Modular *kaizen* Concepts

John W. Moran, PhD
Senior Quality Advisor
Public Health Foundation

National Public Health Improvement Initiative Grantee Meeting
March 30 and 31, 2011
…**PHF Mission:**

We improve the public’s health by strengthening the quality and performance of public health practice

www.phf.org
Session Based on Book Published for NPHII

Modular kaizen: Dealing with Disruptions

Ron Bialek, Grace L. Duffy, and John W. Moran
Purpose

➢ Designed to help health departments in disruptive environments

➢ Improve processes

➢ Greater efficiency, effectiveness, transparency, and accountability

➢ Build on proven practices

➢ Enhance the power of quality and process improvement
Kaizen (pronounced ki-zen) is a Japanese word constructed from two characters:

- “Kai” - change
- “Zen” - goodness or virtue

Kaizen is commonly used to indicate the long-term betterment of a process (continuous improvement) – re-orient a process.
Introductory Session

Modular kaizen is a process to address the need for continuous improvement within Public Health’s highly interruptive environment.

Modular kaizen is a modification of the traditional Kaizen improvement process designed to provide the same rapid results without removing critical personnel from daily operations until needed.

All the components of an effective kaizen event are planned; however, the activities are scheduled in small chunks that fit the rapidly changing calendar of team members and subject matter experts.
Introductory Session

- The opposite of Kaizen Blitz. Rather than getting everyone into a room until the solution is developed, Modular *kaizen* is conducted over a series of short activities designed to fit into a highly interrupt driven work environment.

- This approach is complimentary to both PDCA and DMAIC models of quality improvement.
Introductory Session

The Modular kaizen approach minimizes disruption by making sure no “action” is executed until “check” has been done and data have been analyzed to identify the reality of the current situation.

Modular kaizen is an approach that resists the urge to respond to a disruption with panic. Once the process is stabilized, a full PDCA cycle is undertaken to develop a plan and action steps to proactively minimize the recurrence of the disruption.
Introductory Session

The participants in this session will be exposed to the Modular *kaizen* model of c-a-P-D cycle and the tools most commonly utilized:

- Impact and Disruption Matrix
- Force and Effect+ca Diagram (Disruption and Impact Diagram)
- House of Modular *kaizen*
- SIPOC+CM Diagram
Introduction To Modular *kaizen Concepts*
Modular *kaizen* Flow

- Plan
- Do/Disrupt
- Check
- Act

Flow:
- Plan ➔ Do/Disrupt ➔ Check ➔ Act
- Disruption ➔ check ➔ Do ➔ Modular Kaizen ➔ Plan

**Modular Kaizen**
Check

➢ Investigate and understand the disruption

➢ Is it Special Cause?

➢ Document the severity/urgency

➢ Who/What impacted?

➢ Estimate the length of the disruption – timeline

➢ Use the Limited Information Collection Principal to guide data collection
Act

Based on the data gathered in Check:

➤ Do nothing – continue to monitor the disruption

➤ Investigate - establish an investigative team to dig deeper into the disruption and report back – high level scope

➤ Respond - apply all available resources to the disruption to solve it and bring it under control using the PDCA Cycle
Check

- Evaluate and determine when disruption is under control and resources can be returned to departments to resume regular activities – **Green light**

- Document lessons learned, knowledge gained, and any surprising results that emerged

- Monitor and hold the gains
Act

Red light

- If disruption is not under control repeat the Act/Plan/Do phase to make improvements

- Take action using the PDCA cycle
Many small repeat cycles of check and act

No act is executed until check has been done
Plan

1. Identify and prioritize opportunities

2. Develop AIM statement

3. Describe the current process

4. Collect data on current process

5. Identify all possible causes

6. Identify potential improvements

7. Develop improvement theory

8. Develop action plan

Do

1. Implement the improvement

2. Collect and document the data

3. Document problems, observations, and lessons learned

Check/Study

1. Reflect on the analysis of performance indicators

2. Document problems, observation, and lessons learned

Act

Adopt

Adapt

Abandon

Standardize

Do

Plan

Modular Kaizen - (c a P D) Cycle

PERFORMANCE STANDARDS
- Identify relevant standards
- Select indicators
- Set goals and targets
- Communicate expectations

PERFORMANCE MEASUREMENT
- Refine indicators and define measures
- Develop data systems
- Collect data

REPORTING OF PROGRESS
- Analyze data
- Feed data back to managers, staff, policy makers, constituents
- Develop a regular reporting cycle

QUALITY IMPROVEMENT PROCESS
- Use data for decisions to improve policies, programs and outcomes
- Manage changes
- Create a learning organization

The House of Modular kaizen

Modular kaizen

1 Change Management

- 3 5S system
- 4 Disruption identification
- 5 8 Wastes
- 6 Force & Effect + ca
- 7 Tri-metric matrix
- 8 Teams
- 9 Project management
- 10 Kaizen blitz
- 11 Error proofing
- 12 Quality at source
- 13 Process control
- 14 Fast transition
- 15 Pull technology
- 16 Modular flow
- 17 Daily work management

2 Value Stream Mapping
Tour of the House of Modular kaizen

1. Change Management

2. Value Stream Mapping

3. 5S System
   - Sort
   - Set in order
   - Shine
   - Standardize
   - Sustain

4. Disruption Identification

5. Eight Lean Wastes
## Definition of 8 Types of Waste:

<table>
<thead>
<tr>
<th>Waste</th>
<th>Description</th>
<th>Public Health Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over-production</td>
<td>Items being produced in excess quantity and products being made before the customer needs them</td>
<td>Insurance filing or immunization record opened before all required information is received</td>
</tr>
<tr>
<td>Waiting</td>
<td>Periods of inactivity in a downstream process that occurs because an upstream activity does not produce or deliver on time.</td>
<td>Paperwork waiting for management signature or review</td>
</tr>
<tr>
<td>Unnecessary Motion</td>
<td>Extra steps taken by employees and equipment to accommodate inefficient process layouts.</td>
<td>Immunology testing equipment stored in cabinets far from specialist work area.</td>
</tr>
<tr>
<td>Transportation Handling</td>
<td>Unnecessary movement of materials or double handling</td>
<td>Department vehicles stored in central facility, requiring constant movement of vehicles to and from other high traffic locations</td>
</tr>
<tr>
<td>Over-processing</td>
<td>Spending more time than necessary to produce the product or service</td>
<td>Combining client survey instruments into one form rather than develop specific instruments for each program</td>
</tr>
<tr>
<td>Unnecessary Inventory</td>
<td>Any excess inventory that is not directly required for the current client’s order</td>
<td>Over estimating vaccination support materials requiring additional locked storage cages, inventory counting and reconciliation</td>
</tr>
<tr>
<td>Defects</td>
<td>Errors produced during a service transaction or while developing a product.</td>
<td>Ineffective scripts for initial intake applications. Unclear directions for filling out required forms</td>
</tr>
<tr>
<td>Duplication</td>
<td>Having to re-enter data or repeat details on forms.</td>
<td>Poorly designed client intake computer screens or services checklists</td>
</tr>
</tbody>
</table>
Tour of the House of Modular kaizen

6. Force & Effect+ca

7. Tri-Metric Dashboard

8. Teams

9. Project Management

10. Kaizen Blitz

11. Error Proofing
Tour of the House of Modular kaizen

12. Quality at the Source
13. Process Control
14. Fast Transition
15. Pull Technology
16. Modular Flow
17. Daily Work Management
PDCA: Use of the Modular kaizen basic tools

**Plan**
- 2: Value stream mapping
- 4: Disruption identification
- 7: Tri-metric matrix
- 13: Process control

**Act**
- 7: Tri-metric dashboard
- 13: Process control

**Check**
- 3: 5S
- 5: 8-Wastes
- 6: Force & Effect + ca
- 7: Tri-metric dashboard
- 13: Process control

**Structure**
- 1: Change management
- 8: Teams
- 9: Project management
- 17: Daily work management

© Duffy, Moran, 2010
DMAIC: Use of the Modular kaizen basic tools

**Define**
- 2: Value Stream Mapping
- 4: Disruption identification

**Measure**
- 7: Tri-metric dashboard
- 13: Process control

**Control**
- 7: Tri-metric dashboard
- 13: Process control

**Improve**
- 10: Kaizen blitz
- 11: Error proofing
- 12: Quality at source
- 14: Fast transition
- 16: Modular flow

Organizational Excellence

**Analyze**
- 3: 5S system
- 5: 8 wastes
- 6: Force & Effect + ca

1: Change management
17: Daily work management

Duffy, Moran © 2010
Systems View of the Disruption
Disruption and Impact Matrix

<table>
<thead>
<tr>
<th>Control</th>
<th>How?</th>
<th>Areas of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence</td>
<td></td>
<td>AoC</td>
</tr>
</tbody>
</table>

Impact:

Disrupted State

Current State
Force & Effect + (c)(a) Chart

Disruptive State → AoC → NI → Area of Concern (AoC) → Negative Impacts

Current Stable State

(a) (cause) (act)
<table>
<thead>
<tr>
<th>Control</th>
<th>Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>How?</strong></td>
<td><strong>Areas of Concern</strong></td>
</tr>
<tr>
<td><strong>Impacts</strong></td>
<td><strong>Disruption</strong></td>
</tr>
<tr>
<td>AoC</td>
<td>AoC</td>
</tr>
<tr>
<td>AoC</td>
<td>AoC</td>
</tr>
</tbody>
</table>

Current State
Disruption and Impact Diagram

Areas of Concern (AoC)

Disruptive Force

Impact

Stable Current State

Disruptive State

AoC

Impact

AoC
Modular *kaizen* Case Study
Measurement
PERFORMANCE STANDARDS
- Identify relevant standards
- Select indicators
- Set goals and targets
- Communicate expectations

PERFORMANCE MEASUREMENT
- Refine indicators and define measures
- Develop data systems
- Collect data

REPORTING OF PROGRESS
- Analyze data
- Feed data back to managers, staff, policy makers, constituents
- Develop a regular reporting cycle

QUALITY IMPROVEMENT PROCESS
- Use data for decisions to improve policies, programs and outcomes
- Manage changes
- Create a learning organization

Tri Metric Matrix

A tool which guides an improvement team through the steps of identifying capacity requirements, process expectations, and outcomes for a product or service.

The value of this tool is more than a checklist for filling in customer or process requirements.

This tool prompts the improvement team to interact with customers, suppliers, subject matter experts, and each other to understand enough about the overall process to control it effectively.
Focus effective performance measures through alignment to organizational objectives

Leadership

- S - Skills/Style
- W – Risks
- O – Opportunity
- T – Barriers (Individual)

Strategic Plan

- Organization Design
- Infrastructure
- High Level Process Map
- Org. Level SWOT

Customers

- Needs/Profiles
- Direct interviews
- Best practices
- Complaints
- Industry research
- Competitive analysis
- QFD

Measures

- Key Performance Indicators
- Regulations/Standards
- Outcomes
- Outputs
- Interim milestones
- Monitor & control
Structural Capacity
- Information Resources
- Organizational Resources
- Physical Resources
- Human Resources
- Fiscal Resources

Processes
- The 10 Essential Public Health Services

Outcomes
- Effectiveness
- Efficiency
- Equity

PHS Mission and Purpose
- Philosophy
- Goals
- "Core Functions"

Macro Context

Public Health System
Key Process Indicators (KPI)

- The following areas are some guidelines for potential major KPIs.
  - **Effectiveness**—Does the process output conform to stated requirements? Goal: Doing the right things.
  - **Efficiency**—Does the process produce the required output at minimum resource cost? Goal: Doing the right things well.
  - **Quality**—Does the output meet customer requirements and expectations?
  - **Timeliness**—Does the process produce its output correctly and on time?
  - **Productivity**—How well does the process use its inputs to produce its output? Goal: Establish the ratio of the amount of output per unit of input.
  - **Output**—How much does the process produce in a given time period?

- Depending on the process in place, the KPI may be a combination of the above. It is desirable to have proactive measures that show what is happening now in the process rather than reactive measures that show what has happened. Whatever measures are decided upon should give a clear indication of how the process is operating and should indicate when action must be taken.
<table>
<thead>
<tr>
<th>Tri Metric</th>
<th>Indicator</th>
<th>Definition</th>
<th>Baseline</th>
<th>Improvement Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Capacity Measures

- The capacity of a process is defined as an output measure which is a measure of activity.

- Sometimes this is referred to as the maximum output rate measured in terms of some type of units provided per period of time.

- Sometimes it is useful to understand activity measures which describe the level of resources committed to a process.

- Just knowing these three measures does little to help us understand how the process is satisfying our customers.

- Process and output measures help us understand the capability of the process to meet customer needs.
Process Measures

- Descriptors of how the process is performing in its current state. It is very important to understand how the current state is operating and define the baseline before attempting any type of improvement activities.

- It is important not to change a process before understanding where it is centered or the amount of variation that is present.

- The most common measures of a process are the mean and the standard deviation.

- Once those measures have been calculated, conducting a capability study which measures the number of standard deviations between the process mean and the nearest specification limit in sigma units can occur.
Process Measures

- In general, as a process’s standard deviation rises, or the mean of the process moves away from the center of the tolerance:
  - fewer standard deviations will fit between the mean and the nearest specification limit
  - an increased likelihood of items outside specification will occur
Process Measures

The two indices used in defining process capability are:

- Cp - Measures the variation - how well the data fits within the specification limits (USL, LSL) - width of the process distribution relative to a set of limits
- Cpk - Measures the central tendency – it is an index which measures how close a process is running to its specification limits and how centered the data is between the specification limits

The larger the index, the less likely it is that any item will be outside the specifications.
Specifications

In service industries, healthcare, and public health, many processes do not have defined specifications. For processes without defined specifications, it is important to develop limits with the customers of the process variation that they will tolerate.

Do we have specifications in Public Health?
Specifications

▷ The authors propose developing an *Upper Toleration Limit (UTL) and Lower Toleration Limit (LTL)* to allow use of either Run Charts or Control Charts.

▷ The questions to ask a customer might be “How long are you willing to wait for the doctor, for a flu shot, to get service in a WIC clinic, or to get a meal at a fast food restaurant?”
<table>
<thead>
<tr>
<th>Tri Metric</th>
<th>Indicator</th>
<th>Definition</th>
<th>Baseline</th>
<th>Improvement Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Process</td>
<td>Mean</td>
<td>Mathematical average of a set of numbers.</td>
<td>μ = 10 minutes</td>
<td>μ = 8 minutes</td>
</tr>
<tr>
<td></td>
<td>Standard Deviation</td>
<td>Measurement of variability or the square root of the variance</td>
<td>σ = 2 minutes</td>
<td>σ = 1.5 minutes</td>
</tr>
<tr>
<td></td>
<td>Cp</td>
<td>How well the data fits within the spec limits (USL, LSL)</td>
<td>Cp = 2.0</td>
<td>Cp = 1.6</td>
</tr>
<tr>
<td></td>
<td>Cpk</td>
<td>How centered the data is between the spec limits</td>
<td>Cpk = 1.5</td>
<td>Cpk = 1.0</td>
</tr>
</tbody>
</table>
Outcome Measures

The result of a process output. An outcome measure is used to measure the success of a process. For most processes, an AIM statement is developed to focus what the process is supposed to accomplish and by when. Examples of outcome measures are:

- Achieving a Press Ganey score for patient satisfaction of 99%
- Reducing hemoglobin A1c (HbA1c) to less than 7 for patients with diabetes
- Healthcare acquired adverse event - > 3 Surgical site infection
- 300 accident-free days
- 98% TB completion of therapy
- 97% Medicaid billing success rates
- 100% HIV regimen compliance
- < 5% Tobacco use by middle and high school students
- < 8 minutes clinic waiting time
<table>
<thead>
<tr>
<th>Tri Metric</th>
<th>Indicator</th>
<th>Definition</th>
<th>Baseline</th>
<th>Improvement Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Outcome</td>
<td>Customer Satisfaction</td>
<td>% satisfied customer</td>
<td>98% score</td>
<td>99% score</td>
</tr>
<tr>
<td></td>
<td>Accident free days</td>
<td># accident-free days</td>
<td>300 days</td>
<td>350 days</td>
</tr>
<tr>
<td></td>
<td>TB completion of therapy</td>
<td>Patients completing therapy successfully</td>
<td>75%</td>
<td>95%</td>
</tr>
</tbody>
</table>
### Tri Metric Matrix: Power Outage

<table>
<thead>
<tr>
<th>Tri Metric</th>
<th>Indicator</th>
<th>Definition</th>
<th>Baseline</th>
<th>Improvement Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Capacity:</td>
<td># Amperage/ Volts</td>
<td>Amount of power available to service equipment needs</td>
<td>Standard output of normal hospital requirement at full patient load</td>
<td>Supplemental capacity available through hospital connections to alternate power sources</td>
</tr>
<tr>
<td>electrical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Capacity:</td>
<td>% Coverage • Cycle time to meet requirements</td>
<td>All patient needs adequately covered, rescheduled or transferred to alternate care provider</td>
<td>Standard, documented hospital performance management service levels</td>
<td>Checklist in place and rehearsed for anticipated disruptions to normal service delivery environment</td>
</tr>
<tr>
<td>patient care</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Process</td>
<td>% milestones complete • % deadlines met</td>
<td>Meet or exceed process interim deliverables and outcomes</td>
<td>Documented objectives, process measures, specified outcomes</td>
<td>Continuous improvement to process outcomes, including cycle times and service levels. Documentation updated and published</td>
</tr>
<tr>
<td>4. Outcome:</td>
<td>% “top box” patient • % “top box” staff</td>
<td>Percent of patient and staff satisfaction rated as “very satisfied”</td>
<td>Compared to national hospital survey data of patient, staff ratings</td>
<td>Attain greater than 80% responses above 75% percentile ranking of national survey data</td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Outcome:</td>
<td>% critical patient care completed to requirements</td>
<td>Amount of critical and non-elective patient care delivered on time and within standards</td>
<td>Using industry accepted, documented medical and audit requirements</td>
<td>Increase ability to provide non-critical care at defined service level</td>
</tr>
<tr>
<td>Service level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Tri Metric Matrix Template

<table>
<thead>
<tr>
<th>Tri Metric</th>
<th>Indicator</th>
<th>Definition</th>
<th>Baseline</th>
<th>Improvement Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Measurement

> Measurement is the key to having processes that successfully deliver customer satisfaction.

> Measuring capacity, process, and outcomes gives three critical perspectives to the overall performance of a process.
Changing Behavior

Changing the behavior of the members of an organization can basically be done in one of two ways.

You can force behavior change through micro management and pressure, or you can change the mindsets of the members of the organization so that their thinking results in the behavior required to sustain change.
Changing Behavior

- Mindsets are developed over time and they are the unwritten (and often unspoken) rules that influence behavior.

- What is important to understand is that leaders create the unwritten rules by their behaviors, which may or may not be consistent with the expectations they communicate.

- Edgar Schein is the author of *Organizational Culture and Leadership*. In his book, he writes about changing culture and mindset through embedding mechanisms.
Changing Behavior

The most important thing to understand about mindset and culture change is that it will not come from a change in the organizational chart or posters on the wall.

Mindset and culture change will only come from a change in leaders' behavior.
The Four Variables of Change

Management Involvement

Resource Commitment

Resistance to Change

Degree of Change

Low High

Low High

Minor Major

Trigger II
Change The Way We Function

Trigger IV
Change The Way We Do Business

Trigger I
Change The Way We Work

Trigger III
Change The Way We Interact
Change Agent Dimensions

Interpersonal Skills

High

Low

Power

Low

High

Commitment

High

Commitment

Low

Fast Burn Out
(Imbedded)

The Complete Leader
“Change Agent”

Water and Wait
(Process)

Push Agent
(Dictator)
### Change Commitment Spectrum

**Step 1. CATALYST**
- **Cause**
- **Why**

**Step 2. RESULT**
- **Output**
- **Expectation**

**Step 3. CAPACITY**
- **Experience**
- **Assessment/Needs**

**Step 4. SKILL**
- **Capability**
- **Development/Training**
Change Management

Level of Influence

High

Low

Level of Stake

Low

High

Delegate

Involved

Detached

Frustration
Modular *kaizen* Exercise
Disruption and Impact Diagram

Areas of Concern (AoC)

Disruptive State

Impact

Disruptive Force

Stable Current State

AoC

Impact

Disruptive Force

AoC
Disruption and Impact Matrix

<table>
<thead>
<tr>
<th>Control</th>
<th>How?</th>
<th>Areas of Concern</th>
<th>Disruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence</td>
<td>AoC</td>
<td>AoC</td>
<td>AoC</td>
</tr>
</tbody>
</table>

Impacts

Current State
Q&A

Thank You