Continuous Improvement Toolkit

Value Stream Mapping (VSM)

Managing Risk

PDPC
RAID Logs
FMEA
Fault Tree Analysis
Risk Assessment*
Traffic Light Assessment

Deciding & Selecting

Pros and Cons
Importance-Urgency Mapping
Break-even Analysis
Cost -Benefit Analysis
Force Field Analysis
Voting
SWOT
Pugh Matrix
Decision Tree
QFD
Matrix Diagram
TPN Analysis
Prioritization Matrix
Kano Analysis
Critical-to Tree
Paired Comparison

Planning & Project Management*

RACI Matrix
Stakeholders Analysis
PEST
PERT/CPM
Activity Diagram
Roadmaps
Project Charter
Gantt Chart
PDCA
Control Planning
Gap Analysis
Hoshin Kanri
Kaizen
How-How Diagram
Tree Diagram**
Standard work

Identifying & Implementing Solutions***

Simulation
TPM
Mistake Proofing
Pull Systems
JIT
Ergonomics
Work Balancing
Automation
Bottleneck Analysis
Visual Management
Flow
5S
Value Analysis
Wastes Analysis
SMED
Time Value Map
Process Redesign
SIPOC

Understanding Performance

Lean Measures
KPIs
OEE
Capability Indices
MSA
RTY
Descriptive Statistics
Cost of Quality
Reliability Analysis
Graphical Analysis
Run Charts
Control Charts
Benchmarking
Sampling

Understanding Cause & Effect

Cause & Effect Matrix
Pareto Analysis
Confidence Intervals
Probability Distributions
ANOVA
Design of Experiments
Hypothesis Testing
Regression
Scatter Plot
Correlation
5 Whys
Chi-Square Test
Multi-Vari Charts
Relations Mapping*
Fishbone Diagram

Data Collection

Focus groups
Interviews
Photography
Check Sheets
Measles Charts
Surveys
Critical Incident Technique
Observations

Creating Ideas**

Brainstorming
Analogy
SCAMPER***
TRIZ***
Nominal Group Technique
Mind Mapping*
Affinity Diagram
Attribute Analysis
Lateral Thinking
Visioning

Designing & Analyzing Processes

IDEF0
Value Stream Mapping
Flow Process Chart
Process Mapping
Flowcharting
Service Blueprints

Continuous Improvement Toolkit . www.citoolkit.com

- Value Stream Mapping

❑ Lean is simply a group of strategies for the identification and elimination of the waste inside the value stream.

❑ A **value stream** includes all the activities of all parties involved in the manufacturing and the supply of a product (or service) to their ultimate customer.
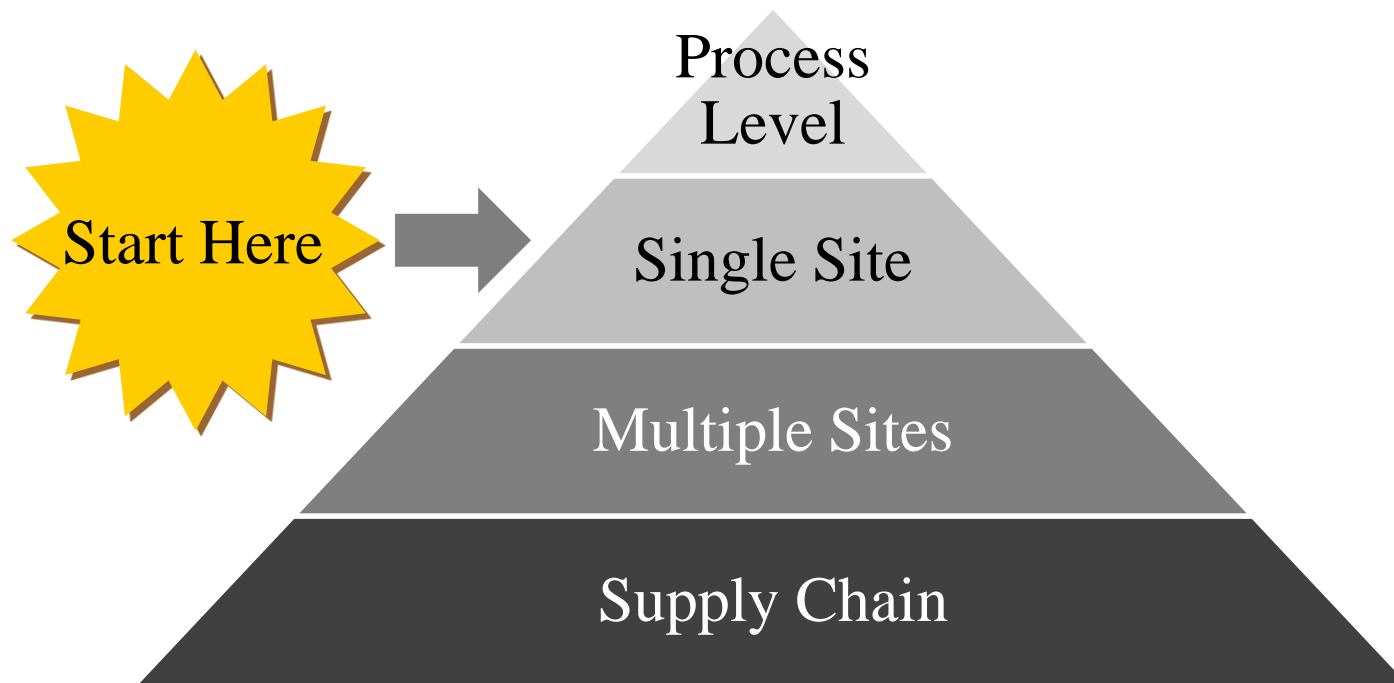
Manufacturing
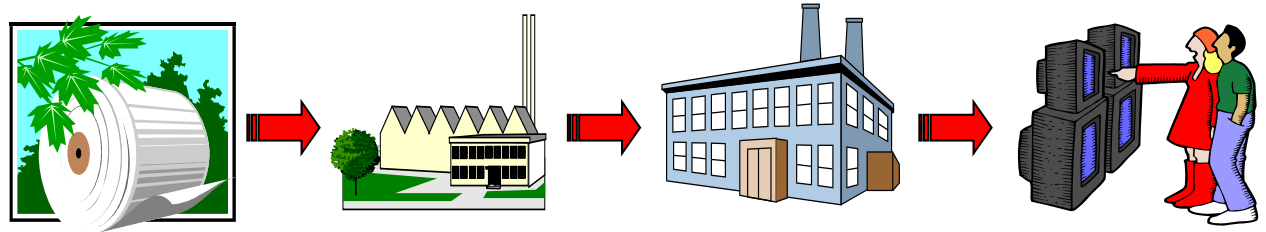
Services

- Value Stream Mapping

Value Stream Mapping:

❑ A strategic mapping tool that helps to understand and visualize the flow of product through the various production stages.

Start Here →

Process Level

Single Site

Multiple Sites

Supply Chain

- Value Stream Mapping

❑ The primary goal is to eliminate waste (**Muda**).

❑ It focuses on the process using the principle of Lean from the perspective of Value.

❑ It tends to display more information than a typical process map.

❑ It spans from the receipt of the material to the delivery of the finished good to the customer.

❑ It creates a visual map of the flow of material and information in the value chain of the product.
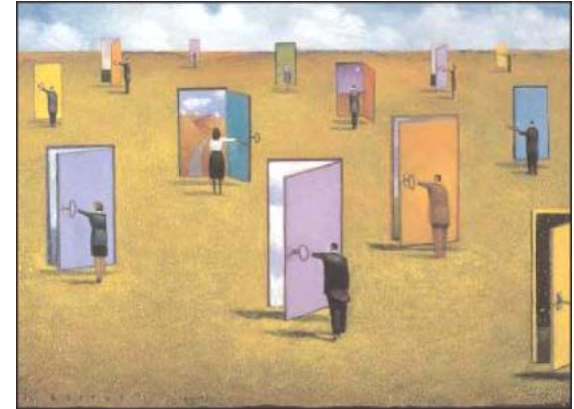
- Value Stream Mapping

Benefits:

❑ Enables to see the big picture rather than individual processes.

❑ Creating such a big picture helps to identify non value-added activities, waste and sources of the waste.

   • Such as work in process, excessive inventories, rework, scrap, etc.

❑ Enables the team to see where would the bottlenecks be.

❑ Helps bring the production rate of the entire process closer to the customer's desired demand rate.

❑ Provides a qualitative measure of what the process should be and how to achieve it.

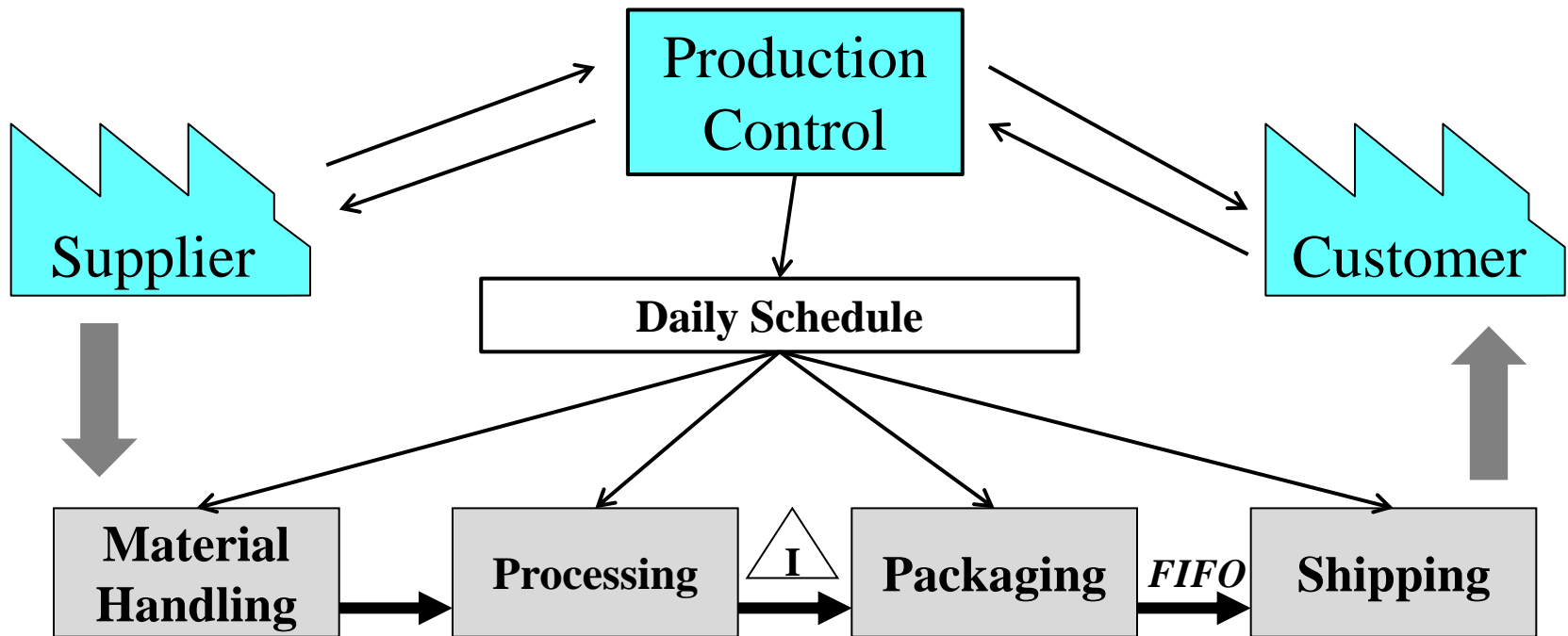❑ Helps plan improvement activities.
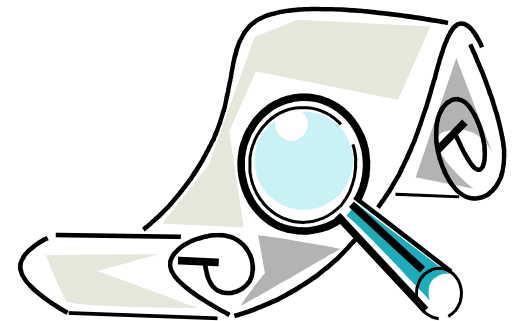
- Value Stream Mapping

Applicability of Value Stream Mapping:

❑ Order to payment process.

❑ Sales forecasting.

❑ Manufacturing.

❑ Backroom processing operations.

❑ Supply chain/distribution network.

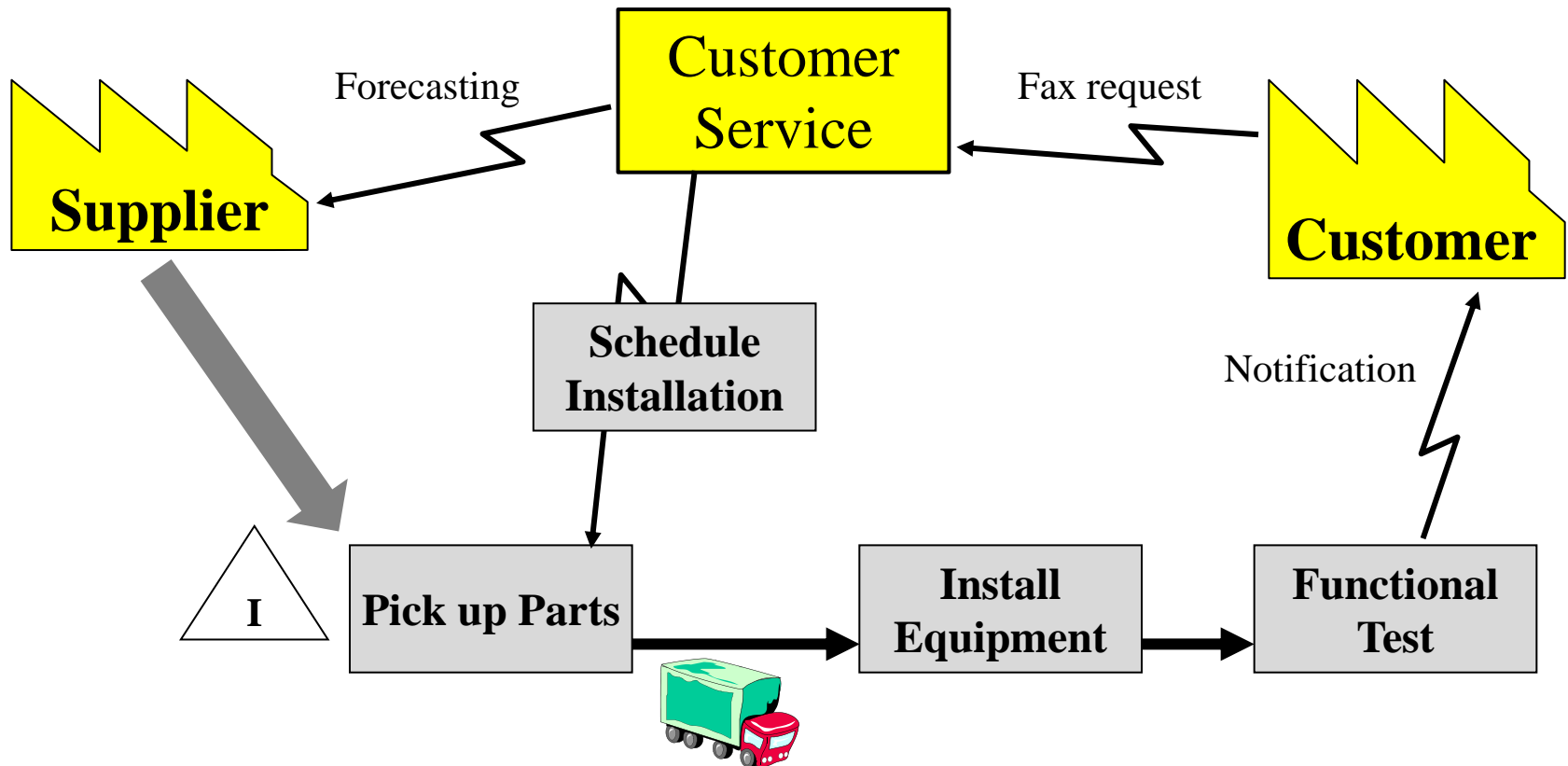❑ Inventory management.

❑ Service delivery.

❑ Product development.
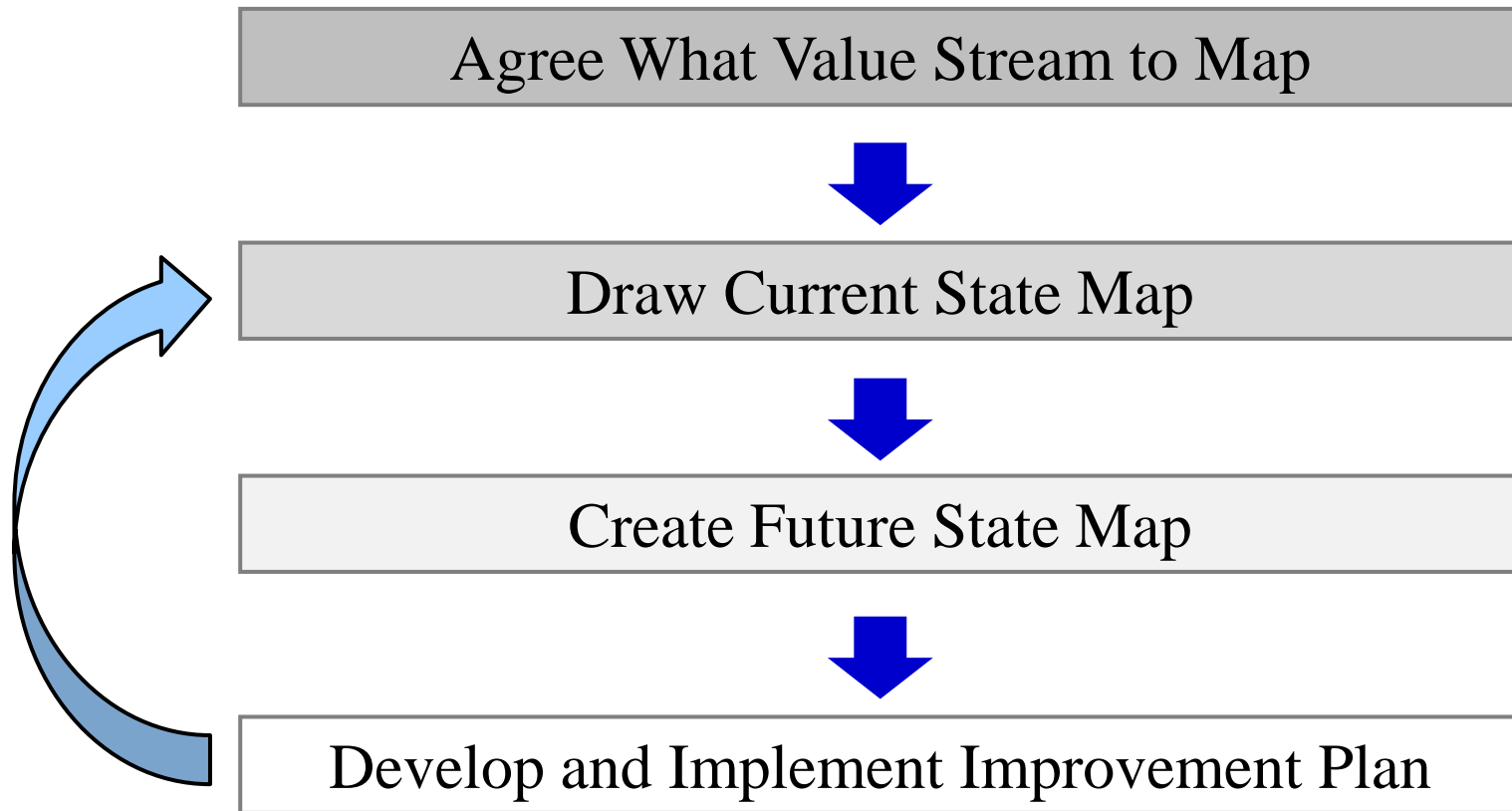
- Value Stream Mapping

Manufacturing Example:

- Value Stream Mapping

Non-Manufacturing Example:

- Value Stream Mapping

Approach:

Agree What Value Stream to Map

⬇

Draw Current State Map

⬇

Create Future State Map

⬇

Develop and Implement Improvement Plan

- Value Stream Mapping

Before Start:

❑ Focus on the production of a single product (or product family).

❑ For products with multiple branches, concentrate on the main process flow first.

❑ A **Product Family Matrix** may be helpful.

| Product	Press	Shape	Bend	Paint	Assemble
A	X	X		X	X
B	X		X	X	X
C			X	X	X
D		X		X	X

- Value Stream Mapping

Current State Map:

❑ Develops an understanding of what happens today:
- Information.
- Material.
- Interactions.

❑ It is often rare to find one person who has knowledge of the entire value stream.

❑ Information is better to be collected from the shop floor.

❑ Analyst should start from the customer end and work upstream to draw the map by hand.

- Value Stream Mapping

Approach:

❑ Establish a team (include people involved in the process).

❑ Walk the process and talk to the people there.

❑ Collect all data and complete data boxes:

- Capture process data.
- Capture cycle time, uptime, changeover time, etc.
- Count delays and inventory between processes.
- Collect demand data, schedule requirements, etc.

❑ Draw the map by hand starting with the material flow.

❑ Map the information flow and the secondary processes (e.g. rework loops).

❑ Add the timeline and VSM calculations.

❑ Don't get blogged down in the details.

❑ Refine the map as you go along.
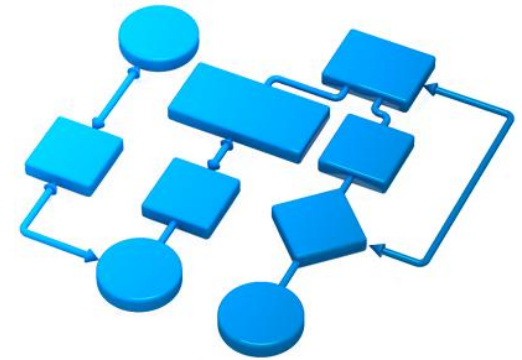
- Value Stream Mapping
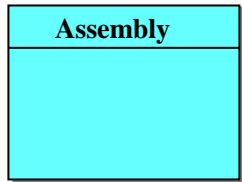
Zone the Map:

Title and Date

Information flow – External customers and suppliers – Secondary processes

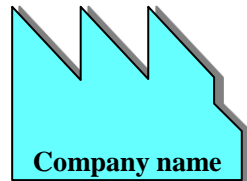Material flow – Primary processes – Data related to each process

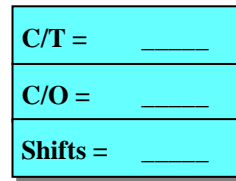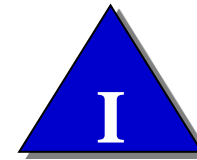Timeline

- Value Stream Mapping

Standard Icons:

Assembly	**Company name**	C/T = _____ C/O = _____ Shifts = _____	**I** **22**	
Process	**Outside Body**	**Data box**	**Inventory**	**Physical flow / Push arrow**
Physical pull	**FIFO** **First-In-First-Out sequence**	**3** **# of workers**	**Signal Kanban**	**Shop stock** (controlled inventory)
Manual & electronic information flow	**OXOX** **Load Leveling**	**Computer generated report**	**Database**	**SMED** **Improvement opportunity**
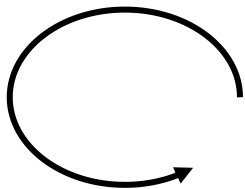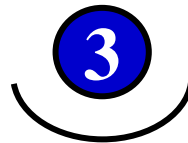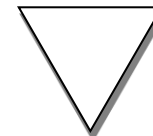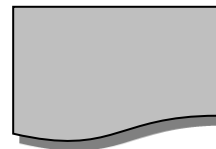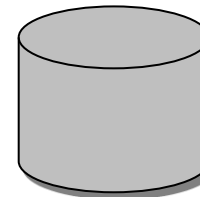
- Value Stream Mapping

Example:

	STAMPING		WELDING		DRILLING		ASSEMBLY		PACKAGE		SHIPPING
	200 T		1		1		1		1		Staging
	C/T = 1 second		C/T = 39 seconds		C/T = 46 seconds		C/T = 62 seconds		C/T = 40 seconds		
	C/O = 1 hour		C/O = 10 minutes		C/O = 10 minutes		C/O = 0		C/O = 0		
	Uptime = 85%		Uptime = 100%		Uptime = 80%		Uptime = 100%		Uptime = 100%		
	NAT = 25200s		2 shifts		2 shifts		2 shifts		2 shifts		
	Lot size = 2 wks		NAT = 25200sl.		NAT = 25200s		NAT = 25200s		NAT = 25200s		

Steel Company

3 X weekly
Batches of 450

6-week forecasts

Weekly fax

Production control

MRP

Weekly schedule

90-/60-/ 30-day forecasts

Daily order

Customer

288 parts / day
Tray = 12 pieces
1 tray / 40 minutes

Daily ship schedule

Issue

Issue

Issue

**Production Lead
Time = 23.6 days**

**Value-Added
Time = 188 seconds**

Value Stream Ratio

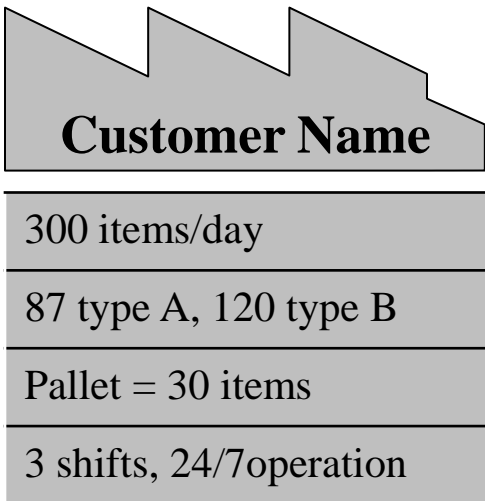| 5 days	7.6 days	1.8 days	2.7 days	2 days	4.5 days
1 second	39 seconds	46 seconds	62 seconds	40 seconds	

- Value Stream Mapping

Date Related to Customer may Include:

❑ Customer demand (item/day).

❑ Product mix.

❑ Shipping frequency.

❑ Standard shipping container quantity.

❑ Customer shift/operation pattern.

Customer Name
300 items/day
87 type A, 120 type B
Pallet = 30 items
3 shifts, 24/7operation

Make sure you get these information directly
from the person who receives the customer orders

- Value Stream Mapping

**Date Related to Each Process may Include:**

❑ Cycle time.

❑ Changeover time.

❑ Uptime / downtime.

❑ Batch size / tray quantity.

❑ The number of operators required.

❑ The number of product variations.

❑ Working time (without breaks).

❑ Scrap rate.

❑ OEE values.

Coating
C/T = 2.3 seconds
C/O = 52 minutes
Uptime = 85%
NAT = 25,200 seconds
Scrap rate = 3.1%

- Value Stream Mapping

It is Useful to Collect Data Such as:
- ❑ Process / Queue times.
- ❑ Setup times.
- ❑ Transport times.
- ❑ Number of people.
- ❑ Number of machines.
- ❑ Defect rates.
- ❑ Batch sizes.
- ❑ Existence of Kanban.
- ❑ Inventory (In process, in queue, in transport).
- ❑ Source of data.
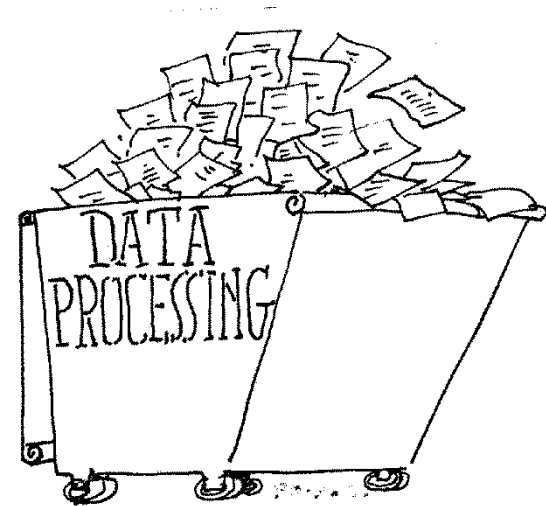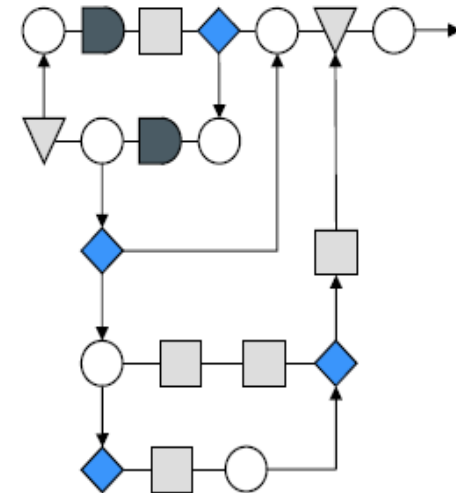
- Value Stream Mapping

The Information Flow:

❑ Goal: to know how much to make and when to make it.

❑ Map what actually happen as opposed to what should happen.

❑ Walk the information flow.

❑ It may be useful to collect examples of relevant documentation.

❑ We should map informal processes as well.

❑ **Key areas to focus on:**

- Demand management.
- Planning.
- Logistics.
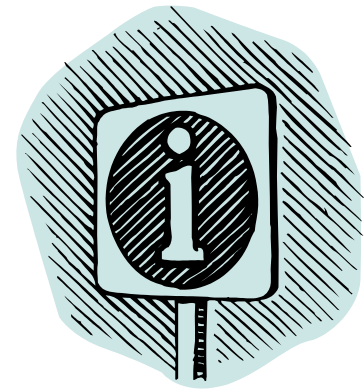
- Value Stream Mapping

Future-State Map:

❑ A very ambitious future state that takes into consideration the customer's need.

❑ This map represents the best possible improvement the project team is able to implement.

❑ It consists of:

- A stream of value-adding processes.
- Linked to the customer by 'pull' of continuous flow.
- With a minimum of waste.
- Uses principles of Lean principles such as load leveling.

- Value Stream Mapping

Future-State Map:

❑ Should be based firmly on Lean principles.

❑ It should be done with a multifunctional group.

❑ Start only when the current state map is understood and agreed.

❑ It is useful to draw a '**blue sky**' future state map.

❑ Then work backward toward what is achievable in the shorter term.

❑ The future map becomes the blue print for implementing a Lean system.

- Value Stream Mapping

Guidelines for the Development of the Future-State Map:

❑ Produce to Takt time.

❑ Are there steps in the process that can be simplified or eliminated?

❑ Develop continuous flow wherever possible.

❑ Use pull systems where continuous flow is not possible.

❑ Try to send the customer schedule to only one production process (pacemaker process).

❑ Distribute the production of different products evenly.

❑ Continuously improve the system.
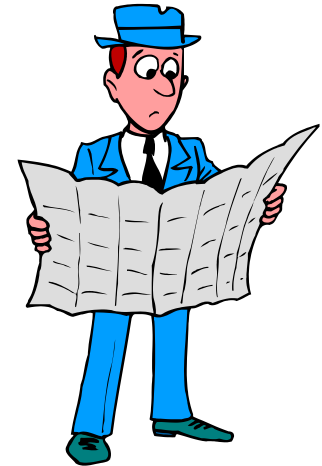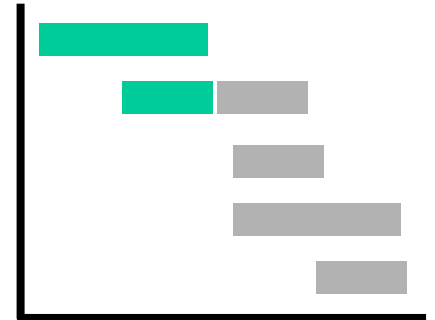
- Value Stream Mapping

Things to Look For:

❑ Are existing systems used in optimum way?

❑ Is automation possible?

❑ Can any paper work be eliminated?

❑ Is information missing or conflicting?

❑ Is information actually used?

❑ Is information reliable and up to date?

❑ Does information arrive in time?

❑ Are things done in the right sequence?

- Value Stream Mapping

Implementation Plan:

❑ A gap analysis should be carried out to identify the list of improvement required to achieve the future state.

❑ Then put together a timetable with milestones and review periods.

❑ You may start with a single product family.

❑ Someone need to own the value stream project.

❑ Monitor the value stream and make it part of the business planning cycle.

❑ Have a regular reviews of the plan.

When the future state becomes a reality it becomes the new current state

- Value Stream Mapping

Further Information:

❑ Always record the inventory you see not what you are told is normally there.

❑ If there are other products than your family travelling through the process, then count all products to obtain the **queue time**.