



# **Lean & Agile Project Management Body of Knowledge (SSD Global Version 4.0)**

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Over the past decade, Lean & Agile Project Management (LAPM) has adopted many tools and ideologies that were not originally based in Lean thinking or Lean and agile techniques (Lean and agile). LAPM continues to improve and capitalize on many tools or thoughts that contribute to process improvement or project management. This forms a unique body of knowledge (BOK) that borrows from a number of project management and process improvement theories.

LAPM, itself, has become better, faster, and more cost-effective as a methodology. In its new form, it is the only practice that works well, in tandem with other project management and process improvement theories.

Although much of Six Sigma and basic problem-solving methods dominate the themes presented in LAPM, there is a strong total quality management (TQM) influence. Therefore, this LAPM BOK is presented in three sections:

Major programs and established BOKs that contributed to Lean & Agile Project Management (Appendix Section 1)

Lean & Agile Project Management theory (Appendix Section 2)

Core tools and knowledge used in Lean & Agile Project Management (Appendix Section 3)

## **Section 1 Major Programs and Established BOKs that Contributed to Lean & Agile Project Management**

### ***The Primary Recognized Process Improvement Programs***

Total Quality Management (TQM)

Total quality management (TQM) is the foundation of most process improvement programs. The core TQM strategy is to embed the awareness of quality throughout the entire organization. Both Six Sigma and Lean manufacturing/thinking promote concepts and tools first introduced by TQM. TQM also means continuously improving processes and products as well as reducing waste. This is why TQM aligns closely with Lean & Agile Project Management.

The major difference between Lean & Agile Project Management and TQM is that the tools used in Lean & Agile Project Management are updated and less labor intensive. Generally, the mission, goals, and philosophy of TQM are also represented in Lean & Agile Project Management.

Many TQM ideas and problem-solving tools can be traced back to the early 1920s, when statistical theory was applied to product quality control. The concept of applying mathematical and statistical models to improve product quality was

further developed in Japan in the 1940s. This effort was led by U.S. Americans such as Edwards Deming and Joseph Juran. Deming was responsible for popularizing the idea whereas Juran wrote much of the original literature.

Deming was a protégé of Dr. Walter Shewhart. Juran also studied with Shewhart. Shewhart is sometimes referred to as the father of statistical quality control. Shewhart's contribution to quality focuses on control charts, special/common cause variation, and analytical statistical studies. Shewhart's work also concentrates on statistical process control (SPC). Often SPC is studied as a subset of TQM. SPC studies various charts and graphs to determine and monitor process capability.

Beginning in the 1980s, a new phase of quality control and management began. The focus widened from quality of products to quality of all issues, including service opportunities, within an organization. It was determined that many of the same mathematical and statistical models used to identify, monitor, and evaluate the quality of products could also be applied in the service industry.

In 1988, a significant step in quality management was made when the Malcolm Baldrige Award was established by the President of the United States. This national award recognizes companies for their quality contributions. Malcolm Baldrige was responsible for bringing quality to the government during the Reagan administration. The Baldrige program's mission is to improve competitiveness and performance related to quality.

The Baldrige program was a direct result of the TQM movement and includes the following:

- Raising the awareness of performance excellence
- Providing organizational assessment tools and criteria
- Educating business leaders
- Recognizing national role models in quality

TQM is a set of management practices throughout an organization, geared to

ensure that the organization consistently meets or exceeds customer requirements. In a TQM effort, all members of an organization participate in improving processes, products, and services. Quality initiatives are not limited to the quality department.

Modern definitions of TQM include phrases such as customer focus, the involvement of all employees, continuous improvement, and the integration of quality management into the total organization.

Basic TQM supports the following:

Line management ownership

Employee involvement and empowerment

Challenging quantified goals and benchmarking

Focus on processes and improvement plans

Specific incorporation in strategic planning

Recognition and celebration

TQM has adopted several documents that are also used in other process improvement efforts to include the Lean & Agile Project Management program. Typically, these documents are identified by the following titles:

Deming's 14 Points

Deming's 7 Deadly Diseases

The Deming Cycle

Joseph Juran's Roadmap for Quality Leadership

The Triple Constraint Model

In general terms, TQM is a management approach to long-term success through customer satisfaction and is based on the participation of all members of an organization in improving processes, products, and services.

## Lean and Agile

In 2001, 17 software developers met in Utah and published The Manifesto for Lean & Agile Software Development. The Lean and agile movement was not any methodology but was intended to restore balance. Although originally intended for software development, Lean and agile became popular for project management circa 2006. Lean and agile's twelve principles are summarized as follows:

1. Customer satisfaction
2. Welcoming change requirements
3. Frequent delivery
4. Daily cooperation
5. Projects built around motivated individuals
6. Face-to-face conversation
7. Progress measurement
8. Sustainable development
9. Attention to technical excellence
10. Simplicity
11. Self-organizing teams
12. Frequent meetings to reassess

Quality focuses on specific tools and techniques, such as continuous integration, automated testing, test-driven development, and other practices. Compared to traditional project management, Lean and agile targets complex systems.

One of the differences between Lean and agile and Six Sigma is the approach to quality and testing. In the DMAIC model as well as project management, a waterfall approach is taken; in Lean and agile, an iterative approach is taken. In every iteration, a small part of the project is developed. Lean and agile introduces a mindset as opposed to a methodology; the approach implies greater flexibility at any stage of project management development.

Lean and agile promotes cross-functional teams, adaptive planning, speedy delivery, and continuous improvement.

## International Standards Organization (ISO)

The International Standards Organization (ISO), founded in 1947, is an international standard-setting body composed of representatives from various national standards organizations (ISO). ISO has developed over 18,000 international standards, making it the largest standards-developing organization in the world. The ISO 9000 and ISO 14000 series are the most well-known. However, up to 1,100 new ISO standards are published every year.

The ISO 9000 family specifically addresses quality management. This means what the organization does to fulfill the following:

- The customer's quality requirements

- Applicable regulatory requirements

- Enhance customer satisfaction

- Achieve continual improvement of its performance in pursuit of these objectives

The ISO 14000 family addresses environmental management. This means what the organization does to do the following:

- Minimize harmful effects on the environment caused by its activities

- Achieve continual improvement of its environmental performance

To be certified in an ISO standard, these steps are necessary:

- Locating and selecting a registrar; this is a company who is certified by ISO to make the initial assessment and provide suggestions for your ISO program.

- Creating an application and conducting a document review.

Participating in an assessment.

Completing the ISO registration.

Participating in a recertification effort.

ISO recertification efforts include gathering the proper measurements and articulating these measurements as well as identifying future opportunities for process improvement. There is also a time factor involved. Therefore, Lean & Agile Project Management often plays a primary role in ISO recertification.

### Capability Maturity Model Integrated (CMMI)

Capability maturity model integration (CMMI) is another popular process improvement program. This integrated approach is intended to help an organization improve performance by recognizing certain levels of performance. CMMI can be used to guide process improvement across a project, a division, or an entire organization.

In CMMI models with a staged representation, there are five maturity levels designated by the numbers 1 through 5:

1. Initial
2. Managed
3. Defined
4. Quantitatively managed
5. Optimizing

CMMI was developed by the CMMI project, which was designed to improve the usability of maturity models by integrating many different models into one framework. The project consisted of members of industry, government, and the Carnegie Mellon Software Engineering Institute (SEI). The main sponsors included the Office of the Secretary of Defense (OSD) and the National Defense Indus-

trial Association.

Each level in the CMMI process requires detailed information gathering and analysis. The significance of Lean & Agile Project Management in CMMI is that often to move up one level Lean & Agile Project Management practices need to be engaged.

## Six Sigma

### Defect Reduction

The Six Sigma problem-solving methodology is the most effective tool to quickly reduce and eliminate defects. It is a team-based methodology that works by systematically identifying and controlling the process variables that contribute to producing the defect or mistake.

### DMAIC Model

Improvement of existing products or processes using the Six Sigma methodology is done in five steps:

Define

Measure

Analyze

Improve

Control

### Define

The purpose of the Define phase is to make sure that everyone understands the project and the goals of the process improvement effort. The basic steps include the following:

Create a process improvement charter and process map.

Identify or define the problems in your process that must be solved in order to

- meet or exceed the customer's specifications or expectations.
- Identify and quantify customer requirements.
- Identify and quantify the process output and defects that fall short of these requirements and create a problem statement.
- State the project goal, which also must be a clear and measurable goal, and include a time limit for the project's completion.
- Determine the few vital factors that are critical to quality, which need to be measured, analyzed, improved, and controlled.

## Measure

The purpose of the Measure phase is to get a strong as-is snapshot of how the process is currently behaving. The basic steps include the following:

- Select the critical-to-quality characteristics in your process. These are the outputs of the given process that are important to the customer. How are you doing now?
- Define what that process output should be, which is done by looking at the customer requirements and the project goal.
- Define the defect for the process. Remember, a defect is an output that falls outside the limits of customer's requirements or expectations and must be measurable.
- Find the inputs to the process that contribute to defects.
- Define the exact dollar impact of eliminating the defects in terms of increased profitability and/or cost savings.
- Measure the defects that affect the critical-to-quality characteristics as well as any related factors.
- Incorporate measurement systems analysis—a method to make sure the defects are being measured properly.

## Analyze

The purpose of the Analyze phase is to review the measurements and information from the previous phase and determine, based on that information, what three to five solutions might be appropriate to solve the problem or roll out the activity. Steps include the following:

- Determine root cause
- Identify variations that could be reduced
- Determine if correlation exists
- Do what-if scenarios
- Determine the timeline and cost of solutions
- Determine the sustainability of the solution

## Improve

The purpose of the Improve phase is to choose a solution, implement the solution, and be able to definitively prove that a process improvement has been accomplished. This is done by comparing the as-is state (Measure) with conditions after the process improvement has been rolled out. Basic steps include the following:

- Articulate the three to five viable solutions
- Gain consensus on the best solution
- Pilot
- Create an execution plan (project plan) if the solution is successful in the pilot
- Choose another one of the three to five solutions if the pilot is not successful
- Roll out

## Control

The purpose of the Control phase is to sustain the improvement. Basic steps include the following:

Clearly articulating the process improvement achieved

Creating a control plan to keep the process in place

Designing a transition plan for the new owner

## DFSS Model

Design for Six Sigma, also known as design for Lean & Agile Project Management (DFSS or DFLSS), is applicable only in situations where a new product or service needs to be designed or redesigned from the very beginning. Many supporters of the DMAIC design believe that this is accomplished in the Analyze and Improve phases of the DMAIC model. However, supporters of DFSS believe a design component is necessary. Recently models based on the DMAIC thinking process that do not have a design component are also referred to as DFSS or DFLSS models.

Today, the most popular DFSS model is define, measure, analyze, design, verify (DMADV). The DMADV model contains the first three phases of the DMAIC model. The last two phases, Improve and Control, are replaced by design and verify.

## Design

Design details, optimize the design, and plan for design verification. This phase may require simulations.

## Verify

Verify the design, set up pilot runs, implement the production process, and hand it over to the process owner(s).

## Statistical Thinking

Both the DMAIC and DMADV model are based on statistical thinking. The following principles form the basis for statistical thinking:

All work occurs in a system of interconnected processes

Inherent variation exists in all processes

Reducing variation is the key to successfully improving a process

### Recognizing Individual Tasks within the Process and Assigning Major Causes of Variability

To successfully analyze a process using statistical process control, it is important to break things down into the smallest elements possible, accepting that all processes have inherent variability, and that variability can be measured. Data is used to understand variability based on the type of variability. Deming used statistical quality control techniques to identify special and common cause conditions in which common cause was the result of systematic variability while special cause was erratic and unpredictable.

#### Common Cause

Common cause variability occurs naturally in every process. Common cause variation is fluctuation caused by unknown factors resulting in a steady but random distribution of output around the average of the data. Natural or random variation that is inherent in a process over time affects every outcome of the process. If a process is in control, it has only common cause variation and can be said to be predictable. Common cause variations are due to the system itself and are somewhat expected. Examples of common cause of variability are

Variation in the weight of an extruded textile or plastic tubing

Variation in moisture content of a resin

Particle size distribution in a powder

Poor training

#### Special Cause

Special cause variation is usually assigned to one of the following conditions:

Variation in the process that is assignable to a specific cause or causes. For ex-

ample, a variation arises because of extraordinary circumstances. Special cause variation is variation that may be assigned to a specific cause. Examples of special cause variation are

The first labels doing well of self-adhesive labels are damaged, marred, or otherwise unusable.

The cartons near the door of a warehouse are exposed to rain and ruined.

### Stabilize Processes

Traditional tools for process stabilization include process capability studies and control charts. The Six Sigma methodology supports the concept that a process may be improved by simply stabilizing the process. Making a process stable means to bring the process within the upper and lower specification limits and as close to the norm as possible.

### Lean Manufacturing/Lean Thinking

Whereas the Six Sigma model concentrates on defect and mistake reduction, Lean manufacturing, and Lean thinking (service related) concentrate on

Waste reduction

Speed

Voice of the customer, employee, business, process

### Waste Reduction

In Lean manufacturing/thinking, other terms for waste are nonvalue, non-value added, and the Japanese term muda. The misconception about the term is that when items are identified as waste it does not necessarily mean that the item will be reduced or eliminated. It simply means that it does not contribute directly to the process being studied. The reduction of waste concentrates on eight key areas:

transportation, inventory, motion, waiting, overprocessing, overproduction, defects, and skills.

## Speed

All process improvement programs are concerned with delivering a product or service that is cost-effective and has maintained a high degree of quality. Speed is also important but not as apparent in other process improvement programs.

Speed is recognized in Lean manufacturing/thinking. One avenue for speed is automation. The term automation, like the term waste, is often misunderstood. Automation simply means standardizing processes, which is also a goal of Six Sigma.

Lean introduced a number of philosophies and tools—the purpose in the speed and automation process to include just-in-time thinking principles. Individually, these efforts are sometimes known as concentration of assembly, kanban cards, bar coding, visible record systems, production leveling, and work standardization.

## Voice of the Customer, Employee, Business, Process

One of the unique things about the Lean methodology is an emphasis on how the customer, employee, business, and process are impacted by the process improvement. This is often referred to as VOC, VOE, VOB, and VOP.

## ***Additional Methodologies and Bodies of Knowledge that Play a Role in Lean & Agile Project Management***

**The Quality Body of Knowledge (Q-BoK™)** is a collection of outlines and documents maintained by the American Society of Quality (ASQ). These outlines are used for general information, reference and to study for a variety of ASQ certifications. The Q-BoK contains a Six Sigma green belt body of knowledge and a black belt Six Sigma body of knowledge. ASQ was the first to establish an industry-recognized body of knowledge for Six Sigma. ASQ currently does not have a Lean & Agile Project Management body of knowledge. However, the Lean & Agile Pro-

ject Management body of knowledge (SSD Global Version 3.0) contains much of the industry-accepted documentation on Six Sigma.

**The Business Analysis Body of Knowledge (BABOK®)** is maintained by the International Institute of Business Analysis. It supports six knowledge areas:

Business analysis planning and monitoring is concerned with which business analysis activities are needed. This includes identifying the stakeholders.

Elicitation is obtaining requirements from the stakeholders.

Requirements management and communication deals with changes to requirements as well as communication to stakeholders.

Enterprise analysis defines the business need and a solution scope.

Requirement's analysis is the progressive elaboration of requirements into something that can be implemented.

Solution assessment and validation determines which solution is best, identifies any modifications that need to be made to the solution, and assesses whether the solution meets the business needs.

The BABOK® provides a framework that describes the areas of knowledge related to business analysis. The BABOK® is intended to describe and define business analysis as a discipline, rather than define the responsibilities of a person. The Guide to the Business Analysis Body of Knowledge is not really a methodology, which makes it easy to partner with Lean & Agile Project Management.

First published in 2005 by the International Institute of Business analysis (IIBA), it was written to serve the project management community. The IIBA® has created the Certified Business Analysis Professional™ (CBAP®), a designation awarded to candidates who have successfully demonstrated their expertise in this field. This is done by detailing hands-on work experience in business analysis through the CBAP® application process and passing the IIBA® CBAP® examination.

**The Project Management Body of Knowledge (PMBOK®)** is -maintained by the Project Management Institute (PMI). All process improvement programs

recognize that basic project management must be in place before process improvement may begin. The PMBOK® supports nine knowledge areas:

- Integration management
- Scope management
- Time management
- Cost management
- Quality management
- Human resource management
- Communications management
- Risk management
- Procurement management

The PMBOK® also promotes that the following phases are necessary for a successful project:

- Initiating
- Planning
- Executing
- Monitoring and controlling
- Closing

**Business Process Reengineering (BPR)** is an approach intended to elevate efficiency and effectiveness of an existing business process. BPR is also known as business process redesign, business transformation, and business process change management. BPR supports the following methodologies for process improvement:

- Process identification
- Review update as-is state

Design to-be

Test and implement to-be

**Change Management** has a variety of meanings depending on the area. All areas of change management play a role in the new Lean & Agile Project Management. These areas include the following:

Project management refers to a project management process in which changes are formally introduced and approved.

Information technology service management (ITSM) is a discipline used by IT professionals.

People change management is a structured approach to change individuals, teams, organizations, and societies.

**Leadership development** traditionally has focused on developing leadership ability. In a Lean & Agile Project Management organization, these methods are imperative to the success of Lean & Agile Project Management. Successful leadership development is generally linked to the following:

Individual's ability to learn

Quality and nature of the leadership development program

Genuine support for the leader's supervisor

Leaders play a key role in building a successful Lean & Agile Project Management organization. There are four primary areas of responsibility:

Choosing the right projects

Choosing the right people

Following the right methodology

Clearly defining roles and responsibilities

**Measurement Systems Analysis (MSA)** is a science that considers selecting the right measurement. Studying the measurement interactions along with assessing the measurement device is also part of the mix. Are measures dependable and valid? What is the measurement uncertainty?

**Statistics** is the science of making effective use of numerical data relating to groups of individuals or experiments. Six Sigma and Lean have always included the field of statistics when measuring and analyzing data. The Lean and agile project manager has to make these studies more digestible for the everyday person. A stronger emphasis is placed on choosing the right software and making sure that the statistic is valid.

**Business Finance** plays a stronger role for the Lean and agile project manager. The buy-in and continued support of a project cannot be based solely on statistical data. Choosing the right return-on-investment formula and being able to measure project success using financial terms has become essential.

As we move forward as Lean and agile project managers, it is important to remember that Lean & Agile Project Management is not just a matter of blending two extraordinarily successful process methodologies but rather encompassing a collection of bodies of knowledge.

**Organizational Development** is a body of knowledge and practice that enhances organizational performance and individual development. Today's organizations operate in a rapidly changing environment. One of the most important assets for an organization is the ability to manage change. Although there is not an industry standard established document outlining the things necessary for successful organizational development, most professionals in this field rely on the works of William Bridges. Bridges is known as one of the foremost thinkers and speakers in the areas of change management and personal transition. Themes throughout Bridges' work encourage recognizing the various phases of change. The most popular being freezing, changing, and refreezing.

## **Section 2 Lean & Agile Project Management Theory**

Lean government implies a new attitude that examines complex bureaucratic systems with the intent of simplifying procedures and reducing waste. Several government agencies have discovered that the Lean approach has enabled them to make complicated processes function better, faster, and more cost-effectively.

The Environmental Protection Agency (EPA) is a strong advocate of Lean government. The EPA recently published several successful case studies. The International City/County Management Association (ICMA) supports a program to assist local government organizations with implementing Lean. The American Society for Quality (ASQ) advocates the adoption of Lean and/or Six Sigma within the U.S. Federal government. Several U.S. political figures have endorsed the Lean initiatives.

During the 81st General Assembly in the State of Iowa, legislation was passed that authorized the department of management to create the office of Lean enterprise. In the January 2012 Colorado State Address, Governor John Hickenlooper remarked that almost every department had initiated a Lean program in order to identify waste/inefficiencies and create savings. Colorado House Bill 11-1212 was passed to integrate Lean government principles. This bill promotes incorporating Lean practices as well as training state employees to be Lean experts within the State of Colorado.

In the United States the practice of Lean government is becoming increasingly popular. Examples of government agencies with active Lean departments include, but are not limited to, the following:

U.S. Department of Defense

U.S. Army

U.S. Department of Agriculture

U.S. Department of Housing and Urban Development

U.S. Nuclear Regulatory Commission

Lean government practices are moving abroad. In Sweden, the migration board is widely regarded as one of the most prominent public authorities to have adopted the Lean model. In 2009, the Singapore housing and development board teams used Lean tools to provide award-winning customer service.

Using Lean tools, government entities can expect to do the following:

Eliminate or dramatically reduce backlogs

Reduce lead times

Decrease the complexity of processes

Improve the consistency of reviews or inspections

Benefit from better staffing allocation

The challenge with implementing Lean government is that most government departments are organized around functions rather than processes. In many cases, necessary resources are not located in the same building. Cross-training programs are generally not supported. Changing or modifying this dynamic alone drastically reduces waiting time, redundancy, and/or rework, but the concept is not always met with enthusiasm.

Lean government supports the idea of creating work cells. A work cell is formed by placing all the necessary resources in one area. Work cells permit cross-training opportunities and reduce both rework and redundancy. Work cells can better manage the first in, first out (FIFO) process, generally increasing citizen satisfaction. Work cells are designed to improve process flow, eliminate waste, and promote standardization.

A basic premise of Lean thinking is to study the value of the work people do and directly connect it to the quality of service provided for the citizen. These activities may cause stress among employees who have not been enlightened by the merits of Lean. Employees may fear job loss or loss of control of their daily activities.

The following activities should be observed with a prominent level of sensitivi-

ty:

Core processes

Current systems managing these processes

People involved in these processes

Innovation possibilities

In the initial process, value stream mapping (VSM) can be extremely useful for governmental agencies. VSM refers to the activity of developing a visual representation of how a particular process, product, or service flows through the system.

VSM also identifies time frames, handoffs, and resources involved throughout the process. VSM, similar to flowcharting, has a set of symbols that represent various processes, materials, and information. However, unlike flowcharting, VSM symbols are not standardized, and there are several variations. New VSM symbols may be created when necessary, or verbiage may be placed inside a rectangular box to provide explanation regarding that step. Once the map is created, it is easier to identify areas of overt as well as hidden waste. Bottlenecks, redundancy, and rework are also more apparent.

In the beginning, another useful tool is kaizen events, also known as rapid improvement events. The idea behind kaizen events is to identify process improvements that can be implemented immediately. Kaizen events are designed to yield quick results. The ancillary benefit is this often increases employee buy-in and morale.

Kaizen events typically bring together a cross-functional team for three to five days to study a specific process. It is important that the members of this team have the ability to make decisions for their group because commitments are made during this session.

Kaizen events are conducted by a facilitator who walks the group through a model for process improvement. Often this model is plan, do, check, act (PDCA). Depending on the nature of the project, the Define, Measure, Analyze, Improve,

and Control (DMAIC) model may be used. Proprietary models, such as select, clarify, organize, run, evaluate (SCORE™) may also be used to conduct the session. Additionally, there is the more traditional and simplified kaizen approach that promotes the following:

Assessment

Planning

Implementation

Evaluation

In the assessment phase, the major goal is to determine the critical-to-quality (CTQ) factors. After a consensus is reached on the CTQ factors, the next step is to develop metrics. In the planning phase, the process improvement intervention is discussed. In the implementation phase, the process improvement is implemented and monitored. Finally, the evaluation phase measures the results based on the metrics developed during the assessment phase.

The success of any rapid improvement event depends on the following:

Teamwork

Personal discipline

Employee morale

In addition to rapid improvement events, another way to kick off a Lean government program is by initiating a workplace organizational model such as the 5S. Similar to a VSM, the 5S model offers visual validation. Comparable to a kaizen event, 5S can be completed in a relatively fleeting period of time.

The 5S model uses a list of five Japanese words, which, translated roughly into English, starts with the letter S: sort, set in order, shine, standardize, and sustain. The 5S model is also used to organize physical space in such diverse areas as health care, warehouses, and retail.

A new term, used more often in government services, is Lean IT. Although Lean principles are well established and have broad applicability, the move to IT is still emerging. Lean IT will increase in use as more governments go online to deliver better services. Although many governments have already made the move to electronic files, the method used to manage these files often mimics manual systems. This makes retrieval of critical data difficult and cumbersome. Lean IT for government will allow these services to be more user-friendly and easier to audit.

In government services, the most challenging task is managing work in progress (WIP). There is a common belief that work received cannot be completed within a fleeting time frame. This is often true because governmental systems are set up to collect data but often lack the discipline to act quickly on the data collected. One value of Lean is that, used properly, daily processes and activities are immediately identified in the value stream. Knowing how many permits are issued in a particular period or being able to calculate a need for tomorrow is the first step in process improvement.

Easy information-gathering tools are used that do not require a vast amount of training or instruction to be effective. Lean uses ordinary metrics to calculate results. When WIP is increased, productivity and quality generally decrease. The immediate goal becomes reducing WIP.

Most Lean government projects share the same goals:

Increase citizen satisfaction

Optimize the value delivered to the public

Involve employees in the continual improvement effort

Develop consistent metrics that are clear and concise

Types of governmental projects that have benefited from implementing Lean and/or Six Sigma include improving the following:

Documentation management

- File archiving
- Inventory management
- Payment process
- Permit process
- Security clearance

Lean government starts with a vision. In the United States, the Lean government leadership vision is usually to provide an efficient environment in which citizens are satisfied and employees are happy. Internationally, the happiness factor is often not regarded as an element, and citizen satisfaction is second to governmental control.

One common factor, however, with international Lean government is the commitment necessary for upper management to motivate the workforce. Another common factor is that this cannot be achieved without some sort of map of the ongoing process. Nevertheless, in many cultures, attaining a map or verbal validation of the current process is nearly impossible.

Lean government can benefit from methodology and tools normally associated with Six Sigma. For example, Lean government favors the PDCA model for problem solving. Many problems in government are far too complex to benefit from this model.

Some governmental issues may need a more robust model such as the DMAIC model or a DFSS model used in Six Sigma and Lean Six Sigma programs. Six Sigma and Lean Six Sigma tools that effectively analyze root cause or performance capability may also be beneficial.

Lean government, like Lean Six Sigma, takes full advantage of other business management tools that include balanced scorecard: strengths, weaknesses, opportunities, threats (SWOT) analysis, and benchmarking theory.

The purpose of Lean government is about contributing to overall citizen satisfaction. This is accomplished by optimizing value and by delivering services faster.

Lean government involves employees in the problem-solving process and uses performance metrics to measure success.

Colorado House Bill 11-1212 provides a solid explanation of Lean principles, which may be applied to any public sector entity. It states,

Lean government principles mean a continuous and rapid process improvement of state government by eliminating a department's non-value-added processes and resources, providing feedback on process improvements that have the purpose of increasing a department's efficiency and effectiveness, and measuring the outcomes of such improvements.

Internationally, as well as domestically, awareness of the government infrastructure is necessary before attempting to initiate a process improvement. The hierarchy, hiring policy, and labor responsibilities need to be considered as well. Paying attention to diversity and remembering Lean principles will ensure Lean government success.

In order for Lean to function properly, it is important to pay attention to the PDCA and basic project management. For example, the project management activities to include initiation, planning, executing, and controlling, are necessary for Lean. See Figure A.1.

Planning can be the most time-consuming phase of the total project. Planning a project includes the following steps.

1. Establish objectives

Your objective statement spells out the specific, quantifiable amount of improvement planned above the baseline performance that was indicated in the problem statement. You also need to determine how long completing this project and achieving your goal will take.

The objective statement directly addresses the information in the problem

statement. Just like the problem statement, the objective statement must contain certain information in order to be effective. A good objective statement contains all the following elements: metric, baseline, goal, amount of time, impact, and corporate goal/objective.

That is, you want to improve some metric from some baseline to some goal in some amount of time with some impact against some corporate goal or objective. This timeline should be aggressive but realistic. These factors are necessary.

Include the following elements in your objectives:

Statement: A brief narrative description of what you want to achieve

Measures: Indicators you will use to assess your achievement

Performance specifications: The value(s) of each measure that define success

Lean & Agile Project Management still favors a popular method of goal setting SMART goals. SMART is an acronym that stands for specific, measurable, attainable, realistic, and timely.

To begin crafting your objective statement, start with the baseline performance you established in the problem statement. After you have set your improvement goal, you can estimate the financial benefit of achieving this goal.

Important questions to ask include the following:

Why? Why are we doing this project? Why is it important to the organization? Why is it important to me and the team?

What? What problems are the project expected to solve? What are the genuine issues at the core of the project? What deliverables do management, or the client expect from this project? What criteria will be used to judge success or failure? If we produce deliverables on time and on budget, what else represents success?

Who? Who has a stake in the outcome?

How? How do various stakeholders' goals differ?

The more clearly you define your project's objectives, the more likely you are to achieve them.

## 2. Develop a plan using work breakdown structure (WBS)

A work breakdown structure (WBS) is a breakdown of all the work important to finish a task. A WBS is orchestrated in a chain of importance and built to consider clear and coherent groupings, either by exercises or deliverables. The WBS should speak to the work distinguished in the affirmed project scope statement and serves as an early establishment for successful timetable advancement and expense evaluating. Supervisors commonly will build up a WBS as a forerunner to a practical details undertaking plan. The WBS should be joined by a WBS dictionary, which records and characterizes WBS components.

The objectives of building up a WBS and WBS dictionary are (1) for the group to proactively and coherently arrange out the task to fulfillment, (2) to gather the data about work that should be accomplished for an undertaking, and (3) to sort out exercises into sensible parts that will accomplish targets. The WBS and WBS dictionary are not the timetable but rather the building pieces to it. The movement of WBS and WBS dictionary advancement is as per the following (Figure A.2):

The WBS and WBS dictionary are not static reports. WBS development is liable to administration dynamic elaboration, and as new data gets to be known, the WBS should be overhauled to mirror that data. A project team that has significant changes to the WBS should reference the change management plan for direction on administration of changes to scope.

### **Example**

Below is a simplified WBS example with a limited number of organizing levels. The following list describes key characteristics of the sample WBS (Figure A.3):

Hierarchical levels: contains three levels of work.

Numbering sequence: uses outline numbering as a unique identifier for all levels.

Level one is 1.0, which illustrates the project level.

Level two is 1.X (1.1, 1.2, 1.3, etc.), which is the summary level and often the level at which reporting is done.

Level three is 1.X.X (1.1.1, 1.1.2, etc.), which illustrates the work package level.

The work package is the lowest level of the WBS at which both the cost and schedule can be reliably estimated.

Lowest level descriptions: expressed using verbs and objects, such as “make menu.”

## ***WBS Numbering***

In a WBS, each level thing has an interesting, allocated number with the goal that work can be recognized and followed after some time. A WBS may have shifting ideas for levels; however, there is a general plan for how to number each level. The following is the general tradition for how undertakings are decomposed:

Level 1: Designated by 1.0. This level is the top level of the WBS and is usually the project name. All other levels are subordinate to this level.

Level 2: Designated by 1.X (e.g., 1.1, 1.2). This level is the summary level.

Level 3: Designated by 1.X.X (e.g., 1.1.1, 1.1.2). This third level comprises the subcomponents to each Level 2 summary element. This effort continues down until progressively subordinate levels are assigned for all work required for the entire project.

On the off chance that assignments are legitimately subordinated, most booking apparatuses will consequently number errands utilizing the above tradition.

## ***WBS Construction Methods***

In spite of the fact that there are distinctive techniques for disintegrating work and

making a WBS, the most direct and successful route is to utilize some type of visual showcase of the deliverables, stages, or exercises. In a perfect world, all project team individuals will gather and conceptualize all work required to finish deliverables effectively. There are two types of WBS:

Deliverable-oriented WBS

Process-centered WBS

### Deliverable-Oriented WBS

A deliverable oriented WBS is built around the project's desired outcomes or deliverables. This type of WBS would likely include the following characteristics:

Level 2 items are the names of all vendor project deliverables that are expected to be required as part of a contract. Level 2 should also include any agency deliverables tasks.

Level 3 items are key activities required to produce the Level 2 deliverables.

Additional levels are used depending upon the magnitude of the deliverables and the level of detail required to reliably estimate cost and schedule.

In the deliverable oriented WBS, all deliverables are identified, and all work is included.

Statewide activities secured as firm-fixed-price contracts are appropriate to the deliverable-situated methodology. Sorted out thusly, extend supervisors and organization administration can audit between time progress against deliverables and effectively decide the rate of the work that is finished. In some cases, a deliverable arranged WBS, and its related calendar can be confounding to peruse on the grounds that their things are not composed successively at the most elevated amount. They are, in any case, extremely purposeful in showing progress against contracted deliverables.

A procedure-focused WBS is like a deliverable-arranged WBS with the excep-

tion that it is sorted out, at the largest amount, by stages or in a procedure instead of by deliverables. The advantage of utilizing a procedure-focused WBS is that it empowers the incorporation of procedure-required deliverables, for example, project development life cycle (PDLC) deliverables. Notwithstanding the sort of WBS utilized, groups should guarantee that all legally binding and PDLC deliverables are represented in the WBS. A procedure focused WBS ordinarily incorporates the accompanying items:

Level 2 exercises are stages or calendar checkpoints/turning points. These exercises could be PDLC stages, for example, initiation, planning, and so on.

Level 3 exercises are those exercises required to finish Level 2 stages or points of reference. Various undertakings are incorporated for any work that should be done in numerous stages.

Additional levels are utilized relying upon the length of the stage or plan and the level of subtle element required to dependably gauge cost and calendar. In the procedure focused WBS, all deliverables are recognized, and all work is incorporated. This completeness will diminish the danger of “reeling sheet” work undertakings, which may impact the plan.

Two industry-standard methods exist for determining how many levels a WBS should have:

Traditionally, the project management body of knowledge backs a foreordained seven-level model, which has the upside of clear names and meanings of every level (e.g., program, undertaking, subtask, work item, and level of exertion); the impediment to this model is that it requires a level of point of interest that might be superfluous. Models/strategies with foreordained levels and level definitions clarify what data should be incorporated and where, yet they need adaptability.

The more contemporary methodology is to give the attributes a chance to direct

the quantity of levels utilized as a part of the judgment of the project manager. It is a decent practice to recognize the quantity of levels to be utilized and so keep up consistency when constructing the WBS. The quantity of levels must be adequate to permit the project manager to dependably gauge timetable and cost and successfully screen and control work bundles.

**Example: WBS Dictionary**

The project manager and team should talk about the WBS and decide the number of levels that are appropriate. The discussion should include the key points of interest. If any terms or conditions need clarification, a WBS dictionary should be attached. The terms placed in the WBS dictionary may be valuable later when creating benchmarks, determining the communication plan, or for group discussions.

**WBS Dictionary—Table Format Example**

WBS #:	1.1.1	Task:	Create Plan
Est. Level of Effort:	40 hrs.	Owner:	Project Manager
Resources Needed:	Subject Matter Experts	Work Products:	MS Project Plan
Description of Task:	Development of a detailed project plan that lists all key resources, tasks, milestones, dependencies, and durations		
Input:	Approved Project Charter SMEs		
Dependencies:	Approval of Budget		
Risk:	Changes to IT Apps plans and deliverables IT Apps implementation releases, which conflict with implementation		

WBS #:	1.1.2	Work Item:	Make Budget
Est. Level of Effort:	16 hrs	Owner:	Project Manager
Resources Needed:	CFO, CIO, Executive Sponsor	Work Products:	ITPR
Description of Task:	Development and documentation of the project budget based on plan and resources		
Input:	Approved Project Charter SMEs		
Dependencies:	Approval of Project Charter		
Risk:	Changes to IT Apps plans and deliverables IT Apps implementation releases which conflict with implementation		

<b>WBS FIELDS</b>					
<i>WBS #</i>	<i>Task</i>	<i>Description of Task</i>	<i>Work Products</i>	<i>Owners</i>	<i>Est. Level of Effort</i>
1	PLANNING	All task management and management activities			
1.1	Plan and supervise		Roll-up Task	Project Manager	N/A
1.1.1	Create Plan	Development of WBS, work package identification, schedule formulation, staffing projection,	WBS, WBS Dictionary, MS Project	Project Manager	40 hrs

		resource estimation. Followed by development of a detailed project plan that lists all the key resources, task, milestones, dependencies, and duration.	Plan		
1.1.2	Create Budget	Development and documentation of the project budget based on plan and resources	ITPR	Project Manager	40 hrs
1.1.3	Prepare Disbursement/R reconciliation	Development of disbursement process for the project, including acceptance/approval forms	Purchase Orders, Deliverable Product Acceptance Form	CFO	40 hrs
1.1.4	Coordinate Activities	Ongoing planning activities for the project including weekly meetings	Meeting Minutes	Project Manager	8 hrs/week

The way to create WBS and WBS dictionary is to engage in conversation about the activity and the steps necessary to achieve the undertaking. A project manager must guarantee that all the work that should be refined for the task is contained inside the WBS dictionary and is comprehended by colleagues and team members. A project manager should gather input from all team members to guarantee that the WBS and WBS dictionary are understandable and clearly identify the timing, cost, and resources by doing the following:

Scheduling a baseline

Determining a cost baseline

Scoping out a baseline

Quality baseline

Baselines are prepared on triple constraints—scope, time, cost (and quality). All of the above bullet points are considered as components of the project management plan. Often the scope, schedule, and cost baselines will be combined into one baseline that is used as an -overall project baseline against which project performance can be measured. The performance measurement baseline is used for earned value measurements.

The outline refers to the estimated cost, resources needed (to include labor costs) and the task schedule. Generally, the plan would include the following fields:

Original scheduled start and finish dates

Planned effort (may be expressed in hours)

Planned or budgeted cost

Planned or budgeted revenue

The main benefits of having a project baseline are the following:

Ability to assess performance

Earned value calculation

Improved future estimating accuracy

The job of the Lean and agile project manager is to guide the team to successful delivery despite the challenges the world throws at the project. LAPM is about monitoring the project against the plan and intervening when the project manager notices things are going off track.

