Seeing the Whole Value Stream

Dan Jones, Chairman, Lean Enterprise Academy &
Jim Womack, Senior Advisor, LEI
November 29, 2011
Housekeeping

• To enlarge slides, use the magnifying glass icon just beneath the slides and to the right on your display console

• To adjust the sound, use the volume control on the console or on your computer

• To ask a question, type it into the box at the bottom of the console and hit “submit”
Today’s Presenters

James P. Womack
- Founder & Senior Advisor, Lean Enterprise Institute (LEI)
- Nonprofit training, publishing, conference & research company
- Founded 1997 to help companies create more value & eliminate waste

Daniel T. Jones
- Founding Chairman of the Lean Enterprise Academy (LEA)
- Nonprofit training, publishing, conference & research Academy in the UK
- Founded 2002 to advance the frontiers of lean knowledge & how to implement it
Today’s Presenters

Jones & Womack

• Lean management thinkers, news commentators, conference keynoters
• Authors of essays & articles on management

Co-authors of lean classics:

• Lean Solutions
• Lean Thinking
• The Machine That Changed the World (with Daniel Roos)
• Most recently: Seeing the Whole Value Stream, an expanded 2nd edition of the workbook originally titled Seeing the Whole
Seeing the Whole Value Stream

- What is extended value-stream mapping for collaborating with suppliers & customers
- A realistic example of how to use it, step-by-step
- 5 new essays on how companies are analyzing & improving supply chains with extended value-stream mapping
When we launched *Seeing the Whole*:

- The world’s producers were busy outsourcing and offshoring their value streams – consisting of the many steps and complicated information flows from order to delivery.

- The goal: lowest piece part price
What a Difference a Decade Makes

• Hardly anyone seemed to think first about:
  ✓ Looking at the value creating work.
  ✓ Removing waste (time, effort, resources).
  ✓ Eliminating the information chaos.

Before relocating anything.

We offered extended value stream mapping as the tool for doing this.
Current-State Extended Value-Stream Map
Ideal-State Extended Value Stream Map
# Summary of the Potential for Improvement

<table>
<thead>
<tr>
<th></th>
<th>Current State</th>
<th>Future State 1</th>
<th>Future State 2</th>
<th>Ideal State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Lead Time</strong></td>
<td>44.2 days</td>
<td>23.9 days</td>
<td>15.8 days</td>
<td>2.8 days</td>
</tr>
<tr>
<td><strong>Value Percentage of Time</strong></td>
<td>0.09%</td>
<td>0.16%</td>
<td>0.24%</td>
<td>1.4%</td>
</tr>
<tr>
<td>(value-creating time to total time)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Value Percentage of Steps</strong></td>
<td>11%</td>
<td>15%</td>
<td>21%</td>
<td>27%</td>
</tr>
<tr>
<td>(value-creating steps to total steps)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inventory Turns</strong></td>
<td>5</td>
<td>9</td>
<td>14</td>
<td>79</td>
</tr>
<tr>
<td><strong>Quality Screen</strong></td>
<td>400</td>
<td>200</td>
<td>50</td>
<td>2.5</td>
</tr>
<tr>
<td>(defects at the upstream end over defects at the downstream end)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delivery Screen</strong></td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>(% defective shipments at the upstream end over % defective shipments at downstream end)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Demand Amplification Index</strong></td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>(% change in demand at upstream end over % change in demand at downstream end)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Product Travel Distance</strong></td>
<td>5,900 miles</td>
<td>5,900 miles</td>
<td>4,900 miles</td>
<td>525 miles</td>
</tr>
</tbody>
</table>

Lean Enterprise Institute
Where We Stand Today

• Squeezing has run its course
• Problems and cost of running global supply chains now apparent
• Cost savings were disappointing
• But, relentless cost pressure continues

As a consequence: we believe the time is right for a second look at extended value stream mapping in partnership with every firm touching value streams.
Five Topics for Today

• Many of you are familiar with extended value-stream maps & we hope *Seeing the Whole Value Stream* will spur your use.

• Today we’ll focus on five extra dimensions:
  ✓ Mapping all the way to the customer.
  ✓ Mapping in retail.
  ✓ Mapping when you have no authority.
  ✓ Lean math as a supplement to mapping.
  ✓ Extending the tool to network analysis.
Mapping to the Customer

• The Toyota Parts Distribution System was deployed during the 1990s
• Became the model lean supply stream
• It addressed long lead times, push stock replenishment and order amplification
• And the cost of replicating stocks at every sales/service point and inability to deliver the basket of parts needed to complete the job
Mapping all the way to the Customer
Mapping the Future State to the Customer
# Efficiency and Service Levels

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts Distribution Center</td>
<td>50,000</td>
<td>65,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Parts Distribution Center</td>
<td>120</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>Local Distribution Center</td>
<td>—</td>
<td>—</td>
<td>15,000</td>
</tr>
<tr>
<td>Dealer</td>
<td>4,000</td>
<td>6,000</td>
<td>40</td>
</tr>
<tr>
<td>Dealer</td>
<td>90</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Stock Level Index</td>
<td>100</td>
<td>33</td>
<td>19</td>
</tr>
<tr>
<td>Service Rate</td>
<td>98% in 7 days</td>
<td>98% in 1 day</td>
<td>98% in 2 hours</td>
</tr>
</tbody>
</table>

Note: Toyota U.S.A. has eleven regional PDCs, serving 1,400 dealers; Toyota Japan has thirty-three regional PDCs, serving 273 DCs who in turn serve 4,700 dealers. (In the U.S.A., Toyota dealers also act as local wholesalers.) Each has on average the above days’ worth of that number of parts in stock. The Stock Level Index is the total sum of the days times the part numbers in each system, with U.S.A. 1994 = 100.
Mapping in Retail

- Tesco the first to follow Toyota parts
- Took a management walk + analysis
- Executive understood power of flow
- Stocks result from demand amplification
- Basket fulfilment true level of service
- Launched experiments to build its rapid replenishment system
- Grew to No. 3 retailer in the world
Mapping When You Have No Authority

- Purchasing managers are often discouraged because they have no authority over the extended value stream.

- Matt Lovejoy asked his supplier, his customer & his customer’s customer to stop blaming each other for delivery & cost problems. Then they drew a map together.

- This changed the entire relationship from win-lose to win-win without any authority!
Lean Math as an Aide to Mapping

Our belief:

✓ If you are serious about mapping you won’t need detailed product costing.

✓ You will be able to see where value should be added and waste eliminated.

But…most senior managers can’t see!

So you may need to do a bit of lean math to supplement your value-stream mapping.
An Example of Lean Math

• Matt Lovejoy was asked by his customer to relocate production: Chicago to China.

• Lead time would increase: 12 to 115 days.

• Cost would apparently fall, but how much?

• Matt and his customer performed the following calculation of additional costs from relocation:
## Additional Costs Due to Relocation

### Additional ‘Per Piece Costs’ of Relocating Production to Chinese Supplier

<table>
<thead>
<tr>
<th>Cost Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional freight (container ship and rail)</td>
<td>$0.27</td>
</tr>
<tr>
<td>Duty (not paid for domestic supply)</td>
<td>$0.40</td>
</tr>
<tr>
<td>Carrying cost of additional inventory for safety stock*</td>
<td>$1.87</td>
</tr>
<tr>
<td>Additional lead time</td>
<td>$0.14</td>
</tr>
<tr>
<td>Air freight expediting (twice a year)</td>
<td>$0.25</td>
</tr>
<tr>
<td>Audits of the supplier (four times a year)</td>
<td>$0.26</td>
</tr>
<tr>
<td>Increased warranty and scrap costs due to the higher “consequence costs” of defects when detected long after they occur</td>
<td>$0.21</td>
</tr>
<tr>
<td>Advanced Product Quality Planning and tool design</td>
<td>$0.34</td>
</tr>
<tr>
<td>Leap premium (10% of current price)**</td>
<td>$1.42</td>
</tr>
<tr>
<td><strong>Total extra costs</strong></td>
<td>$5.16</td>
</tr>
</tbody>
</table>
Conclusion of Lean Math

• If the Chinese supplier can offer a factory gate price $5.16 lower than the Chicago factory gate price ($14.19), the customer ought to relocate to China.

• Result: The customer did not re-source to China but instead pursued cost, quality, and lead time savings through extended value-stream mapping with its current supplier in Chicago.
Mapping Current Supply Systems

Company owned plant
Sub-supplier or customer plant
Transport time – weeks
Inventories – weeks

When needed
Weekly schedule
Weekly schedule 2 weeks firm
Weekly schedule 9 weeks out
38 Weeks
54 Weeks
26 Weeks
33 Weeks
40 Weeks
26 Weeks
UK
Spain
Germany
USA
54 Weeks
57 Weeks
90 Weeks
90 Weeks
90 Weeks
When needed
USA
USA
USA
Customer
Assembly plant
Mexico
Japan
China
UK
Spain
Brazil
Italy
Mapping the Future Supply System

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<table>
<thead>
<tr>
<th>Metric</th>
<th>2005</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product variants</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Continents</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Countries</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Value-processing time</td>
<td>10.5 hours</td>
<td>13.3 hours</td>
</tr>
<tr>
<td>Shortest lead times</td>
<td>26 weeks (182 days)</td>
<td>19 days</td>
</tr>
<tr>
<td>Longest lead times</td>
<td>90 weeks (630 days)</td>
<td>37 days</td>
</tr>
<tr>
<td>Inventory cost</td>
<td>9.5%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Transport costs</td>
<td>3.0%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Special freight costs</td>
<td>9.5%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Demand amplification</td>
<td>4:1</td>
<td>2:1</td>
</tr>
</tbody>
</table>

Lean Enterprise Institute
Extended Value-Stream Mapping

• A tool whose time has come
• But only useful if you have the courage to use it
• In partnership with every organization touching your value streams
• To make value and waste visible to everyone
• To envision and achieve continually better value streams from end to end
Seeing the Whole Value Stream

Q & A
Now Available
Seeing the Whole Value Stream

New expanded edition with examples from today’s presentation on:

- Mapping all the way to the customer
- Mapping in retail
- Mapping when you have no authority
- Lean math as a supplement to mapping
- Extending the tool to network analysis

Available at lean.org
Join us for a two-day exploration of collaborative learning.

Plenary presenters from:

Learning Sessions:
- Seeing the Whole Value Stream
- Follow the Learner - The Lean Leadership Model
- & 4 more learning sessions still to be announced
Gemba-Based Supply Chain and Distribution Learning Sessions

January 17-20, 2012
Florence, KY

From Raw Materials to End Customer

This learning session consists of two 2-day workshops:

- Building the Lean Fulfillment Stream
- Lean Warehousing and Distribution Operations