Table view

6. Expand the Risk Graph Panel by clicking on the left-facing arrow:



7. Right-click on the *Has bronchitis* entry and choose **Display Risk Graph**. You will see the Risk Graph appear on the Risk Graph Panel.
8. In the drop-down box alongside the *Smoker?* entry, click on **yes**. Notice from the *Has bronchitis* Risk Graph that the probability of bronchitis has changed.
9. Close down all the Risk Graphs by clicking on the following button on the toolbar:



### 2.5.3 Entering batches of observations

1. Switch off auto-calculation by toggling the auto-calculate button on the toolbar so that it looks like this:



2. Using the appropriate drop-down boxes, set *Visit to Asia?* to **no** and *Dyspnoea?* and *Positive X-ray* to **yes**. You will see that the *Has bronchitis* Risk Graph hasn't been updated.
3. Click on the calculation button on the toolbar to run a calculation that includes these new observations:



4. You will see that the probability of the patient having bronchitis now increases.

### 2.5.4 Entering soft evidence

1. So far, you have only entered what is called "hard" evidence. Hard evidence is where you specify that a node takes on an exact value (in this case, either **yes** or **no**). It is also possible, however, to enter "soft" evidence. Soft evidence is where you assign a percentage to two or more of a node's states. For example, an x-ray result may not, in your opinion, be 100% positive; there may be some ambiguity. In which case, you might want to record the fact that the x-ray is only 80% positive.
2. Click on **Tools** → **Clear Entered Data** → **All** from the menu bar and click **Yes** in the confirmation dialog that appears.
3. Double-click on the *Positive X-Ray* entry to expand it as shown in Figure 17 below.



Figure 17 Expanded Risk Table entry

4. In the box next to **yes** enter the figure 0.8 and in the box next to **no** enter 0.2.

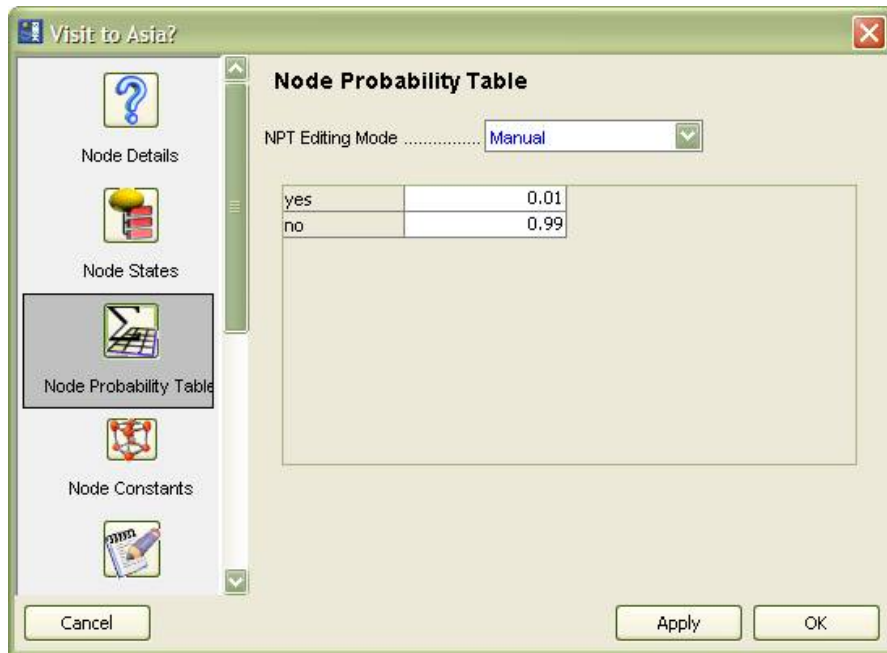


When entering soft evidence, you do not need to ensure that the numbers add up to 1. AgenaRisk will automatically normalise the numbers for you.

5. Click on the calculation button on the toolbar to run a calculation with this new observation. Note the probability of the patient having bronchitis by inspecting the Risk Graph.
6. Now enter 0.9 in the **yes** box and 0.1 in the **no** box and run another calculation. See how the probability of bronchitis has increased slightly.

## 2.6 Viewing NPTs

1. Node Probability Tables (NPTs) contain probability information that underpins the structural relationships in a model.
2. For a node that has no parents (i.e that has no edges coming into it), the NPT is simply a list of probabilities in which each probability corresponds to a state of the node.
3. Right-click on the *Visit to Asia?* node and select **Properties**.
4. Click on the **Node Probability Table** tab in the left panel. The NPT is shown in Figure 18 below.



**Figure 18 NPT for node with no parents**

5. The meaning of this NPT is as follows: our initial understanding (based on research, perhaps) is that there is a 0.01 (i.e. 1%) chance that a patient we see has been to Asia. Conversely, there is a 0.99 (i.e. 99%) chance that a patient we see has not been to Asia. These probabilities are called priors because they represent the state of affairs before any other information is known.
6. Click on **OK** to close the dialog.
7. Right-click on the *Has lung cancer* node, select **Properties** and click on the **Node Probability** tab on the left of the panel. The NPT you will see is shown in .

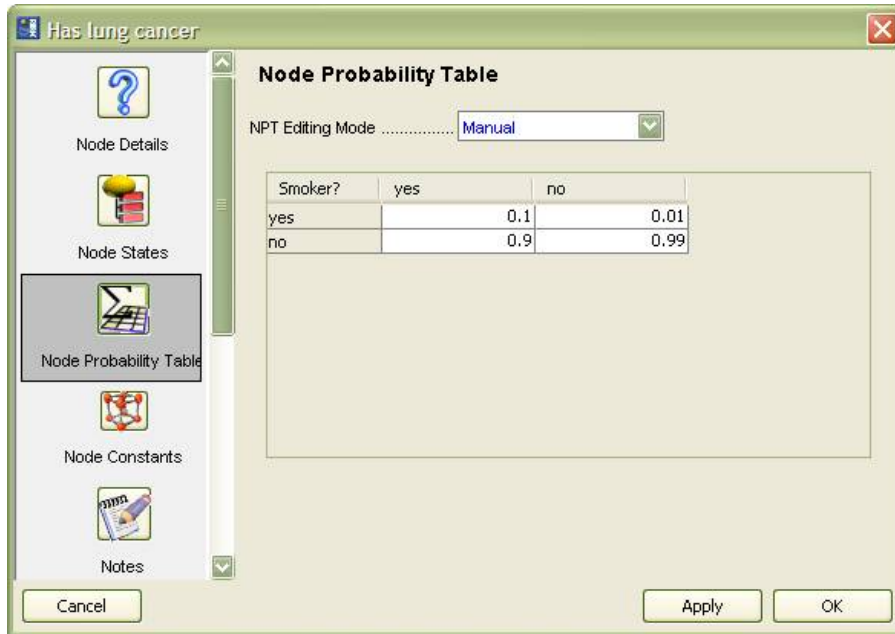


Figure 19 NPT for node with one parent

8. This NPT is more complicated and contains so-called “conditional” probabilities; that is, probabilities that are different depending on the state that the parent node is in. The meaning of this NPT is as follows: if we know that the patient is a smoker, then there is a 0.1 (i.e.10%) chance that they will have lung cancer and a 0.9 (i.e. 90%) chance that they will not; if we know that the patient is not a smoker, then there is a 0.01 (i.e. 1%) chance that they will have lung cancer and a 0.99 (i.e. 99%) chance that they will not. These probabilities may be based on historical admissions data at a clinic. Or, alternatively, they could represent the subjective opinion of one or more experts in the field.
9. AgenaRisk provides very powerful support for generating NPTs automatically using mathematical expressions, Boolean expressions, statistical distributions and table partitioning. These techniques are beyond the scope of this basic tutorial, however, and are dealt with in the more advanced tutorials and in the AgenaRisk reference manual.

## 2.7 Accessing Help

1. At any stage, you can view the full AgenaRisk reference manual by clicking on **Help** → **AgenaRisk Help**.
2. You can also access the user manual by pressing the F1 key.



In order to view the user manual, you need to have Adobe Acrobat Reader installed on your computer.

## 2.8 Using the AgenaRisk example models

1. AgenaRisk comes with a large number of example models. By exploring these, you can get a fuller understanding of the different ways in which AgenaRisk can be used.
2. Some examples have documentation that sits alongside the model and can be viewed within AgenaRisk; others have accompanying documentation in HTML format.
3. To open an example model in AgenaRisk, click on **File** → **Open Example Model...** and click down through the directories until you reach an **.ast** file that you are interested in viewing.

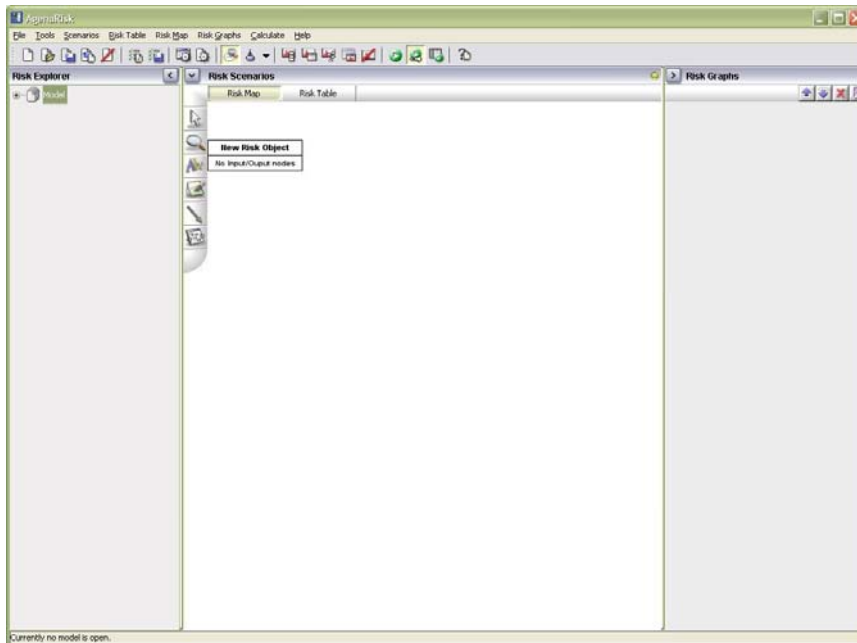
4. Browse the *Examples* sub-directory of your AgenaRisk installation directory in Windows Explorer to see which models have accompanying HTML documentation.

### 3 Building a Simple Model from Scratch

#### 3.1 Creating and Saving a Model

##### 3.1.1 Creating a new model

1. Click on **File** → **Create New Model** and click on **OK** in the confirmation dialog that appears.
2. A new model is created and all three AgenaRisk panels are displayed: the Risk Explorer, the Risk Map and the Risk Table, as shown in Figure 20.



**Figure 20** AgenaRisk panels shown after new model created

3. The Risk Explorer on the left is a tree that shows all Risk Objects in the current model. In basic models (such as the Asia example), there is typically only one Risk Object.
4. Expand the Risk Explorer by clicking on the + symbol next to the root item in the tree (labelled **Model**).
5. Select **New Risk Object** in the Risk Explorer. You will see a blank Risk Map, as shown in Figure 21 below.

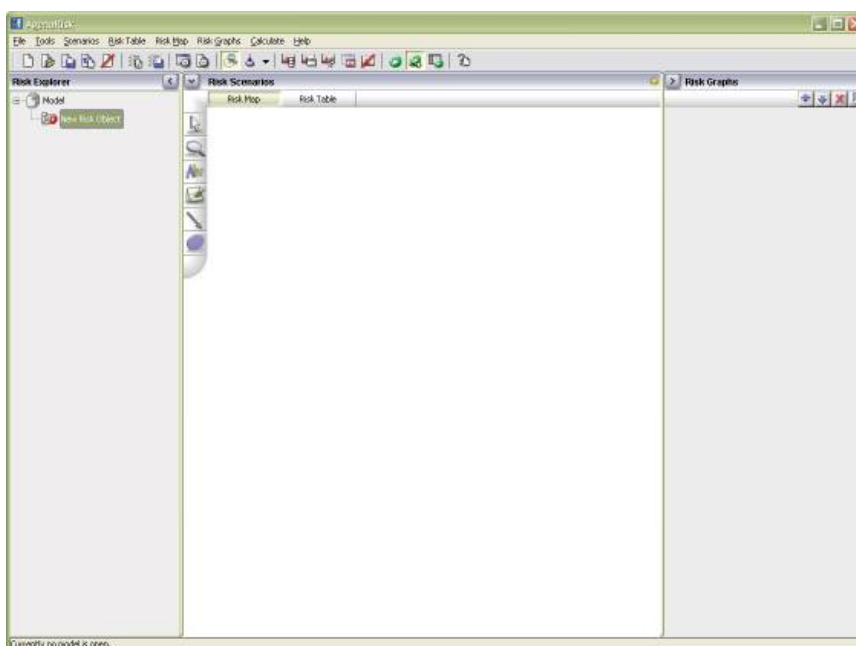


Figure 21 Empty Risk Map for newly created Risk Object

### 3.1.2 Saving models

1. To save your new model, choose **File** → **Save Model** from the menu bar.
2. A file dialog like the one shown in Figure 22 will appear.

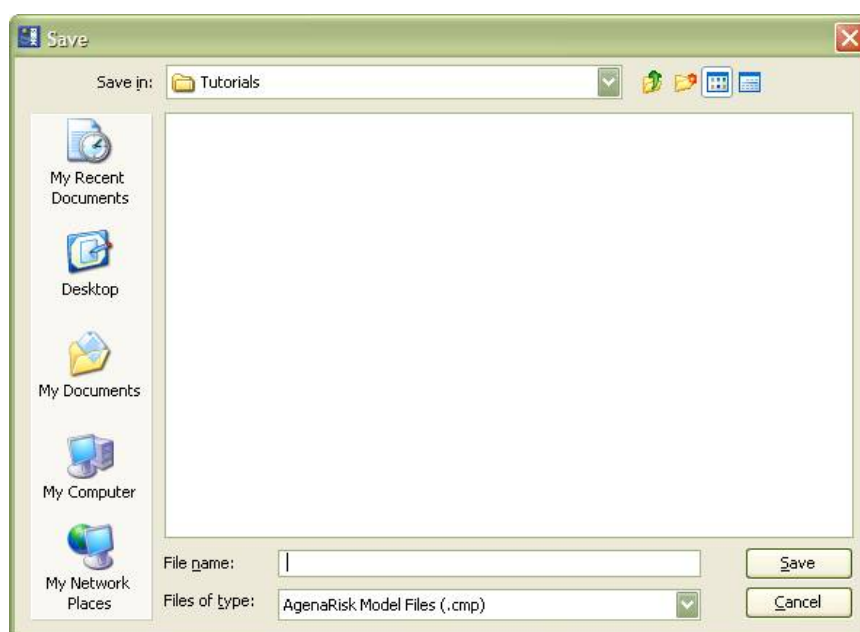


Figure 22 Dialog for specifying where to save a model

3. Navigate to a directory where you want to save the model and then type the following name in the **File name** field: **Asia From Scratch**.
4. Click **Save**.
5. Click **File** → **Close Model** and then click **OK** in the confirmation dialog that appears.

6. Click **File** → **Open Model...** and verify that your model (*Asia From Scratch.cmp*) is available for selection.
7. Click on the model name and then click **Open**.
8. The model is now displayed in AgenaRisk. Notice that the Risk Explorer and Risk Graph Panel are hidden; this is the default when a model is opened.
9. Expand the Risk Explorer by clicking on the right-facing arrow



10. Observe that the **New Risk Object** is selected.
11. Retract the Risk Explorer again by clicking on the left-facing arrow:



As with the Risk Graph Panel, you can change the width of the Risk Explorer when it is expanded by clicking on the bar that separates it from the Risk Map and dragging it.

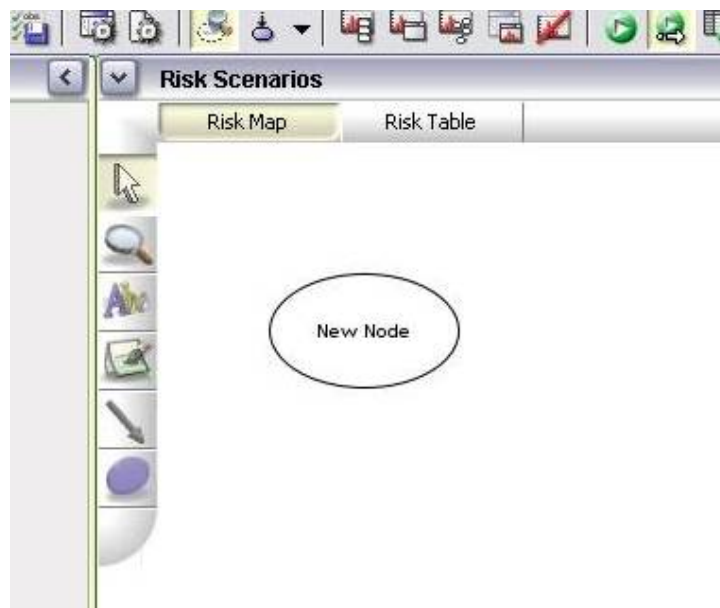
## 3.2 Editing the Risk Map

### 3.2.1 Adding nodes

1. Click on the oval icon on the vertical toolbar next to the Risk Map:



2. Click in the top-left area of the Risk Map. You will see that a new node has been added as shown in Figure 23.



**Figure 23 A new node added to the Risk Map**

### 3.2.2 Changing the name, type and states of a node

1. Right-click on the node you just added and select **Properties** from the menu.
2. In the **Node Name** field, type **Visit to Asia?**
3. In the drop-down box labelled **Node Type** select **Labelled**. The properties dialog should now look like this:

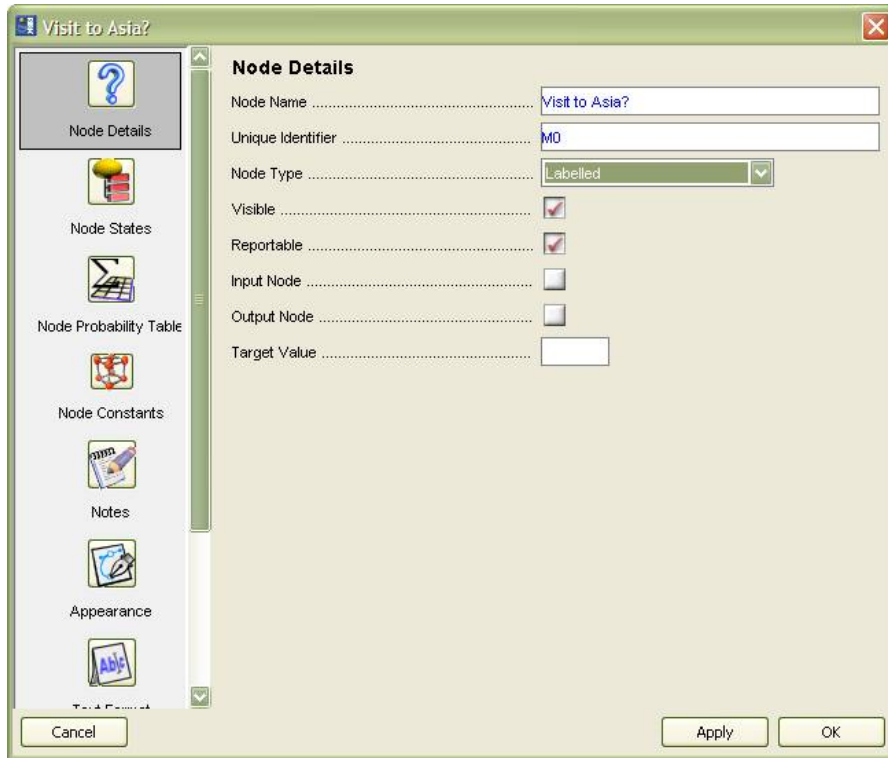


Figure 24 Node properties after changing type to Labelled

4. Click on **Apply**.
5. Click on **Node States** in the left panel of the properties dialog. Notice that, by default, the five states of a Labelled node are named: **0 – 10**, **10 – 20**, **20 – 30**, **30 – 40** and **40 – 50**.
6. In the **States** text box, select all the states by dragging your mouse across them and press the Backspace or Delete key.
7. Type **yes** on the top line of the empty text box and **no** on the next line.
8. Click on **OK**.
9. The Risk Map should now look like this:

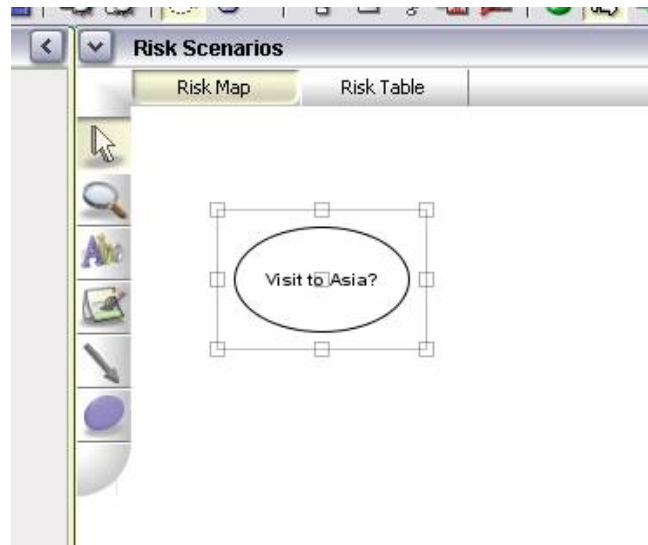


Figure 25 Risk map after renaming node

### 3.2.3 Using copy and paste

1. Right-click on the *Visit to Asia?* node and select **Copy** from the pop-up menu.
2. Right-click on an empty area of the Risk Map to the right of the *Visit to Asia?* node and select **Paste**.
3. A copy of the *Visit to Asia?* node (called *Visit to Asia?\_1*) is now added to the Risk Map.



The fastest way of copying and pasting is to use the keyboard shortcuts Ctrl + C and Ctrl + V.

4. Right-click on this new node and select **Properties**. Observe that the node is of Labeled type (rather than the default type for new nodes, Continuous Interval).
5. Click on the **States** tab in the left panel of the dialog and observe that the states are **yes** and **no** (rather than **0 – 10**, **10 – 20**, **20 – 30**, **30 – 40** and **40 – 50**, the default states for new Labeled nodes).
6. Click on the **Node Details** tab and enter the following name into the **Node Name** field: **Smoker?**
7. Click **OK** and notice that the name of the node has changed.
8. Referring back to Figure 3 in section 2.2, use the copy and paste facility to create and lay out the remaining nodes in the Asia model: *Has tuberculosis*, *Has lung cancer*, *Has bronchitis*, *Tuberculosis or cancer*, *Positive X-ray?* and *Dyspnoea?*. Ignore edges for now; you will add these later.



You can copy and paste multiple nodes at one time. Simply select all the nodes you require (by holding down Ctrl while clicking on them) and then copy and paste as for a single node.

9. If you have time, modify the appearance of each node to match Figure 3.
10. Click **File** → **Save Model** or click on the save icon on the toolbar:



Because you have already saved the model, you do not need to specify a new name; the existing file will be overwritten.



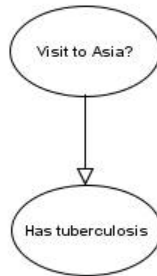
If you want to save a model in a new file at any stage, select **File** → **Save Model As...** from the menu bar.

### 3.2.4 Adding edges

1. Click on the edge icon on the vertical Risk Map toolbar:



2. Click on the *Visit to Asia?* node.
3. Move your mouse downwards to the *Has tuberculosis* node. Notice that a dotted line appears to indicate where the edge is going to be created.
4. Click on the *Has tuberculosis* node to create the edge.
5. The two nodes should now look like this:



**Figure 26** An edge added between two nodes

6. Using Figure 3 in section 2.2 for reference, add the remaining edges to the Risk Map.



Edge direction is very important. To create an edge that starts at node A and finishes at node B, you need to click on node A first and then on node B.

### 3.2.5 Deleting nodes and edges

1. Click on the node icon on the toolbar:



2. Click In an empty area of the Risk Map.
3. Right-click on the node that you have just created and select **Delete** from the pop-up menu. Observe that the node disappears.



The easiest way of deleting objects from the Risk Map is to press the Delete key on your keyboard.

4. Click on the node icon again and click in an empty area of the Risk Map.
5. Repeat this process to create a second node.
6. Click on the edge icon:



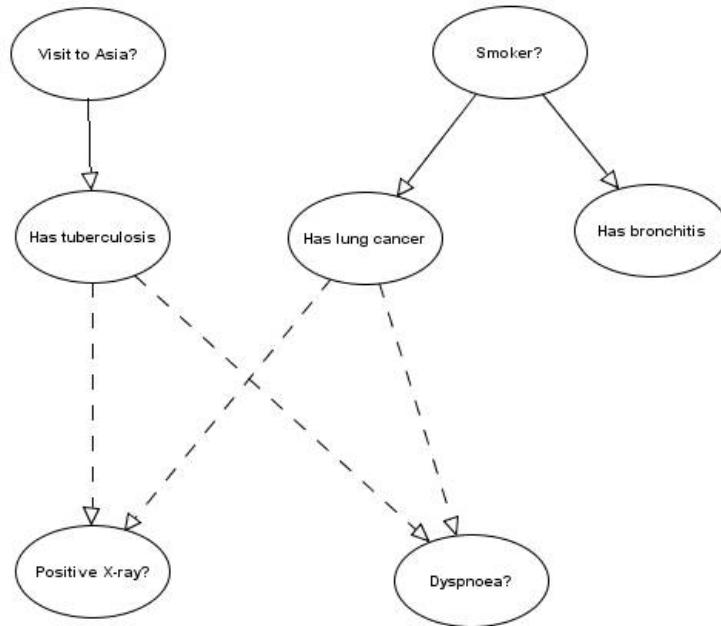
7. Draw an edge between the two new nodes.
8. Right-click on the edge and select **Delete**. Notice that the edge disappears.
9. Redraw the edge between the two nodes.
10. Right-click on one of the nodes and select **Delete**. Notice that the edge disappears as well as the node. The edge is deleted because edges can only exist on the Risk Map if they connect two nodes.
11. Delete the other node so that the Risk Map shows only the Asia model.

### 3.2.6 Hiding nodes

1. Sometimes when building models it is desirable to hide certain nodes to reduce the visual complexity of the Risk Map. In large models there are often intermediate calculation nodes that don't need to be shown to the user of the model. These nodes can be hidden.
2. Right-click on the *Tuberculosis or cancer* node and select **Properties** from the pop-up menu.
3. Uncheck the box marked **Visible**.
4. Click **OK**.
5. You can see that the *Tuberculosis or cancer* node is now shown with a dotted border. The reason for this is that AgenaRisk, by default, will actually show nodes that are marked as hidden. This is typically what you want to do when building models; only when using models do you want truly to hide hidden nodes.
6. In order to hide nodes that are marked as hidden, select **Risk Map** → **Show Hidden Nodes** from the menu bar. You can also do this by clicking on the following toolbar button:



7. The *Tuberculosis or cancer* node now disappears. Notice that indirect links between nodes are now shown as dotted lines to replace the direct links to and from the hidden node (see Figure 27). Be aware that the underlying structure of the model is the same; only the view has changed.



**Figure 27 Indirect links shown after a node is hidden**

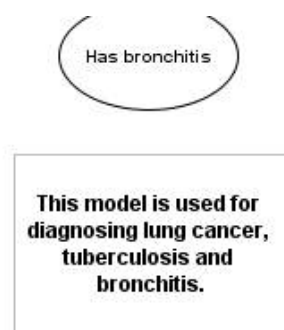
8. Select **Risk Map** → **Show Hidden Nodes** from the menu bar (or use the toolbar button) to display the *Tuberculosis or cancer* node again.
9. Right-click on *Tuberculosis or cancer*, select **Properties**, tick the **Visible** box and click **OK**. The node is now restored.

### 3.2.7 Adding labels

1. Click the text note icon on the Risk Map vertical toolbar:




2. Click in the space below the *Has bronchitis* node on the Risk Map. A label containing default text will appear.
3. Right-click on this label and select **Properties** from the pop-up menu.
4. In the box marked **Text**, type the following: **This model is used for diagnosing lung cancer, tuberculosis and bronchitis.**
5. In the **Font Size** box, enter the value **12**.
6. In the **Horizontal Text Alignment** drop-down box, select **Centre**.
7. In the **Vertical Text Alignment** drop-down box, select **Centre**.
8. Click **OK**.
9. You will see that the label has changed. However, you can't see all the text now, so drag one of the small grey boxes outwards to enlarge the label. The label should now look like this:




**Figure 28 A label added to the Risk Map**

10. Move the label around the Risk Map and observe that labels behave, in many respects, just like nodes.
11. If you have time, experiment with the other visual properties of the label to see how much control you have over its appearance.

 Labels ignore any line breaks that you might enter in the text. To achieve the effect of multiple paragraphs, add a label for each paragraph and use the movement, grouping and alignment functions to space the text as you require.

12. Right-click on the label and, from the pop-up menu, select **Delete**.

### 3.2.8 Adding pictures

1. To add more information to your model, you can also import pictures in JPEG format that have been created elsewhere.
2. Click on the paintbrush icon on the vertical toolbar:  

3. Click in an empty area at the bottom of the Risk Map.
4. In the dialog that appears, navigate to your AgenaRisk installation directory and select the *agena-logo.jpg* file as shown in Figure 29.

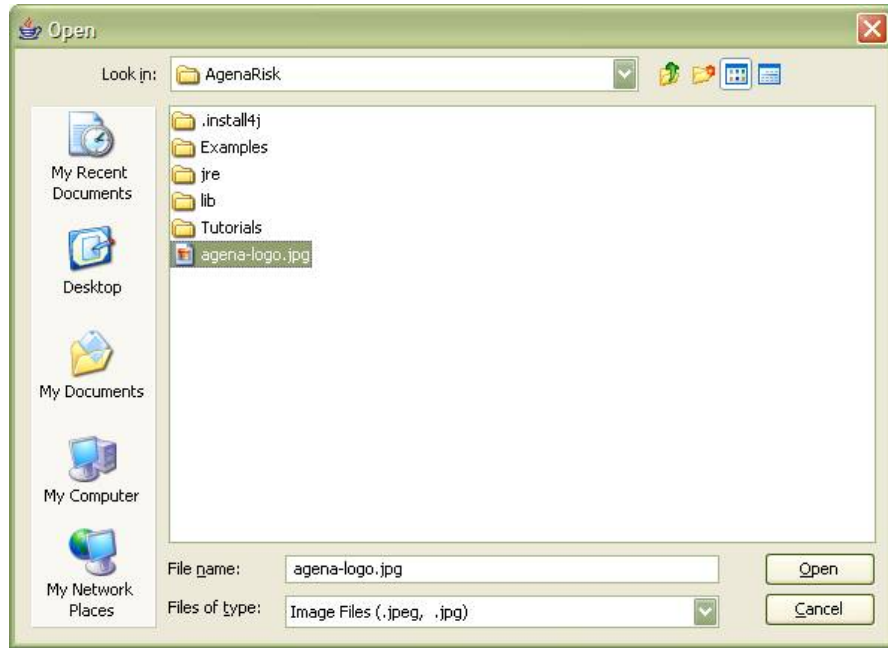


Figure 29 Choosing a picture to add to the Risk Map

5. Click **Open**.
6. The Agena logo has now been added to the Risk Map. Observe that you can move it and resize it.
7. Right-click on the image and select **Delete** from the pop-up menu.

### 3.2.9 Annotating edges

1. Labels are useful for describing models and explaining how they should be used. However, in some cases, you may want to label an edge separately. Using an ordinary label is not satisfactory since, as the edge moves, the label doesn't stay with it.
2. Right-click on the edge between *Smoker?* and *Has bronchitis* and select **Annotate with Label** from the pop-up menu.
3. Right-click on the label and select **Properties**.
4. In the box labelled **Text**, type **Known Strong Link**.
5. Click **OK**.
6. Try moving the edge label. Notice that it doesn't move independently.
7. Now move the *Has bronchitis* node and observe that the label stays anchored to the edge.
8. Right-click on the edge label and select **Delete**.

### 3.3 Editing NPTs

1. Right-click on the *Visit to Asia?* node and select **Properties**.
2. Click on the **Node Probability Table** tab in the left panel.

3. In the text box to the right of **yes**, enter the value **0.01**.
4. Either click in the box to the right of **no** or press the Tab key.
5. Enter the value **0.99**.
6. Right-click on the *Tuberculosis or cancer* node and select **Properties**.
7. Click on the **Node Probability Table** tab in the left panel.
8. In the bottom text box in the first column, enter the value **0**.
9. Drag your mouse over the two cells in the first column (i.e. the cells that now contain **1.0** and **0.0**).
10. When they are selected, right-click and choose **Copy** from the pop-up menu.
11. Select the two cells in the second column, right-click and choose **Paste**. Observe that the two values from the first column have been entered.
12. Select the two cells in the third column, right-click and choose **Paste** again.
13. In the fourth column, enter **0** in the top text box and enter **1** in the bottom text box.
14. The NPT is now complete. Click **OK**.
15. Complete the NPTs for the remaining nodes using the data in Table 2 below.



When you are dealing with a large NPT, you can save time by entering the table in Microsoft Excel first, copying the data, selecting the corresponding rows and columns in the NPT and then pasting.

<i>Smoker?</i>	yes	0.5			
	no	0.5			
<i>Has tuberculosis</i>	Visit to As...	yes	no		
	yes	0.05	0.01		
	no	0.95	0.99		
<i>Has lung cancer</i>	Smoker?	yes	no		
	yes	0.1	0.01		
	no	0.9	0.99		
<i>Has bronchitis?</i>	Smoker?	yes	no		
	yes	0.6	0.3		
	no	0.4	0.7		
<i>Positive X-ray?</i>	Tuberculo...	yes	no		
	yes	0.98	0.05		
	no	0.02	0.95		
<i>Dyspnoea?</i>	Has bronchitis	yes		no	
	Tuberculosi...	yes	no	yes	no
	yes	0.9	0.8	0.7	0.1
	no	0.1	0.2	0.3	0.9


**Table 2 Asia model NPT probabilities**

- When you have finished, return to section 2.5 and check that the model behaves the same as the original.

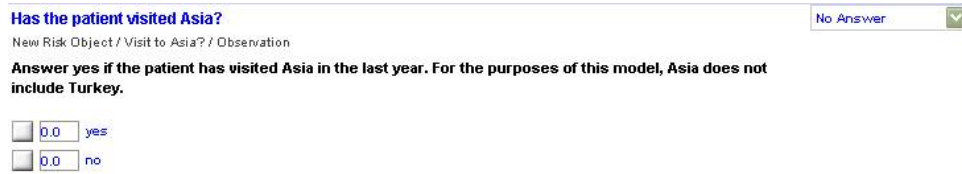
### 3.4 Editing the Risk Table

#### 3.4.1 Editing entries

- Whenever you create a node on the Risk Map, a corresponding entry is created in the Risk Table. The default names and descriptions given to these entries are not very informative; you can change them so that they present a more informative interface for users who want to enter data via the Risk Table.
- Click on the Risk Table tab at the top of the screen.
- Click at the end of the **Visit to Asia?** entry so that the cursor appears after the question mark.
- Delete the text using the Backspace key and type the following: **Has the patient visited Asia?**
- Now double-click on the entry to expand it.
- Click at the end of the text that says **New Node**. This is the long description of the entry where you can put extra explanatory information to help users when they enter data.
- Delete the text using the Backspace key and type the following: **Answer yes if the patient has visited Asia in the last year. For the purposes of this model, Asia does not include Turkey.**

 You can also edit a Risk Table entry by right-clicking on it and selecting **Properties**.

8. The entry should now look like this:



The screenshot shows a form for a Risk Table entry. The title is "Has the patient visited Asia?". Below the title, it says "New Risk Object / Visit to Asia? / Observation". To the right of the title is a dropdown menu with "No Answer" selected. Below the title, there is a text instruction: "Answer yes if the patient has visited Asia in the last year. For the purposes of this model, Asia does not include Turkey." At the bottom, there are two radio button options: "0.0 yes" and "0.0 no".

Figure 30 A Risk Table entry after editing

### 3.4.2 Creating, editing and deleting headings

1. Headings can be used to organise the entries in the Risk Table. By default, all entries are created under a single heading that has the same name as the Risk Object (*New Risk Object* in this case).
2. Double-click on the **Has the patient visited Asia?** entry to retract it.
3. Right-click anywhere in the Risk Table and select **Add Heading** from the pop-up menu. Notice that a new heading with the default name **New Heading** has been added at the bottom of the Risk Table.
4. Click at the end of the **New Heading** text so that the cursors appears and delete the text using the Backspace key.
5. Type in the following: **Questions**.
6. Create another heading, right-click on it and select **Delete** from the pop-up menu.
7. Rename the **New Risk Object** heading **Results**.

### 3.4.3 Moving entries

1. You can now start to reorganise the Risk Table under the three headings.
2. Click on the **Has the patient visited Asia?** entry and then click on the downward arrow on the Risk Table vertical toolbar:



3. Keep on clicking on the down arrow until the entry appears under the **Questions** heading. Do the same for: **Positive X-ray?**, **Dyspnoea?** and **Smoker?**
4. The Risk Table should now look like this:

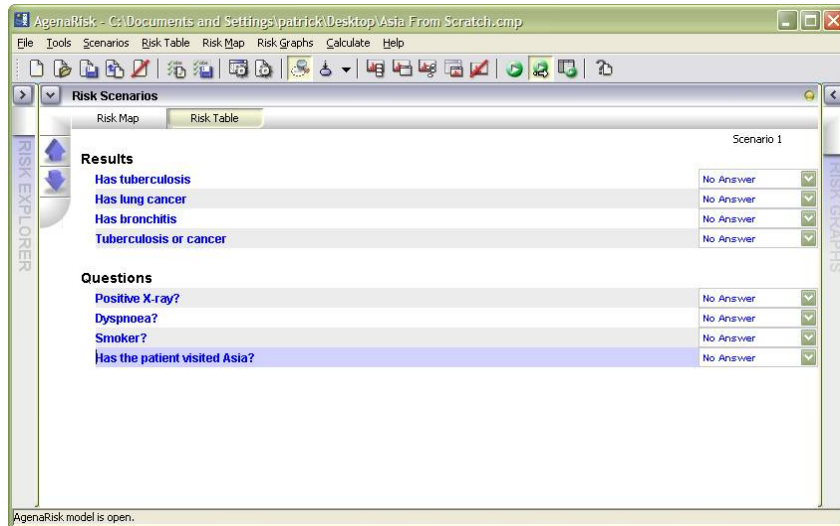


Figure 31 A Risk Table entry after editing

5. The entries in your Risk Table might be in a different order depending on which entries you moved first. You can change their order by using the upward arrow on the vertical toolbar



in conjunction with the downward arrow.

### 3.4.4 Hiding, deleting and adding entries

1. Often, there are many nodes in a model that don't really need corresponding Risk Table entries, since users are never going to enter data for these nodes. These entries can either be temporarily hidden or permanently deleted (if you are sure you are not going to need them).
2. Right-click on the **Tuberculosis or cancer** entry and select **Properties** in the pop-up menu.
3. Uncheck the **Visible** box and click **OK**.
4. You will see that this entry has now been greyed out. This is because, by default, nodes that are marked as hidden are still shown.
5. In order to hide the hidden node, right-click anywhere on the Risk Table. Note that the **Show Hidden Entries** menu item has a tick next to it. Click it, thereby removing the tick.
6. The **Tuberculosis or cancer** entry has now disappeared.
7. Right-click anywhere on the Risk Table and select **Show Hidden Entries** to show the entry again.
8. Right-click on **Tuberculosis or cancer** and select **Delete**. The entry has now been permanently removed from the Risk Table.
9. You can add a new entry to replace it, however. Right-click on the last entry under the **Results** heading and select **Add Entry**. A new entry is added to the Risk Table.
10. Click on the link icon just before the new entry's name:



11. In the properties dialog that appears, fill out the fields so that the dialog looks like that shown in Figure 32 below.

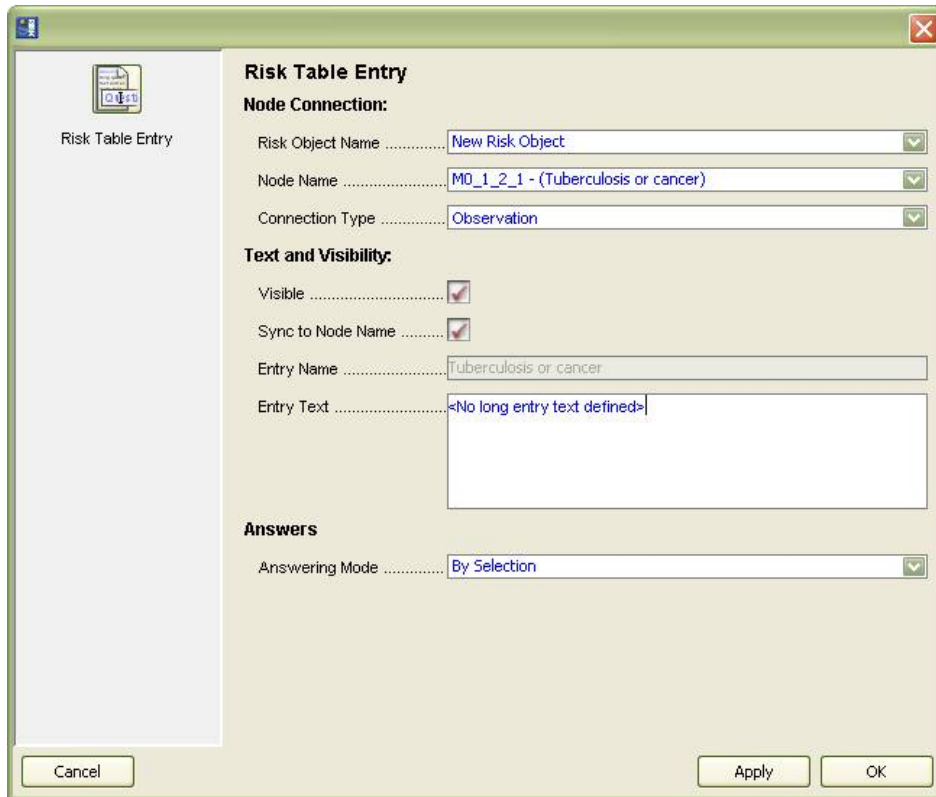
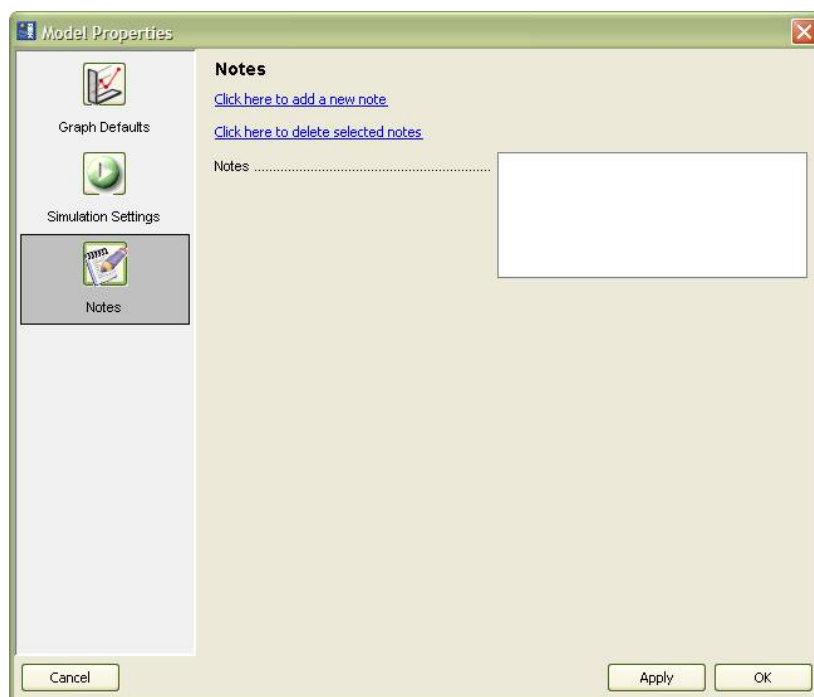


Figure 32 Properties for a new Risk Table entry

12. Click **OK**. Notice that an entry identical to the previously deleted **Tuberculosis or cancer** entry has now been added.

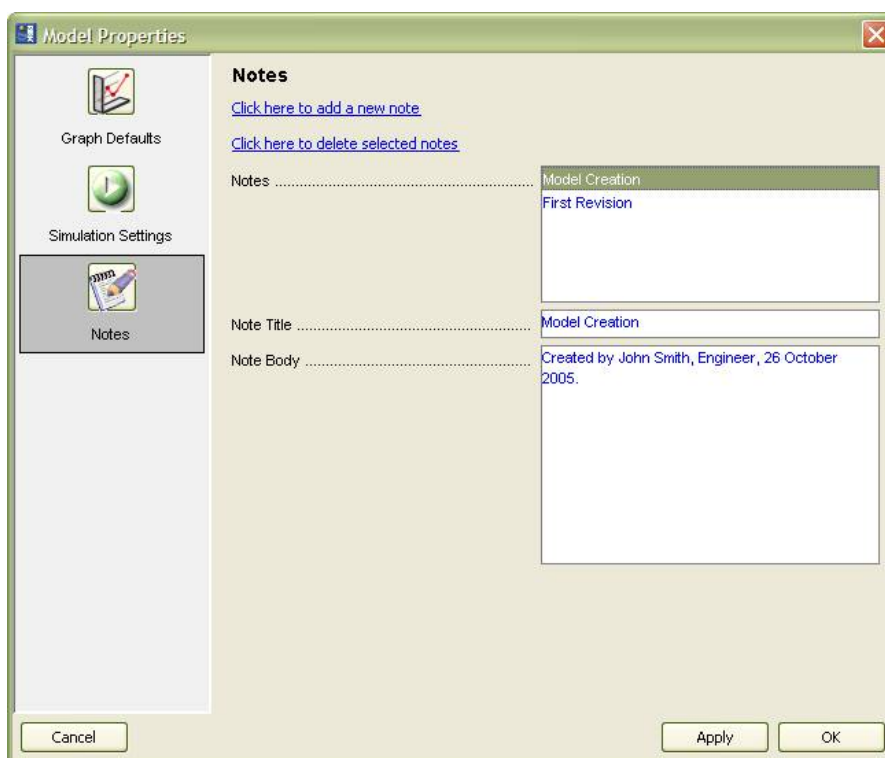
### 3.5 Adding Notes

1. As well as adding labels and pictures to the Risk Map, and supplying extended descriptions to entries in the Risk Table, it is possible to document models using the notes facility.
2. Select **File** → **Model Properties** and click on the **Notes** tab in the left panel of the dialog. You will see the following:




**Figure 33 Empty model notes dialog**

3. Click on the hyperlink that says **Click here to add a new note**.
4. In the **Note Title** field, type **Model Creation**.
5. In the **Note Body** field, type **Created by John Smith, Engineer, 26 October 2005**.
6. Click **Apply** and then click on the **Click here to add a new note** hyperlink again.
7. In the **Note Title** field, type **First Revision**.
8. In the **Note Body** field, type **Revised by Peter Jones, Manager, 27 October 2005. Changed NPT of Visit to Asia? node**.
9. Click **Apply**. Your notes dialog should now look like the one in Figure 34.



**Figure 34 Model notes dialog containing two notes**

10. To view the text of each note, simply select it in the **Notes** list.
11. Notes can also be deleted. Select the note called **First Revision** and click the hyperlink named **Click here to delete selected notes**. Observe that only one note is left in the list. Select this node to see its full text.
12. Click **OK**.

 Notes can also be added to individual nodes in the Risk Map via the Notes tab of the Properties dialog. This is useful for logging how a node's states or NPT change over time.

## 4 Next Steps

This tutorial has given you a basic introduction to the range of features that AgenaRisk has to offer. However, it has only skimmed the surface. In order to benefit fully from AgenaRisk's enormous modelling power and flexibility you should work through the more advanced tutorial, *Modelling with AgenaRisk*, and explore the range of well-documented example models that are included with the software.