1 Introduction

OVERVIEW

The motivation for writing this book was a disappointing realization over many years of teaching and mentoring Project Leaders that there are plenty of technical texts explaining the painful underlying statistics in Six Sigma and Lean Sigma, but there are hardly any books explaining what to do from a practical standpoint. There are proliferations of books explaining at a high level the overall concept of a project, but next to none that take the Project Leader through a project, step by step. There are a multitude of books explaining just enough on project tools to suck the reader into buying consulting time from the author to apply them, but none that leave the reader in a position of practical self-sufficiency. Most unfortunately of all, there are a whole host of books written by theorists who have never led a project to solve a business problem using the methodologies they espouse, but very few ever written by those who have actually applied this stuff.

The aim here is to be different. The hope is that I provide a book that can be used practically day to day by Process Improvement Leaders (from any industry), Champions, and Consultants to guide them through how to solve as many different types of business problems as possible. It is certainly not meant to be a technical text to take the place of the statistical tomes that are readily available—I'll reference as many as I can of those along the way. By analogy, this is how to drive the car, not how the car works. In a field as passionate as Lean Sigma, I'm sure there will be disagreement at times with the order of tools used, so please remember that this is a guide—not the definitive solution.

I'll also hasten to add at this point that I don't favor Lean over Six Sigma or vice versa. Let's face it—we need them both and, by the end of this book, I probably will have

offended both camps equally. The text is most certainly not for purists; it's just about an approach that works.

INTENDED AUDIENCE

The primary audiences for this book are

- The host of Process Improvement Project Leaders (Green Belts and Black Belts), across *all* industries, who are leading projects to improve processes by shortening lead times, increasing capacity, improving yields and accuracy, reducing inventories, and so forth using tools and methodologies that come under the Lean or Six Sigma banners
- Project Champions or Sponsors who are wondering what questions to ask of their Project Leaders and what they should see in terms of activity, as well as seeking to improve their project selection and scoping skills
- Technical Mentors (Master Black Belts) who are looking to improve their project- and tools-mentoring skills and to better select and scope projects
- Deployment Leaders who are seeking to better select and scope projects to improve Return On Investment (ROI) of the Program
- Consultants who are brushing up on skills as both a Technical Mentor and a Deployment Lead

PREREQUISITES

This book is specifically aimed at a project-based approach to process improvement. In order to ensure a usable text, it will be necessary to make some basic assumptions before leading up to the project—in particular, the existence of the following:

- A clear business reason to do the project.[1]
- A Project Leader (usually referred to as a Black Belt or Green Belt, depending on the level of training) to lead the project. It is usually best to have a Belt that is not from the functional groups impacted by the project if at all possible—that way, the Belt has no preconceived notions of solution and can be relied upon to look at the process with a fresh set of eyes.

[1] The chapters on Project Identification and Selection in Stephen A. Zinkgraf's book, *Six Sigma—The First 90 Days*, will certainly help set the stage here (Prentice Hall PTR, ISBN: 0131687409).

- A Team comprised of people who live and breathe the process every day. Lean Sigma is certainly a team sport and should not be viewed as a "gladiator" undertaking. There should be no hero mentality to solution of process problems.
- A committed Champion to remove potential roadblocks.[2]
- Time made available for the Team to complete the project, both for the Belt and the Team. If this is not the case, failure is just a few short weeks away.

These elements are absolutely necessary, but in this book I will not spend any more time on them because the focus here will be on the problem-solving roadmap itself and the tools therein.

Another significant assumption here is that the Project Leader will have gone through some basic Lean Sigma or Six Sigma training to at least Green Belt level. It is possible to complete a project just on this text alone, but the intent is for this book to be a *practical* support guide as opposed to a technical teaching guide. I will endeavor to reference key technical texts throughout.

BASICS

In order to better understand the detailed methods of Lean Sigma process improvement, it is important to first have a clear understanding of the basics involved. This begins with simple clarifications of what a process is, how it is defined and then how it is improved.

A PROCESS

The first thing to point out here is that Lean Sigma is a *process* improvement methodology, not a function or an activity improvement methodology. This is a key distinction in framing the project and it is one that Champions frequently get wrong during project identification, scoping, and selection.

A process is a sequence of activities with a definite beginning and end, including defined deliverables. Also, a "something" travels through the sequence (typical examples include a product, an order, a patient, or an invoice). Resource is used to accomplish the activities along the way.

[2] The role of the Champion is clearly outlined in Chapter 8, "Defining the Six Sigma Infrastructure" in Stephen A. Zinkgraf's book, *Six Sigma—The First 90 Days*.

If you can't see an obvious, single process in your project, you might have difficulty applying process improvement to it. The start and end points need to be completely agreed upon between the Belt, Champion, and Process Owner (if this is not the Champion). Clearly, if this is not the case, there will be problems later when the end results don't match expectations.

ENTITIES

In the preceding definition of a process, there is a "something" that travels along it. For want of a better name, I'll refer to this as an *entity*. Clearly, this entity can be fundamentally different from process to process, but there seems to be surprisingly few distinct types:

- **Human.** Employees, customers, patients
- **Inanimate.** Documents, parts, units, molecules
- **Abstract.** Email, telephone calls, orders, needs

The trick is to be able to identify the Primary Entity as it flows through the process with value being added to it (for example, a patient or perhaps the physical molecules of a product). There will, of course, be secondary entities moving around the process, but focus should be on identifying the primary.

Belts sometimes find this difficult when the entity changes form, splits, or replicates. For instance, in healthcare (in the ubiquitous medication delivery process), orders are typically written by the physician and so the Primary Entity is the written order. The order can then be faxed to the pharmacy, and is thus replicated and one copy transmitted to the pharmacy fax machine. The faxed order is then fulfilled (meds are picked from an inventory) and effectively the Primary Entity changes to the medication itself, which will be sent back to the point of request.

Similarly, in an industrial setting, we might see the Primary Entity change from customer need to sales order to production order to product.

DELIVERABLES

The last element of the definition of a process is the deliverables. This is often where novice Belts make the biggest mistakes. Simply put, the deliverables are the minimum set of physical entities and outcomes that a process has to yield in order to meet the downstream customers' needs.

The single most common mistake Belts make in process improvement is to improve a process based on what customers say they *want* versus what they truly *need* (more about this in the section, "Customer Interviewing" in Chapter 7).

The deliverables need to be thoroughly understood and agreed upon in the early stages of the project; otherwise later during the analysis of what it is exactly in the process that affects performance, the Belt will have the wrong focus.

If your project doesn't have a start, an end, deliverables, or a Primary Entity, it probably isn't a process and you will struggle to apply Lean Sigma to it. Table 1.1 gives examples of good and poor projects across varying industries.

Table 1.1 Examples of poor versus good projects

Industry	Healthcare	Chemical Manufacturing	Discrete Manufacturing	Service/ Administrative	Transportation and Logistics
Good Projects	Length of stay Emergency department, operating room, care units Accuracy Meds admin/ delivery, charging, billing, patient handoffs Capacity Emergency department, operating room, radiology, lab Lead time Radiology, lab Downtime Equipment, rooms	Accuracy Invoice, yield, assay Capacity Line, product, vessel Lead time Delivery, production, replenishment Downtime Equipment, lines, vessel	Accuracy Invoice, yield Capacity Line, product Lead time Delivery, production, replenishment Downtime Equipment, lines	Accuracy Invoice, delivery, product Capacity Service area, call center, product Lead time Delivery, call hold time Downtime Equipment, servers, lines	Accuracy Invoice, bills of lading Capacity Hump yard, distribution center Lead time Delivery Downtime Locomotive Damage Locomotive, package, radio Inventory Product, packaging

(continues)

Table 1.1 Examples of poor versus good projects (Continued)

Industry	Healthcare	Chemical Manufacturing	Discrete Manufacturing	Service/ Administrative	Transportation and Logistics
Poor Projects	Satisfaction[6] Patient, staff, physician	Reduce healthcare costs			
Poor Projects	Communication[3] Sales and marketing Improve forecast accuracy[4] Cell phone consolidation Improve employee retention Implement XYZ system			Reduce office utility costs Improve quality of master data in SAP/Oracle/etc. File all paper documents electronically Electronic product catalog Reduce DSO from 75 days to 30[5]	

METHODOLOGIES

Six Sigma and Lean are both business improvement methodologies—more specifically, they are business process improvement methodologies. Their end goals are similar—better process performance—but they focus on different elements of a process. Unfortunately, both have been victims of bastardization (primarily out of ignorance of their merits) and often have been positioned as competitors when, in fact, they are wholly complementary.

For the purpose of this practical approach to process improvement

- **Six Sigma** is a systematic methodology to home in on the key factors that drive the performance of a process, set them at the best levels, and hold them there for all time.
- **Lean** is a systematic methodology to reduce the complexity and streamline a process by identifying and eliminating sources of waste in the process—waste that typically causes a lack of flow.

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[3] Although communication is a process, it is not a fundamental Value Stream in an organization. Instead, look to mending the primary Value Streams first, and then it might even be possible to eliminate the need for person-to-person communication entirely.

[4] It is best to tackle the responsiveness of the process before looking into forecasting (i.e., the more responsive my process, the less I have to worry about forecasting).

[5] Although this is a legitimate project, it is large and difficult for a Green or Black Belt to handle. It usually requires running as a Master Black Belt program of projects.

[6] Satisfaction is a useful metric, but it typically lags in the process and thus becomes difficult to deal with. Also, it is inherently affected by many noises in the process. Try to understand what in the process brings the satisfaction and perhaps target that in the project.

In simple terms, Lean looks at what we *shouldn't* be doing and aims to remove it; Six Sigma looks at what we *should* be doing and aims to get it right the first time and every time, for all time.

LEAN SIGMA ROADMAP

Lean Sigma is all about linkage of tools, not using tools individually. In fact, none of the tools are new—the strength of approach is in the sequence of tools. The ability to understand the theory of tools is important, but this book is about how to apply and sequence the tools.

There are many versions of the Six Sigma Roadmap, but not so many that fully incorporate Lean in a truly integrated Lean Sigma form. Figure 1.1 shows a robust version of a fully integrated approach put together over many years by the thought leaders at Sigma Breakthrough Technologies, Inc. (SBTI).[7] The roadmap follows the basic tried and tested DMAIC (Define, Measure, Analyze, Improve, and Control) approach from Six Sigma, but with Lean flow tools as well as Six Sigma statistical tools threaded seamlessly together throughout. As proven across a diverse range of SBTI clients, the roadmap is equally at home in service industries, manufacturing industries of all types, and healthcare, including sharp-end hospital processes, even though at first glance some tools may lean toward only one of these. For example, despite being considered most at home in manufacturing, the best Pull Systems I've seen were for controlling replenishment in office supplies. Similarly, Workstation Design applies equally to a triage nurse as it does to an assembly worker.

The roadmap is a long way removed from its Six Sigma predecessors and is structured into three layers:

- Major phases
- Minor phases
- Tools and deliverables (how and what)

This is done purposefully to ensure the problem-solving approach isn't just a list of tools in an order. It has meaning inherent to its structure. This is a *crucial* point to practitioners. Throughout this book, I'll explain not only *which* tool to use, but also *why* it is used, so that Belts move from blind tool use to truly thinking about what they are doing and focusing on the end goal of improving the process.

[7] Sigma Breakthrough Technologies, Inc. (SBTI) is a professional services firm specializing in Six Sigma and Lean deployments. For more information, see www.sbtionline.com.

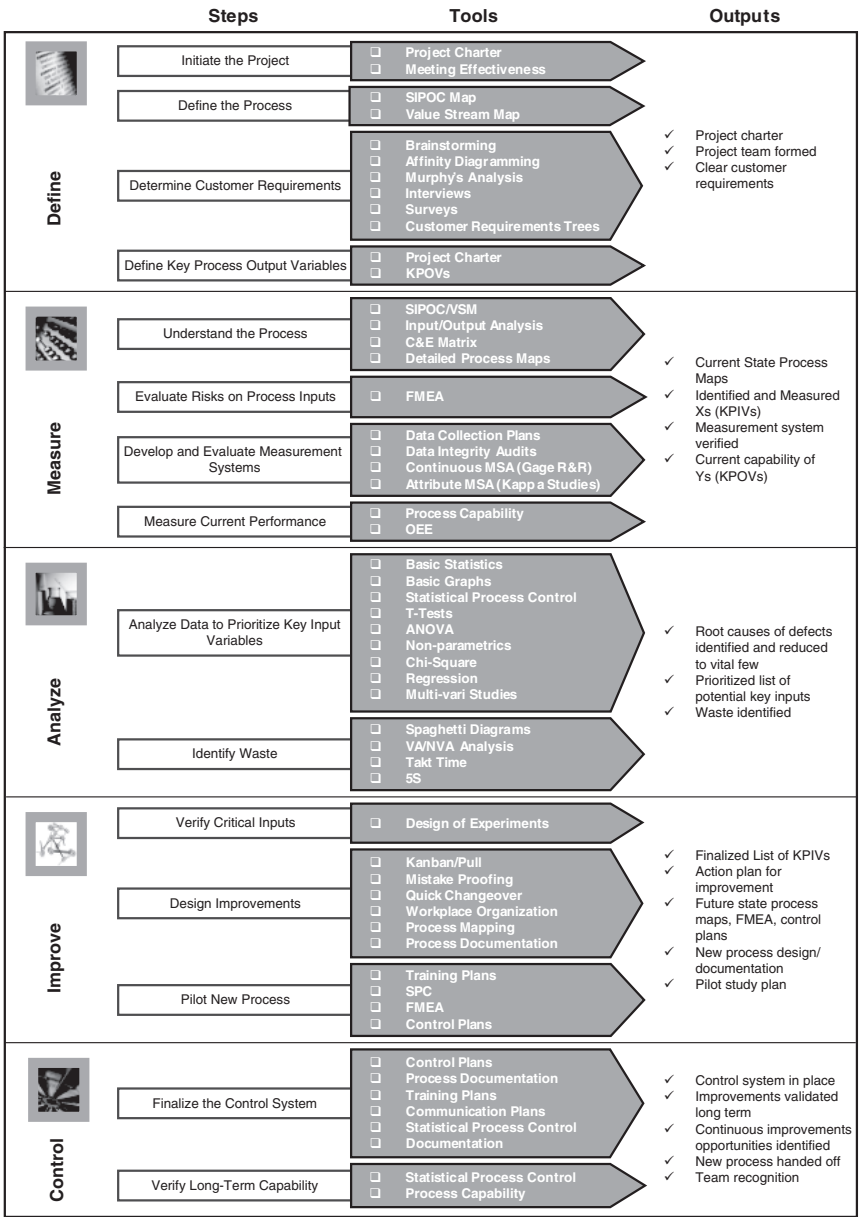

Figure 1.1 Integrated Lean Sigma Roadmap © SBTI, 2003.[8]

[8] Source: SBTI's Lean Sigma training material.

The best Belts I've found were the most practical thinkers, not the theorists. This is a practical roadmap, and the user should try and focus on the underlying principle of "I'll apply the minimum practical sequence of tools to understand enough about my process to robustly make dramatic improvement for once and for all in my process."

HOW TO USE THIS BOOK

The intent for this book is that it be used as a tool to help Project Leaders guide a project, and thus needs to be structured in a form that best helps the reader start with their problem in hand and quickly progress to the solution. I'm sure it is possible to read it from beginning to end; however, it is not designed with that purpose in mind. Its layout probably will be perceived as a little unorthodox, mainly due to a few simple issues:

- There are a multitude of different Problem Categories.
- Each Problem Category has a different route to a solution.
- The same tools are used in the solution of multiple Problem Categories.
- The application of each tool can vary subtly, depending on the problem. This book is structured into three main parts (shown graphically in Figure 1.2):

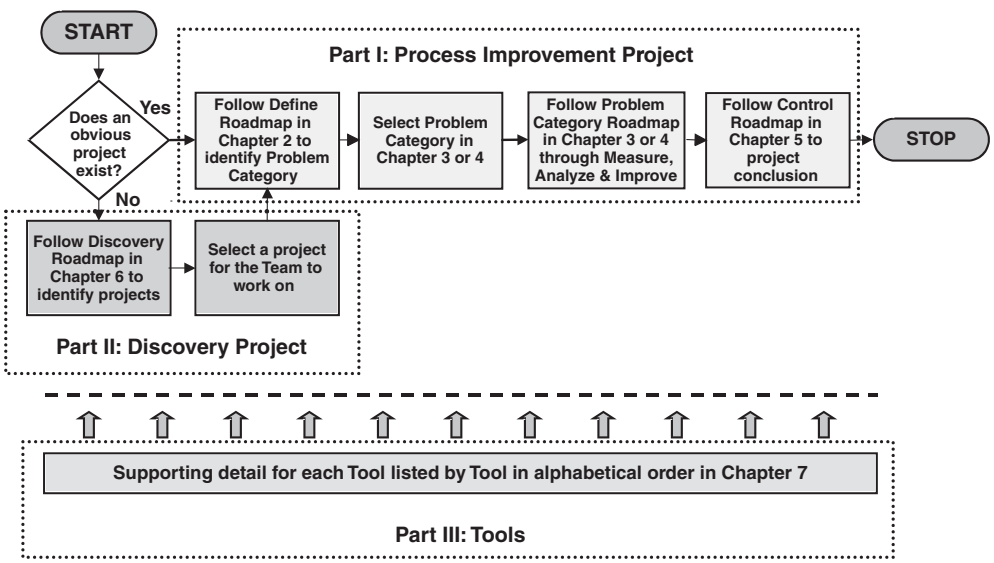

Figure 1.2 How to navigate through this book.

- **Part I (Chapters 2–5).** Project Roadmaps describe the route to a solution for a wide range of problems. The text lists which tools to use (listed in *italics* like this), in which order, why, and in essence forms the detail behind the roadmap shown in Figure 1.1. The Belt/Team should follow the roadmap in this section that best describes the process problem that they are encountering, based on key decision points listed in the text. For more detail on a tool listed, the Belt/Team should refer to the tool detail in Part III, where the tools are listed in alphabetical order.
- **Part II (Chapter 6).** A Discovery Roadmap is used to identify potential projects in a process where there are no obvious targets. This is often useful to businesses that are new to Lean Sigma and are not sure how to identify good projects to work on. The text lists which tools to use (listed in *italics* like this), in which order, and why. For more detail on a tool listed, the Belt/Team should refer to the tool detail in Part III, where the tools are listed in alphabetical order. After the project or multiple projects have been identified in the process using the Discovery Roadmap, one will be selected and the Team will follow the Project Roadmaps described in Part I.
- **Part III (Chapter 7).** Individual tools roadmaps explain in detail how to use each tool.

Thus, in summary:

- If no project is obvious for the process, the Team will follow the Discovery Roadmap in Chapter 6 to its conclusion to identify projects.
- If a project is clear, the Team will follow the Project Roadmap(s) commencing in Chapter 2 to their conclusion to complete the project.
- In both Roadmaps, the text will refer to a sequence of tools and the rationale for the sequence. Details on each tool listed are available in alphabetical order in Chapter 7.

The Project Roadmap in Part II follows this path:

1. A standard set of *Define* tools is applied in sequence at the beginning of any project.
2. At this point, the Belt/Team should have enough understanding of the process problem to select the type of problem that is apparent. The text lists some 25 or so Problem Categories with titles such as "The capacity of the process is too low." Generally speaking, this is at an overall-process level (considering the process as a whole), in which case the categories are listed in Chapter 3. However, there are rare projects in which a significant amount of work has already been done on the process. In this case, the Problem Category might be at a within-process level where a single process step has been identified as being the problem area, in which case the categories are listed in Chapter 4.

3. The Belt/Team selects the Problem Category in Chapter 3 or 4 and follows the *Measure*, *Analyze*, and *Improve* tools roadmaps specific to it.
4. A standard set of *Control* tools is applied in sequence to the end of any project.

Thus, for any project, the user applies the following:

- *Define* tools, standard across all projects
- *Measure*, *Analyze*, and *Improve* tools, pertinent to the specific Problem Category
- *Control* tools, standard across all projects

And, for each tool along the way, practical application detail is available in Chapter 7.

PROBLEM CATEGORIES

To use this book effectively, it will be necessary to identify the Problem Category based on the process issue(s) at hand. This might seem awkward to novice Belts, but it is an important skill to develop. Belts need to be able to step back from the process and see the bigger picture before diving into the detail. Quite often, the inexperienced Champion and Process Owner can be a hindrance at this point by pushing the Belt down a road to solution before truly understanding the underlying problem. The purpose of the Define tools is to provide an understanding of what, from the customer's perspective, the problem truly is and frame it in a measurable form. *Only after the Define tools have been applied can the Belt confidently say which Problem Category he is dealing with.*

AND FINALLY...

Processes and their respective problems are real-world phenomena, requiring practical actions and change. Any tool, even based on the cleverest theory, is only as good as the practical business solution it provides. To reiterate, this is about practical achievement versus theory; thus, at any point in the project, it is important to be able to answer

- What is the question?
- What tool could help answer the question?
- How do I get the necessary data for the tool?
- Based on the data, what is the tool telling me?
- What are the practical implications? (The big "So what?!!" as is it often called)
- What is the next question that arises based on where we've been?

The best Belts maintain this holistic viewpoint; the best Champions and Mentors keep pushing the Belts for the holistic view.

It is probably worthwhile to point out that no project is easy, but hopefully this guide will bring a little clarity and confidence to those who have to navigate through it.

The only thing left to say at this point is "Good Luck!" Even the best Belt needs some of that, too.