Value Stream Mapping (VSM) Workshop
• Intros
• What is VSM?
• Benefits of VSM
• VSM Elements
• Exercise
• Break
• VSM Process
• VSM Symbols
• Summary
• Resources
• Q&A
Introductions

• 30 seconds each
• Where do you work?
• Why do they pay you? What value do you provide?
• Where are you from?
• What is your background on Lean?
What is a Value Stream Map?

• VSM = Value Stream Map
• VSM is a visual means to depict and improve the flow of processes, as well as the information that controls the flow of materials and information through the process
• Starts from customer request for product or service, to delivery of item back to customer
• Developed in an event format, usually 3-5 days with a cross-functional team
VSM Elements

INFORMATION FLOW

MATERIAL FLOW

DATA BOXES

TIMELINE

http://www.greensuppliers.gov/tech/tools.html?id=lean_clean
CONFUSION AROUND VALUE STREAM MAPPING TIMELINE

Lead Time = 38 mins

Cycle Time = 30 mins

Value Added = 10 mins

Example: **Review Design Changes**

- **Request arrives for design change**
- **Work starts on design change**
- **Setup complete**
- **Send email with approval**

<table>
<thead>
<tr>
<th>Waiting: Busy with other tasks</th>
<th>NVA: Loading Program</th>
<th>NVA: Inspecting, fixing typos, print out file, complete paperwork</th>
<th>VA: Reviewing changes</th>
<th>VA: Make Decision and Submit</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 mins</td>
<td>4 mins</td>
<td>16 mins</td>
<td>6 mins</td>
<td>4 mins</td>
</tr>
</tbody>
</table>

**Process Name**

**Review Design Change**

**Lead Time**

**Cycle (Working) Time**

**Value Added Time**
Benefits of a VSM

- Looking horizontally across a company at the system level, similar to how a customer would view the process
- Highlights areas where the product or service flow stops or is constrained
- Reduces sub-optimizing
- Team building and networking
- Improved communication
https://www.youtube.com/watch?v=YYsn0X0EVRI (10 mins)
• Woodfold Manufacturing reduced volatile organic compound (VOC) emissions by nearly 1,000 lbs per year and diverted 6 tons per year of solid PVC waste from the landfill through opportunities identified in a value stream mapping event.

EPA The Environmental Professional’s Guide to Lean & Six Sigma
Case Study: Baxter International Healthcare Corporation (Box 9)

Baxter Healthcare Corp., a worldwide leader in manufacturing global medical products, adopted a number of Lean techniques to reduce its environmental footprint. Baxter integrated environmental metrics with traditional Lean manufacturing tools, helping the company double in size and revenue while keeping total waste generation close to 1996 levels. Several company plants completed a value stream map (VSM) to find ways to reduce water and energy consumption. One plant developed a VSM and implementation plans by walking through the production process and highlighting water usage and major processing steps. In the VSM, 96 opportunities were prioritized with many graphically represented by starbursts; these opportunities were also included in three future state VSMs. Through the VSM event, Baxter developed an action plan that should save $17,000 over three months and 170,000 gallons of water per day.

https://www.epa.gov/lean/lean-environment-toolkit-chapter-3
Traditional VSM with Water Data

Water VSM using water not timeline

http://www.epa.gov/lean/environment/toolkits/environment/ch3.htm
Focus on Customer Response Time

• The largest obstacle is the fact that waste often hides in plain sight, or is designed into activities

• We cannot eliminate the waste of material, labor, or other resources until we recognize it as waste
  – A job can consist of 99% waste
    • 1 hour task that takes 1 week to provide customer what they asked for
Value vs non-value added

Customer View: Before and After Lean

Before

24 mins of work
1 day response

After

24 mins of work
1 hour response

Remove delays (red) first, before reducing value time (green)
VSM Before

Add Material Usage to Address Environmental Impact
Review: TIM WOODS (8 Wastes)

• Waste = Non-value added
• Find and eliminate these 8 forms of waste in your processes

T
TRANSPORTATION
Moving items or information

I
INVENTORY
Items or information that customer has not received

M
MOTION
Excessive movement within workspace

W
WAITING
Waiting for information or items to arrive

O
OVERPROCESSING
Doing more work than necessary

O
OVERPRODUCTION
Doing work before it is needed

D
DEFECTS
Mistakes and errors that need to be reworked

S
SKILLS
Not using workers to fullest of abilities
Figure 7: Future State Value Stream Map with EHS Icons and E Materials Line

VSM After
Breaking VSM process boxes into specific process steps

» Helps Lean teams see how the current process works and locate waste

VSM tie to Process Maps

<table>
<thead>
<tr>
<th>EHS</th>
<th>Painting</th>
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<tbody>
<tr>
<td>3 people</td>
<td></td>
</tr>
<tr>
<td>C/T = 7 min</td>
<td></td>
</tr>
<tr>
<td>C/O = 4 hr</td>
<td></td>
</tr>
<tr>
<td>Uptime = 48%</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Step 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Step 1.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Step 1.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Step 1.3</td>
</tr>
</tbody>
</table>
Exercise

Making Pizza
Pizza Exercise

• Watch the video
• Capture major process steps
• Collect inventory data
• Collect cycle time data
  – Lead time and yield will be provided
Pizza Making VSM Exercise

- **DOUGH**
  - C/T = _______
  - V/A Time = _____

- **SAUCE**
  - C/T = _______
  - V/A Time = _____

- **TOPPINGS**
  - C/T = _______
  - V/A Time = _____

**TRAYS**

**SCREENS**

**PIZZAS**
VSM from Video

Dough
Get dough, flatten, use docker and toss, place on screen

- C/T = 73 secs
- C/O = 0 sec
- Availability = 100%
- 1 person / shift
- V/A Time = 30 sec
- Yield = 100%

Sauce
Put on dough, spread evenly

- C/T = 25 secs
- C/O = 0 sec
- Uptime = 100%
- 1 person / shift
- V/A Time = 10 sec
- Yield = 99%

Toppings
Add toppings (plus cheese) and spread out, round up edges

- C/T = 100 secs
- C/O = 1 sec
- Uptime = 98%
- 2 person / shift
- V/A Time = 70 sec
- Yield = 92%
- Waste = 2%

Time:
- Dough: 360 sec
- Sauce: 100 sec
- Toppings: 100 sec
15 MINUTE BREAK
VSM Process Steps
Steps to creating a VSM

• Define key product or service
• Define product family
• Determine improvements needed
• Schedule event with key team members
• Gather data (preparation)
• Conduct event
• Develop Action Plan
• Follow up (30/60/90 days)
• Schedule VSM refresher
Define key product or service

• Most frequent requests
• Highest volume of work
• Most critical product/service
• Area with most issues/problems
• Future growth areas
• High visibility to customers
• Other strategic reasons
Define product family

<table>
<thead>
<tr>
<th>PRODUCTS</th>
<th>Assembly Steps and Equipment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>X</td>
</tr>
<tr>
<td>B</td>
<td>X</td>
</tr>
<tr>
<td>C</td>
<td>X</td>
</tr>
<tr>
<td>D</td>
<td>X</td>
</tr>
<tr>
<td>E</td>
<td>X</td>
</tr>
<tr>
<td>F</td>
<td>X</td>
</tr>
<tr>
<td>G</td>
<td>X</td>
</tr>
</tbody>
</table>

Source: Rother and Shook 1999, p. 6.
Determine improvements needed

• Customer complaints and issues
• Financial issues
  – Overtime, margin, inventory, scrap, warranty
• Flow issues
  – Bottlenecks, missed deliveries, shortages, rework
• Employee complaints and issues
  – Absenteeism, tools, training, interruptions
Schedule event with team

• Identify key resources across the value stream
  – Use SIPOC diagram (next slide)
• Find people with most experience
  – Delay event if not available
• Confirm attendance and expectations
• Review their responsibilities and who they represent
## SIPOC – Community Recycling

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Inputs</th>
<th>Process</th>
<th>Outputs</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grocery store</td>
<td>Food and drinks</td>
<td>Purchase Items</td>
<td>Trash</td>
<td>Landfill</td>
</tr>
<tr>
<td>Department store</td>
<td>Gifts</td>
<td>Remove from packaging</td>
<td>Recycled Materials</td>
<td>Residents</td>
</tr>
<tr>
<td>Farmer’s Market</td>
<td>Household items</td>
<td>Sort out waste into bins</td>
<td>Compost Dirt</td>
<td>Community</td>
</tr>
<tr>
<td>Gas station</td>
<td>Tools</td>
<td>Bins collected</td>
<td>Greenhouse Gas Emissions</td>
<td></td>
</tr>
<tr>
<td>Department store</td>
<td>City website</td>
<td>Contents dropped off to correct location</td>
<td>Lechete</td>
<td></td>
</tr>
<tr>
<td>Restaurant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City Officials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Make sure Earth is included as a Customer!**
Gather data (preparation)

- Issues and complaints
- Interviews and focus groups
- Observations and timings
- Historical data
- Inventory levels
- Scorecard and financial performance
Conduct event

- Typically 3-5 days
- Major phases
  - Training
  - Gemba Walk
  - Current State Map
  - Identify waste and opportunities
  - Ideal State
  - Future State Map
Training

- Overview only to get everyone on same page, not expert level
- Most learning will be hands-on during event
- Focus on tools used in event
- Interactive with simulations and videos is ideal
Gemba Walk

- Japanese word for “the real place”
- Go to where the actual work is being done, interact with the workers to improve decision making and problem solving
- Shows respect for the workers to understand what they do
- Referred to as “Gemba Walk” or “Go and See”
Current State

• What is happening today (snapshot)
• 80% of what is typically done
  – not exceptions and one-off situations
• Based on data gathering and interviews during event
• Capture problems, not solutions
• Must thoroughly understand current state before making improvements
• Identify opportunities with burst symbol
Identify waste and opportunities

- Customer satisfaction
- 8 forms of waste
- Longest lead times
- Longest cycle times
- Most inventory (bottlenecks)
- Frustration areas
- Overburden (muri)
- Instability/variation (mura)
Ideal State

• How would you setup this process if you were starting from scratch, with no boundaries, all the money, all the people, all the resources you wanted, along with the following principles in place?
  – Defect-free
  – Just in time
  – One piece flow
  – Minimal inventory
  – Lowest cost
  – All value added processes
  – Minimal space
Future State

• Come back from reality from Ideal State
• How close can be get to Ideal State, given:
  – Limited time (6-12 months)
  – Limited budget (low cost solutions)
  – Limited resources
  – Current limitations (regulations, agencies, customers, procedures/policies)
VSM States

1. Current State
2. Ideal State
3. Future State
Develop Action Plan

• Identify potential solutions
• Determine impact and ease of implementation
• Vote on best ideas
• Create action plan with names, dates, and deliverables
1. Turn down water temp on part wash machine
2. Dry sweep implementation
3. Water flow in bathroom sinks
4. Drip irrigation in landscaping
5. Reuse water in stress testing equipment
6. Water flow in toilets
7. Part wash machine pipe insulation
8. Water pipe leak fixed
9. Upgrade chiller
10. Plug water pipe at end of each shift
Multivoting (3-5 dots each)

1. Turn down water temp on part wash machine
2. Dry sweep implementation
3. Water flow in bathroom sinks
4. Drip irrigation in landscaping
5. Reuse water in stress testing equipment
6. Water flow in toilets
7. Part wash machine pipe insulation
8. Water pipe leak fixed
9. Upgrade chiller
10. Plug water pipe at end of each shift
<table>
<thead>
<tr>
<th>#</th>
<th>Action</th>
<th>Assignee</th>
<th>Due Date</th>
<th>Deliverable</th>
<th>Status</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Update procedure</td>
<td>Vera</td>
<td>12/1/17</td>
<td>Procedure released and available in system</td>
<td>In Process</td>
<td>Need new rep from HR</td>
</tr>
<tr>
<td>2</td>
<td>Email photos from event</td>
<td>Brion</td>
<td>8/1/17</td>
<td>Email with photos attached sent to team</td>
<td>Complete</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Kaizen event on hiring process</td>
<td>Uma</td>
<td>1/15/18</td>
<td>Report out from event</td>
<td>Not started</td>
<td></td>
</tr>
</tbody>
</table>
Follow up (30/60/90 days)

• Don’t wait for 30 days to follow-up
• Schedule immediately the week after event, and each week for first month
• Suggest meeting weekly for first 90 days
• Some actions may require kaizen events to complete
  – Schedule and help facilitate events
• Track progress after improvements
  – May be delayed due to backlog of work and metrics
Schedule VSM refresher

• Typically updated every 6-18 months
  – Depends on how much improvement is made
• Put on calendar immediately, including prep time
• Captures benefits since last event
• Start from beginning, don’t update maps
  – Unless nothing has changed 😞
Symbols
VSM Symbols

- **Kanban Arriving in Batches**
- **Signal Kanban**
- **Withdrawal Kanban**
- **Production Kanban**

**Supermarket Withdrawal**

- **First In, First Out (FIFO)**

- **Buffer or Safety Stock**

- **Load Leveling**

- **Go and See Production Scheduling**

- **Kanban Post**

max. ___ items
VSM is a good tool for getting teams aligned, focused on the customer, looking at system optimization and reducing flow inhibitors.

Leads to plans that can reduce lead time by 50% or more!

Takes significant effort, but very valuable.

Conduct current, ideal and future state maps.

Key is the follow-up with the action plan (by process owner, not facilitator).
Resources

Learning to See: Value Stream Mapping to Add Value and Eliminate MUDA
Mike Rother and John Shook

Value Stream Mapping: How to Visualize Work and Align Leadership for Organizational Transformation
Karen Martin and Mike Osterling
• Plus (+)
  – What did you like?
  – What did you learn?

• Delta (Δ)
  – What could have gone better?
  – What was least valuable?
Helping businesses and organizations achieve “triple bottom line” performance using Lean and Six Sigma
Services

• Mentor Current LSS Experts
• Analyze Data
• Research, Advise and Teach
• Facilitate Events
• Management Coaching
• Network
Training Classes and Workshops

- Intro to Lean and Six Sigma
- Lean and Green Workshop
- 5S Workplace Organization
- Personal Lean
- Statistical Process Control (SPC)
- Capability Analysis (Cpk/Ppk)
- Variable and Attribute Gage R&R
- Regression and ANOVA
- Design of Experiments
- Advanced SPC
- Value Stream Mapping (VSM)
- Advanced Standard Work
- More coming soon...

http://www.biz-pi.com/PDX/
Other Websites

• Business Performance Improvement
  – BIZ-PI.com

• Earth Consultants - Lean Six Sigma and the Environment (Planet)
  – LeanSixSigmaEnvironment.org

• Lean Six Sigma for Good
  – LeanSixSigmaForGood.com

• Lean Portland
  – LeanPDX.org
Brion Hurley
Lean Six Sigma Master Black Belt
Portland, Oregon (USA)
brion@biz-pi.com
321-271-5361