Process Mapping
Cut Errors, Reduce Costs & Improve Quality

Steven Bonacors – Lean Six Sigma Master Black Belt
...

[Image of network and world map]
Learning Objectives

In this session you will learn:

• Process Mapping Techniques: Keys to Driving Organization Success
  – How to draft process maps to evaluate your own processes
  – Key process mapping terms and symbols definitions to help you
  – Real-world examples of process maps you can use

• Eliminate Unnecessary Waste: Value Stream Process Mapping
  – How the concept of "white space" applies to cutting costs
  – Recognizing meaningful data & turning it into actionable results
  – Keys to determining your Value Effectiveness Ratio
  – Guidelines for drafting a Value-Stream Process Map

• Improving the Bottom Line with Process Mapping Guidance
  – Discover sources of hidden waste and opportunities for improvement
  – Set your baseline for dramatic quality and yield improvements
  – Reduce costs and cycle time: Massive improvement opportunities
Profound Process Knowledge

“In order to manage your process, you need to know your process.”

- W. Edwards Deming

There is no better way to acquire this knowledge than by mapping and modeling your processes.
What Do You Do Every day?

Would you like to impact the entire organizations?
Process Mapping Techniques:

- **Top-down Flow Chart**: Charting high-level process activities and their associated sub-processes/activities.
- **Logic diagram**: Documenting a process that has decision points, exceptions, or multiple potential paths.
- **Processing versus cycle time chart**: Identifying where time is lost or wasted during execution.
- **Activity Chart**: Determining if each process step is value-adding and captures the associated time/cost.
- **Workflow diagram**: Finding the optimal physical movement of people, material, and information.
- **Cross-functional flow chart**: Mapping who performs each step in a process.
- **RACI Diagram**: Clarifying roles, responsibilities, and accountability among process performers.
- **Use Case**: Defining the interactions between the system users and the information system.
- **Business process modeling notation (BPMN)**: Mapping processes for use by both business and IT Team members.

Keys to Driving Organization Success
Which Mapping/Modeling Options Should I Use?

Use the acronym **DRIVE** to remember potential intents:

- **Diagnostic**: The process has a problem and you are flowcharting it to identify its root cause.
- **Regulatory**: Process documentation must comply with a regulating body’s requirements (SOX, OSHA, GAAP, ISO, etc.)
- **Improvement**: Your flow chart must identify opportunities to improve cost, quality, service, and speed.
- **Value Analysis**: The technique determines which process steps directly benefit the paying customer and which do not.
- **Education**: The technique teaches and/or communicate proper process execution to reduce variability and inconsistency.

How to draft process maps to evaluate your own processes
Essentials of Effective Process Documentation

- **Establish Revision Control:** All charts need a title box, which provides the document context, when it was created, who was involved, when it was revised, and so on.

- **Ensure Documentation Validity:** What is documented does not always represent the actual process; this is why all process documentation must be independently validated. Make sure the process stakeholders confirm the process actually happens as the documentation says it does.

- **Make Your Charts User Friendly:** Documentation may be used by multiple audiences with varying levels of process expertise. Your intention is to communicate, not confuse.

- **Flowcharting Symbols:** There are dozens of symbols and icons that can be used to create a flow chart. (KISS – Keep it super simple).

Key process mapping terms and symbols definitions to help you understand the processes more clearly.
Top Down Flow Chart

Start

Foundry → Motor → Pump → Distribution

Stop

Fab → Machine → Paint → Assembly → Test

Prep Housing → Install Armature → Install Shaft → Press Bearings → Grease Fittings

Real-world examples of process maps you can use
SIPOC

**Suppliers**
- Supplier #1
- Supplier #2
- Supplier #3

**Inputs**
- Billing Dept. staff
- Customer database
- Shipping information
- Order information

**Process**
- Billing Process

**Outputs**
- Delivered invoice
- Delivered receipt

**Customers**
- Customer #1
- Customer #2

**Input Metrics**
- Accuracy of database info.
- Staff expertise
- System up-time

**Process Metrics**
- System responsiveness
- Accuracy of order info.
- Accuracy of shipping info.
- Rework % at each step

**Output Metrics**
- Invoice x% accuracy
- Invoice cycle time
- # of process steps
- # of process steps
- Cost/invoice
- Delay time between steps

**Quality**

**Speed**

**Cost**

A 50,000 Foot Map, Meant to be on One Slide, Best to Start on a Flip Chart
A Value Stream Map is a Process Map with Data Boxes: Mapping Material, Information, & Cycle Time Flow
Swim Lane Diagram

Each lane is a Function where the Handoff’s tend to be the pain points
Spaghetti Diagram

- Lines indicate paper/information travel:
  - No set path
  - Lots of rework

- Indicates an in-box or outbox where work (forms/information) waits to be worked on or transferred

Physical Distance, Touch Points, # of Trips, Congestion Locations
Process / Product Matrix

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Product/Process Touch Points, Relationships and Similarities
Organizational Layout

Physical layout of operational space, tools, useful in training
Strategy - Thought Map

- Problem: Has the CTQ’s been defined?
- Are the team members identified?
- Are the stakeholders briefed?
- Are the CTQ’s measurable?
- Is Y=F(X) established?
- Do we have a measurement system?
- Critical variables identified?
- Can we control X’s?
- Can we have dashboards on X’s?

Captures the logic, strategy, ideas, and decision criteria.
Symbols / Objects

Use Paper (Post-It Notes) and Pencil First
What is Muda? (Waste):

1. **Transport** – movement of parts and/or documentation further than necessary.
2. **Inventory** – stock of virtually anything is waste.
3. **Motion** – non-value added movement of people, or machinery.
4. **Waiting** – wait time is idle time; waiting for people, machines, information or material.
5. **Overproduction** – producing more than customers demand or producing at a faster pace than is needed.
6. **Overprocessing** – putting in more work than is necessary to meet the customer’s requirements.
7. **Defects** – rework and defects which take time, materials, energy, capacity and labor.

* Another waste is: People (untapped and/or misused resources)

**TIMWOOD** = Process Waste to Target & Eliminate
Eliminate Unnecessary Waste:

Service lead time = 384 min
Customer call time = 24 min

Order Mgmt. Supervisor

Weekly Update

Phone Call

Manual Update

Screen for Accnt Mgr

P/T = 3 min
Lost calls=10%
Volume=1200

DIST

Pick
Pack & Ship

20 Orders
P/T = 120 Min
Error Rate=1%
Volume=1200

Order Mgmt

Shipping Info

Order Mgmt

2 min

Order Mgmt

Pricing

8 min

Order Mgmt

Product Need

6 min

Order Mgmt

Customer Info

2 min

Order Mgmt

Forecast Improvement

Value Stream Process Mapping
How the concept of "white space" applies to cutting costs
Data Patterns

The Pareto chart is used to show everything 80-20

Recognizing meaningful data & turning it into actionable results
Assessing Types of Tasks

- **Value Adding (VA):** Steps essential to deliver product or service according to customer requirements. Three criteria:
  1. Transforms the product or service toward completion
  2. Customer cares (would be willing to pay for it)
  3. Done right the first time

- **Required Waste (RW):** Steps that are not essential to the customer but the business has to perform

- **Non-Value Adding (NVA):** Steps that do not qualify as Value Add or Business Non-Value Adding

Each Process Step Can Have Varying % of VA, RW, NVA
## Process Cycle Efficiency (% PCE%)

Process Cycle Efficiency = \( \frac{\text{Total Value Add Time}}{\text{Total Cycle Time}} \times 100\% \)

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<th>Application</th>
<th>Typical Cycle Efficiency</th>
<th>World Class Cycle Efficiency</th>
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<tr>
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<td>10%</td>
<td>50%</td>
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<tr>
<td>Creative/Cognitive Processes</td>
<td>5%</td>
<td>25%</td>
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**Keys to determining your Value Effectiveness Ratio**
VSM Guidelines

1. Gemba Walk: Walk the process – be the unit moving through the process
2. Synchronize Production with Customer Demand (Produce to the Takt time)
3. Identify and Get Rid of Non-Value Added Activities
4. Develop Continuous Flow Wherever Possible
5. Use “Supermarkets” and WIP Caps to Control Production Where Continuous Flow Is Not Possible
6. Manage Only One Process (The Bottleneck)
7. Level the Production Mix and Volume
8. Reduce Changeover Times, Downtime, Defects
9. Reduce Batch Sizes
10. 5s, Line Balance, Setup Reduction, Pull Systems

Guidelines for drafting a Value-Stream Process Map
FMEA applied on a Process Map

Start

Frequency | Severity | Detectability
--- | --- | ---
How often does it happen? | How bad is it if it happens? | Is it easy to know it happened?

Risk Priority Number = Frequency x Severity x Detectability
Improving the Bottom Line

- Always create Process Maps with a team.
- Interrogate the process by watching in many different conditions.
- Don’t let space be an issue. Consider using flip charts and post-its (as the process steps) and post on a wall to gather your initial ideas.
- If your map does not have enough space to list all the information, use numbered reference sheets as attachments.
- Maintain your Process & Value-Stream Maps with dates and update them as necessary. Use them as a reference. Always maintain a baseline and version control.
- Use a Parking Lot to stay focused: (1) Improvement Ideas; (2) Assumptions; (3) Questions; and (4) Additional Observations

Extended Cost Pareto

Choose products A, B, & C if cost reduction is critical

Process Mapping Guidance
Hidden Waste

- Value Adding Step (VA)
- Non-value Adding Step (NVA)
- Required Waste (RW)

![Diagram of process flow and audit/test]

90% FTTY

Times:

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66% Rolled Throughput Yield

Discover sources of hidden waste and opportunities for improvement
Process Metrics

- Takt Time of the Operation
- The amount of Labor Time
- The Operation Cycle Time
- Set-Up Time
- First Time Through Quality
- Rework / Scrap
- Unplanned Machine Downtime
- Batching Logic
- # Shifts
- Any special Requirements – Tools, Systems, Approvals, etc..

Set your baseline for dramatic quality and yield improvements
Use Pick Chart for Focusing Team Improvement Activities

**IMPLEMENTATION Difficulty**
= Time x Resource type
= X coordinate

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<td>Cross functional team</td>
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**BENEFIT**
= Delay x Impact Magnitude
= Y Coordinate

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Reduce costs and cycle time: Massive improvement opportunities
Now that you have a spark…

…go start a fire and process map with your team
Did we meet our learning objectives?

- Process Mapping Techniques: Keys to Driving Organization Success
- Eliminate Unnecessary Waste: Value Stream Process Mapping
- Improving the Bottom Line with Process Mapping Guidance
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“It all really helps”

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