

Vaccination Centre JaamSim Model

Instructions

The
Strategy
Unit

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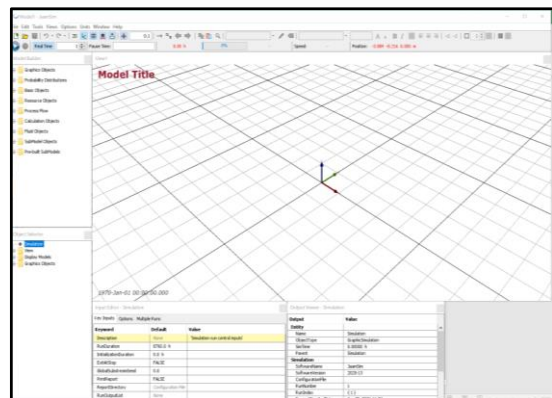
(anastasiia.zharinova@nhs.net), based on a model developed by Wolverhampton ICS with our advice[1]

This excel spreadsheet processes the results generated by the vaccine centre discrete event simulation (DES) model.

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1. Install JaamSim

JaamSim is an open source discrete event simulation software that does not require a license. To run the model you will need to install JaamSim following the instructions in the manual (see link below). Please ensure that you have an appropriate version of Java and your graphics drivers are up to date, (if you have problems please also try the 32 bit JaamSim even if you have a 64 bit machine as this has resolved issues for some people). Once installed when you open JaamSim you should see this default screen: --->



>>>Click this link to download the JaamSim Manual page 6 has the installation instructions

>>>Click this link to choose the appropriate version of the JaamSim program to download

Further info:

JaamSim website: <https://jaamsim.com/>

JaamSim github: <https://github.com/jaamsim>

2. JaamSim setting up and running the model

Once JaamSim is installed, you can open the model configuration file "SU VacCentre DES 2021-01-29.cfg" using the menu in the control panel at the top choose "File" then "Open".

There are 4 views available:

- 1_Parameters** - shows the 'Input Model Parameters' table, where you can change the parameters of the model
 - 2_Model** - shows the process flow of the model, when running you can observe where bottlenecks appear
 - 3_Adjustable** - allows you to pan around and zoom in on aspects of the whole model.
 - 4_Components** - where additional components needed for the model to run are kept, e.g. distributions. Unless you are adapting the model you won't need to change anything here.
- You can move between views using 'Views' Menu on the Control Panel at the top of your screen.

2.1 Changing the model parameters

The parameters view in the model focuses on the inputs you can customise in the 'Input Model Parameters' table. By clicking on the orange text you can type your own settings into the model.

Parameters			
COVID Vaccine Centre Simulation			
This model was adapted for wider use by The Strategy Unit 28th January 2021 based on a model developed with Wolverhampton ICS For full model description and instructions, please go to www.strategyunitwm.nhs.uk			
Input Model Parameters:			
Patient Arrivals		Activity Timing Distributions (mins)	
Number of arrivals expected per day	620	1. Temperature check	
Number of hours for arrivals	10 h	Minimum	0.5 min
Resources		Mode (most common)	0.5 min
Temperature Check	1	Maximum	0.5 min
Sign In Staff	1	2. Sign in	
Vaccinators	7	Minimum	0.5 min
Observation spaces	15	Mode (most common)	0.5 min
Queue Spaces		Maximum	0.5 min
From Temperature Check to Sign In	3	3. Administer vaccine	
From Sign In to Vaccination	23	Minimum	5 min
From Vaccination to Observation	0	Mode (most common)	5.5 min
Output Acceptable Wait Settings		Maximum	7 min
Temp. check - percent waiting over	5 min	4. Observation	
Sign in - percent waiting over	15 min	Minimum	15 min
Vaccination - percent waiting over	15 min	Mode (most common)	15 min
Observation - percent waiting over	5 min	Maximum	15 min
		Conveyance Timing Distributions (mins)	
		1. To park a car	
		Minimum	1 min
		Mode (most common)	3 min
		Maximum	5 min
		2. Walk car park to tempcheck	
		Minimum	1 min
		Mode (most common)	2 min
		Maximum	3 min
		3. Walk tempcheck to sign in	
		Minimum	0.5 min
		Mode (most common)	0.5 min
		Maximum	0.5 min
		4. Walk sign in to vaccination	
		Minimum	0.5 min
		Mode (most common)	0.5 min
		Maximum	0.5 min
		5. Walk vaccination to observation	
		Minimum	1 min
		Mode (most common)	1 min
		Maximum	1 min
		6. Walk observation to car	
		Minimum	2 min
		Mode (most common)	5 min
		Maximum	7 min
		7. Walk observation to car	
		Minimum	2 min
		Mode (most common)	5 min
		Maximum	7 min
		8. Car to site exit	
		Minimum	1 min
		Mode (most common)	1 min
		Maximum	1 min

In the first column you can update:

Patient Arrivals - how many people on average you aim to see in one day and how many hours they arrive over, make sure to state the number of hours with a space and the letter h afterwards to ensure the model knows it is in hours.

Resources - This is the number of patients that can be consecutively processed at each activity (Temperature check stations, sign in stations, vaccination bays and observation places). The model currently assumes there are sufficient staff that there is no gap in service.

Queue Spaces - the number of people able to queue whilst maintaining social distancing each of the activities may be limited by physical space constraints. Here you can enter how many people can fit between the activities in the centre you are modelling. The model will use these to pause activities when patients are unable to move forward until there is a space ahead of them. The model currently assumes that those waiting for temperature check are able to queue outside with out a limit to maximum length.

Output Acceptable Wait Settings - If you are interested in what percentage of patients wait longer than a certain length of time at each activity you can enter it here and it will change these measures into the output file. For example if patients are in a standing queueing outside you may want to aim for a shorter wait than inside with chairs provided. Please ensure you enter the figures in minutes with space min afterwards e.g. "5 min" or it will cause an error.

In the second column:

Activity Timing Distributions - For each of the 4 activities (temperature check, sign in, vaccination and observation) supply the timing parameters. These currently use triangular distributions until more detailed distribution data is available, enter the minimum, the mode (most common) and the maximum time these activities take to perform. If the values entered are the same for the minimum, mode and maximum a fixed rate that doesn't vary is presumed. Please ensure that you enter the figures followed by space min e.g. "5 min" and that the minimum is less than or equal to the mode and that the mode is less than or equal to the maximum or it will cause an error.

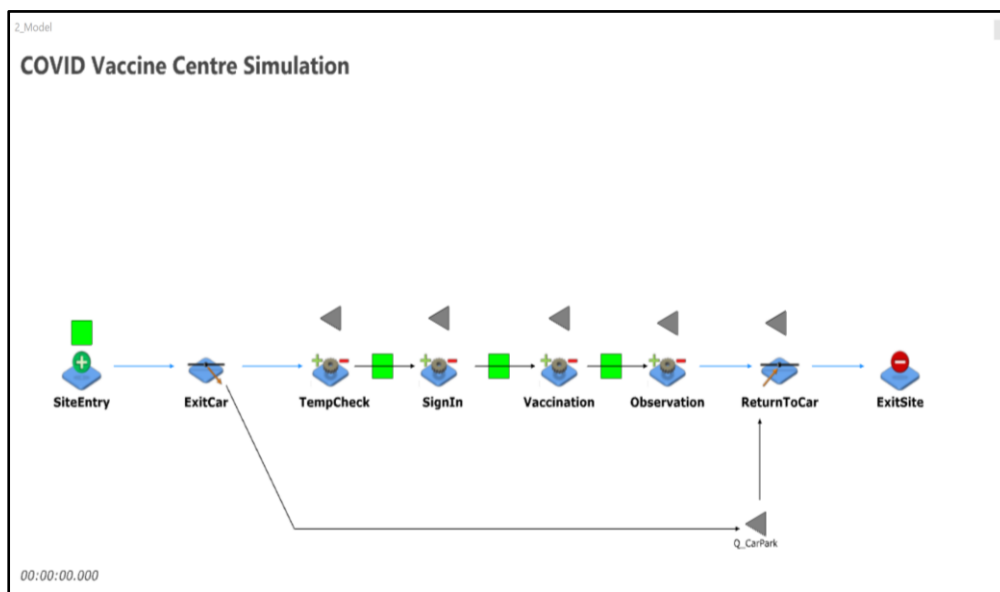
In the remaining section of the table:

Conveyance Timing Distributions - The times it takes to move from one activity to another (e.g. from parking a car to the temperature check area). There are 7 conveyance timings set up in this version of the model, the model allows patients to over take each other when finding a car park space, getting to the temperature check and then when leaving the building and the car park (the blue arrows in the model, see diagram in the next section) but not once they have entered the temperature check queue (black arrows in the model, see diagram in the next section).

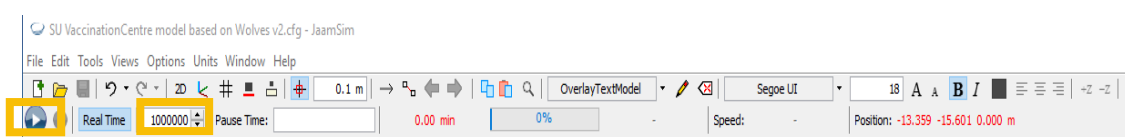
Currently the model assumes that everyone comes by car, one person per car. This is something you may want to develop in a future development of the model to suit your local situation. These currently use triangular distributions until more detailed distribution data is available, enter the minimum, the mode (most common) and the maximum time these activities take to perform. If the values entered are the same for the minimum, mode and maximum a fixed rate that doesn't vary presumed. Please ensure that you enter the figures in minutes followed by space min e.g. "0.5 min" and that the minimum is less than or equal to the mode and that the mode is less than or equal to the maximum or it will cause an error.

2.2 Running the model

Once you have set up your model you are ready to run it. If you wish, you can watch the patients going through the model in the 2_Model view:



To run the model you need to press 'Run' button in the Control Panel (blue circle with white triangle in).



You can adjust speed of the run using the speed multiplier in the box next to real time, we suggest starting at a speed around 400 initially so you can visually check the model is running as you would expect and view where bottlenecks might be. You may then want to increase the speed 1000000 times real time using the up arrow next to the box or by typing it in. The model is set to run 200 iterations at the higher speed this should not take long, each one samples from the distributions to account for the variability seen and so produces different results on each run.

3. Processing the model results

This excel template has been provided to help with formatting and processing the results, it produces a chart and a table from the model output.

Once model has finished running, it will save a **.dat** file to the same folder as you have the model configuration file with the same name as the **.cfg**. Open the .dat file in excel.

Copy the contents into the "Paste ,Dat file here" worksheet.

The "Outputs Table and Chart" will update automatically.