Organizing Six Sigma Projects

by Liem Ferryanto

Projects are the building blocks for the Six Sigma DMAIC (define-measure-analyze-improve-control) or DFSS (Design for Six Sigma) methodology. Thus, organizing projects is a fundamental capability that must be owned by a Master Black Belt or a Champion.

Six-Sigma-based projects should be thought of as systematic and scientific actions of larger tactical and strategic improvement plans. In contrast, what we might call ad hoc projects are tolerated to fix very limited urgent issues while finding more structured and comprehensive solutions. This article discusses some principles of organizing Six-Sigma-based projects to prevent them from becoming ad hoc projects.

From a Vision to Projects: Tactical and Strategic Improvement

To move something, we need a “driving force” or what Elliott Jaques refers to as a value or vector.1 Figure 1 presents a flowdown illustrating how a vision works as the primary driving force for Six Sigma projects:

- A vision is the driving force for a mission.
- The corporate mission is the driving force for cross-functional and specifically functional objectives.
- Objectives are the driving forces for cross-functional and specifically functional programs.
- Programs are the driving forces for cross-functional and specifically functional tasks.

Fig. 1 A cascade from a vision to projects
The flowdown ends with tasks, which consist of two types of work:

1. Operations, or institutionalized work, follow “known pathways,” meaning that the practitioner relies upon existing knowledge, rules, and routines.
2. Projects have “uncharted pathways,” meaning that unknown variables exist and require problem-solving and decision-making skills of the practitioner.

Successful Six-Sigma-driven project results thus become lessons to be learned and transformed into operations. The transformation will build or improve new or existing infrastructures and systems of doing business.

Figure 1 also emphasizes how projects should be traceable. Traceability of a project is a capability to identify what elements or characteristics should be controlled, identify where changes in the execution may impact the corporate programs or objectives, and identify root causes of the un-achievable corporate programs or objectives. Together, the flowdown from vision to projects and the traceability of projects back up the ladder show how Six Sigma projects are the specific actions of tactical and strategic plans to build or to improve the infrastructure and system of doing business.

Projects as Systematic and Scientific Actions

Projects are traceable and feasible when they comprise the goals they are to achieve, the methods that will be used, the resources required, and the limits within which the work must be done. These elements make projects systematic.

Building and improving a system forces us to apply physics or other laws to modelling the system as the flow or added-value transformation of energy, material, and information. In this way, projects are scientific actions. Figure 2 shows the flow of energy, material, and information of a system.

Fig. 2 Flow of energy, material and information of a system
As practitioners define and prepare to prioritize potential projects, they should remain aware of the systematic and scientific nature of individual projects, as well as understand how those projects fulfill a tactical and strategic purpose.

**Organizing Six Sigma Projects: Project Flowdown**

In “A Mathematical Framework for the Key Characteristic Process,” Anna C. Thornton describes how an approach based on Key Characteristics (KC) can help identify areas where variation most affects product quality and thus requires extra attention. This approach can also help Six Sigma practitioners prioritize projects.

According to Thornton, “Key Characteristics (KCs) are the product, sub-assembly, part, and process features that significantly impact the final cost, performance, or safety of a product when the KCs vary from nominal.” KCs should be ranked based on their sensitivity to sources of variation that inhibit the intended function of a product, such as process capability (piece-to-piece variation), degradation over time/cycle, customer usage and duty cycle, external operating environment, and internal operating environment/interaction with neighboring subsystems. The goal in product design or process engineering is to have products or processes that are insensitive to the source of variation.

A KC approach begins with identifying KCs and then creating a “KC flowdown”:

The KC flowdown provides a system view of potential variation risk factors and captures the design team’s collective knowledge about variation and its sources. A KC flowdown is the hierarchy of variation-sensitive product requirements and component and process features that contribute to their variation.

It is natural that project flowdown should follow KC flowdown. When a design team fails to create a systematic flowdown, too many projects are identified and most of them are just ad hoc projects. It is hard to trace the root causes of overwhelming ad hoc projects. Consequently, quality plans can become too cumbersome. All of these ultimately create a frustration, as the projects do not relate to the corporate goal of achieving what the customer wants. Figure 3 shows the relation between a KC and a project flowdown.

Having understood that projects are the main building blocks to achieve corporate goals, we need to specify the focus of a project so that it does not deviate from its ultimate goals. The objective of each Six Sigma project, from product to process, is to deliver KCs that are driven by a program. Therefore every project should focus on variation reduction, variation control, and variation verification to achieve KCs.
Projects for processes may start from process mapping, then go to process control, and end at audit. Projects for product designs may start from robust engineering/optimization, then go to tolerance analysis and design, and end at reliability testing/key life testing. Each KC in each project should also have progressive results from basic KC to advanced KC as in Kano models.

Fig 3. A relation between a KC and a project flowdown

References


2 Jaques, 16.

3 Jaques, 19.


5 Thornton, 146.
About the Author

Liem Ferryanto, Ph.D., is a DFSS Champion at Research In Motion Ltd., Waterloo, Canada. He has over twelve years’ successful track record in leading cross-functional teams and complex large-scale projects in the US, Canada, Europe, and Southeast Asia.

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