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Value Stream Mapping

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Learning Objectives

Upon successful completion of this module, the student should be able to:

- Understand What is a Value Stream Map
- Understand Why We Map a Process
- Understand Input / Output Analysis
- Understand Types of Maps
- Understand Spaghetti Diagrams
- Understand Circle Diagrams

What is a Process Map?

- A visual process analysis tool, which integrates:
  - Functional orientation of traditional swim lane process maps
  - Key Lean time and quality metrics
- Tactical level tool which highlights the disconnects/wastes/delays in a process
  - Used to “drill down” from a value stream map
  - Helps see “the waste behind the waste”
  - Reveals the individual steps in a process
- Often serves as the analytical and design tool in a Kaizen Event
- Serves as standard work for workforce training and process monitoring

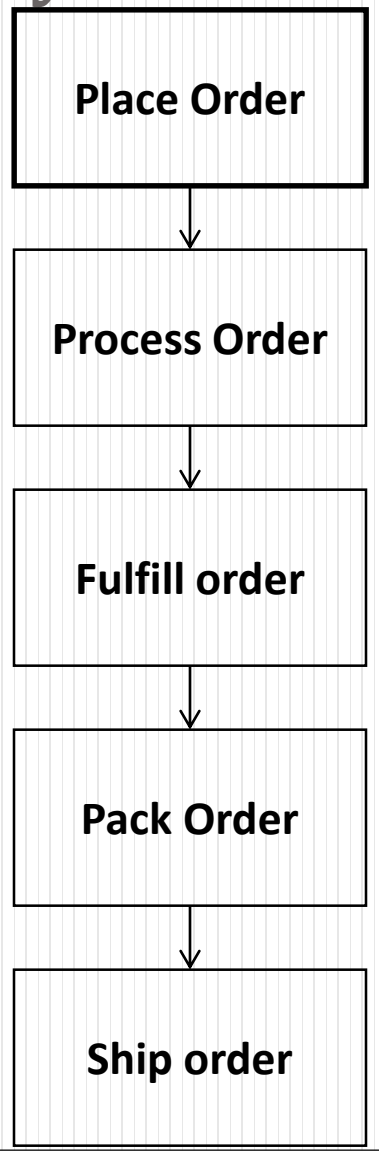
Why Map the Process?

- Find mistakes which require extra processing, rework, or downstream errors.
- Uncover where people are working on low priority items at the wrong time, or completely non-value added items
- Discover processing steps which really aren't needed
- Show where employees, information or goods move from one place or another without any purpose
- Identify where people in the downstream activity are waiting because upstream activity has not delivered
- Show steps that ultimately don't meet the need of customer

Input / Output Analysis

- Used to identify the inputs that drive the process outputs
- Categorizes inputs as:
  - Controllable (c)- variables that can be changed
  - Uncontrollable (u)- variables that are difficult or impossible to control
- Steps to create an Input / Output Analysis
  - Step 1- Detail the process steps (“P” from the SIPOOC)
  - Step 2- List Key Output Variables (KPOV’s)
    - Created by the process as a result of the process input variables
  - Step 3- List and classify Key Input Variables (KPIVs)
    - Variables (X’s) that impact the output variables (Y’s)

Input / Output Analysis- Fulfillment Process



Input / Output Analysis- Fulfillment Process

Inputs	Type
Inventory	c
Customer Name	u
Address	u
Ship Method	c
Credit Card	u

Place Order
Select Product
Place in Cart
Checkout

Outputs
Order
Validation of Customer Information
Address
Ship Method
Credit Card

Inputs	Type
Order	c
Inventory Count	c
Charge System	c
Email System	c

Process Order
Check Inventory
Update Inventory
Charge Customer
Send Order to Warehouse

Outputs
Available Inventory
Customer Charge
Emailed Order

Input / Output Analysis- Fulfillment Process

Inputs	Type
Order	c
Printers	c
Paper	c
Picker	c
Inventory	c

Fulfill Order
Print Order
Packing Slip
Select Order
Look for Inventory
Take to Shipping

Outputs
Order
Filled Order

Inputs	Type
Order	c
Packing Supplies	c
Packing Employees	u

Pack Order
Receive Product
Select Materials
Pack Order

Outputs
Unit to Ship
Change in Inventory

Inputs	Type
Shipment Options	c
Shipment Systems	c
Web Systems	c

Ship Order
Select Method
Print Label
Attach Label
Close Order in System

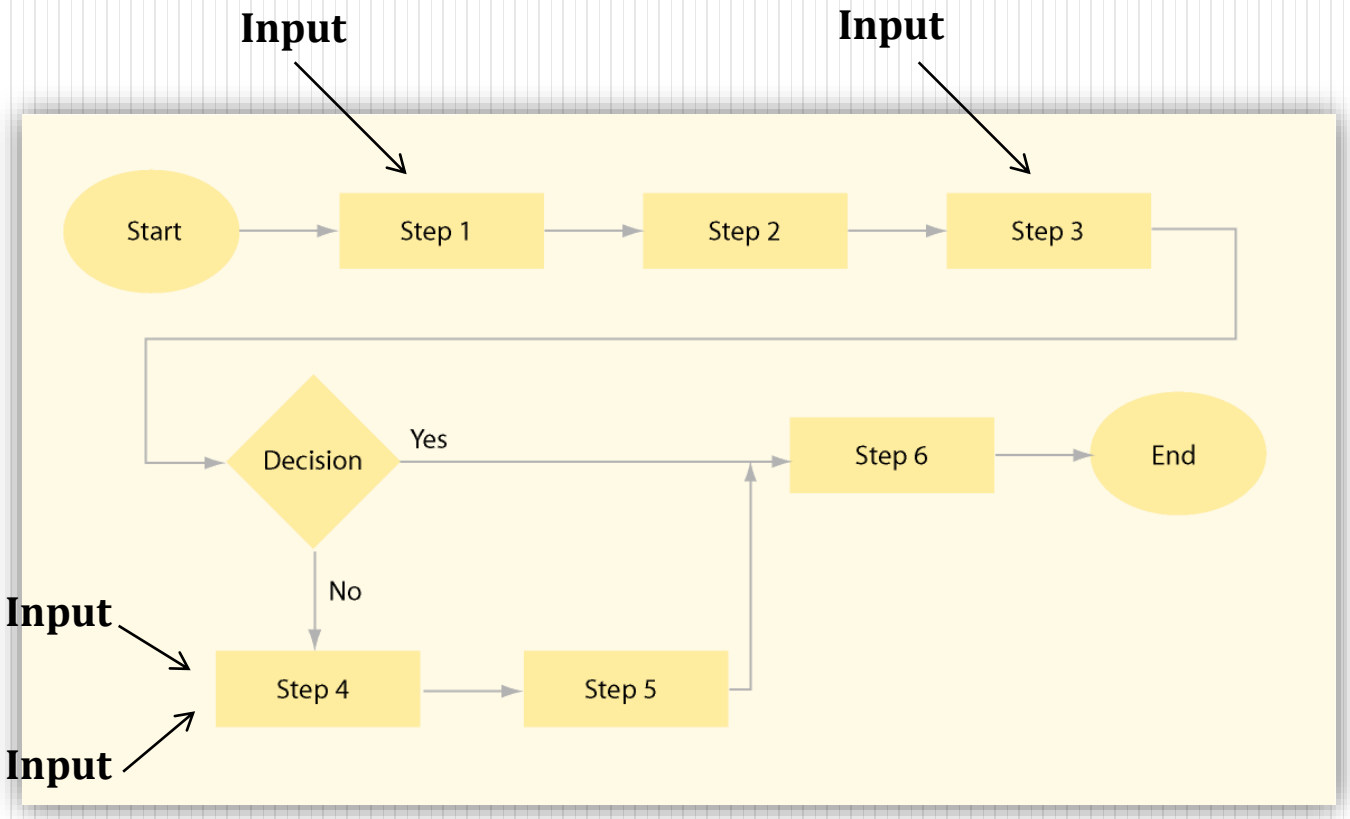
Outputs
Cost of Shipping
Shipment
File to Accounting

Types of Maps

- Flow Map (Flow Chart)
  - Input / Output flows of a process
  - Does not include data
- Process Map
  - Used to analyze and design the steps in a process
  - Includes data
  - Can be used in simulations
- Value Stream Map
  - Used to analyze and design the flow of materials and information
  - Includes data

Traditional Flow Map

- Process steps with inputs and outputs → Process Map

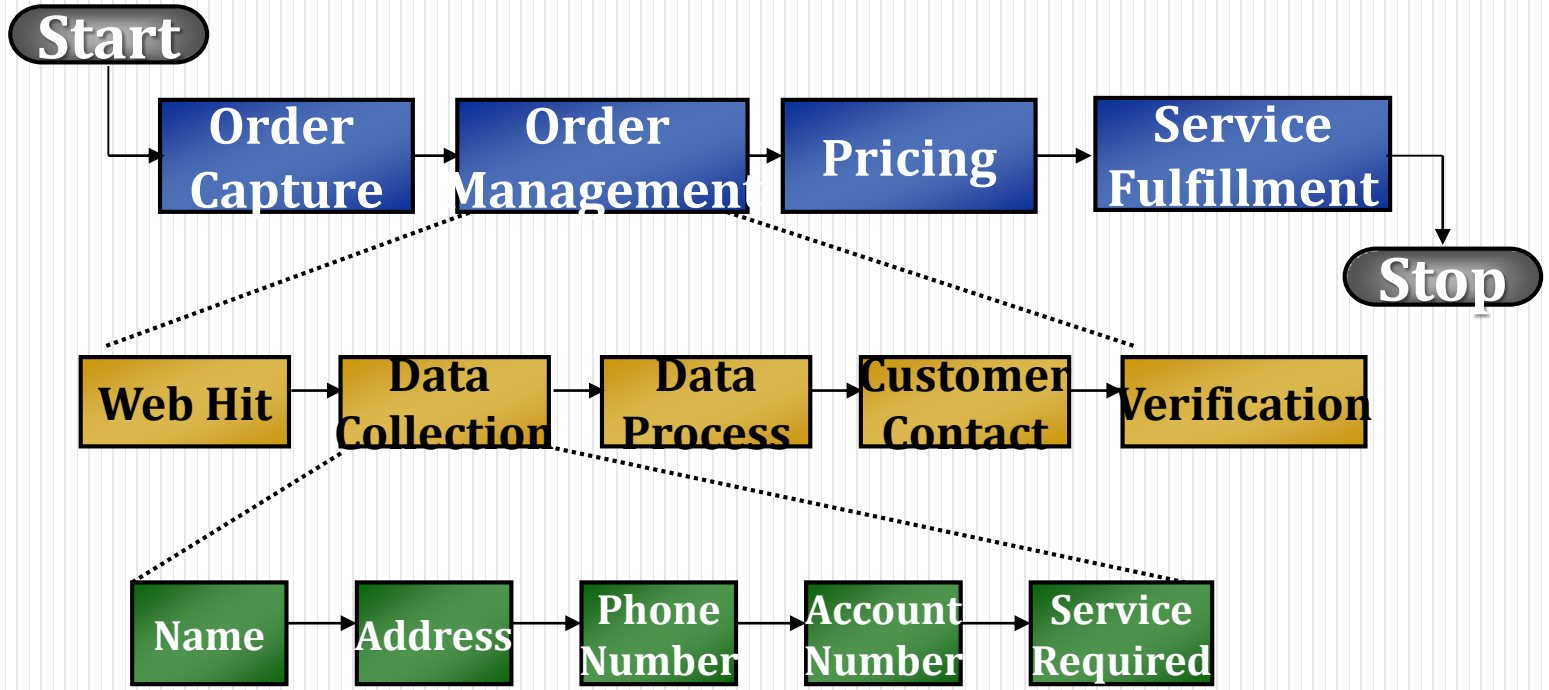


Process Mapping
Helpful Hints

- Always create Process Maps with a team. Rarely, does one person have all process knowledge.
- Interrogate the process by watching in many different conditions. You must watch the process as it happens to see the detail you need.
- Don’t let space be an issue. Consider using flip charts and post-its (as the process steps) and post on a wall to get your initial ideas across.

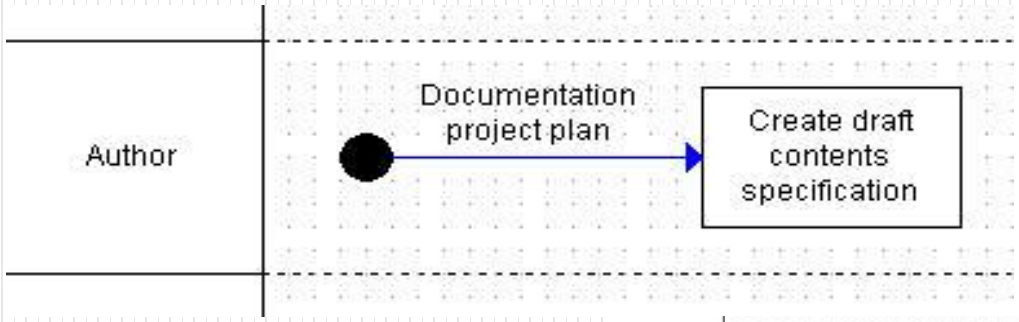
Top Down Process Map

- Provides a focus by selectively expanding from the highest level down to the level where the root cause is located
  - Determine the correct level of the process to Value Stream Map
  - It is a vertical look at the process



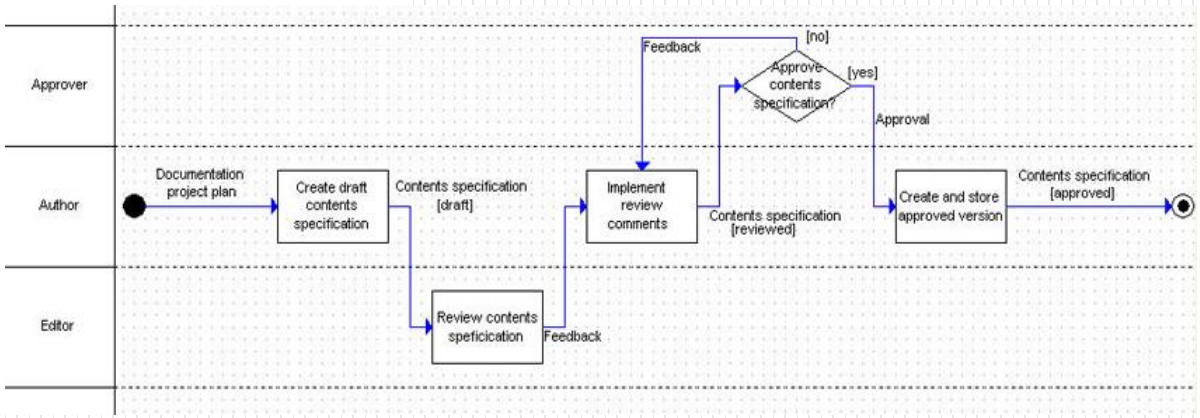
Swim Lane Process Map

- Shows multiple departments/functions
- Sequence and time of processes is important
- Can show information and service flows if needed
- Top lane is typically process customer



1 Process Role

Multiple Process Roles



Value Stream Map Concept

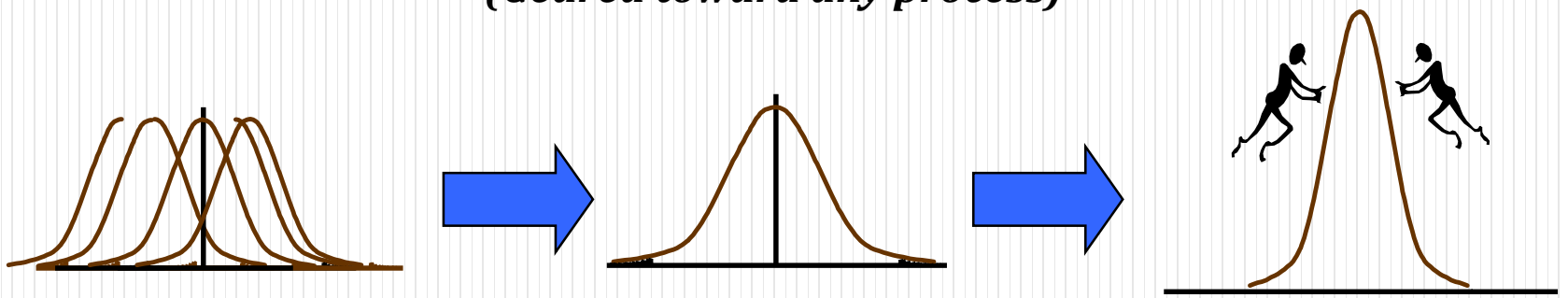
- Gives users new ways of thinking about and looking at operations
- Takt time and other concepts kept simple
- Basic principles, concepts and tools apply to many environments

Components of a Value Stream Map

- 4 Key elements:
  - Clearly focused and accurate process flow
  - Map containing information flow within value stream
  - Accurate depiction of work quantity and location
  - Considers time

Benefits of VSM

Classic VSM Approach
(Geared toward any process)



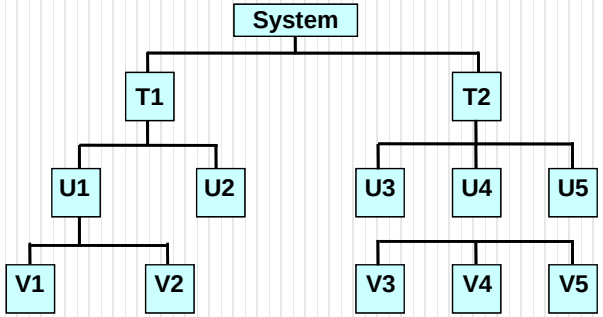
Processes Uncontrolled Difficult to Characterize

Processes Characterized and Controlled But Not Optimized

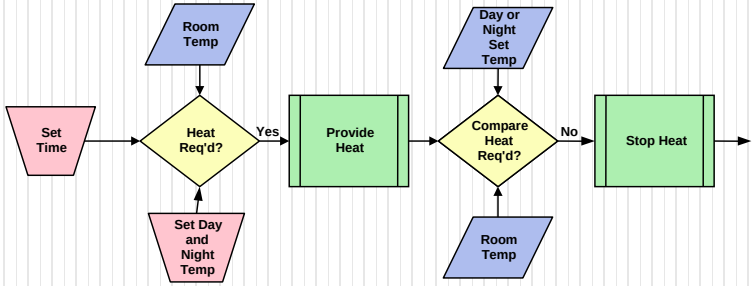
Processes Characterized, Controlled, and Optimized

What is Involved in a Value Stream

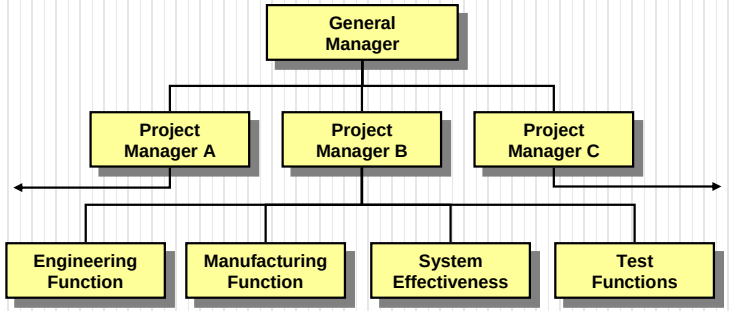
Product/Service



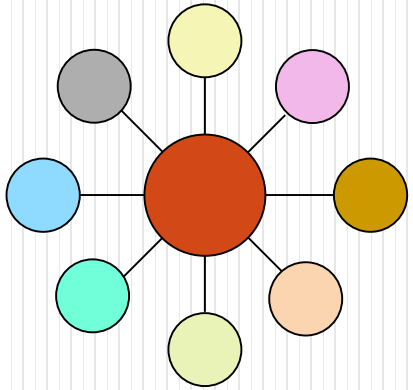
Process



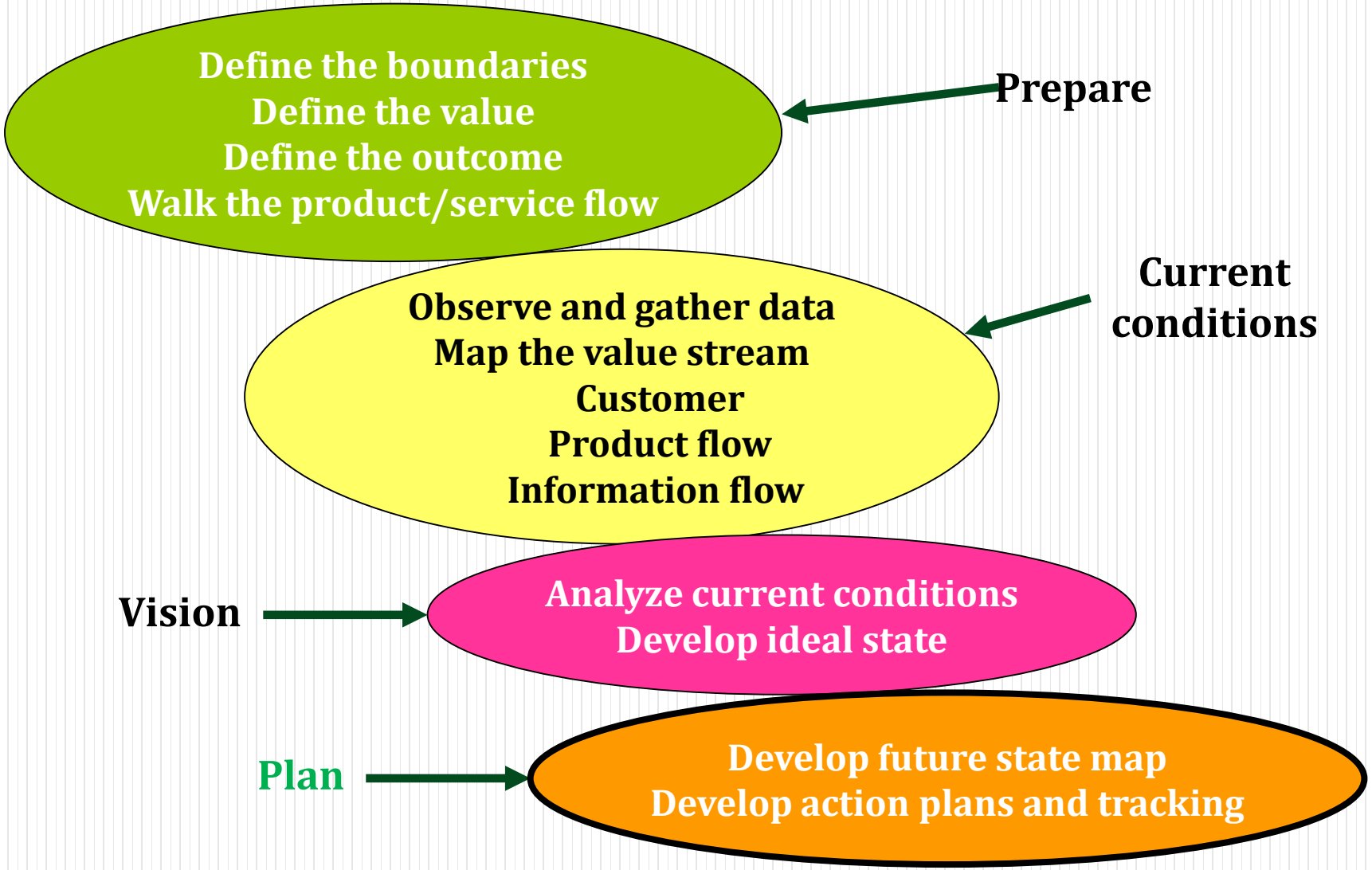
People



Enterprise



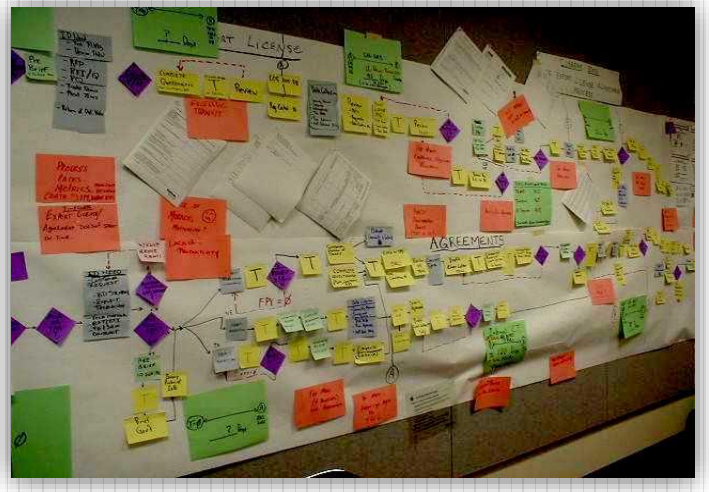
How Value Stream Mapping Is Done



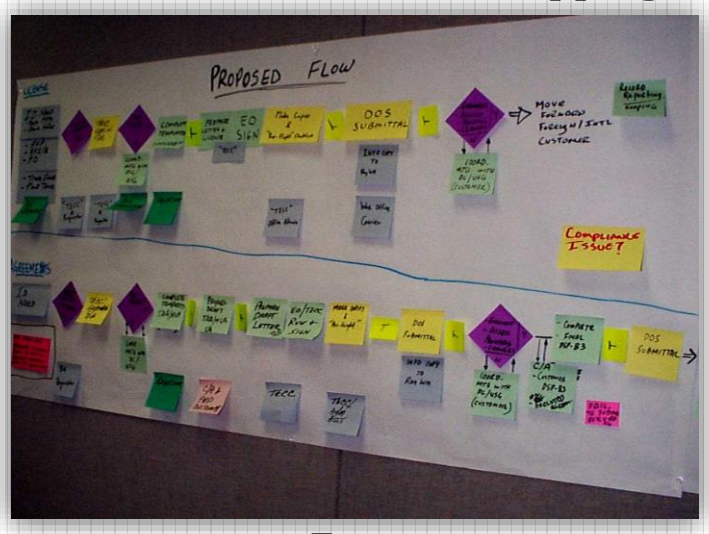
Team Training Kaizen Value Stream Mapping

- Define boundaries
- “Walk” the process (Gemba)
  - Identify tasks and material / information flows between them
- Gather data – Identify resources
- Create “Current State” map
- Define value
- Analyze current conditions identifying:
  - **Value added**
  - **Waste**
- Visualize “Ideal State”
- Create “Future State” map
- Change process to eliminate waste and maximize value
- Develop action plans and tracking

Current



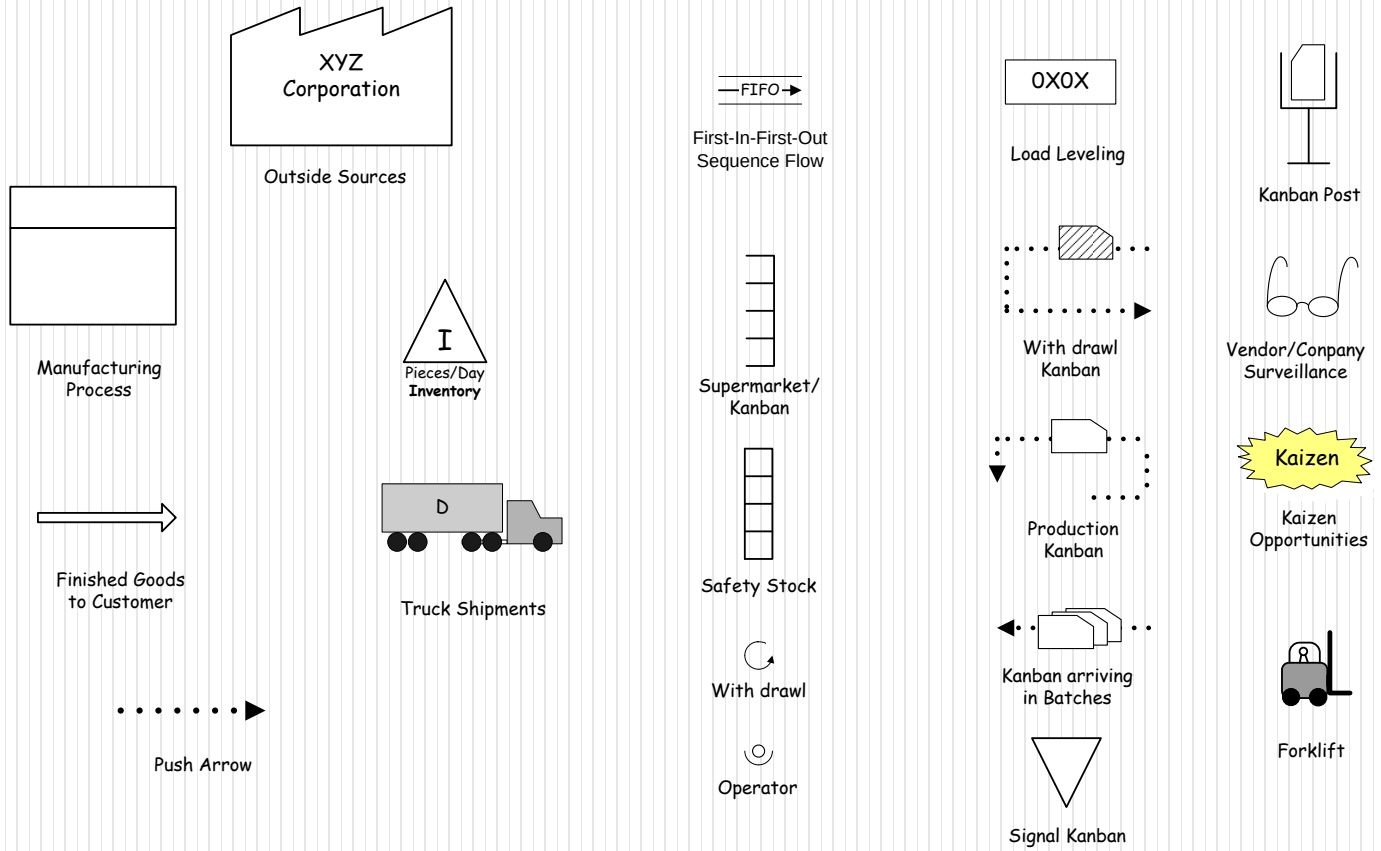
Manual Value Stream Mapping



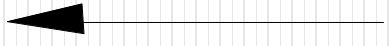
Future

VSM: Material Flow Mapping Icons

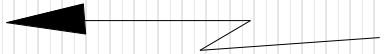
Value Stream Icons



VSM: Information Flow Mapping Icons



Manual Info Flow

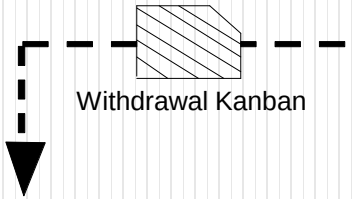


Electronic Info Flow

Weekly Schedule

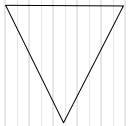
Schedule

Load Leveling

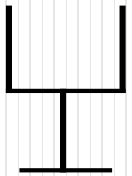


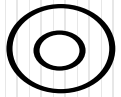
Withdrawal Kanban

Production Kanban



Signal Kanban

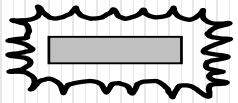




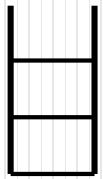
Sequenced Pull Ball

Go See Production Scheduling

GENERAL ICONS

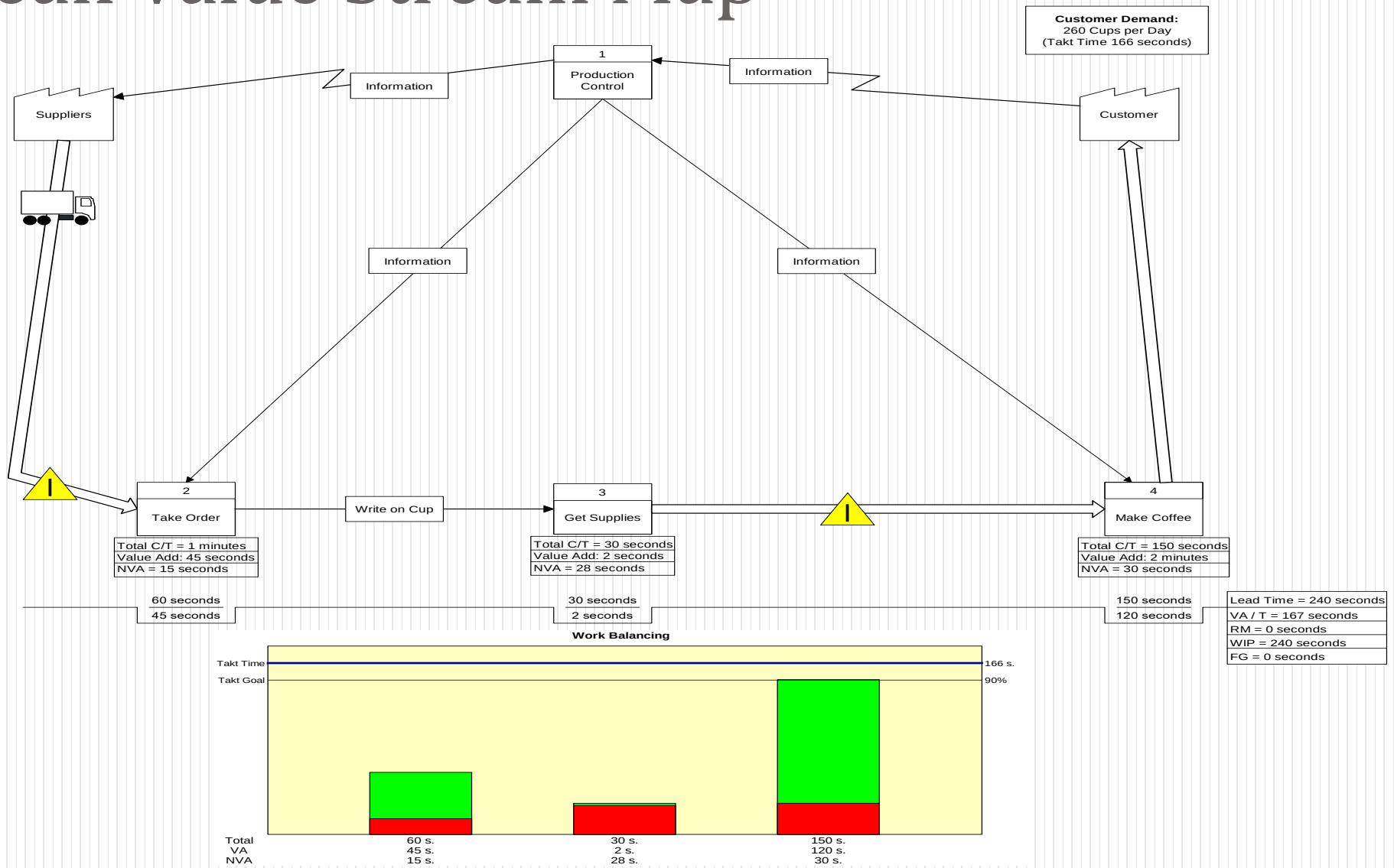


Kaizen Lightening Burst

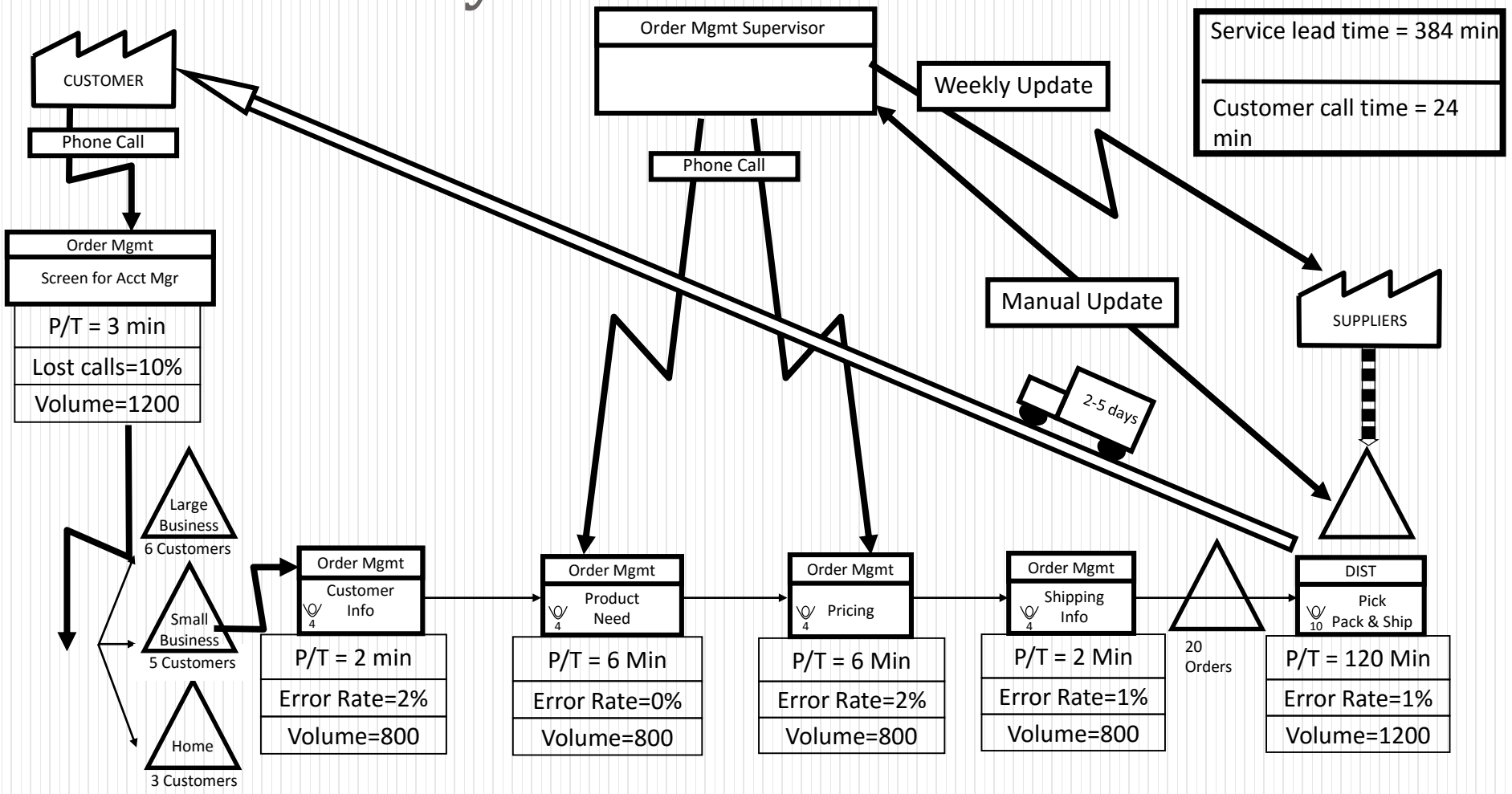


Buffer or Safety Stock

Lean Value Stream Map



Sample Completed Future State VSM with Analysis



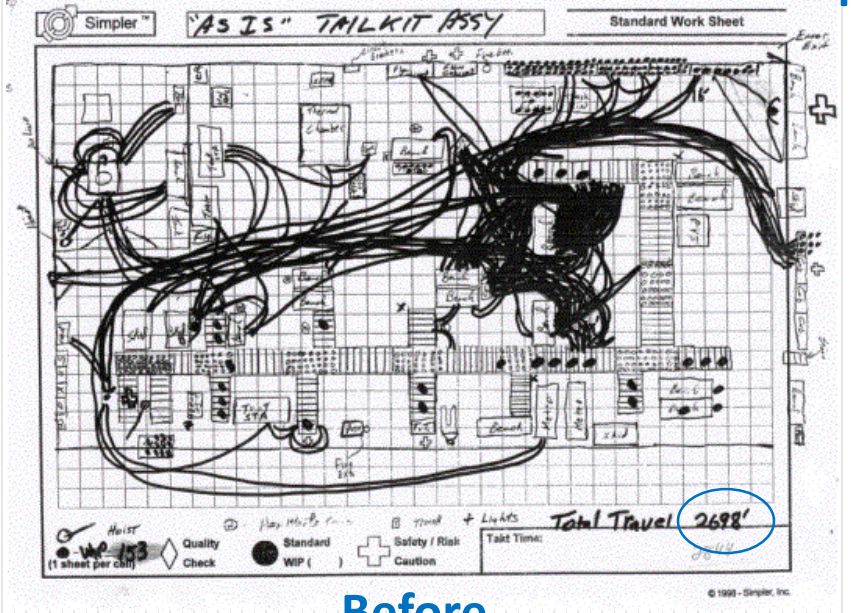
Tying VSM Efforts to Strategic Goals

- Focus on continuous improvement elements
- Balance quantitative and qualitative measures
- Dashboard integration

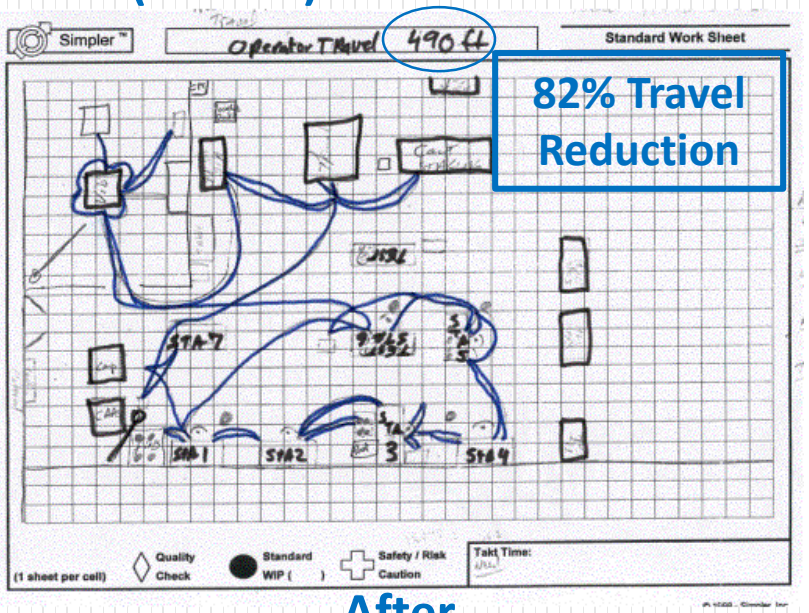
Physical Movement – Spaghetti Diagram

- Makes visible: Inefficiencies or Poor layouts or Wasted motion
- Each line represents a single travel path frequency
- Measure “Travel” distances between stations and compute total distance
- “De-conflict” traffic and gridlock

Wind Corrected Munitions Dispenser (WCMD) Product Flow



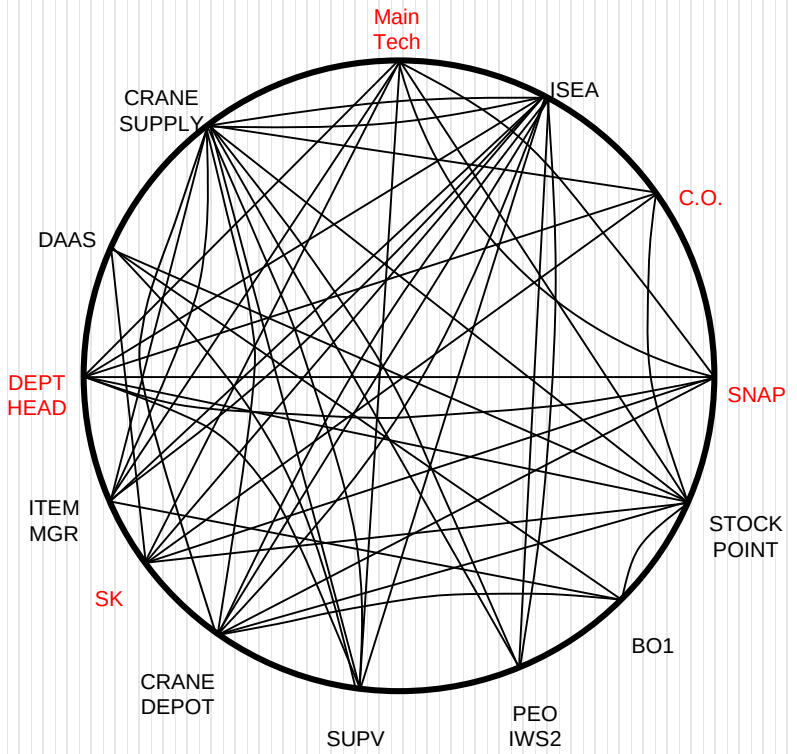
Before



After

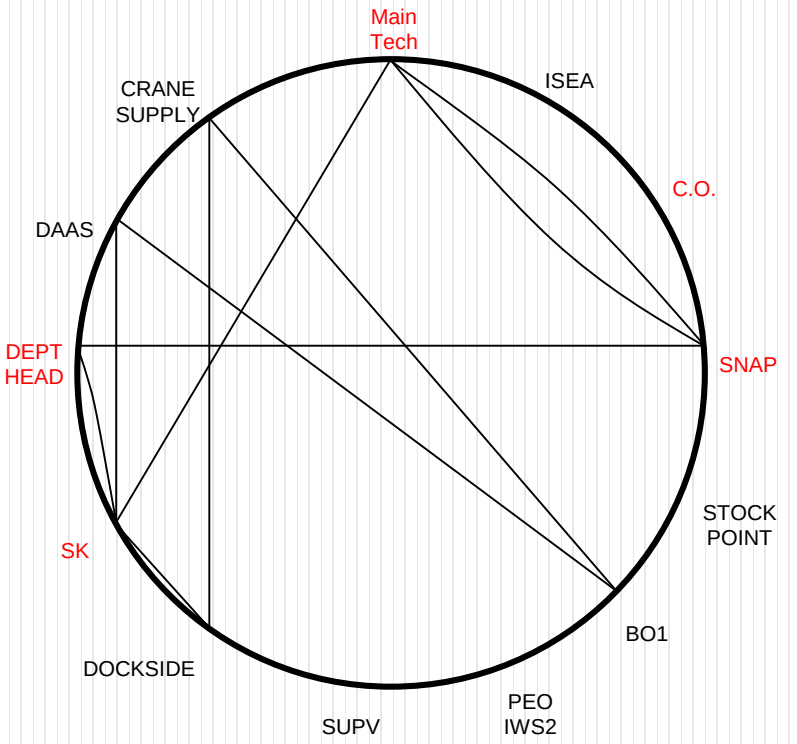
Virtual Movement – Circle Diagram (Information Flow, Handoffs)

Current State



Handoffs … 47
Flow Clock Time … 486 hrs
Manual Touch Time … 108 hrs

Future State



Handoffs … 10
Flow Clock Time … 90 hrs
Manual Touch Time … 58 hrs

Summary

In this module you have learned about:

- What is a Value Stream Map
- Why We Map a Process
- Input / Output Analysis
- Types of Maps
- Spaghetti Diagrams
- Circle Diagrams

Team Exercise:
Develop a Current State Process Map

Use your Team Training Kaizen

1. **Determine boundaries (beginning / ending)**
2. **List process steps (use verbs)**
3. **Sequence steps (Post-It Notes)**
4. **Use appropriate symbols if necessary (decisions)**
5. **Show information flows**
6. **Use paper on the wall with sticky notes for your process steps mapping**