Dynamic Populations and Networks (& Events!)

Using Modeling to Prepare for Changing Healthcare Needs

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Critical Role of Network & Population Dynamics

- We have introduced the basic mechanisms for
  - Creating populations of pre-specified size
  - Creating network from a pre-specified set of network categories
- However,
  - Open populations (e.g. with immigration, death, birth) are the norm
  - Research suggests that many types of networks dynamics (serial partnerships, differing contact durations) are important to contagion dynamics

AnyLogic's Support of Network & Population Dynamics

- Fortunately, AnyLogic provides strong support for
  - Adding & removing population members
  - Adding & removing connections
- However, this support does not yet have direct graphical interface support or specification
  - using this support does require that you call "methods" to accomplish this

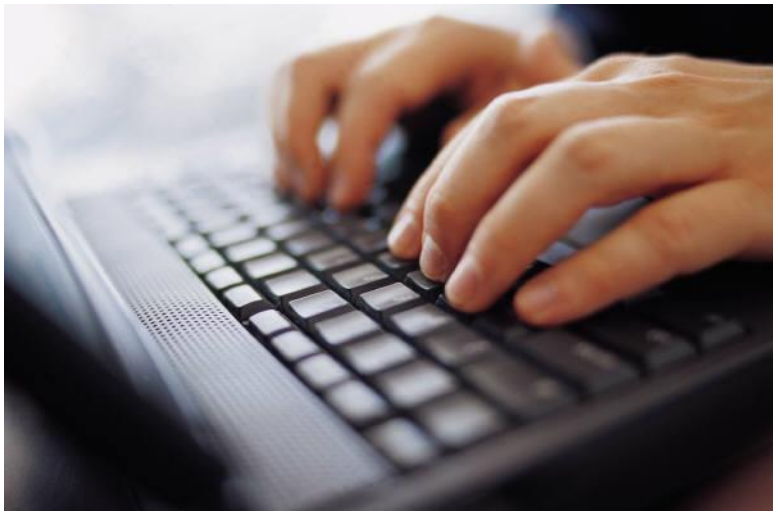
AnyLogic Support for Changing Populations

- Adding to population
  - add_*populationname(parameters)*
    - *Allow explicit specification of agent parameter values*
  - add_*populationname()*
    - *Uses* population *specification of agent parameter values*
- Deleting from population
  - remove_*populationname*(agentToBeRemoved)

AnyLogic methods for Adding & Deleting Connections

- *agentA*.connectTo(*agentB*)
  - Connects *agentA* to *agentB*
  - NB: Connections are assumed to be undirected and symmetric (i.e. if *agentA* is considered to be connected to *agentB*, then *agentB* is considered to be connected to *agentA*)
- *agentA*.disconnectFrom(*agentB*)
  - Disconnects *agentA* and *agentB* from each other
- For more details and additional methods, see the slides for the *Networks* lecture

Hands on Model Use Ahead



Load Provided (or Previously Built) Model:

MinimalistNetworkABMModel

Suggest Saving as "**MinimalistNetworkABMModelWithOpenPopulation**"

Add Immigration (using Event)

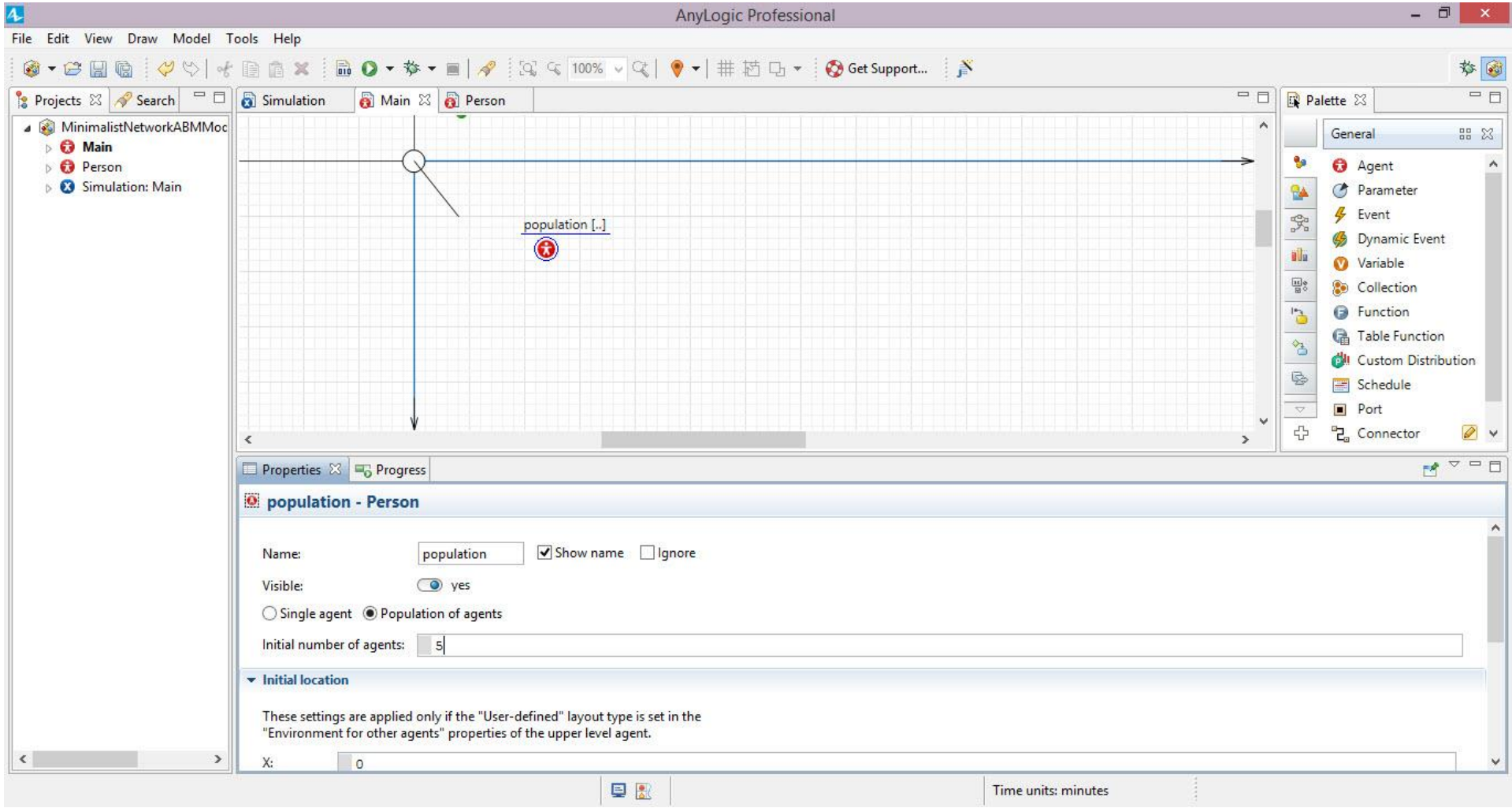
- Assume 5 people coming in per year
- We create an event to add people to the population

Add Death (using Statechart)

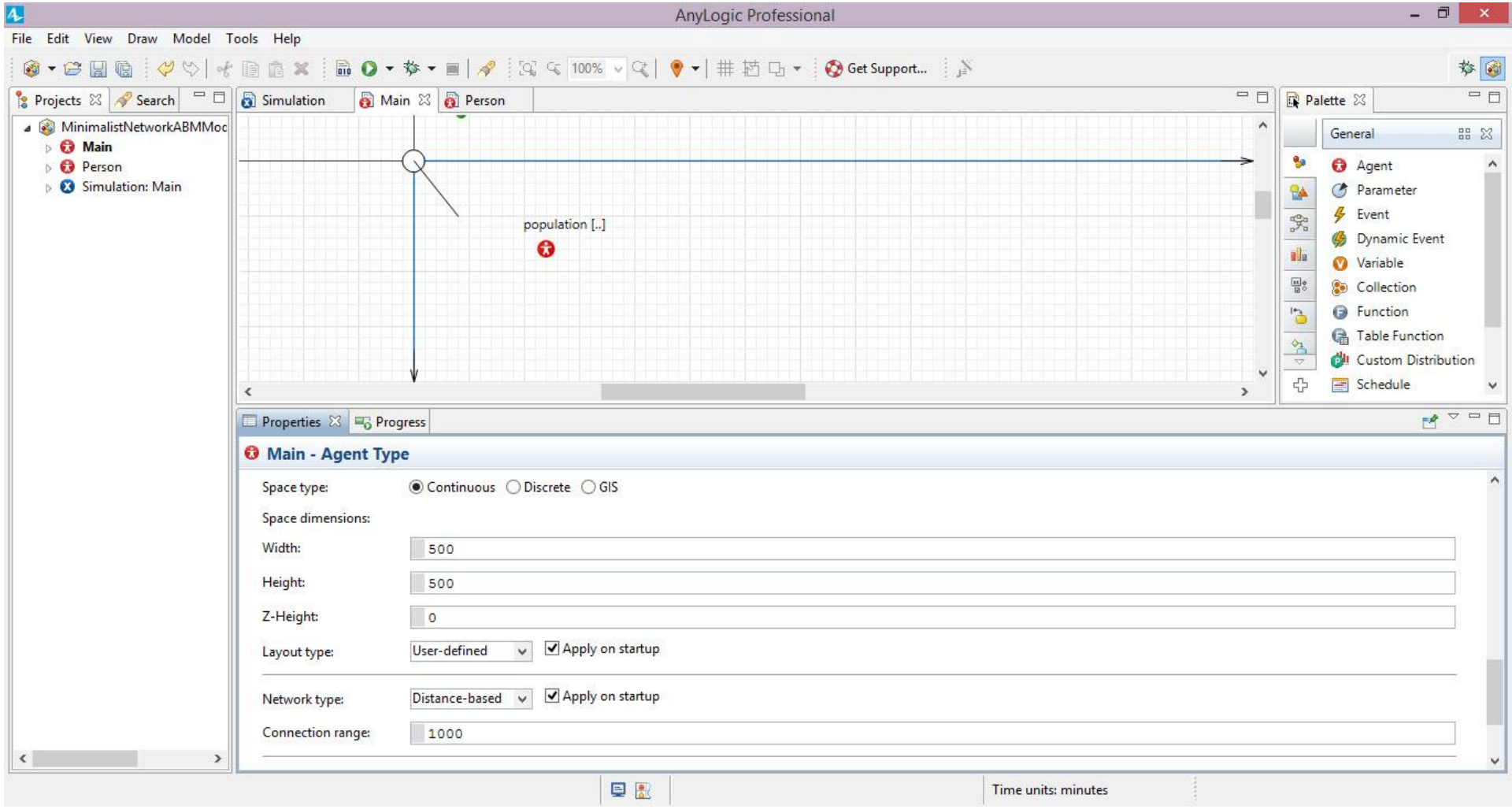
- Define

Add Birth (Using Statechart)

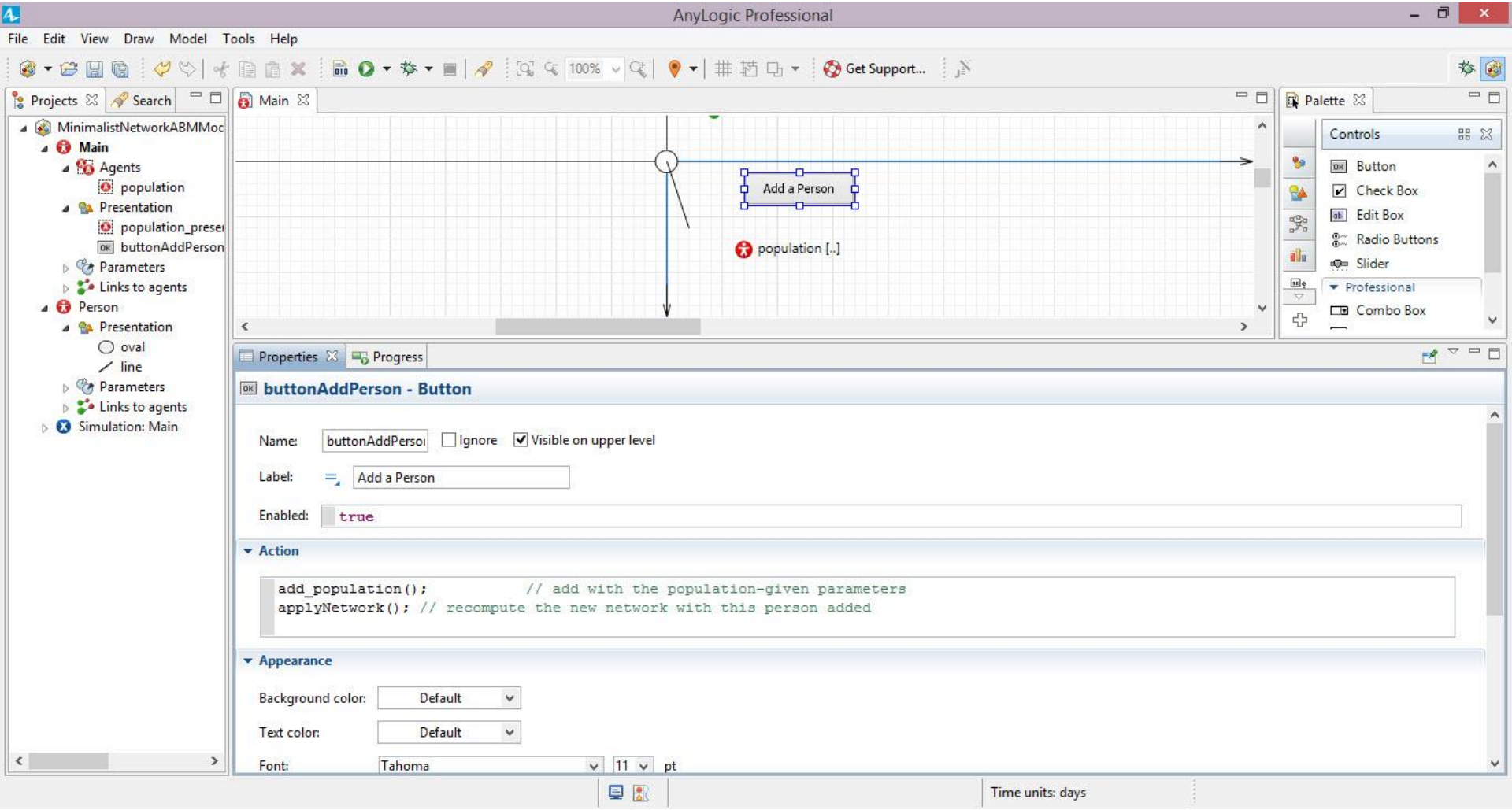
Set Small Population Size (5)



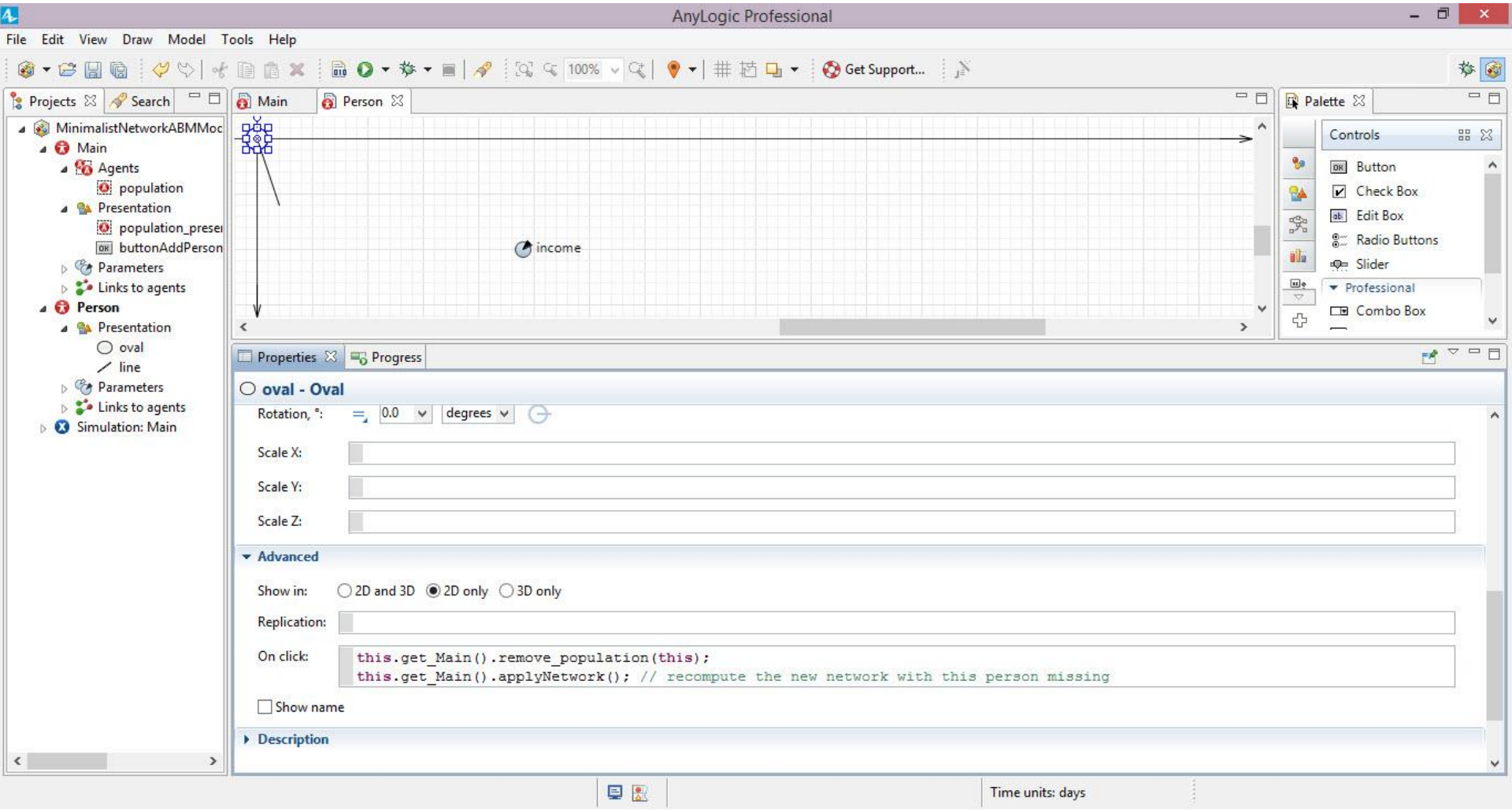
Set Distance Based Network with High Connection Range Threshold



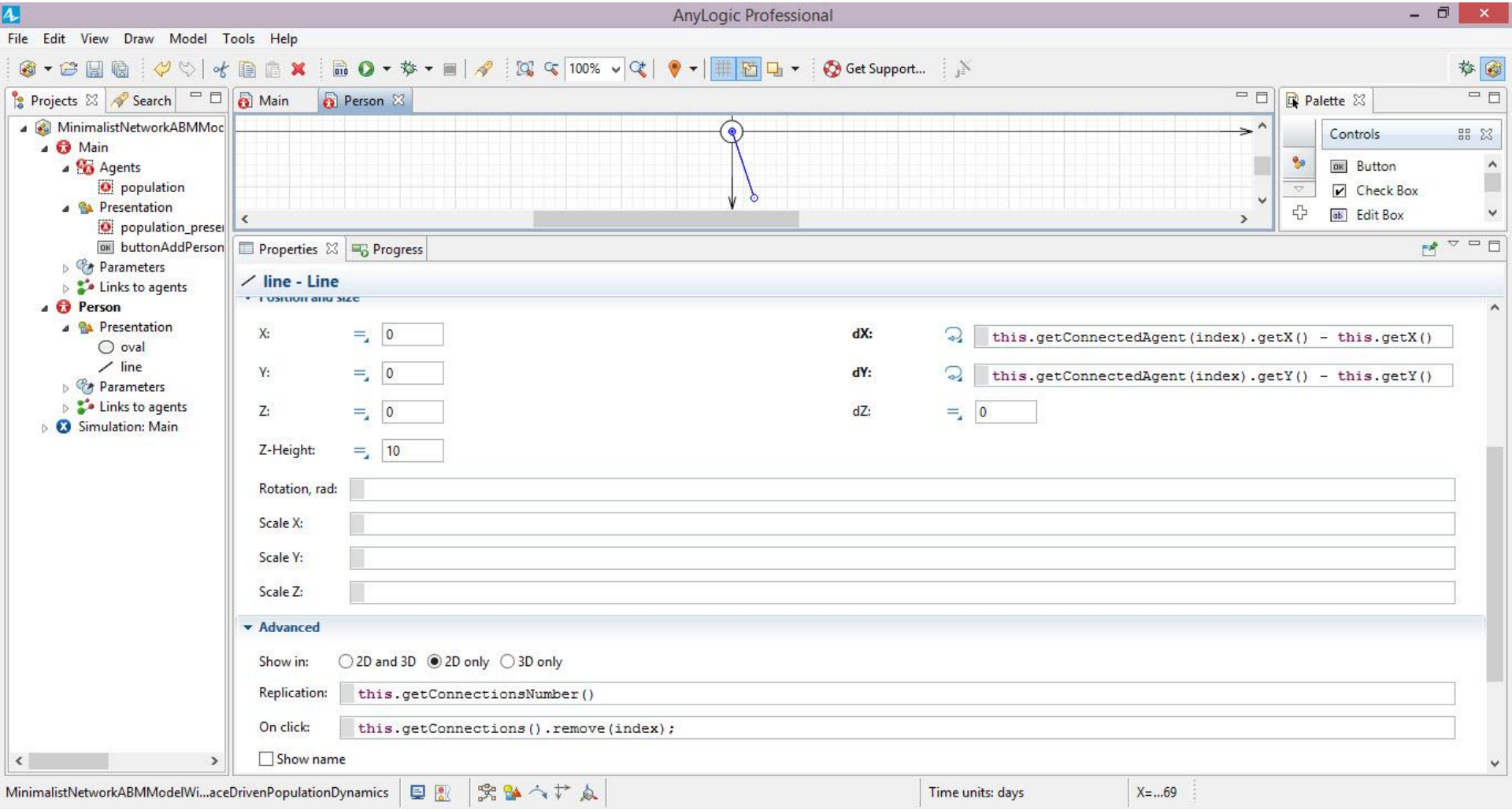
To Main: Add Button to Request Adding Population Member



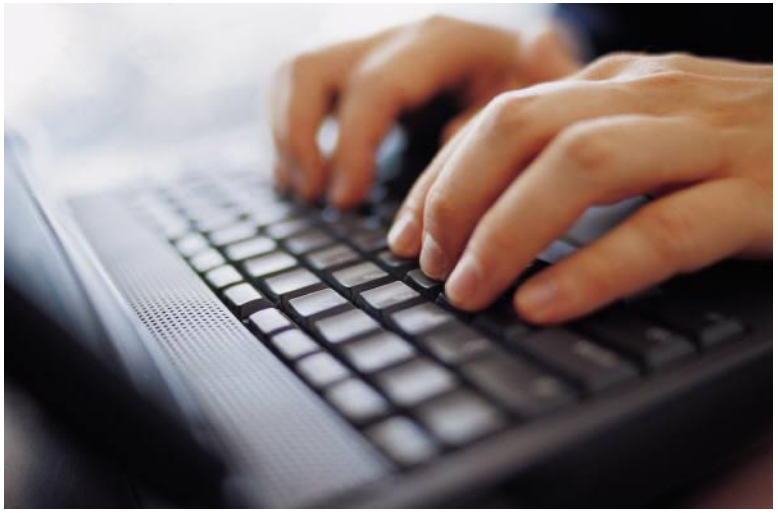
To Person's "Oval", Add a "Handler" to Delete a Person if their Node is Clicked



To Delete a Connection Between two Agents when Clicking on a Visual Link



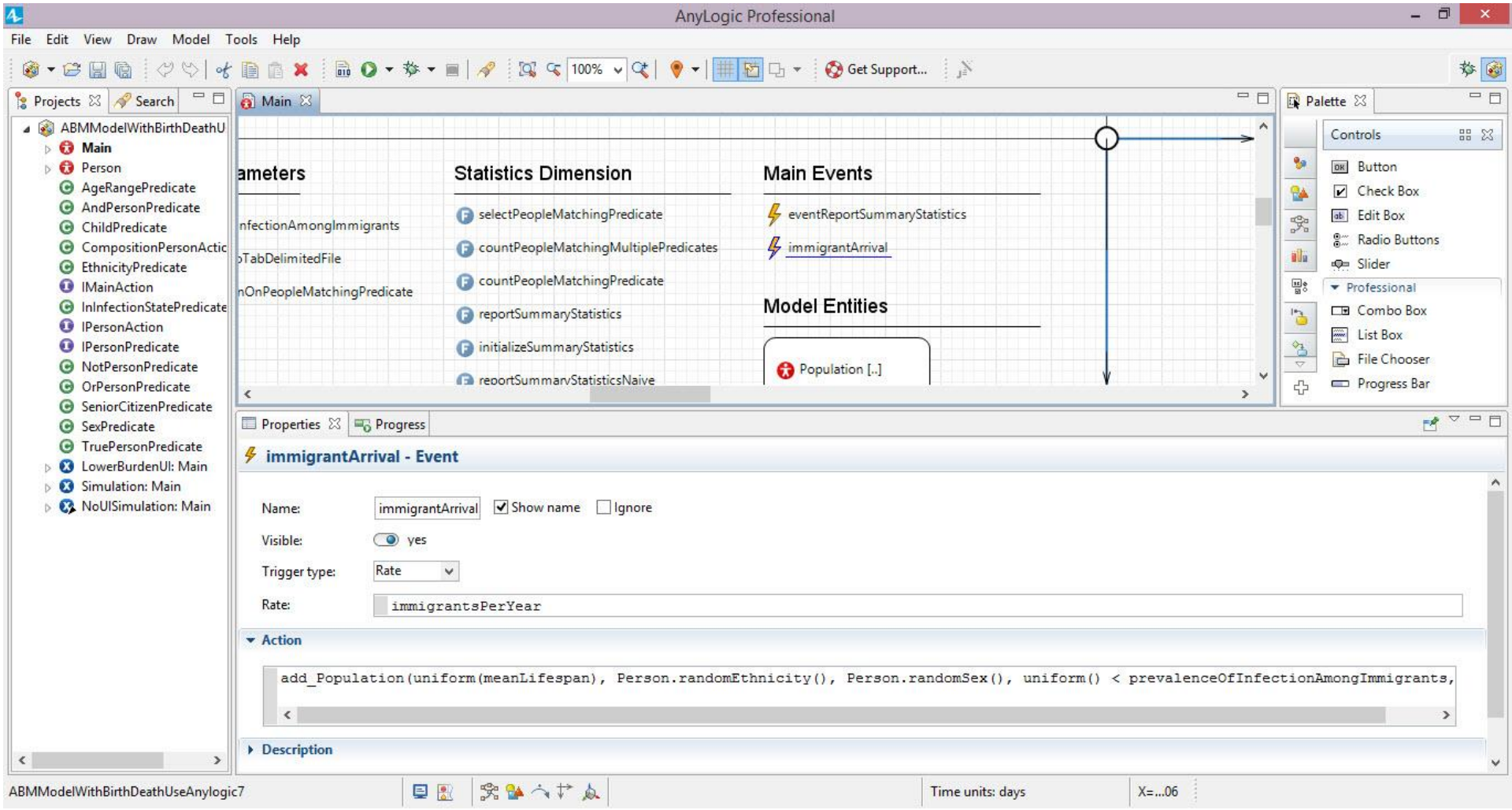
Hands on Model Use Ahead



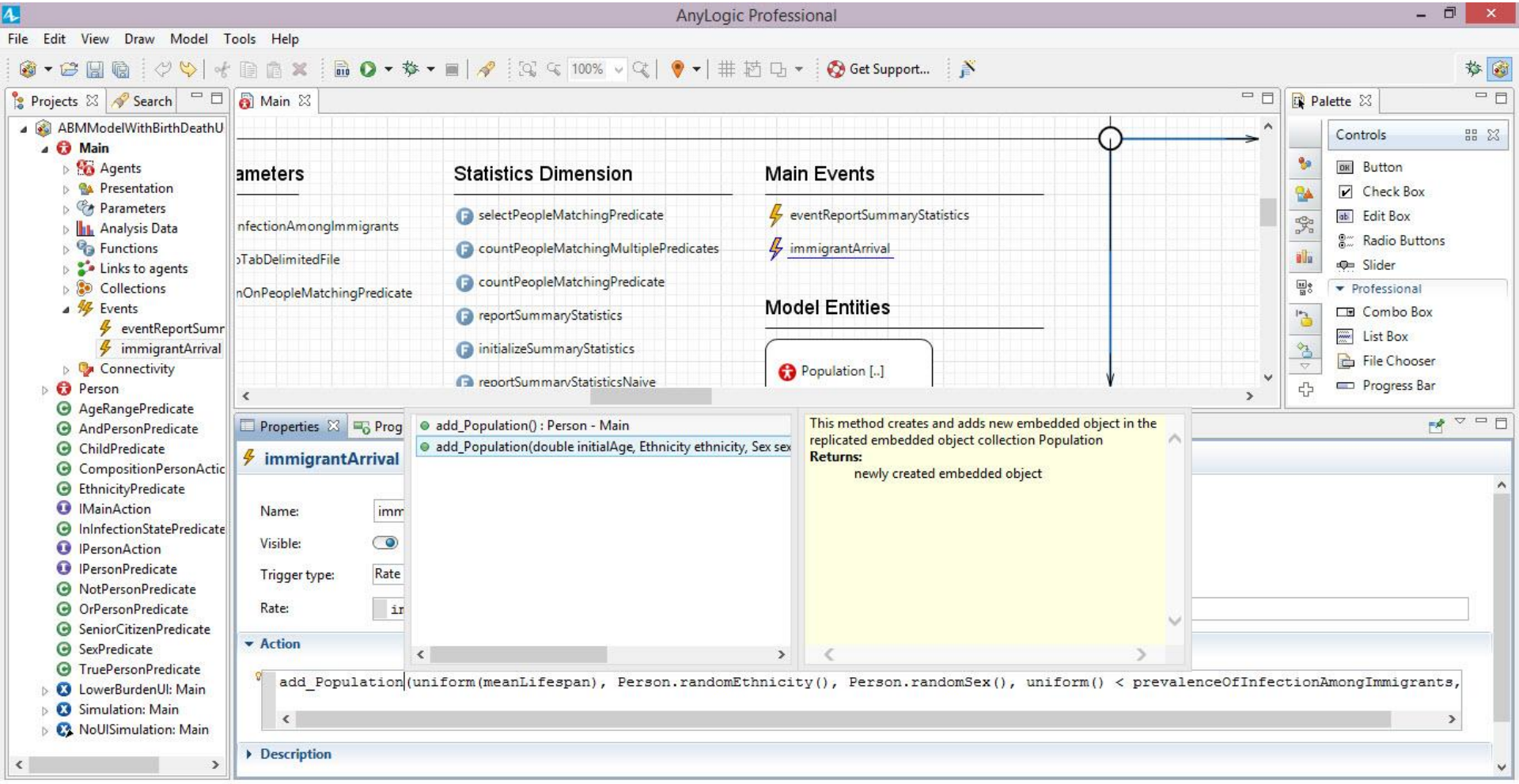
Load Provided Model:

ABMModelWithBirthDeath

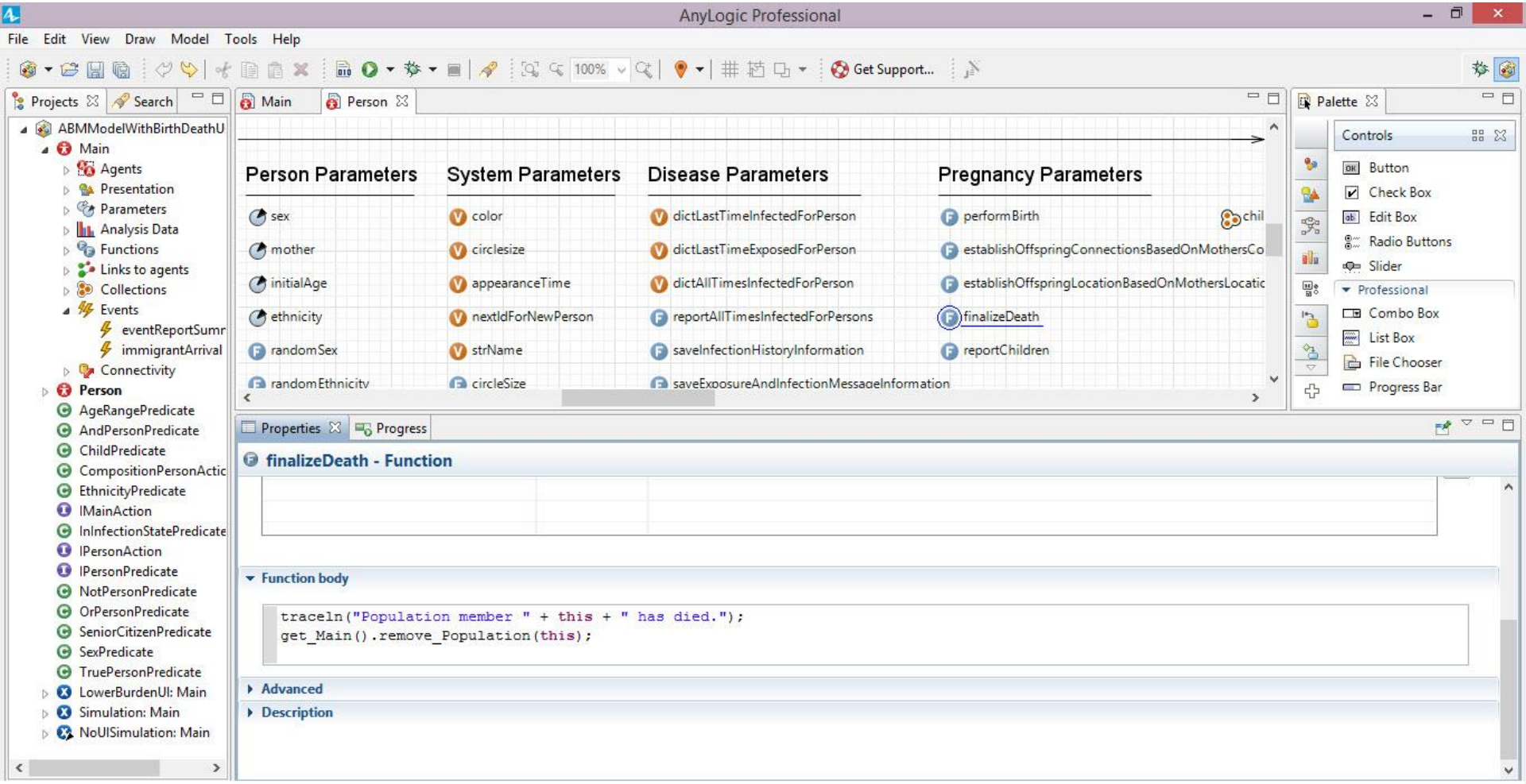
Adding an Immigrant to the Model Population



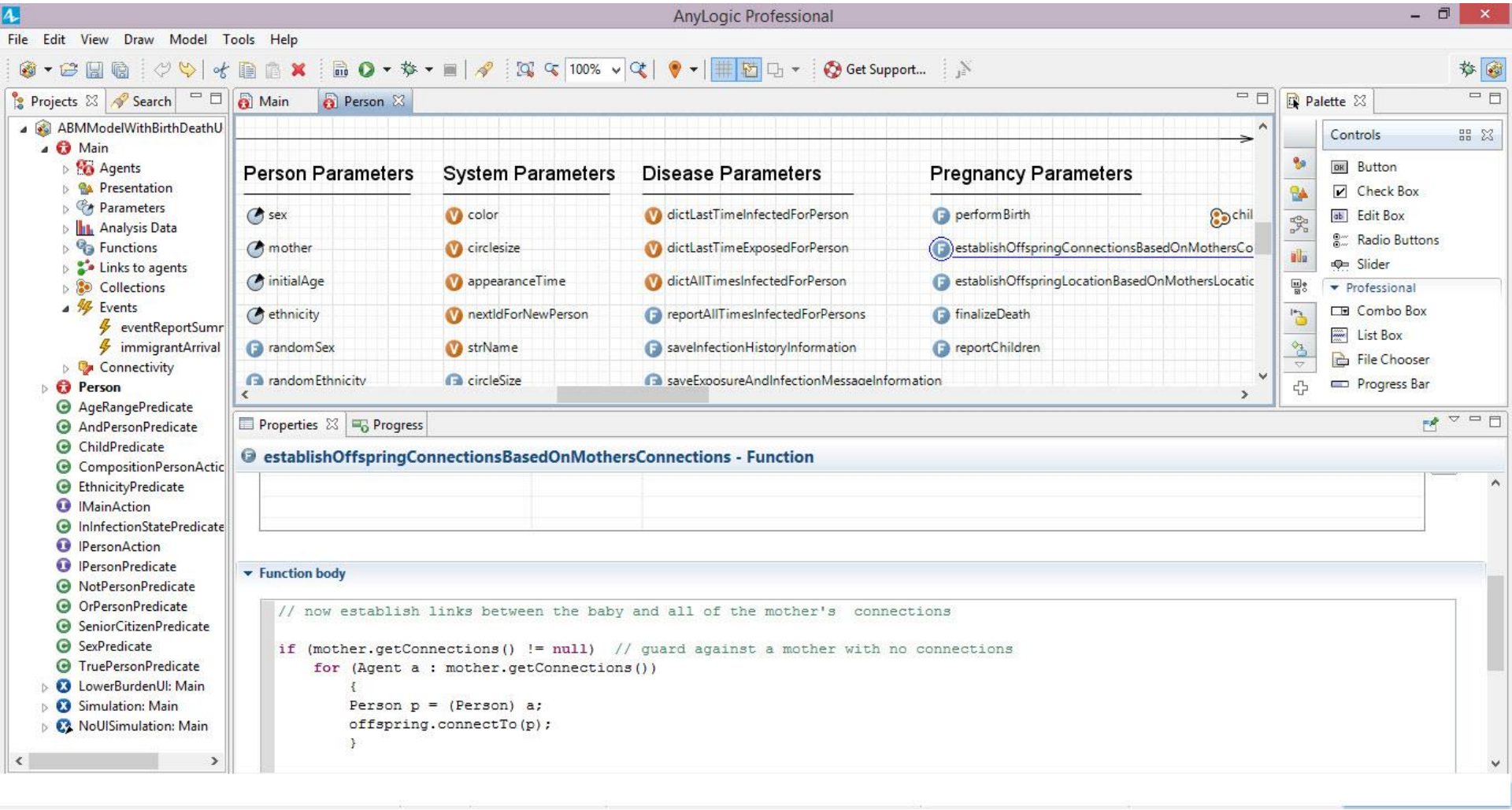
Add Population Options – Note Customization to Context



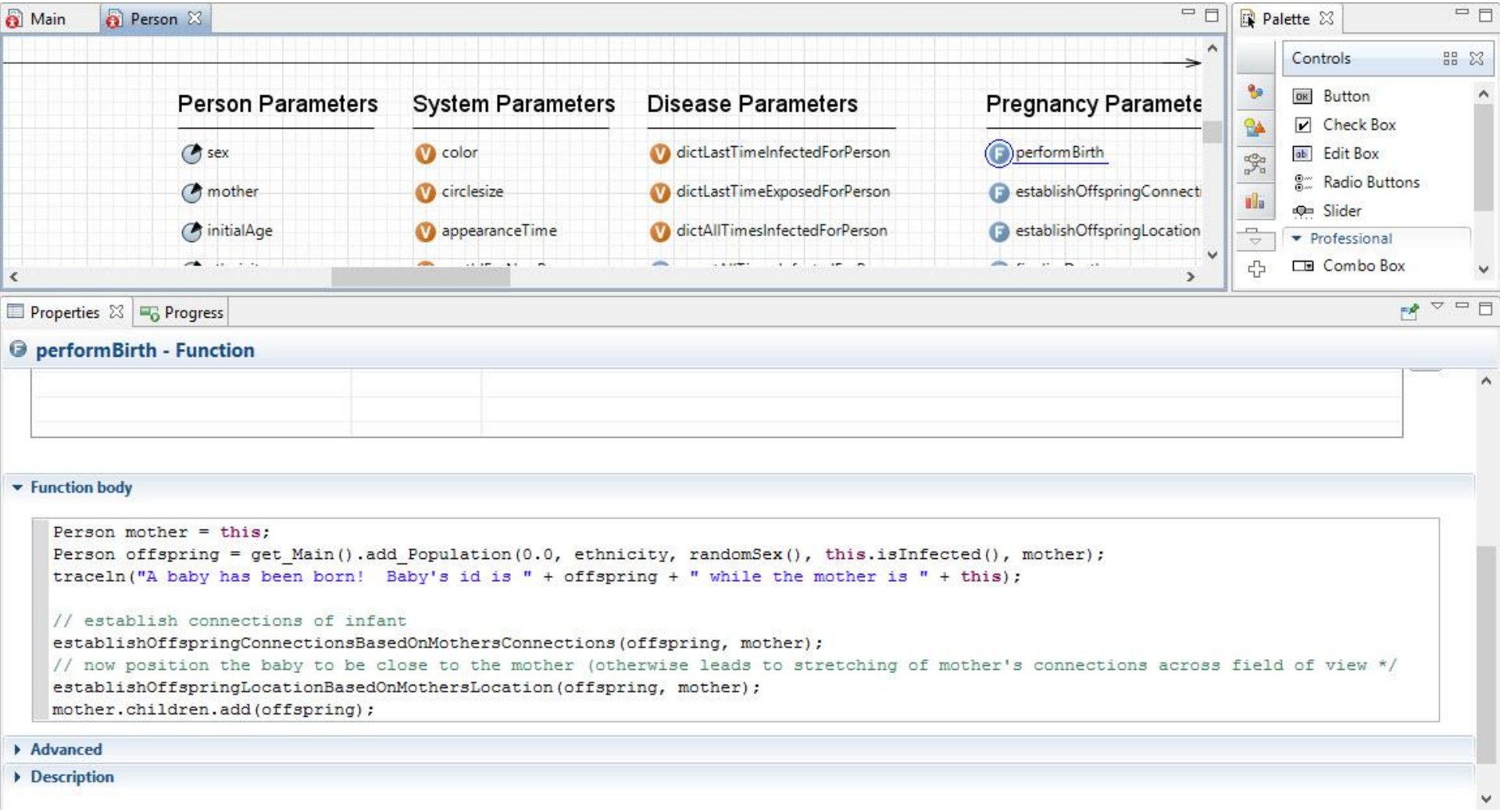
Removing a Population Member



Establishing Baby's Connection
Looping over Connections



Code to Perform Birth



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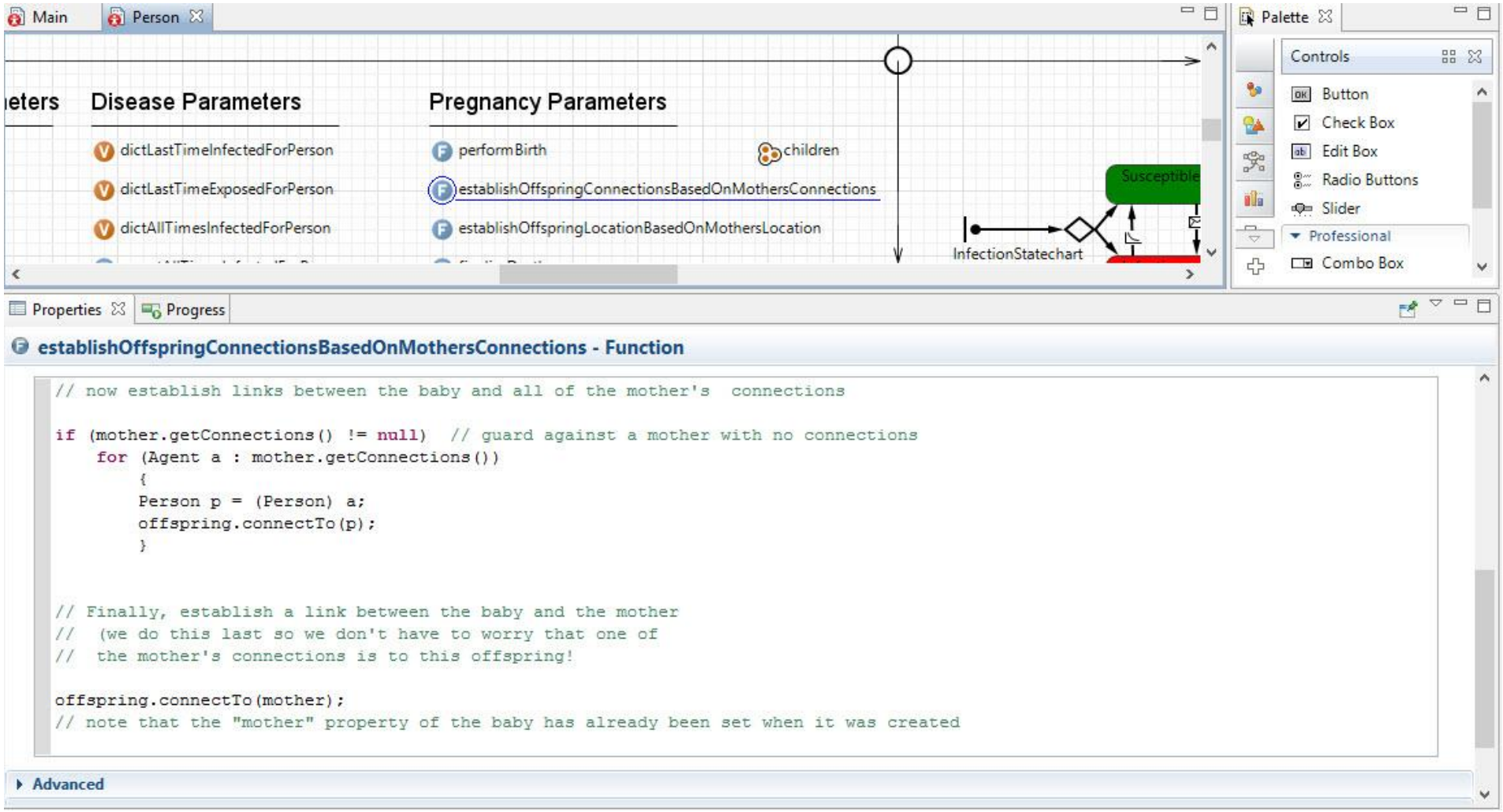

Setting Offspring Location