The DMAIC Improvement Process

**DMAIC** refers to a data-driven improvement cycle used for improving, optimizing and stabilizing business processes and designs. The DMAIC improvement cycle is the core process used to drive Six Sigma projects. DMAIC is not exclusive to Six Sigma and can be used as the framework for other improvement applications.

DMAIC is an abbreviation of the five improvement steps: Define, Measure, Analyze, Improve and Control. All of the DMAIC process steps are required and always proceed in this order:

**Define**
Write down what you currently know. Seek to clarify facts, set objectives and form the project team. Define the following:

- A problem statement
- The customer(s)
- **Critical to Quality** (CTQs) — what are the critical process outputs?
- The target process and other related business processes
- Project targets
- Project boundaries
- A project charter is often created and agreed during the Define step.

**Measure**
This is the data collection step. The team decides on what should be measured and how to measure it. This forms a data collection plan. It is usual for teams to invest a lot of effort into assessing the suitability of the proposed measurement systems. Good data is at the heart of the DMAIC process:

- Define the process critical Xs (inputs) and Ys (outputs).
- Define the measurement plan.
- Test the measurement system.
- Collect the data.
- A Measurement System Analysis (gauge study) is performed at this stage.

**Analyze**
The data collected in the Measure step is analyzed to determine root causes of defects. Within Six Sigma, often complex analysis tools are used. However, it is acceptable to use basic tools if these are appropriate.

- Identify gaps between current performance and goal performance
- Identify how the process inputs (Xs) affect the process outputs (Ys)
- List and prioritize potential opportunities to improve
- Identify sources of variation
- Data is analysed to understand the location or distribution of the data collected. Histograms and box plots are often used to do this.

Adapted from: http://en.wikipedia.org/wiki/DMAIC
**Improve**

Identify creative solutions to fix and prevent process problems. Use brainstorming or techniques like [Six Thinking Hats](http://en.wikipedia.org/wiki/Six_Thinking_Hats) and [Random Word](http://en.wikipedia.org/wiki/Random_word). Some projects can utilise complex analysis tools like DOE ([Design of Experiments](http://en.wikipedia.org/wiki/Design_of_Experiments)), but try to focus on obvious solutions if these are apparent.

- Create innovative solutions
- Focus on the simplest and easiest solutions
- Test solutions using [FMEA](http://en.wikipedia.org/wiki/FMEA)
- Create a detailed implementation plan
- Deploy improvements
- [Ishikawa diagrams](http://en.wikipedia.org/wiki/Ishikawa_diagram) can be used throughout all DMAIC stages. Within the Improve step, we can use these to help brainstorm potential solutions.

**Control**

Monitor the improvements to ensure continued success. Create a control plan. Update documents, business process and training records as required.

A [Control chart](http://en.wikipedia.org/wiki/Control_chart) can be useful during the control stage.

**Replicate or Thank the Team**

This is additional to the standard DMAIC steps but it should be considered. Think about replicating the changes in other processes. Share your new knowledge within and outside of your organization. It is very important to always provide positive moral support to team members.

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