Notes:

Improve

Key Learning Points

1. Explain how to generate and evaluate solutions and process changes.
2. Develop implementation plans.
3. Prove effectiveness of solutions and process changes.

The DMAIC Methodology

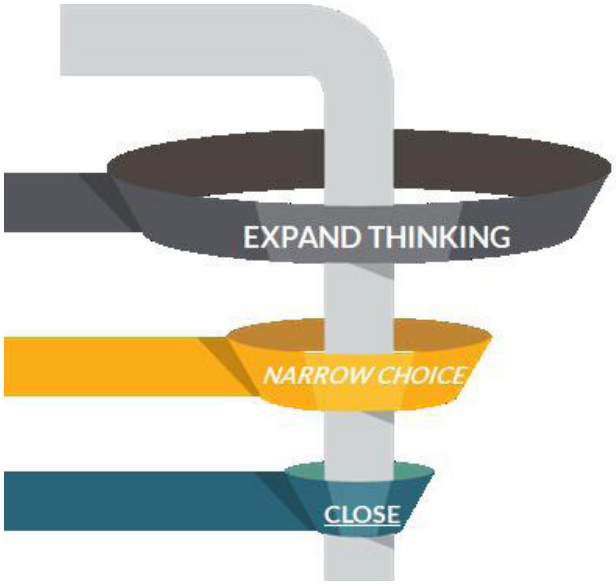
DMAIC Steps	Tools Used
Improve Step: Improve the process by eliminating defects	
▪ Develop potential solutions ▪ Assess failure modes of potential solutions ▪ Validate potential improvement using Pilot studies ▪ Correct/re-evaluate the potential solution For high risk and larger projects: ▪ Perform Design of Experiments	▪ Brainstorming ▪ Mistake Proofing For high risk and larger projects: ▪ Design of Experiments ▪ Pugh Matrix ▪ Failure Modes and Effects Analysis ▪ Simulation Software
Improve Tollgate Review	

Purpose of the Step

At this stage you have already learned how to measure and analyze the data. You have also learned to prove that the root causes of your problem are indeed causes based on testing that data. Now it is time to act on your proven theories and adjust processes to fix the problem.

During the Improve step you will develop proposed solutions and test or pilot them in a real business environment. These practiced solutions will allow you to collect real-time data to verify that you have fixed the sources of variation and will help you address road blocks that may challenge a full implementation in the future.

To Improve



Generate Possible Solutions

The Improve step is the process of deciding on the best remedy. Since all possible solutions are not equally good, the team must consider a range of possible solutions and agree on the most effective and appropriate remedy.

The team's first task is to identify a number of possible solutions. Start by reviewing the root causes uncovered in the Analyze step. Brainstorming, Creative Thinking, Benchmarking, detailed Process Maps, and Rapid Improvement Events/ Kaizen Events can be helpful in finding solutions to address the proven Xs.

Tools to use to generate potential solutions are:

- Brainstorming
- Creative Thinking
- Benchmarking
- Process Mapping

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Evaluate Possible Solutions

Once your team has identified many possible remedies, you should evaluate each one in terms of its probable impact on the problem and the organization.

Tasks completed during this phase:

- Link Solutions to Root Causes
- Create Selection Criteria
- Complete a Selection Matrix
- Complete a Pugh Matrix
- Complete a Payoff Matrix

Design Solution, Controls, and for Culture

In designing a solution and the controls needed around that solution, a team must also consider how these changes will affect stakeholders. This section presents tools to use for this step.

Tasks completed during this step:

- Complete Change Acceleration Planning
- Complete a Risk Assessment
- Complete an FMEA
- Design an Experiment
- Complete a Simulation

Prove Effectiveness

To prove the effectiveness of your solution, you need to determine the best method for conducting a test and collecting data to demonstrate effectiveness.

Tasks completed during this step:

- Complete a Dry Run
- Complete an Acceptance Test
- Complete a Pilot

Develop Implementation Plan

Once you are sure that your selected improvement will work, it is time to roll out the improvement to the existing process. Before you do this you need to create an implementation plan noting how the improvement will be made.

Be sure to include instructions for:

- People affected by the improvement

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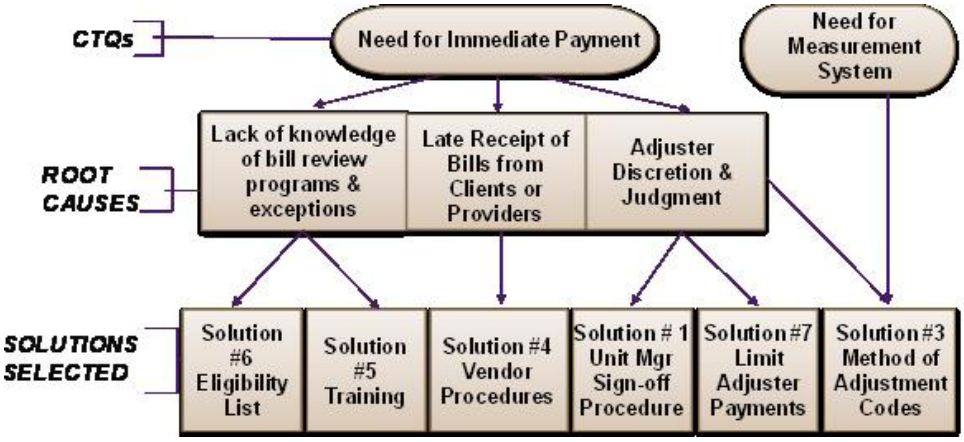
- People who will need to understand the control plan
- Any training that is needed on the revised process
- How and when the revised process will be transferred to the process owner

Linking Solutions to CTQs

Many teams do a great job in the Measure step by producing an exhaustive list of all the different data they are going to collect. Then in Analyze, they list all of the different theories relative to Xs that they are going to test. As you move through Improve, make sure that you remain focused on the list of critical Xs proven in the Analyze step to solve the problem by addressing known root causes. The starting point for this linkage is a written list of causes that will be addressed.

Example: Review of Medical Bills



Sources of Solutions

When generating ideas, go for quantity and generate as many ideas as possible. Once the field of creative ideas is generated, the portfolio of ideas can be evaluated to identify the final, optimal solutions.

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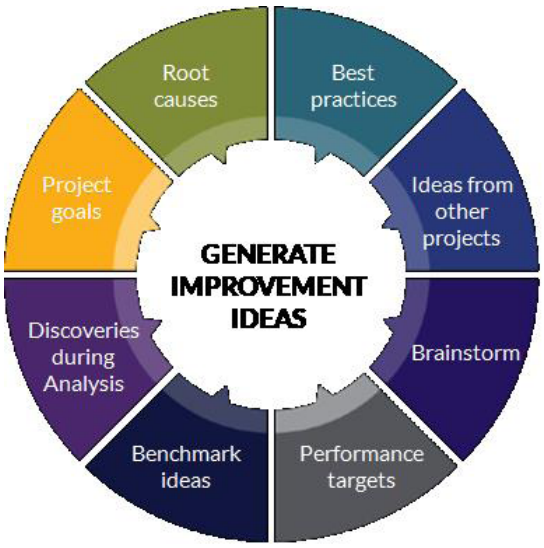

Idea Generation

Remember, the team's goal is to generate many ideas about how each of the root causes may be eliminated or drastically reduced. Some ideas may affect more than one root cause. That will be made clear when they are evaluated. What's important is that the team focus on one root cause at a time. Start with the root causes which are determined to have the biggest contribution to the problem statement.

To generate ideas use:

Benchmarking

Benchmarking is a tool where a company measures its performance against another's best-in-class practices. A benchmarking study determines how best-in-class organizations achieved their performance levels and uses that information to improve performance.

Innovative Thinking

Innovation, is by definition, creating something new. As such it creates change. There are many levels of innovation from the rare revolutions that create dramatic change to the evolutionary innovations that happen every day.

When determining improvements, you are interested in innovations that will sell in the market place, or create value internally for internal products, The reaction of the customer to the innovation is more important than the innovation itself.

Criteria

Each team must agree on the criteria it will use to evaluate the solutions. The most common criteria for evaluating alternative solutions include:

- Total Cost

- Impact on the Problem
- Benefit/Cost Relationship
- Cultural Impact/Resistance to Change
- Implementation Time
- Uncertainty About Effectiveness
- Health, Safety, and the Environment

The following tools can be used to help evaluate solutions:

- Selection Matrix
- Pugh Matrix
- Payoff Matrix

Link Solutions to Xs

In the Analyze step, the significant Xs that are important to the success of the project have been identified. As you generate the many possible solutions, the team can create a simple matrix with a list of Xs related to possible solutions.

If done as a matrix, the team should then mark an "X" where a potential solution addresses one of the Key Xs. It is a simple approach to help understand if one solution impacts the majority of the identified Xs, and may be a first step in narrowing the list of solutions.

POSSIBLE SOLUTIONS	Agent Availability (X3)	Average Completion Time (X4)	Average Call Time (X8)	Forecasting Accuracy (X1)
Create Forecasting Tool to be used				X
Create Schedule Adherence policy	X			
Create agent data report for managers	X			
Reduce Non-value Activity in Order and Call Flow process		X	X	

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How to Change

1. Evaluate the improvement against the project goal.
2. Identify those affected by the improvement.
3. Determine customer needs with respect to the improvement.
4. Determine the required resources.
5. Specify the procedures and other changes.
6. Assess human resource requirements.
7. Verify that the improvement meets customer needs.

Design Process Changes and Flow

When designing or redesigning a process, follow these guiding principles of physical design:

- Operations are in close physical proximity.
- Products/services have the same or similar sequence of operations.
- Operations are interdependent.
    - All run to the drumbeat
    - The drumbeat is customer demand
- Space is minimized, room for inventory is minimized.
- Equipment is situated for easy maintenance.
- Workflow is unidirectional; often 'U' or 'L' shaped.
- There is low variability (throughput and quality).

You Can't Rush Change

In this Quality Minute, "Don't Cook Your Chicks," Dr. Juran explains that a chicken egg takes 21 days to incubate, no more, no less, proving that some processes just can't be rushed.

Similarly, a company embarking on quality efforts needs to allow ample time for changes in its culture to take hold.

Change Affects the Organization

Cultural Resistance to Change

By their very nature, quality efforts create change in an organization. The intended effect of the change is to offer something better to internal and external stakeholders—an enhanced product or service, a more efficient work process, reduced waste, and so forth. The actual effect, even though technologically sound

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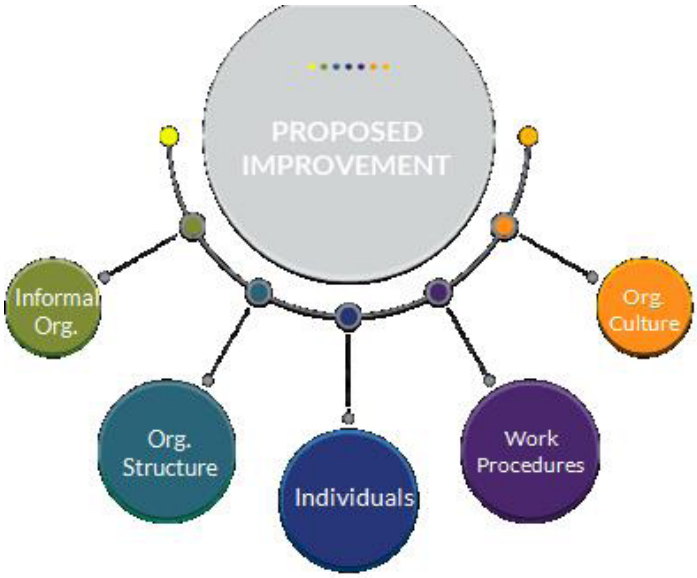
and appealing, has a social consequence. Any change might be viewed by those affected as a threat and, until the threat is neutralized, change will be difficult to achieve. This objection to change on the part of those affected, such as the workers on the assembly line, the employees in the district office, the technicians in the laboratory, etc., is defined as "cultural resistance."
Cultural resistance is a natural consequence of change, particularly any abrupt change that alters established habits, traditions, beliefs, status, or practices. No one likes to be told that his/her way is no longer the preferred way, especially if he or she has been doing it that way for years. Cultural resistance to such a change can occur even among those who would benefit from the proposed change and may even believe philosophically in it.

Restructuring business processes takes time, both for acceptance of the new system and for retraining employees in their new roles within that system. Hastening the process will result in frustration and resistance.



Design for Culture

Identify those affected by the change. This can include:

- A new approach requires that people learn new skills and procedures. This reduces the perceived value of those who were experts in the old ways of doing things.
- Asking people to share a work process with individuals they have not worked with before.
- Requiring people to change their schedules—when they come and go or when they eat lunch, for instance.

The following tools are useful when Designing for Culture:

- Barriers and Aids Chart
- Change Management Plan

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- Communication Plan

Follow the Rules of the Road

Provide Participation

- This is the most important rule for introducing change.
- Those affected should participate in the planning and execution.
- Lack of participation leads to resentment and resistance.
- Allow those closest to the process time to give their input (Voice of the Customer).

Provide Enough Time

- How long does it take for members of a culture to accept a change?
- Members need time to evaluate the change impact.
- Even if the change seems beneficial, they need to learn what price they must pay in cultural values.
- Include time to reinforce direction potentially many times before the change is made.

Start Small

- A small-scale tryout reduces risk for advocates and members of the culture.
- Kinks can be worked out before implementing on a wider-scale.
- Momentum on a small-scale can be used moving forward with full implementation.

Avoid Surprises

- A major benefit of the cultural pattern is predictability.
- A surprise is a shock to this predictability and a disturber of the peace.
- Maintaining dialogue and having a communication plan is a critical factor in avoiding surprises.

Choose the Right Year

Timing can be very important to a change.

Example:
ABC Corp. is planning to implement computerized documentation, and has two concurrent projects focused on the completeness of design documentation, and compliance with government regulations. Would this be the right year to do an additional project on documentation at the organization?

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Keep the Process Free of Excess Baggage

- Avoid cluttering the process with extraneous matters not closely related to getting the results.
- The risk is that the debates will get off the main subject and into side issues.
- Defining scope in the project charter helps a team focus and stay clear of extraneous matters.

Work With Recognized Leadership

- The culture is best understood by its members.
- Leadership can be informal.
- Convincing leadership is significant for change acceptance.
- Recognize whom your informal and formal leaders are. Can some leverage others for additional support?

Treat People With Dignity

- Respect individual differences.
- Value divergent opinions as an opportunity to see a new perspective.

Reverse the Positions

- Ask: "What position would I take if I were a member of the culture?"
- Role play to stimulate understanding of the other person's position.
- Process mapping can help you understand the process as others see it, and walk the process in their shoes. See the process as they live it through their eyes.

Deal Directly With Resistance

- Try a program of persuasion (cookies help).
- Offer a quid pro quo—something for something.
  - Example: When developing a new documentation form for test technicians, the technicians' feedback was incorporated into making the form easier to fill out and streamlining information so there is less double entry of results.
- Change the proposal to meet specific objections.
  - Example: If having jobs start on time is a bigger problem identified by a department than increasing volumes, determine if start time should be the project focus which would impact the volumes being handled in the department.
- Change the social climate in ways that make the change more acceptable.
- Forget it. Sometimes the correct alternative is to drop the proposal.

Notes:

Assess Risk

Risk Assessment makes up the first part of a risk management process. Risk Assessment involves identifying and analyzing risks as well as planning and implementing activities to reduce the risk. To complete the risk management process, you must track the resolution of the abatement activities.
Before making any changes to the process or even just for experimentation, be sure to assess the potential risks.

To Assess Risk:

1. Identify Risks
2. Analyze Risks
3. Plan, Communicate, and Implement Abatement Activities
4. Track Resolution of Abatement Activities

Aspects of Assessing Risk

Implementing any change successfully has two aspects—the technical quality of the solution and the acceptance of the solution. Look for risks around both aspects.

Use Failure Mode Effect Analysis to Assess Risk.

Two Aspects of Assessing Risk

	Technical Quality	Acceptance
Customers	Do we risk exposing customers to potential defects?	Will the customers accept the change?
Employees	How will the review process impact employees?	Will the employees buy in to the change?
Business	Will the new process adversely affect business goals, such as costs or schedule?	Have the key business stakeholders bought into the change?
Compliance	Are there any compliance issues?	Will people accept and follow the new procedures?
Safety	Are there any safety risks associated with this experiment, or associated with the changes in the process or procedure?	Will persons affected by change consciously or unconsciously become absorbed with ensuring safety?

Prove Effectiveness

Once a solution is designed and before it is finally adopted, it must be proven effective under operating conditions. In a service-intensive organization, a pilot program is often the best way to test a solution because it offers the opportunity to prove the solution under real operating conditions. A pilot tests the solution on a limited scale; therefore, any shortcomings or deficiencies can be recognized and corrected before implementing the change organization-wide.

Notes:

To prove the effectiveness of your solution, you need to determine the best method for conducting a test and collecting data to demonstrate effectiveness.

This can be done through a Pilot test.

Pilot Test

A pilot test is a test of all or part of a proposed solution on a small scale in order to better understand its effects and to learn how to make the full-scale implementation more effective.

Pilot Advice:

- The improvement team should be involved
- Collect data on both the process and on external factors
- Make sure the full range of inputs and process conditions are tested
- Identify potential trouble spots – review all information from the pilot

Create an Implementation Plan

An implementation plan is used to plan the transition to the new process. It can be a guide for a pilot as well. After a pilot, it will be revised as necessary and used when the solution is proven in operating conditions. It will also contain information needed regarding training on the new process.

At this point, the team may need to develop the costs of the improvement and verify the expected cost benefit of the project. Refer back to the business case in the Project Charter. When developing the business proposal do the following.

- Concentrate on direct costs and direct benefits, using indirect costs that are generally acceptable to all stakeholders.
- Keep the analysis simple, focus on cost of implementation and a few key benefits that clearly exceed the cost.
- Use standard methods and rates in your calculations.
- List all activities that contribute to either cost or benefit and identify as much as possible how these activities will be measured.
- Keep the presentation simple and easy to understand.

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