Building User Interfaces for Models

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MIT 15.879

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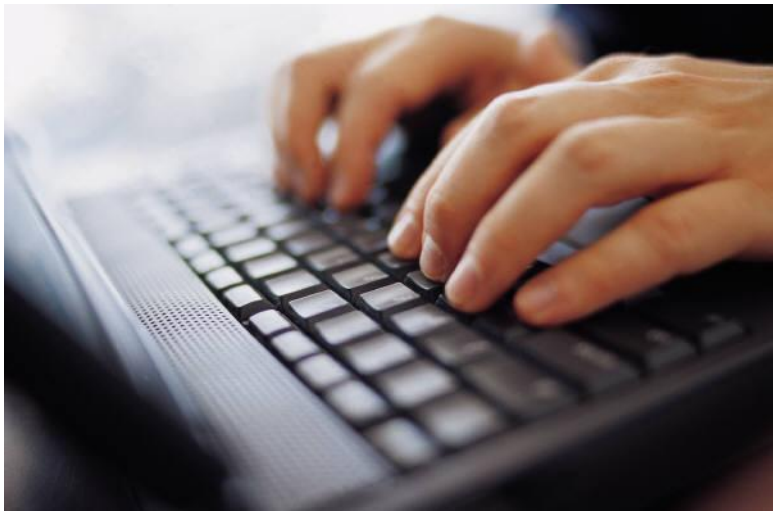
Lecture Focus: Creating Custom User Interfaces using “Controls”

- ‘Controls” are “widgets” that allow for obtaining user input
  - These widgets have properties that can be set at both design and run (execution, simulation) time
- By setting the properties of these controls at design time, we can
  - Establish their general logical & visual properties
  - Establish their correspondence with model variables
- These controls can be used by the user during simulation to set assumptions in the model

Hands on Model Use Ahead



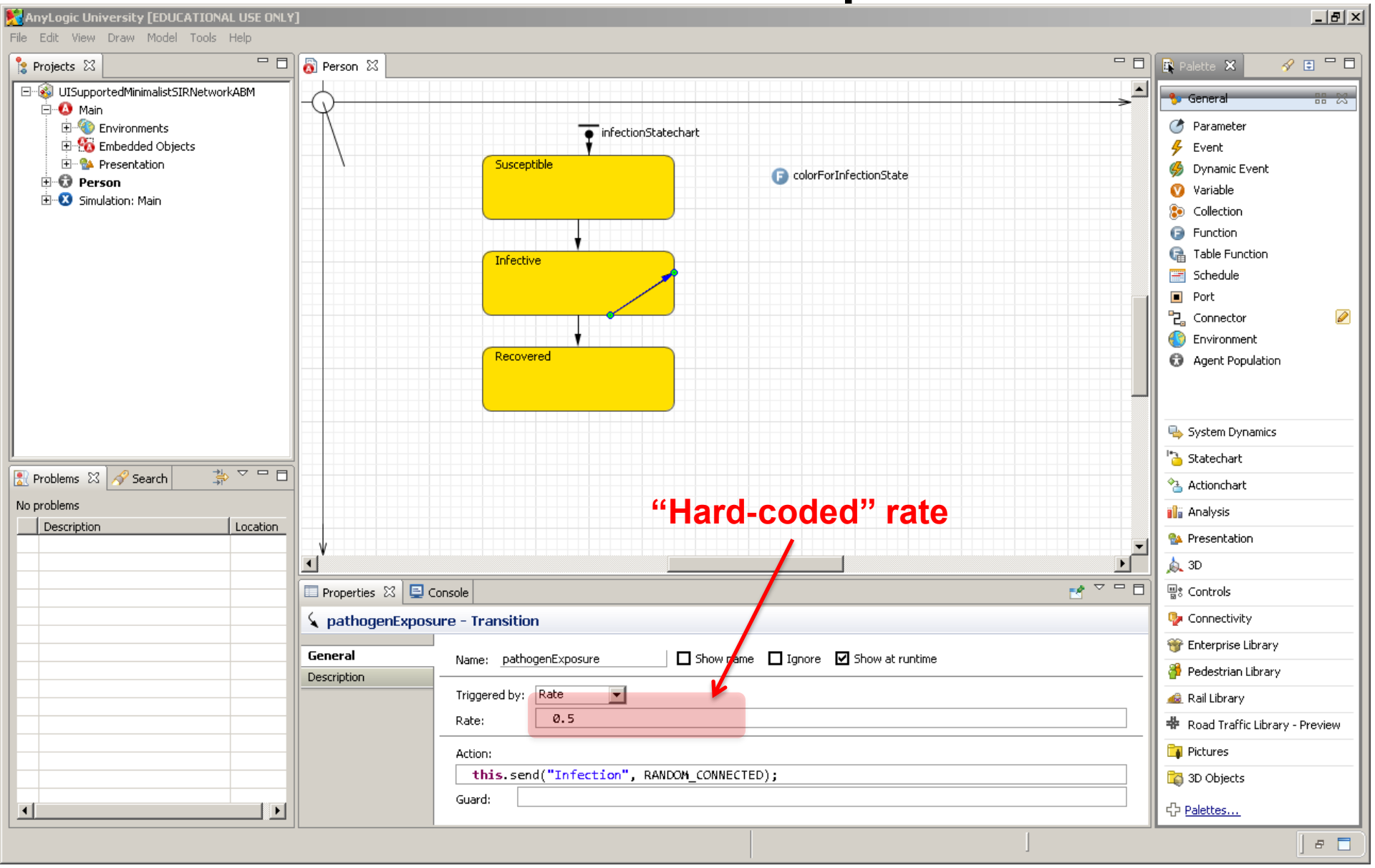
Load Previously Built Model:

MinimalistSIRNetworkABM

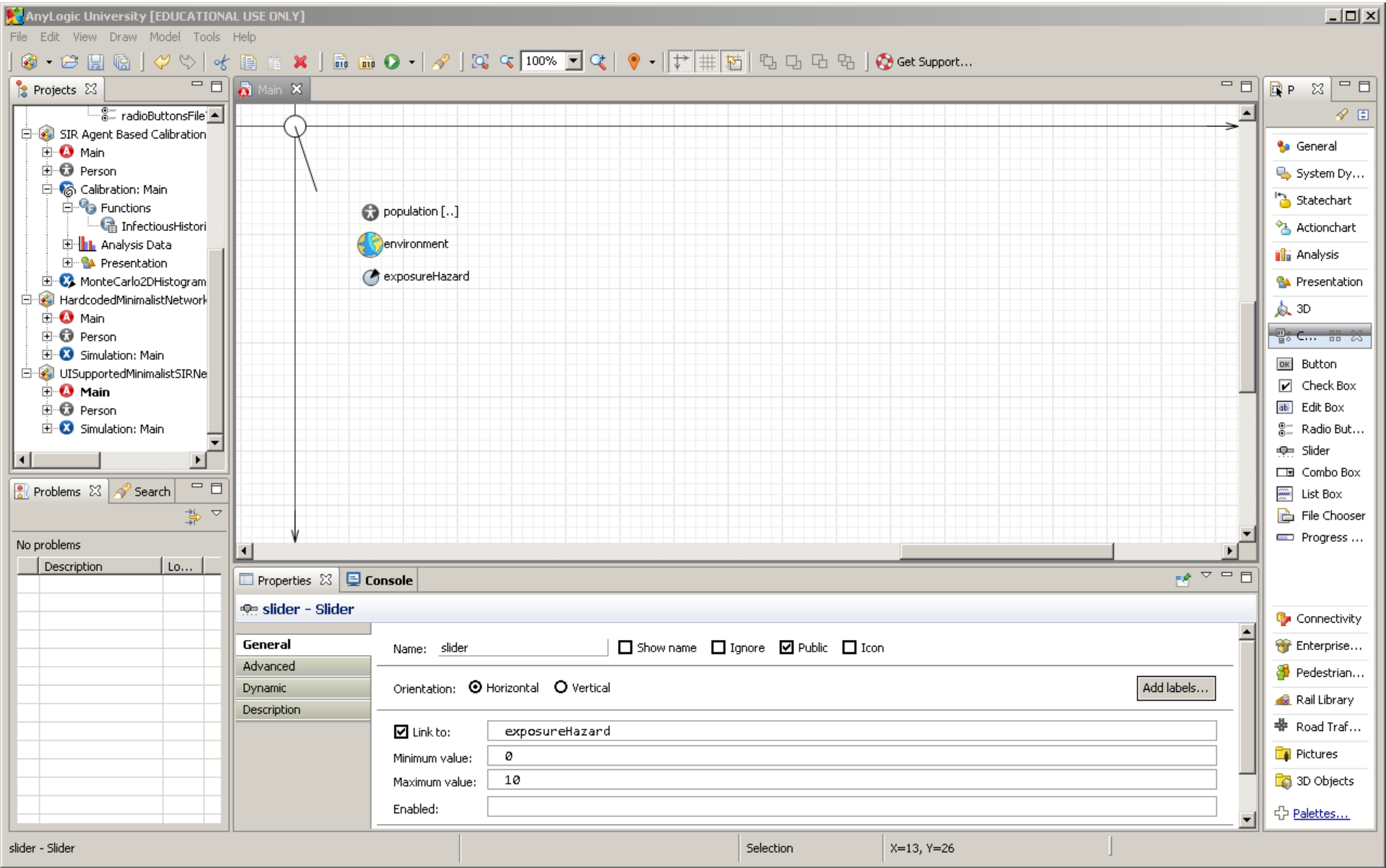
After change, suggest saving as

"**UISupportedMinimalistSIRNetworkABM**"

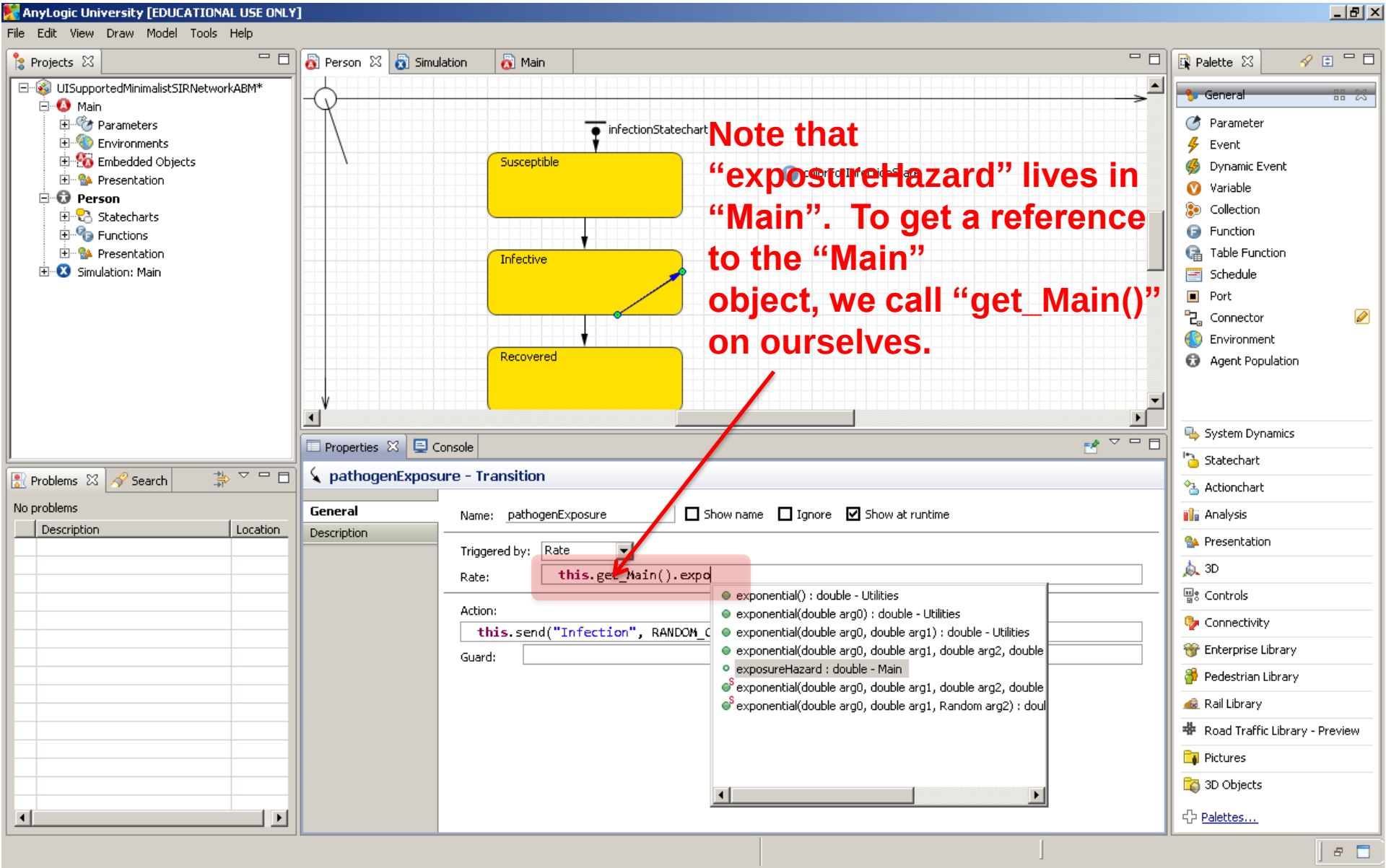
Recall: Hardcoded Exposure Rate



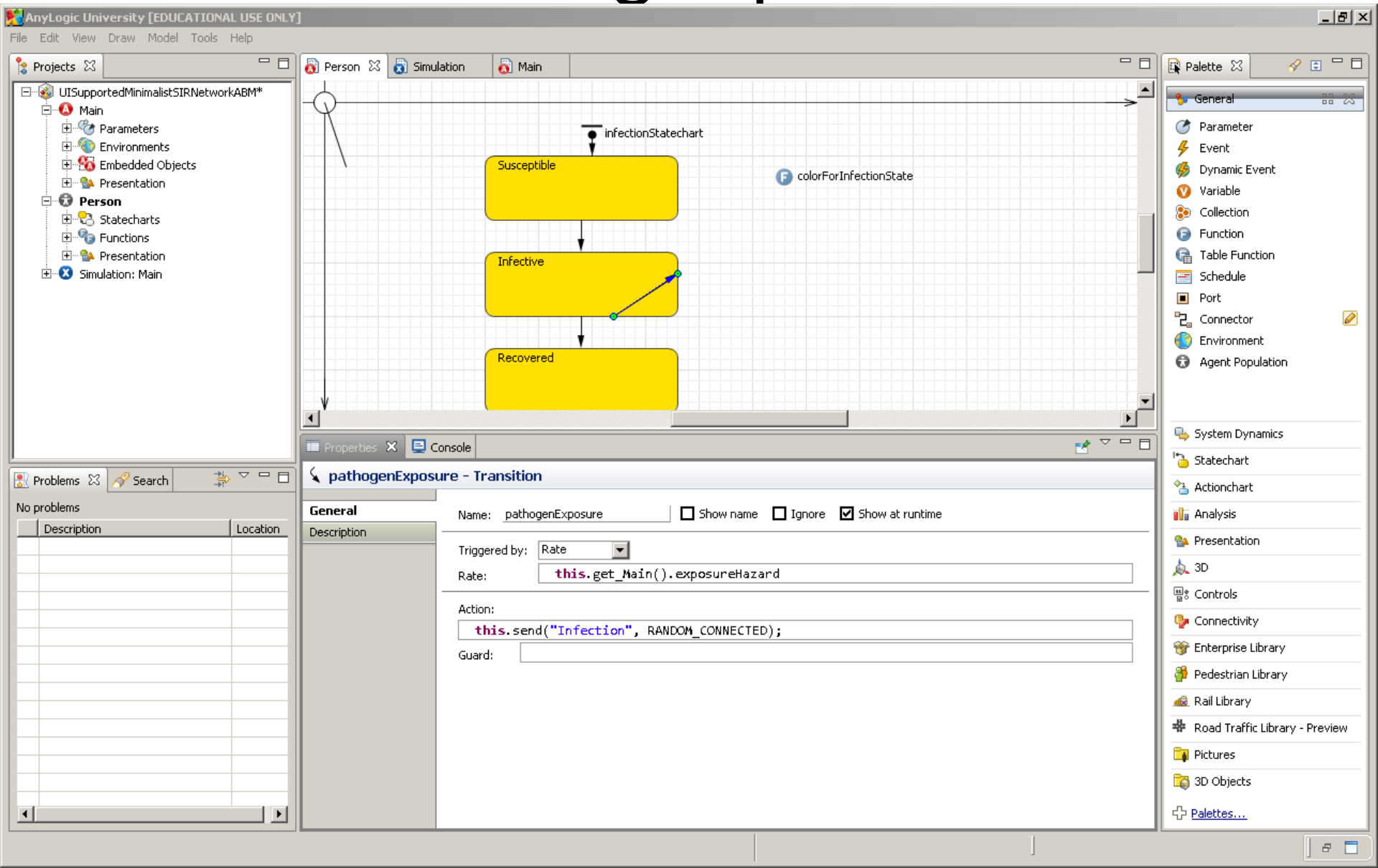
Add a Related Parameter to ***Main***



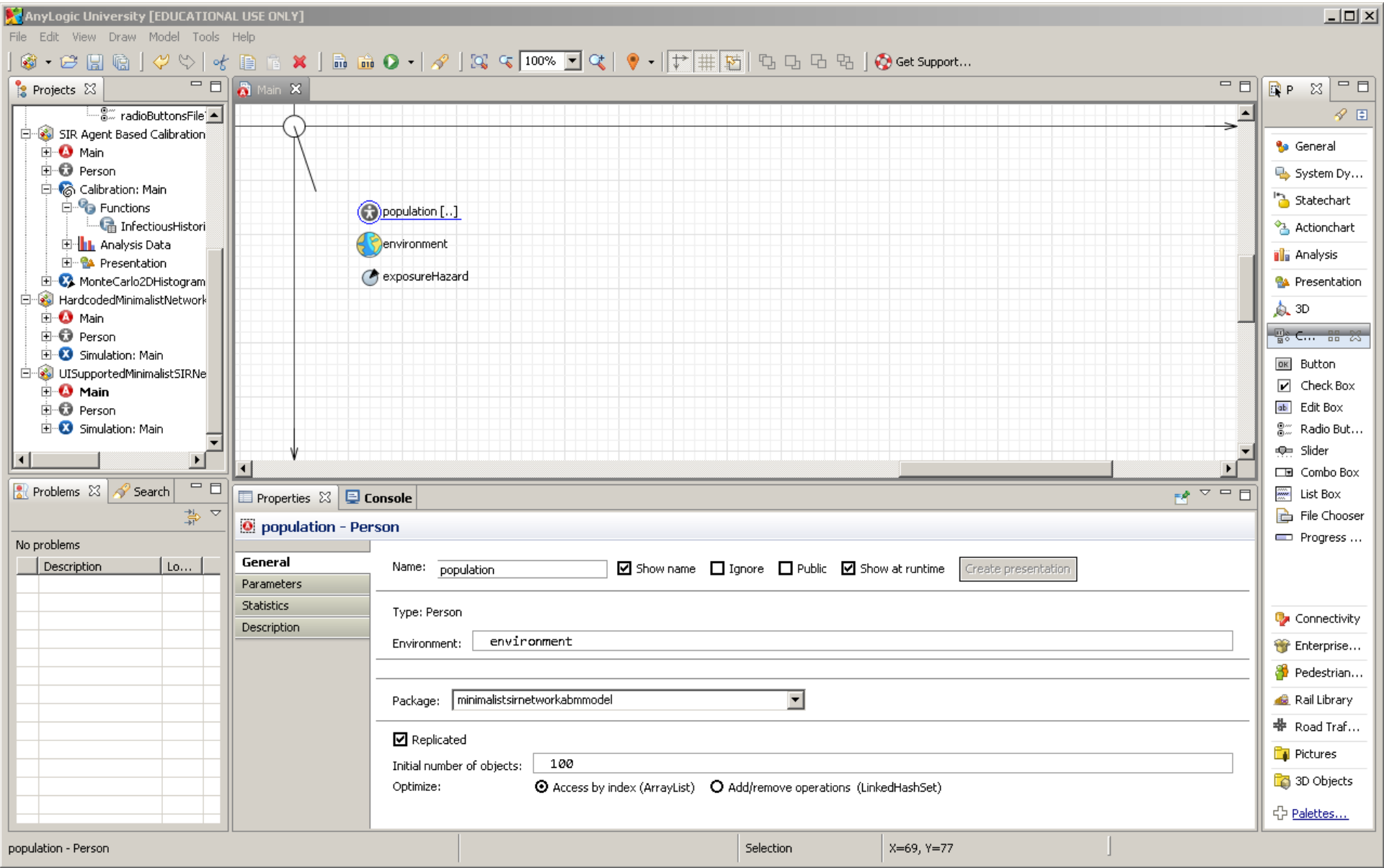
Setting the Transition to Refer to the Parameter in Main



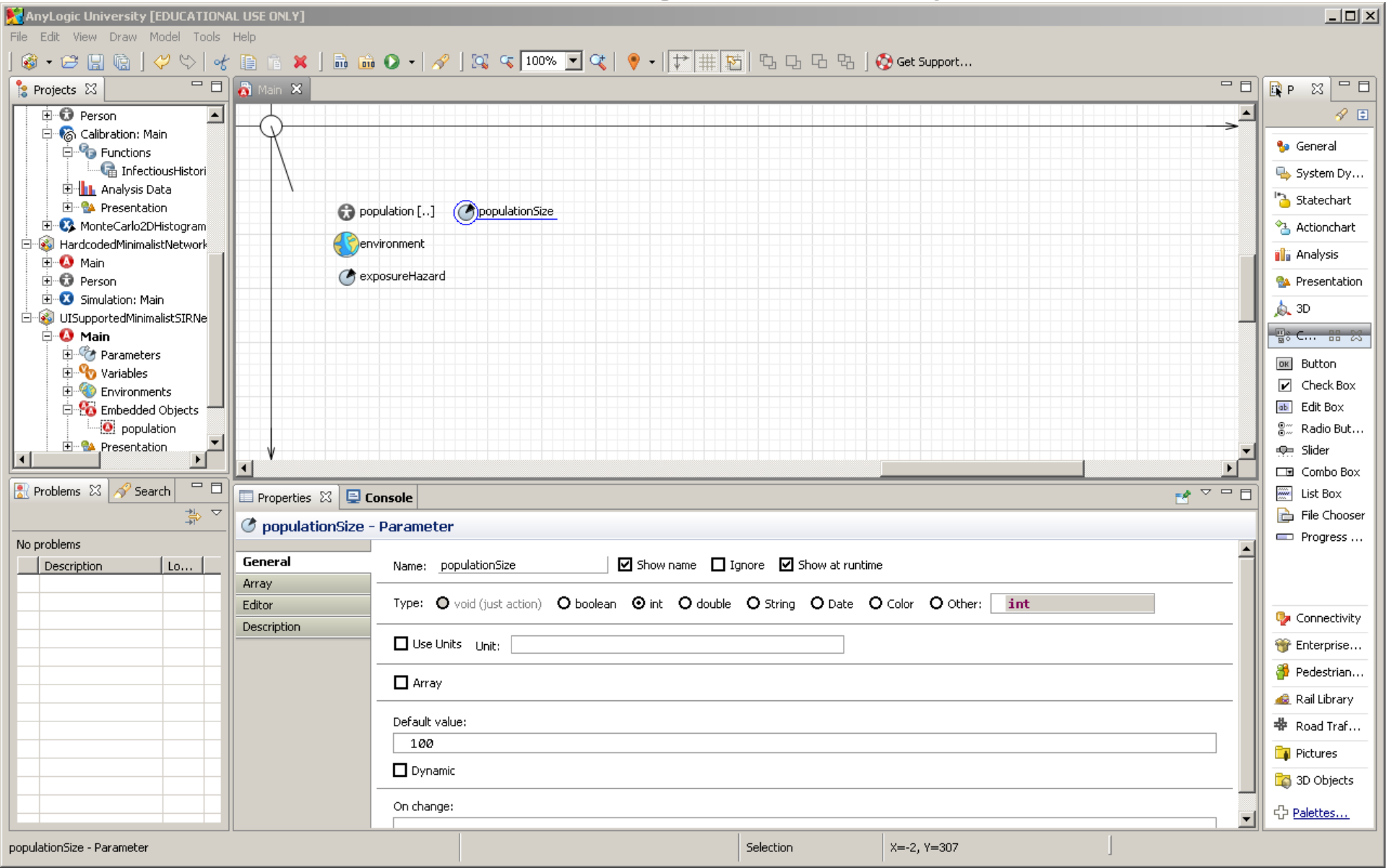
Resulting Expression



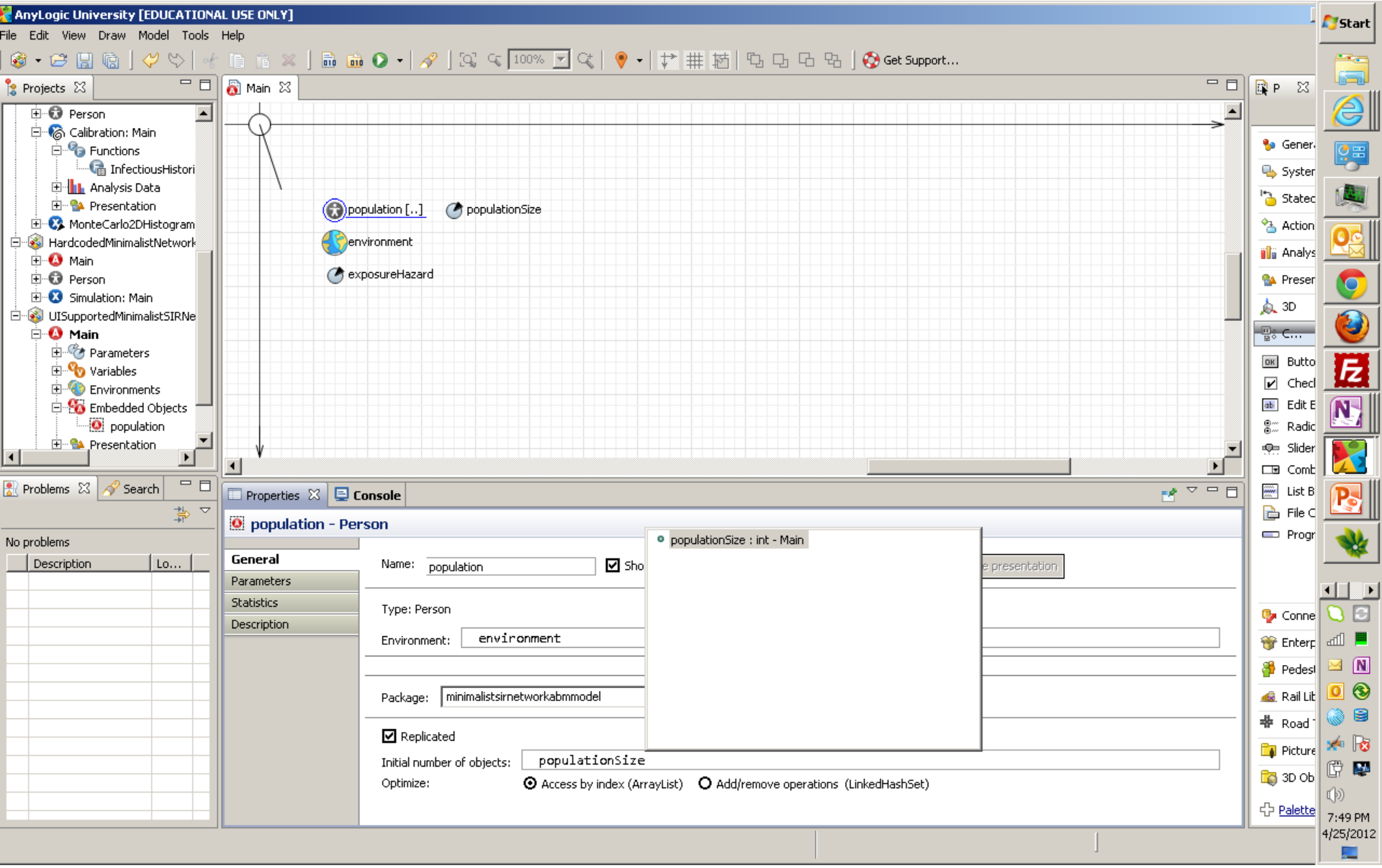
Reminder: An Explicitly Specified Population Size



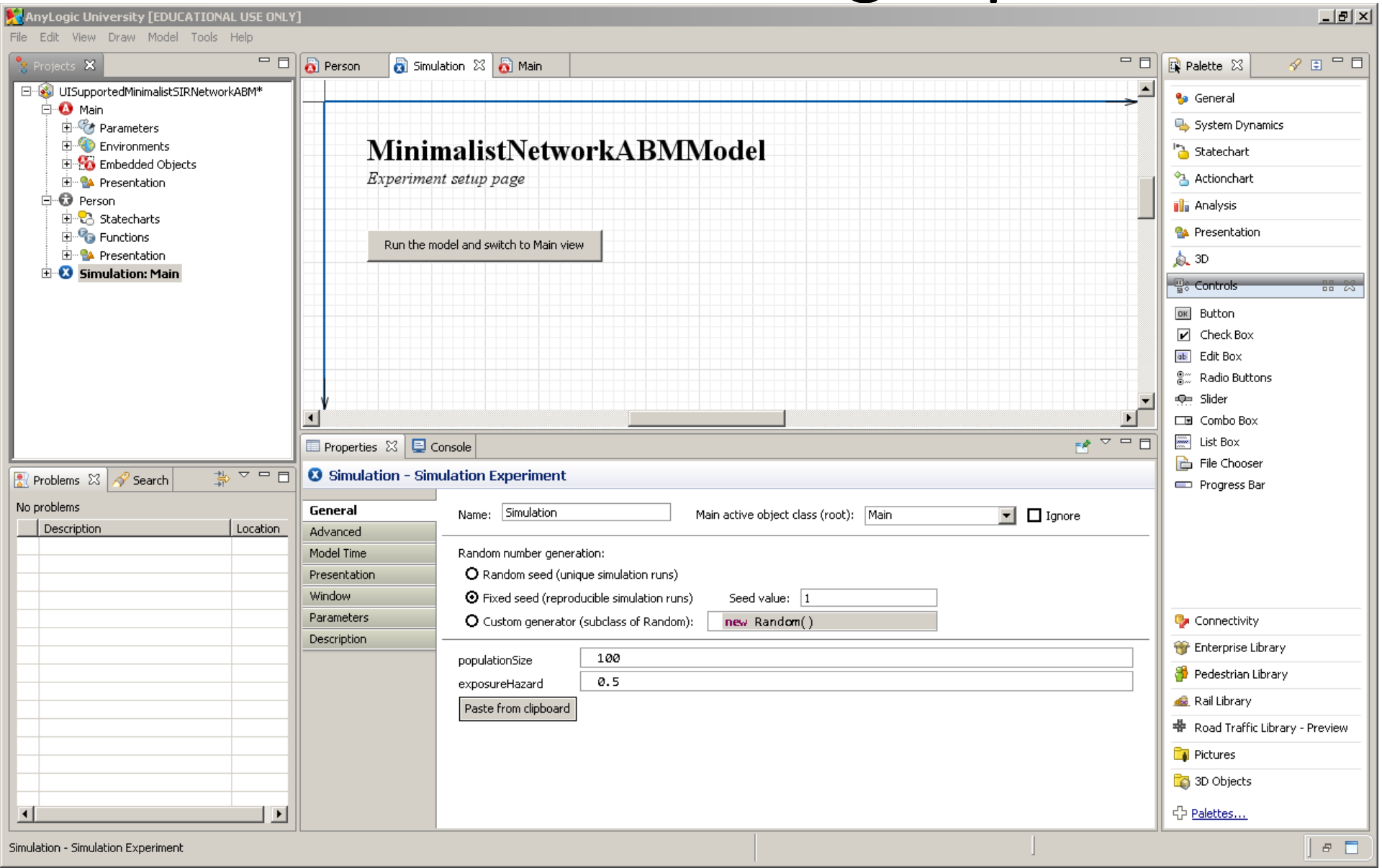
A Parameter Giving the Population Size



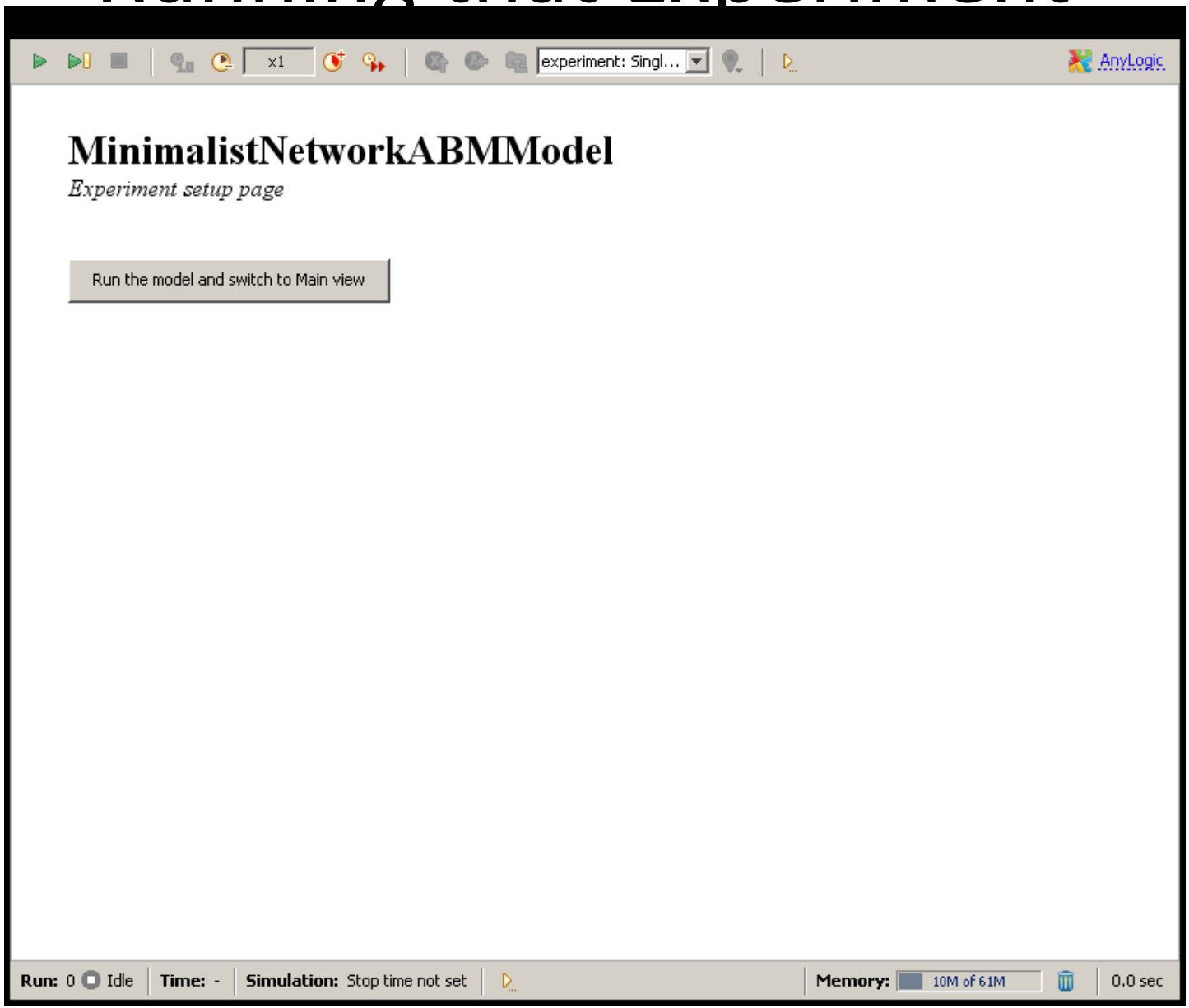
Setting the Population to Use the Parameter Value



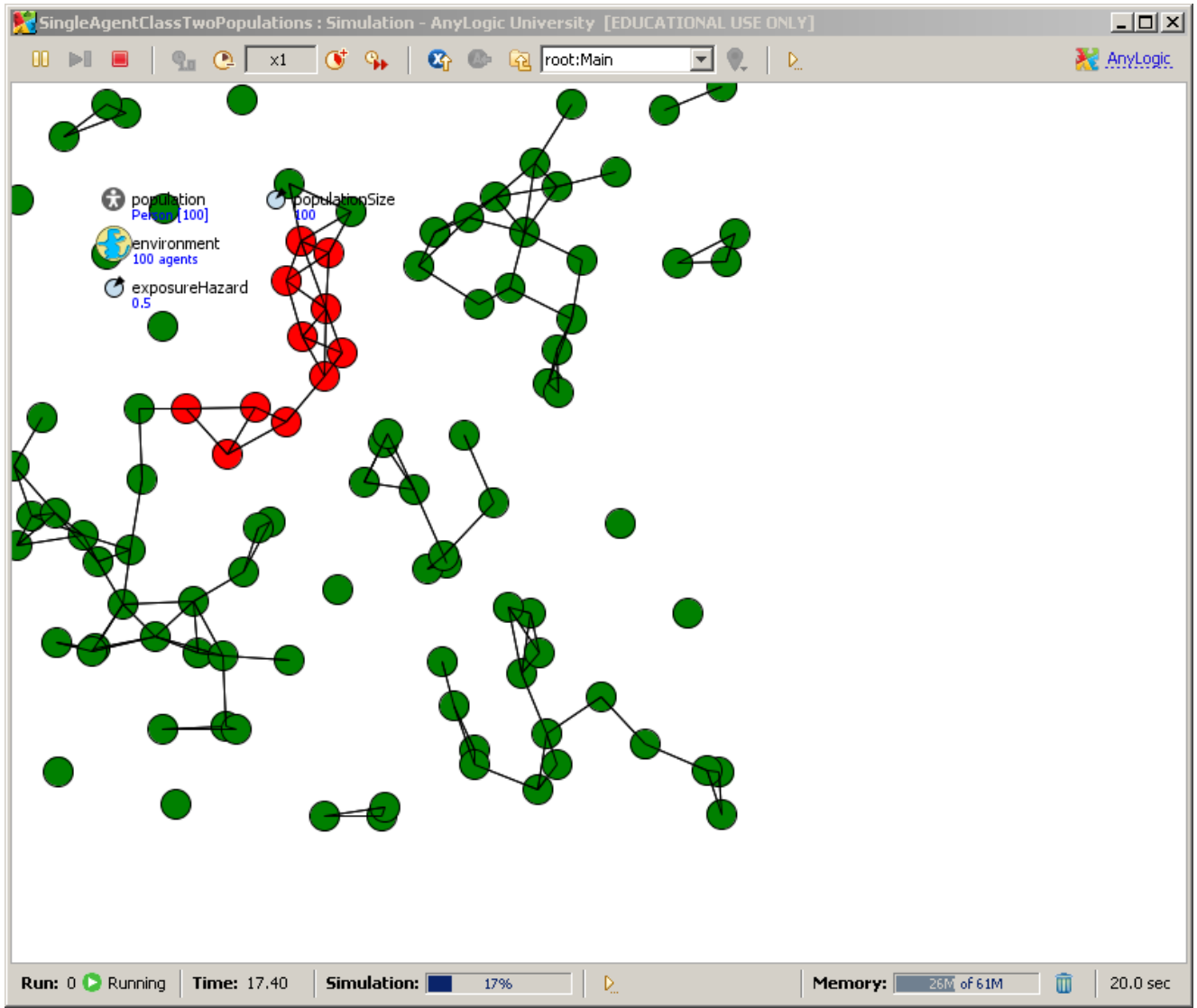
Reminder: The Existing Experiment



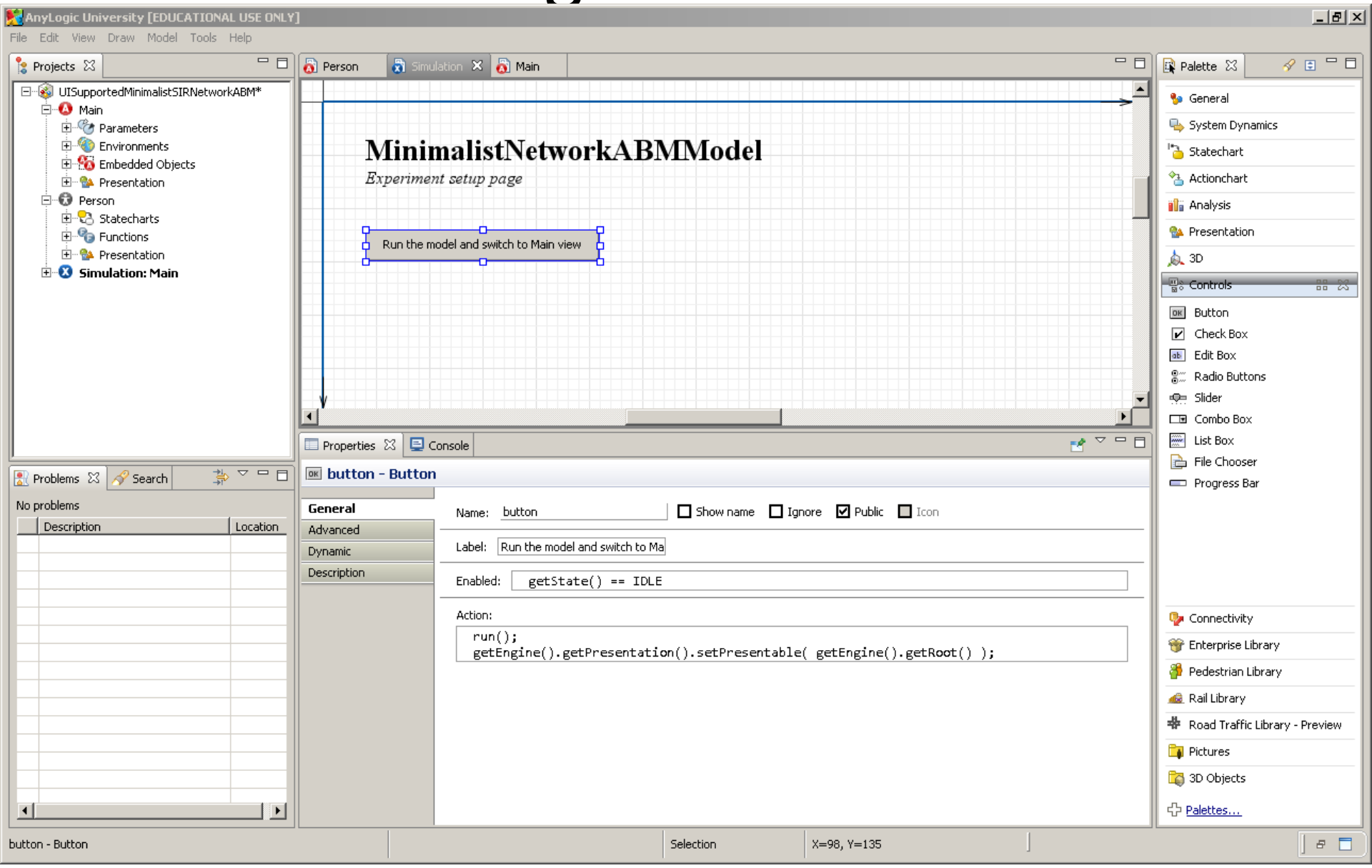
Running that Experiment



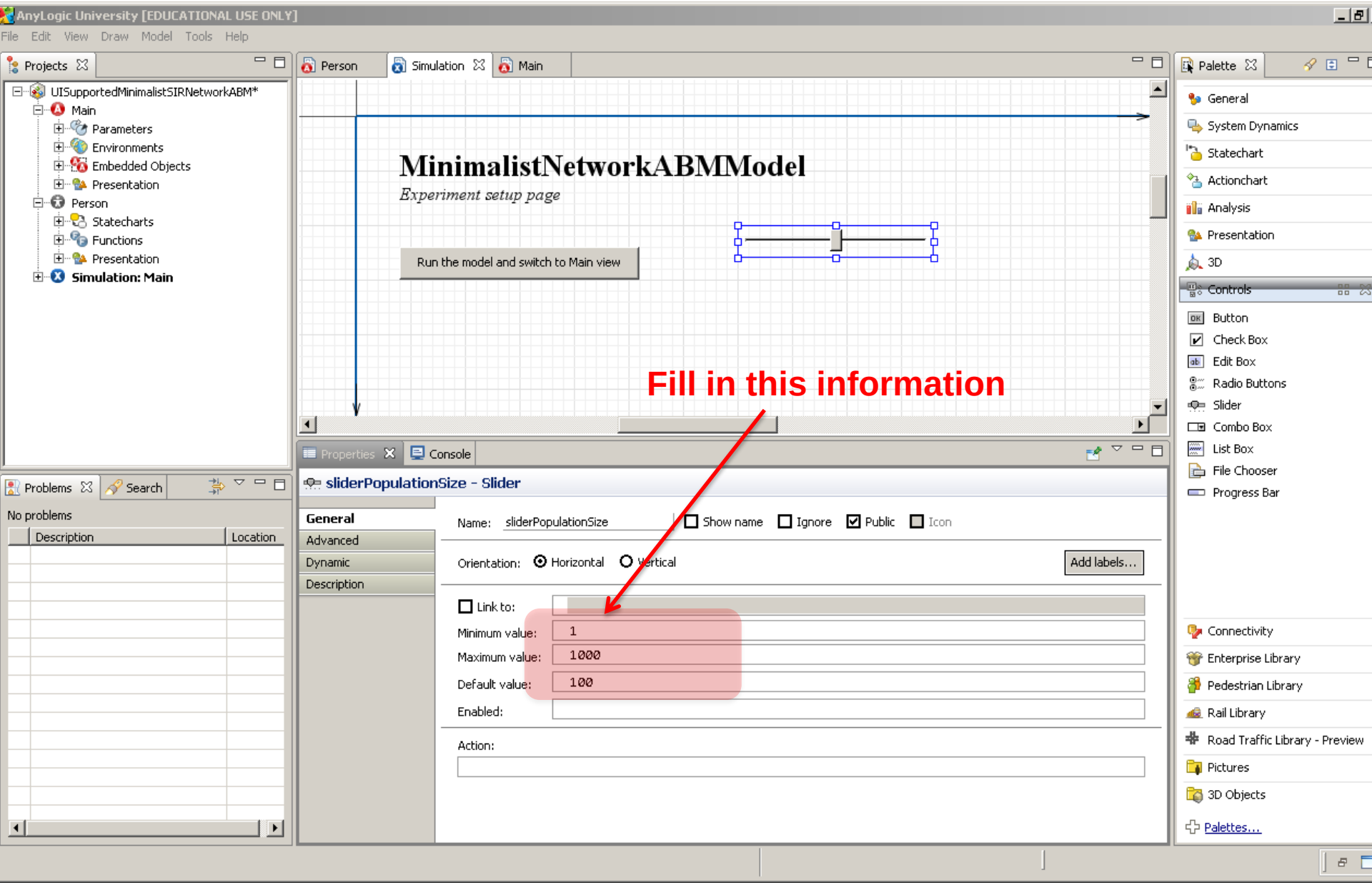
Reminder: Pushing the Button Shows the Simulation Visualization



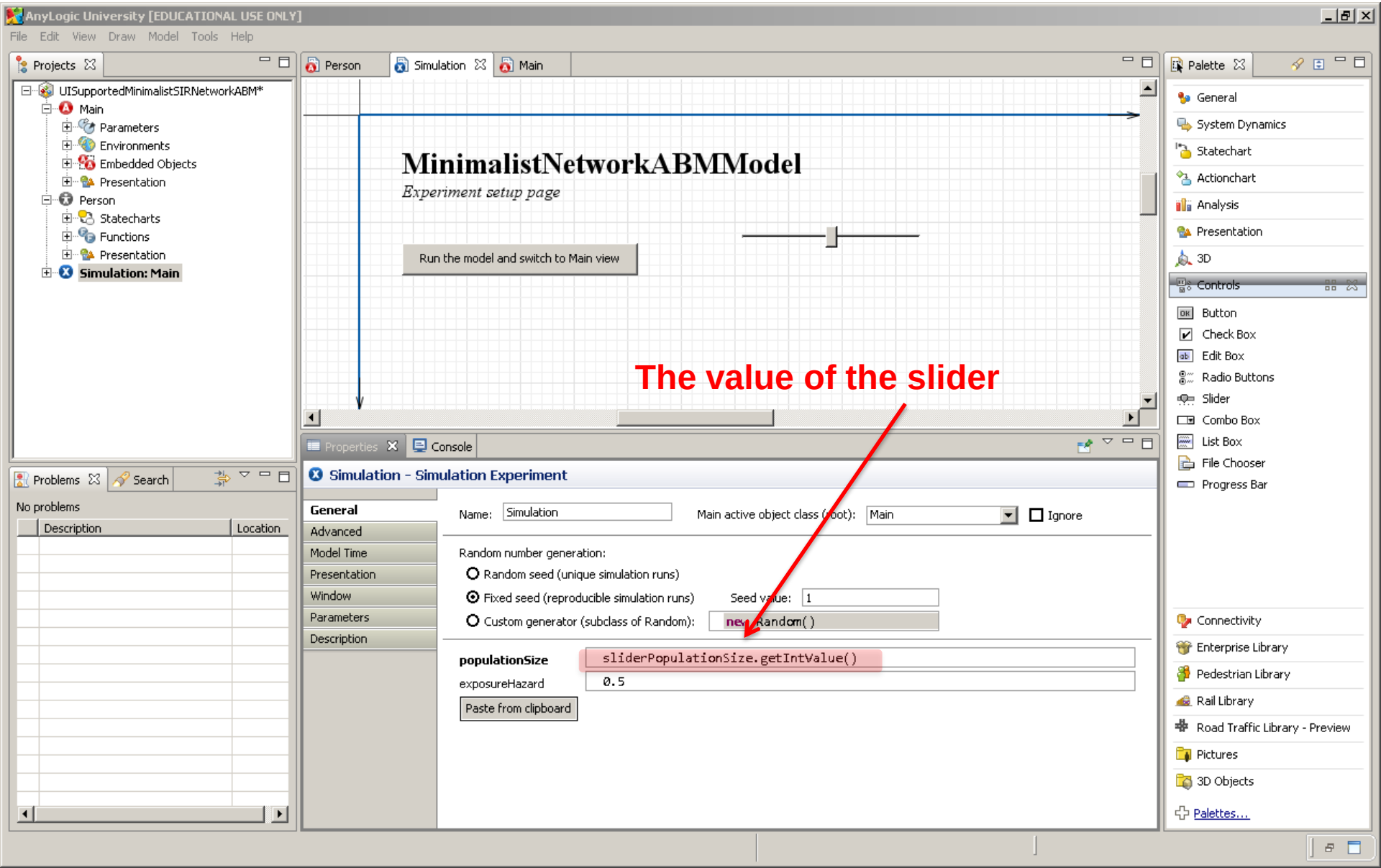
Understanding the Button's Actions



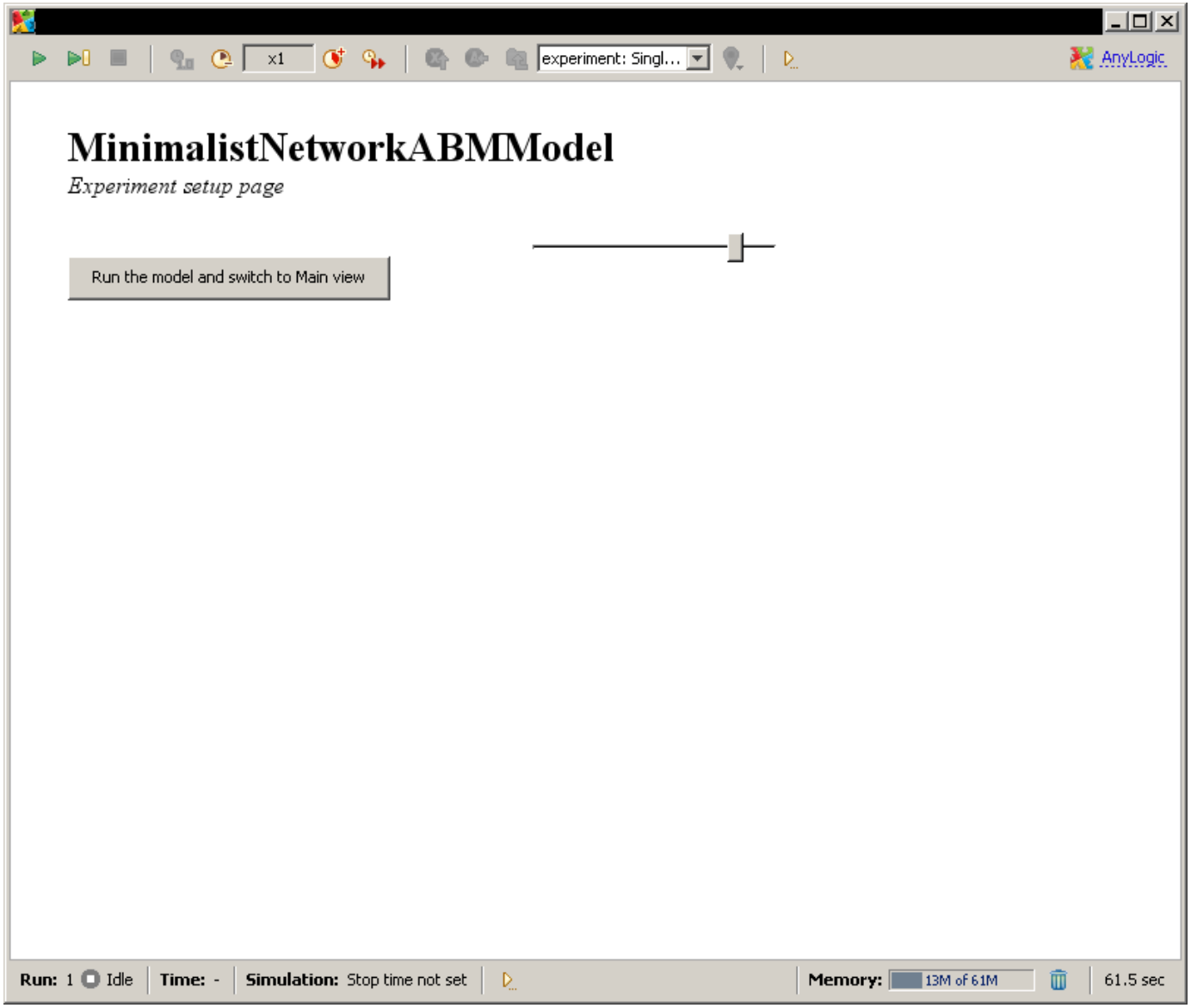
Adding a Slider to Represent the Population Size



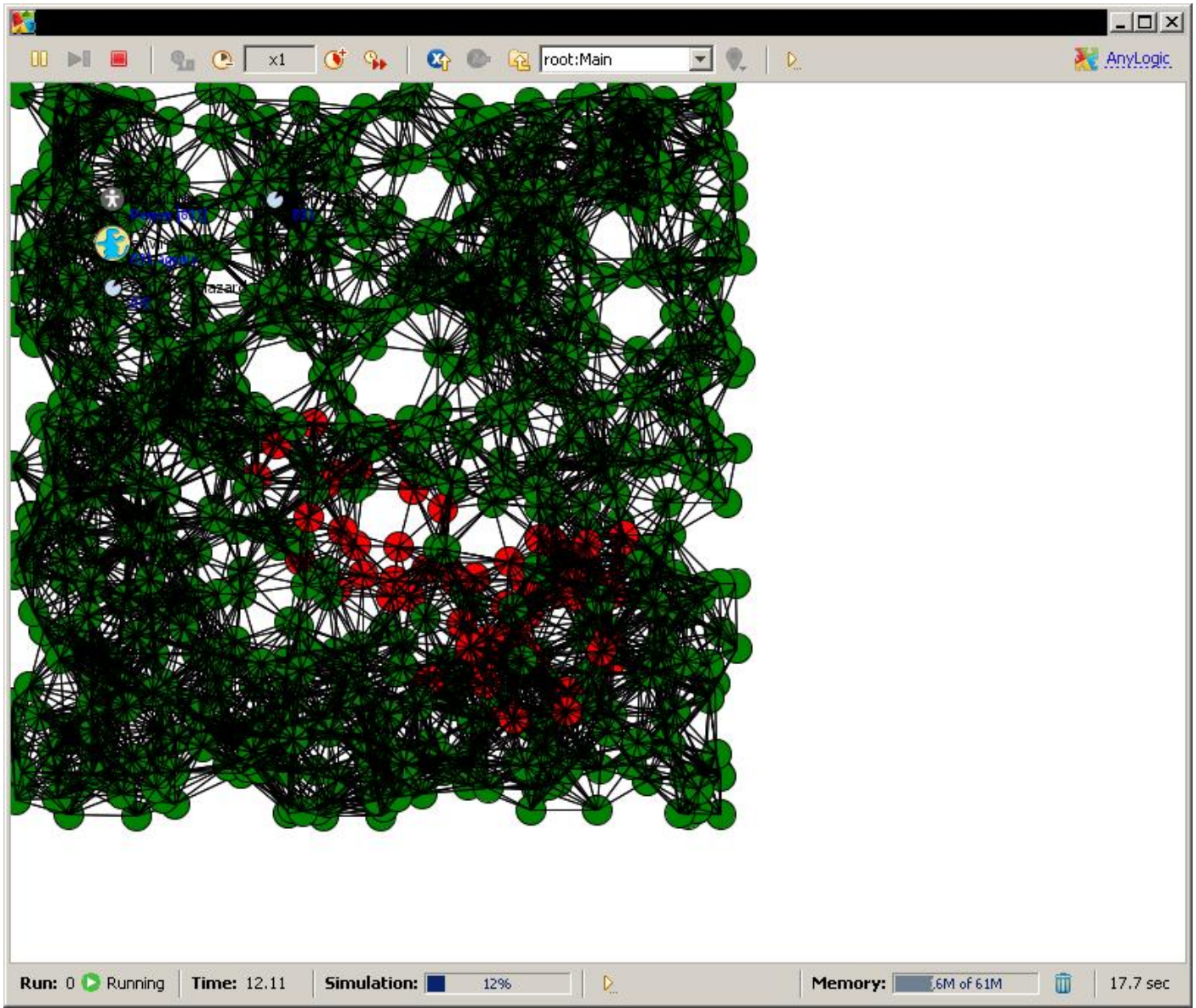
Setting the Simulation Parameter Values to Use the Slider Setting



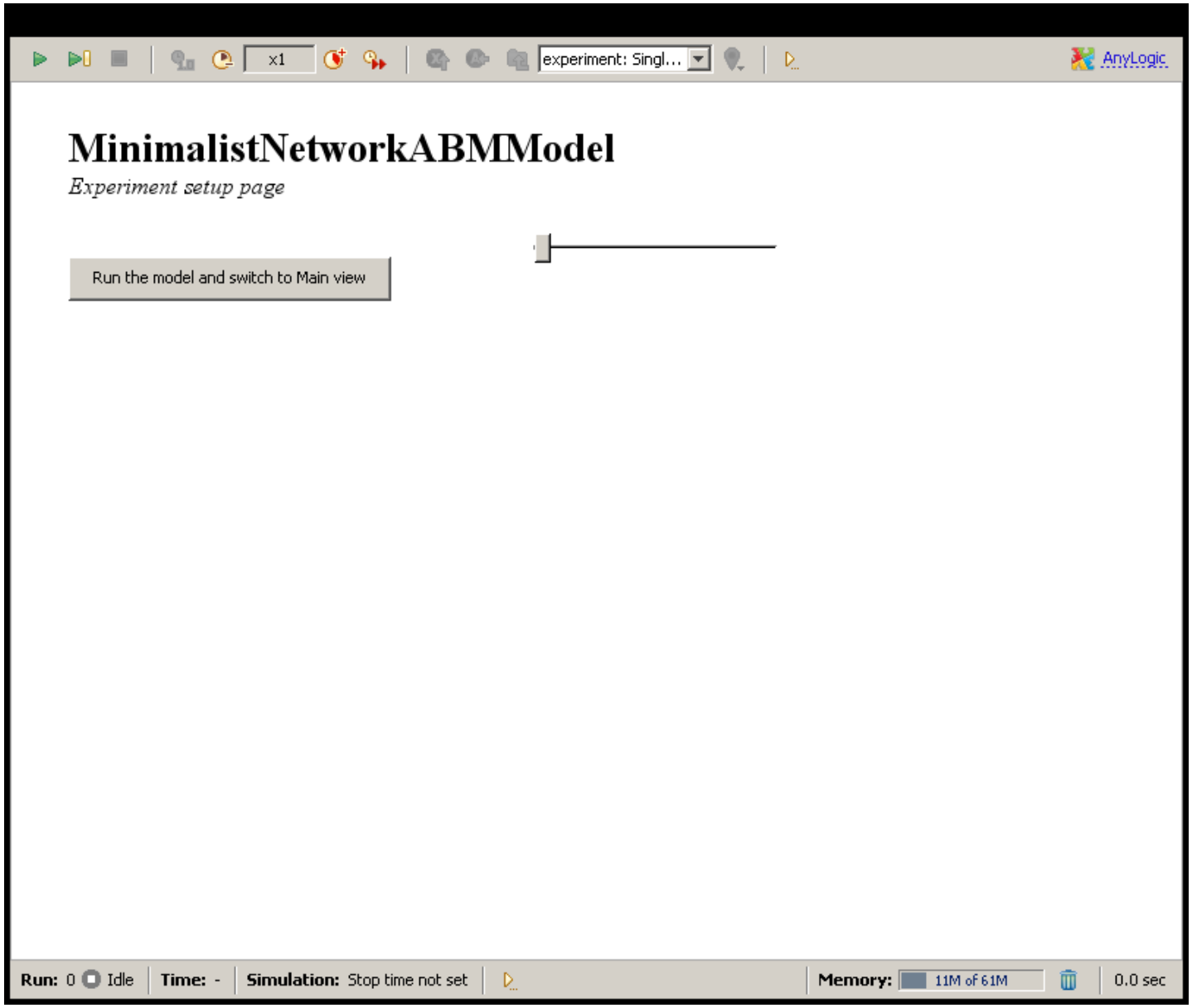
Choosing a High Value on the Slider



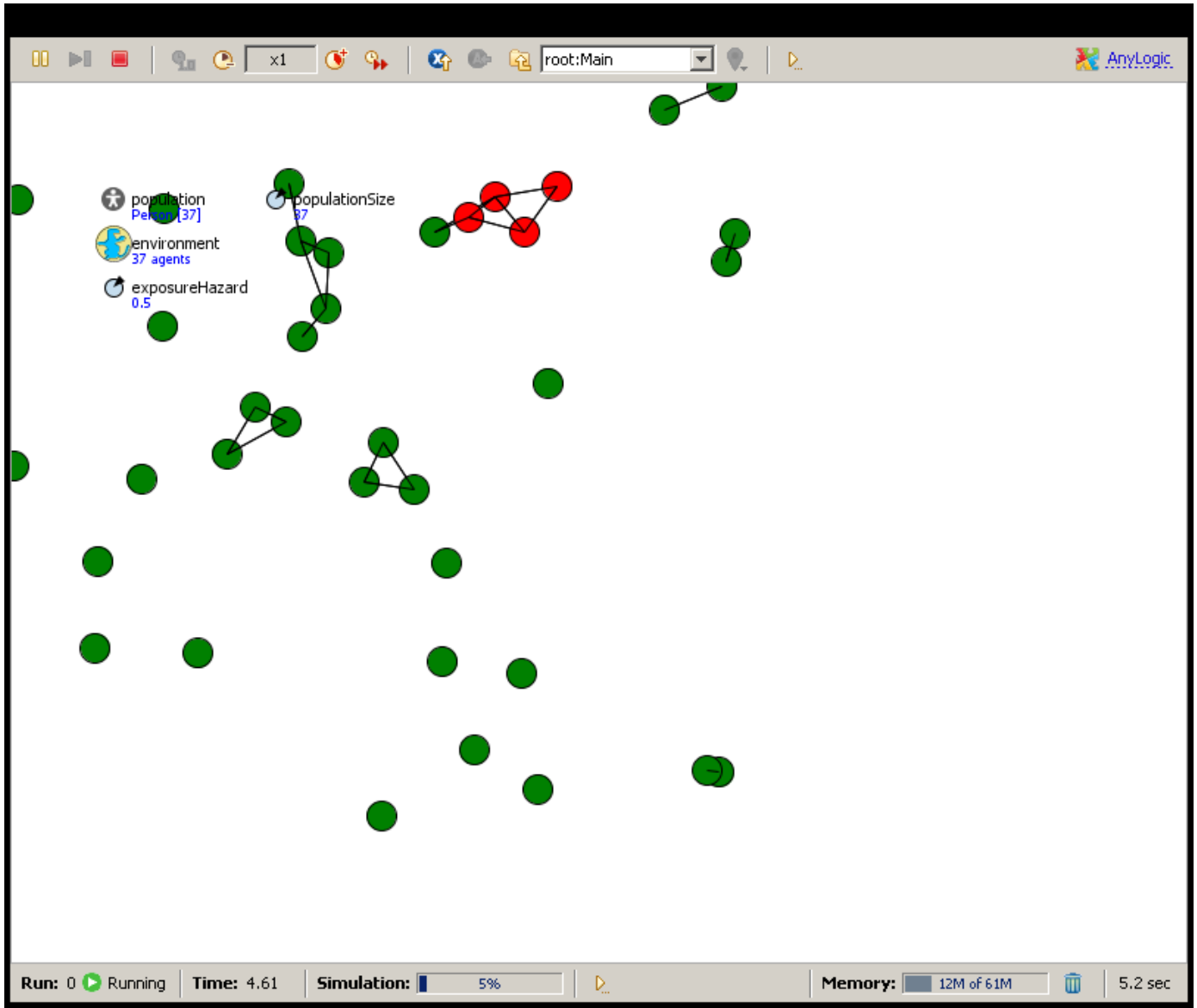
Resulting Network – Large Population



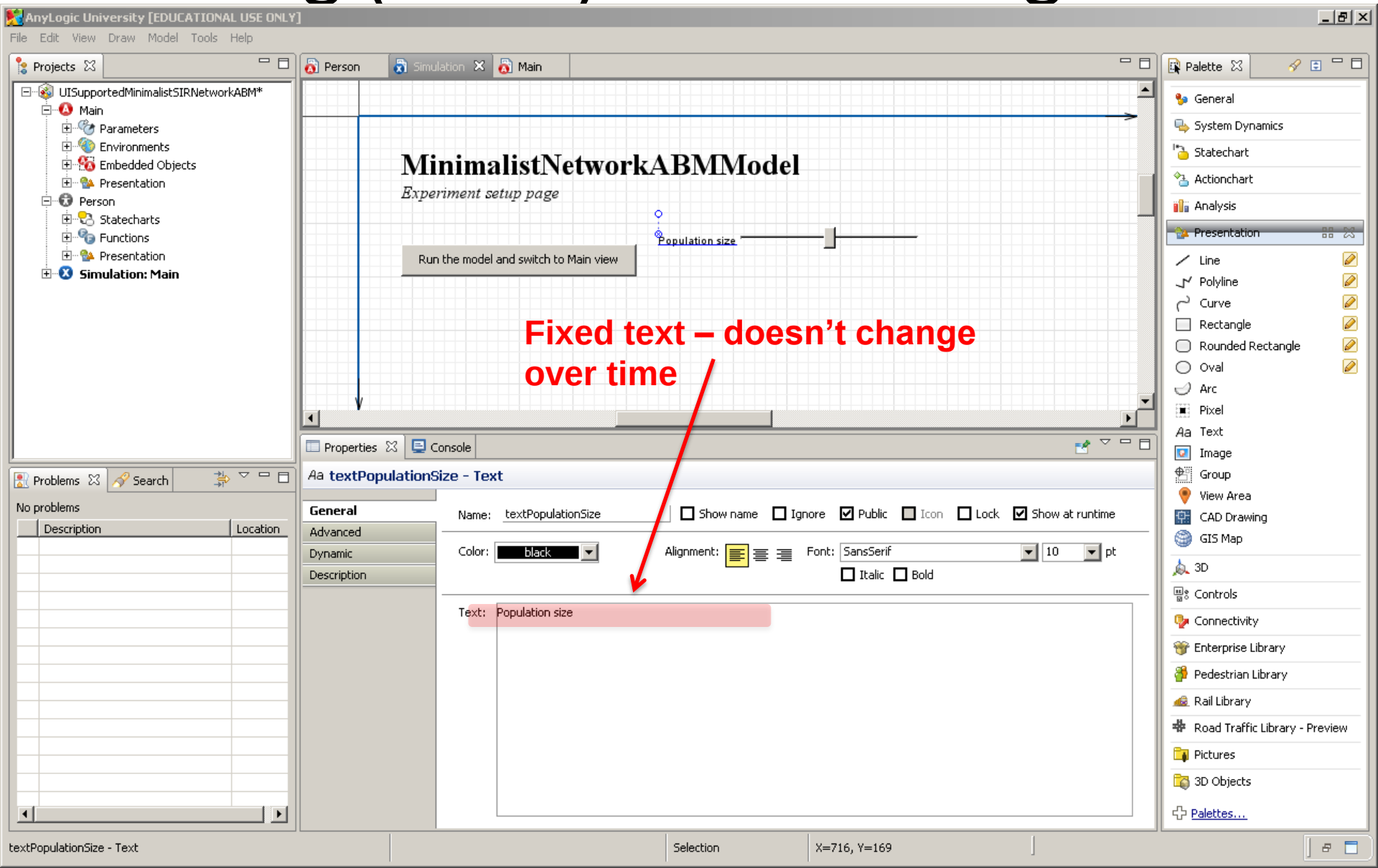
Choosing a Low Value on the Slider



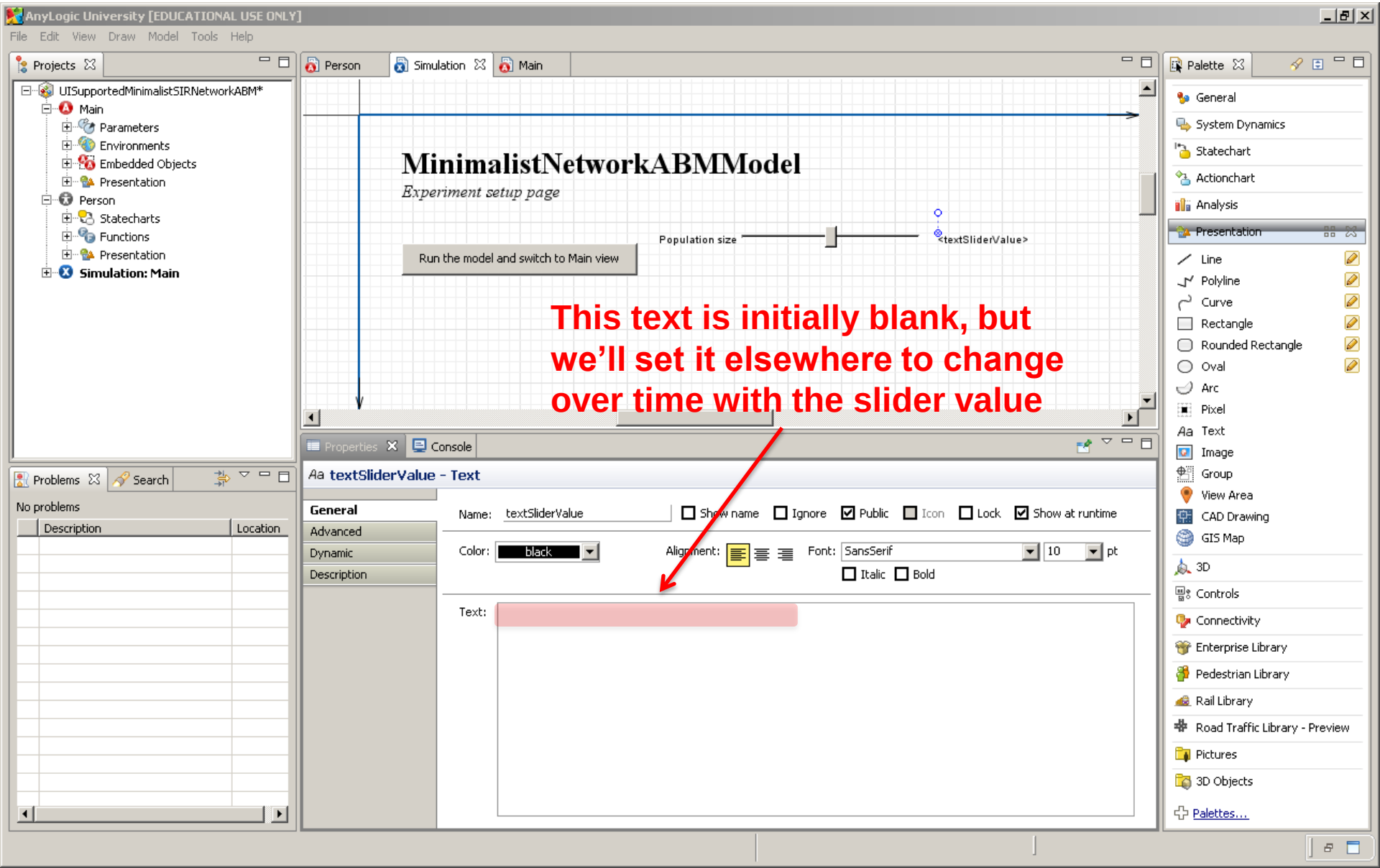
Resulting Network -- Small Population



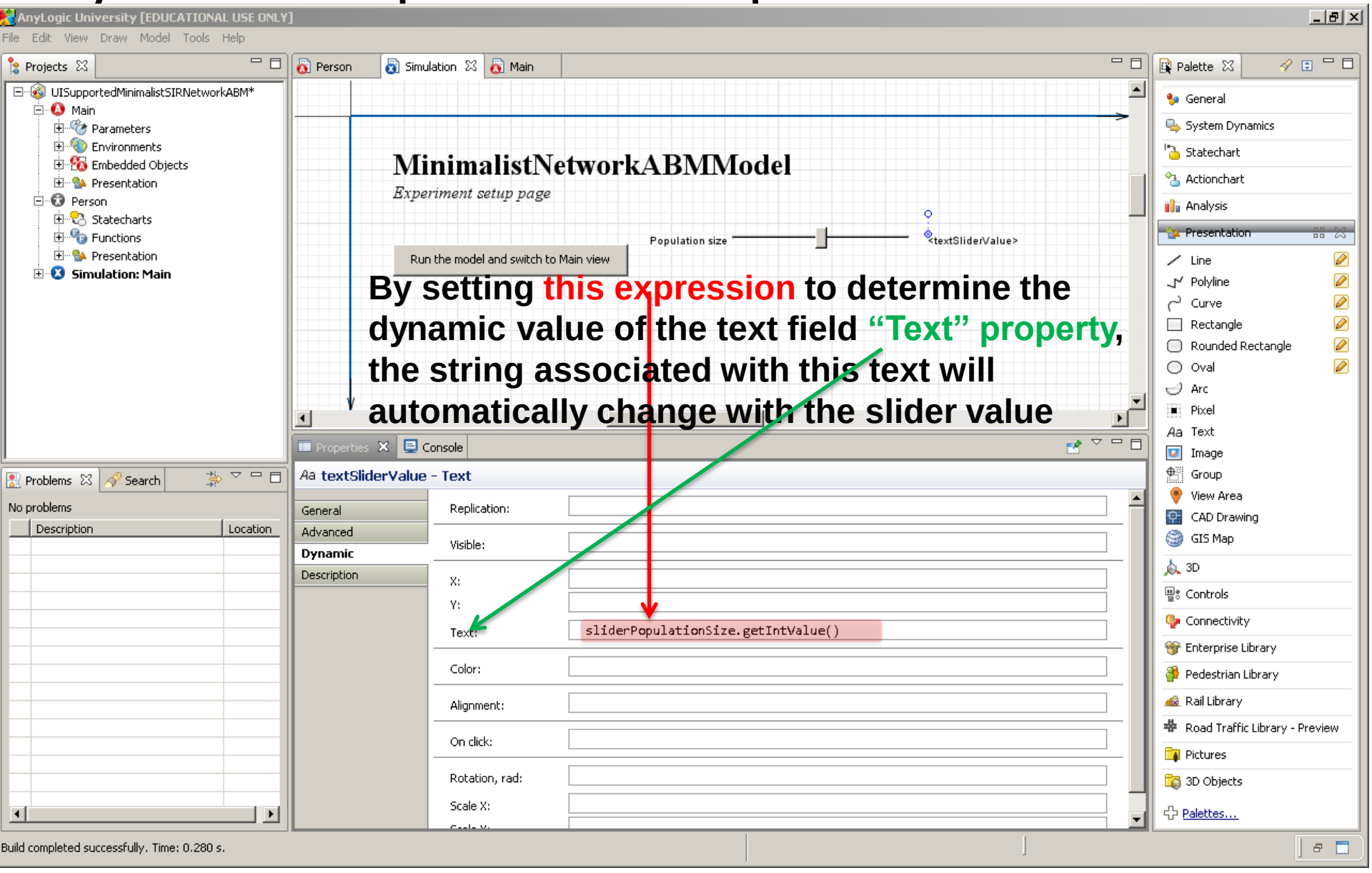
Adding (Static) Text Labeling Slider



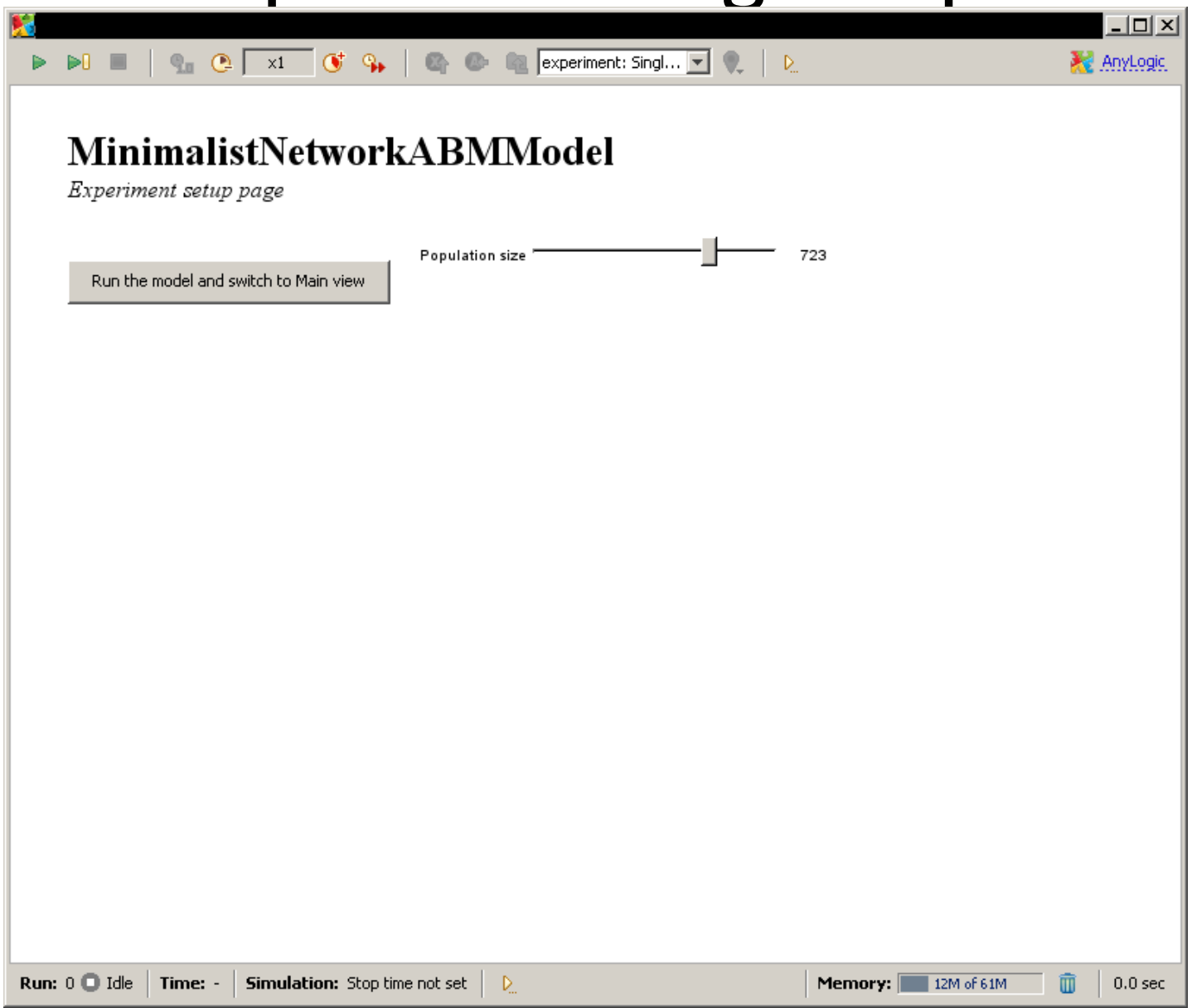
Creating a Text Element to Give the Slider Value



Dynamic Properties to Report the Slider Value



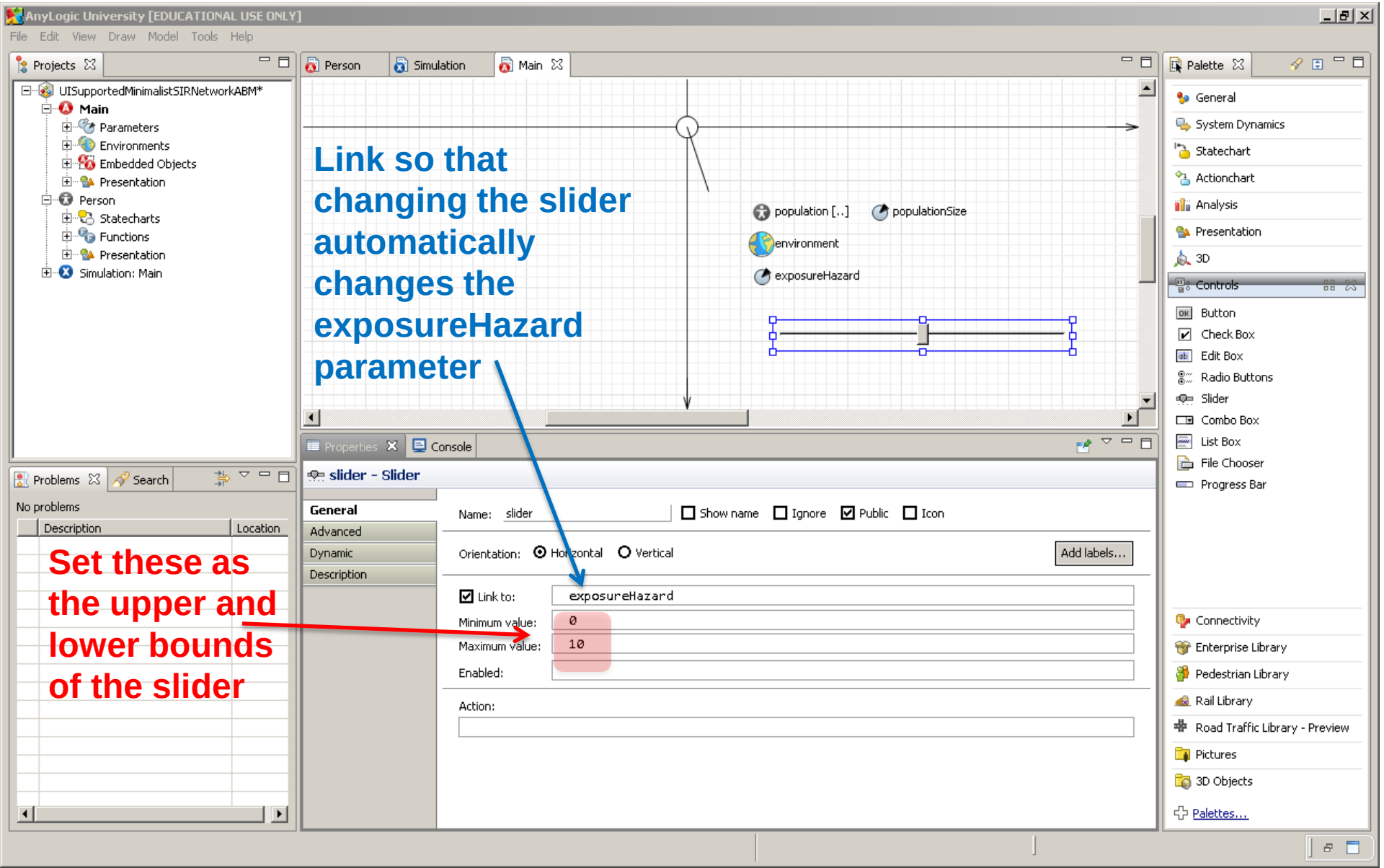
Example Resulting Output



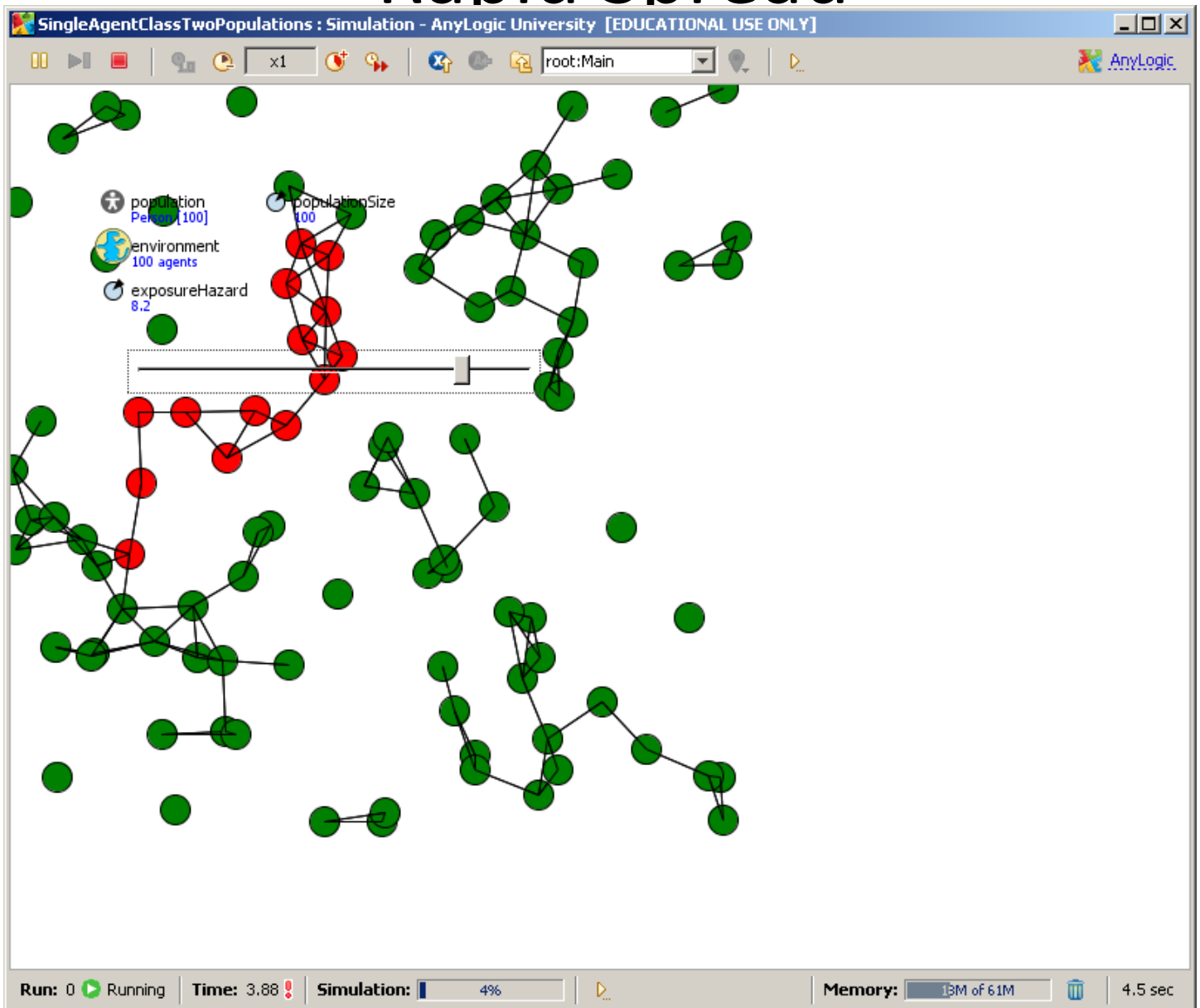
Reflecting on Temporal Specificity of UI Elements

- The user interface component (slider) we created thus has had its value used to set the initial state of the model (the population size)
- User interface components can also be used to vary assumptions dynamically during runtime
  - For example, vary parameter values

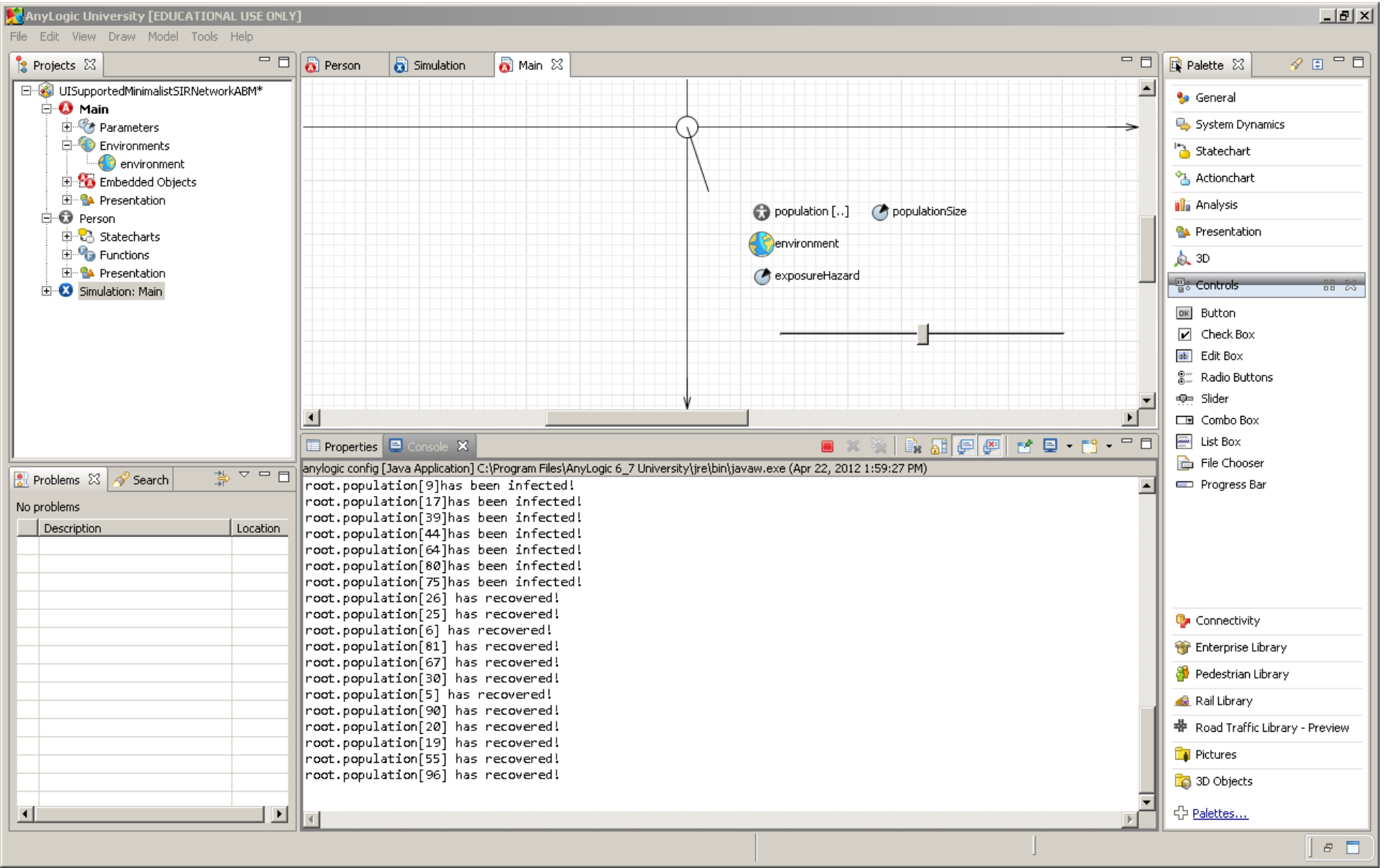
Example: Creating a Slider to Dynamically Vary the Infection Hazard



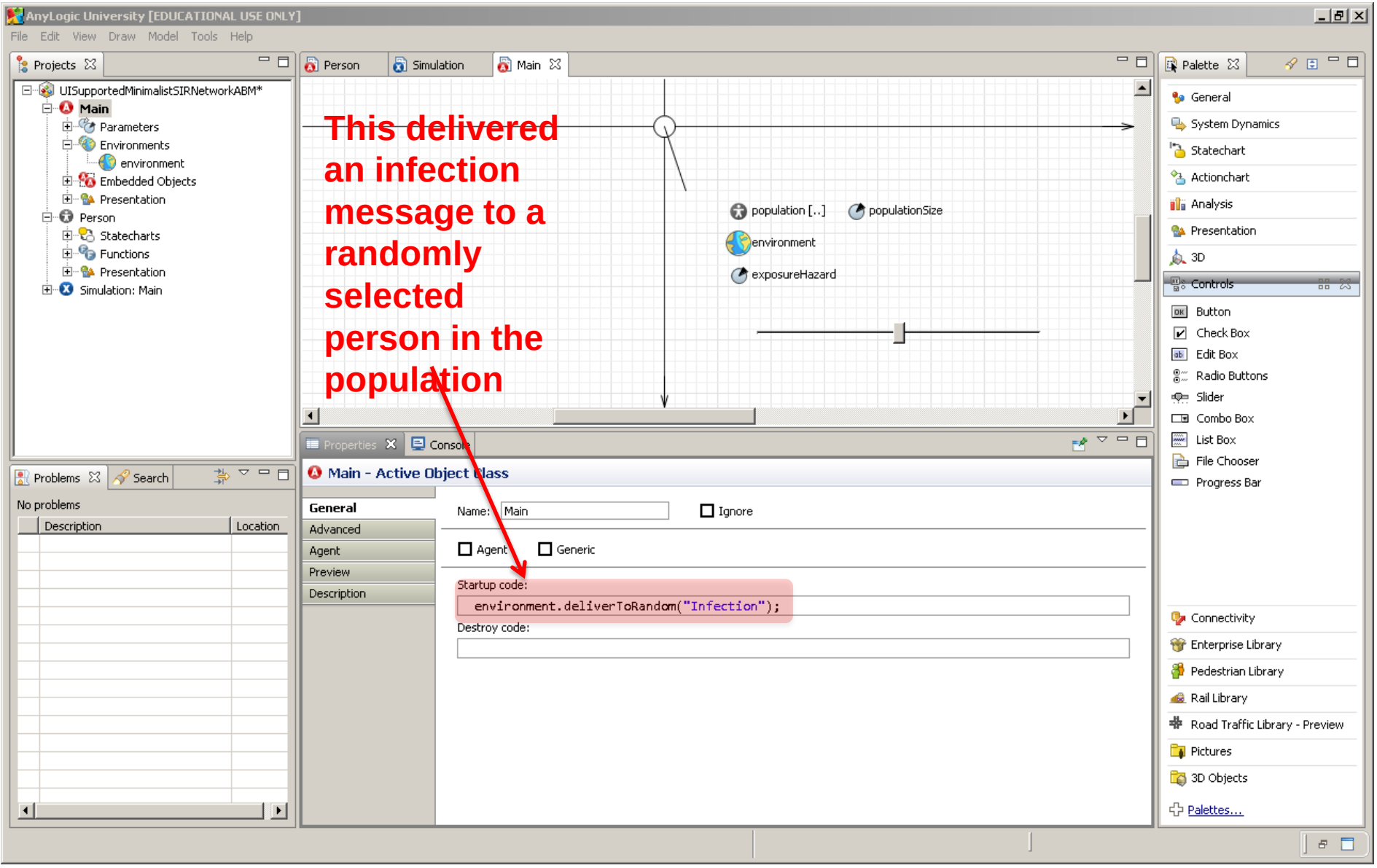
A High Slider Value Leads to a More Rapid Spread



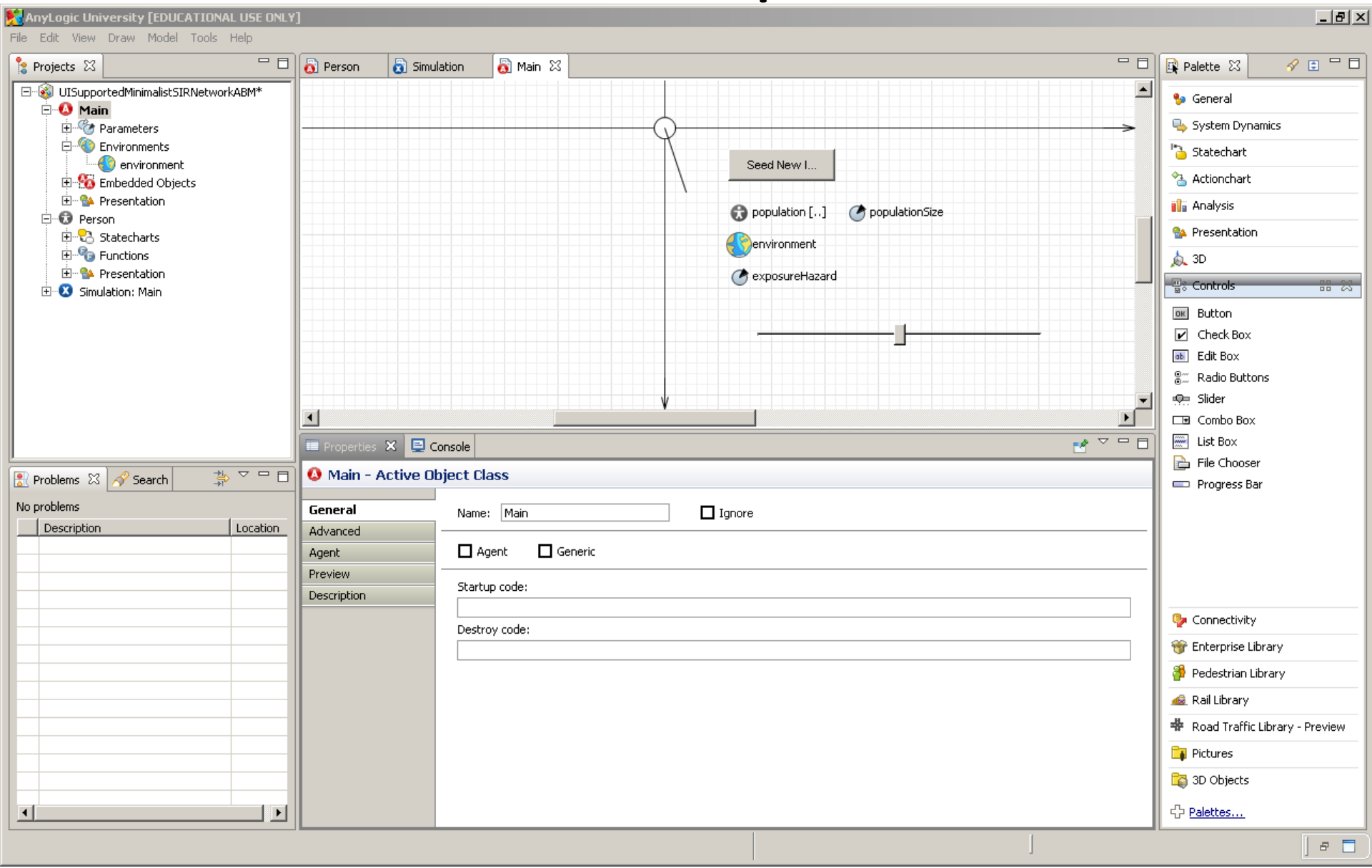
Dropping the Slider Value (Exposure Hazard) to 0 Can Stop the Spread



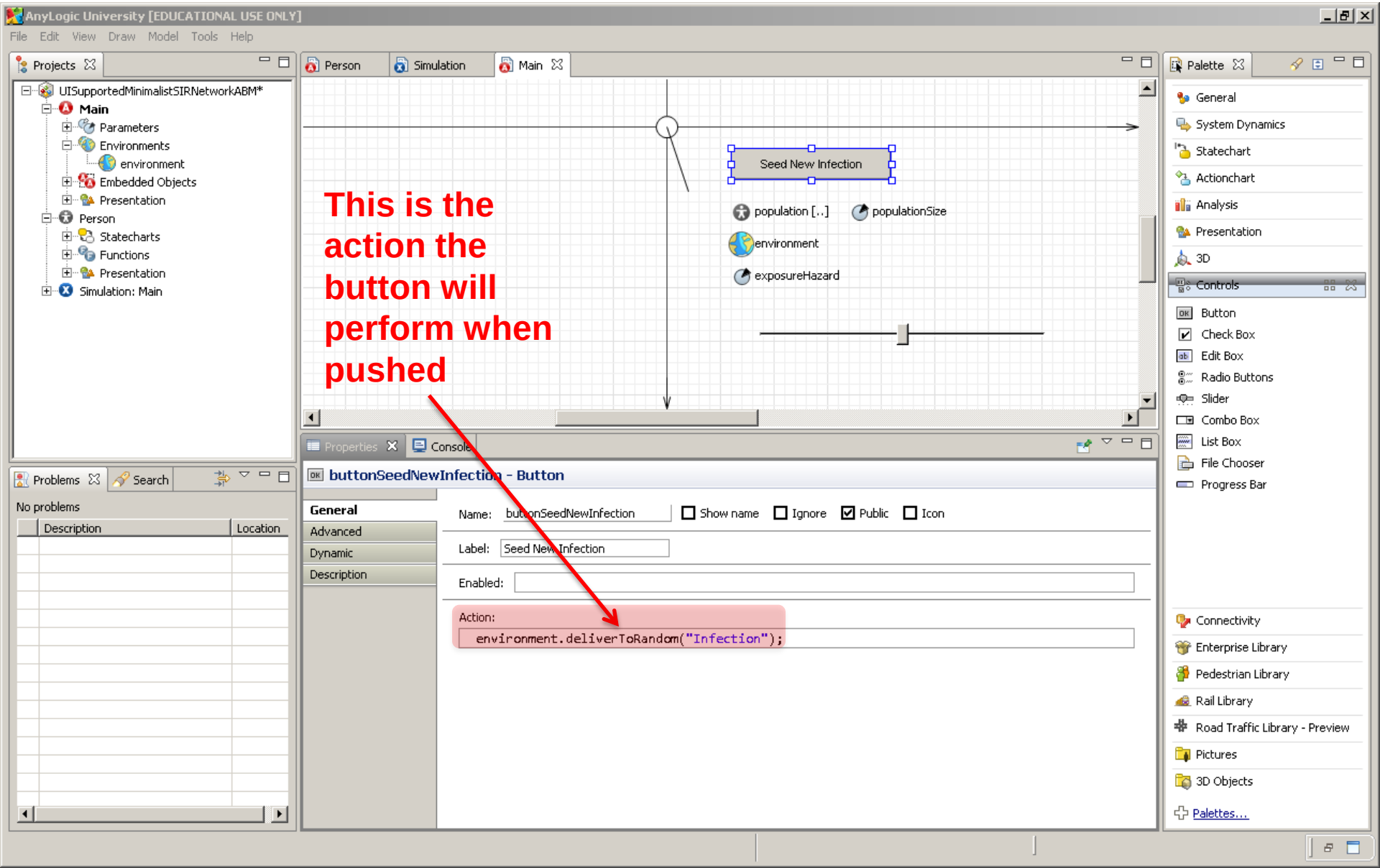
Recall: The Initial Infection Seed



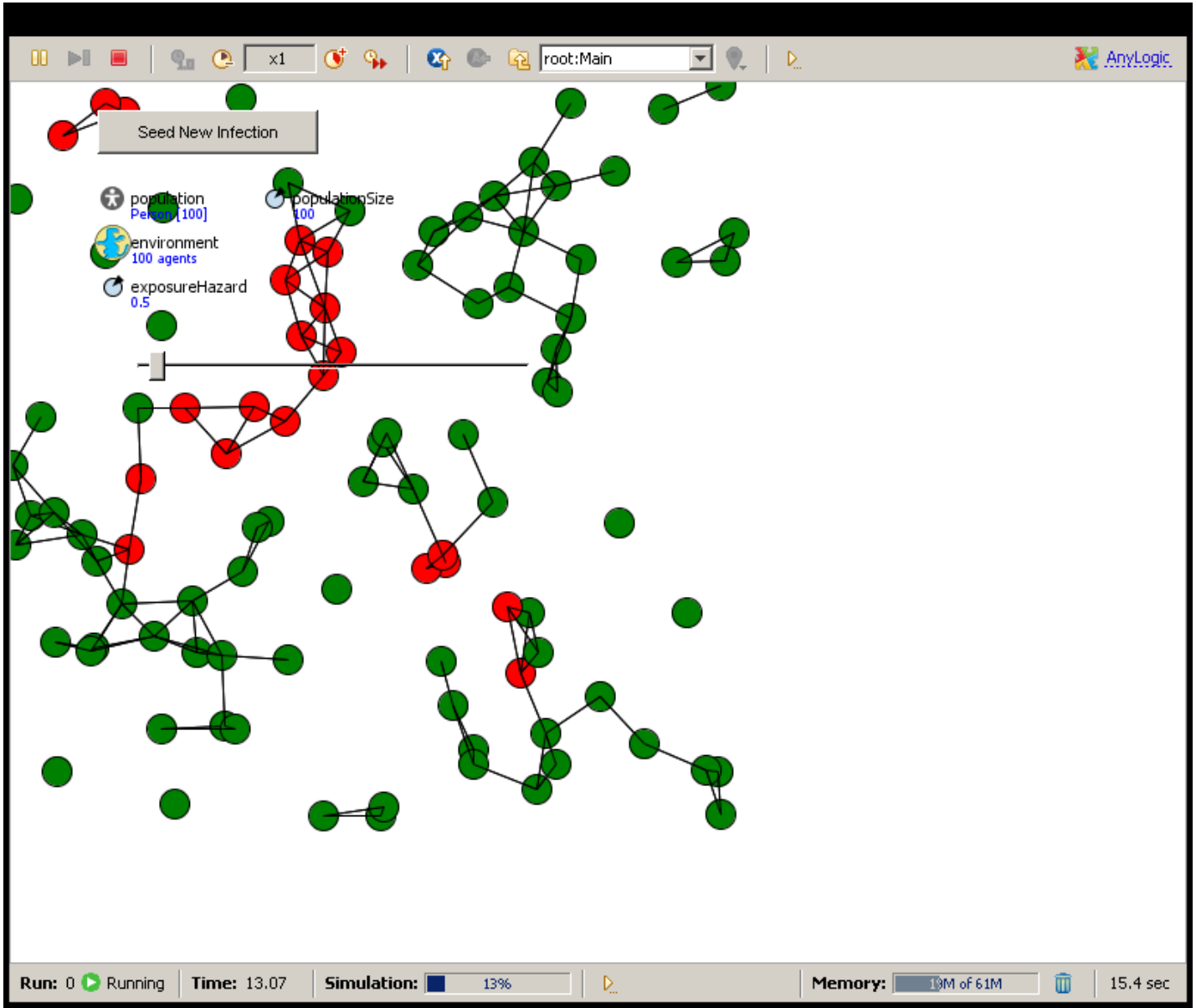
Cut Text from Startup Code for Main



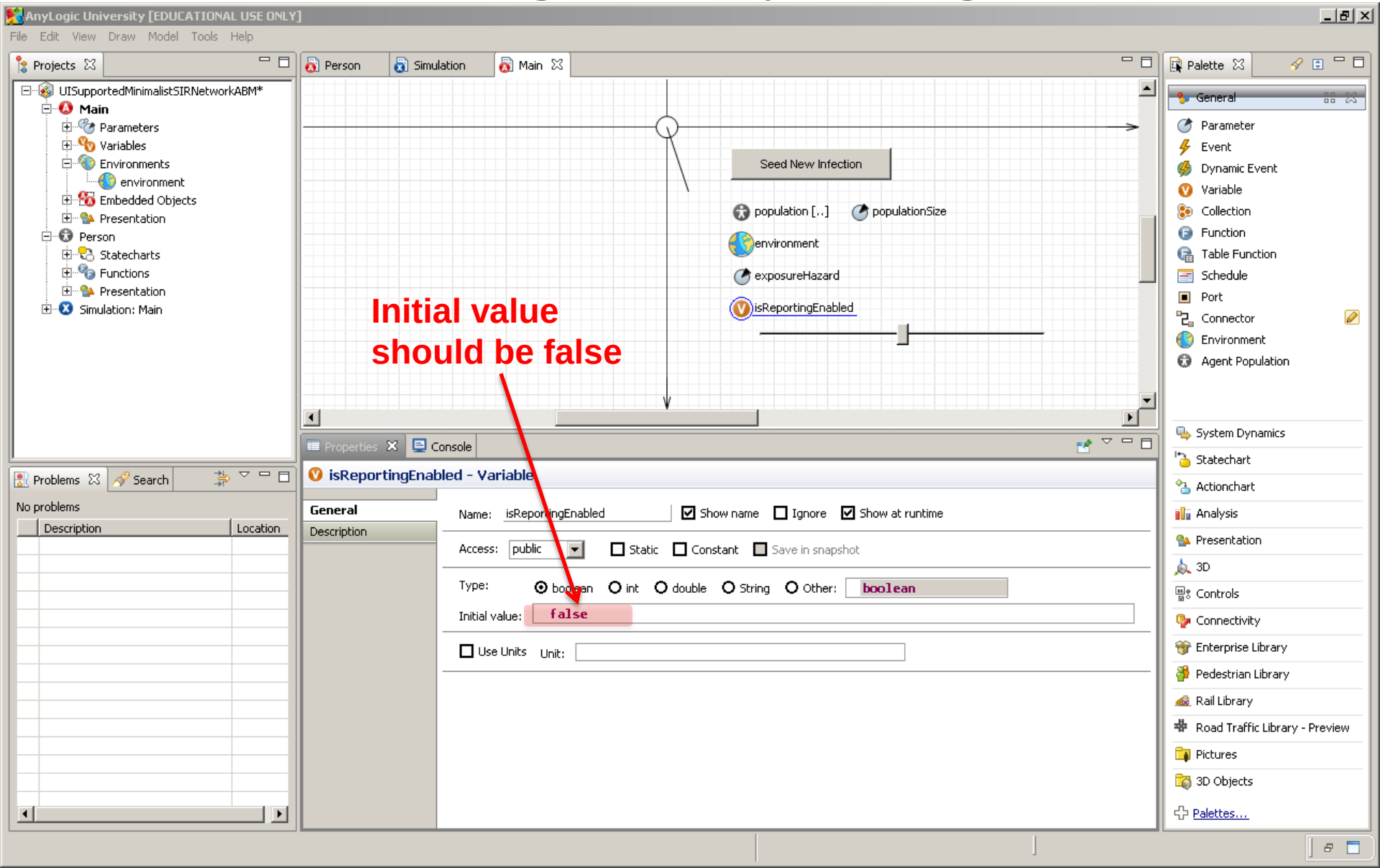
Setting the Button to Seed a New Infection



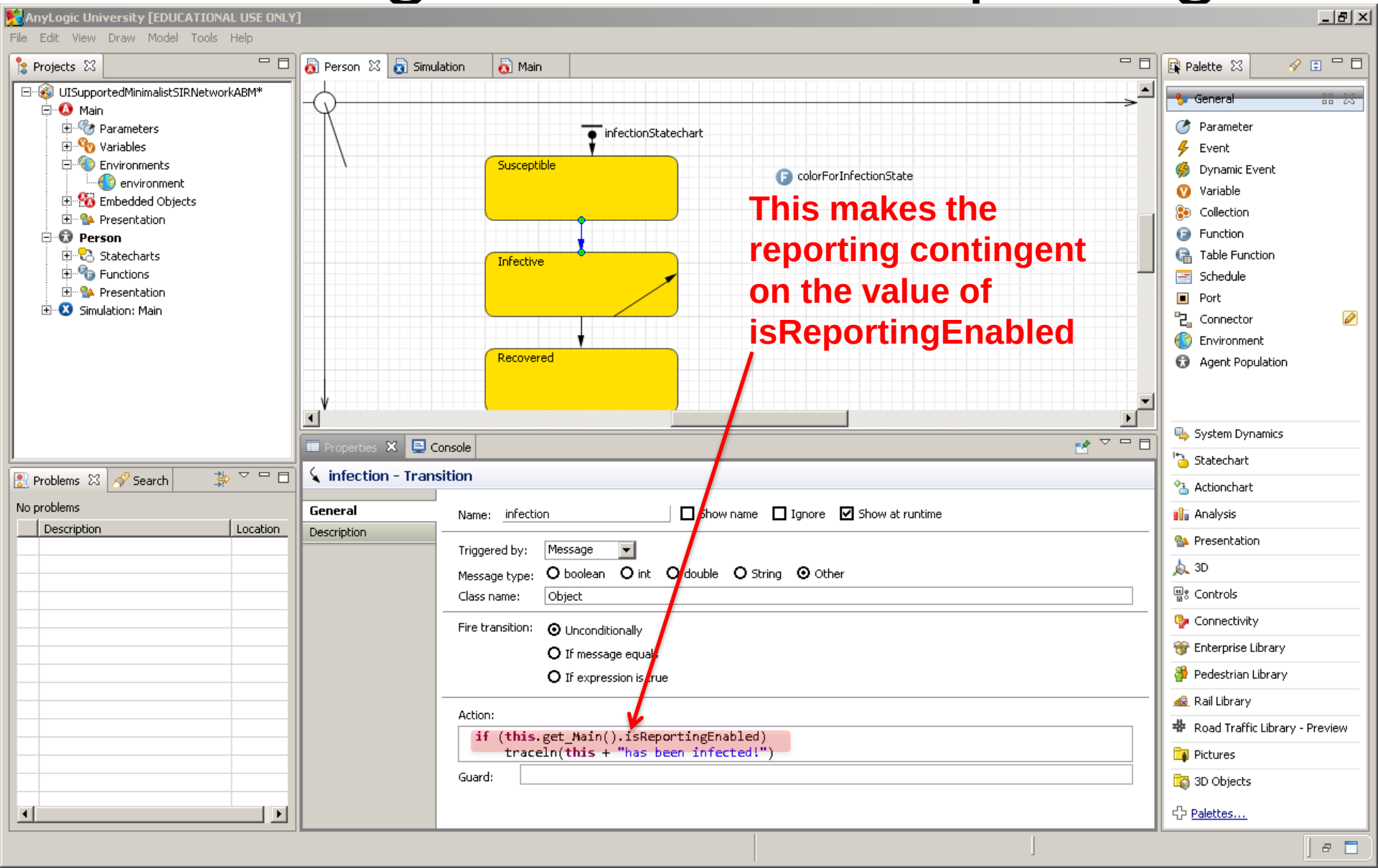
With Multiple Presses, Multiple "Seed" Infections



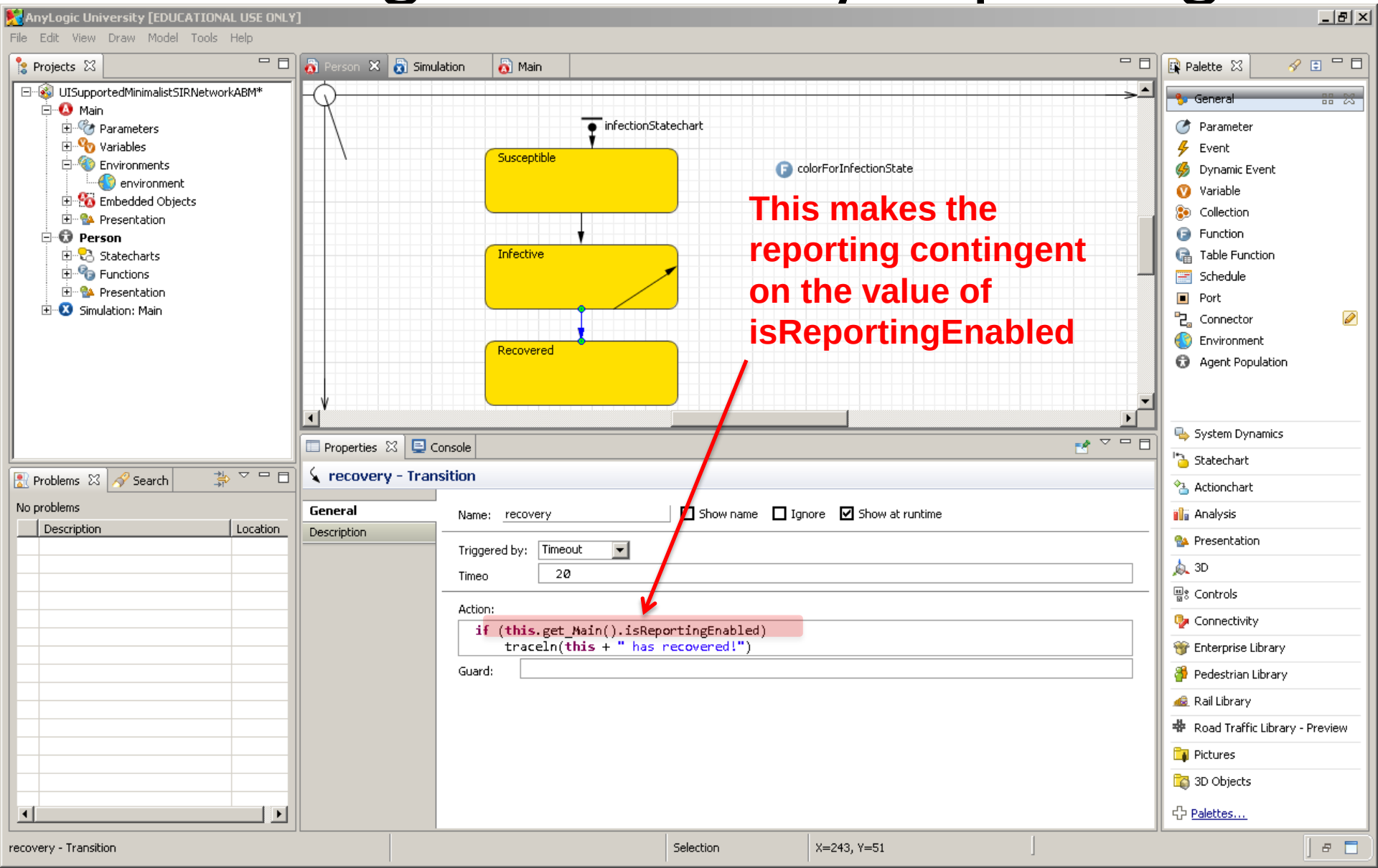
Add a Contingent Reporting Variable



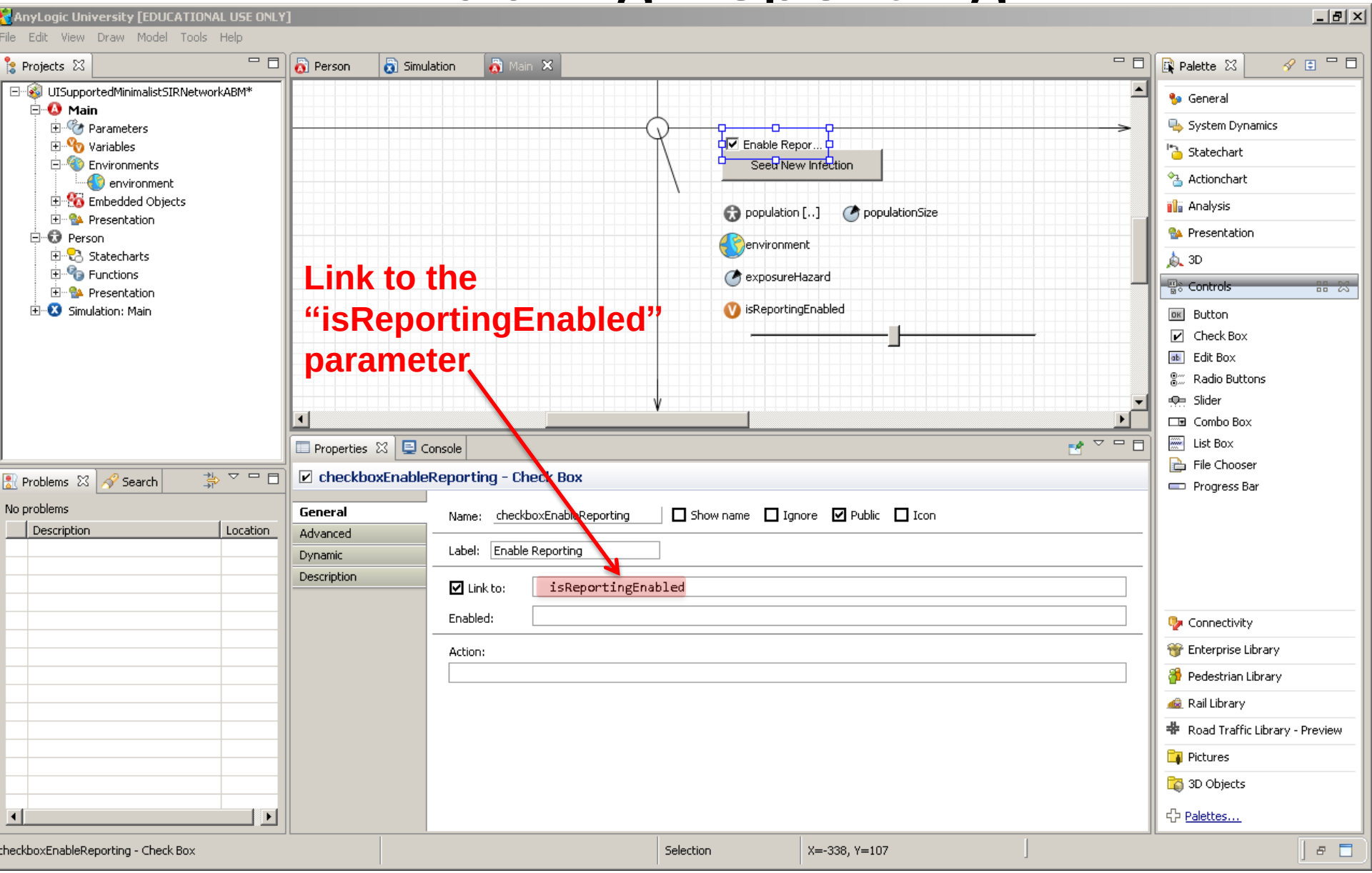
Contingent Infection Reporting



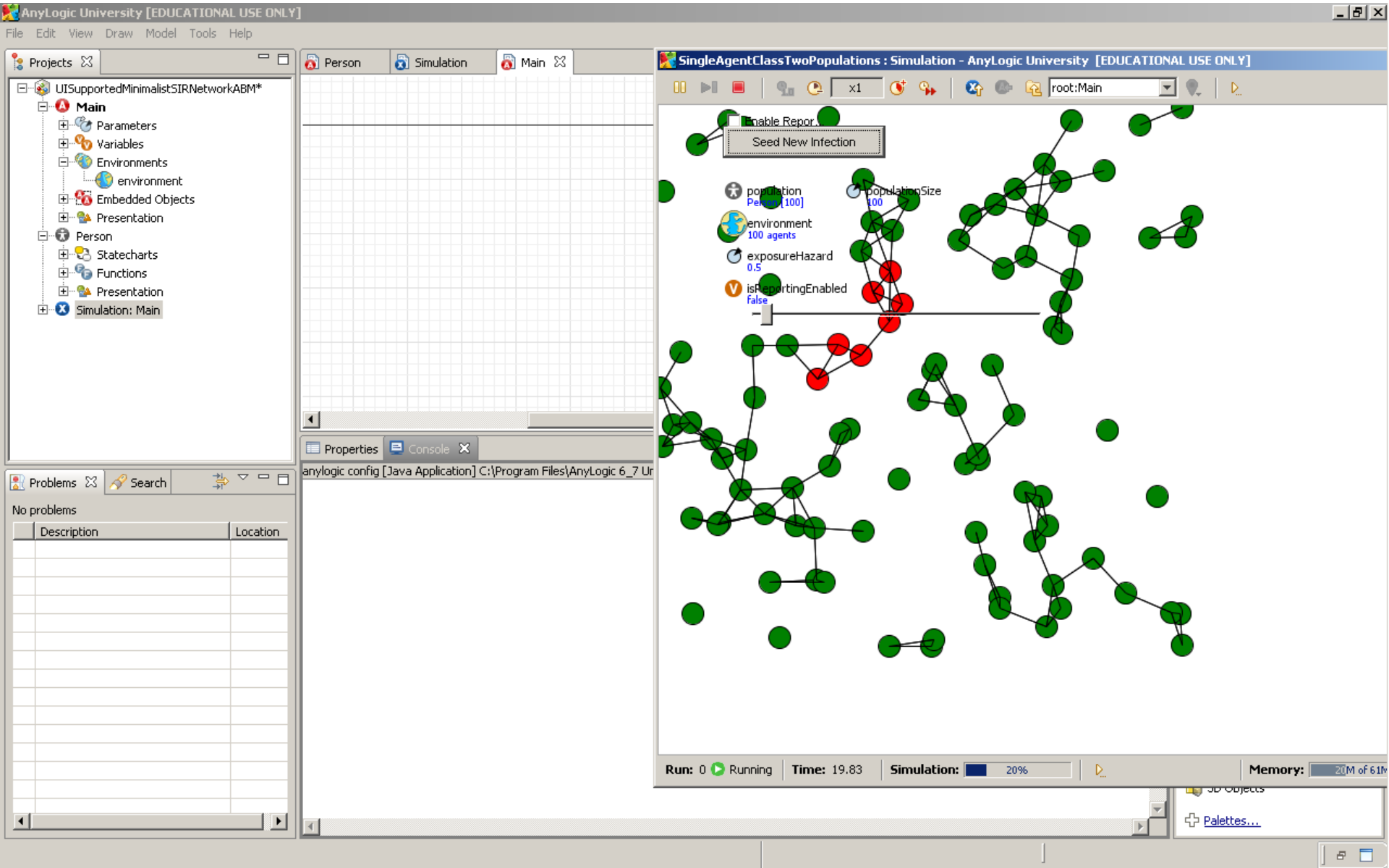
Contingent Recovery Reporting



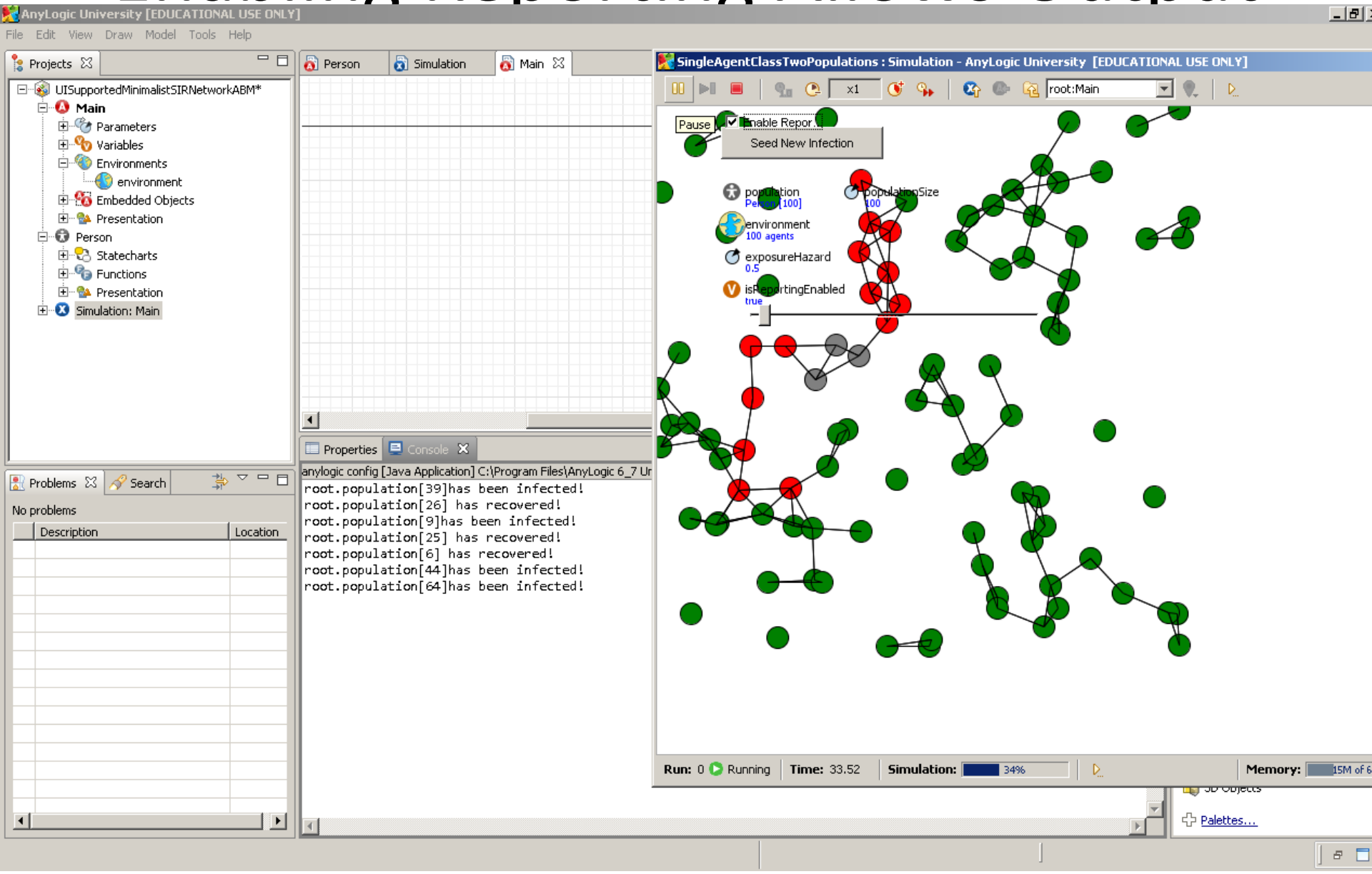
Enabling Reporting



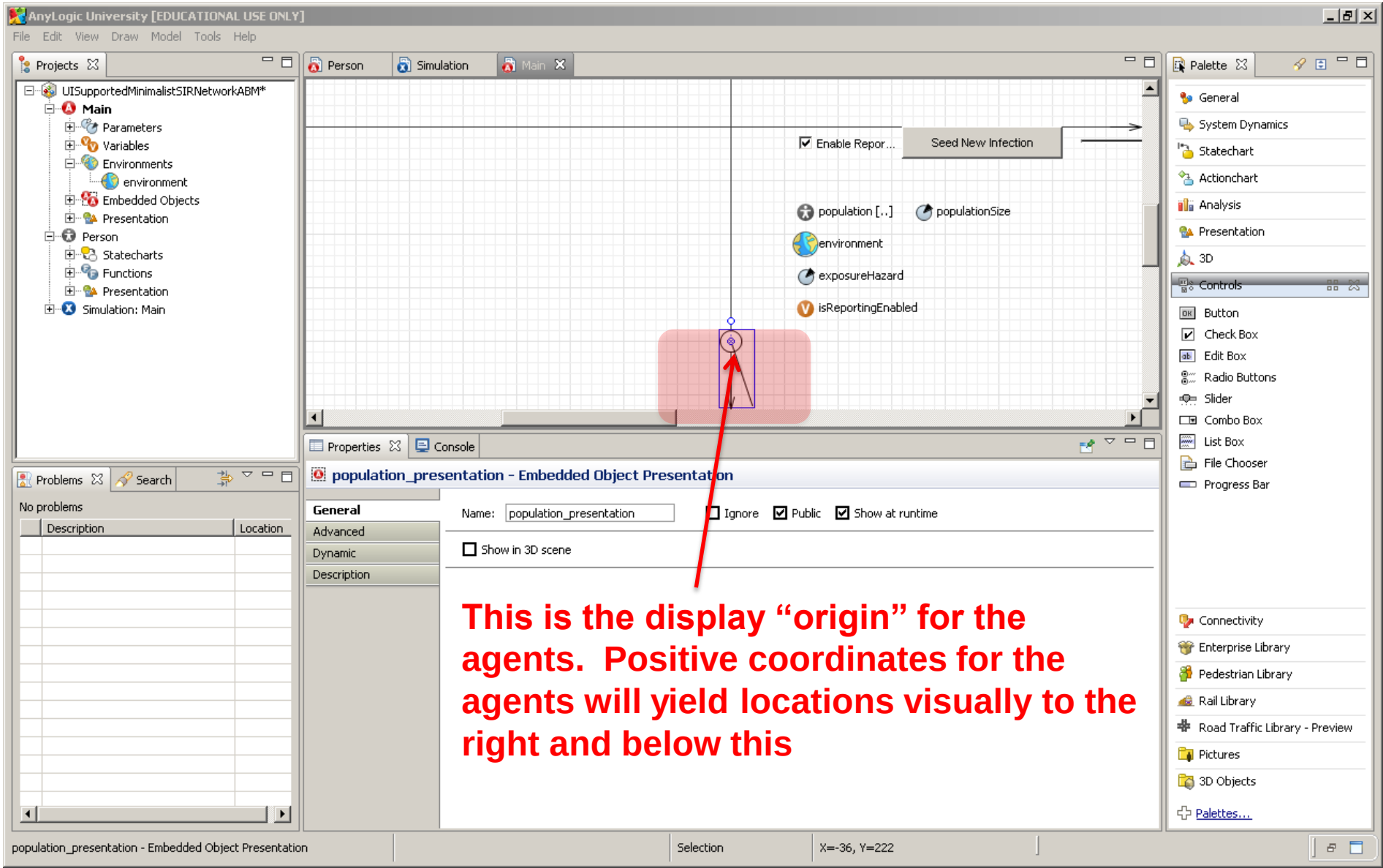
Unless Reporting is Enabled (i.e. Checkbox is Checked), No Output



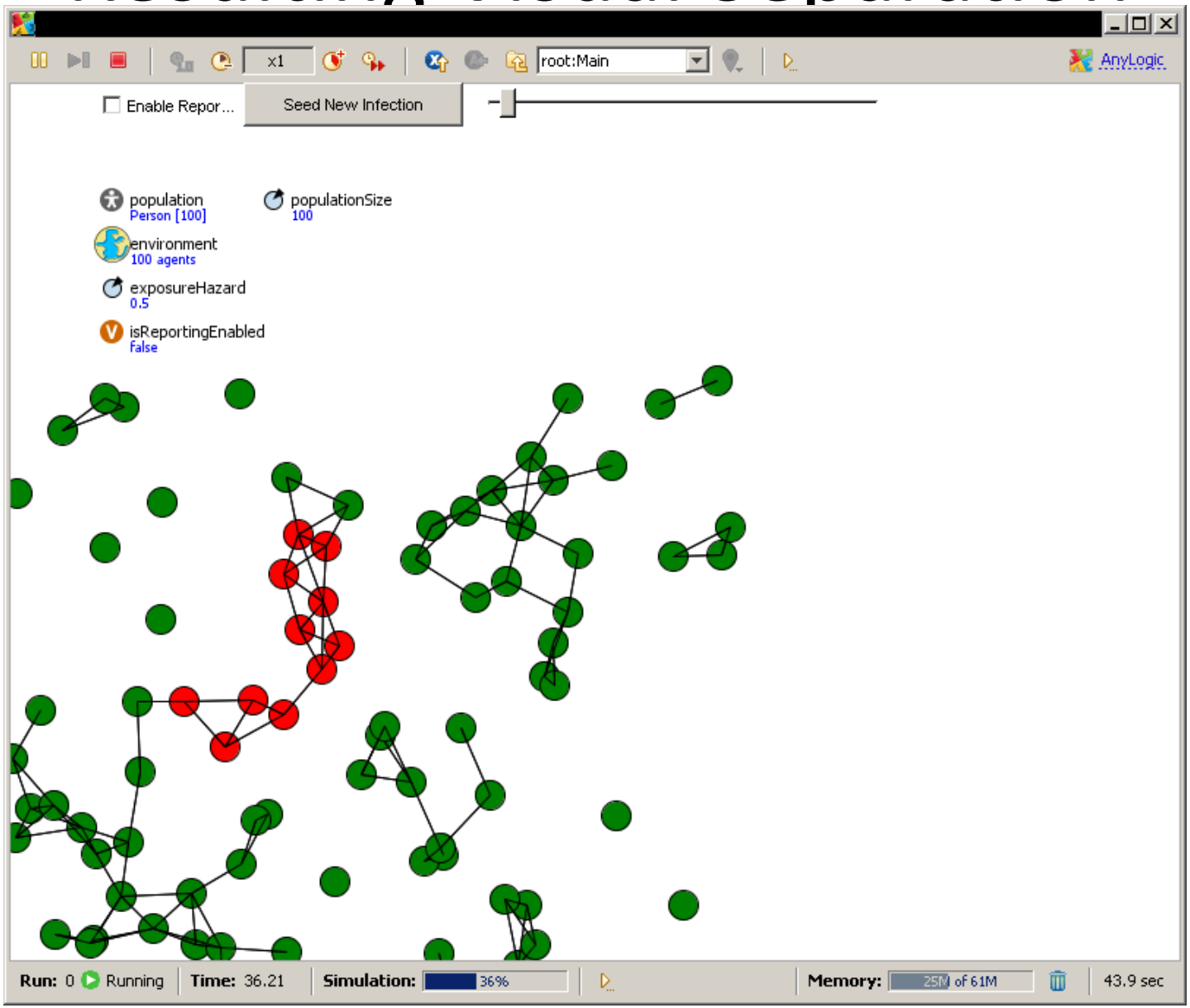
Enabling Reporting Allows Output



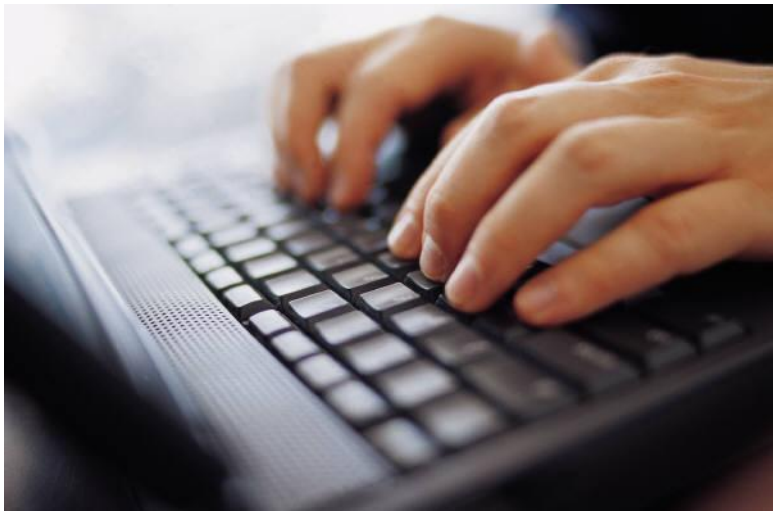
Cleaning Up by Separating the Network Display Space from Other Model Components



Resulting Visual Separation



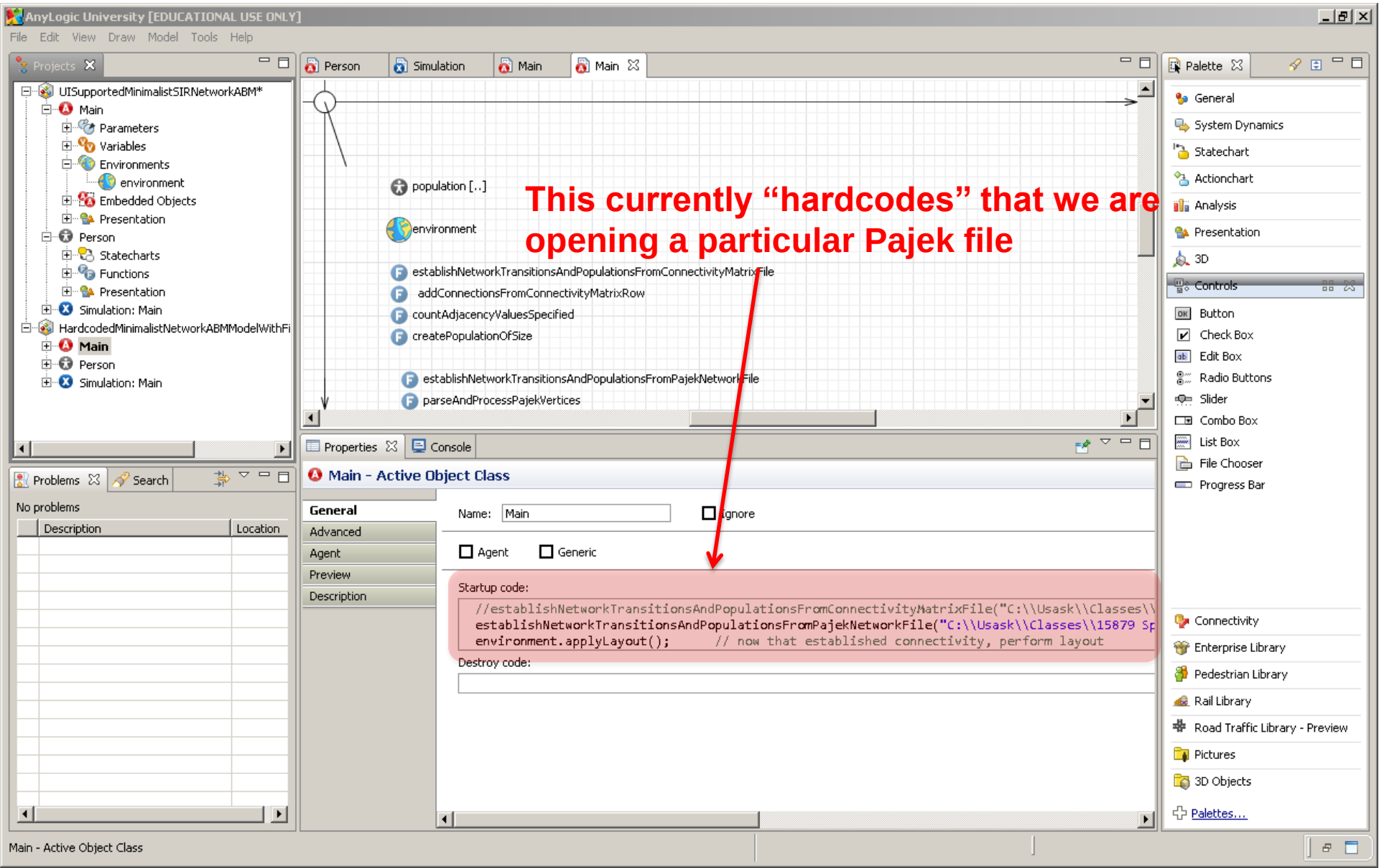
Hands on Model Use Ahead



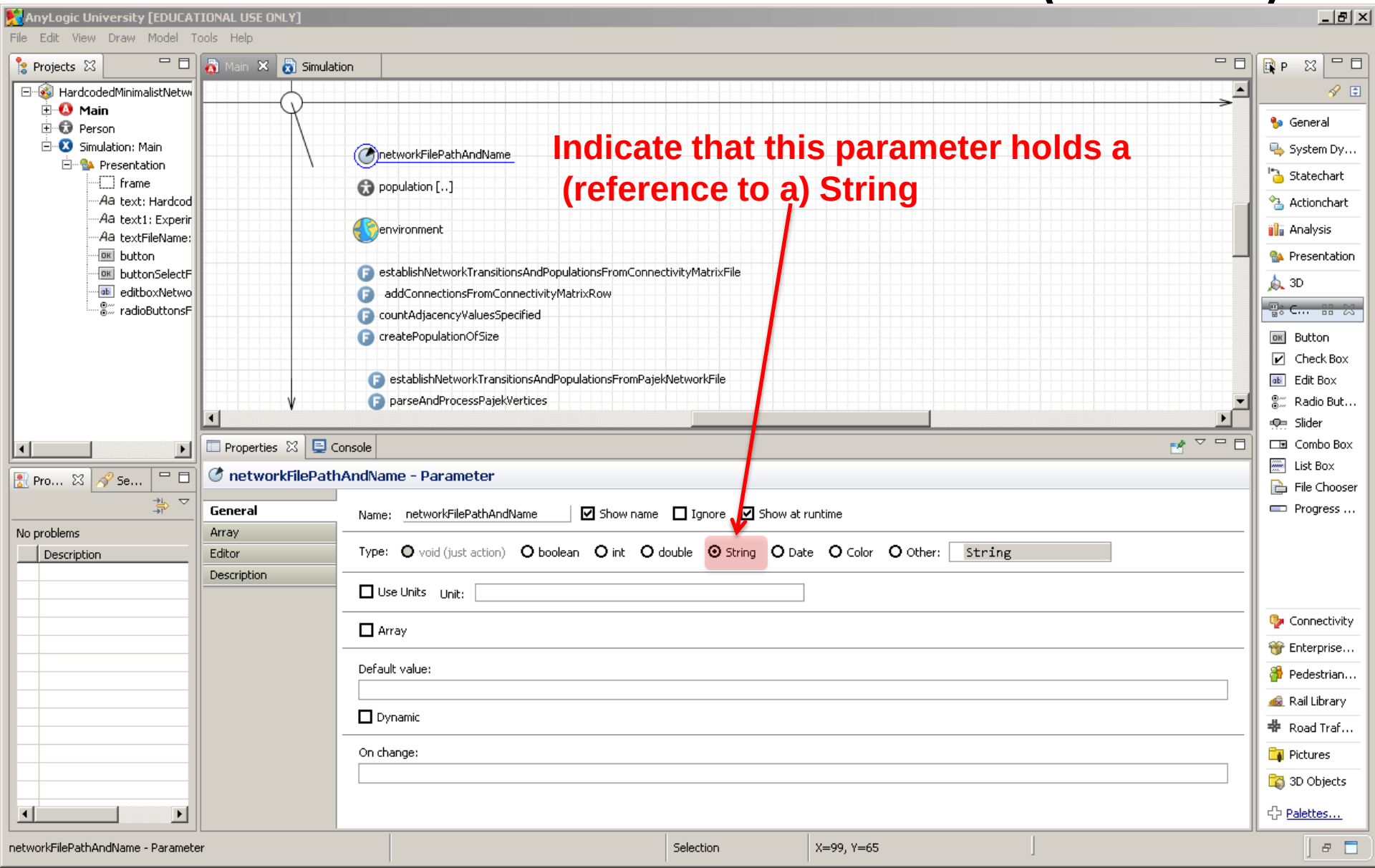
Load Example Model:

HardcodedMinimalistNetworkABMModelWithFileDrivenNetworkStructure

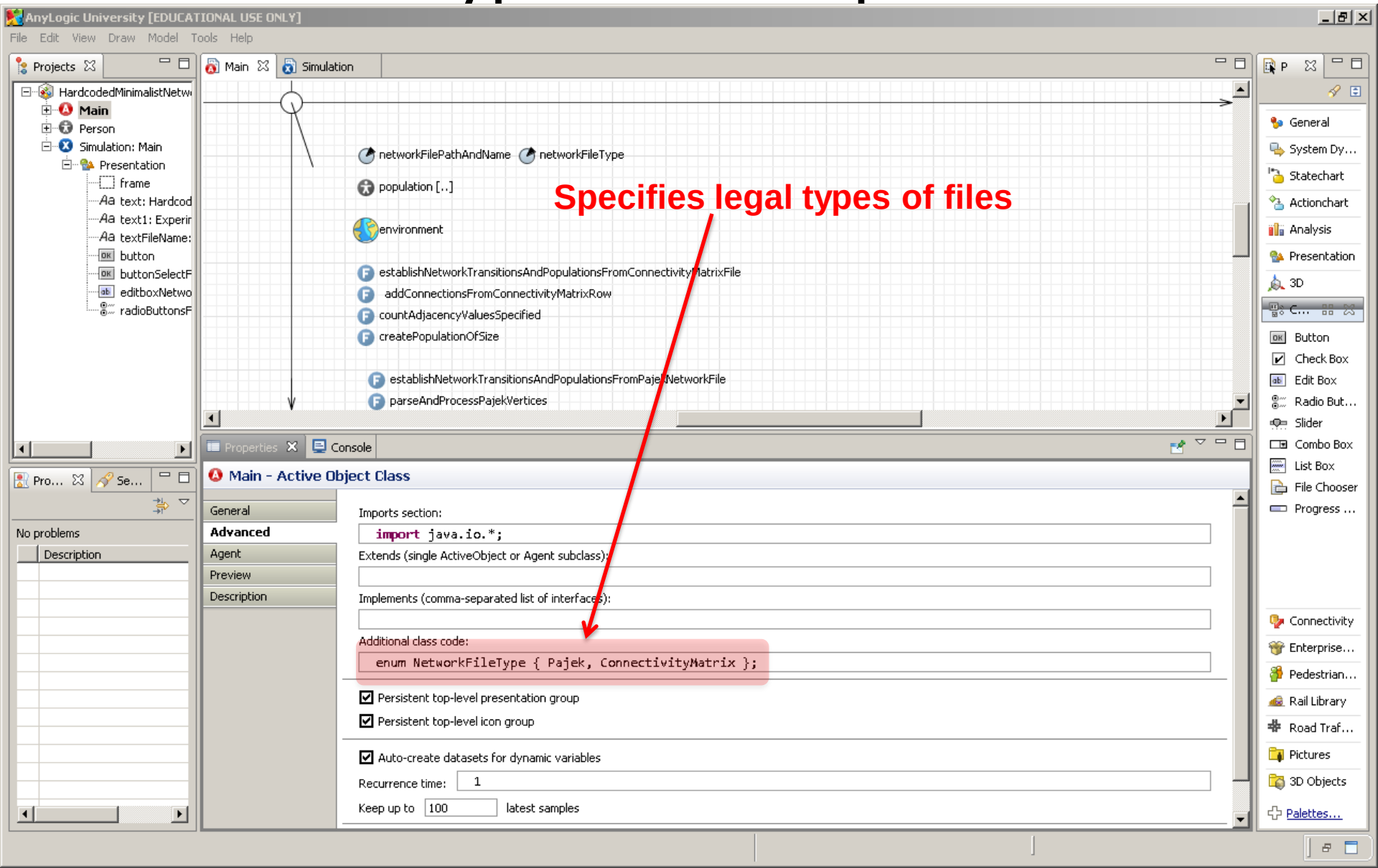
Recall: “Hardcoded” File Names



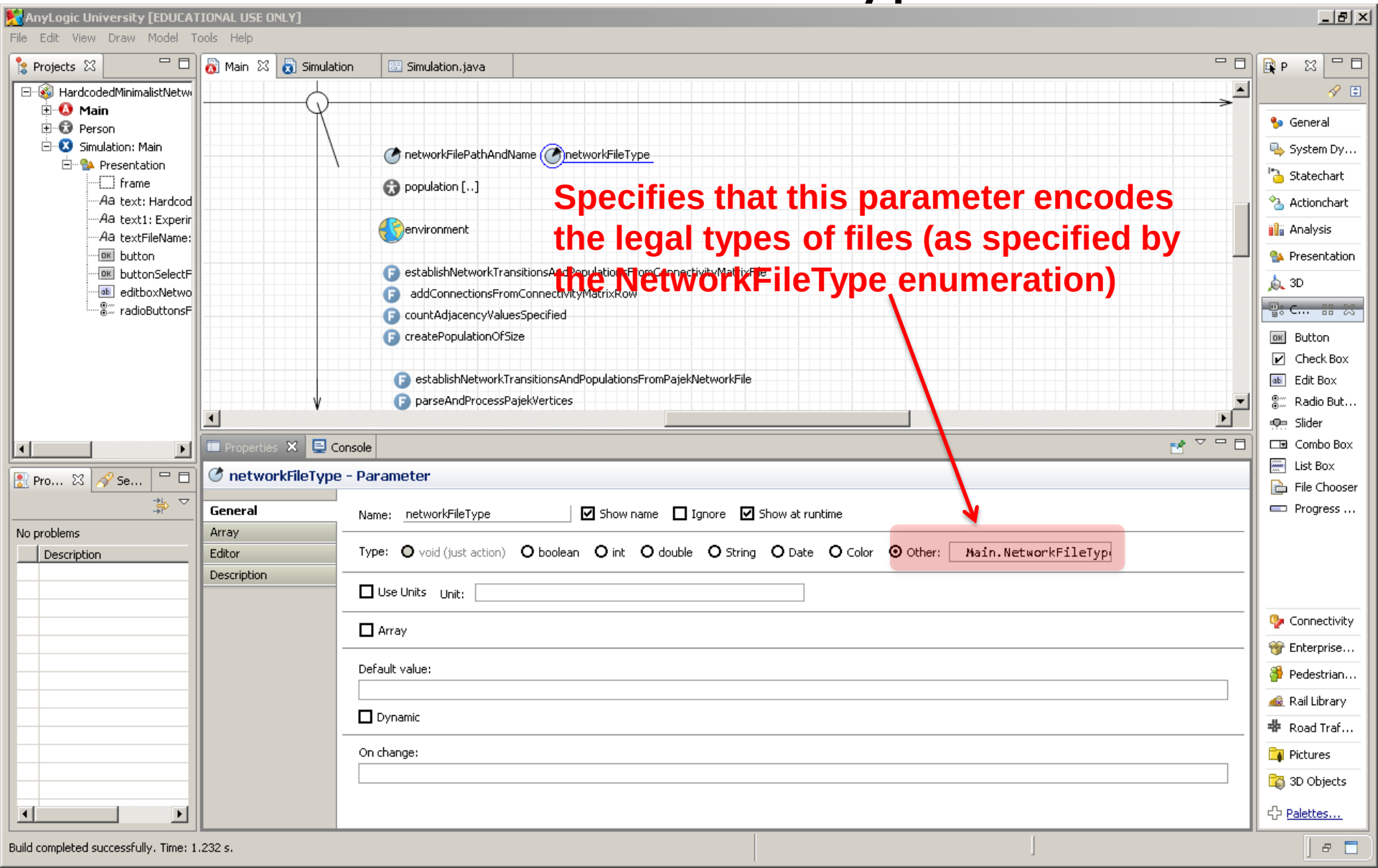
Creating a Parameter to Communicate the Network File Name & Location ("Path")

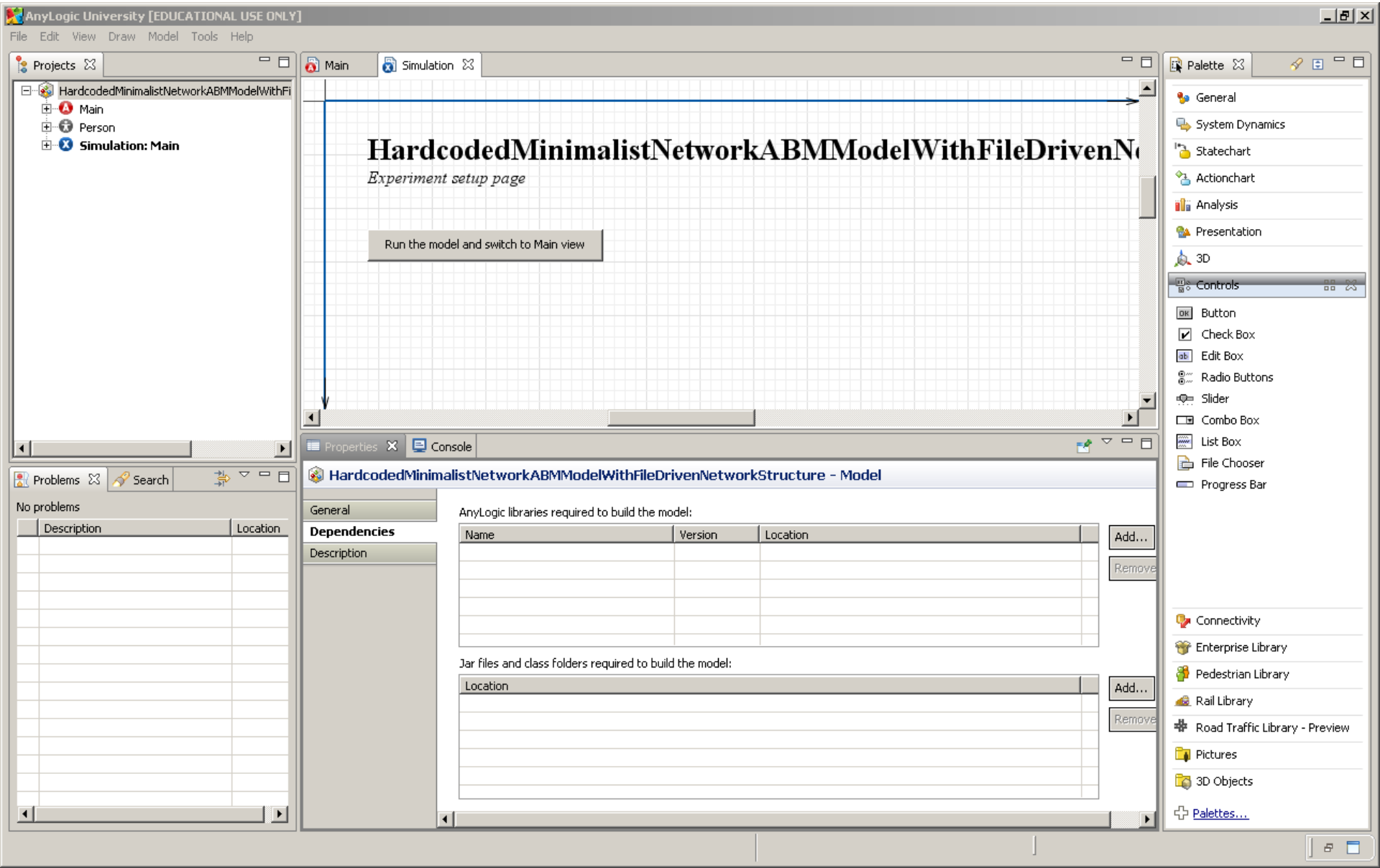


Creating an “Enum” to Encode the Possible Types of the Specified File



Creating a Parameter to Encode the Network File Type

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Statechart
Actionchart
Analysis
Presentation
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Controls
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Edit Box
Radio Buttons
Slider
Combo Box
List Box
File Chooser
Progress Bar
Connectivity
Enterprise Library
Pedestrian Library
Rail Library
Road Traffic Library - Preview
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Version
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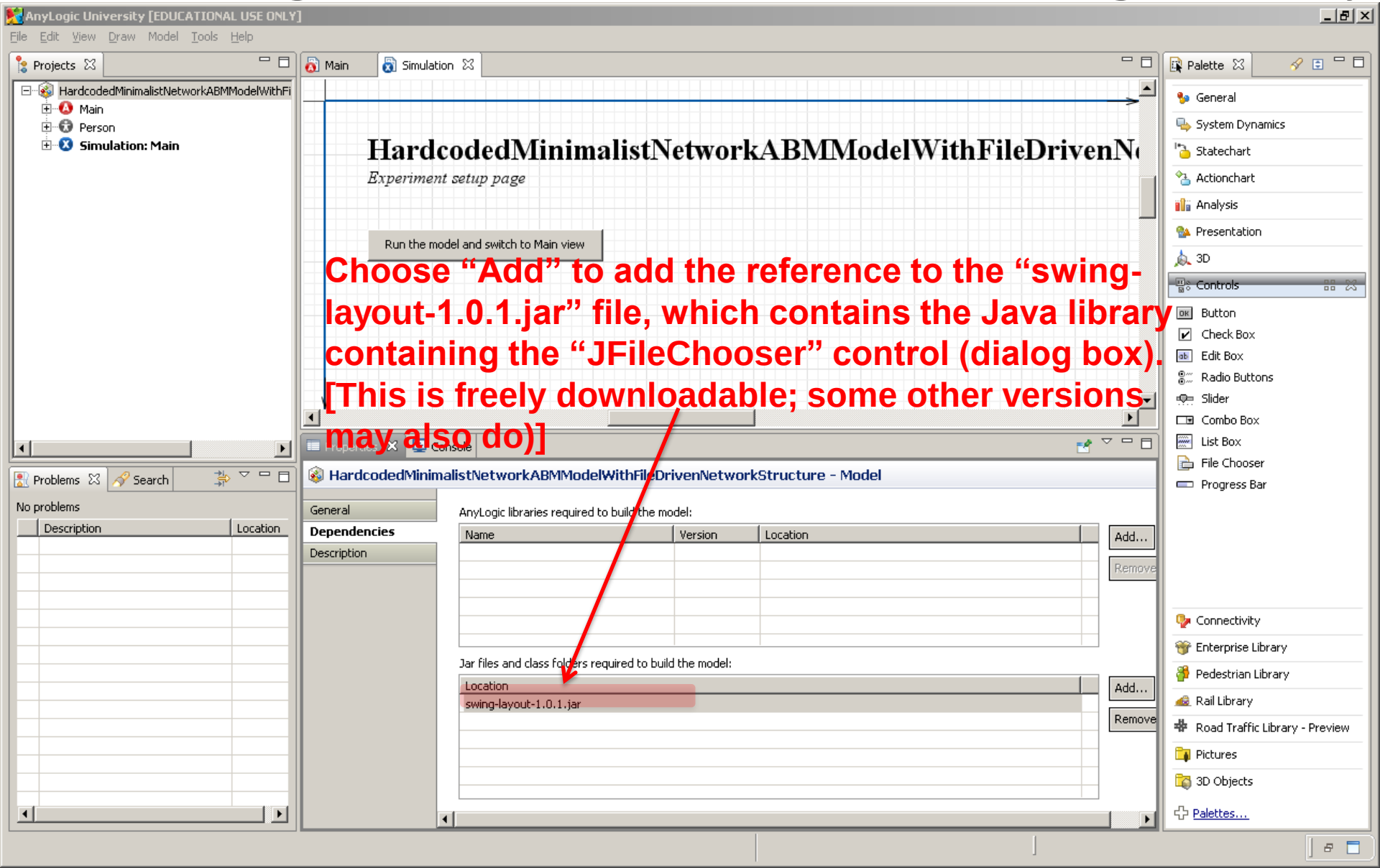
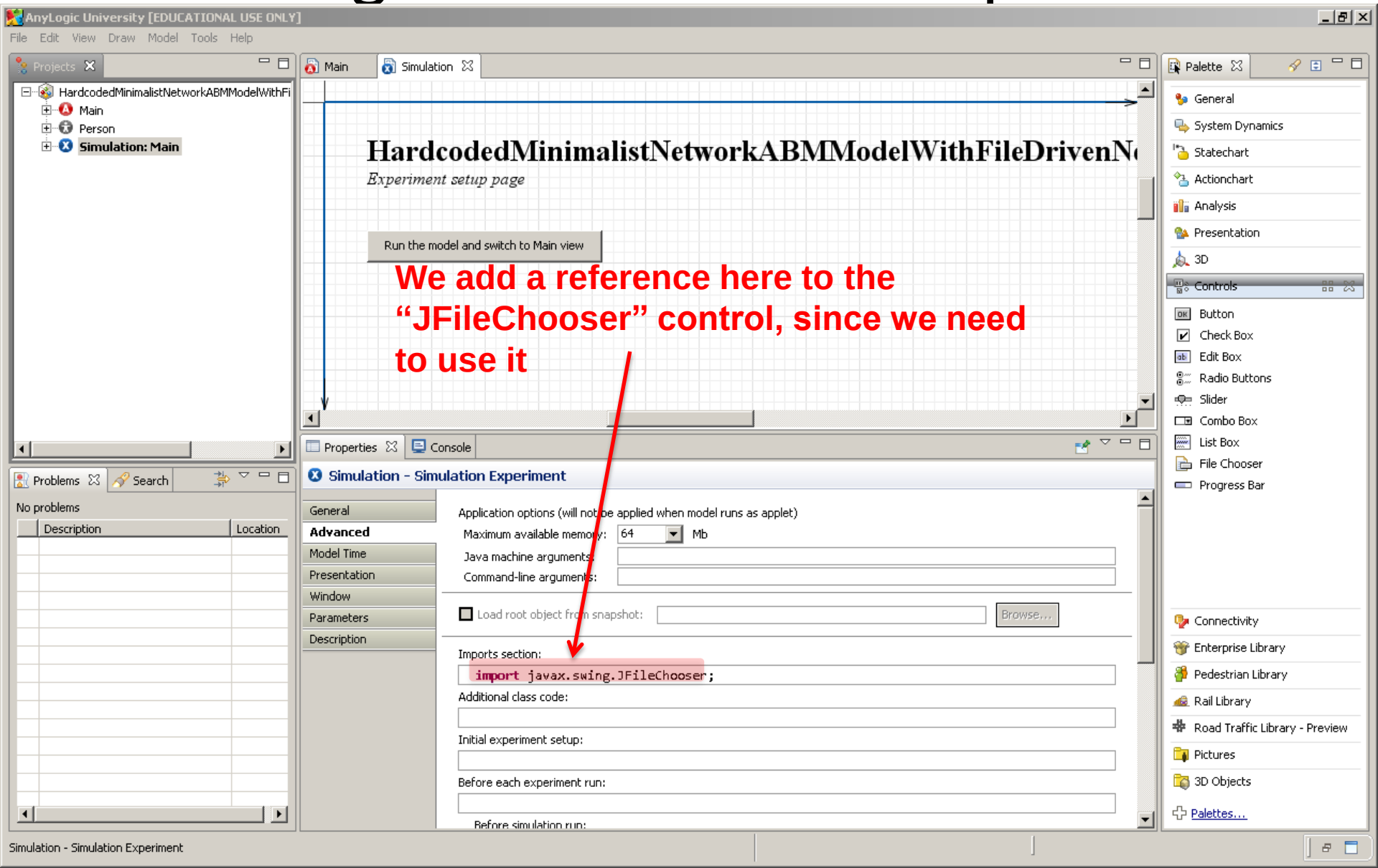
Remove
Jar files and class folders required to build the model:
Location
Add...
Remove

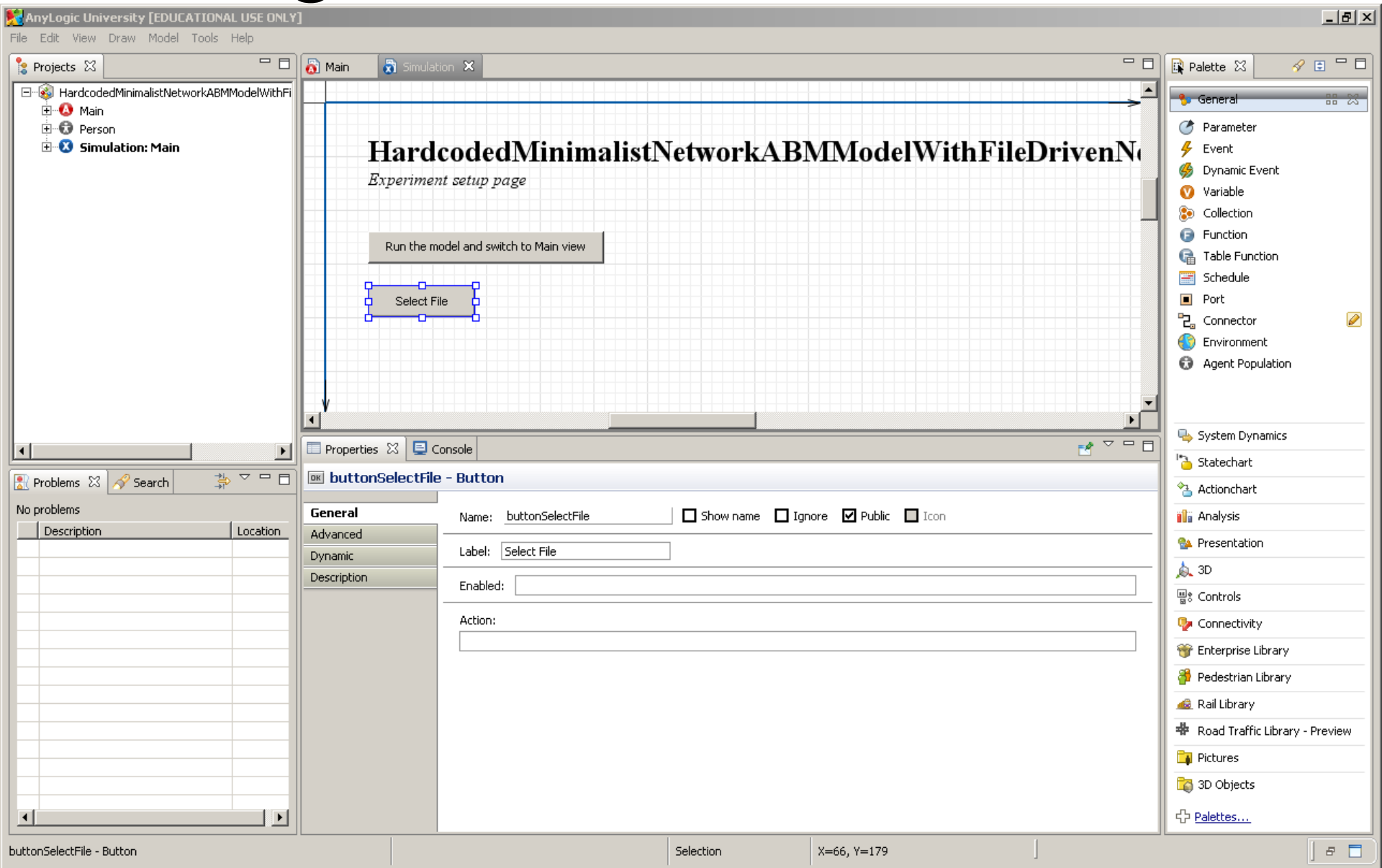
Referring to the External Java Swing Library



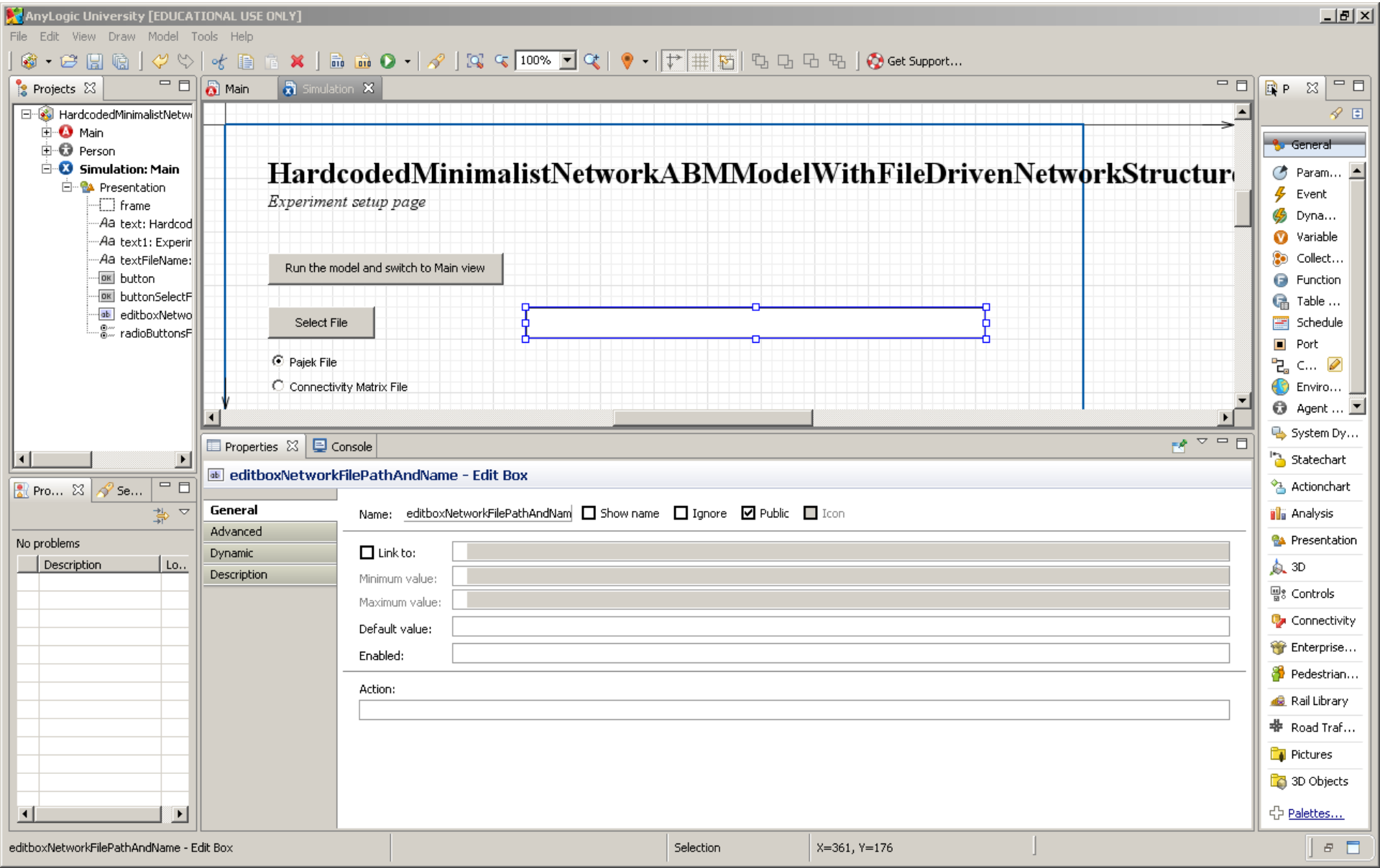
Adding a Reference to the Java "Swing" File Chooser Component



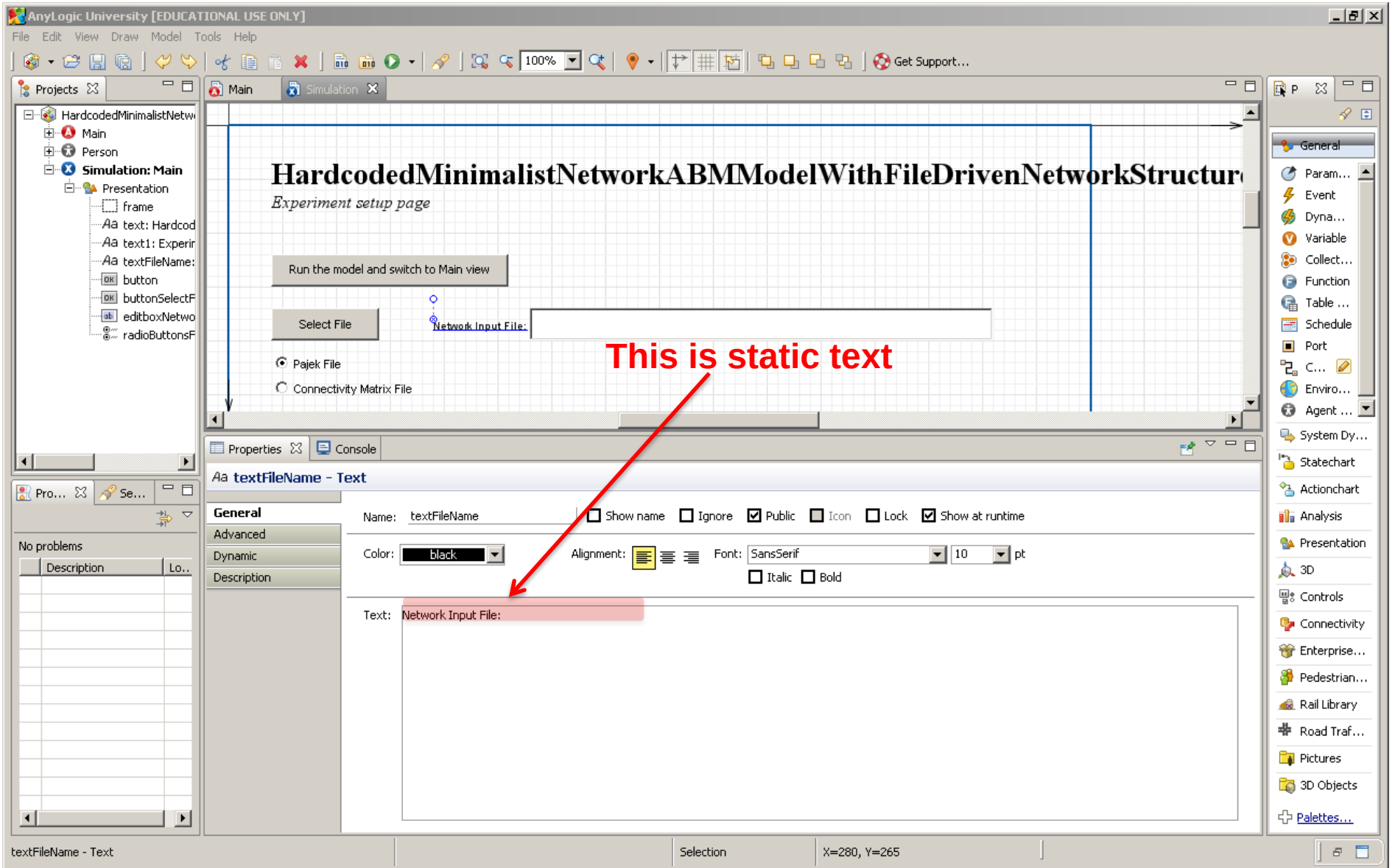
Adding a Button “buttonSelectFile”



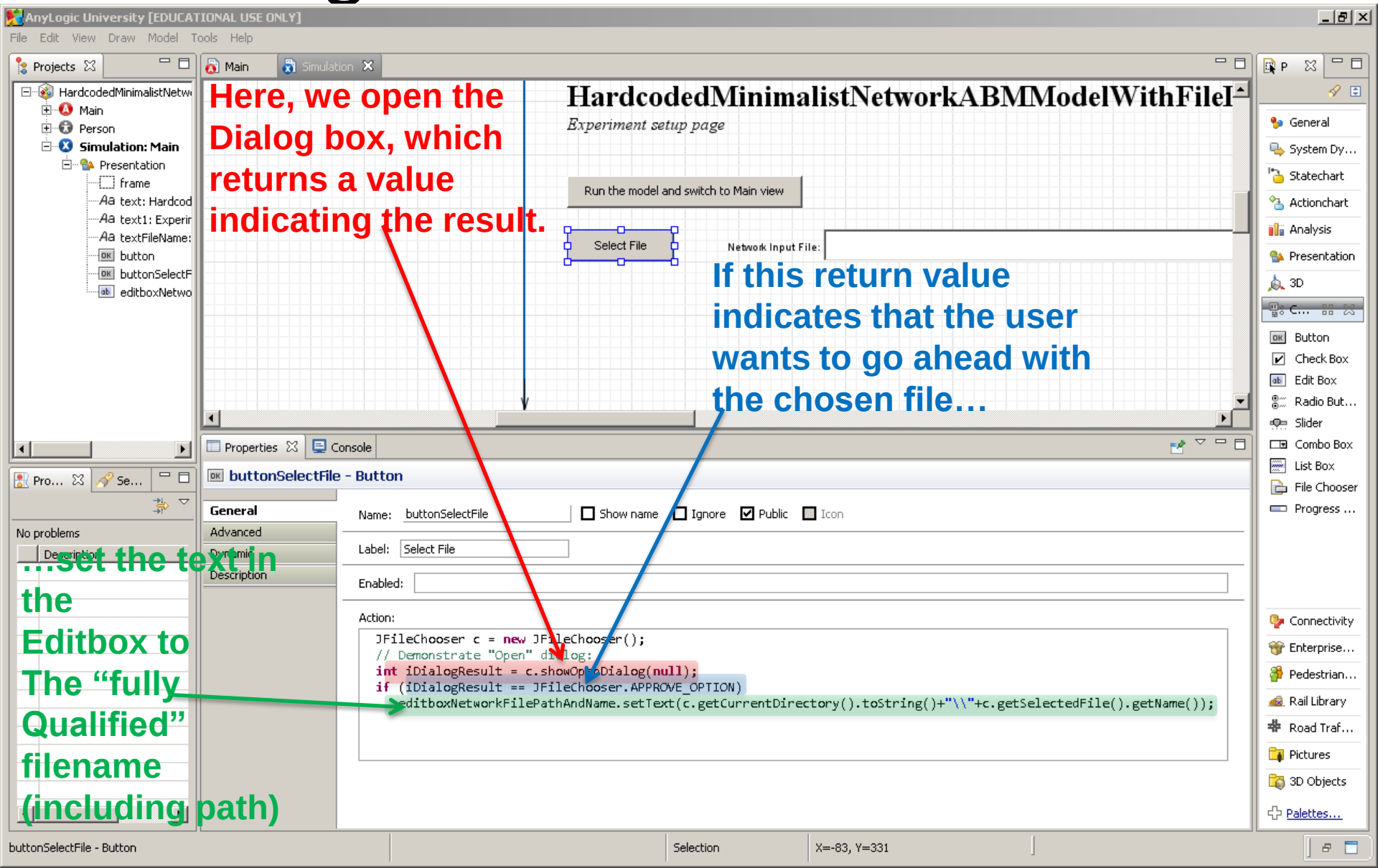
Add an EditBox editboxNetworkFilePathAndName

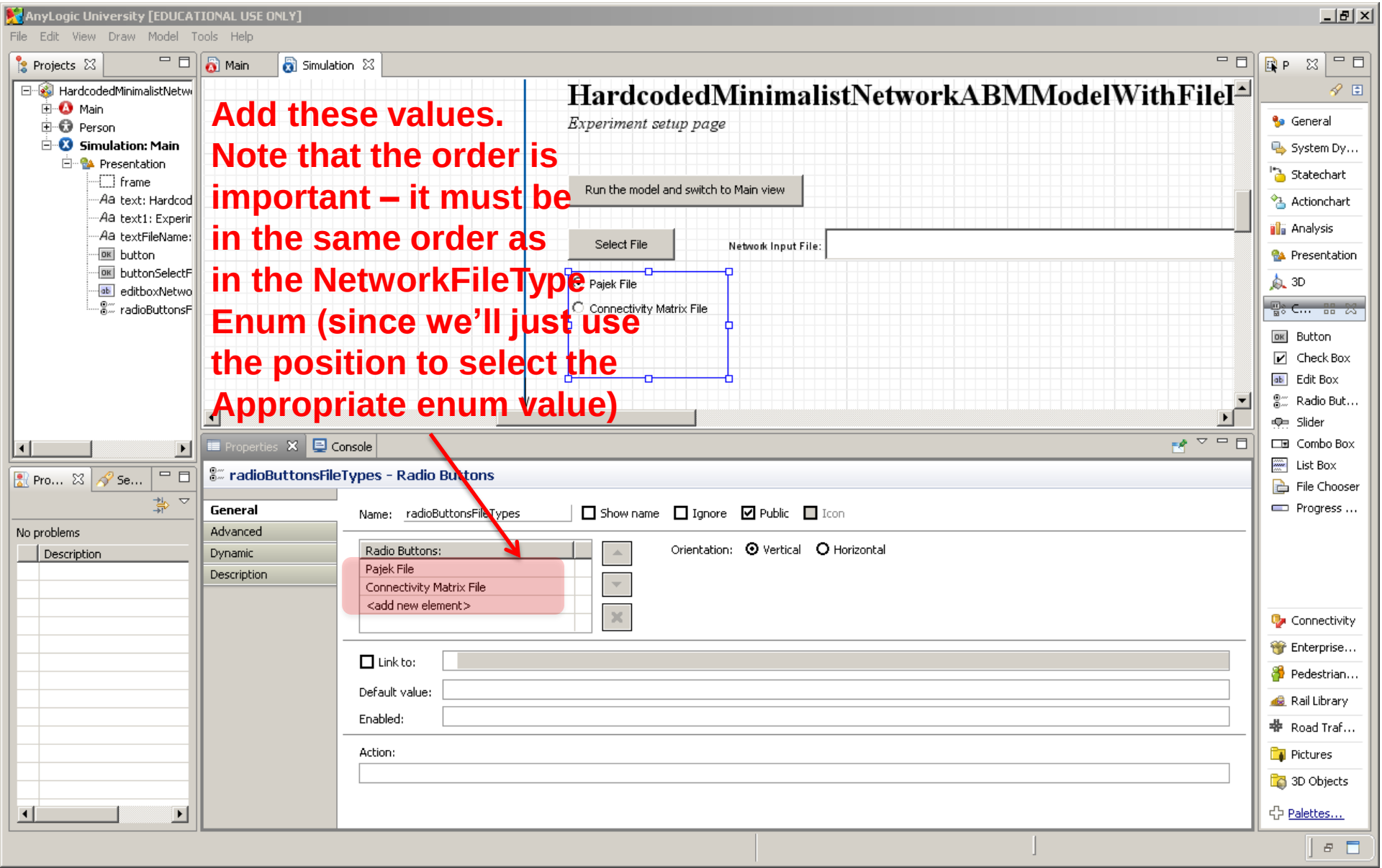


Adding a Label for the Filename



Logic to Set the File Name

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Experiment setup page
Run the model and switch to Main view
Select File
Network Input File:
Pajek File
Connectivity Matrix File
Add these values.
Note that the order is
important – it must be
in the same order as
in the NetworkFileType
Enum (since we'll just use
the position to select the
Appropriate enum value)
Properties
Console
radioButtonsFileTypes - Radio Buttons
General
Advanced
Dynamic
Description
Name: radioButtonsFileTypes
Show name
Ignore
Public
Icon
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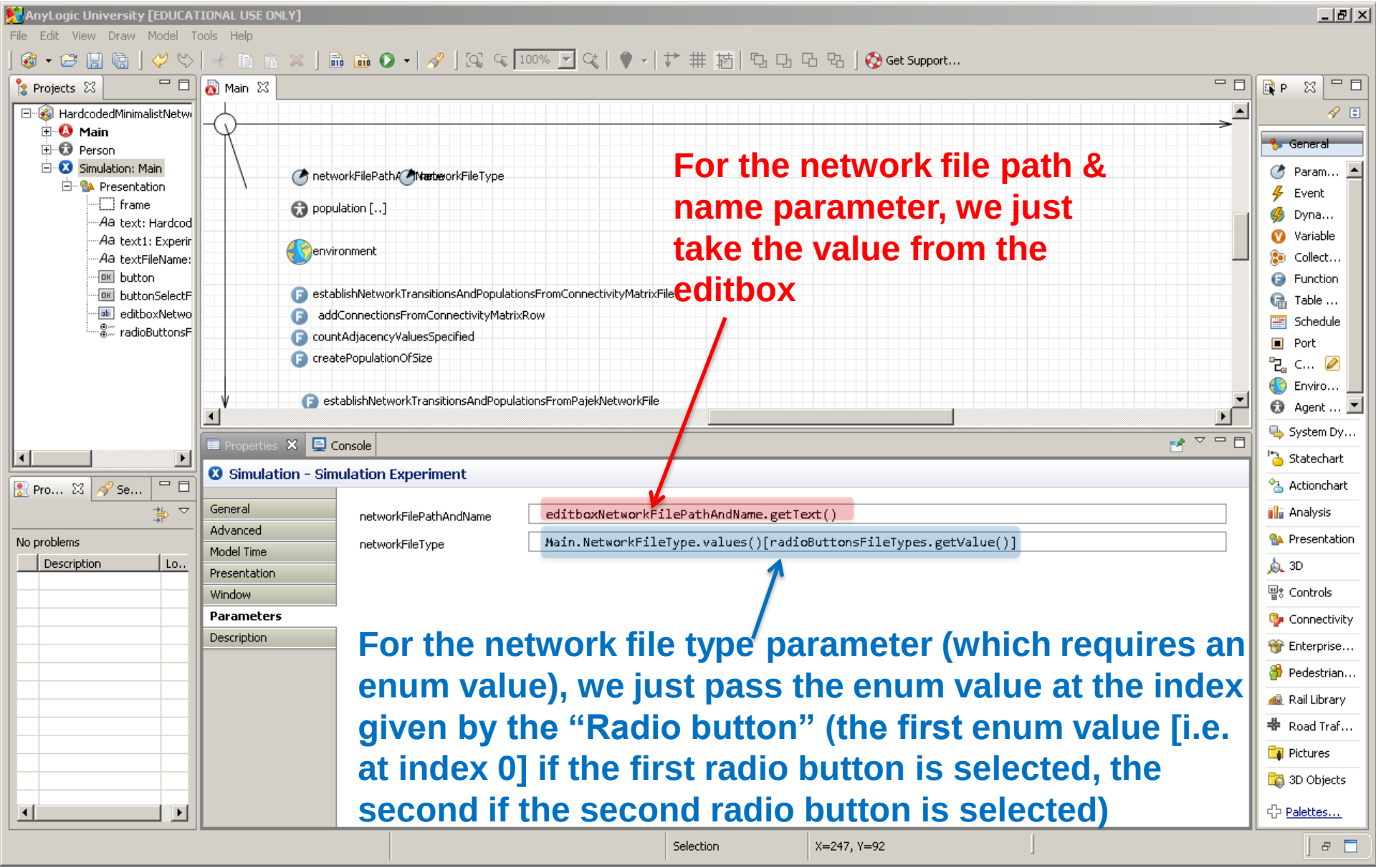
Pajek File
Connectivity Matrix File
<add new element>
Orientation: Vertical Horizontal
Link to:
Default value:
Enabled:
Action:
No problems
Description
General
System Dy...
Statechart
Actionchart
Analysis
Presentation
3D
Button
Check Box
Edit Box
Radio But...
Slider
Combo Box
List Box
File Chooser
Progress ...
Connectivity
Enterprise...
Pedestrian...
Rail Library
Road Traf...
Pictures
3D Objects
Palettes...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File Edit View Draw Model Tools Help
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radioButtonsF
Main
networkFilePathA
workFileType
population [..]
environment
establishNetworkTransitionsAndPopulationsFromConnectivityMatrixFile
addConnectionsFromConnectivityMatrixRow
countAdjacencyValuesSpecified
createPopulationOfSize
establishNetworkTransitionsAndPopulationsFromPajekNetworkFile
For the network file path & name parameter, we just take the value from the editbox
Properties
Console
Simulation - Simulation Experiment
General
Advanced
Model Time
Presentation
Window
Parameters
Description
networkFilePathAndName
editboxNetworkFilePathAndName.getText()
networkFileType
Main.NetworkFileType.values()[radioButtonsFileTypes.getValue()]
For the network file type parameter (which requires an enum value), we just pass the enum value at the index given by the "Radio button" (the first enum value [i.e. at index 0] if the first radio button is selected, the second if the second radio button is selected)
No problems
Description
General
Param...
Event
Dyna...
Variable
Collect...
Function
Table ...
Schedule
Port
Enviro...
Agent ...
System Dy...
Statechart
Actionchart
Analysis
Presentation
3D
Controls
Connectivity
Enterprise...
Pedestrian...
Rail Library
Road Traf...
Pictures
3D Objects
Palettes...
Selection
X=247, Y=92

Startup Code for Main