

White Paper

Lean Six Sigma in the public sector:

Applying proven methodologies to improve quality, remove waste, and uncover hidden opportunities in state and local government.

Kent Snyder
Principal
Xerox Global Services, Inc.

Newton Peters
Principal
Xerox Global Services, Inc.

September, 2004

Table of Contents

- 2 Introduction
- 3 Lean Flow eliminates waste
- 4 Six Sigma is driven by quality
- 5 Lean Six Sigma achieves quality without waste

Introduction

With the public's demand for greater service at lower costs, no organization has the luxury of being wasteful. State and local governments are no exception. Governments are asked to provide on-demand access to public records, the ability to retrieve and complete forms online, and an infrastructure that enables electronic payments—all with the same (or fewer) resources than they had in the past. Officials must also pay a great deal of attention to how they operate because their budgets are public record and frequently scrutinized by taxpayers and the press.

One of the greatest opportunities for reaching these objectives is realized through a *structured* approach to process improvement. It is with this in mind that many local and state governments implement *structured document management and information management solutions* to gain efficiencies, improve the ways in which they handle information, and eliminate many time, cost, and labor intensive, paper-based processes.

Improvement, though, requires change—and with any change, comes risk. Many government agencies therefore look to minimize risk by managing change through processes that are time-tested and have been proven to repeatedly yield desired results. This white paper explores two such processes: Lean Flow and Six Sigma.

The following pages are intended to:

- Provide the histories and theories behind Lean Flow and Six Sigma methodologies.
- Explain the synergy attained by integrating Lean Flow and Six Sigma into a single approach.
- Demonstrate how *Lean Six Sigma* can be utilized to improve the ways state and local governments manage documents—and the information they contain.

Lean Flow eliminates waste

The history of Lean Flow

The Lean Flow process, also called Lean Manufacturing, Continuous Flow, and more recently, Just-In-Time Manufacturing, was innovated by Henry Ford just after the turn of the century. He likened his concept of the assembly line to a river that flows continuously. Anything that disrupts the flow is waste that must be eliminated. Utilizing this methodology, Ford Motor Company could start and finish a Model T in just over 30 hours.

In the late 1940s, Toyota Motor Corporation based its production system on the Lean Flow process. Of course, Toyota built on Ford's concepts, which were methodical and streamlined, but highly inflexible. Lean Flow, as employed by Toyota, linked its production system with real-time customer demands and material replenishment requirements—so only the exact quantity of products and materials needed were produced at any specific point in time. This is similar to the Just-In-Time manufacturing paradigm that changes the traditional “supply-and-demand” model to a more efficient, responsive “demand-then-supply” model.

Toyota management recognized that to be effective, Lean Flow must be *inwardly focused* on eliminating waste (reducing inventory, costs, etc.), but *outwardly focused* on meeting customer demand (i.e. providing the car in the desired color, with the desired options, etc.). Flexibility became a large part of how this change was accomplished. Toyota was perhaps the first company to publicly note: “*The ability to eliminate waste is developed by giving up the belief that there is no other way to perform a given task. It is useless to say, ‘It has to be done that way,’ or ‘This can’t be helped.’ At Toyota, we have found that there is always another way.*”

Lean Flow today

While Lean Flow began as a manufacturing model, today's definition has been extended to include the process of creating an “optimized flow” anywhere in an organization. The only requirement is that this “flow” challenge current business practices to create a faster, cheaper, less variable and error prone process.

Lean Flow experts have found that the greatest success can be achieved by methodically seeking out inefficiencies and replacing them with “leaner”, more streamlined processes. Sources of waste commonly plaguing most business processes include:

- Waste of worker movement (unneeded steps)
- Waste of making defective products
- Waste of overproduction
- Waste in transportation
- Waste of processing
- Waste of time (idle)
- Waste of stock on hand

Putting Lean Flow to work

Implementing a Lean Flow requires having the right data and knowing how to use it. There are a number of different approaches taken by organizations, but fundamentally, Lean Flow is achieved by:

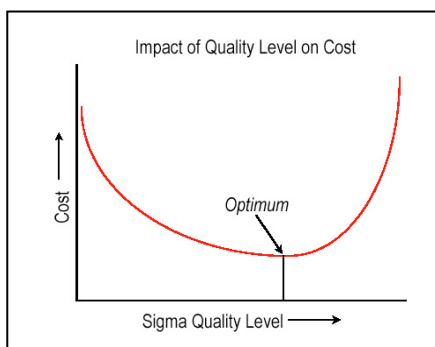
- Analyzing the steps of a process and determining which steps add value and which do not.
- Calculating the costs associated with removing non-value-added steps and comparing those costs versus expected benefits.
- Determining the resources required to support value added steps while eliminating non-value-added steps.
- Taking action.

(These implementation steps, which tie into a process called Value Stream Mapping, will be explained in greater detail later in this paper.)

Six Sigma is driven by quality

The history of Six Sigma

In the 1980s, engineers at Motorola Corporation discovered the mathematically derived point where the cost of eliminating a defect is greater than the cost of living with (and repairing) the defect. That is, there is an acceptable point of imperfection—and any quality improvement made beyond that point is more expensive than the expected cost savings of fixing the imperfection.



There have been a number of people in history who have contributed to today's definition of Six Sigma.

- *In the first half of the 1800s, Carl Frederick Gauss introduced the concept of a normal curve.*
- *In the 1920s, Walter Shewhart proved that three sigma from the mean is the point where a process requires correction.*
- *In the mid-1980s, Bill Smith, a Motorola engineer, explained that Six Sigma (which represents 3.4 defects per million) is the optimum level to balance quality and cost.*

Bill Smith, one of Motorola's engineers, explained the acceptable level of imperfection for Motorola was *Six Sigma*, which equates to 3.4 defects per million units. This discovery forced Motorola to assess quality levels by measuring defects in millions rather than thousands, which had been the traditional method. This change enabled a vast improvement in the ability to assess—and improve—quality levels. Six Sigma enabled Motorola to cost-efficiently

perform defect-free more than 90% of the time, resulting in a savings of \$16 billion to date.

Six Sigma today

While the concept of Six Sigma began in the manufacturing arena decades ago, the idea that organizations can improve quality levels and work “defect-free” is currently being incorporated by state and local governments of all types and sizes. So what is today's definition of Six Sigma? It depends on whom you ask. In his book *Six Sigma: SPC and TQM in Manufacturing and Services*, Geoff Tennant explains that “Six Sigma is many things... a vision; a philosophy; a symbol; a metric; a goal; a methodology.”

Naturally, as Six Sigma permeates into today's complex, sophisticated government landscape, the methodology is “tweaked” to satisfy unique needs of individual government bodies. But no matter how it is deployed, there is an overall framework that drives Six Sigma toward improving government performance. Common Six Sigma traits include:

- A process of improving quality by gathering data, understanding and controlling variation, and improving predictability of a government agency's business processes.
- A formalized Define, Measure, Analyze, Improve, Control (DMAIC) process that is the blueprint for Six Sigma improvements. (The DMAIC process will be described in greater detail later in this paper.)
- A strong emphasis on value. Six Sigma projects focus on high return areas where the greatest benefits can be gained.
- Internal cultural change, beginning with support from administrators and champions.

Putting Six Sigma to work

By incorporating Six Sigma processes, hundreds of organizations, including Xerox Corporation, Sony Corporation, and General Electric have

been able to gain significant results. In fact, GE annual reports state that Six Sigma delivered \$300 million to its bottom line in 1997, \$750 million in 1998, and \$2 billion in 1999—and those are just hard dollar savings. The George Group, an independent organization nationally recognized for expertise in Lean Six Sigma, learned that Six Sigma also generated tangible improvement in other areas at GE, including:

- 10-fold increase in life of CT scanner X-ray tubes.
- Improved yields of super-abrasives—worth a full decade of increased capacity despite growing demands.
- 62% reduction in turnaround time of railcar leasing repairs.
- Plastics business added 300 million pounds of new capacity—equivalent to one free plant.

After successes like the one at GE, it is no surprise that many companies currently look to Six Sigma Black Belts and Green Belts—individuals who have undergone extensive training to become experts in the Six Sigma process—to help improve quality and obtain results.

Lean Six Sigma achieves quality without waste

Operating by itself, Lean Flow focuses on using the minimum amount of resources (people, materials, and capital) to produce solutions and deliver them on time to customers. The process, however, does not have the discipline to deliver results predictably. That is, in some cases, Lean Flow implementation involves a non-formalized investigation into an organization's workflow followed by immediate re-arrangement of processes. While this approach produces change quickly, it can not be relied upon to consistently yield desired results. On the other end of the spectrum, Lean Flow implementation can involve extremely thorough data collection and analysis that take years before any change occurs. This

approach often yields desired results, but takes too long to get there.

Meanwhile, Six Sigma, operating independently, aims to improve quality by enhancing knowledge generating processes. In many cases, this leads to slow, deliberate, change-intolerant practices.

To combat these challenges, organizations have found that by “nesting” the Lean Flow methodology within the Six Sigma methodology, a synergy is attained that provides results much greater than if each of the approaches was implemented individually.

When Lean is added to Six Sigma, slow processes are challenged and replaced with more streamlined workflows. Additionally, the data gathered during Lean Flow implementation helps identify the highest impact Six Sigma opportunities. When Six Sigma is added to Lean, a much-needed structure is provided that makes it easier to consistently and predictably achieve optimum flow. The two methodologies work so well together, that a new, integrated, *Lean Six Sigma* approach, with its own unique characteristics, has been defined and incorporated by several leading organizations, including Xerox Corporation.

Lean Six Sigma is the application of lean techniques to increase speed and reduce waste, while employing Six Sigma processes to improve quality and focus on the Voice of the Customer. Lean Six Sigma means doing things right the first time, only doing the things that generate value, and doing it all quickly and efficiently.

Lean Six Sigma outside of the manufacturing environment

Lean Six Sigma is not limited to the manufacturing arena. In fact, virtually any process can incorporate the methodology because the ideals of quality and waste reduction apply everywhere. To prove the point, Xerox Global Services currently employs

Lean Six Sigma in the document world, helping customers obtain vast improvements in the ways they produce, store, and distribute documents. Document-related Lean Six Sigma, like in the manufacturing arena, follows a work process that can benefit from quality and waste reduction. Also like manufacturing processes, document processes consume resources and require management of changes and additions. And finally, document process improvements can provide the same types of quantifiable benefits as manufacturing process improvements:

- Greater efficiencies
- Faster response
- Enhanced customer service
- Reduced costs
- Increased quality

Lean Six Sigma applied to document management services in state and local governments

One key area where state and local governments seek to improve efficiency is by implementing digital imaging and repository solutions to simplify and streamline document-intensive business processes. Imaging and repository solutions include scanning, organizing, and storing back-files and incoming documents so they are readily available and instantly accessible to the people who need them most. Agencies often look to experts in the industry to help them implement change, affording them the ability to concentrate on their core mission— serving the public.

For more than 17 years, Xerox has been incorporating a Lean Six Sigma methodology to help improve the ways in which information flows in, through, and out of state and local governmental agencies. Specifically, Xerox Global Services imaging and repository services leverage the Lean Six Sigma-based DMAIC approach.

Define

The Define phase of the DMAIC process is often skipped or short-changed, but is vital to the overall success of any Lean Six Sigma project. This is the phase where the current state, problem statement, and desired future state are determined and documented via the Project Charter. Xerox asks questions like: *What problem are we trying to solve? What are the expected results if we solve the problem? How will we know if the problem is solved? How will success be measured?* In most cases where imaging and repository services are involved, the problem relates to document management and access. State and local governments look to improve the ways documents are created, stored, accessed, and shared so they may accelerate and enhance work processes, share information more conveniently, and collaborate more effectively. As the project progresses and more information is collected in future phases, the problem statement developed in the Define phase is refined.

Examples of common document-related problem statements developed in the Define phase include:

- It is difficult for government workers to access or share information that resides only on paper.
- Paper documents are easily misfiled or misplaced.
- Paper-based work processes are slow, expensive, and cumbersome.
- Compliance with the Freedom of Information Act is difficult.
- Providing additional revenue opportunities for electronic access to key documents, such as land records, accident reports, and court notes is challenging.
- To share paper-based information, workers must make a copy and manually mail, overnight, and/or fax the document.
- Constituent access to public records is frustrating for both taxpayers and government workers.
- Paper documents are expensive to store.

Examples of how Xerox might quantify the benefits of implementing imaging and repository services include:

- Cost reduction of storing information online or digitally instead of on paper.
- Savings gained by eliminating long-distance fax charges and postal/courier expenses.
- Improvements in user productivity and satisfaction by “digitizing” document search and retrieval methods.
- Time savings of repurposing—rather than recreating—existing documents.
- Intangible benefit of improved ability to share knowledge and collaborate “virtually”.
- Enabling taxpayers to access public records and government employees to securely access confidential information via the Web— instantly, conveniently, and without taking up time from the clerk’s office.

Improve

The Improve phase is when recommended solutions are implemented. A project plan is developed and put into action, beginning with a pilot program and culminating in full-scale, enterprise-wide deployment. Where appropriate, new technology is implemented, workflows are streamlined, paper-based processes are eliminated, and consulting services are initiated. Key factors of success during this phase are acceptance by end users and enterprise-wide change without any degradation of current productivity levels.

Common imaging and repository solutions implemented in the Improve phase include scanning services, Web-based document access, and workflow solutions for task tracking and automation. When implementing these services, Xerox always looks first to leverage existing technology. If new technology is required, Xerox will ensure new solutions work within existing customer infrastructures so implementation is seamless with minimal disruption to current workflows.

Control

Once a solution is implemented, the next step is to place the necessary “controls” to assure improvements are maintained long-term. This involves monitoring—and in many cases, publicizing—the key process metrics to promote continuous improvement and to guard against regression. In many cases, Xerox will revisit the implementation after 3-6 months to review key metrics and evaluate if the initial progress has been sustained. A common practice is to put key metrics, including hard cost savings and achievement of pre-defined Service Level Agreements, in full view “on the dashboard” to provide continuous feedback to the organization and so decision-makers can assess the project’s level of success as it moves forward.

The Control phase is where Xerox and/or local government representatives ensure the imaging and repository solution consistently delivers:

- Satisfied constituents because of convenient, self-serve public records access and open lines of communication with government officials.
- Productive government agency workers due to faster access to mission-critical information and simpler collaboration with fewer paper-based, labor-intensive tasks and redundant effort.
- Secure solutions that ensure only authorized personnel have access to confidential information.
- Reduced costs—a primary objective in the public sector.
- Solutions that, even in the event of a disaster, ensure business continuity—because the government can never shut down.

Xerox Global Services helps companies streamline and digitize their document-intensive business processes—everyday processes like customer communications, billing, training, or records management. Our people work closely with clients to identify, quantify, and realize hidden opportunities to save money, find new sources of value, and simplify how work gets done.

For more information on how Xerox Global Services can help implement solutions that accelerate and improve document-related processes in government environments, call 800-ASK-XEROX ext. XGS or visit www.xerox.com/contactglobalservices.

Author: Kent Snyder

As a Lean Six Sigma Black Belt, Kent Snyder is responsible for deploying the LSS Methodology and managing Black Belt projects that drive Economic Profit. He has over seventeen years experience in the field of process improvement and has consulted with many clients to make improvements and add innovation to their vital business processes. He has extensive skill in the areas process improvement, document management, process modeling & simulation, and supply chain management.

317-506-6530

Kent.Snyder@xerox.com

Author: Newton Peters

Newton Peters is a national- and world-recognized court technology speaker, writer, and educator. Before his current position as a Principal with Xerox Global Services, Inc., Newton developed the strategic plan and model for a state-wide shared data environment for the Florida Supreme Court; taught courses and acted as Director of IT for Tennessee Temple University; served on the ASP Technical Advisory Board within the State of Mississippi and as an Editorial Advisor for IBM's System Management magazine; and consulted with Anderson Consulting and JusticeLink to aide in the development of an Electronic filing System for submitting documents into the Judicial system. .

Cell: 850-305-1740

Phone: 334-858-2479

Newton.Peters@xerox.com

