Six Sigma – Part 5: Looking at the Six Sigma Technology Tool Landscape

An Online Continuing Education Course for Engineers

Course Number: P-2027

Credit: 2 Hours / 2 PDH / 2 CPD

Module 1

Eyeing Process Characterization and Optimization Technologies

In This Module

- Understanding the platforms and protocols of technology tools
- Recognizing the capabilities and limitations of manual tools and techniques
- Examining various levels of computerized Six Sigma technology

The fundamental tenets and tools of Six Sigma are naturally independent of how you apply them. They are conceived in the abstract world of mathematics and logic. Consider a histogram, a cause-and-effect matrix, or a run chart — even now, as you read this, you can see these in your mind's eye. Picture a curve, for example, representing the distribution of how long it takes travelers to drive from Salt Lake City to Phoenix — a normal distribution, of course. Is the curve you picture drawn by hand? Is it on the back of a napkin or a nice piece of graph paper, or do you picture seeing it on a computer screen or high-definition TV monitor? Chances are the answer is none of the above. You just "see" it. That's because the concept and values of that distribution exist independent of how they're captured, analyzed, and viewed.

Imagine that you're in Salt Lake City and you're thinking of driving to Phoenix, so you call a few friends who've recently made the trip and ask them how long it took. You might jot down their times on a piece of scrap paper, quickly look at the range, and estimate the mean in your head. You're done; that's all it took. You wouldn't have entered them into a spreadsheet and calculated the precise mean and standard deviation. You would have naturally corrected for the fact that Verna and Jerome like to shop at all the Navajo art shops, while James has a new Porsche. But that's about it.

Now imagine you've been asked to provide estimates to travel agencies, trucking firms, and a nostalgic Route-66 car club. The scrap-paper approach doesn't seem so appropriate now: Not only do you need to collect more data; you need to analyze it for road types and weather and traffic conditions. Meanwhile, the trucking firms follow different processes and routes and have very different goals and targets than the car clubs. At this point, you're more

likely envisioning Google Maps, Yelp for restaurants, Trip Advisor for motels, perhaps some computerized selection criteria, and a variety of tables and curves showing means and ranges — all available through the Internet.

In both cases, you've conceptually used the same methods, but the required depth of precision and range of applications is vastly different, so the tools are as well. The capabilities you bring to bear on the definition, measurement, analysis, and planning for variation and control reach from paper and pencil to space-age computing power.

In this module, you read about the different technologies you can use to characterize and optimize processes. You see how to analyze them in Module 2 and manage them in Module 3.

Understanding the Platforms and Protocols

From the no-tech world of pencil-and-paper process maps to the high-tech universe of real-time run-charts served onto tablet displays from manufacturing plants in faraway continents, you now have a wide range of technology platforms and protocols at your disposal.

Paper and pencil

Sometimes, nothing is quite as fast and easy as just grabbing a pencil or pen and a piece of paper and drawing a quick picture or entering info on a printed form. It's a great way to get images and ideas out of your head or to capture information from an event or occurrence. It's fast, cheap, and requires little training and minimal equipment.

Nearly everyone has drawn boxes and lines on a piece of paper or whiteboard to represent organization charts, information flow, or process steps. And anyone that's visited a doctor or dentist has filled out paper forms. Admittedly, the drawings are usually pretty crude and the handwriting barely legible, but it's fast — fast enough for you to keep moving and for ideas and information to flow. That's the best part about it — and it's often the drawback of computer-aided tools, which can be slow and cumbersome enough that you spend more time in the mechanics of creation or capture instead of the creation or capture process. Plus, there's the cost of the equipment.

In this high-technology, fast-moving world, don't fully discount the value and applicability of what you may call the low-tech tools. The simplicity and ease of use have a time and place. But don't kid yourself, either; today's world has

little tolerance for isolated, random, nonstandardized information that can't be easily moved, shared, and leveraged. Manual tools have applicability, but that applicability is limited.

Looking at desktops and laptops

We're guessing you probably have a desktop or laptop computer. These devices all share a common architecture: Data and programs are stored locally on disk drives; the computer's processor runs applications; keyboards enable you to enter data and control programs; and graphical displays provide visuals. Most of the application programs utilized in Six Sigma throughout the DMAIC cycle — including those for process design, characterization, analysis, and control, as well as project management software and all manner of other utilities — were designed for this architecture.

Most Six Sigma desktop/laptop software programs run only on the PC-Windows platform and aren't compatible with the Apple OSX operating system. Check with the software vendor before you buy to be sure the program you want runs on your computer.

Everyone became comfortable having their data and programs on their computers, but the desktop/notebook approach naturally limits the sharing of information and collaboration. You can e-mail files and access data from servers, but that's a far cry from collaboration. Although the evolution is underway as we write this — programs and data are moving to the Cloud — in the meantime, the overwhelming majority of computer tools used in the definition, measurement, analysis, improvement, and control of processes over the vast history of Six Sigma projects have been performed on desktop and laptop computers.

Upgrading to smartphones and tablets

With the advent of cloud computing and high-bandwidth access to the Internet, lugging the data and processing power of traditional computers around with you is no longer necessary. All you need is access and the entry and display capability, and you can utilize integrated systems and information in the Cloud to accomplish your tasks. So increasingly, smartphones and tablets are effective tools for the Six Sigma practitioner.

Expanding to enterprise-class options

The world's a big place; it's way too big to fit on your PC. Yes, you can perform local projects and crunch the data on your laptop. But after you step beyond

your immediate project, workgroup, or operating environment, you need more. To address projects of broader scope and scale, larger challenges, and extended value streams, you need *enterprise-class* technology — technology meant for collaboration among geographically distributed teams; the orchestration of processes that span organizations; information living in corporate databases; and the flow of goods and information across extended supply chains.

Moreover, enterprise-class systems are more independent of the user's platform — that is, they run from centralized environments and let you utilize whatever device you have, whether it's a PC, Mac, or something else. Increasingly, centralized systems such as ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), or BPM (Business Process Management) can be hosted outside of corporate datacenters, in the Cloud, or delivered through a model known as *software as a service,* or SaaS.

Knowing When Going Manual Makes Sense (And Doesn't)

Most people use computers to do their work, and Six Sigma is naturally computational and collaborative, so manual tools have limited use. But with all the computer programs available — and the need for accuracy, sharing, and control — some situations support using a pen or marker, for a couple of reasons:

- **It's fast and free-form.** Whether you're describing what you understand a current process looks like or designing a new process, it's a quick way to put your ideas out there — especially if you don't have more sophisticated tools handy.
- **It's inexpensive.** You don't need a computer, software, or training — or even electricity — to draw a process map with a pencil and paper. With a ruler, template, and graph paper, you can draw pictures of processes.

You can make fast progress utilizing selected tools in manual mode. Mostly, these apply in the early-stage or more qualitative situations.

- **Affinity diagrams:** *Affinity diagrams* are the output of group collaboration and brainstorming sessions (see Part II). These sessions are often best conducted in off-site casual settings, and the tool of choice is the sticky note: It's fast and portable. You need to copy and organize the info into a spreadsheet or table later, but these manual diagrams are a natural way to start.
- **Fishbone (Ishikawa) diagrams and CT (critical-to) trees:** Save time by brainstorming causal factors by hand *before* you start making pretty charts in a drawing tool. Head to Part II for details on fishbone diagrams.

- **Data entry:** Some circumstances, such as spontaneous conditions and environments, favor manual data capture. For example, quick updates on a shop floor or in a meeting may best be initially captured on a whiteboard. (But we still can't figure out why medical offices make people fill out paper forms.)
- **Instructions**: Many environments are well-suited to handwritten instructions for controlling behavi[or] and keeping processes in control. Shop-floor instruction boards [often] handwritt[en] [in]structions to race-car drivers are on [the]

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- **[Pro]grams:** As we note in Part II, the language and controls of process mapping are complex and specific. A protocol called the Business Process Modeling Notation (see `www.bpmn.org`) governs the many aspects of process mapping. And this module covers so many of the process drawing and process mapping computer tools available that you really have no excuse to be drawing processes by hand anyway.

Every Six Sigma tool is supported by multiple software products (see the following sections). You're not forced to do any of it by hand.