Value Stream Mapping Tools and application of Tools in Arena Simulations

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Abstract: **Value Stream Mapping has the reputation of uncovering waste in manufacturing, production and business processes by identifying and removing or streamlining non-value-adding steps. A flow diagram showing the process is drawn to reflect the current state of the operation. The non-value actions are identified in each step and between each step by their waste of time and resources. The process is analyzed for opportunity to drastically reduce and simplify it to the fewest actions necessary. By reducing wastefulness the proportion of value adding time in the whole process rises and the process throughput speed is increased. This makes the redesigned process more effective (the right things are being done) and more efficient (needing fewer resources). The reengineered process is flow charted in its future state with process steps and information flows redesigned, simplified and made less expensive and increase in productivity.**

Keywords: **Value Stream, Current Stream Mapping, Future State Mapping, Takt time, Cycle Time, Lean Manufacturing, Simulation.**

I] Introduction

Value Stream Mapping (VSM) is a lean manufacturing technique used to analyze and improve value-addition. It emanates from developments on the Toyota Production System (TPS) but with wide application outside the automotive industry. VSM helps to identify and eliminate waste in the service and production sector VSM became a popular implementation method for Lean manufacturing, and it is considered as a classification scheme [1].

The increasing intensity of competition in the global market, forcing manufacturers to develop production systems and processes that will provide more flexibility, competitiveness and high quality products and ensure reduction of production costs. At the same time, manufacturers have to pay more attention to product variety and customer value, because era of mass production is over [2].

Value-stream mapping can be a communication tool, a business planning tool, and a tool to manage company change process. Creating a value stream map will allow the company to document current production lead time, inventory levels, and cycle times in order to determine the ratio of value-added to total lead time of the product family being analyzed, creating a vision of an ideal value flow [3]

II] Seven Value Stream Mapping Tools:

The typology of the seven new tools is presented in terms of the seven wastes already described. In addition the delineating of the overall combined value stream structure will be useful and will also be combined as shown in the table 5.
Table 3.1 explains about the seven value stream mapping tools and origin of tools.

Table 1. Seven Value Stream Mapping Tools

S.No	Mapping Tools	Origin of Tools
1	Process Activity Mapping	Industrial Engineering
2	Supply Chain Response Matrix	Time Compression / Logistics
3	Production Variety Funnel	Operations Management
4	Quality Filter Mapping	New Tool
5	Demand Amplification Mapping	System Dynamics
6	Decision Point Analysis	Efficient Consumer Response Matrix
7	Physical Structure Mapping	New Tool

## III] Arena Simulation Modeling

Arena Basic Edition software that brings the power of modeling and simulation to business process improvement. It is designed primarily for newcomers to simulation and Serves as an introductory product and foundation to the rest of the Arena product family. Typically, any process that can be described by means of a flowchart can be simulated with Arena Basic Edition. Arena Basic

Edition is most effective when analyzing business, service, or simple (nonmaterial- handling intensive) manufacturing processes or flows.

Typical scenarios include:

☐   Documenting, visualizing, and demonstrating the dynamics of a process with Animation.

☐   Predicting system performance based on key metrics such as costs, throughput, cycle times, and utilizations.

☐   Identifying process bottlenecks such as queue build ups and over-utilization of resources Planning staff, equipment, or material requirements. In addition to the Arena Basic Edition, Rockwell Automation offers a full suite of products to provide enterprise-wide simulation, optimization, and 3D model animation.

With the help of arena we can model, simulate, visualize, and analyze with Arena. To begin, we'll look at the process of receiving and reviewing a home mortgage application. We will build the flowchart shown below, introducing the process of modeling and simulating with Arena. Figure 3.3 shows about process modelling of the flow.
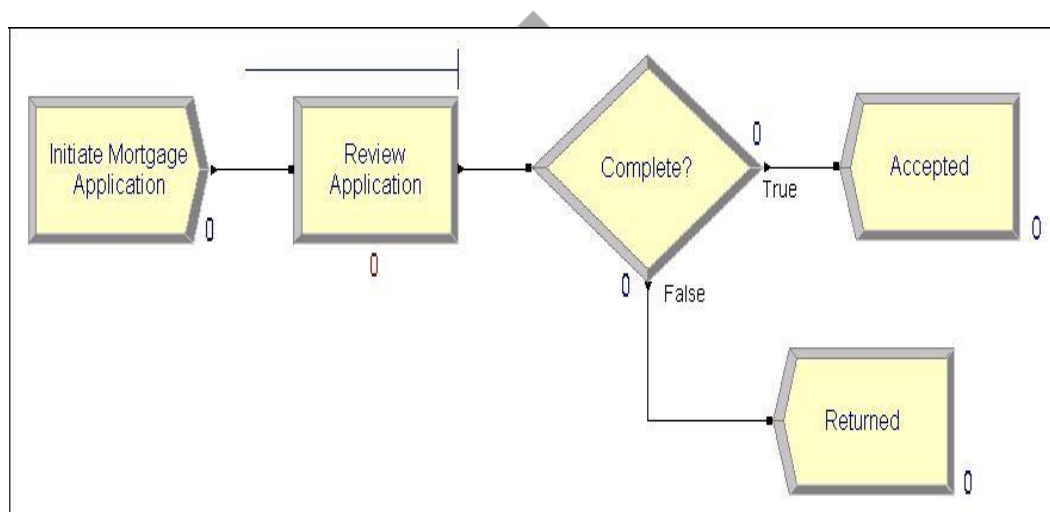
Figure 1. Process of modeling and simulating with arena

Arena modeling environment: If Arena is not already running, start it from the Windows Start menu and navigate to **Programs > Rockwell Software > Arena**. The Arena modeling environment will open with a new model window, as shown below. Figure 3.4 shows the arena simulation environment where one can build simulation model with the help of project bar. Different entities are used to produce the whole process flow to analyze current state of the existing system.

To model your process in Arena, you'll work in three main regions of the application window. The Project Bar hosts panels with the primary types of objects that you will work with:

☐   **Basic Process panel**: Contain the modeling shapes, called modules, which you'll use todefine your process.

☐   **Reports panel**: Contains the reports that are available for displaying results of simulationruns.

☐   **Navigate panel**: Allows you to display different views of your model, includingnavigating through hierarchical sub models and displaying a model thumbnail.

In the model window, there are two main regions. The flowchart view will contain all of your model graphics, including the process flowchart, animation, and other drawing elements. The lower, spreadsheet view displays model data, such as times, costs, and other parameters.

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