

## HEALTHCARE OUTPATIENT MODEL

- Click Object and Containment and add 3 New Objects called Patient1, Patient2, and Patient3. Check the box that says Display Object Value.
- Click Define Object Dimensions (3D) and change the colors of the different Objects. Close the dialog boxes.
- Add a Start Process and call it Registration. Double click the Start Process (Registration) and click Define Object Creation Rules.
- Click Create Objects Based on Distribution. Select Patient1 from the Object Type list. Change the percentage to “30”.
- Select Patient2 and 3 from the Object Type list. Make the percentage for Patient2 “30”, and Patient3 “40”. Close dialog boxes.
- Add a Generic Process and name it Waiting Room. Click the Process Capacity and Buffer and change the Queue/Buffer Capacity to “15” Objects and leave the Process Capacity at “1”.
- Create another Generic Process and name it “ProcedureRoom1”. Edit the Process Timing Properties by adding Patients 1, 2, & 3 to the Object List.
- Add in the values shown on the table below:

Object List	Cycle(Min)	Cycle(Max)	Loading	Unloading	Distribution	Mean	StdDev	Del
Default Timing	0.0	0.0	0.0	0.0	Std. Normal	0	0	<input type="checkbox"/>
Patient1	5	20	0.00	0.00	Normal Distri	12	5.47	<input type="checkbox"/>
Patient2	15	40	0.00	0.00	Normal Distri	32	4.65	<input type="checkbox"/>
Patient3	30	90	0.00	0.00	Normal Distri	50	4.89	<input type="checkbox"/>
New Object Timing								<input type="checkbox"/>

- Change the Process Capacity and Buffer so that Queue/Buffer Capacity is “0” and leave the Process Capacity at “1”.
- Right click on ProcedureRoom1 and copy it. Paste two copies below and rename them ProcedureRoom2 and ProcedureRoom3.
- By selecting the 3 processes, you can right click and go the align section and select “Left” so the processes are in a straight line. Do this for ProcedureRoom2, Waiting Room, and Registration so they are also aligned. (Align Bottom).
- Create another Generic Process called Recovery Area. Change the Queue/Buffer Capacity to “0” Objects and leave the Process capacity at “15”.
- Add an End Process and name it Discharge.

- Align the processes.
- Connect the Flow.
- With the Selection Tool, select the connection lines going from Waiting Room to ProcedureRoom1, 2, & 3. Right click and select Item Properties. Click the Customize Option and edit the Behavior. Click the checkbox next to Enable Object Poling and make sure to check the box Apply behavior to all selected connections.
- Run the simulation. Notice how the Patients in the Waiting Room are only going to Procedure Room 1. To change that:
  - Stop the simulation. Open the properties of Waiting Room (double click it). Open the Customize option and select Least Busy/Randomized Routing. Check the box next to "Select the least busy process". Run the simulation again and you should see the Patients go to the other Procedure Rooms. Stop the simulation.
  - Select the Results Process button from the Processes Toolbar and place a Results Process underneath Waiting Room. Click Add Parameter.
  - Add in the information shown on the table below:

Dynamic Display List

Display	Context	Context Detail	Object	Parameter	Type	Exp	Format	Del
#Waiting	Process	Waiting Room		Total Object Count	Last		Integer	<input type="checkbox"/>

- Change the text background colors so when the value is a certain number, the text background color will change. Fill out the information as shown in the image below:

Normal/Warning/Error color control

Enable color control

Set text background color to  ... When value is <  10

Set text background color to  ... When value is =  10

Set text background color to  ... When value is >  10

- Run the simulation. Notice how the background color changes when the number of patients gets to a certain value.
- Open the Recovery Area Process Timing Properties. Fill out the table based on the information below:

Object List	Cycle(Min)	Cycle(Max)	Loading	Unloading	Distribution	Mean	StdDev	Del
Default Timing	0.0	0.0	0.0	0.0	Std. Normal	0	0	<input type="checkbox"/>
Patient1	20	40	0.00	0.00	Std. Normal	0	0	<input type="checkbox"/>
Patient3	30	90	0.00	0.00	Std. Normal	0	0	<input type="checkbox"/>
Patient2	30	50	0.00	0.00	Std. Normal	0	0	<input type="checkbox"/>
New Object Timing								<input type="checkbox"/>

- Speed up the simulation. Pull up the Model Information tab and view the results. Stop the simulation.
- Under the Model Build tab, click on Resources and Shifts.
- Add a Resource and name it Doctor. Change the Available Number to 2.
- Add another Resource and name it Transport with an Available Number of 2. Click Add. Make sure Transport is selected and check the box Add Transition Behavior. Change the Speed to 1.5 units/sec. Accept the changes.
- Select Procedure Rooms 1, 2, & 3 and open their properties. Open the customization tab and select Resource Constraints. Change the Required Number of Doctors to 2. Make sure the box at the bottom that says Apply Resources To All Selected is checked. Accept the changes.
- Select all the connection lines from Waiting Room to Recovery Area. Open their properties. Open the customization tab and select Resource Constraints. Change the Required Number of Transports to 1. Check the box Apply Resources To All Selected is checked. Accept the changes and run the simulation.
- Speed up the simulation and go to the Analysis tab. Under Model Information Report, select Resource Allocation and view the results.
- Under Simulation Summary, select Report In Seconds (W/Resource Summary) and view these results.
- Select all the processes. Under the Value Stream Map, click Display Mode and Select Value Stream Map from the list. Then select Waiting Room, all Procedure Rooms, and Recovery Room and open their properties. Open the Customization tab and select VSM.
- Check the boxes from Display Total Objects Processed to Display Process Efficiency and also check Apply VSM to All Selected Processes. Accept the changes.
- By making these processes larger (by dragging a corner of one box) it is possible to view the information.
- Open the Waiting Room properties and select Display Settings 2D/3D. Make sure only Display In Process Objects is checked. Accept the changes. Change the Display Mode back to Model View and stop the simulation.
- Under the Analysis tab, choose Additional Data Collection. Under Step 1 choose Object and Patient 1. For Step 2, select Patient1 for Based on Object Type. Check the box that says Parameter to Track and choose ObjectLeadTime from the list. For Step 3 choose ObjectCompleted. Then click Add.
- Do the same for Patients 2 & 3.
- Run the simulation. Under the Analysis Tab again, by clicking Dynamic Data Graphs you can view the results by selecting one of the 3 events you just created in the previous step. Stop the simulation.
- Click Define Scenario Set and select Create New Set. Name it Healthcare Example Scenario. Close the dialog box.
- Under the Analysis tab, check the box Auto Increment Name and name it Scenario. Now run the simulation.



- Now stop the simulation. Once it stops, it automatically saves this scenario. When you make changes and run the simulation again, it automatically saves as Scenario2 and so on.
- Edit the Process Timing Properties of ProcedureRoom1. Change the Cycle(Max) for Patients 1, 2, & 3 as follows: Patient1: 40. Patient2: 60. Patient3: 120. Accept the changes.
- Now click on Resources and Shifts. Change the Available Number of Doctors to 3 and the number of Transports to 5. Accept the changes.
- Run the simulation. Let it run for a short time and stop it. A new scenario will save automatically.
- Click Scenario Analyzer. In this window, click Open Existing Scenario Set and choose Healthcare Example Scenario that we created earlier.
- Expand the tree and check the boxes of the results you would like to view. When you check the box of one part of the scenario set and click Graph Quad 1 for example, the information of the box you check will show up on that graph.
- Check the box Detailed Data Collection.
- Run the simulation.
- Under the Analysis tab, click Schedules (Object/Resources). Here you can select any of the patients from the list and view the report.
- Stop the simulation.
- Adding images to processes.
- Open the Display Settings 2D/3D of Waiting Room. Uncheck the box Use Default Process Image. Then click browse and select an image to use for Waiting Room. You may do the same for the rest of the processes.