APTAC Body of Knowledge Competency Guide
C. Basics of Contracting with Government Entities
C.3.3 Quality Systems

Description

The SCAA states that PTACs should not offer clients training on topics such as ISO 9000, Lean Six Sigma, or manufacturing, except where manufacturing assistance specifically relates to compliance with federal, state and/or local government-specific requirements. However, these are areas that are critical to the manufacturing concern to be successful in the government market place. A contracting officer will need to see that the business has a thorough understanding of these risk mitigaters. Familiarity with these concepts will help the PTAC counselor alert her/his client to areas they may need to explore. This BOK description offers an overview of these programs.

Six Sigma: Concepts and Processes

The Six Sigma Methodology is practiced by manufacturers for implementation of quality assurance. Increasing overall knowledge of Six Sigma can improve government efficiency through reduction of oversight and total ownership costs by facilitating more effective communication between government inspectors and industry suppliers. Formal training in Six Sigma techniques leads to two outcomes, designation of Green Belt status and designation of Black Belt status. Green Belts are prepared to support quality control and improvement teams through a foundational understanding of Six Sigma applications. Six Sigma Black Belts apply statistical and analytical rigor to resolving quality questions by leading quality improvement teams. The six step of this process are:

Step 1: Define

Identify the process that needs improvement, the nature of the problem. The objectives for adopting the six sigma improvement process are defined during this step. A team is formed and trained about the benefits of adopting the six sigma methodology to improve current process.

Next, you identify the customers or the people who would be impacted by this project and the critical requirements are documented. Finally, a tea, charter is created which details project scope, business case, and the problem statement. The key tools used during the define phase are: Project Charter, stakeholder analysis, and SIPOC (Suppliers, Inputs, Process, Outputs, and Customers) diagram which visually depicts the key elements for the Six Sigma project.

Step 2: Measure

Define the parameters that will be used to measure performance improvement, including the baseline performance and the extent to which the process can be improved. The key defects in the process are identified and defined. Data is collected to analyze the difference between the current performance and the desired performance and process variations are established. The key tools used during the Measure phase are: Pareto charts, control charts, and Failure Mode and Effects Analysis (FMEA).

Step 3: Analyze
During this phase, the data collected during the measure phase is used to analyze the gap between the current and desired performance. Next, a root-cause analysis is performed to define the possible reasons for the performance gap and quantify the main causes for variation. The gap between the current and desired state is also calculated in financial terms. The key tools used during the Analyze phase are Cause and Effect diagram, Regression analysis, and Flow diagrams.

Step 4: Improve
Now that you have defined the problem, measured the performance gap, and analyzed the reason for the gap, you will devise a set of possible solutions and then select the best possible solution for the problem identified. It is imperative to devise the implementation plan with the time frame for implementation. The main outcome of the improve phase is the designing of the performance improvement plan which will bring about a marked, measured difference in your existing process. The key tools used during this phase are: Force field diagram, Stakeholder Definition, and FMEA.

Step 5: Control
The final phase is the Control phase wherein you formulate project management plans and procedures to control or sustain the improved process. This is one of the most important steps of the six sigma methodology and a failure to devise a control plan might ruin the entire effort to improve the original process. During this phase you need to document the revised process, devise, and deploy the response plan, and transfer knowledge of the new process to the process owner and the team. The key tools used during the Control phase are: Quality control process charts, control charts, and standardization practices.

Introduction to Lean Enterprise Concepts

Lean Aerospace Initiative
The Lean Aerospace Initiative (LAI) was born out of practicality and necessity as declining defense procurement budgets collided with rising costs and military industrial overcapacity, prompting a new defense acquisition imperative: affordability rather than performance at any cost. The initiative was formally launched in 1993 when leaders from the U.S. Air Force, the Massachusetts Institute of Technology (MIT), labor unions, and defense aerospace businesses forged a trail-blazing partnership to transform the industry, reinvigorate the workplace, and reinvest in America using a philosophy called "lean."

LAI's community extends forward to the customer and reaches back through the supply chain. The consortium consists of leaders and implementers from major U.S. defense and commercial aerospace companies, suppliers, government agencies, organized labor, and MIT.

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Definitions of Lean

- Use less of everything: less human effort, space, inventory, investment, engineering effort.
- Do the right thing, in the right place, at the right time, in the right quantity.
- Add value by eliminating waste, being responsive to change, focusing on quality and enhancing the effectiveness of the workforce
- Focus on maximizing the value stream while eliminating all waste.
- Focus on constantly shortening the order to delivery time by maximizing the flow of information and material while reducing cycle time.
- A lean enterprise is an integrated entity that efficiently creates value for its multiple stakeholders by employing lean principles and practices.

Lean embraces all aspects of industrial operations (product development, manufacturing, organization and human resources, customer support), including customer-supplier networks, and is governed by a systemic set of principles, methods and practices.

Chief benefits of lean include:

- Efficient use of resources,
- Rapid product development cycle,
- Higher quality at lower cost,
- Greater flexibility and environmentally sustainable production.

The Five Fundamental Principles of Lean Thinking

1. Define value in the terms of the customer.
   Define value in the customer's terms for the specific service or product, ie: meeting customer needs, prices, and schedule. Another way to define value is: What are the things customers are willing to pay more for?

2. Identify the Value Stream.
   The value stream is the set of specific actions required to bring a specific product (whether a good, a service, or, increasingly, a combination of the two) through the three critical management tasks of any business: the problem-solving task running from concept through detailed design and engineering to production launch, the information management task running from order-taking through detailed scheduling to delivery, and the physical transformation task proceeding from raw materials to a finished product in the hands of the

customer." (Lean Thinking, Womack and Jones, p19.)

3. Make the Process Flow.
   Once value is defined, the value stream is known, and wasteful steps are eliminated, the focus becomes making the value-added process steps flow. Information and material should never stop moving. Focus on the ideal process for providing a product or service, without regard to the cost, time, organizational structure, required resources, or functional disciplines that are currently required. Organizational structures and procedures are many times the reason that material and information are delayed.

4. Pull Value from the Customer.
   Find out how the customer defines value and provide the service or the product as it is needed, rather than pushing products onto the customer. As processes become more streamlined and less wasteful, they inherently become faster and more flexible. Being able to design, build and deliver exactly what a customer needs, should also mean being able to meet customer needs using even fewer resources. In manufacturing, this has been one of the reasons for the use of Just-in-Time manufacturing techniques. For example Dell Computers has done exactly this by using information technology to integrate its enterprise.

5. Pursue Perfection.
   Lean is a way of thinking. The reduction of defects, time, cost and all forms of waste is never ending. The four previous principles reinforce themselves in a continuous improvement loop. Although perfection is impossible, lean enterprises have persuaded their employees to behave as if perfection is achievable.

The Seven Types of Manufacturing Waste

1. Defects—Scrap, rework and repair
2. Waiting—For help, tools, information or parts
3. Inventory—Finished goods and work in process
4. Unnecessary Motion—worker leaving the work site to get parts, tools, or information; equipment and tools not conveniently located.
5. Over-processing—Doing work that is not needed, reworking defective product, meeting requirements the customer is not concerned about.
6. Over-production—Working ahead of schedule and consuming resources and then having to wait for customer payment.
7. Transportation—Parts moving between workstations and back and forth between warehouses

From a manufacturing perspective, look for waste anytime material is not moving. Look for workers waiting idle at or having to leave the work site. Ask why material has to move and why more work cannot be done in one location. The only value in a manufacturing facility is when material is being transformed with the minimum amount of consumed resources.

Lean 6 Sigma for Manufacturing

Lean-Six Sigma is a developing management concept that blends Lean Manufacturing principles with 6 Sigma tools. This approach is gaining increasing use within commercial, defense industry and government facilities as the most effective way to reduce manufacturing cycle time, unit cost and improve product quality. The module will be of value to any personnel involved in production or preparing for production, to include those involved in the systems engineering process. The material is presented as a mix of theory and actual applications, from both defense and commercial industries.

Other Quality Systems

1. ISO 9000:2000
2. Capability Maturity Model-Integration (CMMI)

