

Study Guide: DMAIC



What is DMAIC?

- The DMAIC model is a problem solving and process improvement model
- DMAIC stands for define, measure, analyze, improve and control. It's a data-driven iterative approach that you can use to improve a process or fix a problem
- Now DMAIC is a core part of the Six Sigma quality improvement methodology
- DMAIC is also considered a quality management method

How to apply DMAIC?

The DMAIC Model has 5 steps:

1. Define:



Purpose: The first step is to clearly define the problem or the process that needs improvement. It's crucial to establish a well-defined project scope and set specific, measurable objectives.

Activities: During this phase, project goals and objectives are articulated, and a project charter is often created. Stakeholders' needs and expectations are identified, and a high-level process map may be developed to provide an initial understanding of the process.

2. Measure:



Phase 2: Measure

Quantify the problem. How does the process currently perform? Or in other words, what is the magnitude of the problem? Measurement is critical throughout the life of the project. As the team starts collecting data they focus on both the process as well as measuring what customers care about. That means initially there are two focuses: reducing lead time or improving quality. In the Measure Phase, the team refines the measurement definitions and determines the current performance or the baseline of the process.

Steps	Tools
Determine How the Process Currently Performs	Data Collection Plan
Create a Plan to Collect the Data	Operational Definitions
Ensure the Data is Reliable	Check Sheet
Gather the Baseline Data	Project Charter
Update Your Project Charter	

Purpose: In this phase, you focus on gathering data and establishing a baseline for the current state of the process. It's essential to understand the process's performance by collecting relevant data and metrics.

Activities: You select key performance indicators (KPIs) and measurement methods, collect data systematically, and analyze it to assess the process's capability and performance. The goal is to quantify the problem and identify trends or patterns.

3. Analyze:

Phase 3: Analyze

Identify the cause of the problem. What is causing the problem? The Analyze Phase is often not given enough attention and, without analysis, teams jump to solutions before knowing the true root causes of the issues. The result is teams who implement solutions but don't resolve the problem! These efforts waste time, consume resources, create more variation and, often cause new problems. The ideal is for teams to brainstorm potential root causes (not solutions), develop hypotheses as to why problems exist and then work to prove or disprove their hypotheses. Verification includes both process analysis and data analysis and has to be completed before implementing solutions. This is the crux of the Analyze Phase!

Steps

- Closely Examine the Process
- Graphically Display the Data
- Look for What Might be Causing the Problem
- Verify the Cause(s) of the Problem
- Update your Project Charter

Tools

- Value Stream Map
- Value Added Flow Analysis
- Run Charts
- Histograms
- Pareto Charts
- Box Plots
- Fishbone Diagram
- 5 Whys
- Root Cause Hypothesis
- Project Charter

Purpose: Once you have collected and analyzed data, the next step is to dig deeper into the root causes of the identified problems or variations in the process. This phase is about understanding why issues occur.

Activities: Statistical tools and techniques are often used to identify potential causes. Hypotheses are formulated and tested to determine which factors have the most significant impact on the problem. The analysis helps prioritize issues and provides insights into where improvements can be made.

4. Improve:

Phase 4: Improve

Implement and verify the solution. How will the team mitigate the root causes of the problem? Once the project teams have determined the root causes it's time to develop solutions. The Improve Phase is where the team brainstorms solutions, pilots process changes, implements solutions and lastly, collects data to confirm there is measurable improvement. A structured improvement effort can lead to innovative and elegant solutions that improve the baseline measure and, ultimately, the customer experience.

Steps	Tools
Brainstorm Solutions That Might Fix the Problem	Brainstorming
Select the Practical Solutions	Value Stream Map
Develop Maps of Processes Based on Different Solutions	Benchmarking
Select the Best Solution(s)	Swimlane Map
Implement the Solution(s)	Classic Lean Improvements
Measure to Ensure Improvement	PDCA/PDSA
	Weighted Criteria Matrix
	Pilot Checklist
	Implementation Plan
	Impact Effort Matrix
	To-Be Map

Purpose: With a clear understanding of the root causes, the Improve phase is where you develop and implement solutions to address the identified issues and improve the process.

Activities: Potential solutions are generated, evaluated, and selected based on their anticipated impact. Changes to the process are carefully planned and executed. The goal is to optimize the process to achieve the desired improvements while considering potential risks.

5. Control:



Phase 5: Control

Maintain the solution. How do you sustain the improvement? Now that the process problem is fixed and improvements are in place, the team must ensure that the process maintains the gains. In the Control Phase the team is focused on creating a Monitoring Plan to continue measuring the success of the updated process and developing a Response Plan in case there is a dip in performance. Once in place, the team hands these plans off to the Process Owner for ongoing maintenance.

Steps	Tools
Ensure the Process is Properly Managed and Monitored	Control Plan
Document the Improved Process	Control Chart
Apply Improvements to Other Areas	Monitoring & Response Plan
Share and Celebrate Your Success	Documentation
Continuously Improve the Process Using Lean Principles	Innovation Transfer Opportunities
	Gallery Walks

Purpose: In the final phase, the focus shifts to ensuring that the improvements are sustained over time. Controls are put in place to monitor and maintain the process at the desired level of performance. During these steps you can also decide if you need to apply the DMAIC cycle again.

Activities: Key performance indicators (KPIs) are defined and tracked to ensure the process remains stable and consistent. Control plans and standard operating procedures are established to guide ongoing operations and prevent the recurrence of issues.

Advantages and Disadvantages of DMAIC

Advantages:

- Useful when you need to improve a complex process
- Reduces the possibility of fixing the wrong issue

Disadvantages:

- Doesn't suit organizations that rely on creativity
- It's inappropriate for simple and obvious problems

The DMAIC model provides a systematic and data-driven approach to problem-solving and continuous improvement. It allows organizations to methodically identify and address process deficiencies, leading to better quality, increased efficiency, and enhanced customer satisfaction.