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Process simulation

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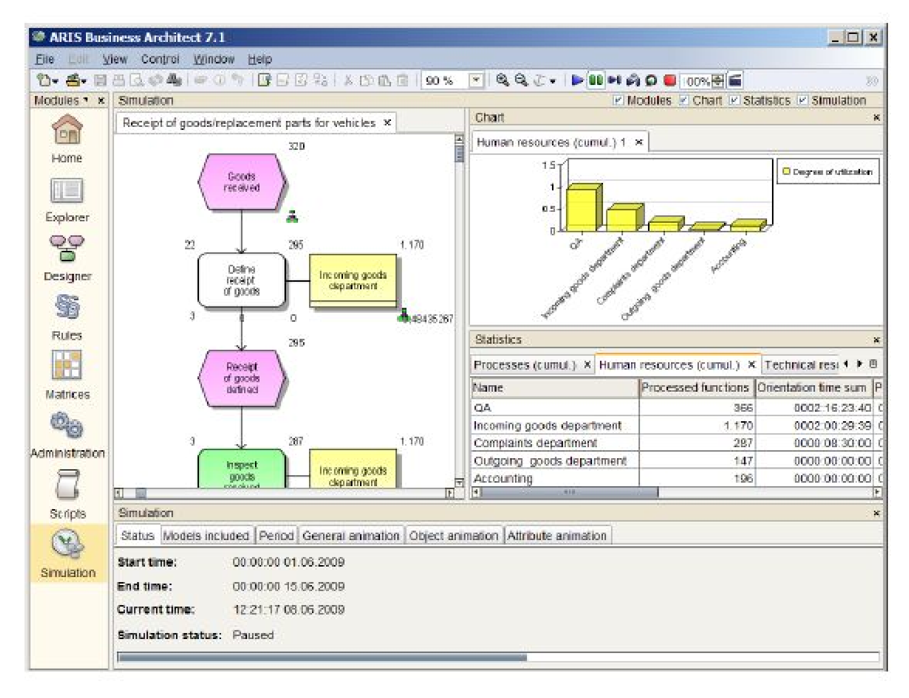
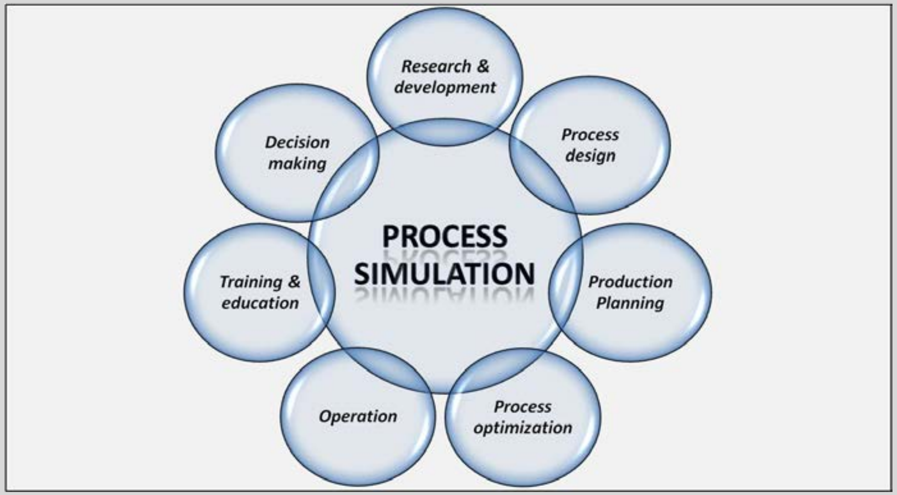
Process simulation

Process Simulation is a technique that helps business analysts simulate the execution of business process for studying the resource consumption throughout a process, identifying bottlenecks and improving the current business by process refinement and resources re-allocation.





Rules of simulation

Rule 1: Be clear as to the Question being answered, and the focus of the simulation.

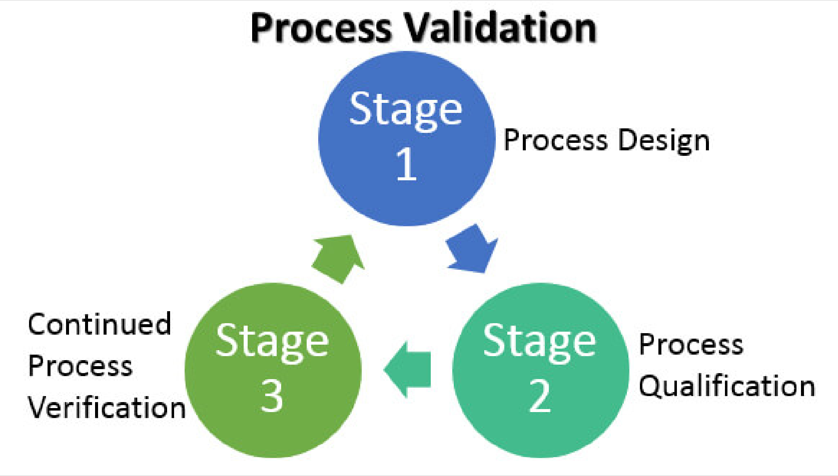
Two common areas of focus are:

- Process Validation
- Process Optimization

This focus should guide the way the user looks to determine which results are collated and presented in the project. The user must be clear as to the 'Measure' of 'what good looks like', and also the 'target' or level of this measure that the business is looking to achieve.

Rule 2: Develop the appropriate measures and targets, after all you can't improve what you aren't measuring.

This is about testing a process in terms of its structure and the frequency that tasks take place. This simulation does not need the full process data in terms of task timings, token arrival patterns or resource information. It merely requires the process model and percentages for XOR junctions.



Rule 3: Simulation with little data still has value in terms of validating processes

This is the main fully functional use of the simulation; data is now required on token arrival patterns, task timings, task priority, resource availability and usage. The user would also have to provide some input in terms of service level required and the parameters which are to be optimized.

Service Level can be expressed in a number of ways, measured at end events.

'x'% of tokens completed with 'T' time

units per time period.

The time period could be an hour or a day etc.

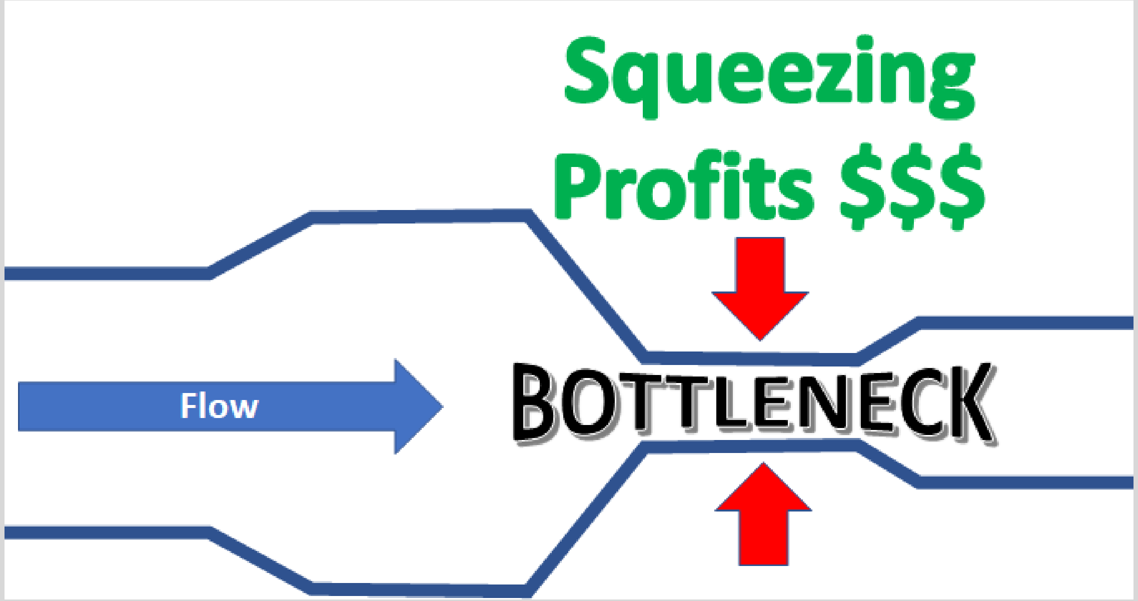
Rule 4: Determine a defined list of parameters and ranges that are under consideration and experiment accordingly

Simulation experimentation normally uses the concept of replications, where the random number seeds are changed to provide a range of answers for the same data. Results are normally made available for each replication so the user can see the range of results and decide if sufficient replications have been run.

Rule 5: Undertake sufficient experimentation and replications to be sure valid answers are obtained.

When a number of scenarios (sets of parameter values) deliver very similar results, the decision of which to adopt is normally taken based on other criteria rather than purely the simulation output. Accuracy of results does depend to some extent on the business question being answered, is Scenario A better than Scenario B does not need totally accurate results, merely confidence of the relative difference between the output measures. If however the purpose is to predict a specific service level metric e.g. 90% of emergency patients are served within 2 hours, more accuracy is required, particularly if failure to meet the target resulted in penalty costs.

The **Theory of Constraints** is a methodology for identifying the most important limiting factor (i.e. constraint) that stands in the way of achieving a goal and then systematically improving that constraint until it is no longer the limiting factor. In manufacturing, the constraint is often referred to as a bottleneck.



A successful Theory of Constraints implementation will have the following **benefits**:

- Increased profit (the primary goal of TOC for most companies)
- Fast improvement (a result of focusing all attention on one critical area – the system constraint)
- Improved capacity (optimizing the constraint enables more product to be manufactured)
- Reduced lead times (optimizing the constraint results in smoother and faster product flow)
- Reduced inventory (eliminating bottlenecks means there will be less work-in-process)

Core Concept

The core concept of the Theory of Constraints is that every process has a single constraint and that total process throughput can only be improved when the constraint is improved (change must achieve the profit).

The Five Focusing Steps

TOC

The Five Focusing Steps

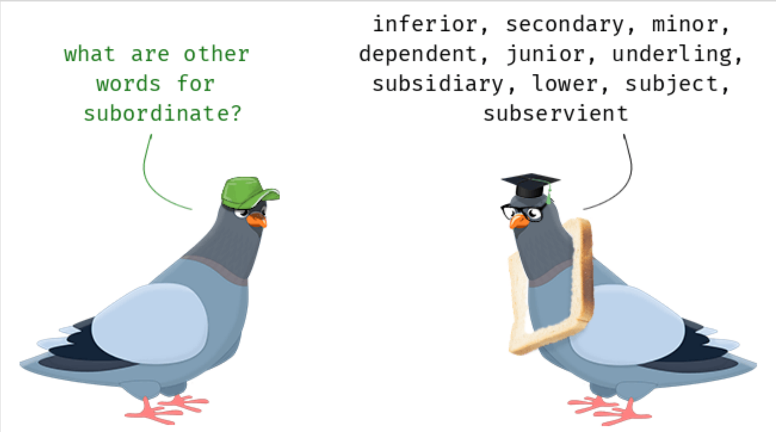
1) Identify

Identify the current constraint (the single part of the process that limits the rate at which the goal is achieved).

Exploit Make quick improvements to the throughput of the constraint using existing resources (i.e. make the most of what you have).

2) Subordinate

Review all other activities in the process to ensure that they are aligned with and truly support the needs of the constraint.



The Five Focusing Steps

3) Elevate

If the constraint still exists (i.e. it has not moved), consider what further actions can be taken to eliminate it from being the constraint. Normally, actions are continued at this step until the constraint has been “broken” (until it has moved somewhere else). In some cases, capital investment may be required.

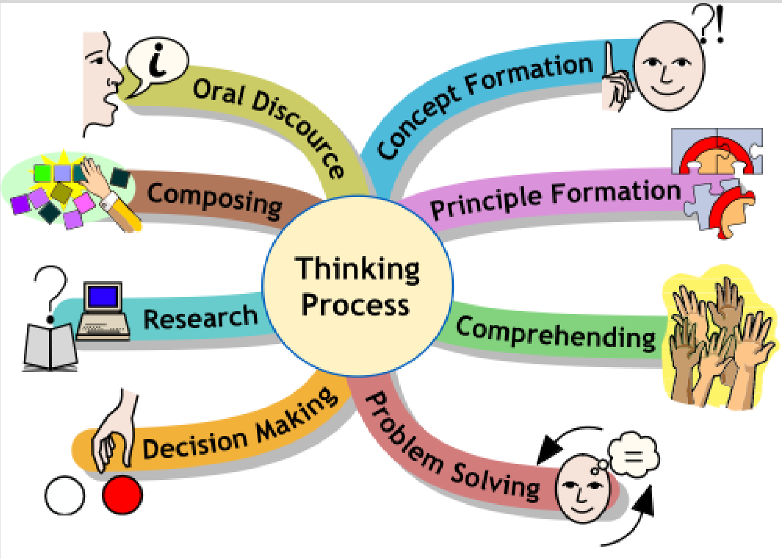
4) Repeat

The Five Focusing Steps are a continuous improvement cycle. Therefore, once a constraint is resolved the next constraint should immediately be addressed. This step is a reminder to never become complacent – aggressively improve the current constraint…and then immediately move on to the next constraint.

The Thinking Processes

- a sophisticated problem solving methodology

- What needs to be changed?
- What should it be changed to?
- What actions will cause the change?



Tools:

Current Reality Tree

Evaporating Cloud Tree

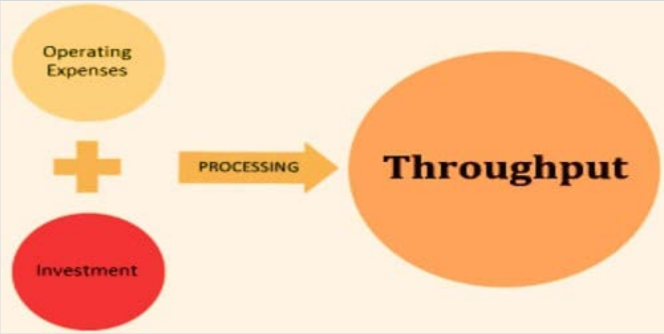
Future Reality Tree

Strategy and Tactics Tree

Throughput Accounting

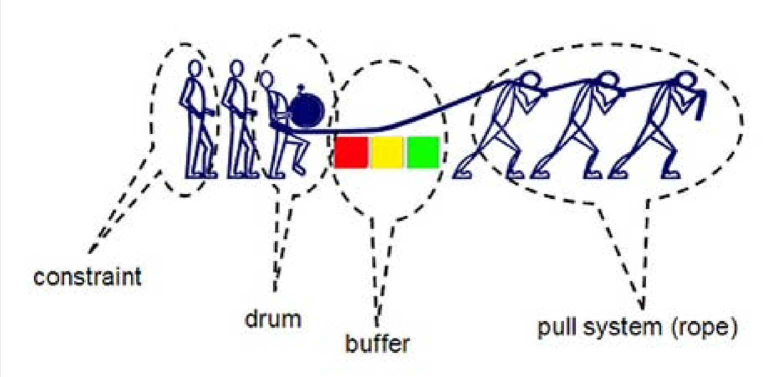
Throughput Accounting is an alternative accounting methodology that attempts to eliminate harmful distortions introduced from traditional accounting practices.

- Will Throughput be increased?
- Will Investment be reduced?
- Will Operating Expenses be reduced?



Net Profit = Throughput − Operating Expenses
Return on Investment = Net Profit / Investment
Productivity = Throughput / Operating Expenses
Investment Turns = Throughput / Investment

Drum-Buffer-Rope



The “**Drum**” is the constraint. The speed at which the constraint runs sets the “beat” for the process and determines total throughput.

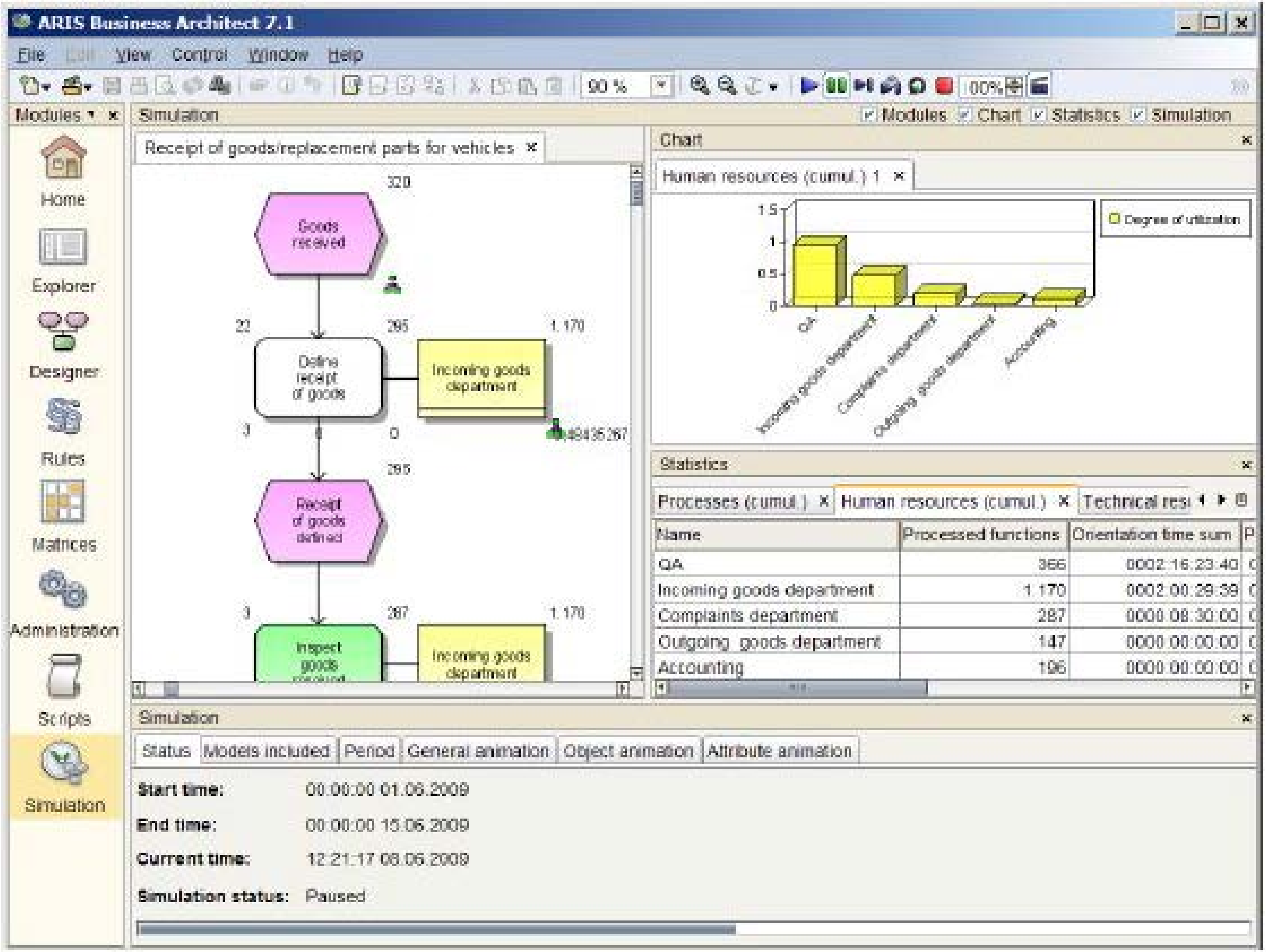
he “**Buffer**” is the level of inventory needed to maintain consistent production. It ensures that brief interruptions and fluctuations in non-constraints do not affect the constraint. Buffers represent time; the amount of time (usually measured in hours) that work-in-process should arrive in advance of being used to ensure steady operation of the protected resource.

The “**Rope**” is a signal generated by the constraint indicating that some amount of inventory has been consumed. This in turn triggers an identically sized release of inventory into the process. The role of the rope is to maintain throughput without creating an accumulation of excess inventory.

Goals of using ARIS Business Simulator

- Process analysis and optimization, including the identification of bottlenecks, internal and external benchmarking, resource optimization, and process cost management
- Human resource and capacity planning
- Risk assessment, risk minimization, as well as risk control (new feature available with ARIS 7.1 SR8 and later versions)

Arris Business simulator



Data required for simulation

- What data do I have to provide to be able to perform a simulation?
- How much effort is required for preparing the relevant process models?

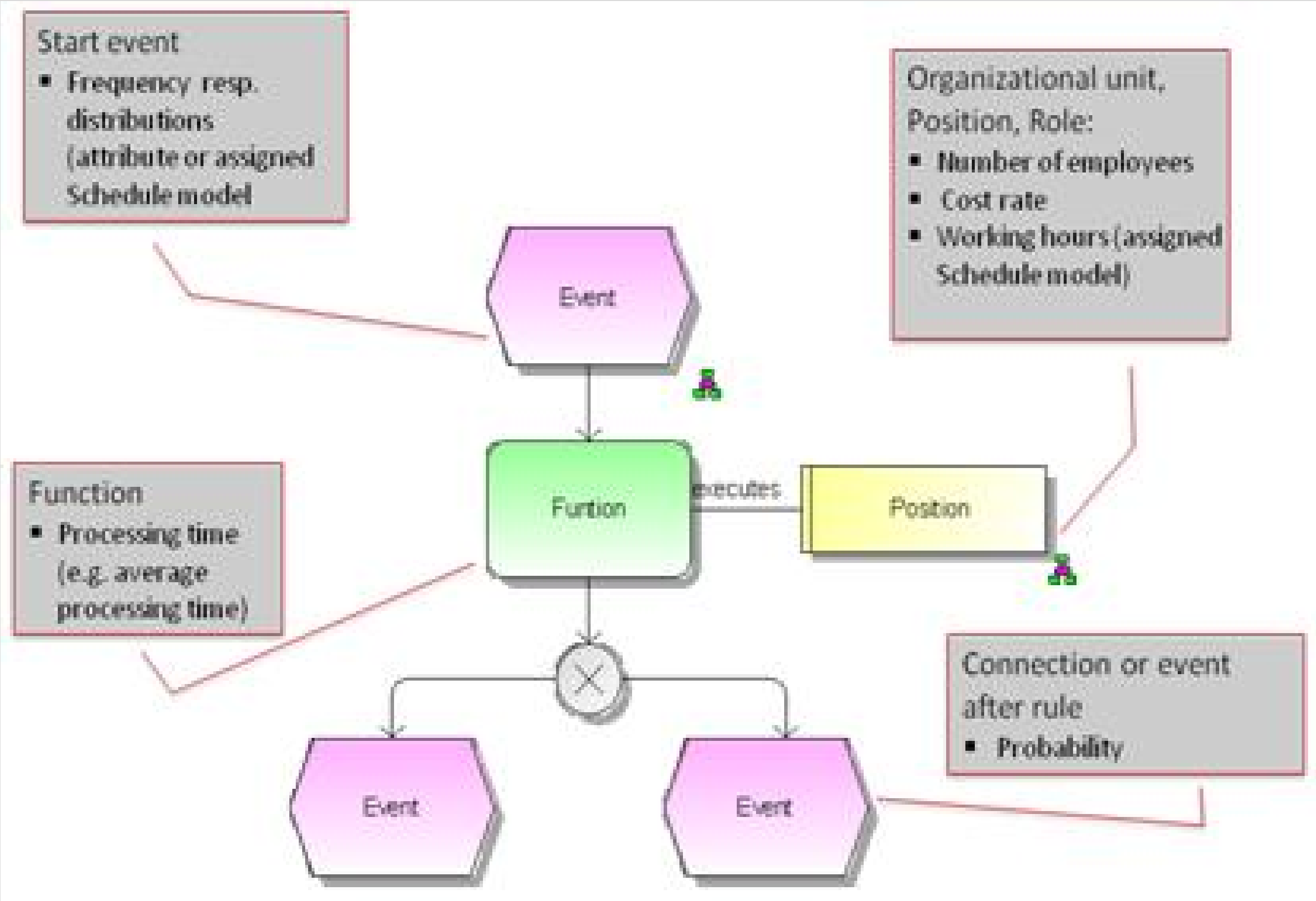
It depend on the objectives that are to be achieved by the simulation procedure and on the accuracy you expect from the simulation results.

Arris Business simulator

Example of simulation in order to realize human resources planning, for which the required processing time (e.g., for the implementation of new processes) is to be determined, the basic input for the process model (EPC or BPMN) is rather limited:

- expected process execution frequency (defined based on the start event/s)
- processing time per function
- probabilities at the branches of the paths

Most important input for process simulation



Arris Business simulator

Recommendations:

- Explain the benefits of simulation to the relevant target groups.
- When preparing process models for simulation purposes it may be useful to cooperate closely with the operating departments to not only collect input data, but also improvement proposals.
- Value your employees' input.
- Win your employees' trust by explaining to them that the process model will not contain every single work step in detail and that the planned degree of utilization will be below 100%.