Using Six Sigma for Process Improvement

Office of Continuous Improvement, Information Technology
Office of Continuous Improvement

Our primary goal is to improve process efficiency and effectiveness at Valparaiso University in order to improve constituent satisfaction and resource utilization
OCI Staff

valpo.edu/it/oci
Services Provided by the OCI

- Needs assessment and recommendations for improvement
- Measurement and data analysis
- Process review and recommendations for improvement
- Documentation training and review

- Project scoping
- Project management
- Centralized Continuous Improvement project management reporting
- Continuous Improvement Coaching
- Training of improvement methods and tools

Submit requests through helpdesk.valpo.edu
### Six Sigma (6σ) vs. DPMO

<table>
<thead>
<tr>
<th>Sigma</th>
<th>DPMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>690,000</td>
</tr>
<tr>
<td>2</td>
<td>308,000</td>
</tr>
<tr>
<td>3</td>
<td>66,800</td>
</tr>
<tr>
<td>4</td>
<td>6,210</td>
</tr>
<tr>
<td>5</td>
<td>320</td>
</tr>
<tr>
<td>6</td>
<td>3.4</td>
</tr>
</tbody>
</table>
How do we achieve Six Sigma?

**DMAIC**

The universal problem-solving methodology for Process Improvement

- Define
- Measure
- Analyze
- Improve
- Control
DEFINE – Project Charter

- **Problem Statement**: What problem is the team improving?
- **Business Case**: Why is it important for the institution to complete this project?
- **Measurable (SMART) Goals/Objectives**: How will you measure improvement?
- **Project Scope**: What’s in? What’s out?
- **Team Members**: Who is leading the project? Who is on the core project team?
- **Resources**: What resources (people, time, financial, etc.) will be needed?
- **Milestones**: What are the important dates for the project?
A high-level view of the process, which helps to:
- Define project scope
- Identify where to collect data
- Maintain focus on the customer
<table>
<thead>
<tr>
<th>Suppliers</th>
<th>Inputs</th>
<th>Process</th>
<th>Outputs</th>
<th>Customers</th>
</tr>
</thead>
</table>
| Coffee Bean Supplier  
Grinder Manufacturer  
Electric Utility  
Staff - Employee | Roasted Coffee  
Coffee Grinder  
Electricity  
Labor | 1  
Grind Coffee | Ground Coffee | Brewing Prep (Step 3) |
| XYZ Restaurant Supply  
Staff - Employee | Paper Filter  
Labor | 2  
Select and place paper filter | Prepared Filter Basket | Brewing Prep (Step 3) |
| XYZ Restaurant Supply  
Grinding Process (Step 3)  
Filter Basket (Step 3)  
Staff - Employee | Measuring cup  
Ground Coffee  
Labor | 3  
Measure and add ground coffee | Proper Amount of Ground Coffee | Brewing (Step 5) |
| Bottled Water Company  
Staff - Employee | Filtered Water  
Labor | 4  
Measure and add filtered water | Prepared Coffee Machine | Brewing (Step 5) |
| Prepared Coffee Machine (Step 4)  
Electric Utility  
Staff - Employee | Coffee Machine  
Electricity  
Labor | 5  
Turn on machine and brew coffee | Brewed Coffee | Coffee Pouring (Step 7) |
| XYZ Restaurant Supply  
Water Utility  
Staff - Employee | Wastebasket  
Sink and Water  
Labor | 6  
Remove grounds and rinse filter basket | Cleaned Filter Basket | Brewing Prep (Step 2 – Next Run) |
| XYZ Restaurant Supply  
Staff - Employee | Brewed Coffee  
Cup  
Labor | 7  
Select cup and pour coffee | Drinkable Coffee | Ultimate Consumer - Coffee Drinker |
5 Why Analysis

• Define the Problem
  1. Why is that happening?
  2. Why is that happening?
  3. Why is that happening?
  4. Why is that happening?
  5. Why is that happening?

• Can be 4, 5, 6, etc. depending on problem. Don’t go into obscurity.
Voice of the Customer (VOC)

VOC translates what customers say they want into measurable customer requirements based on what customers find critical to quality (CTQ).
Example from Check Request Project

Please note: This is an example from a work in progress and not representative of a final outcome of a project.
Value Stream Map

Information

- Web Form
- Colleague
- E-mail

Process

Activity #1 (VA/NVA) ➔ Activity #2 (VA/NVA) ➔ Activity #3 (VA/NVA) ➔ Activity #4 (VA/NVA)

Time

- Minutes
- Hours

Issues / Pain

Valparaiso University
Value Stream Map Example

Total Time: 105 mins
Value Added

The activity physically changes the product or adds important information required by the customer.

Value-Added Time Breakdown for Making Coffee

- Value-Added
- Non-Value-Added
- Non-Value-Added; but necessary
Eliminate Waste (TIMWOODS)
Bad coffee

People:
- Rude
- Computer not updated
- No training

Procedures:
- Wrong fee
- Too much coffee
- No training
- Too much water
- Too many grounds
- Wrong size filter

Material:
- Bad sugar
- Outdated
- Packets wet
- Lids don't fit cup

Equipment:
- Bad cream
- Brew time too long
- Dirty basket
- Dirty cups
- Coffee not hot enough
- Warmer not working
Cause & Effect Diagram

Problem Statement

- People
- Process
- Location
- Equipment
- Control
Improve

- Identify problems and solutions to improve the process (Plan), Implement (Do), test (Check), and modify solutions (Act) until the desired objectives have been achieved.
Brainstorming

• The problem to be solved is stated and written down for everyone to see
• Establish ground rules
  – No judgement
  – Everyone contributes
• Record ideas on a flipchart or whiteboard exactly as given – no paraphrasing
• Group ideas into categories – eliminate duplicates
Control

Make sure that the process improvements stick through documentation, training and auditing.
Process Documentation

• Defines the process owner and provides a fundamental understanding of the process
• Allows any other team member the ability to recreate results (which reduces variability!)
  – Documentation needs to be accessible
  – Documentation needs to be reviewed regularly
1. Draw a pig
1. Draw the side profile of a pig, centered on the page.

2. Make sure the pig's head is facing left.

3. The pig should be drawn large enough so that a piece of it is in every box EXCEPT the top right.
1. Draw a capital M, so the tip of the middle V of the M touches the intersection of the grid lines in the NW quadrant.

2. Draw a capital W, so the tip of the middle V of the W touches the intersection of the grid lines in the SW quadrant.

3. Draw a capital W, so the tip of the middle V of the W touches the intersection of the grid lines in the SE quadrant.

4. Go back to the M you drew in Step 1, and draw a slightly upwardly bowed line that runs from the most eastern point of the M, to the intersection of the grid lines in the NE quadrant.

5. Continue that line from the intersection of the grid lines in the NE quadrant to the most easterly point of the W that you constructed in the 3rd step.

6. Draw a downwardly bowed line from the most western point of the W in the SE quadrant, to the most easterly point of the W in the SW quadrant.

7. In the exact middle of the box between the NW quadrant and the SW quadrant, draw a circle the size of a dime.

8. Draw an inwardly bowed line from the most westerly point of the M created in Step 1, to the top of the circle you just drew in Step 7.

9. Draw an inwardly bowed line from the most westerly point of the W created in Step 2, to the bottom of the circle you drew in Step 7.

10. Draw a horizontal straight line about ½ inch in length starting from the middle of the line you created in Step 8.

11. Draw a horizontal straight line about 1/3 inch in length starting from the middle of the line you drew in step 9.

12. Draw a curly-cue about 1 inch in length starting at the upper third of the line you created in Step 5, extending in an easterly direction.

13. Put two dots in middle of the circle you drew in Step 7, arranged horizontally, and about ¼ of an inch apart.
<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Sub-Task</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Draw a letter M at the top left intersection.</td>
<td>1.1</td>
<td>Bottom center of M touches intersection</td>
</tr>
<tr>
<td>2</td>
<td>Draw letter W at bottom left intersection</td>
<td>2.1</td>
<td>Top center of W touches intersection</td>
</tr>
<tr>
<td>3</td>
<td>Draw letter W at bottom right intersection</td>
<td>3.1</td>
<td>Top center of W touches intersection</td>
</tr>
<tr>
<td>4</td>
<td>Draw arc from letter M to top right intersection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Draw another arc from top right intersection to bottom right W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Draw an arc between the two bottom Ws</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Draw the letter O in center left box</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Draw arc from letter M to tangent of the circle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Draw arc from left W to tangent of the circle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Draw an arc for the mouth</td>
<td>10.1</td>
<td>Half way between the W and circle</td>
</tr>
<tr>
<td>11</td>
<td>Draw an arc for the eyes</td>
<td>10.2</td>
<td>Must be a happy pig</td>
</tr>
<tr>
<td>12</td>
<td>Draw cursive letter e near top of arc on right</td>
<td>11.1</td>
<td>Half way between the M and circle</td>
</tr>
<tr>
<td>13</td>
<td>Draw two dots in middle of circle for pigs’ nose.</td>
<td></td>
<td></td>
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Additional Resources

• Six Sigma Toolbox from Moresteam.com

• ASQ-American Society for Quality:

• Moresteam:
  – https://www.moresteam.com/

• iSixSigma:
  – https://www.isixsigma.com/

• Six Sigma Daily (Villanova):
  – http://www.sixsigmadaily.com/

• LeanOhio:
  – http://lean.ohio.gov/
Recap

• Go to where the work is done to really understand the process

• If it’s important enough to do, it’s important enough to document

• Don’t let perfect get in the way of better – the best method is the one you actually use.

• Success is about mindset - “The pessimist sees difficulty in every opportunity. The optimist sees the opportunity in every difficulty.” - Winston Churchill
Q&A