

DR. ALVIN'S PUBLICATIONS

# A BRIEF COMPARISON OF THREE SIMULATION SOFTWARES

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ARENA | ANYLOGIC | FLEXSIM  
DR. ALVIN ANG



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# INTRODUCTION

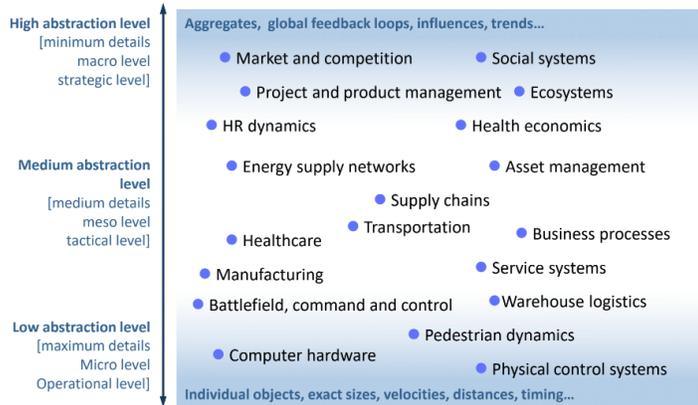
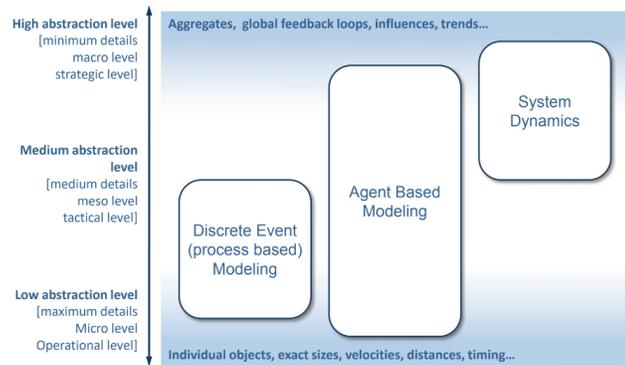
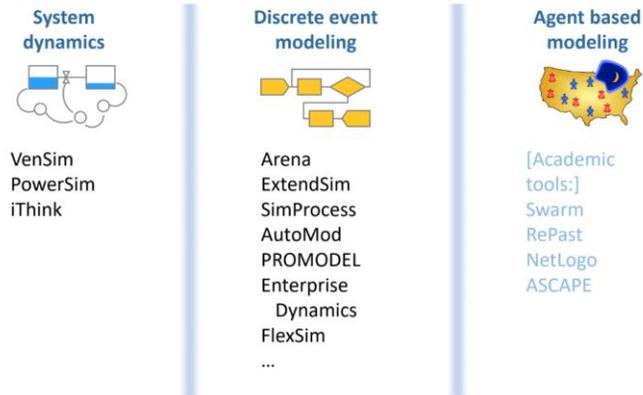


Figure 1: Three Types of Simulation Models and their Applications

Figure 1 shows the three main types of simulation models:

#### **SYSTEM DYNAMICS**

- System Dynamics (SD) is an approach to understanding the nonlinear behavior of complex systems over time using stocks, flows, internal feedback loops, table functions and time delays. (Wikipedia 2020)
- Not commonly used in the industry – mainly used for academic publications.
- You can see from Figure 1 that it's mainly for High Level usage e.g. government policy planning, business strategy planning etc.
- In other words, since SD is used at a very high level such as macro-economic policies, they are rarely used by the average day to day person.
- Out of the three software (Arena / Anylogic / Flexsim), only Anylogic is able to perform SD simulation.
- However, due to SD's unpopularity, even Anylogic users don't use it for this purpose.

## DISCRETE EVENT MODELING

- A Discrete-Event Simulation (DES) models the operation of a system as a (discrete) sequence of events in time. Each event occurs at a particular instant in time and marks a change of state in the system. (Wikipedia 2020)
- Very common because the average layman can relate to it.
- All three software (Arena / Anylogic / Flexsim) does DES.
- In fact, almost all other simulation software does DES.
- You can see from Figure 1 that DES is at a Low to Medium level usage.
- Meaning, it can be used for day to day or tangible events simulation. Such as hospital planning, warehousing & logistics, manufacturing process planning, office layout planning etc.

## AGENT BASED MODELING

- An Agent-Based Model (ABM) is a class of computational models for simulating the actions and interactions of autonomous agents (both individual or collective entities such as organizations or groups) with a view to assessing their effects on the system as a whole. (Wikipedia 2020)
- In other words, rather than tracing the event that flows through time, ABM tracks the individual agents' movements and interactions.
- Also not commonly used because it is difficult for the average person to relate to a model that is based on the Agent (as opposed to an Event).
- You can see from Figure 1 that it may be used for all levels (Low to High Abstraction level).
- Out of the three software (Arena / Anylogic / Flexsim), only Anylogic is able to perform ABM simulation.
- However, due to ABM's unpopularity, even Anylogic users don't use it for this purpose.

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## ARENA

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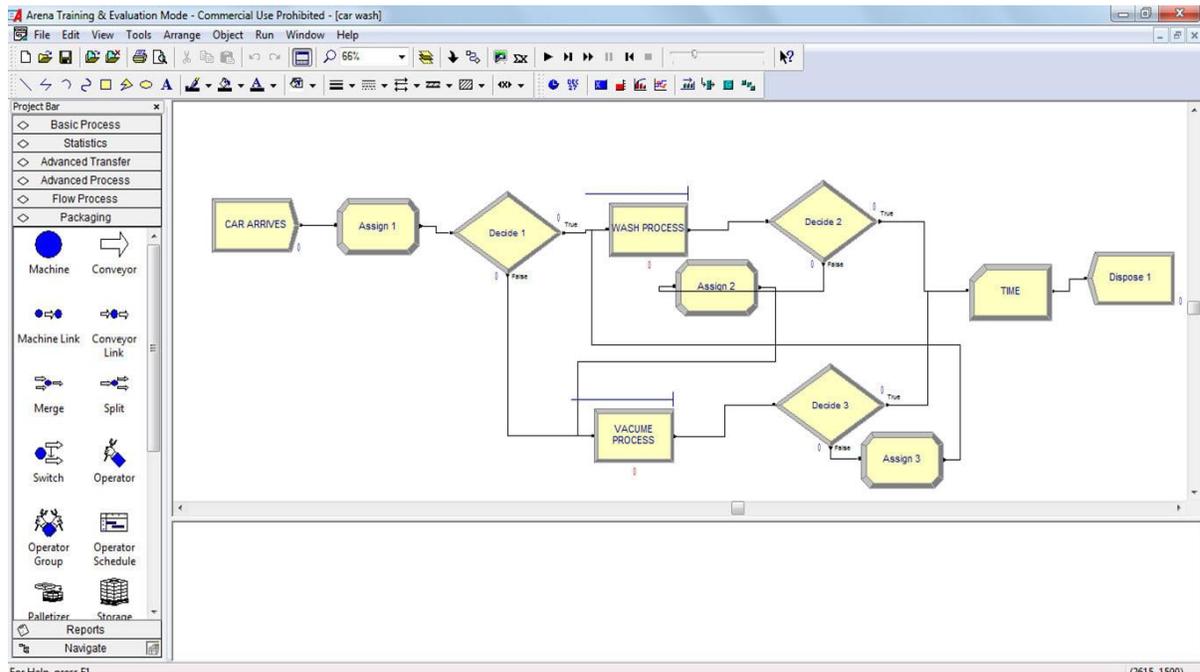


Figure 2: Arena Simulation Graphical User Interface (GUI)

- <https://www.arenasimulation.com/>

### MADE IN...

- USA

### GOOD FOR...

- Used for setting up simple simulation models quickly without the need of animations.
- That means, the focus of Arena is mainly on logic and process flows rather than fanciful animations.
- Arena is preferred for students or layman who have no prior knowledge of simulation and can begin simulating simple business processes easily – mostly through drag and drop.

### BAD FOR...

- Uses mainly plain graphics.

- If advanced animations are needed, it will be a big headache to try to inculcate that into Arena (lots of sophisticated steps involved).
- Also, should you wish to simulate complex processes (example a factory with tons of sophisticated relationships), don't use Arena.
- Rather, choose Anylogic. (You will see why in the next section).

FOR A TRIAL,

- <https://www.arenasimulation.com/simulation-software-download> (this trial allows full functionality for a period of time)

Or

- <https://www.arenasimulation.com/academic/students> (this is the most popular option for students to use – but with limited functions).

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## ANYLOGIC

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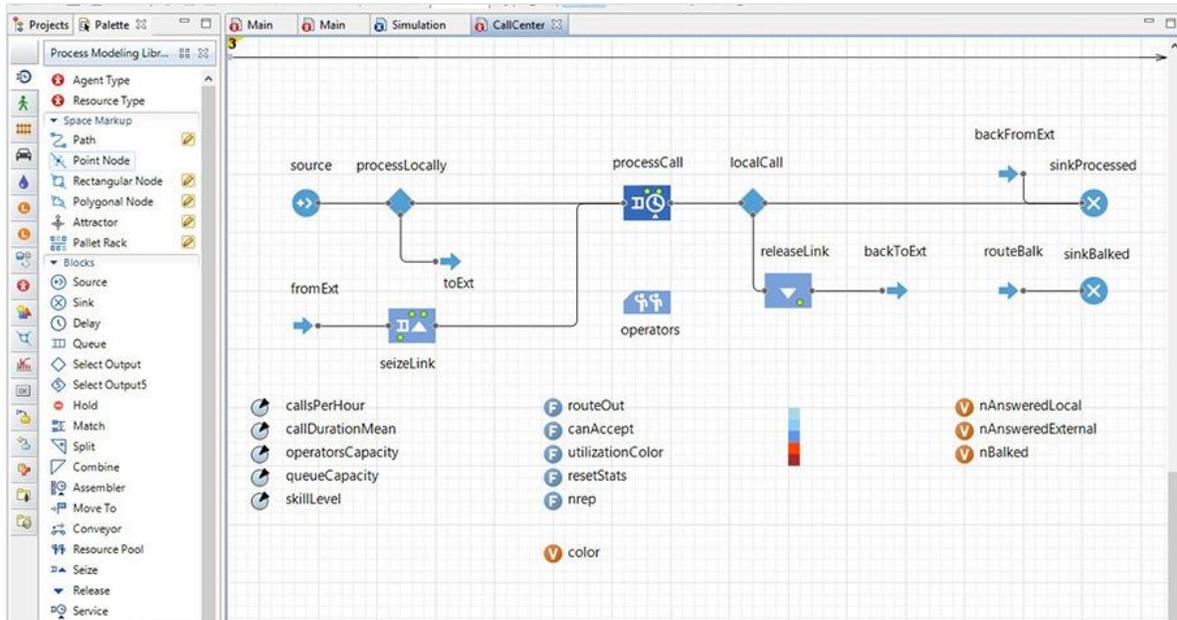


Figure 3: Anylogic Graphical User Interface (GUI)

- <https://www.anylogic.com/>

### MADE IN

- Russia.

### GOOD FOR...

- Although the Graphical User Interface (GUI) is similar to Arena, Anylogic is Java script based.
- This means that even though it is similar to Arena's drag and drop style, Anylogic's focus is mainly on coding / programming the process.
- It's a preferred choice for developers / coders who can tweak background parameters.

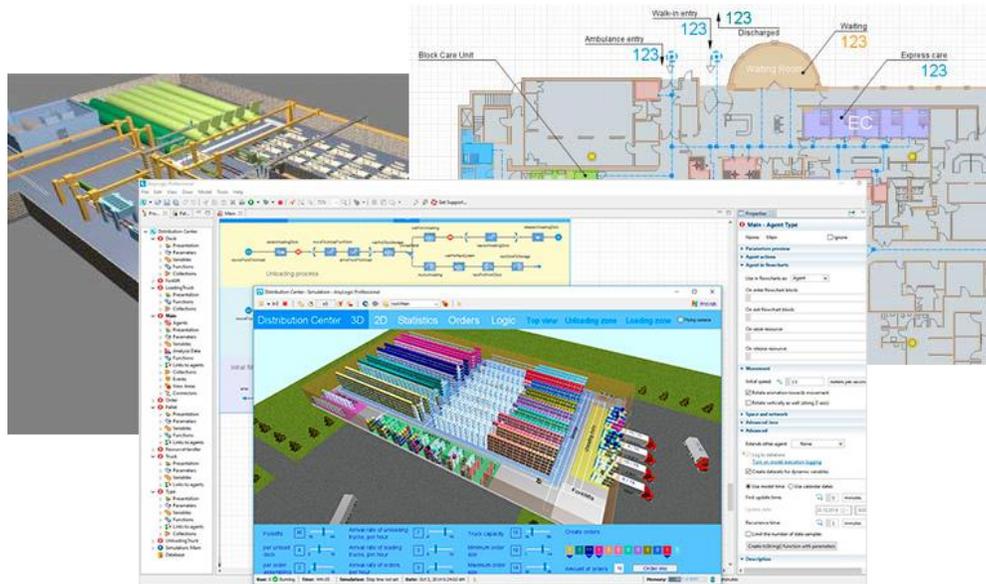


Figure 4: Anylogic Animations

- Anylogic's animations / graphics are better (or rather easier) to implement compared to Arena.
- As can be seen in Figure 4, an entire factory's process can be simulated in Anylogic.
- Which means that if you have intricate factory processes with lots of complicated relationships, you should choose Anylogic over Arena.
- Oh and by the way, Anylogic was the company that developed Anylogistix (<https://www.anylogistix.com/>) as well.
- Anylogistix is solely meant for logistical simulation, but we will not dwell on it here.

BAD FOR...

- If you are a non-developer / coder, you should stick with Arena rather than Anylogic.
- However, if you are going to perform heavy simulations, you should familiarize yourself with Anylogic.

FOR A TRIAL...

- <https://www.anylogic.com/downloads/>

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## FLEXSIM

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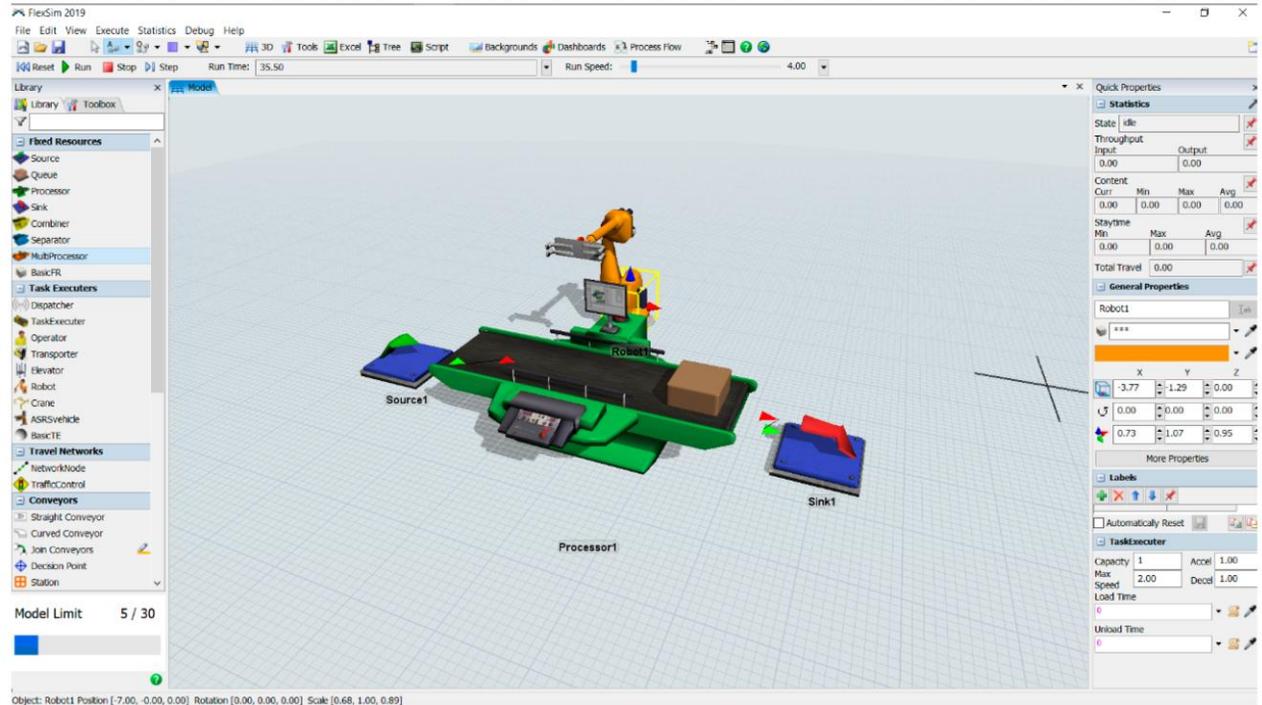


Figure 5: Flexsim Graphical User Interface (GUI)

- <https://www.flexsim.com/>

### MADE IN

- USA.

### GOOD FOR...

- Figure 5 shows the Graphical User Interface (GUI) for Flexsim.
- The key difference is that Flexsim jumps straight to animating the process. (And their animations are good!)
- Which means, the moment you have developed your model, the animation starts running the moment you hit play. (You will see the machines moving... the factory workers carrying stuff around... etc.)

- And that also means that you don't have to separate your logic flow with the animation. (which happens all the time in Arena and Anylogic).
- However, should you wish to focus purely on logic flows without seeing the animation, that option is available as well in Flexsim.
- Once again, it's a preferred choice for layman / non-coders who would like to develop their models quickly.
- In my opinion, Flexsim's animation is the best amongst all three software.
- You can develop the animations directly within Flexsim (called the Animation Creator).
- So if your focus is on the animations, you should choose Flexsim.



*Figure 6: Great Animations With Flexsim!*

BAD FOR...

- If you are a non-developer / coder, you could choose between Arena or Flexsim.
- But bear in mind that if you are really focused on getting your analytics right, example going straight to process flows and drawing out statistics, Arena is still the way to go.

- For Flexsim , you will have to go thru more clicks before you can understand how statistics is drawn out of the model.
- Also, if you are going to perform heavy simulations, I won't suggest Flexsim because they are more focused on the animations.
- In other words, imagine trying to draw up a complex factory floor with so many animations going on at the same time... you might get bogged down.
- For complex simulations, I still suggest Anylogic.

FOR A TRIAL...

- Flexsim has two types of software: Flexsim Express and Flexsim Healthcare
- Do note that both of them have their distinct ways of usage!
- In other words, you maybe familiar using Flexsim, but the Healthcare model may not operate the same way (the GUI and stuff...)
- <https://account.flexsim.com/flexsim-express/> (for Flexsim Express)
- <https://healthcare.flexsim.com/> (for Flexsim Healthcare)

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## CONCLUSION

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- I have had many years of experience playing with these three Simulation Software (Arena / Anylogic / Flexsim).
- They are currently the most popular DES simulation software.<sup>1</sup>
- I observed that they are still primarily used in the academic sector, and not so much in the industry. I guess because currently, the industry is not ready for simulation.
- I believe that only at such a time when Artificial Intelligence (AI) is prevalent that the industry will increase their adoption.
- Based on personal experience, Arena seems to be the most widely adopted software compared to Anylogic and Flexsim (even though Anylogic is soon catching up with their aggressive marketing strategies).
- The reason, I believe, is because Arena was the pioneer in DES – and they first got their foothold (popularity) through academic licensing.
- Meaning, most universities were already familiar with Arena before Anylogic and Flexsim came in.
- This article presented my personal experiences using them.
- However, this article is not meant to promote any software because each has its own strengths and weaknesses.
- Rather, my suggestion is to test out all three before choosing.

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<sup>1</sup> In this article, I will only refer to the Discrete Event Simulation (DES) model since it is the most practical model.

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## ABOUT THE AUTHOR

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Dr. Alvin Ang earned his Ph.D., Masters and Bachelor degrees from NTU, Singapore. He is a scientist, entrepreneur, as well as a personal/business advisor. More about him at [www.AlvinAng.sg](http://www.AlvinAng.sg).