Dallas IIA
Six Sigma Application: Tools for Auditors
Dan Samson, CIA
Senior Manager & R6S Expert
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The value stream is a set of all the actions required to bring a product or service through the business processes into the hands of the customer.

**Value Stream Defined**

Information Flow (Customer Values / Requirements)

Customer recognized Value-Added Activities

- Define Understand Customer needs
- Design Radar System
- Provide Obtain Parts
- Fashion Assemble Radar
- Deliver Ship Radar

SUPPORTIVE PROCESSES

Product / Service Flow
## Value Stream Defined

- **Customer** = external, paying Customer

- Value (usefulness, worth, utility) is translatable into something that Customers will gladly pay money for:

<table>
<thead>
<tr>
<th>Products &amp; Features</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Attributes</td>
<td>Price Point</td>
</tr>
<tr>
<td>Quality Levels</td>
<td>Integrity and Commitment</td>
</tr>
<tr>
<td>Delivery Rate</td>
<td>Reputation</td>
</tr>
<tr>
<td>Convenience</td>
<td></td>
</tr>
</tbody>
</table>

*Value is ultimately determined by the external, paying Customer*
Value Added Terms Defined

Value Added Activity
An activity that transforms or shapes (for the 1st time) material or information to meet customer requirements.

Non-Value Added Activity (Waste)
Those activities that take time or resources, but do not add to the customer requirements (goal = eliminate these!)

Non-Value Added Planned Waste
Those activities that do not add to the customer requirements, but must be done for the business to operate (goal = reduce these too!)
Seven Sources of Waste*

- Correction
- Overproduction
- Material movement
- Motion
- Waiting
- Inventory
- Processing

* from Tacchi Ohno
Waste (Product Development)

- **Correction** – miscommunication, drawing errors
- **Material Movement** – data hand-off
- **Motion** – unnecessary analysis, testing, people involved, coordination of meetings, etc.
- **Over Production** – designing but not making, never gets to launch, no standardization, designing in features that customers don’t want
- **Waiting** – for other elements/functions/disciplines
- **Inventory** – design data not organized/not fully utilized
- **Processing** – redesign/unfocused activities; poorly run team meetings
Waste (Administration)

- **Correction** – incorrect data entry
- **Over Production** – preparing reports, not acted upon/multiple copies
- **Material movement** – extra steps in the process; distance traveled
- **Motion** – steps/data entry
- **Waiting** – processing monthly, not as the work comes in (closings)
- **Inventory** – transactions not processed
- **Processing** – signoffs, reports, etc.
The Value Add Analysis Tool

Value Add Analysis Benefits:

✓ Enables identification of waste and planned waste for elimination and further diagnostics

✓ Leans processes

✓ Facilitates knowledge sharing/transfer among process owners and stakeholders
The Value Add Analysis Tool

Value Add Analysis Benefits:

✓ Prioritizes improvement opportunities

✓ Saves your company actual $$$!

✓ Improves your external customer’s satisfaction

✓ Can enable generation of revenue
The Value Add Analysis Tool

Approach

- Review existing process maps or create new ones.

- Identify defined process to assess. You will need:
  - Clear beginning and ending points
  - Know all stakeholders for process
  - Understand materials, machinery, etc involved or have stakeholder with knowledge

- Validate and “level set” process owners based on existing process maps. Gain baseline agreement for discussion.
  - This is key. Avoid assessing multiple or related processes at one time.
The Value Add Analysis Tool

Approach Continued…

- Conduct *facilitated* discussion with process owners
  - Set Ground Rules
  - Map the steps in the process as if “you were the object”

- Document process step description and responsibility

- Identify the elapsed time since the prior step (i.e. step one will have a zero elapsed time from prior step)

- Identify the actual time each step takes to complete in a common unit of measure (usually minutes)
The Value Add Analysis Tool

Approach Continued…

- Identify the amount of “dead time” associated with the step

- Through discussion with stakeholders determine whether the step is value added or not
  - Done right the first time
  - Transforms or shapes the product or service to be delivered
  - Adds value to the external customer

- Determine whether non-value added activities are pure waste or planned waste
The Value Add Analysis Tool

An example…

- Utility Business
  - New customer connections

- Map the steps in connecting a new customer’s electric power
The Value Add Analysis Tool

An example continued...

Start

Customer calls Service Center and requests Service.

Service takes Customer Info and opens account

Service Rep. Supervisor reviews input for accuracy.

Rework

Yes

New customer info loaded to New Connections System overnight.

New Connections Dept. downloads New Connect Daily Report

Verifies customer application complete and forwards to scheduler for appointment.

Scheduler contacts Customer for Appointment.

Field office Verifies customer Address and info complete

Staffs work for connection.

Customer connected

End

OK?

Schedulers contacts

Field office

Rework

No

Scheduler establishes work order and forwards to field office.
The Value Add Analysis Tool

An example continued...

Document the steps in the process:

- Description
- Responsibility
- Elapsed time
- Actual time
- Dead time
- Whether the step is value added or not
The Value Add Analysis Tool

An example continued…

- Lets assume the process map is complete, accurate, and detailed enough and that elapsed time, duration time, and dead time are already known….

- Which steps in the process are value added and which are waste or planned waste?
The Value Add Analysis Tool
An example continued...

Start → Customer calls Service Center and requests Service.

Service takes Customer Info and opens account → Service Rep. Supervisor reviews input for accuracy.

Rework No

Yes → OK?

New customer info loaded to New Connections System overnight. → New Connections Dept. downloads New Connect Daily Report

Verifies customer application complete and forwards to scheduler for appointment. → Scheduler contacts Customer for Appointment.

Scheduler establishes work order and forwards to field office. → Field office verifies customer address and info complete

Staffs work for connection. → Customer connected

End
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Responsible Person</th>
<th>Elapsed Time</th>
<th>Actual Time (minutes)</th>
<th>Dead Time</th>
<th>Value Add</th>
<th>Non-Value Add</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Customer calls Service Center and requests service.</td>
<td>Customer, Call Center</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2</td>
<td>Service takes Customer info and opens account</td>
<td>Call Center Rep</td>
<td>0</td>
<td>20</td>
<td>1</td>
<td>20</td>
<td>0</td>
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<tr>
<td>3</td>
<td>Service Rep.Supervisor reviews input for accuracy.</td>
<td>Supervisor</td>
<td>21</td>
<td>20</td>
<td>40</td>
<td>0</td>
<td>20</td>
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<tr>
<td>4</td>
<td>Rework</td>
<td>Call Center Rep</td>
<td>60</td>
<td>90</td>
<td>40</td>
<td>0</td>
<td>90</td>
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<tr>
<td>5</td>
<td>New customer info loaded to New Connections System overnight.</td>
<td>Supervisor</td>
<td>130</td>
<td>30</td>
<td>480</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>New Connections Dept. downloads New Connect Daily Report</td>
<td>New Connects</td>
<td>510</td>
<td>30</td>
<td>60</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>Verifies customer application complete and forwards to scheduler for appointment.</td>
<td>New Connects</td>
<td>90</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>60</td>
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</table>
The Value Add Analysis Tool

An example continued…

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Responsible Person</th>
<th>Elapsed Time (minutes)</th>
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<th>Dead Time</th>
<th>Value Add</th>
<th>Non-Value Add</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Scheduler contacts Customer for Appointment.</td>
<td>Scheduler</td>
<td>120</td>
<td>20</td>
<td>20</td>
<td>20</td>
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<tr>
<td>9</td>
<td>Scheduler establishes work order and forwards to field office.</td>
<td>Scheduler</td>
<td>40</td>
<td>60</td>
<td>120</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>Field office verifies customer address and info complete</td>
<td>Field Office</td>
<td>180</td>
<td>60</td>
<td>2880</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>Staffs work for connection.</td>
<td>Field Office</td>
<td>2940</td>
<td>120</td>
<td>1440</td>
<td>0</td>
<td>120</td>
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<tr>
<td>12</td>
<td>Customer connected</td>
<td>Field Office</td>
<td>1560</td>
<td>60</td>
<td>120</td>
<td>60</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>5261</td>
<td>100</td>
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</tbody>
</table>
The Value Add Analysis Tool

An example continued…

New Customer Connections
Value Add Analysis Results

- Value Added
- Pure Waste
- Planned Waste
- Dead Time

Value Added Non-Value Added
The Value Add Analysis Tool

An example continued…

Time Value Bar Chart
New Customer Connections

Dead Time
Non-Value Add
Value Add
The Value Add Analysis Tool

Given the data collected from the Value Add Analysis, which major steps would you prioritize for further diagnostics/analysis?
Conduct post session debrief to prioritize for improvement

Further analysis options:
- Step #4 “Rework”
  - 130 minutes total time dedicated to rework. What are the root causes and conditions associated with the rework?
  - 20% reduction in time associated with rework could save $$
    
    26 minutes x $100/hr = $43 X multiple connections!

- Step #11 “Staff for connection job”
Additional tools to support further analysis

- Spaghetti Charts
- Apollo Root Cause Analysis
- Failure Mode Effect Analysis
Additional tools to support further analysis

- **Spaghetti Charts**

  Capture the physical flow/travel of a process by measuring or calculating the distance traveled for:
  - People
  - Product / material
  - Information
  - Rework
Additional tools to support further analysis

- **Apollo Root Cause Analysis**
  - Focus on interrelationships between causes and effects to identify opportunities for effective solutions
  - Alignment around the problem and the significance
  - Incorporates key cause and effect principles
  - Use of evidence to validate causes
  - Thoroughness of investigation is driven by time and knowledge available
  - Effectiveness of solutions dependent on degree of acceptable risk

Focus on finding solutions...not fixing blame
Additional tools to support further analysis

**Failure Mode and Effects Analysis (FMEA)**

- A systematic technique to identify potential failures and understand the impact the failure may have on the new process

- Will help mitigate risk and further improve the product or process improvement

- FMEA is used to identify the following:
  - What can go wrong?
  - What is the effect if this would occur?
  - What is the plan to control or prevent its occurrence?

Analyze the potential failure modes of the improved process.
Q&A