Developing Solutions to the Challenges Public Health Organizations Face in 2011 Using Tree Diagrams and Prioritization Matrix of the Advanced Tools of QI

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Introduction:

When public health professionals are confronted with complex community health or organizational issues or problems, they need to be able to analyze a lot of information quickly and efficiently to make the best possible decisions to solve the issues or problems. The advanced quality improvement (QI) tools[2,3] help to synthesize large amounts of information, identify the critical areas on which to focus, and guide the decision-making process.

As stated by Chinese philosopher Lao Tse, "For every complex question there is a simple answer, and it is usually wrong." The advanced tools of QI, shown in Figure 2, are designed to deal with complex issues in a manner which guides those analyzing the issues to focus on hidden interrelationships that are not obvious without detailed analysis. This detailed analysis guides those examining an issue away from the simple answer and into a process of continual refinement of the issue. To make the best possible decisions, it is necessary to analyze a large quantity of information. The advanced tools of QI help to synthesize and refine information to focus on the critical pieces before developing potential solutions.

The Public Health Foundation (PHF) has observed the Deming Plan-Do-Check-Act (PDCA) of QI techniques/methods successfully applied in public health to help identify and solve complex community health and system problems and issues. Figure 1 shows the PDC/SA cycle. The Plan-Do-Check/Study-Act cycle (PDC/SA) is both simple and powerful. Its simplicity comes from the systematic, straightforward and flexible approach that it offers. Its power is derived from its reliance on the scientific method; it involves developing, testing, and analyzing hypotheses. This foundation offers a means to become comfortable with a host of QI methods and techniques and to progress into addressing more complex problems, employing additional QI tools, and migrating to system-wide approaches to QI.

Spending adequate time in each phase of the PDCA cycle is imperative to having a smooth and meaningful quality improvement process.[4]

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[2] Management For Quality Improvement: The New QC Tools, S. Mizuno, editor, Productivity Press, ©1988

[3] R. Bialek, G. Duffy, and J. Moran, editors, *The Public Health Quality Improvement Handbook*, ASQ Quality Press, ©2009, pp 189 – 213.

[4] ABCs of the PDCA: http://www.phf.org/resourcestools/Documents/ABCs_of_PDCA.pdf

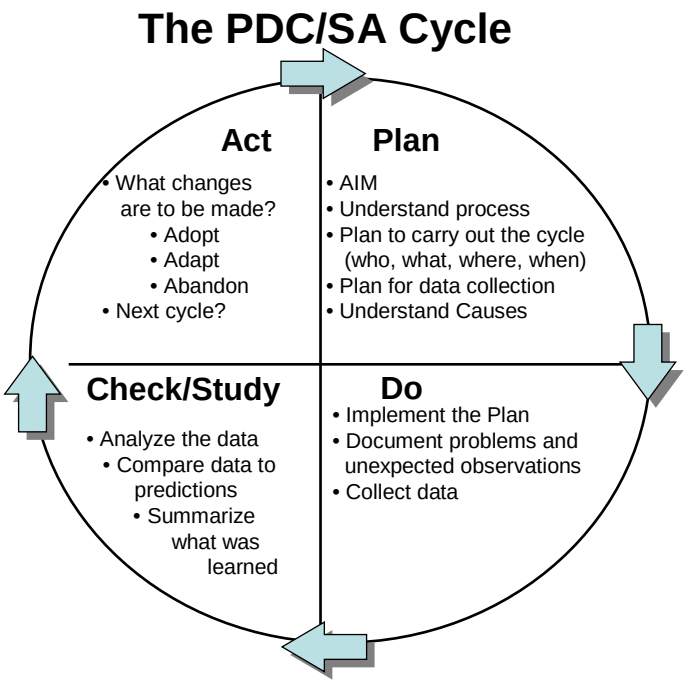

Figure 1

The advanced tools of QI support the PDC/SA Cycle by taking a systematic approach of continuous refinement of the issue, moving from one tool to the next in a defined sequence of application. This process of constant refinement helps to clarify the issue being investigated and its interrelated components. Figure 2 shows the General Approach[5] on how to use the advanced tools of QI in a problem-solving sequence to resolve an important issue/problem. When used in a sequence of application, the advanced tools of QI form a dynamic process that continually refines the issue/problem statement, thereby narrowing the scope and the approach to solve it.

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[5] R. Bialek, G. Duffy, and J. Moran, editors, *The Public Health Quality Improvement Handbook*, ASQ Quality Press, ©2009, pp 190.

General Approach On How To Use The Advanced Tools Of Quality Improvement

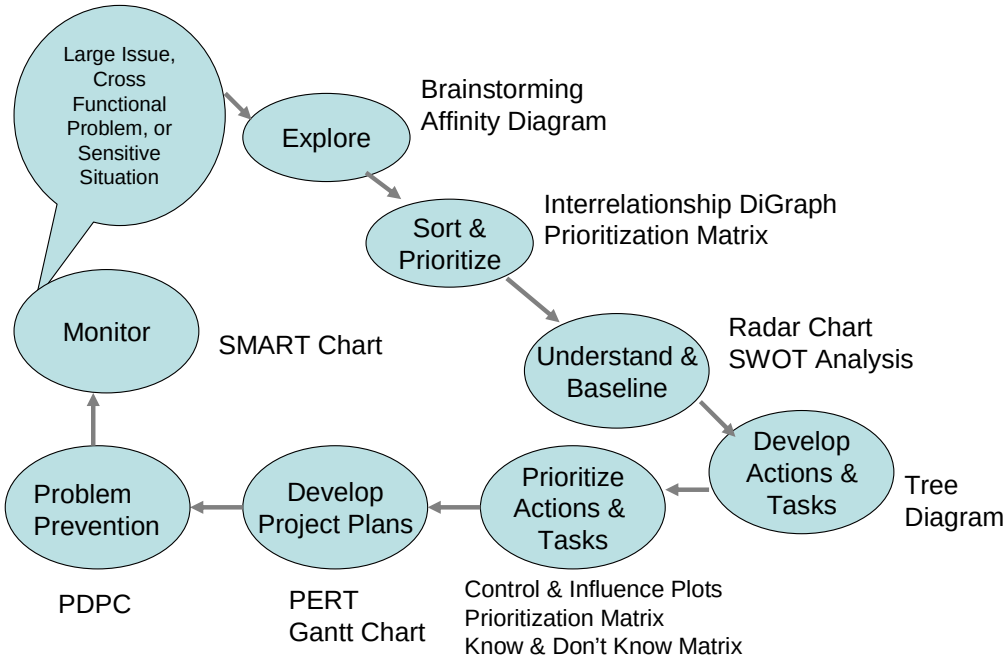

Figure 2

This general flow does not address all issues or problematic situations that could arise. When using the advanced tools of QI, a team or individual should think through an approach to use and then adopt the best sequence of advanced tools of QI to fit the particular issue or situation.

Recent Application:

At the 2010 APHA annual conference[6], the authors conducted an interactive workshop on the use of two advanced tools of QI to demonstrate to the participants how to develop solutions to the challenges public health organizations face in 2011. The two advanced QI tools utilized during the workshop were the Tree Diagram[7] and the Prioritization Matrix[8].

In a previous interactive workshop at the APHA conference, presenters used the Affinity Diagram[9] to demonstrate how to surface related issues around the issue "What are the Challenges Public Health Organizations Face in 2011?" Once these challenges surfaced,

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[6] 138th Annual Meeting & Exposition, Denver, CO, November 6-10, 2010.
[7] R. Bialek, G. Duffy, and J. Moran, editors, *The Public Health Quality Improvement Handbook*, ASQ Quality Press, ©2009, pp 213 - 214.
[8] R. Bialek, G. Duffy, and J. Moran, editors, *The Public Health Quality Improvement Handbook*, ASQ Quality Press, ©2009, pp 204 - 207.
[9] R. Bialek, G. Duffy, and J. Moran, editors, *The Public Health Quality Improvement Handbook*, ASQ Quality Press, ©2009, pp 193 - 195.

presenters utilized the Interrelationship Digraph[10] to understand how the various issues are related to each other. The affinity headers that surfaced and were prioritized for one of the breakout groups in the session were:

- Changing Political Landscape
- Community Partnership Development
- Public Engagement
- Effectively Achieving Accreditation
- Health Care Reform and Implementation
- Access to Care

Once the workshop participants agreed on the affinity categories, leaders utilized an Interrelationship Digraph (ID) to visualize how the various group headings of the issue "What are the Challenges Public Health Organizations Face in 2010?"are related and to discover any hidden linkages.

A previous White Paper entitled "Utilizing the Advanced Tools of QI to Solve Problems: Understanding the Challenges Public Health Organizations Will Face in 2010[11]" can be referenced to understand the process of how to use and apply the affinity diagram and ID graph to an issue.

Once participants agreed on the major challenges, they utilized a tree diagram to develop solutions for overcoming two of the challenges:

- Community Partnership Development
- Effectively Achieving Accreditation

Presenters asked the workshop participants to take these two issues impacting "What are the Challenges Public Health Organizations Face in 2011" and use a tree diagram to develop possible actions that could solve the issue. Tree diagramming is a method of taking broad objectives and breaking them down into their subcomponents in a step-by-step approach. A tree diagram starts with one item that branches into two or more items in a logical manner and facilitates methodical movement of thought from generalities to specifics.

It is best to use a Tree Diagram:

- To develop a process for focusing a team on a logical thought process.
- To select key issues which need to be reduced to the task level after utilizing an affinity diagram or Interrelationship Digraph

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[10] R. Bialek, G. Duffy, and J. Moran, editors, *The Public Health Quality Improvement Handbook*, ASQ Quality Press, ©2009, pp 199 -201.

[11] "Utilizing the Advanced Tools of QI to Solve Problems: Understanding the Challenges Public Organizations Will Face in 2010." Ron Bialek, Sarah Gillen, John Moran, http://www.phf.org/resourcestools/Documents/Utilizing_the_Advanced_Tools_of_QI.pdf, accessed 2/17/2011

- To organize broad categories into finer levels of detail and go from the general to specific or from objectives to tasks to measures, etc.
- To break down broad objectives into specific implementation detail, identify root causes or create assignable tasks when a plan must be generated and mapped out
- To explain details to others when a simple communication tool is needed

The process to construct a Tree Diagram is:

- To develop a statement of the goal and write it at the far left of a piece of flip chart paper, drawing a box around it.
- To utilize the ideas developed in the Affinity Diagram brainstorming session, arranging the ideas from broad to specific for each header card in a tree diagram format. Asking a question that leads to the next level of detail is helpful.
- To ask the following questions about the goal statement if the Affinity Diagram process was not used:
    - "How can this be accomplished?"
    - "What causes this?"
    - "Why does this happen?"
    - "What tasks must be done to accomplish this?"
    - Brainstorm all possible answers
- To write each idea to the right of the first statement. Show links between the tiers with arrows as shown in figure 3.

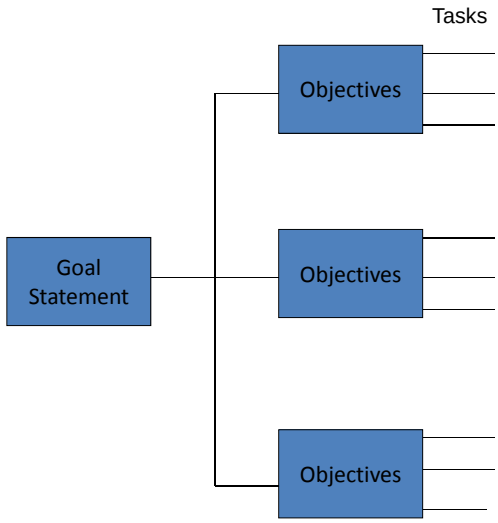

Figure 3

Figures 4 and 5 show abbreviated examples that were developed in the workshop on the issues of “Effectively Achieve Accreditation” and “Successfully Develop Community Partnerships.”

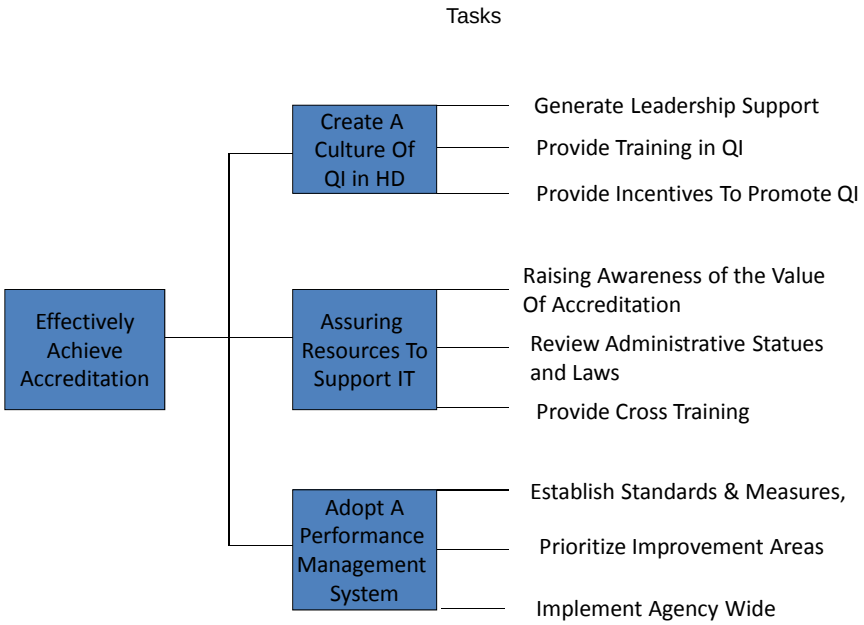

Figure 4

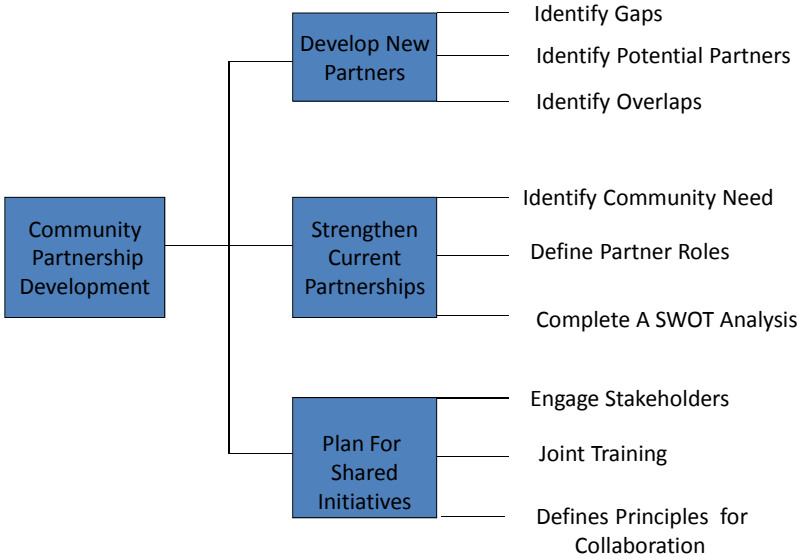

Figure 5

Once the tree diagram is completed, the next step is checking that all of the items at this level are necessary for the one on the previous level. Checking logic and flow by asking the following check question at each level of the tree diagram is crucial:

- If all of the items at this level were present or accomplished, would they be sufficient for the one on the previous level?
- Once the tree diagram is checked, it can be used to prioritize tasks, develop contingency plans, or assign responsibilities.

Once all of the possible actions to solve the issue have been listed in the tree diagram, it is necessary to prioritize them according to largest impact on the issue. With limited resources, focusing on the most important first is crucial. Workshop participants used a prioritization matrix to accomplish this task. A prioritization matrix is a qualitative decision-making tool that utilizes an L-shaped matrix to capture the prioritization data. To accomplish the prioritization, the workshop participants used a pair-wise comparison process of items under consideration, utilizing a set decision criteria to guide the pair-wise comparisons and a weighting criteria to score the pair-wise comparison.

It is best to use a prioritization matrix:

- When consistency is needed in a decision-making process
- When selecting firm decision criteria is necessary before starting by team consensus to guide the decision-making process
- When an arbitrary prioritization process is not desired
- When a numerical scale to represent each judgment on the pair-wise comparisons is preferable
- When a quick and efficient method to prioritize a list of potential alternatives or actions is warranted
- When a simple way to present a group's collective prioritization on a complex issue is desired

The process to construct a Prioritization Matrix is as follows:

- Utilize the header cards from the Affinity Diagram; brainstorm list issue/actions to be prioritized or the task level of the tree diagram.
- Develop the decision criteria to be utilized when making the pair-wise comparisons before starting the process. Some criteria could be:
    - Improved quality
    - Lower costs
    - Improved delivery
    - Improved outcomes
    - Better service
- Draw an L-shaped matrix on a piece of flip chart paper, incorporating enough rows for all of the items under consideration on the vertical axis. Have one more column than rows on the horizontal axis in order to total the scores for each item.

- Label the rows with the items under consideration; the columns' labels should correspond to the row numbers.
- Blank out the intersections of the same item in a row and column, resulting in a diagonal block through the L-shaped matrix as shown in Figure 6.

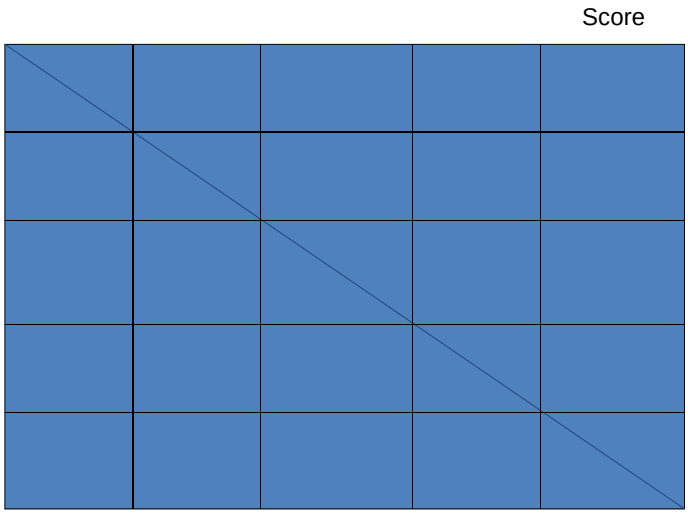

Figure 6

- Take the cards two at a time and ask the following question: Does having X contribute more than Y in achieving the goal, based on our decision criteria?
    - Let the experts decide the answer to the question – expertise will rotate in the group on different pair-wise comparisons
    - Decide on amount of influence by using the following rating scale once an agreement is reached:
        - 1 – equally important
        - 5 – significantly more important
        - 10 - exceedingly more important
        - 1/5 - significantly less important
        - 1/10 - exceedingly less important
    - Assign the consensus value to the issue/action contributing more than the other compared action in the matrix. The one not contributing more gets the reciprocal score. If both are equally important, they both get a score of 1.
    - Do the pair-wise comparisons quickly; the first inclination is usually correct.
    - Total the scores upon pair-wise completion and prioritize the issues/actions from the most important (highest score) to least important (lowest score).

- Use the decision criteria throughout the process. Changing the decision criteria might change the prioritization.
- Use this process in conjunction with the tree diagram as shown in figure 7.

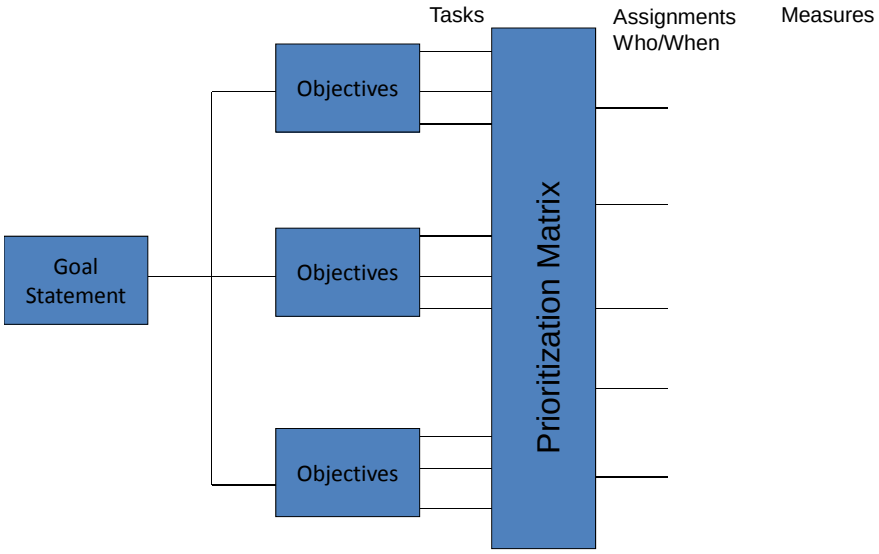

Figure 7

Figures 8 and 9 show examples that were developed in the workshop on the issues of "Effectively Achieving Accreditation" and "Successfully Developing Community Partnerships."

Effectively Achieve Accreditation

	1	2	3	4	Score
1		10	1	5	16
2	1/10		1/5	5	5.3
3	1	5		1	7
4	1/5	1/5	1		1.4

1. Generate Support Among Leaders
2. Provide training In QI
3. Establish Standards and Measures
4. Raise Awareness of the Value of Accreditation

Figure 8

In this prioritization matrix, it is obvious to start with "Generating Support among Leaders" and then focus on "Establishing Standards and Measures."

Community Partnership Development

	1	2	3	4	Score
1		1/5	1/10	1/5	.5
2	5		10	5	20
3	10	1/10		5	15.1
4	5	1/5	1/5		5.4

1. Identify Community Needs
2. Define Partner Roles
3. Complete SWOT Analysis
4. Joint Training

Figure 9

In the Community Partnership Development prioritization matrix, the focus should start with "Defining Partner Roles" and then focus on a SWOT Analysis.

Summary:

The next step in the process, which was not covered in the workshop because of time constraints, is to take the top prioritized tasks and use a Gantt Chart to develop the timeline and resources needed for implementation. When the Tree Diagram is being constructed on a prioritized issue, the team can gather data and evidence to demonstrate and support the interrelationships that were defined to ensure that they are valid. This step is a check on decisions made as to what to focus on before developing solutions to the original issue. It is always best to verify and validate with data, evidence, and potential strategies whenever possible to ensure the team is making quality decisions.

The output from these workshop exercises was the synthesis of those who participated in this workshop from many different health departments and with different concerns, challenges, and perspectives. The participants were able to apply the lessons of the presentation to a practical issue that is faced by the public health community. As the participants experimented with the Advanced Tools of QI, they were able to work with new colleagues in the session and organize their thoughts in logical groups in a manner that allowed the group to reach a consensus.

We encourage you to try these exercises and tools with your staff to help your organization understand and develop approaches to help you meet the challenges public health organizations face in 2011 and beyond.