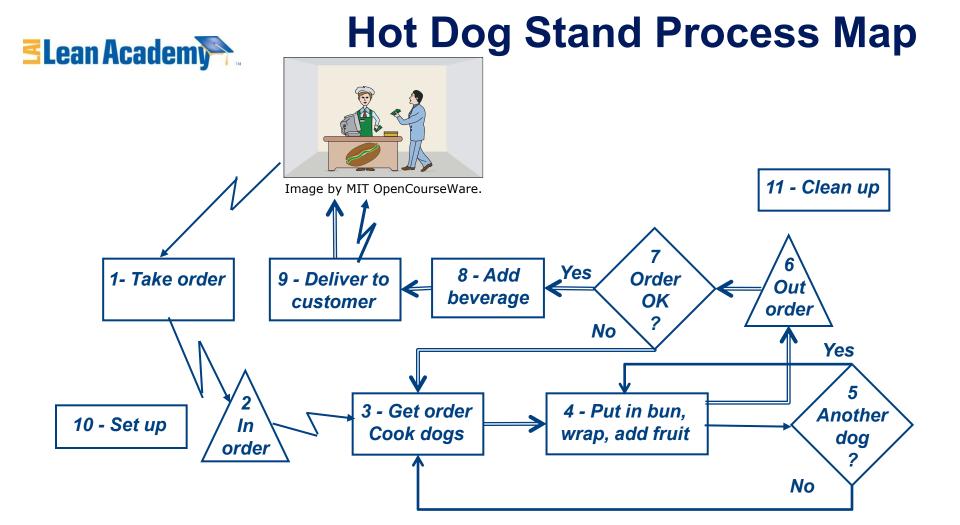# Value Stream Mapping Basics

Learning Objectives

At the end of this module, you will be able to:

- **Sketch a basic value stream map**

- **Demonstrate basic value stream analysis**

- **Recognize steps for process improvement using value stream mapping and analysis**

Hot Dog Stand Process Map

Image by MIT OpenCourseWare.

1- Take order

9 - Deliver to customer

8 - Add beverage

7 Order OK ?

6 Out order

11 - Clean up

Yes

No

10 - Set up

2 In order

3 - Get order Cook dogs

4 - Put in bun, wrap, add fruit

5 Another dog ?

Yes

No

How can Sasha and Andy improve their productivity to meet growing customer demand?

Five Lean Thinking Fundamentals

- **Specify *value*: Value is defined by customer in terms of specific products and services**

- **Identify the *value stream*: Map out all end-to-end linked actions, processes and functions necessary for transforming inputs to outputs to identify and eliminate waste**

- Make value *flow* continuously: Having eliminated waste, make remaining value-creating steps "flow"

- Let customers *pull* value: Customer's "pull" cascades all the way back to the lowest level supplier, enabling just-in-time production

- Pursue *perfection*: Pursue continuous process of improvement striving for perfection
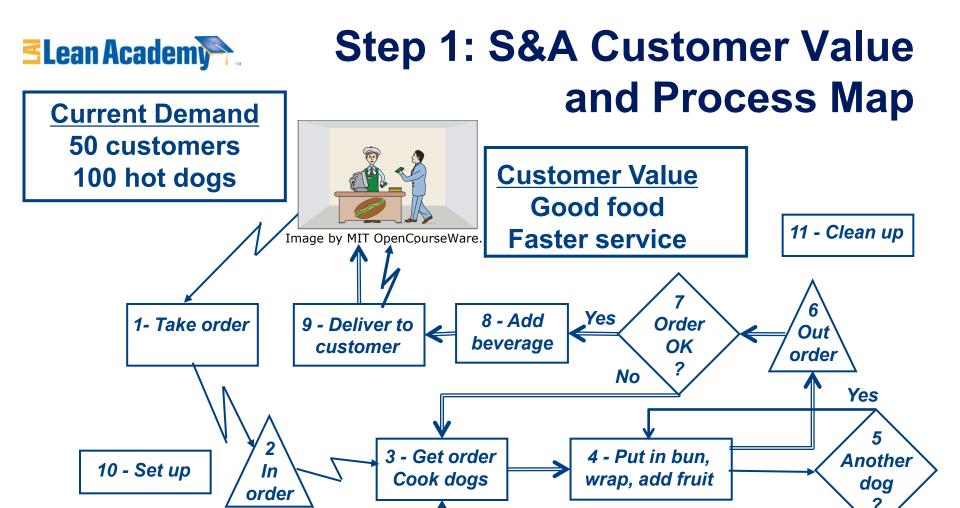
Ref: James Womack and Daniel T. Jones, Lean Thinking (New York: Simon & Schuster, 1996).

Value Stream Map (VSM)

- **A <u>tool</u> used to improve a process by identifying added value and eliminating waste**

- **A process map that follows the *value creation process***
  - **"strap yourself to the product (or service) and see where you go"**

- **A process map with *data* added**
  - **Times: processing, wait, cycle**
  - **Quality: number of rejects**
  - **Inventory**
  - **Resources**
    - **Number of people**
    - **Space**
    - **Distance traveled**
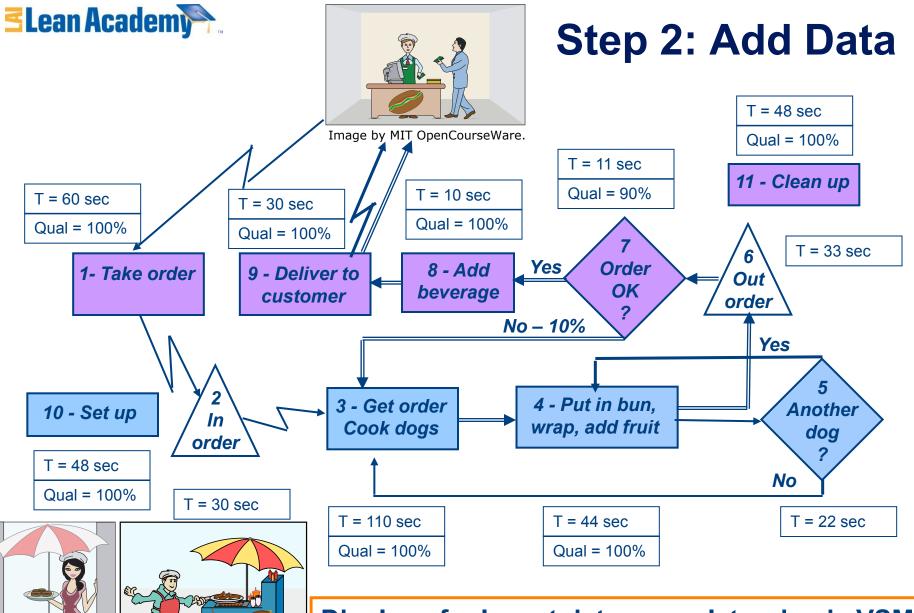 - **Whatever else is useful for analyzing the process**

Steps for Creating a VSM

1. **Define customer value and the process**
   - "Walk" the process to identify tasks and flows
   - Identify value-added and waste process steps

2. **Create the "current state" VSM**
   - Gather data on resources, time, quality for each step

3. **Analyze map to determine opportunities for improvement**
   - Identify bottlenecks and other flow impediments
   - Brainstorm actions to eliminate waste and add value

4. **Create a "future-state" map to visualize the desired and realistic next state**

5. **Create action plans to move toward future state**

Step 1: S&A Customer Value and Process Map

Current Demand
50 customers
100 hot dogs

Image by MIT OpenCourseWare.

Customer Value
Good food
Faster service

11 - Clean up

1- Take order

9 - Deliver to customer

8 - Add beverage

7 Order OK ? — Yes / No

6 Out order

10 - Set up

2 In order

3 - Get order Cook dogs

4 - Put in bun, wrap, add fruit

5 Another dog ? — Yes / No

This process map follows the value creation process ✔

Value/waste assessed at each process step ✔

Lean Academy

Image by MIT OpenCourseWare.

| T = 48 sec |
| Qual = 100% |

11 - Clean up

| T = 11 sec |
| Qual = 90% |

| T = 60 sec |
| Qual = 100% |

| T = 30 sec |
| Qual = 100% |

| T = 10 sec |
| Qual = 100% |

| T = 33 sec |

1- Take order

9 - Deliver to customer

8 - Add beverage

7 Order OK ?

Yes

6 Out order

No – 10%

Yes

10 - Set up

2 In order

3 - Get order Cook dogs

4 - Put in bun, wrap, add fruit

5 Another dog ?

No

| T = 48 sec |
| Qual = 100% |

| T = 30 sec |

| T = 110 sec |
| Qual = 100% |

| T = 44 sec |
| Qual = 100% |

| T = 22 sec |

Images by MIT OpenCourseWare.

Display of relevant data completes basic VSM

S&A Takt And Cycle Times

Lean Academy
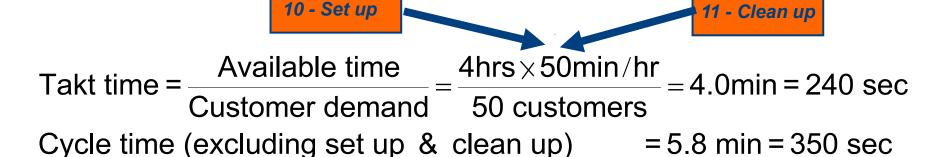
**Current demand
50 customers**

Open from 10AM - 2PM

$$\text{Takt time} = \frac{\text{Available time}}{\text{Customer demand}} = \frac{4\text{hrs} \times 60\text{min/hr}}{50 \text{ customers}} = 4.8\text{min} = 288 \text{ sec}$$

Cycle time (summed from previous data) $= 7.4 \text{ min} = 446 \text{ sec}$

**Valid alternate calculation –
assume setup/cleanup is done "when things are slow"**

10 - Set up   **11 - Clean up**

$$\text{Takt time} = \frac{\text{Available time}}{\text{Customer demand}} = \frac{4\text{hrs} \times 50\text{min/hr}}{50 \text{ customers}} = 4.0\text{min} = 240 \text{ sec}$$

Cycle time (excluding set up & clean up) $= 5.8 \text{ min} = 350 \text{ sec}$
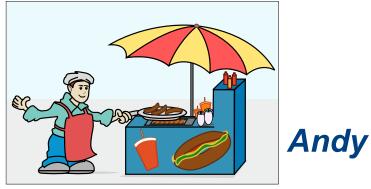
Cycle time > takt time, but two workers – can demand be met?

Step 3: Value Stream Analysis

Sasha

Image by MIT OpenCourseWare.

Andy

Image by MIT OpenCourseWare.

- **With your team, take 15 minutes to**
  - **Calculate the total**
    - **Value added time**
    - **Non value added time**
    - **Wait time**
  - **Calculate the total "touch time" that Sasha and Andy spend on a single order**
- **Be ready to report your answers to the class**

Utilization and Capacity

VAT is only slightly over 50% $\Rightarrow$ Opportunities for improvement

Available time = 4 hours = 240 min

Worktime: Touch time per order X number of orders
  Sasha's tasks: _____/60 min X 50 cust. = _____ min
  Andy's tasks: _____/60 min X 50 cust = _____ min

Utilization: Worktime / time available
  Sasha's: (_____min / 240 min) X 100% = _____%
  Andy's: (_____min / 240 min) X 100% = _____%

Capacity: Time available / touch time per order
  Andy working at 100% = (240min X 60) / _____sec = ___

Utilization and Capacity

VAT is only slightly over 50% ⇒ Opportunities for improvement

Available time = 4 hours = 240 min

Worktime: Touch time per order X number of orders
    Sasha's tasks: <u>159 </u>/60 min X 50 cust. = <u> 133 </u> min
    Andy's tasks: <u>224 </u>/60 min X 50 cust = <u> 187 </u> min

Utilization: Worktime / time available
    Sasha's: (<u> 133 </u>min / 240 min) X 100% = <u> 55 </u>%
    Andy's: (<u> 187 </u>min / 240 min) X 100% = <u> 78 </u>%

Capacity: Time available / touch time per order
    Andy working at 100% = (240min X 60) / <u> 224 </u>sec = <u> 64 </u>

We will consider complications like varying orders or irregularly spaced customers in the Variation Module

Summary - S&A Value Stream Analysis (VSA)

- **Current production (50 customers) is a little below current capacity (64 customers) of Andy and Sasha**
  - **Process improvement needed to meet growing demand**
- **Andy and Sasha are both underutilized**
  - **But utilization is not balanced between them**
- **Cycle time of 7.43 min per customer (or even 5.8 min) too long**
  - **Should be able to shorten cycle time to meet demands of customers for faster service**

Bottom Line
Sasha and Andy should implement process improvement for week 3 to meet growing demand!
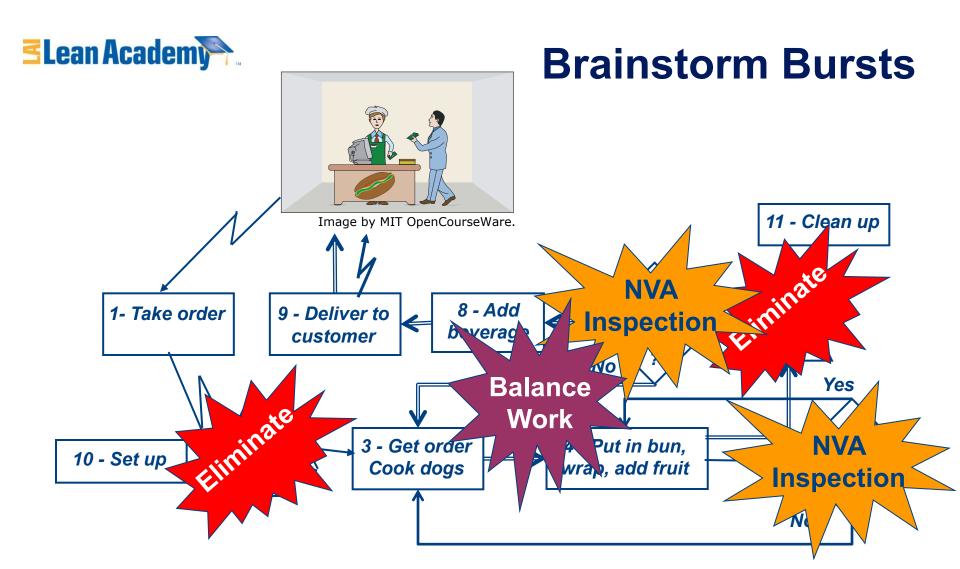
Improvement Brainstorm

Sasha

Image by MIT OpenCourseWare.

Andy

Image by MIT OpenCourseWare.

- **Help Sasha and Andy figure what to improve**
  - **How can utilization be improved?**
  - **How can cycle time be reduced?**
  - **What has to be done to serve 75 customers?**
  - **What has to be done to serve 100 customers?**

Brainstorm Bursts

1- Take order

9 - Deliver to customer

8 - Add beverage

11 - Clean up

NVA Inspection

Eliminate

Balance Work

Eliminate

No

Yes

10 - Set up

3 - Get order Cook dogs

4 - Put in bun, wrap, add fruit

NVA Inspection

No

Steps for Creating a VSM

1. **Define customer value**

2. **Create a "current state" map**
    *   "Walk" the process to identify tasks and flows
    *   Gather data on resources, time, quality for each

3. **Analyze map to determine opportunities for improvement**
    *   Identify value-added and waste
    *   Brainstorm actions to eliminate waste and add value

4. **Create "future-state" map to visualize the desired state**

5. **Create action plans to move towards future-state**

Why is VSM a Useful Tool?

- **Helps visualize interactions and flows**

- **Shows linkages between information and product flows**

- **Provides a common language for talking about a process**

- **Helps to identify:**
  - **the constraint(s) - any resource whose capacity is less than customer demand;**
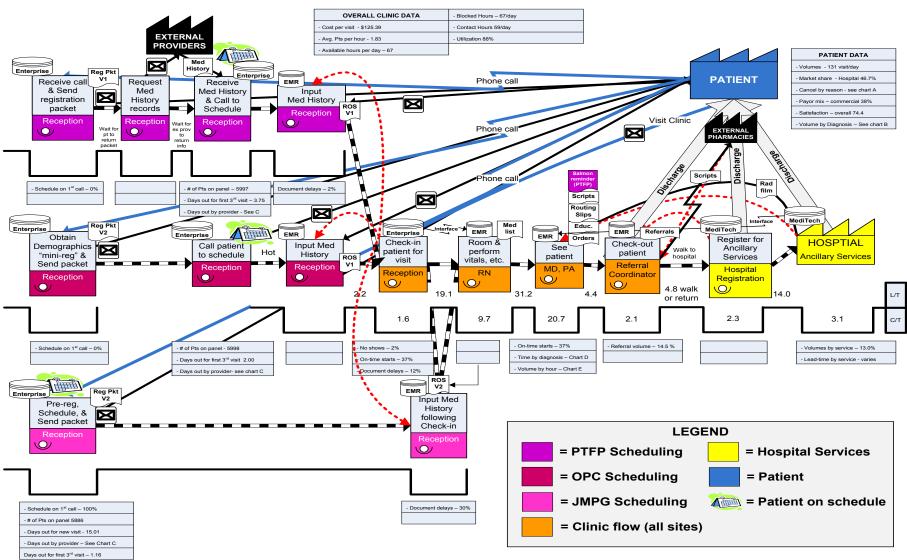 - **wastes as well as their sources**

Tips for Creating a VSM

- **Involve entire team**

- **Actually walk the process - follow the material and information through the process, starting at the beginning**

- **Use Post-it notes and butcher paper**

- **Use symbols or icons that are meaningful to the process but common enough to be understood by all involved**

"Industrial Strength" Example

Jefferson Healthcare Clinic - Current State Map

OVERALL CLINIC DATA	
- Cost per visit - $125.39	- Blocked Hours – 67/day
- Avg. Pts per hour - 1.83	- Contact Hours 59/day
- Available hours per day – 67	- Utilization 88%

PATIENT DATA
- Volumes - 131 visit/day
- Market share - Hospital 46.7%
- Cancel by reason - see chart A
- Payor mix – commercial 38%
- Satisfaction - overall 74.4
- Volume by Diagnosis – See chart B

LEGEND

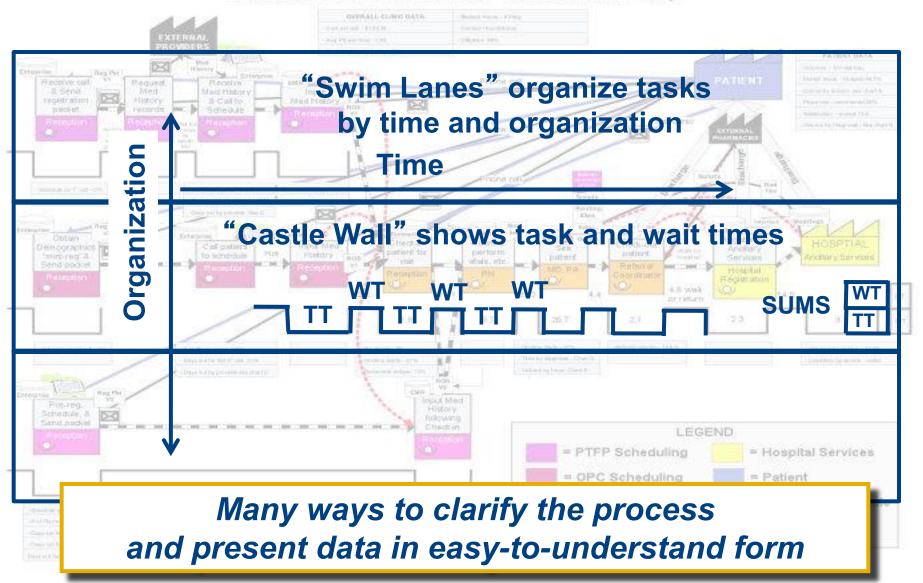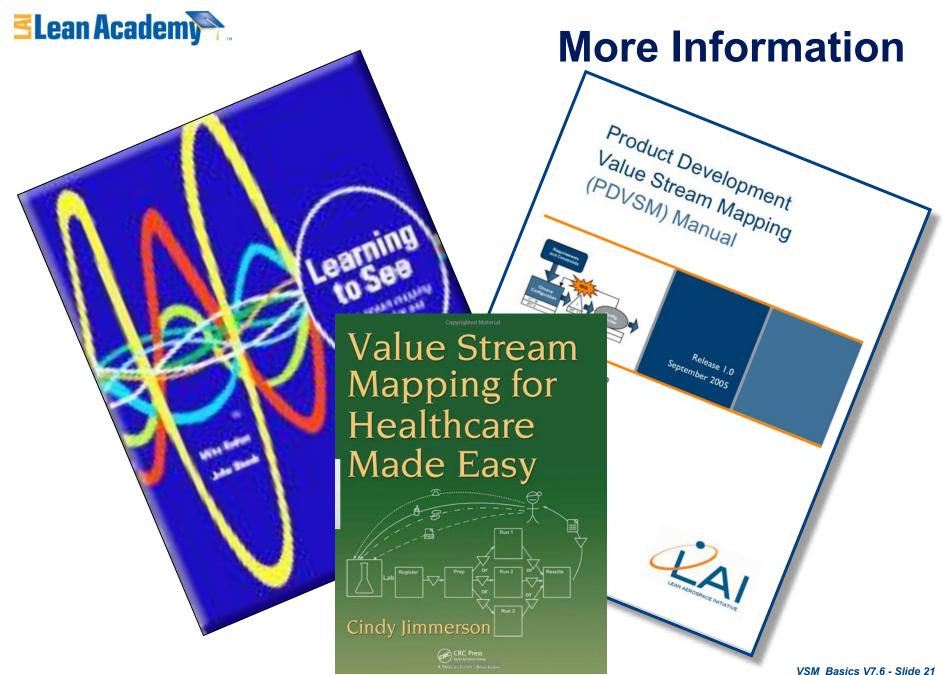|	
■ = PTFP Scheduling	■ = Hospital Services
■ = OPC Scheduling	■ = Patient
■ = JMPG Scheduling	= Patient on schedule
■ = Clinic flow (all sites)	

Courtesy of Jefferson Healthcare, Port Townsend, WA. Used with Permission.

Additional Graphic Elements

Jefferson Healthcare Clinic - Current State Map

"Swim Lanes" organize tasks
by time and organization

Time

Organization

"Castle Wall" shows task and wait times

WT   WT   WT

TT   TT   TT

SUMS   WT / TT

LEGEND

= PTFP Scheduling   = Hospital Services

= OPC Scheduling   = Patient

*Many ways to clarify the process
and present data in easy-to-understand form*

Courtesy of Jefferson Healthcare, Port Townsend, WA. Used with Permission.

LAI Lean Academy

Learning to See

Value Stream Mapping for Healthcare Made Easy

Cindy Jimmerson

CRC Press
Taylor & Francis Group
A PRODUCTIVITY PRESS BOOK

Product Development Value Stream Mapping (PDVSM) Manual

Release 1.0
September 2005

LAI
LEAN AEROSPACE INITIATIVE

Courtesy of Lean Enterprise Institute. Used with permission.

Jimmerson, C., Value Stream Mapping for Healthcare Made Easy, Productivity Press, New York, NY, 2010

McManus, H., "Product Development Value Stream Mapping (PDVSM Manual)", Release 1.0, Sept 2005. Lean Advancement Initiative.

Rother, M. and Shook, J. *Learning to See*, v1.2, The Lean Enterprise Institute, Cambridge, MA June 1999

Acknowledgements

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- **Sharon Johnson – Worcester Polytechnic Inst.**
- **Jose Macedo – Cal Poly San Luis Obispo**
- **Hugh McManus – Metis Design**
- **Ted Mayeshiba – USC**
- **Earll Murman – MIT**

16.660J / ESD.62J / 16.853 Introduction to Lean Six Sigma Methods
IAP 2012