PROVIDING CUTTING-EDGE KNOWLEDGE TO GOVERNMENT LEADERS

Improving Service Delivery in Government with Lean Six Sigma

John Maleyeff
Professor
Lally School of Management & Technology
Rensselaer Polytechnic Institute
Hartford Campus

Strategy and Transformation Series

IBM Center for The Business of Government

2007

STRATEGY AND TRANSFORMATION SERIES

Improving Service Delivery in Government with Lean Six Sigma

John Maleyeff
Professor
Lally School of Management & Technology
Rensselaer Polytechnic Institute
Hartford Campus

IBM Center for
The Business of Government

TABLE OF CONTENTS

FOREWORD

On behalf of the IBM Center for The Business of Government, we are pleased to present this report, "Improving Service Delivery in Government with Lean Six Sigma," by John Maleyeff.

Albert Morales

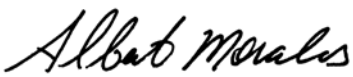
Since the passage of the Government Performance and Results Act of 1993, there has been increased interest in the federal government on improving service delivery and delivering results. The 2007 Program Assessment Rating Tool scores for 977 agencies indicate that a key improvement area in the federal government is the execution and delivery of results. Dr. Maleyeff's report is a comprehensive review of how public sector managers can use Lean Six Sigma to improve the execution and delivery of results.

The hallmark of an effective report on a complex topic is that it is written in layman's terms for practitioners at all levels, particularly those interested in learning more about Lean Six Sigma. Dr. Maleyeff's report sets forth specific actions that public sector managers can take in starting and implementing Lean Six Sigma projects, and provides the reader with a description of the Lean Six Sigma deployment process from program development to project implementation.

Monica Painter

The report highlights the need to translate the Lean Six Sigma methods from applications in manufacturing to the service-oriented environment of the public sector. Specifically, Lean Six Sigma needs to take into account the cross-functional flow of process and information, increased task variability, numerous handoffs, hidden benefits and costs, and the different terminologies that are characteristic of the service environment. The report cites several examples of successful implementation and application of Lean Six Sigma projects in the public sector. It also enumerates key success factors and potential pitfalls. In our research and past experience, we have found that the number one success criterion in deploying Lean Six Sigma is the adamant commitment of senior leadership.

As we head further into the 21st century, we hope that process improvement trends in government transformation, supported by the innovative application of Lean Six Sigma as described in this report, will lead to more efficient and effective use of citizen tax dollars by public sector managers in providing services that meet or exceed the needs of the public.



Albert Morales
Managing Partner
IBM Center for The Business of Government
albert.morales@us.ibm.com

Monica Painter
Associate Partner
IBM Global Business Services
monica.painter@us.ibm.com

EXECUTIVE SUMMARY

Lean Six Sigma provides a means to improve the delivery of services using a disciplined, project-based approach. It brings numerous advantages if implemented properly, but it also risks being regarded as another management fad. In this report, guidelines are recommended for the application of Lean Six Sigma in government. They are targeted to administrators responsible for a wide range of public-sector services, including those provided to citizens and those provided to internal customers.

As methodologies, both Six Sigma and Lean have evolved from collections of techniques to comprehensive management systems. Both strive to enhance customer service leading to sustained organizational success and both require a supporting organizational culture. Their approaches differ somewhat, leading some to question their compatibility. But by understanding their fundamental principles, the combined Lean Six Sigma can be a powerful means to enhance customer satisfaction while managing costs.

Managers of a service organization attempting to apply Lean Six Sigma often find their task complicated by two mitigating circumstances. First, much of Lean Six Sigma terminology and many of its techniques were originally intended for manufacturing, and applying them to services has been challenging. Second, services by their nature possess special characteristics, for example, the importance of information and the abundance of cross-functional process flows. However, an increasing number of service organizations have applied Lean Six Sigma to their organizations, including public sector organizations.

Many of the potential barriers could exist in any service organization (public or private) but appear to exist in greater frequency in government, including inconsistent leadership motivation, union rules and regulations, job security concerns, and a prevalence of undocumented processes. Other characteristics unique to the public sector pose an additional challenge, including skepticism about government, legislative controls, competing special interests, the election cycle, and term limits.

Definition of Lean Six Sigma

Lean Six Sigma encompasses many common features of Lean and Six Sigma, such as an emphasis on customer satisfaction, a culture of continuous improvement, the search for root causes, and comprehensive employee involvement. In each case, a high degree of training and education takes place, from upper management to the shop floor.

Some governmental entities have managed to sustain a comprehensive improvement program over many years. These organizations possess some commonality, including: (1) they initiated and continue to preach a constancy of purpose based on a consistent underlying methodology; (2) their key leadership positions have been in place for lengthy periods of time; (3) they guarantee that employees will not lose their jobs as a consequence of an improvement project; and (4) they measured their time to success in years rather than weeks or months.

In this report, examples of successful process improvement programs are highlighted at the local, state, and federal levels. A number of improvement projects illustrating the range of Lean Six Sigma's influence are also described. The Lean Six Sigma guidelines are presented as two sets

of recommendations. At the program level, recommendations for creating a supporting infrastructure and organizational culture are presented along with a number of specific action items. At the individual project level, guidelines for structuring a Lean Six Sigma project are detailed.

The creation of an infrastructure that supports the Lean Six Sigma program requires that attention be given to four goals: (1) deploy a sound, consistent, and robust methodology; (2) build trust by removing fear; (3) initiate long-term cultural change; and (4) communicate the vision to all stakeholders. Active commitment of leadership is a must, in both words and action.

To further set the stage for a Lean Six Sigma program, it is recommended that:

- A centralized focal point be created who is dedicated to firmly establishing the program within the organization
- Departmental involvement be sought to create a working relationship and enhance credibility
- Training be focused on a simple toolbox containing basic Lean Six Sigma skills
- Skilled facilitators, who are critical to project success, be obtained externally and/or developed internally

Within a Lean Six Sigma program, specific projects will be initiated. It is recommended that each Lean Six Sigma improvement project consist of three distinct stages. During the project initiation stage, the guidelines recommend focusing on a structured mechanism for project selection and project team creation. A disciplined project management structure is recommended for the project execution stage that ensures focus on root causes of problems rather than their symptoms. The project communication stage involves delivering project information early and often, using mechanisms that are accessible to as many employees as possible.

Understanding Lean Six Sigma

In their quest to grow and prosper, many businesses have combined two popular management approaches—Lean and Six Sigma—with the intention of building a more robust version of each. The result is typically referred to as Lean Six Sigma. In this report, the application of Lean Six Sigma in government is explored and guidelines for its implementation are recommended. These guidelines will consist of a disciplined, project-based approach that ensures effectiveness of improvement efforts. They will be useful to administrators responsible for a wide range of public-sector organizations that range in size from federal to local, and in function from revenue management to homeland security.

Instituting a formal process improvement program can provide great benefits. It can serve to consistently reinforce the notion that administrators have two important jobs—managing and improving. With Lean Six Sigma, improvement projects follow a prescribed mandate and structure, guaranteeing that important problems are attacked using a sound and consistent methodology. It can avoid pitfalls common to efforts that address symptoms, rather than causes, of problems and enforce the use of data in decision making.

The consistency of approach provided by Lean Six Sigma enhances the effectiveness of project teams and allows for the sharing of project results across the organization. Disciplined follow-up ensures that project team recommendations are implemented and tracked. But sustaining Lean Six Sigma requires a culture that actively supports process improvement in both words and actions. And the active commitment of leadership is a must.

What Is Lean Six Sigma?

Both Lean and Six Sigma have come to be considered management approaches rather than a collection of techniques. Some practitioners consider Lean and Six Sigma to be mutually exclusive while others see more similarities than differences. Either way, it is useful for practitioners to understand the origins of each approach and their philosophical roots.

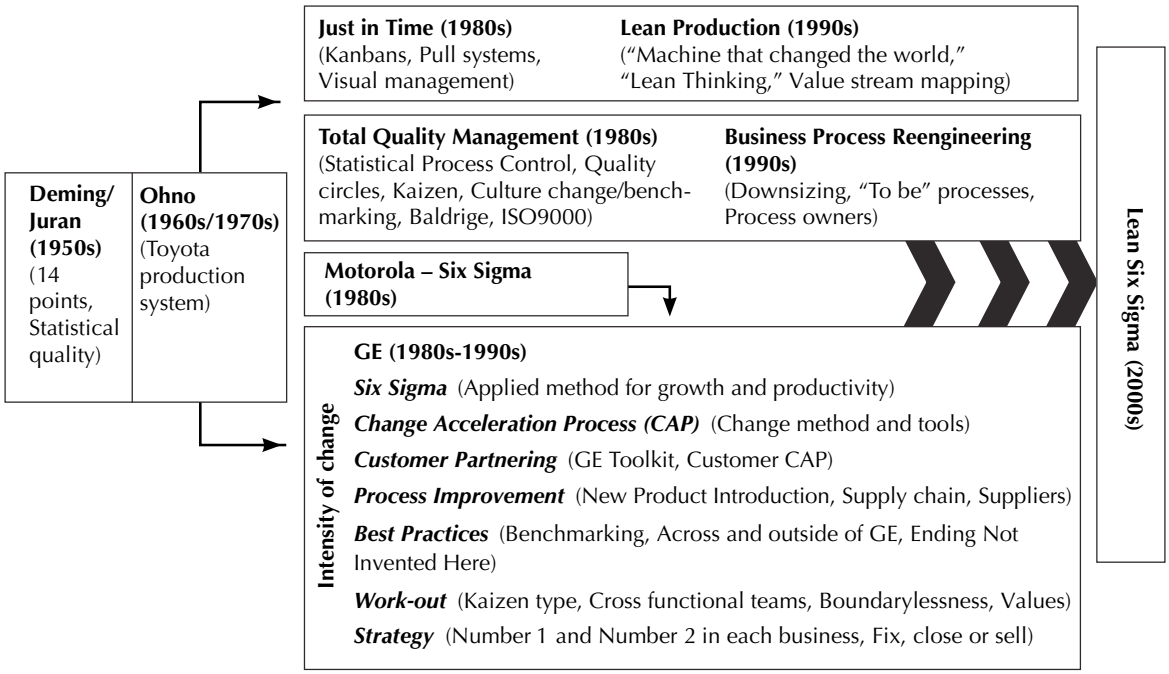
Lean[1]

Lean can be defined as a management approach that seeks to maximize value to customers, both internal and external, while simultaneously removing wasteful activities and practices. It is based on the management system used at Toyota Motor Corporation, with Shigeo Shingo and Taiichi Ohno generally considered to be its architects. Womack, Jones, and Roos,[2] in a worldwide study of automobile manufacturing, used the term "lean" to describe the activities that seek to minimize waste, such as excess inventory and defective products.[3] Their study concluded that Lean was preferable to "mass production" prominent in the United States and Europe. Lean manufacturing gradually found its way in the mainstream jargon during the mid to late 1990s.

Definition of Lean Six Sigma

Lean Six Sigma encompasses many common features of Lean and Six Sigma, such as an emphasis on customer satisfaction, a culture of continuous improvement, the search for root causes, and comprehensive employee involvement. In each case, a high degree of training and education takes place, from upper management to the shop floor.

Figure 1: Lean Six Sigma Builds on Practical Lessons Learned from Previous Eras of Operational Improvement



Source: *IBM Institute for Business Value,* Driving Operational Innovation Using Lean Six Sigma.

Lean Thinking[4] introduced many practitioners to Lean, including a five-step application guide: (1) specify value from the customer's perspective; (2) identify the stream of processes used to provide value; (3) remove non-value-added activities from the value stream; (4) create pull by having all work initiated by customer demand; and (5) strive for perfection.

The application of Lean principles in healthcare, services, and internal business processes is now under way. But since Lean was originally motivated by competitive pressures in manufacturing, much of its jargon and many of its techniques apply to manufacturing operations, and special efforts must be undertaken to successfully apply Lean to services. For example, the relevance of the five-step guide may not be apparent when applied to a service or business process since inventory as such generally would not exist. However, many of the descriptive and intuitive tools of Lean apply nicely to services, and its overall goals do not conflict with those of a service manager.

Successfully applying Lean requires a long-term viewpoint that considers all stakeholders. That is, Lean will only succeed if the organization's infrastructure reflects a common focus, which is often difficult to achieve in a large bureaucracy. For example, Emiliani[5] details how a manufacturer achieved significant profitability and growth, emphasizing that the marketing, accounting, design, and sales departments needed to modify their operations to support Lean. Lean, therefore, cannot achieve sustained success unless executives, as well as middle managers and their staff, are active participants.

Six Sigma[6]

Six Sigma can be defined as a management approach that seeks to maximize profits by systematically applying scientific principles to reduce variation and thus eliminate defects in product and service offerings. In 1986, the foundations of Six Sigma were established by Bill Smith at Motorola Corporation in response to product quality challenges. The application of Six Sigma contributed to Motorola winning the Malcolm Baldrige National Quality Award (MBNQA[7]) in 1988.

The statistical roots of the term six sigma[8] have become less important as Six Sigma has evolved into a comprehensive management system. Many practitioners, however, continue to view Six Sigma as a set of techniques that promote variance reduction. The popularity of Six Sigma was boosted dramatically when it was adopted by GE Corporation under the leadership

Key Definitions

Kaizen (pronounced kī´-zen) literally means "change for the better." It is typically used to denote a short term (one-to-five-day) focused process improvement effort during which a multi-stakeholder project team works full-time on the project, often led by a professional facilitator known as a "sensei."

DMAIC is an acronym for "Define, Measure, Analyze, Improve and Control" and refers to a systematic five-step approach to running a process improvement project; its origins would be found in early quality programs such as the Plan-Do-Study-Act structure developed by Walter Shewhart in the 1930s.

of Jack Welch. While Six Sigma is most easily understood in a manufacturing context, it can and has been applied to healthcare and other services. But it is not clear that all of the Six Sigma tools, particularly the statistically based methods, are necessary in services or that professional service employees would be able to apply them as well as their more technically sophisticated counterparts in manufacturing.

Six Sigma projects are formalized and highly structured, making use of scientific approaches in the selection and management of projects. Six Sigma projects use a DMAIC structure, considered by many practitioners to be the primary reason for Six Sigma's success. DMAIC enforces a high degree of discipline and commonality in project organization, problem-solving tools, software, and terminology.

Six Sigma implementation would begin with executive education followed by extensive training throughout the organization. Typically, formalized levels of training would be established, with project and mentoring roles often defined by a "belt" level (for example, master black belt, black belt, green belt, and so on). The tools of Six Sigma include well-known problem-solving techniques and popular statistical approaches, and a common software platform would usually be integrated to achieve a consistent means of internal communication. Six Sigma black belt certification is becoming a standard by which many quality practitioners are judged.

Lean Six Sigma

Despite their disparate roots, it is clear that Lean and Six Sigma encompass many common features, such as an emphasis on customer satisfaction, a culture of continuous improvement, the search for root causes, and comprehensive employee involvement. In each case, a high degree of training and education takes place, from upper management to the shop floor.

But it is equally clear that differences exist. Lean managers tend to be somewhat holistic, satisfied with removing wasteful activities that hinder their ability to serve customers. Six Sigma managers tend to be financially driven, focusing directly on cost savings or revenue increases as the criteria for success. The similarities and differences of Lean and Six Sigma are listed in Table 1.

It is easy to envision several varieties of Lean Six Sigma. A version offered here would be characterized as follows. The Lean influence would cause the organization to: (1) maintain an understanding of both internal and external customers' needs and desires; (2) seek to maximize the value-added content of all processes; (3) constantly evaluate employee incentives to ensure their alignment with systemwide performance objectives; and (4) look beyond strictly financially quantifiable cost savings. The Six Sigma influence would cause the organization to: (1) stress data-driven decisions that are based on facts rather than opinions; (2) devote resources to solving problems that present significant challenges to business success; and (3) implement a consistent, highly structured project-based improvement regimen.

Relationship to Performance Measurement

Confusion often exists concerning how process improvement relates to performance measurement, which many governmental entities have embraced as an important component of their management system. Performance measurement can and possibly should play a key role in an effective process improvement program. But process improvements are not a natural consequence of effective performance measurement. That is, a process improvement mentality will not take root without additional

Table 1: Comparison of Lean and Six Sigma

Focal Point	Lean	Six Sigma
Similar Tendencies		
Main goal	Organizational survival and/or growth through superior and improving customer satisfaction.	
Executive influence	Must be committed *and* actively involved in the program's implementation and operation.	
Tools and techniques	Include basic root cause analysis, problem solving, process analysis, and data analysis techniques.	
Employee involvement	Employees are trained and encouraged to contribute to problem solving and to identify problems as they occur.	
Application areas	Initially focused on manufacturing but can and has been applied to other industries, including service, healthcare, and education.	
Potential Differences		
Project management	Tend to be expeditious Kaizen projects completed in a few days with the team working full-time on the effort.	Tend to be deliberate projects consuming multiple months using a disciplined structure.
Project focus	Tend to focus on improving customer service by minimizing wasteful practices.	Tend to focus on improving customer service by minimizing variation and reducing errors.
Project selection	Tend to be based on removing significant waste and/or adding more value for customers, with multiple criteria used as justification.	Tend to be based on a quantitative analysis of cost savings and/or revenue enhancements.
Analysis techniques	Tend (traditionally) to be geared toward descriptive displays (e.g., process maps), root cause analysis, and mistake proofing.	Tend (traditionally) to be geared toward statistical data analysis, controlled experimentation, and optimization.

commitment and resources. In fact, performance measurement systems can pose a barrier unless administrators are cognizant of the following:

- **Recognizing the value of performance measurement data in process improvement**
  Most performance data are designed to evaluate effectiveness by focusing on metrics that represent how well and how efficiently services are provided. While these "outcome" data can be valuable in highlighting areas of concern, their role is often less valuable during improvement projects that require "process" data. An important reason for this disconnect is that most service processes flow across departments and it is difficult to attribute overall performance to any single department. For example, a finance department may experience complaints about the accuracy of bills, but the root cause of the inaccuracies could be found in another department that provides the finance department with billing-related information. An added data collection effort would be required to determine the root cause of the department's billing inaccuracies.

- **Understanding variation is crucial**
  Contemporary quality management offers a "process oriented" viewpoint, where the goal of data is to create a fundamental understanding of the process that generated the data. This goal cannot be achieved unless the existence of variation is understood. For example, the number of phone calls received by a municipality will vary from month to month, even if all of the service processes remained unchanged. An appropriate phrase would be "the data changed but the process remained the same."

  Administrators who do not appreciate variation will often react to changes in the data even when no important process changes have occurred. These reactions waste time and result in frequent priority adjustments as new data arrive followed by the inevitable over-reaction. Employees grow frustrated and frequently resort to the well-known practice of gaming performance data.

Lean Six Sigma in the Public Sector

Today, many public sector managers are well aware of quality and process improvement methodologies. The government division of the American Society for Quality, for example, includes about 1,000 members in the United States and Canada.[9]

Many such managers across the nation are now applying various process improvement methodologies within the public sector. Most have met with mixed success, in many cases applying proven methods periodically but not systematically. Readers interested in the research methodology, including how many of these individuals participated in the effort, should refer to the Appendix of this report.

Success Factors and Examples

Organizations that have maintained a long-standing and comprehensive process improvement program such as Lean Six Sigma possess many common features. It is clear that these features enhance their ability to sustain the efforts over a period of time.

- They have been inspired by influences emanating outside of the public sector, usually a leader with business experience.
- They have experienced little leadership turnover.
- They paved the way for the program's implementation by removing organizational barriers and modifying its culture.
- They focus on certain underlying principles and maintain a consistent conceptual framework, based on Lean and/or Six Sigma, or alternatively Total Quality Management (TQM),[10] the MBNQA guidelines, or the family of standards set by the International Organization for Standardization (ISO).[11]
- They began by employing a full-time administrator to oversee the program's implementation, but this position was often considered temporary until the program was up and running so as not to create an unnecessary bureaucracy. However, a champion for the effort will continue to be needed in the organization.
- They offer a guarantee to employees that no layoffs will result from a process improvement project.
- They make conscious efforts to communicate program successes internally, such as posting project results electronically or placing storyboards in prominent locations.
- They face similar challenges, revealed by responses to a question asking respondents to consider a list of 20 potential organizational barriers, where most respondents chose the majority of the list as at least somewhat troublesome.
- They did not achieve success overnight, with most taking several years to create a culture that characterizes and sustains their program.

City of Fort Wayne

Since his election in 2000, Mayor Graham Richard of Fort Wayne, Indiana, has led a Lean Six Sigma effort. The result is savings estimated to be about $11 million, with no tax increases and increases in citizen satisfaction. The mayor attributes his 16-percentage-point re-election in 2004 to enhanced customer service. While working in the private sector, Richard founded the TQM Network and had firsthand experience with Six Sigma. He brought an entrepreneurial spirit to the city and has devoted considerable energy to the Lean Six Sigma efforts.

Lean Six Sigma in the Department of Defense

In the public sector, the Department of Defense (DoD) has been a leader in the implementation of Lean Six Sigma. The summary below offers an overview of activities now in DoD.

In the Office of the Secretary of Defense

In April 2007, the Office of the Secretary of Defense publicly articulated the need to institute a framework to support the acceleration of transformation throughout the department. The initiative was called Continuous Process Improvement and Lean Six Sigma (CPI/LSS). Supporters of the transformation initiative include DoD senior leaders who have experience within the private sector and who have seen firsthand the success experienced with the use of continuous process improvement and Lean Six Sigma.

The CPI/LSS initiative includes the CPI/LSS Senior Steering Committee, which will guide the development of a new CPI/LSS Program Management Office. The new Program Management Office (PMO) will lead DoD-wide CPI/LSS activities by tracking progress and results, as well as formulating an incentives program to encourage further use of CPI/LSS methods throughout DoD. The PMO is also planning to issue DoD-wide CPI/LSS goals, including using CPI/LSS in individual performance objectives.

Currently, efforts are under way to complete an initial set of CPI/LSS projects and refine priorities that establish an increased number of targets of opportunity within DoD.

In the United States Army

The challenge for the United States Army now is to broaden the number of adopters within the service. The Army is increasing the number of CPI/LSS projects within the service. As a key first step in gaining wider acceptance of the use of the CPI/LSS tools, the Army recently issued a single large contract to support the deployment of Lean Six Sigma.

In the United States Air Force

The United States Air Force has been involved with Lean since 1983. In the early 1980s, the Air Force established the Lean Aerospace Initiative (LAI), which had been fostered by industry leaders. The Air Force now has several "islands of excellence" in regard to CPI/LSS, particularly in the depot and maintenance areas. Lean Six Sigma has not yet been fully used in the Air Force's administrative and transactional processes. With the successes of CPI/LSS achieved at Tinker Air Force Base and Warner Robbins Air Logistics Center, there is now broader acceptance of the approach. Air Force senior leadership strongly supports the use of the CPI/LSS approach and has communicated the importance of the use of these tools throughout the Air Force in several memorandums from the Secretary of the Air Force.

In addition to their communications strategy, the Air Force also created the Air Force Smart Operations for the 21st Century (AFSO21) initiative, which has given an overall organization focus and direction to further drive the deployment of CPI/LSS methods across the entire Air Force. With several large contracts now in place to provide funding to receive advice and assistance, it is expected that the Air Force will quickly spread this approach across all areas within the service.

In the United States Navy

The United States Navy is further along than either the United States Army or the United States Air Force in the adoption and use of CPI/LSS tools. They now have built an extensive knowledge and experience base on the use of CPI/LSS. There are currently major Lean Six Sigma deployments running in Space and Naval Warfare Systems Command (SPAWAR), Naval Sea Systems Command (NAVSEA), and the Naval Air Systems Command (NAVAIR).

Deployment of CPI/LSS in NAVSEA and NAVAIR has demonstrated clear success in developing the internal capability to train and execute projects within those commands. The Norfolk Naval Shipyard is now expanding its use of Lean Six Sigma.

— Monica Painter and Mark McDonald
IBM Global Business Services

The program includes a part-time program manager, in place since the program's inception, who is certified as a Lean Six Sigma master black belt. Thirty employees are trained as black belts and about 100 more are trained as green belts; they all work on improvement projects along with holding full-time operational or managerial positions. Green belts are trained in the same tools as black belts, with the latter receiving more in-depth training, particularly in statistical techniques.

The program manager works with the administration to choose projects, target candidates for training, and mentor individuals during the training process. He has also developed and, until recently, delivered the green belt training program. Results of projects and information on the program are available to employees in their departments and available to the public on the city's website.[12]

Florida Department of Revenue

The Florida Department of Revenue initiated "Six Sigma Light" in 2003. "Light" refers to the department's effort to customize the program by beginning with basic Six Sigma and Lean tools. They also introduced the program gradually so it would not appear to be a heavy-fisted corporate mandate. The department emphasizes category 6 (process management) of the MBNQA criteria, which includes how an organization maintains a sustainable system of process design, management, and improvement.

A major emphasis involves benchmarking other public- and private-sector entities to find ideas, tools, techniques, and business practices that can be adapted to the organization, focusing on a formal structure and the use of basic tools. Their internal newsletter contains information on improvement projects, and an internal web page communicates program initiatives to employees. These communication mechanisms are designed to encourage learning and best practice sharing.

The department's training program is designed to be results-oriented, with education and application performed concurrently. Each participant in the six-month training program attends classes one or two days each month. Simultaneously, they each join a team to define a real-world problem, collect data to validate the extent of the problem, analyze root causes, propose potential solutions, and present an action plan to the department's senior leaders. After the course, they work to complete the action plan and report the results. For every dollar invested in the training program, the department is seeing a $23 benefit.

National Nuclear Security Administration

As a separately organized (semi-autonomous) agency within the U.S. Department of Energy, the National Nuclear Security Administration (NNSA) has accomplished its missions of nuclear weapons stewardship, nuclear nonproliferation, and providing the Navy with nuclear propulsion, using a group of independent private-sector contractors who provide both managerial and operational services. Through benchmarking of these contractors and other public and private organizations, the NNSA identifies best practices in terms of not only what activities take place but also how internal processes are managed. In particular, NNSA has adapted the practice of nurturing an environment that encourages processes to change over time through formal process improvement mechanisms.

While NNSA and its predecessors have employed various business process methodologies over the last two decades, their Lean Six Sigma initiative is relatively new and has been aggressively pursued, with about four to six projects being performed at any one time. Application areas include procurement, finance, hiring, complaint resolution, travel management, and processing security clearances. The focus of the projects tends to be reducing delays in service delivery while maintaining strict quality requirements. Projects generally result in the development of standard operating procedures in ISO format that include helpful mechanisms such as flowcharts, checklists, standard data entry sheets, and information handoff forms.

The organizational commitment is evident in their senior management performance standards that include requirements for championing, implementing, and conducting process improvement projects. Lean Six Sigma and process improvement requirements cascade through the management review process down to the line management level. Formal quarterly briefings monitor progress on each project, and semi-annual or annual briefings are held for follow-up of completed projects.

Using Lean Six Sigma for Improvements

Similar features were also noted in successful individual projects, even in organizations that would not be characterized as progressive. The projects tended to employ a formalized project structure, similar to DMAIC, at times with minor modifications. The tools used during the project were very basic techniques that are easy to apply by non-technical employees. These methods included many root cause analysis tools and some very basic statistical tools.

Lean Six Sigma to Improve Tax Collection

The city of Hartford, Connecticut, successfully reduced the processing time for checks in their tax collection office. Most checks are now processed in less than one working day, resulting in significantly higher interest earned by the city. After creating and studying a display of the workflow, project team members were able to remove redundant tasks along with tasks that currently have no real value. More specific job responsibilities were also assigned and the resulting work activities were standardized.

Administrators cite the generation of an "elevator speech" early in the project as an important communication mechanism. This short and simple statement summarized the project's goals and benefits to the city. It was used by team members to communicate a consistent message to fellow employees, ensuring transparency and heading off potential misperceptions.

Lean Six Sigma to Improve Classified Information Review Process

Based on feedback from customers and management that the review process for classified information was complete and accurate but not always timely, a team of NNSA staff members requested and received approval to initiate an improvement project. Using the DMAIC methodology, the project team employed process mapping and an associated analysis of potential failures to describe the current process and highlight causes of delays.

The team found that inconsistent use of a tracking database, informal prioritization, inconsistent documentation, inter-agency delays, and unclear follow-up activities hampered the process's effectiveness.

Lean Six Sigma in the Department of Homeland Security

The Lean Six Sigma approach can also be applied to the challenges of the public sector. Take, for example, the Office of the Principal Legal Advisor (OPLA) in the U.S. Department of Homeland Security (DHS) Bureau of Immigration and Customs Enforcement. OPLA, DHS's largest legal program, litigates 400,000 alien removal cases each year. Embracing strategic management and Lean Six Sigma, it deployed a nationwide, Web-accessible case and document management system; gave each employee a scanner; established a Strategic Review Division to review offices and spread best practices; improved hiring and training; and formed numerous Lean Six Sigma working groups made up of employees from across the country.

By giving its employees shared ownership in OPLA's processes, it is now quickly moving toward more efficient litigation and administrative processes. The working groups are increasing OPLA's efficiencies in everything from electronically exchanging documents with the private bar; to increasing the efficiency with which court cases are calendared; to devising case-management metrics that will capture inefficiencies in its litigation processes; to creating electronic case files that its trial attorneys can carry into courtrooms using laptops. Many other processes are also under review, and OPLA is now embarking on forming strategic alliances with stakeholder agencies.

With software enhancements, new personnel, and numerous process fixes in the works, OPLA will continue its historic transformation. Lean Six Sigma has been key to its success.

Source: *IBM Institute for Business Value,* Driving Operational Innovation Using Lean Six Sigma.

After making process modifications, standard operating procedures were developed and implemented. While doubling the information available to management for tracking customer requirements and for resource leveling work, the completeness of system data improved dramatically as did overall cycle time.

Lean Six Sigma to Improve Pothole Repair

A significant number of pothole complaints received

in Fort Wayne, Indiana, motivated a project in the Street Department. The project team employed basic tools, mainly the creation and analysis of process flow diagrams, along with a simple analysis of data using dot plots and Pareto analyses. The team studied the current process by identifying unnecessary steps and generating ideas on how inefficient activities could be done more effectively.

The data, organized by location, highlighted that repair time delays were weather-related and randomly spread across the city, rather than isolated in particular areas. Changes were made to the complaint-receipt and repair-order distribution activities, the workforce was redistributed to respond more quickly, and various other wastes were removed from the process. Average repair time was decreased from about four days to at most three hours using the same number of employees.

Lean Six Sigma to Improve Licensing Services

The Washington State Department of Licensing identified those offices having excessive customer wait times for obtaining or renewing a driver's license. Starting at the office with the longest waits, project teams were formed at each location. By focusing data collection on finding process bottlenecks, solutions were implemented that included changes to software, queue organization, and equipment layout.

Most offices achieved a 50 percent or more wait time reduction along with an increase in customer satisfaction. During the projects, many quality-of-work-life issues were identified and changes were made (for example, installing a new office refrigerator), which increased employee satisfaction and motivated more employees to help with future projects.

Lean Six Sigma to Improve Vehicle Maintenance

In Oregon's Lane County, a process improvement project was initiated after a fatal accident that resulted in an inspection by the Occupational Safety and Health Administration and subsequent citation for non-compliance with safety requirements. During early stages of the project, a systematic audit was performed to identify gaps between the county's safety procedures and the corresponding regulatory requirements. Based on this audit, it was discovered that no standards existed for pre-trip vehicle inspection of heavy equipment.

The resulting improvement effort focused on improved safety rather than achieving a more narrow compliance to regulatory guidelines. The project studied current practices, identified areas for improvement, and created standard procedures for pre-trip inspections. The project team included the county's safety committee along with operational personnel from multiple divisions, including landfill and roads maintenance.

Unique Organizational Characteristics

Implementing Lean Six Sigma always requires careful consideration of the special organizational factors that may work for or against its success (see Table 2). Some of the potential barriers that could occur in the private sector are found with greater frequency in the public sector:

Table 2: List of Potential Challenges

Challenges Consistent with the Private Sector	Challenges Unique to the Public Sector
• Inconsistent leadership motivation • Management competency in process improvement • Culture that considers time devoted to improvement less valuable than time devoted to "real work" • Union rules and relations • Technical skill of employees • Many undocumented processes	• Unique human resource practices • The election cycle and term limits • Attitude of employees regarding stability and job security • Legislative controls • Competing special interests • Revenue not directly linked to value provided

- Inconsistent leadership motivation due to competing priorities, personal goals, or political realities.
- Management ignorance of, or experience with, process improvement.
- A culture that considers time devoted to improvement much less important than time devoted to normal work activities.
- The existence of union rules and relations that hinder the modification of work assignments.
- Service employees that are typically not trained or experienced in applying sophisticated quantitative methods.
- Many undocumented processes that preclude a consistent, organization-wide understanding of how a service should be provided.

Several additional challenges particularly unique to the public sector include distinctive human resource practices; the election cycle and term limits; stability and job security concerns; legislative controls; and competing special interests. Additionally, revenue is typically not directly linked to value, since most of the funding of services derives from tax revenue paid by citizens, who traditionally have low expectations, making them relatively apathetic and therefore not likely to routinely complain or offer suggestions for improvement.

Unique Characteristics of Government Processes

To understand how Lean Six Sigma should be applied in government, it is important to describe a public-sector service process in conceptual terms. To this end, the results of a prior study are useful. This study by the author concluded that most service processes share a number of common structural characteristics and many of these characteristics would not be found to the same extent in manufacturing.[13] They are:

- **Importance of information.** Either the service itself consists of information (e.g., tax advice) or the service includes important information (e.g., instructions on a utility bill), and this information should be measurable, complete, and understandable.
- **Significant task variability.** The duration of service tasks (e.g., repairing a pothole, renewing a license) is usually variable, making the control of workflow difficult.
- **Cross-functional process flows.** Service processes typically flow across departments within an organization where employees work under competing incentives and often suffer from long-standing rivalries or other conflicts that hinder their coordination.
- **Many handoffs of information.** The importance of information and a cross-functional process flow often leads to mistakes or miscommunications, such as use of a term or phrase that has different meanings to workers in different departments.
- **Numerous management or technical reviews.** Due to the need to seek approval or to have text or figures verified, many services include "inspections" by technical staff or management, which increases the cost of providing the service and delays service completion.
- **Hidden benefits and costs.** While non-financial performance metrics are common, quantifying the financial benefit of improved service delivery that results in better customer satisfaction is difficult.
- **No explicit motivation for urgency.** Employees may unwittingly cause serious delays by being unaware of the overall service process and therefore not cognizant of task priority, or they may simply be unmotivated to sacrifice their comfort for the good of the organization.

Some of the pitfalls that could result from ignoring these characteristics include: (1) focusing an improvement effort on speeding up document flow, when the effort may be better focused on improving the quality of the information contained on, or missing from, the documents; (2) creating a process improvement team without membership from all departments involved in service delivery; (3) solving local problems that are impacted by cross-departmental miscommunication; (4) allowing employees to remain ignorant of overall process flow; (5) creating inspections in response to problems, a discredited industrial practice, rather than finding ways to eliminate the need for these reviews; and (6) using financial justification alone to decide on resource allocation to improvement projects.

Starting a Lean Six Sigma Program

The premise that Lean Six Sigma can form the basis of a systematic and disciplined process improvement program in government has been supported. It is clear, however, that the program will not be effective without considerable employee involvement from top leadership to frontline employees. They must all believe that a personal benefit will result from their active involvement. As such, Lean Six Sigma will not be effective if used as a mechanism for cutting short-term direct payroll costs through layoffs.

The goal of Lean Six Sigma should be to improve service and ultimately lower the cost of its delivery. But this goal should be accomplished through a combination of employee attrition, workforce reallocation, and contractor attrition, so that additional services are provided to the public. In this way, newly elected leaders may be motivated by a desire to enhance their status in the community in a very visible way. To achieve these ends, Lead Six Sigma should be implemented in a carefully thought-out manner.

Infrastructure Considerations

Management commitment to a Lean Six Sigma process improvement program must go beyond slogans, banners, or motivational speeches. The leadership team should exude a constancy of purpose, along with discipline and patience that allows the program to take root. The management team must be made responsible and accountable for *both* managing the organization and improving its effectiveness. The creation of an infrastructure that sustains requires attention be given to the following four actions, which are summarized in Table 3.

Deploy a sound, consistent, and robust methodology.
The establishment of a consistent philosophical foundation, supported by an accompanying methodology, is critical. Leadership is best advised to focus on the methodology with which they are familiar, as the specific methodology is less important than a consistent and viable implementation strategy. The research has shown that Lean Six Sigma can be effective, along with other methodologies such as the MBNQA criteria or TQM.

The foundation must be easy to understand but not be reduced to clichés. The research has found that successful programs share not a methodology but a common set of principles. For example, they consider citizens to be customers rather than nuisances. And they also believe that individual employees can make a difference, especially in terms of their ideas that can help management make positive change.

Outside consultants can be helpful during early stages of program implementation. But they can also be a hindrance when their approach is inconsistent with the organization's culture or when they are seen as being held solely responsible for the program's success.

Training needs to be consistent with the methodology and provided in a just-in-time manner, allowing employees to immediately apply the concepts and techniques covered. The creation of a common language, approach, and toolbox will enhance communication across the organization. The methodology, however, cannot be viewed as inflexible. It should be allowed to evolve as circumstances change, such as during times of leadership turnover.

Table 3: Elements in Developing a Lean Six Sigma Program

Infrastructure	**Deploy a sound and robust methodology**	• Consistent philosophical framework • Easily understood but no clichés • Consistent just-in-time training • Flexibility to allow evolution
	Build trust by removing fear	• Employee involvement critical • No layoff guarantee • Celebration of success
	Initiate culture change	• Gradual implementation • Focus on "process," not blame • Priority to improving and doing work • Tangible benefits for all employees
	Communicate with stakeholders	• Early and continuing awareness • Tangible benefits to be realized • Progress documented visibly • Top leader involvement
Implementation	**Create a centralized focal point**	• Needed to maintain persistence • Skilled, enthusiastic, and impartial • Best if temporary
	Ensure departmental involvement	• Liaison or similar relationship • Supports credibility and awareness • Eliminates repeated use of personnel
	Focus on a basic toolbox	• Basic tools of Lean Six Sigma • Understanding and transparency • Enhanced employee motivation
	Obtain externally and/or develop skilled project facilitators	• Critical to project success • Assertive, competent, and impartial • Ensures project timeline met

Build trust by removing fear.

To obtain and maintain organization-wide support, leaders should address the fear that will inevitably accompany Lean Six Sigma initiation. This fear is mainly due to job insecurities, including the possibility of layoffs or punishment for speaking honestly during project sessions. Leadership should be cognizant of the very real need for employee involvement. So while it may appear that lowering costs through improvement will only occur with layoffs or other payroll cuts, successful programs focus on using normal attrition to reduce operating costs.

The author believes that a clear statement must be made by the leadership team guaranteeing that no reductions in force will take place as a result of a process improvement activity. However, some reassignments (either more or less individuals assigned to a specific task) might result from a Lean Six Sigma project. In some cases, for example, formal agreements between union and management were modified to contain the no-layoff guarantee.

Over time, it will become apparent to union members and other employees that indeed they can benefit from Lean Six Sigma. In particular, their job satisfaction will increase as they are allowed to participate in determining how their job is done. Another benefit to both management and staff would be confidence that the efficiency and effectiveness of their operations compares favorably with those in the private sector, eliminating concerns of privatization.

Staying the Course

When a new leader is elected, it is incumbent upon remaining administrators to work early and aggressively to maintain the Lean Six Sigma effort, especially when the new leader lacks business experience or possesses a general skepticism of government's effectiveness. One useful mechanism would be the utilization of process maps, standard procedures, and process data during briefing sessions so that their value, and in turn the value of the Lean Six Sigma program, becomes evident.

Transparency is critical so that employees understand that Lean Six Sigma will provide a benefit rather than a threat. To this end, it is recommended that suggestions made during project meetings that affect quality of work life be taken seriously. One example was noted where employees asked for and received a new office refrigerator, initiated by a suggestion made during a process improvement project, even though this action would not improve the service being analyzed.

Initiate long-term cultural change.
Gradual but steady implementation is generally preferred over a massive rollout that can give rise to a "this too shall pass" passive-aggressive reaction. During this time, management at all levels must continuously reinforce a focus on "process" by avoiding the practice of assigning blame for problems that occur. Supervisors must allow workers to devote attention to improving their work in addition to doing their work. And workers should see that tangible benefits can be derived from their participation in improvement efforts.

When management and staff on a project team are treated as equals, the line separating their responsibility blurs. Staff appreciate being able to control how their work is done. Managers appreciate having staff members that are motivated to provide excellent service to customers. Employees at all levels who are members of a process improvement team that makes improvement suggestions have a natural desire to see that their ideas produce favorable results.

Maintaining momentum is critical since the culture should be allowed to evolve naturally. Mistakes are likely, especially miscommunicating the program's intentions. In one case when Lean was introduced into an organization, a rumor began that Lean meant "Less Employees Are Needed." In such cases, leadership needs to take quick and decisive action.

Communicate the vision to all stakeholders.
Since stakeholder involvement is critical, all affected constituencies should be kept abreast of the program's development early and often. This communication should also address the tangible benefits that should accrue to each stakeholder, while avoiding promises that may not be realized. The phrase "under promise and over deliver" is appropriate.

Early communication with employees is a must. But management should be aware that not all employees have access to the same communications mechanisms as management. For example, certain employees may not be assigned an e-mail account, and some employees may not have been assigned a mailbox. Once the communication is begun, feedback from employees should be encouraged, since in many cases an implementation detail is easily changed to accommodate the needs of a constituency group.

The leadership team should be involved in a clear, convincing, and vocal way. Making site visits, spending time in each training wave, and dropping in on project meetings are examples of leadership action that signals their commitment. Monitoring progress on a monthly basis through Lean Six Sigma status meetings may also be considered.

As projects commence, presenting the results internally using posters or other visible media, placed prominently in a common work area, is worthwhile. Certain external customers, such as contractors, advocacy groups, and ordinary citizens, can help spread the message if they can be convinced that the program is in their self-interest.

Implementation Considerations

The implementation of Lean Six Sigma should be undertaken in ways consistent with the traditions of the organization and the personality of its leaders. Certain actions could be considered essential for effective implementation:

Create a centralized focal point.
While the chief executive will be called upon to provide visible leadership, he or she will be unable to manage detailed implementation activities. Creating a steering committee or assigning a high-level executive to this task should be considered, but it is important to avoid establishing a new bureaucracy.

The organization may wish to assign a program administrator who would be dedicated to firmly establishing the program within the organization. This position would work closely with the chief executive. He or she should be skilled and enthusiastic. Excellent interpersonal and communication skills are also critical. And the program administrator should be viewed across the organization as an impartial arbitrator.

Ideally, a full-time program administrator will maintain the position for as long as it takes, since the ultimate goal is to infuse a process improvement culture throughout the organization. Ultimately, Lean Six Sigma efforts would be decentralized and become a routine component of each department's activities. Organizations that have decentralized from the start have noticed that lack of a standard project structure, training program, and communication mechanism has hindered cross-departmental communication.

Ensure departmental involvement.
It is helpful to create a working relationship between the program administrator and each department or operating unit. For example, each department may wish to appoint a process improvement liaison, or "champion." The liaison will serve as a useful communication link so that information from the leadership team is presented to employees via a trustworthy source.

A liaison can help present the program as valuable to the department rather than pushed onto the department from headquarters. He or she can also act as mentor for employees just getting involved in project improvement teams. And a liaison can be very helpful in identifying projects that can solve important problems while having a good chance of success.

When departmental involvement is inconsistent, several risks are created. Some departments may simply not take part in the improvement activities.

The Tortoise Wins

When establishing a Lean Six Sigma program, persistence is vital. Terms such as "diligence," "resolve," "discipline," "tenacity," and "patience" have been applied to a leader who will not let the program "die" even when the inevitable crises, or other changes and distractions, occur.

Or a department may include one or two supporters who participate repeatedly in improvement projects. When this occurs, two potential effects are likely that decrease the chance of long-term viability. First, those few individuals will eventually find that their workload increases or their merit rating suffers due to their participation in improvement projects. Second, due to transfer or retirement, these individuals will eventually leave the department and their replacements will likely not be encouraged to participate.

Focus on a basic toolbox.
It would be rare for a governmental entity beginning a process improvement effort to require more than the basic tools of Lean Six Sigma. Further, keeping the tools simple will enhance its acceptance among both managers and staff, creating a sense of mutual understanding and transparency. The training of project management and project communication skills should also be included. And the training should always occur on a just-in-time basis to prevent the entropy that often accompanies training programs.

Table 4 on page 22 presents elements that could form the basis of a training program for public-sector employees. Ideally, the training program will be spread over a period of time and include an application project so that students apply the tools as they learn them. For example, the students could meet two consecutive days, every second or third week, while working on a project. This program could continue until six to eight full days of training have been completed.

When employees experience firsthand the effect the tools can have on improving their work, motivation to take an active part in future projects increases. Other employees viewing project results will understand the tools being applied and become less intimidated and often volunteer for membership on subsequent project teams. An additional advantage is

Table 4: Elements of a Lean Six Sigma Training Program

Main Topic	Coverage
Introduction to Lean Six Sigma and Definitions	• Customers (constituency receiving value from a service process) • Stakeholders (organizations that are involved with a service process) • Value-added activity (task for which a customer is willing to pay) • Waste (time spent in other than value-added ways) • Green and black belts (classification of employees based on their level of expertise in Lean Six Sigma principles and tools) • Project team roles (management, administrators, and staff)
DMAIC Project Structure	• Define (create problem statement and customer value definition) • Measure (map the process and collect associated data) • Analyze (identify problems and significant waste) • Improve (find ways to eliminate waste and/or add value) • Control (develop implementation and follow-up plan)
Process Mapping	• Flowchart (basic display of service process flow) • Spaghetti chart (display of facility layout with process flow) • Time value map (timeline showing lead time and value-added time) • Value stream map (display of a process with supporting data) • Consumption map (map of customer interaction with a service)
Root Cause Analysis Tools	• Failure Modes & Effects Analysis (or FMEA, prioritizes causes of poor performance) • Five Whys (method that moves from symptoms to root cause) • Affinity building (brainstorming activity to quickly organize details) • Cause-and-effect diagram (display of potential problem causes)
Data Analysis Tools	• Data collection basics (check sheets, surveys, data entry forms) • Pareto analysis (ranking of problem importance) • Run charts (simple plot of process data over time) • Calculations (average, standard deviation, etc.) • Scatter plot (display to determine if a relationship exists)
Improvement Techniques	• Five S (methods for organizing a workplace) • Mistake proofing (mechanism to prevent problems and errors) • Standard work (consistent structuring of a work task) • Standardization (consistent operation of a service process) • Visual workplace (highly visible communication mechanisms)

that training costs are allocated over a larger number of employees.

In some organizations, a few specialized internal or external experts can be developed or made available when their need arises. For example, the Florida Department of Revenue includes personnel with expertise in statistical modeling in their various offices that do forecasting, measurement analysis, customer satisfaction analysis, or revenue management. They are called upon to contribute to improvement projects on an as-needed basis.

Obtain externally and/or develop internally skilled project facilitators.

The importance of skilled project facilitators cannot be overemphasized. Their function includes teaching, coaching, and mentoring, while guiding the team at

a suitable pace. They must be assertive in order to overcome challenges such as dominant personalities and reluctant participants. For example, the facilitator must mitigate the effect of powerful team leaders whose "pet" ideas may not represent effective solutions. Other situations that must be avoided include the acceptance of opinions as facts, groupthink, feuding, rushing, digressions, and tangents.

Facilitators must be assertive but impartial, so that team meetings move along at a steady pace with minimal diversions. Facilitators should possess breadth so that they understand the broad range of issues relevant to policy and administrative matters. They should have effective communication skills, and be able to work comfortably with both management and staff.

In some organizations, external consultants have been used as facilitators with some success. In these cases, care must be taken to ensure consistency from project to project. Generally this can be achieved by forming a long-term relationship with a contractor so that their involvement is more one of partnership than supplier. If facilitators are to be developed internally, each must be chosen carefully since not every enthusiastic, technically competent employee will make an effective project facilitator.

Implementing a Lean Six Sigma Project

Lean Six Sigma would be characterized by a consistent and disciplined project methodology. Consistency is valuable because it creates: (1) constancy of purpose, (2) the perception of competency, (3) an environment where similar tools are applied in similar ways, (4) advantageous training conditions, and (5) effective communication across the organization. The project methodology detailed below incorporates the best facets of Lean and Six Sigma. But it is not meant to be complete in all details, allowing for some local customization to fit the needs of specific organizations.

Each Lean Six Sigma project should include three stages—Project Initiation, Project Execution, and Project Communication—detailed below and summarized in Table 5.

Project Initiation

"Preparation, preparation, and preparation" may be thought of as the three things to remember when initiating a process improvement project. Key success factors include involving key stakeholders on the project team, soliciting support from administrators, addressing political sensitivities, employing a skilled facilitator, consulting with customers, and ensuring that the problem warrants commitment of the organization's resources. An improvement project should be initiated based on a structured project selection procedure and begun with careful selection of the project team.

Selection and Justification

A decision to devote resources to an improvement project should be preceded by confirmation that the effort is consistent with the organization's strategic plan and that the anticipated benefits outweigh the associated costs. Personnel and other costs to execute a project would typically be understood. But estimating the benefits of improvement is difficult since they include some that are tangible and some that are intangible. Given the difficulty in quantifying intangible benefits, it is recommended that project approval be a leadership decision, supported by an analysis that considers three sets of potential benefits:

1. *Financially quantifiable benefits* can be projected in monetary terms. Cost reductions such as labor, equipment, and material would typically be included as well as revenue increases such as taxes, interest, and fees. For example, decreasing the lead time for processing checks will result in increased interest earned.
2. *Non-financially quantifiable benefits* cannot be projected monetarily but can be quantified in other ways. This category is broad but would include the projected number of customers (e.g., taxpayers, contractors) affected in a positive way if the service were improved. For example, decreasing the wait time for license renewal will result in more drivers who are able to renew their license in an acceptable period of time.
3. *Intangible benefits* cannot be quantified precisely, either financially or otherwise. They include higher customer or employee satisfaction, better chance of re-election, and more participation from employees in future projects. For example, among the benefits to consider may be the creation of a better employee work environment.

Table 5: Lean Six Sigma Project Implementation

Project Initiation	**Selection and justification**	• Financially quantifiable • Non-financially quantifiable • Intangible
	Team creation	• Trained facilitator • Cross-functional representation • Administrator(s) and frontline staff • Internal customers • Various experience with process • Various experience with DMAIC • Support group representatives
Project Execution	**Define**	• Problem statement • Review of stakeholders • Identification of customers • Customer value definition
	Measure	• Complete and accurate process maps • Multiple process maps • Data collection
	Analyze	• Waste identification • Data analysis • Root cause analysis
	Improve	• Generation of ideas • Rating of ideas • Improvement recommendations
	Control	• Implementation plan • Performance tracking plan • Ongoing feedback plan
Project Communication	**Prior to and during project execution**	• Elevator speech • Status meetings
	After project completion	• Final presentation • Visible communication mechanisms

The establishment of performance targets is useful. These targets create a focus on either incremental or substantial performance improvements. But many projects should be considered successful even if the target improvement is not achieved. Therefore, care must be taken to eliminate any sense of punishment or disappointment if targets are not met. Otherwise, to avoid failure, the team may resort to artificial manipulation of the numbers. In fact, administrators should be careful not to classify any project as a failure as long as the project team worked diligently on the improvement effort.

At times, projects may be initiated due to a periodic or an extraordinary event that itself creates justification. For example, a municipality may routinely initiate a project when a retirement or transfer from a department occurs. In these cases, the goal would be to improve the process so that the remaining employees could provide the service without a decrease in performance. Or a city may initiate a project when poor performance is noted in a very visible way, such as in a newspaper or television investigative study. These projects often benefit by having a project team that possesses a common motivation.

Counting What Hurts, Part I

A city's safety department is responsible for tabulating and reporting OSHA-recordable accidents and injuries, as well as providing expertise to improve safety. The reporting activity is likely to include time wasted tracking down late or inaccurate data, dealing with a disorganized IT system, and creating ad hoc reports for specific administrators. If this activity were improved, the tangible financial benefits would include lower OSHA fines and decreased costs paid to safety consultants. Tangible non-financial benefits would include more man-hours devoted to improving safety. Intangible benefits would include a more challenging and interesting work environment for skilled employees, leading to higher satisfaction levels.

Team Creation

Each member of the team should be trained in Lean Six Sigma methodology. The project team should be large enough to encompass key stakeholders of the service process but not so large as to hamper its effectiveness. Among the group of about six to 12 members, the project team should include:

1. An experienced facilitator
2. At least one representative from each department through which the service flows
3. Frontline employees who understand how the process currently operates
4. One or more administrators who understand the context within which the service operates, including organizational, financial, legal, environmental, and political contexts
5. At least one customer, if customers are internal

Inviting at least one employee who is new to the service helps to infuse fresh ideas. To help support future projects, it is useful to include at least one newly trained employee without experience with improvement projects. Consideration could also be given to including a representative from each department that provides the service with information systems or other support.

External customers cannot participate fully in project team activities but should be asked to provide input. For example, when considering the improvement of its Department of Licensing & Inspections, one city consulted with building contractors, restaurant staff, and food vendors. Customers will generally be thankful for the opportunity to participate and are a source of enhanced public relations. After project completion, it is imperative that participants be informed of the project's outcome. While it is tempting to consider the creation of a standard group of taxpayers to call upon for assistance, this practice is not recommended since the services offered by government will serve many different constituencies and diverse ideas are useful.

Project Execution

The planned project timeline would be based on the team's availability and the problem scope. The project may follow a kaizen format, completed in one to several days with the team devoted full-time to the project. Or the project may be executed over weeks or months with the team devoted part-time to the project. A third alternative that combines the first two options would consist of embedding a kaizen activity within each phase of DMAIC. This alternative allows for the gathering of information between sessions and can maximize the effectiveness of each project phase.

Many practitioners in both the public and private sectors consider DMAIC to be the major strength of Six Sigma. It is imperative that a project execution structure similar to DMAIC be followed that makes sense given conditions that exist in the public sector.

Define—Create Problem Statement and Customer Value Definition

An improvement project should not proceed until a precise project definition or problem statement is developed. Here, the problem is defined and the project objectives are delineated. The scope of the process under study is also specified at this time (i.e., where it starts and ends). Using a standard format, the problem statement would also include major constraints, key metrics, improvement targets, and the role of each team member. It is useful to review the list of stakeholders and modify the team's composition if necessary to remove future barriers.

The team needs to develop a concise understanding of the so-called "voice of the customer." But customers will often consist of more than one

constituency, each defining value based on their needs, desires, or expectations. Typically, value is multi-dimensional in that customers may be concerned with one or more of the following: quality (accuracy, dependability, completeness, conformance); speed (delivery, responsiveness); access (availability, options, convenience); security (personal, informational); competency (knowledge, consistency, integrity); communication (clarity, customization, flexibility); and empathy (courtesy, friendliness).

To define value accurately, it is sometimes necessary to speak with a sample of external customers. One-on-one or small group sessions are typically more effective than surveys, which require brevity to be completed in sufficient numbers and can add development time to the project. More open-ended information also allows for the uncovering of issues with which the team was unaware. For example, a permitting office improvement project may invite a group of external contractors for lunch and ask for their input. These sessions would not require the entire project team. The facilitator must be careful to keep the discussion focused on defining value and exposing problems, while exploring gaps in the present service offering.

Measure—Map the Process and Collect Associated Data[14]

The team must develop a common and complete understanding of the service process. This objective is best achieved using one or more displays. Each display, generically referred to as a process map, shows the service process flow in a visual and intuitive manner. It is important that each process map include every activity that takes place, including those that are undesirable such as returning incomplete paperwork to a sender. The complexity of the process map should be kept manageable and not include, for example, activities that rarely occur.

Multiple process maps are often helpful to understand the service from various perspectives, including cross-functional interactions, physical movement within a building, lead time breakdown, and processing times for each activity. Various types of process mapping methods that should be included in a Lean Six Sigma training program are listed and described in Table 4 on page 22.

Who Pays the Bill?

A tax collection process would have two main customers. The first customer is the taxpayer, who judges performance based on accuracy (an error-free tax bill), timeliness (receiving the bill in time to make a payment), convenience (a payment option that suits his or her needs), courtesy (pleasant interactions when calling or visiting the office), and responsiveness (quick question resolution). A second customer is the governmental entity, which judges performance based on speed (prompt deposit) and accuracy (error-free processing).

Womack and Jones[15] suggest the use of a process map to create an understanding of how customers interact with the service process, referring to the display as a "consumption map." Consumption maps can be very helpful when the project team has little understanding of customers, especially in cases where the interaction is relatively complex. They are similar but more comprehensive than a traditional service blueprint, which separates front-office interactions from back-office functions.

The creation of a process map will change the focus of a project team discussion from finger-pointing at each other (to assign blame) to finger-pointing at the display (to understand the process). A process map also highlights the interaction among stakeholders during service delivery, which is not always obvious to a worker focused on performing a specific task. The project team members will begin to appreciate that they indeed work together and that the service will be enhanced if they work together more effectively. The value of a process map cannot be overstated.

It is generally true that as process improvement programs mature, their use of data increases. Without the benefit of data, a project team risks making recommendations based on inaccurate perceptions. For example, during a project to reduce late trash pickups, a data set may be used to provide their location, while another data set may be used to calculate average duration of each process step (e.g., how long trucks wait at the landfill). Data will help determine if a problem is systematic (requiring a systemwide solution) or sporadic (requiring a solution focused on a specific time or place).

Counting What Hurts, Part II

For a process that reports OSHA-recordable data, waste could include: late delivery of information (delay); management check of a report (review); reworking an incorrect data analysis (mistake); entering written data into a computer (duplication); employees walking to pick up forms (movement); generating ad hoc reports by hand (processing inefficiency); and having technically experienced employees perform mundane tasks (resource inefficiency).

Analyze—Identify Problems, Value-Added Activities, and Non-Value-Added Activities

The process maps and associated data will often highlight areas of concern without excessive analysis. But the project team should ensure objectivity by systematically identifying the process steps that add direct value to customers and highlighting those steps that do not add value. The non-value-added activities would collectively be called waste. While some Lean practitioners refer to seven traditional categories of waste,[16] an alternative list that applies to services has been developed.[17] The seven service process waste categories are:

1. **Delay:** Time spent in a visible queue (e.g., paperwork in an in-box) or time spent waiting for information (e.g., a voice-mail message response)
2. **Review:** Inspection of completed or partially completed work to check for errors or omissions (e.g., confirming conformance with standard accounting procedures or checking work of a new employee)
3. **Mistake:** Redoing work because of errors or omissions identified internally (e.g., correcting data entry errors) or noticed by external customers (e.g., resending a bill originally mailed to an incorrect address)
4. **Duplication:** Activities that are done elsewhere in the system or that can be done more easily in another part of the system (e.g., writing data onto a form prior to computer entry or making a hard copy of a form that is saved electronically)
5. **Movement:** Physical transport of information, personnel, or equipment (e.g., traveling to attend a meeting or mailing reports to a customer)
6. **Processing inefficiency:** Performing a task in an ineffective manner (e.g., "reinventing the wheel" every time a report is generated or punching holes in paper after copying)
7. **Resource inefficiency:** Ineffective management of personnel, equipment, materials, or capital (e.g., idle workers or using workers for tasks not requiring their skills)

Once a significant form of waste is identified, the project team must be careful to address its cause rather than its symptoms. A method of identifying root cause, known as the Five Whys, is very helpful for "drilling down" to root cause. As an example, consider the case of excessive errors in documents sent to federal regulators. A response to a symptom would be having a manager check all documents prior to their submission to the regulator. But this inspection will add cost and time, and may not significantly improve quality. Consider the application of the Five Whys:

1. *Why are there errors?* Usually because the document is incomplete.
2. *Why are documents incomplete?* Usually because writers forget to include all necessary information.
3. *Why do they forget?* Because they are trained to focus on accuracy, not completeness.
4. *Why aren't they trained to check for completeness?* Because the regulators frequently make changes to the reporting requirements after the training is completed.

Note that the number five in Five Ways is arbitrary since the root cause may be found after any number of iterations, in this case four. Based on this root cause, recommendations may include the creation of a standard reporting template or the implementation of a checklist, along with procedures for updating the template or checklist as requirements change.

Improve—Find Ways to Eliminate Waste and/or Add Value

To ensure objectivity, each idea for improvement should be geared toward removing a specific waste or adding value where gaps in customer service were noted. A challenge often faced by the facilitator is keeping each team member engaged and actively

participating, while at the same time focusing the discussion on relevant ideas.

Narrowing down a large number of improvement ideas requires evaluating or rating each idea based on two sets of criteria. One set of criteria would concern the projected benefits. The benefits of each idea should be projected for all customers across every dimension of value. The second set of criteria would concern projected costs. The costs of each idea would include implementation time, ease of implementation, risk of creating new problems, required resources, implementation cost, complexity of operation, required training, probability of stakeholder acceptance, and required computer system modifications.

It is tempting to consider improvement ideas that involve the use of information technologies, such as handheld devices, personal computers, or software modifications. But the project team must be careful to avoid the automation of waste. If automation is considered, it is imperative that representatives from departments that would be responsible for its creation and maintenance be consulted. Indirect costs such as training and maintenance must be considered as well as the capability of the users, including customers.

Often, improvement projects focus on streamlining paperwork flow. In these cases, the project team should recognize that the purpose of the service is not to transmit paper but to transmit information. Problems can be mitigated by considering redesign of the paperwork to serve two purposes: reduce waste in the service process and provide better value for customers. As an example, a real estate tax bill may be redesigned to make instructions simpler and simultaneously provide taxpayers with additional information such as their property's appraised value.

Control—Develop Implementation and Follow-Up Plan

The control phase of DMAIC is often overlooked but extremely critical. It involves the development of plans to track implementation progress, collect data on subsequent performance, and identify the return of previous problems or the creation of new unanticipated problems. A useful starting point is the documentation of a revised set of standard operating procedures. Ideally, ideas suggested by the team to prevent problems, such as flowcharts to illustrate workflow, checklists to ensure completeness, and standard forms to guarantee accuracy, would be included in the procedures.

Picking the Fruit

For most government services, basic improvement techniques often provide great opportunity for significant performance enhancement due to the prevalence of "low hanging fruit." Some of the popular techniques include mistake proofing (i.e., creating a mechanism to prevent a problem from occurring); Five S (i.e., organizing a workplace to reduce wasted time); standard work (i.e., finding the best way to complete a task); and other forms of standardization (i.e., creating a standard set of internal processes).

Data on performance may take as many as three forms. First, metrics could be placed within the system to measure, internally and objectively, how well the system performs. Second, customer surveys could be developed and used to measure customer perspective on performance. And third, a feedback mechanism could be initiated to highlight problems as they arise.

The feedback mechanism for identifying problems should be quick, easy, and non-judgmental. Highly visual means are useful to communicate the existence of problems to employees and managers, and to separate recurring problems from isolated events. For example, employees would write problems they see onto a card or sticky note, which is then placed onto a centrally located display board. It is important that the note contain a problem, not a solution and not an assignment of blame. Periodically, the notes would be retrieved, the problems tabulated, and the staff would meet to discuss fixes as a form of continuous improvement.

Actions taken during this phase help to sustain process improvement efforts by ensuring project closure and by guaranteeing that the project team's efforts have produced change for the better. Two recommendations should be considered: (1) a follow-up six-month or one-year project team meeting could be scheduled for each improvement project, where recommendations would be revisited, their success

Counting What Hurts, Part III

When a project is initiated, the champion of the project is likely to launch the project with remarks such as those below:

> "The project's goal is to increase the speed with which the safety department collects monthly data on OSHA-recordable accidents and injuries. Timely collection of these data will enable the department to spend more time working to improve safety for employees. The city will also pay less in OSHA fines and would be able to save money by using fewer outside consultants.
>
> Members of the project team will be observing the data collection process, listening to all those involved with data collection, and objectively analyzing the workflow to see where mistakes occur and delays in obtaining data are common. The team will report their progress on a monthly basis to all levels of management. Everyone will need to help with implementing the team's recommendations, so if anyone doubts the objectivity of the team or wishes to get involved in the project, they should contact the team leader, Michael Smith."

analyzed, and modifications considered; or (2) a centrally located database or spreadsheet could be maintained that contains important information for each project, such as its goals, results, and implementation timeframe.

When waste is removed from a service process, the lead time will almost always decrease and problems will become more obvious than they were in the past. For example, in a wasteful process, paperwork returned to the sender for correction may not be noticed as obviously as it would be if the process were streamlined. The analogy often employed is relating the level of waste to a brook's water depth and relating problems to rocks beneath the water's surface. As process waste is removed, the lead time (water level) decreases and more problems are noticeable (the rocks break the water's surface).

Project Communication

It is recommended that sharing information about each project be done early (before the project begins), often (during the project execution), and thoroughly (by including all key constituency groups). At a minimum, the communication should be targeted to the project team, to administrators responsible for the service process, to employees affected by the project, and to other administrators indirectly affected by the project.

Prior to and During Project Execution

Early in the project, the creation of an "elevator speech" is recommended so that the project team communicates a common theme to co-workers and others. It would be a less formalized version of the problem statement, but brief and written in conversational form. The elevator speech can help to serve an internal public relations purpose by exposing employees to ongoing projects and reinforcing their usefulness and transparency.

Periodic status meetings are also recommended. Such meetings could serve as "tollgate" meetings in which the project sponsors and champions assess progress and provide guidance for the next phase. They should be targeted to key leaders and affected administrators who are not members of the project team. Keeping all decision makers informed is critical. For example, it eliminates unfortunate "surprises" by identifying challenges with which the project team is unaware. The status meetings also help support cultural change within the organization.

Minutes of team meetings need not be excessively long, but should include action items for the team. Experience has shown that unless each team member is given a specific task for which he or she is responsible, it is likely that the task will not be completed. Usually peer pressure and disappointment with letting down the team will motivate team members to complete their "homework" assignment.

After Project Completion

The final project results should be delivered to key leaders and affected administrators. But it is also helpful to expose as many employees as possible to the project and its results. In addition, communication with taxpayers and other external stakeholders may be considered to promote a sense of progressive and competent government. For example, the city of Fort Wayne organizes an annual forum in September for the presentation

of their improvement projects. Businesses in and around the region are also invited to participate. Several hundred presenters and other visitors attend.

The specific forms of communication should vary depending on the targeted group or individual. Communication to the leadership team would typically involve both an oral presentation and a written report. It is also recommended that content of the final presentation be made more widely available in a visible and convenient way. Options include physical placement prominently in the facility, placement on the organization's computer system, placement on a public Internet site, and inclusion in the organization's internal newsletter. A large storyboard, for example, could be displayed prominently in a cafeteria or another popular location routinely visited by employees.

The Future of Lean Six Sigma in Government

A disciplined process improvement methodology, such as Lean Six Sigma, can benefit any organization, from large corporations to small municipalities. By focusing on intuitive techniques such as process maps, mistake proofing, and standardization, Lean Six Sigma is easily understood and highly transparent, enhancing communication and participation. If implemented wisely, Lean Six Sigma can be robust and adaptable.

Those programs that have managed to sustain success in process improvement possess similar characteristics. Their early attention to the development of a solid organizational foundation was crucial. The implementation of highly structured improvement projects provides confidence that each improvement effort will be justified. But their success may also be attributed to some level of happenstance, such as leaders re-elected for multiple terms and leadership teams with private-sector experience or access.

For public-sector entities, the opportunities are great, but only if the obstacles to implementation are well understood. Employees at all levels must participate, and therefore leaders need to appreciate that each employee needs to personally benefit from Lean Six Sigma. Creating another bureaucracy or another mandate from headquarters must give way to an organization-wide attitude that fosters a focus on customers and their satisfaction. As such, the integration of Lean Six Sigma within the organization must be carefully nurtured.

As we look into the future of process improvement in government, two things are clear: We know what to do and we know how to do it. The methodology of Lean Six Sigma has borrowed freely from past quality initiatives while incorporating an improved implementation structure. It is hard to imagine a new and substantially improved methodology. The onus is squarely placed on leadership—there needs to be real understanding of the requirements for success and there needs to be real commitment to making the changes necessary to achieve a transformation.

Lean Six Sigma supports the ongoing changes in government that are expected to accelerate as we move into the 21st century. For example, a 2006 report by the IBM Center for The Business of Government highlighted six trends that are transforming government,[18] three of which are directly related to process improvement efforts such as Lean Six Sigma. In particular:

- *The use of performance management systems will accelerate.* If these systems are to support the improvement of services, an accompanying process improvement methodology needs to be implemented. There must be an understanding that managing performance is equal parts measuring performance and improving performance. In particular, services do not improve on their own, even within a strong performance-measurement environment.
- *The tendency toward higher levels of citizen engagement is beginning.* Citizen involvement clearly fits into a Lean Six Sigma framework, where citizens are considered customers and treated that way. In fact, a Lean Six Sigma effort that does not include significant customer (and other stakeholder) involvement is doomed to failure.
- *One-size-fits-all approaches will give way to an emphasis on managerial flexibility within departments and agencies.* Lean Six Sigma can

support this concept, referred to as "changing the rules," due to its implementation structure combined with its adaptability. But this support needs to originate and be fostered at the highest levels. That is, the organization as a whole must be committed to the infrastructural and cultural transformations that are needed for Lean Six Sigma to take hold.

While it is hard to predict the future, Lean Six Sigma is likely to be viewed as a valuable approach in the portfolio of management improvement programs that can be undertaken by government executives. And the citizenry may begin to believe that their tax dollars, at least relatively speaking, are well spent.

Acknowledgments

Many individuals helped with this project by completing written questionnaires, participating in live interviews, or identifying useful contacts. The author is grateful to the following individuals: Mark Abramson, Randy Allen, James Cavanaugh, Barry Crook, Lee Erdmann, Janice Gloster, Guy Gordon, Barbara Heller, Roger Hirt, Albert Ilg, Kirk Jaeger, Frank Kaminsky, Harry Kenworthy, Tony Kirby, Lynn Lachance, William Mee, Becky Meyers, Howard Schussler, Don Shaw, Joseph Smith, Dale Weeks, and Dave Yoest. The author also expresses his gratitude to the Government Division of the American Society for Quality.

Appendix: Research Methodology

The activities employed to create the Lean Six Sigma implementation guidelines consisted of the following three activities:

1. An analysis of how public-sector services differ from private-sector services was conducted. This work was a natural extension of recent work on service processes existing primarily in private-sector companies.[19] A key conclusion was that unique characteristics found in services must be taken into account when considering their management and improvement. These characteristics, however, may not be evident to an observer given the myriad of diverse activities that take place when delivering a service. To understand the uniqueness of public-sector services, a list of services offered by governments was developed and analyzed. The list was derived from reviews of budgets and other strategic and operational planning documents, as well as meetings with administrators.
2. The development and analysis of open-ended written questionnaires was completed. Twenty-five questionnaires were completed by experienced public-sector administrators identified through professional organizations. Questions related to where improvement efforts were focused; how projects were chosen; project teams' average size, level of commitment, and overall project durations; the project management structure; the main process improvement techniques used during typical projects; and the improvement projects that were the most successful and why. In addition, potential barriers were listed and participants were asked to indicate which gave them the most challenge. Finally, each participant was asked to provide specific advice to a public administrator wishing to initiate a comprehensive process improvement effort.
3. Extensive follow-up interviews with 15 public-sector administrators currently or previously involved in process improvement efforts were conducted. These audiotaped interviews lasted anywhere from 30 minutes to two hours, and allowed participants to elaborate on their experiences, specific projects, and the advice they chose to offer. Participants were also asked to respond to hypotheses offered by the author pertaining to Lean Six Sigma guidelines under consideration. These sessions helped to validate the guidelines presented in this report.

Among the myriad of advice offered by questionnaire participants and interviewees, no one suggested that implementing a comprehensive program for process improvement would be easy. On the other hand, no one suggested that an effort not be made.

Endnotes

1. During 1949 to 1975, the Toyota Production System (TPS) gradually evolved into what is generally considered the gold standard of manufacturing effectiveness. Consequently, it has been the focus of many academic studies. During the 1980s, the phrase "just-in-time" (JIT) was used in the United States to denote manufacturing approaches, based on the TPS, that minimized queue time of parts waiting for each operation, thus speeding the flow of production. The phrase JIT was gradually replaced by the term "Lean" to denote a more encompassing system that fosters the removal of all wasteful activities and practices.

2. James P. Womack, Daniel T. Jones, and Daniel Roos, *The Machine That Changed The World*, HarperCollins Publishers, 1991.

3. The term "waste" is often used in the public sector to define programs or services that do not contribute to the overall well-being of society and therefore constitute a waste of taxpayer money. In Lean, waste is used to denote specific non-value-added activities that take place during the delivery of a service, such as errors and delays.

4. James P. Womack and Daniel T. Jones, *Lean Thinking* (2nd Edition), Free Press, 2003.

5. Bob L. Emiliani, *Better Thinking, Better Results*, Center for Lean Management, 2003.

6. While in many ways the study of Lean has its roots in academe and therefore possesses a relatively consistent definition, Six Sigma, with its roots firmly in industry, includes a more diverse set of definitions and viewpoints. Therefore, readers should consider this introduction to be the author's informed opinion.

7. The Malcolm Baldrige National Quality Award (MBNQA) is generally considered the most prestigious award for businesses, education, and healthcare organizations. Companies apply for consideration based on seven sets of criteria. The award is judged by the U.S. Commerce Department's National Institute of Standards and Technology (NIST) and presented by the president of the United States.

8. The term "sigma" refers to a statistical measure of variation and the number "six" refers to the relationship between process variation and product specifications. When used as a metric, six sigma quality is achieved when each potential defect would have a very small chance of occurrence, usually expressed as 3.4 defects per million opportunities.

9. http://www.asq.org/government/why-quality/overview.html

10. TQM (Total Quality Management) was arguably the first comprehensive quality management program that took the responsibility of quality control from the quality department and placed it into the hands of employees throughout the organization. It included a significant amount of training albeit in ways that were not always consistent across or within organizations.

11. The International Organization for Standardization (ISO) is an international body that produces standards for business operation. In North America, many practitioners are familiar with the ISO 9000 family of standards that concern the management of quality.

12. http://www.cityoffortwayne.org/index.php?option=com_content&task=view&id=1014&Itemid=1158

13. John Maleyeff, "Exploration of Internal Service Systems Using Lean Principles," *Management Decision* 44-5 (2006), pp. 679–682.

14. In most standard applications of DMAIC, process mapping takes place during the define phase. It is presented here as the initial step in the measure phase since, for many services, the process map acts as both a description of the process and a means for initiating data collection.

15. James P. Womack and Daniel T. Jones, *Lean Solutions*, Simon & Schuster, 2005.

16. At Toyota, Taiichi Ohno developed a classification system consisting of seven waste categories to analyze manufacturing processes: defective material, excess employee movement, material transport, processing

delays, processing inefficiency, overproduction to account for yield losses, and inventory beyond what is presently needed. Some of these categories do not apply directly or obviously to service processes.

17. Maleyeff, pp. 683–684.

18. Mark A. Abramson, Jonathan D. Breul, and John M. Kamensky, "Six Trends Transforming Government," IBM Center for The Business of Government, Washington, D.C., 2006.

19. Maleyeff, pp. 674–689.

References

Abramson, Mark A., Jonathan D. Breul, and John M. Kamensky. "Six Trends Transforming Government," IBM Center for The Business of Government, Washington, D.C., 2006.

Cunningham, J., and O. Fiume. *Real Numbers: Management Accounting in a Lean Organization*. Managing Times Press, 2003.

Deming, W. E. *Out of the Crisis*. MIT Center for Advanced Engineering Study, 1986.

Emiliani, Bob L. *Better Thinking, Better Results*. Center for Lean Management, 2003.

Emiliani, Mario L. "Lean Behaviors." *Management Decision* 36-9 (1998), pp. 615–631.

George, Michael L. *Lean Six Sigma for Service*. McGraw-Hill, 2003.

Hammer, Michael. "Deep Change: How Operational Innovation Can Transform Your Company." *Harvard Business Review* 82-4 (2004), pp. 84–95.

IBM Institute for Business Value. *Driving Operational Innovation Using Lean Six Sigma*, January 2007.

Imai, M. *Kaizen*. McGraw-Hill, 1986.

Maleyeff, John. "Benchmarking Performance Indices: Pitfalls and Solutions," *Benchmarking: An International Journal* 10-1 (2003), pp. 9–28.

Maleyeff, John. "Exploration of Internal Service Systems Using Lean Principles." *Management Decision* 44-5 (2006), pp. 674–689.

Ohno, Taiichi. *The Toyota Production System*. Productivity Press, 1998.

Parasuraman, A., V. A. Zeithaml, and L. L. Berry. "A Conceptual Model of Service Quality and Its Implications for Future Research." *Journal of Marketing* 49 (1985), pp. 41–50.

Rother, M., and J. Shook. *Learning to See (Version 1.3)*. Lean Enterprise Institute, 2003.

Spear, S., and H. K. Bowen. "Decoding the DNA of the Toyota Production System." *Harvard Business Review* 77-5 (1999), pp. 96–106.

Womack, James P., and Daniel T. Jones. *Lean Solutions*. Simon & Schuster, 2005.

Womack, James P., and Daniel T. Jones. *Lean Thinking* (2nd Edition). Free Press, 2003.

Womack, James P., Daniel T. Jones, and Daniel Roos. *The Machine That Changed the World*. HarperCollins Publishers, 1991.

ABOUT THE AUTHOR

John Maleyeff is a professor in the Lally School of Management & Technology on the Hartford, Connecticut, campus of Rensselaer Polytechnic Institute (RPI). Dr. Maleyeff teaches graduate courses to working professionals in operations management and quantitative methods. His research focuses on applying analytical and management methodologies, such as Lean and Six Sigma, to manufacturing, service, healthcare, and educational entities, including their internal business processes. He also consults with a number of businesses, mostly in the areas of Lean management, operations planning and control, and statistical modeling.

Dr. Maleyeff has held professional positions at RCA's David Sarnoff Research Center in New Jersey, LEGO Group A/S in Denmark, and the U.S. Department of Defense. He was previously on the faculty of industrial and manufacturing engineering at Western New England College, where he developed a reputation for leading-edge interdisciplinary curricula development in conjunction with industrial interaction.

His publications have appeared in a diverse set of international journals, including *Management Decision, Quality Engineering, International Journal of Educational Management, The TQM Magazine, Benchmarking: An International Journal, Journal of Management in Engineering,* and *The Journal of Healthcare Risk Management*. He is a member of the Decision Sciences Institute (DSI) and the American Society for Quality (ASQ).

Dr. Maleyeff received his Ph.D. in industrial engineering and operations research from the University of Massachusetts.

KEY CONTACT INFORMATION

To contact the author:

John Maleyeff, Ph.D.
Professor, Lally School of Management & Technology
Rensselaer Polytechnic Institute, Hartford Campus
275 Windsor Street
Hartford, CT 06120
(860) 548-7870
fax: (860) 548-5322

e-mail: maleyj@rpi.edu

COMPETITION, CHOICE, AND INCENTIVES

Determining a Level Playing Field for Public-Private Competition (1999)
Lawrence L. Martin

Implementing State Contracts for Social Services: An Assessment of the Kansas Experience (2000)
Jocelyn M. Johnston and Barbara S. Romzek

A Vision of the Government as a World-Class Buyer: Major Procurement Issues for the Coming Decade (2002)
Jacques S. Gansler

Contracting for the 21st Century: A Partnership Model (2002)
Wendell C. Lawther

Franchise Funds in the Federal Government: Ending the Monopoly in Service Provision (2002)
John J. Callahan

Making Performance-Based Contracting Perform: What the Federal Government Can Learn from State and Local Governments (2002, 2nd ed.)
Lawrence L. Martin

Moving to Public-Private Partnerships: Learning from Experience around the World (2003)
Trefor P. Williams

IT Outsourcing: A Primer for Public Managers (2003)
Yu-Che Chen and James Perry

The Procurement Partnership Model: Moving to a Team-Based Approach (2003)
Kathryn G. Denhardt

Moving Toward Market-Based Government: The Changing Role of Government as the Provider (2004, 2nd ed.)
Jacques S. Gansler

Transborder Service Systems: Pathways for Innovation or Threats to Accountability? (2004)
Alasdair Roberts

Competitive Sourcing: What Happens to Federal Employees? (2004)
Jacques S. Gansler and William Lucyshyn

Implementing Alternative Sourcing Strategies: Four Case Studies (2004)
Edited by Jacques S. Gansler and William Lucyshyn

Designing Competitive Bidding for Medicare (2004)
John Cawley and Andrew B. Whitford

International Experience Using Outsourcing, Public-Private Partnerships, and Vouchers (2005)
Jón R. Blöndal

Effectively Managing Professional Services Contracts: 12 Best Practices (2006)
Sandra L. Fisher, Michael E. Wasserman, and Paige P. Wolf

E-GOVERNMENT

Supercharging the Employment Agency: An Investigation of the Use of Information and Communication Technology to Improve the Service of State Employment Agencies (2000)
Anthony M. Townsend

Assessing a State's Readiness for Global Electronic Commerce: Lessons from the Ohio Experience (2001)
J. Pari Sabety and Steven I. Gordon

Privacy Strategies for Electronic Government (2001)
Janine S. Hiller and France Bélanger

Commerce Comes to Government on the Desktop: E-Commerce Applications in the Public Sector (2001)
Genie N. L. Stowers

The Use of the Internet in Government Service Delivery (2001)
Steven Cohen and William Eimicke

State Web Portals: Delivering and Financing E-Service (2002)
Diana Burley Gant, Jon P. Gant, and Craig L. Johnson

Internet Voting: Bringing Elections to the Desktop (2002)
Robert S. Done

Leveraging Technology in the Service of Diplomacy: Innovation in the Department of State (2002)
Barry Fulton

Federal Intranet Work Sites: An Interim Assessment (2002)
Julianne G. Mahler and Priscilla M. Regan

The State of Federal Websites: The Pursuit of Excellence (2002)
Genie N. L. Stowers

State Government E-Procurement in the Information Age: Issues, Practices, and Trends (2002)
M. Jae Moon

Preparing for Wireless and Mobile Technologies in Government (2002)
Ai-Mei Chang and P. K. Kannan

Public-Sector Information Security: A Call to Action for Public-Sector CIOs (2002, 2nd ed.)
Don Heiman

The Auction Model: How the Public Sector Can Leverage the Power of E-Commerce Through Dynamic Pricing (2002, 2nd ed.)
David C. Wyld

The Promise of E-Learning in Africa: The Potential for Public-Private Partnerships (2003)
Norman LaRocque and Michael Latham

Digitally Integrating the Government Supply Chain: E-Procurement, E-Finance, and E-Logistics (2003)
Jacques S. Gansler, William Lucyshyn, and Kimberly M. Ross

Using Technology to Increase Citizen Participation in Government: The Use of Models and Simulation (2003)
John O'Looney

Seaport: Charting a New Course for Professional Services Acquisition for America's Navy (2003)
David C. Wyld

E-Reporting: Strengthening Democratic Accountability (2004)
Mordecai Lee

Understanding Electronic Signatures: The Key to E-Government (2004)
Stephen H. Holden

Measuring the Performance of E-Government (2004)
Genie N. L. Stowers

Restoring Trust in Government: The Potential of Digital Citizen Participation (2004)
Marc Holzer, James Melitski, Seung-Yong Rho, and Richard Schwester

From E-Government to M-Government? Emerging Practices in the Use of Mobile Technology by State Governments (2004)
M. Jae Moon

Government Garage Sales: Online Auctions as Tools for Asset Management (2004)
David C. Wyld

Innovation in E-Procurement: The Italian Experience (2004)
Mita Marra

Computerisation and E-Government in Social Security: A Comparative International Study (2005)
Michael Adler and Paul Henman

The Next Big Election Challenge: Developing Electronic Data Transaction Standards for Election Administration (2005)
R. Michael Alvarez and Thad E. Hall

Assessing the Impact of IT-Driven Education in K–12 Schools (2005)
Ganesh D. Bhatt

The Blogging Revolution: Government in the Age of Web 2.0 (2007)
David C. Wyld

Bridging the Digital Divide for Hard-to-Reach Groups (2007)
Heike Boeltzig and Doria Pilling

Can Governments Create Universal Internet Access? The Philadelphia Municipal Wireless Network Story (2007)
Abhijit Jain, Munir Mandviwalla, and Rajiv D. Banker

FINANCIAL MANAGEMENT

Credit Scoring and Loan Scoring: Tools for Improved Management of Federal Credit Programs (1999)
Thomas H. Stanton

Using Activity-Based Costing to Manage More Effectively (2000)
Michael H. Granof, David E. Platt, and Igor Vaysman

Audited Financial Statements: Getting and Sustaining "Clean" Opinions (2001)
Douglas A. Brook

An Introduction to Financial Risk Management in Government (2001)
Richard J. Buttimer, Jr.

Understanding Federal Asset Management: An Agenda for Reform (2003)
Thomas H. Stanton

Efficiency Counts: Developing the Capacity to Manage Costs at Air Force Materiel Command (2003)
Michael Barzelay and Fred Thompson

Federal Credit Programs: Managing Risk in the Information Age (2005)
Thomas H. Stanton

Grants Management in the 21st Century: Three Innovative Policy Responses (2005)
Timothy J. Conlan

Performance Budgeting: How NASA and SBA Link Costs and Performance (2006)
Lloyd A. Blanchard

Transforming Federal Property Management: A Case for Public-Private Partnerships (2007)
Judith Grant Long

HUMAN CAPITAL MANAGEMENT

Results of the Government Leadership Survey (1999)
Mark A. Abramson

Profiles in Excellence: Conversations with the Best of America's Career Executive Service (1999)
Mark W. Huddleston

Reflections on Mobility: Case Studies of Six Federal Executives (2000)
Michael D. Serlin

Managing Telecommuting in the Federal Government: An Interim Report (2000)
Gina Vega and Louis Brennan

Using Virtual Teams to Manage Complex Projects: A Case Study of the Radioactive Waste Management Project (2000)
Samuel M. DeMarie

A Learning-Based Approach to Leading Change (2000)
Barry Sugarman

Toward a 21st Century Public Service: Reports from Four Forums (2001)
Mark A. Abramson

Labor-Management Partnerships: A New Approach to Collaborative Management (2001)
Barry Rubin and Richard Rubin

Winning the Best and Brightest: Increasing the Attraction of Public Service (2001)
Carol Chetkovich

A Weapon in the War for Talent: Using Special Authorities to Recruit Crucial Personnel (2001)
Hal G. Rainey

A Changing Workforce: Understanding Diversity Programs in the Federal Government (2001)
Katherine C. Naff and J. Edward Kellough

Life after Civil Service Reform: The Texas, Georgia, and Florida Experiences (2002)
Jonathan Walters

The Defense Leadership and Management Program: Taking Career Development Seriously (2002)
Joseph A. Ferrara and Mark C. Rom

The Influence of Organizational Commitment on Officer Retention: A 12-Year Study of U.S. Army Officers (2002)
Stephanie C. Payne, Ann H. Huffman, and Trueman R. Tremble, Jr.

Human Capital Reform: 21st Century Requirements for the United States Agency for International Development (2003)
Anthony C. E. Quainton and Amanda M. Fulmer

Modernizing Human Resource Management in the Federal Government: The IRS Model (2003)
James R. Thompson and Hal G. Rainey

Mediation at Work: Transforming Workplace Conflict at the United States Postal Service (2003)
Lisa B. Bingham

Growing Leaders for Public Service (2004, 2nd ed.)
Ray Blunt

Pay for Performance: A Guide for Federal Managers (2004)
Howard Risher

The Blended Workforce: Maximizing Agility Through Nonstandard Work Arrangements (2005)
James R. Thompson and Sharon H. Mastracci

The Transformation of the Government Accountability Office: Using Human Capital to Drive Change (2005)
Jonathan Walters and Charles Thompson

Designing and Implementing Performance-Oriented Payband Systems (2007)
James R. Thompson

Managing for Better Performance: Enhancing Federal Performance Management Practices (2007)
Howard Risher and Charles H. Fay

Seven Steps of Effective Workforce Planning (2007)
Ann Cotten

INNOVATION

Managing Workfare: The Case of the Work Experience Program in the New York City Parks Department (1999)
Steven Cohen

New Tools for Improving Government Regulation: An Assessment of Emissions Trading and Other Market-Based Regulatory Tools (1999)
Gary C. Bryner

Religious Organizations, Anti-Poverty Relief, and Charitable Choice: A Feasibility Study of Faith-Based Welfare Reform in Mississippi (1999)
John P. Bartkowski and Helen A. Regis

Business Improvement Districts and Innovative Service Delivery (1999)
Jerry Mitchell

An Assessment of Brownfield Redevelopment Policies: The Michigan Experience (1999)
Richard C. Hula

San Diego County's Innovation Program: Using Competition and a Whole Lot More to Improve Public Services (2000)
William B. Eimicke

Innovation in the Administration of Public Airports (2000)
Scott E. Tarry

Entrepreneurial Government: Bureaucrats as Businesspeople (2000)
Anne Laurent

Rethinking U.S. Environmental Protection Policy: Management Challenges for a New Administration (2000)
Dennis A. Rondinelli

Understanding Innovation: What Inspires It? What Makes It Successful? (2001)
Jonathan Walters

Government Management of Information Mega-Technology: Lessons from the Internal Revenue Service's Tax Systems Modernization (2002)
Barry Bozeman

Advancing High End Computing: Linking to National Goals (2003)
Juan D. Rogers and Barry Bozeman

The Challenge of Innovating in Government (2006, 2nd ed.)
Sandford Borins

A Model for Increasing Innovation Adoption: Lessons Learned from the IRS *e-file* Program (2006)
Stephen H. Holden

MANAGING FOR PERFORMANCE AND RESULTS

Corporate Strategic Planning in Government: Lessons from the United States Air Force (2000)
Colin Campbell

Using Evaluation to Support Performance Management: A Guide for Federal Executives (2001)
Kathryn Newcomer and Mary Ann Scheirer

Managing for Outcomes: Milestone Contracting in Oklahoma (2001)
Peter Frumkin

The Challenge of Developing Cross-Agency Measures: A Case Study of the Office of National Drug Control Policy (2001)
Patrick J. Murphy and John Carnevale

The Potential of the Government Performance and Results Act as a Tool to Manage Third-Party Government (2001)
David G. Frederickson

Using Performance Data for Accountability: The New York City Police Department's CompStat Model of Police Management (2001)
Paul E. O'Connell

Moving Toward More Capable Government: A Guide to Organizational Design (2002)
Thomas H. Stanton

The Baltimore CitiStat Program: Performance and Accountability (2003)
Lenneal J. Henderson

Strategies for Using State Information: Measuring and Improving Program Performance (2003)
Shelley H. Metzenbaum

Linking Performance and Budgeting: Opportunities in the Federal Budget Process (2004, 2nd ed.)
Philip G. Joyce

How Federal Programs Use Outcome Information: Opportunities for Federal Managers (2004, 2nd ed.)
Harry P. Hatry, Elaine Morley, Shelli B. Rossman, and Joseph S. Wholey

Performance Management for Career Executives: A "Start Where You Are, Use What You Have" Guide (2004, 2nd ed.)
Chris Wye

Staying the Course: The Use of Performance Measurement in State Governments (2004)
Julia Melkers and Katherine Willoughby

Moving from Outputs to Outcomes: Practical Advice from Governments Around the World (2006)
Burt Perrin

Using the Balanced Scorecard: Lessons Learned from the U.S. Postal Service and the Defense Finance and Accounting Service (2006)
Nicholas J. Mathys and Kenneth R. Thompson

Performance Leadership: 11 Better Practices That Can Ratchet Up Performance (2006, 2nd ed.)
Robert D. Behn

Performance Accountability: The Five Building Blocks and Six Essential Practices (2006)
Shelley H. Metzenbaum

Implementing OMB's Program Assessment Rating Tool (PART): Meeting the Challenges of Integrating Budget and Performance (2006)
John B. Gilmour

The Philadelphia SchoolStat Model (2007)
Christopher Patusky, Leigh Botwinik, and Mary Shelley

What All Mayors Would Like to Know About Baltimore's CitiStat But Were Afraid Someone Might Actually Tell Them: Frequently Asked Questions About the CitiStat Performance Strategy (2007)
Robert D. Behn

NETWORKS AND PARTNERSHIPS

Leveraging Networks to Meet National Goals: FEMA and the Safe Construction Networks (2002)
William L. Waugh, Jr.

Applying 21st-Century Government to the Challenge of Homeland Security (2002)
Elaine C. Kamarck

Assessing Partnerships: New Forms of Collaboration (2003)
Robert Klitgaard and Gregory F. Treverton

Leveraging Networks: A Guide for Public Managers Working across Organizations (2003)
Robert Agranoff

Extraordinary Results on National Goals: Networks and Partnerships in the Bureau of Primary Health Care's 100%/0 Campaign (2003)
John Scanlon

Public-Private Strategic Partnerships: The U.S. Postal Service-Federal Express Alliance (2003)
Oded Shenkar

The Challenge of Coordinating "Big Science" (2003)
W. Henry Lambright

Communities of Practice: A New Tool for Government Managers (2003)
William M. Snyder and Xavier de Souza Briggs

Collaboration and Performance Management in Network Settings: Lessons from Three Watershed Governance Efforts (2004)
Mark T. Imperial

The Quest to Become "One": An Approach to Internal Collaboration (2005)
Russ Linden

Cooperation Between Social Security and Tax Agencies in Europe (2005)
Bernhard Zaglmayer, Paul Schoukens, and Danny Pieters

Leveraging Collaborative Networks in Infrequent Emergency Situations (2005)
Donald P. Moynihan

Public Deliberation: A Manager's Guide to Citizen Engagement (2006)
Carolyn J. Lukensmeyer and Lars Hasselblad Torres

A Manager's Guide to Choosing and Using Collaborative Networks (2006)
H. Brinton Milward and Keith G. Provan

The E-Government Collaboration Challenge: Lessons from Five Case Studies (2006)
Jane Fedorowicz, Janis L. Gogan, and Christine B. Williams

From Forest Fires to Hurricane Katrina: Case Studies of Incident Command Systems (2007)
Donald P. Moynihan

PRESIDENTIAL TRANSITIONS

The President's Management Council: An Important Management Innovation (2000)
Margaret L. Yao

Government Reorganization: Strategies and Tools to Get It Done (2004)
Hannah Sistare

Performance Management for Political Executives: A "Start Where You Are, Use What You Have" Guide (2004)
Chris Wye

Becoming an Effective Political Executive: 7 Lessons from Experienced Appointees (2005, 2nd ed.)
Judith E. Michaels

Getting to Know You: Rules of Engagement for Political Appointees and Career Executives (2005)
Joseph A. Ferrara and Lynn C. Ross

Six Trends Transforming Government (2006)
Mark A. Abramson, Jonathan D. Breul, and John M. Kamensky

Reflections on 21st Century Government Management (2007)
Donald F. Kettl and Steven Kelman

The Management of Regulation Development: Out of the Shadows (2007)
Cornelius M. Kerwin

SOCIAL SERVICES

Delivery of Benefits in an Emergency: Lessons from Hurricane Katrina (2007)
Thomas H. Stanton

STRATEGY AND TRANSFORMATION

The Importance of Leadership: The Role of School Principals (1999)
Paul Teske and Mark Schneider

Leadership for Change: Case Studies in American Local Government (1999)
Robert B. Denhardt and Janet Vinzant Denhardt

Managing Decentralized Departments: The Case of the U.S. Department of Health and Human Services (1999)
Beryl A. Radin

Transforming Government: The Renewal and Revitalization of the Federal Emergency Management Agency (2000)
R. Steven Daniels and Carolyn L. Clark-Daniels

Transforming Government: Creating the New Defense Procurement System (2000)
Kimberly A. Harokopus

Trans-Atlantic Experiences in Health Reform: The United Kingdom's National Health Service and the United States Veterans Health Administration (2000)
Marilyn A. DeLuca

Transforming Government: The Revitalization of the Veterans Health Administration (2000)
Gary J. Young

The Challenge of Managing Across Boundaries: The Case of the Office of the Secretary in the U.S. Department of Health and Human Services (2000)
Beryl A. Radin

Creating a Culture of Innovation: 10 Lessons from America's Best Run City (2001)
Janet Vinzant Denhardt and Robert B. Denhardt

Transforming Government: Dan Goldin and the Remaking of NASA (2001)
W. Henry Lambright

Managing Across Boundaries: A Case Study of Dr. Helene Gayle and the AIDS Epidemic (2002)
Norma M. Riccucci

Managing "Big Science": A Case Study of the Human Genome Project (2002)
W. Henry Lambright

The Power of Frontline Workers in Transforming Government: The Upstate New York Veterans Healthcare Network (2003)
Timothy J. Hoff

Making Public Sector Mergers Work: Lessons Learned (2003)
Peter Frumkin

Efficiency Counts: Developing the Capacity to Manage Costs at Air Force Materiel Command (2003)
Michael Barzelay and Fred Thompson

Managing the New Multipurpose, Multidiscipline University Research Centers: Institutional Innovation in the Academic Community (2003)
Barry Bozeman and P. Craig Boardman

The Transformation of the Government Accountability Office: Using Human Capital to Drive Change (2005)
Jonathan Walters and Charles Thompson

Transforming the Intelligence Community: Improving the Collection and Management of Information (2005)
Elaine C. Kamarck

Executive Response to Changing Fortune: Sean O'Keefe as NASA Administrator (2005)
W. Henry Lambright

Ramping Up Large, Non-Routine Projects: Lessons for Federal Managers from the Successful 2000 Census (2005)
Nancy A. Potok and William G. Barron, Jr.

The *Next* Government of the United States: Challenges for Performance in the 21st Century (2005)
Donald F. Kettl

Reforming the Federal Aviation Administration: Lessons from Canada and the United Kingdom (2006)
Clinton V. Oster, Jr.

Improving Service Delivery in Government with Lean Six Sigma (2007)
John Maleyeff

SUPPLY CHAIN MANAGEMENT

Enhancing Security Throughout the Supply Chain (2004)
David J. Closs and Edmund F. McGarrell

Investing in Supply Chain Security: Collateral Benefits (2005, 2nd ed.)
James B. Rice, Jr., and Philip W. Spayd

RFID: The Right Frequency for Government (2005)
David C. Wyld

Benchmarking Procurement Practices in Higher Education (2007)
Richard R. Young, Kusumal Ruamsook, and Susan B. Purdum

Collaboration: Using Networks and Partnerships
(Rowman & Littlefield Publishers, Inc., 2004)
John M. Kamensky and Thomas J. Burlin, editors

Competition, Choice, and Incentives in Government Programs
(Rowman & Littlefield Publishers, Inc., 2006)
John M. Kamensky and Albert Morales, editors

E-Government 2001
(Rowman & Littlefield Publishers, Inc., 2001)
Mark A. Abramson and Grady E. Means, editors

E-Government 2003
(Rowman & Littlefield Publishers, Inc., 2002)
Mark A. Abramson and Therese L. Morin, editors

Human Capital 2002
(Rowman & Littlefield Publishers, Inc., 2002)
Mark A. Abramson and Nicole Willenz Gardner, editors

Human Capital 2004
(Rowman & Littlefield Publishers, Inc., 2004)
Jonathan D. Breul and Nicole Willenz Gardner, editors

Innovation
(Rowman & Littlefield Publishers, Inc., 2002)
Mark A. Abramson and Ian Littman, editors

Integrating Performance and Budgets: The Budget Office of Tomorrow
(Rowman & Littlefield Publishers, Inc., 2006)
Jonathan D. Breul and Carl Moravitz, editors

Leaders
(Rowman & Littlefield Publishers, Inc., 2002)
Mark A. Abramson and Kevin M. Bacon, editors

Learning the Ropes: Insights for Political Appointees
(Rowman & Littlefield Publishers, Inc., 2005)
Mark A. Abramson and Paul R. Lawrence, editors

Managing for Results 2002
(Rowman & Littlefield Publishers, Inc., 2001)
Mark A. Abramson and John M. Kamensky, editors

Managing for Results 2005
(Rowman & Littlefield Publishers, Inc., 2004)
John M. Kamensky and Albert Morales, editors

Memos to the President: Management Advice from the Nation's Top CEOs
(John Wiley & Sons, Inc., 2000)
James J. Schiro, editor

Memos to the President: Management Advice from the Nation's Top Public Administrators
(Rowman & Littlefield Publishers, Inc., 2001)
Mark A. Abramson, editor

New Ways of Doing Business
(Rowman & Littlefield Publishers, Inc., 2003)
Mark A. Abramson and Ann M. Kieffaber, editors

The Procurement Revolution
(Rowman & Littlefield Publishers, Inc., 2003)
Mark A. Abramson and Roland S. Harris III, editors

Transforming Government Supply Chain Management
(Rowman & Littlefield Publishers, Inc., 2003)
Jacques S. Gansler and Robert E. Luby, Jr., editors

Transforming Organizations
(Rowman & Littlefield Publishers, Inc., 2001)
Mark A. Abramson and Paul R. Lawrence, editors

Note: Rowman & Littlefield books are available at bookstores, online booksellers, and from the publisher (www.rowmanlittlefield.com or 800-462-6420).

About the IBM Center for The Business of Government

Through research stipends and events, the IBM Center for The Business of Government stimulates research and facilitates discussion of new approaches to improving the effectiveness of government at the federal, state, local, and international levels.

The Center is one of the ways that IBM seeks to advance knowledge on how to improve public sector effectiveness. The IBM Center focuses on the future of the operation and management of the public sector.

About IBM Global Business Services

With consultants and professional staff in more than 160 countries globally, IBM Global Business Services is the world's largest consulting services organization. IBM Global Business Services provides clients with business process and industry expertise, a deep understanding of technology solutions that address specific industry issues, and the ability to design, build and run those solutions in a way that delivers bottom-line business value. For more information visit www.ibm.com.

For additional information, contact:
Jonathan D. Breul
Executive Director
IBM Center for The Business of Government
1301 K Street, NW
Fourth Floor, West Tower
Washington, DC 20005
(202) 515-4504, fax: (202) 515-4375

e-mail: businessofgovernment@us.ibm.com
website: www.businessofgovernment.org