Quality Management & Planning (7M or 7MP) Tools

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The Seven Quality Management (7M) Tools

• Affinity diagrams:
  – organizes ideas into meaningful categories by recognizing underlying similarity. It is a means of data reduction in that it organizes a large number of qualitative inputs into a smaller number of major dimensions, constructs, or categories.

• Tree diagrams:
  – breaks down or stratifies ideas in progressively greater detail. The objective is to partition a big idea or problem into its smaller components.
7M Tools (cont’d)

• Process Decision Program charts (PDPC):
  – designed to help prepare contingency plans. The emphasis of PDPC is the impact of problems or issues on the project.

• Matrix diagrams:
  – constructed to analyze the correlations between two groups of data.

• Interrelationship digraph (ID):
  – designed as a means of organizing disparate ideas by arranging related ideas into groups in an attempt to define the ways in which the ideas influence one another.
7M Tool (cont’d)

- Prioritization matrices:
  - used to help decision makers determine the order of importance of the activities or goals being considered.

- Activity Network diagram:
  - used to determine which activities are to be performed, when they must be performed, and in what order.
Affinity diagram is a way to organize a large set of ideas. Very helpful for any team with a brainstorming session, when analyzing information. Encourages the participation of all in the group. Similar items can be categorized and central themes emerge.
Affinity Exercise

• Each person write out 5 post it notes quickly with requirements you have for your next vacation. Do not discuss with others in your group

• After everyone has 5 done – put them out on the table or flip chart

• As a group organize them into clusters

• Apply a heading to each cluster/group
Affinity Diagram

Safely
- Easy to get to
- Not too long to get there
- Within 6 hour drive

Activities
- Family fun stuff to do
- Game room
- Variety of activities
- Stuff to buy
- Water park nearby
- Boat

Accommodations
- Pool
- Nice accommodations
- Food I like
- Beach

Cost
- Locator/travel time
- Climate
  - Nice weather
  - Not too hot
  - Sun

Affinity Diagram
• A systematic method to outline all the details needed to complete a given objective.

• Partition a big idea or problem into its smaller components.
Go on family vacation

Prepare

Plan vacation

- Internet search
  - Identify locations
    - Make decision
      - Choose hotel
        - Make hotel reservation
      - Get family buy in
        - Clothing and shoes
          - Toiletries
            - Activities and games
          - Get time off
            - Activities and games
          - Transportation
            - Get gas
            - Save
              - Budget $
                - Open vacation account
                  - Direct deposit
                  - Hold at post office
                    - Get pet sitter
                      - Turn off delivery
                    - Car maintenance
                      - Get gas
• Used to chart the course of events that will take us from a start point to our final complex goal.
• Designed to help prepare contingency plans.
• The emphasis of PDPC is the impact of the “failures” (problems) on project schedules.
Matrix Diagram

• Is used to show the relationship between objectives and methods, results and causes, tasks and people, etc.

• Used to determine strength of relationships between a grid of rows and columns

• Can identify key aspects based on relationships
### Matrix diagram -- relationship

<table>
<thead>
<tr>
<th></th>
<th>Safety</th>
<th>Cost</th>
<th>Climate</th>
<th>Location / travel time</th>
<th>activities</th>
<th>accommodations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>planning</strong></td>
<td><img src="strong" alt="Strong relationship" /></td>
<td><img src="possible" alt="Possible relationship" /></td>
<td><img src="strong" alt="Strong relationship" /></td>
<td><img src="strong" alt="Strong relationship" /></td>
<td><img src="strong" alt="Strong relationship" /></td>
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<tr>
<td><strong>budgeting</strong></td>
<td><img src="strong" alt="Strong relationship" /></td>
<td><img src="strong" alt="Strong relationship" /></td>
<td><img src="possible" alt="Possible relationship" /></td>
<td><img src="strong" alt="Strong relationship" /></td>
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<tr>
<td><strong>preparing</strong></td>
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<td><img src="possible" alt="Possible relationship" /></td>
<td><img src="possible" alt="Possible relationship" /></td>
<td><img src="possible" alt="Possible relationship" /></td>
<td><img src="possible" alt="Possible relationship" /></td>
</tr>
</tbody>
</table>

- ![Strong relationship](strong): strong relationship
- ![Possible relationship](possible): possible relationship
- ![Relationship](relationship): relationship
<table>
<thead>
<tr>
<th>Resources:</th>
<th>Mom</th>
<th>Dad</th>
<th>Kids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tasks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shop</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>car maintenance</td>
<td></td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>pack clothing</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>stop mail</td>
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<tr>
<td>pack games</td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>save</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- ● Primary responsibility
- ○ Team member
- ▲ Resource
• Interrelationship digraph (ID): designed as a means of evaluating the ways in which disparate ideas influence one another. Used to identify the critical issues and key drivers of a problem.

• Often uses input from other tools: affinity diagram or fishbone.
Prioritization matrices: used to help decision makers determine the order of importance of the activities or goals being considered.
**Steps to Create Solution Prioritization Matrix:**

#1: Create a list of ‘want’ criteria (CTQs)
#2: Weight the list of ‘want’ criteria (CTQs) on a scale of 1 to 10
#3: Compare the list of solutions to the weighted criteria (CTQs) and score on a scale of 1, 3, or 9
#4: Multiply the weight by the score for each criteria to get the weighted score for each criteria (CTQs)
#5: Compute and discuss the total scores for each solution

<table>
<thead>
<tr>
<th>Potential Solutions</th>
<th>Criteria and Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Safety</td>
</tr>
<tr>
<td><strong>CTQ Weight (1-10)</strong></td>
<td>0</td>
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<tr>
<td><strong>Atlantic in the Bahamas</strong></td>
<td>0</td>
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<tr>
<td><strong>Lake George</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Outer Banks, NC</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Niagara Falls</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Cruise to Caribbean</strong></td>
<td>0</td>
</tr>
</tbody>
</table>

Rate each Solution to the weighed Criteria on a scale of 1, 3, or 9
1 = low, 3 = moderate, 9 = high
**Steps to Create Solution Prioritization Matrix:**

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<table>
<thead>
<tr>
<th>Potential Solutions</th>
<th>Criteria and Weights</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>CTQ Weight (1-10) ?</td>
<td>3</td>
<td>9</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>8</td>
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<tr>
<td><strong>Atlantis in the Bahamas</strong></td>
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<td>1</td>
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<tr>
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<td>3</td>
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<tr>
<td><strong>Niagara Falls</strong></td>
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<td>9</td>
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<td>1</td>
<td>3</td>
<td>150</td>
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<tr>
<td><strong>Cruise to Caribbean</strong></td>
<td></td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>3</td>
<td>9</td>
<td>216</td>
</tr>
</tbody>
</table>

Rate each Solution to the weighted Criteria on a scale of 1, 3, or 9
1 = low, 3 = moderate, 9 = high
Activity Network Diagram

• Graphic project time-line
• Identifies critical tasks to be monitored
• Team can identify resources, bottlenecks, and timetables
Activity Network Diagram

Plan

Go on Vacation

Prepare

Budget

Execute

<table>
<thead>
<tr>
<th>Time</th>
<th>ES</th>
<th>EF</th>
<th>LS</th>
<th>LF</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 days</td>
<td>81</td>
<td>88</td>
<td>141</td>
<td>148</td>
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</tbody>
</table>
The Affinity Diagram is a useful brainstorming tool and will energize your team.

The Interrelationship Digraph comes in handy when the team needs to agree on the most likely cause(s) and effect(s) contributors.

The Prioritization, Matrix, PDPC, Tree and Activity Network Diagrams are effective planning tools as they help the team build consensus on priorities, relationships and identify the elements required for effective execution of a given plan.

Start by taking small steps with the Affinity Diagram and the Interrelationship Digraph. They are both fun tools to use.