Continuous Process Improvement Transformation Guidebook

May 2006

DEPUTY SECRETARY OF DEFENSE
1010 DEFENSE PENTAGON
WASHINGTON, DC 20301-1010

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MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Establishment of DoD-wide Continuous Process Improvement (CPI) Programs

The Secretary and I expect that every DoD organization is focused every day on improving the effectiveness of our support to the Warfighter. This is particularly important now--given wartime demands, recapitalization needs, and fiscal realities.

CPI has proven to be an important tool for improving the operating effectiveness of the DoD, not only within logistics and acquisition activities, but also across the full range of operational, administrative, Science and Technology, and support functions. We should continue to broaden and accelerate use of these tools to further improve effectiveness.

The attached guide is a resource for use by the Department in designing and managing CPI efforts. The guide standardizes terminology and incorporates best practices from leading industry and DoD experience.

DoD's policy on the capture of benefits from improvement efforts is that cost savings and expense reductions that result from improvements in overall operating effectiveness can be retained by the organizations that generate them. Effective management oversight should lead to reinvestment in additional CPI efforts and recapitalization.

The Deputy Under Secretary of Defense (Logistics and Materiel Readiness) will take action to institutionalize our CPI efforts including CPI expert certification, guidance documentation, and creation of forums to capture and share best practices across the Department. Thanks for working to create a culture of continuous improvement throughout the DOD.

Attachment:
As stated

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Section 1.
Introducing DoD CPI

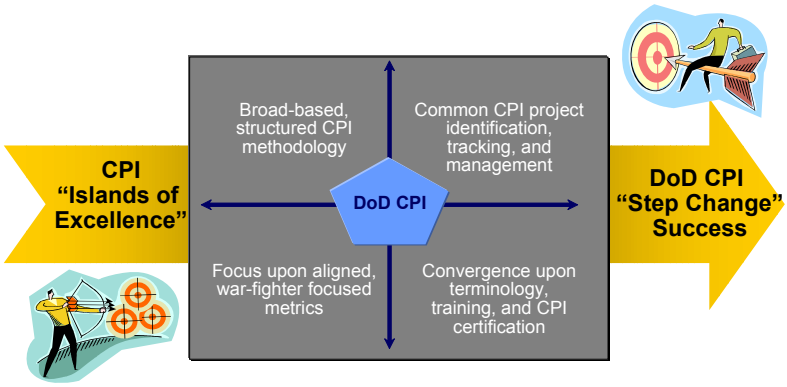
Overview

DoD is achieving significant performance improvements in its full range of activities—from operations to human resources management and logistics management—with the major focus on improving the support for the warfighter customer through the application of Continuous Process Improvement (CPI) concepts and tools. DoD CPI is a strategic approach for developing a culture of continuous improvement in the areas of reliability, process cycle times, costs in terms of less total resource consumption, quality, and productivity. In DoD, CPI comprises the application of a broad range of tools and methods, such as Lean, Six Sigma, and Theory of Constraints (TOC).

For example, the Air Force applied CPI to improve its medical referral management process and reduced the flow time on provider authorizations from 97 hours to 1 hour; the Army used a Lean approach to increase the mean time between overhaul (MTBO) for T700 helicopter engines by 300 percent; the Navy reduced the cycle time for F404 jet engines by 78 percent in 2 years; and the Marine Corps applied TOC tools to reduce the repair cycle time for CH-46 helicopters by 40 percent. The Defense Logistics Agency (DLA) reduced interest payments and administrative lead times on a major support contract by 10 percent through Lean and Six Sigma techniques. DLA is currently applying these techniques to improve Common Access Card (CAC) issuance rates. These successes, and many others like them, demonstrate DoD's ability to apply world-class, best-of-breed practices to meet a wide range of operational requirements.

These outstanding achievements are only the beginning. As Secretary England's memo indicates, this guidebook is designed to facilitate CPI success by codifying experiences to date that have produced the best result. There is great promise for DoD to leverage, expand, and connect past isolated CPI successes as it establishes an overriding CPI culture that converges on best practices, and shares information among its organizations. This Guidebook is a resource to be used throughout the Department for designing and managing CPI efforts.

Figure 1-1. Guidebook Overview



This Guidebook provides members of the Department with a framework that is to be used for implementing and sustaining a culture of continuous improvement. It focuses on the following four key elements of CPI that require a common understanding and support to facilitate ongoing CPI initiatives and set the stage for greater enterprise-level improvements:

- ***A broad-based, structured CPI implementation method*** that spotlights why a sound plan is needed and how to determine and implement the best solution. This involves strategic planning at the enterprise level to properly focus CPI activities and involves operational planning at the organizational level to achieve aligned CPI performance improvement across the enterprise value stream. The methodology describes stakeholder key roles and responsibilities involved in supporting, monitoring, and repeating the improvement process. It also includes the use of peer groups to benchmark activity and cross-fertilize best management practices across DoD. This methodology is a baseline and reference mechanism for continual refinement of CPI application.

- ***A focus on CPI implementation within a structure of goals that are aligned to a warfighter-driven, outcome-based metric***. Goals that are pursued and achieved in each CPI project should be measured by results-oriented performance metrics that support war fighter customer requirements most effectively in terms of time and cost. CPI projects should be in strategic alignment with an organization's results-oriented metrics (such as Government Performance and Results Act (GPRA) related measures) to ensure the optimal impact on the enterprise value stream. Improved reliability, reduced processes' cycle times, and a focus on targeted effectiveness at lowest total cost are driving elements of improvement efforts.

- ***Emphasis on the management and integration of CPI projects***. Project management principles are at the heart of success for supporting CPI projects, although CPI itself is not a project but rather a journey of continuous improvement without end. Periodic progress evaluation and reporting are essential for results achievement and synergy among improvement projects. This Guidebook provides a format for initiating, tracking and evaluating CPI projects in terms of process improvement.

- ***Ways to determine how well projects and organizations are progressing with CPI initiatives, training, and certification***. This Guidebook provides a framework and useful checklists to gauge organizational CPI maturity. CPI maturity can be recognized at various discrete stages. A critical mass of trained CPI resources is needed for success. To rapidly and effectively implement CPI in DoD, individuals should be trained to fulfill various full time and part time roles in CPI-related functions. The commitment for some key personnel may be two or more years. Levels of expertise will be defined and individuals identified based on the level of expertise they achieve. Outside expert assistance is likely to be initially needed from sources such as other DoD activities or the commercial sector. But the goal is to develop in-house CPI expertise and capabilities within a reasonable timeframe (e.g. 1 to 3 years) and take full ownership for the continuing emphasis on CPI.

This Guidebook is designed to assist DoD organizations in using CPI concepts and tools to improve the full range of processes and activities that comprise DoD operations. CPI concepts have

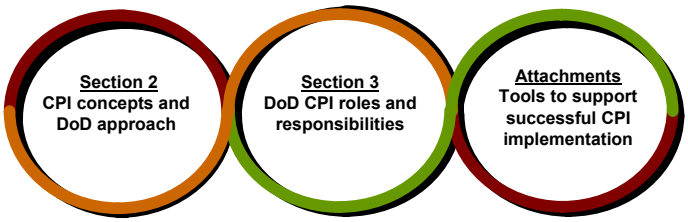
been employed in the private and public sectors and have shown to be relevant and applicable to any organizational process in industrial, service, office and field operational environments. Therefore, this Guidebook should be applied throughout DoD. As the elements and activities in each process are defined and improvement opportunities identified, all DoD organizations will participate in both defining, implementing and sustaining improvement solutions.

CPI is a systems approach that requires the holistic integration of all improvement activities to accomplish operational objectives. This systematic approach requires periodic feedback and refinement loops between strategic planning and aligned CPI activity cascading down through the entire enterprise.

Structure and Use of This Guidebook

This Guidebook applies to all levels and functions of DoD. It is organized to flow logically from the initial introduction of CPI concepts into the strategic planning process to the required organizational structure, and describes the tools needed to solve problems, eliminate waste, reduce variability, and enhance reliability throughout specific CPI projects' identification, execution and sustainment.

Figure 1-2. Guidebook Structure



As Figure 1-2 shows, the remaining sections and attachments are organized as follows:

- The framework for DoD CPI described in Section 2 introduces and explains overall CPI concepts as well as outlines the Department's approach to CPI.
- The roles and responsibility section (Section 3) addresses specific participants and organizational elements in the DoD structured approach to CPI. Each participant should understand, at least at a basic level, the roles and responsibilities of the other participants.
- The attachments provide more in-depth material on specific topics that will be useful to various participants, depending upon their role in CPI. These include a list of useful references, progress assessment techniques, and a suggested CPI project documentation format. They also provide additional information regarding the DoD approach to CPI implementation, training, and certification.

Process improvements resulting from effective CPI application will greatly benefit the Department, both in terms of improved operations and in reduced resource consumption. Cost savings and expense reductions that result from improvements in overall operating effectiveness may be retained by the organizations that generate them. Effective management oversight should lead to reinvestment in additional CPI efforts and recapitalization.

Section 2.
DoD CPI Framework

CPI provides organizations a method for analyzing how work is currently being done and how processes can be improved to do the job more efficiently and effectively on an ongoing basis. CPI has evolved for DoD as an overall approach from separate performance improvement schools of thought originating in the private and public sectors. Most notably are the contributions of:

- ***Lean***, which evolved with increased voice of the customer value-added focus from Just-in-Time - initially in manufacturing industries;
- ***Six Sigma***, which evolved from Shewhart, Deming and Juran's statistical quality control and total quality management focus upon satisfying customer expectations across multiple sectors;
- ***Theory of Constraints***, which has evolved through continual refinement by Eli Goldratt to a present stage of advanced planning capability through Critical Chain functionality utilized in both the public and private sectors.

These schools of performance improvement have separately and collectively proven to be useful in the world of business and increasingly, over the past decade, in improving national defense. CPI also recognizes the criticality of communication and information management, but does not mandate the specific information technology to accomplish this end. CPI provides DoD managers and workers with proven performance improvement tools to build a strong warfighter support foundation for improving cycle time and reliability, aligning the work of subordinate organizations to enterprise-wide goals, and optimizing costs.

There are many measures for gauging how well an organization is meeting the needs of its customers. The premise throughout this Guidebook is that the customers are the warfighters, and their readiness is the primary goal. Notwithstanding how many intermediate organizations may be involved, two important measures for meeting the warfighter's readiness needs are cycle time and reliability at affordable cost.

Cycle time refers to the amount of time required for the DoD component to accept a current or future customer demand (normally the warfighter) and provide the requested capability. CPI looks at the "touches" that occur during this period, how much time is consumed by each touch, and evaluates whether a particular touch provides value to the warfigher. Touch refers to touch labor, otherwise traditionally known as the application of direct labor, and typically includes both value and non-value added components in the eyes of the customer. The objective is to align the organization and its processes to shorten the cycle time without adversely affecting the reliability and cost of the good or service. Cycle time improvement can be focused on any process to reduce the time and resources involved. An important CPI related concept is the expansion of thinking beyond a focus on direct labor alone to look at the larger picture of all utilized labor

resources including direct, indirect and other supporting stakeholder efforts as part of the total labor consumption equation.

Reliability refers to the degree of certainty that a product or service (or any expected outcome) of a process will perform as intended over a set period of time under specified conditions. Experienced CPI practitioners know that simply attempting to speed up a process with the objective of reducing cycle time is to run the risk of compromising quality, thereby degrading reliability. CPI balances the need for speed with the need for reliability.

Cycle time and reliability almost always can be improved if money is no object. However, because no organization enjoys unlimited funding, CPI practitioners must consider the costs and benefits of process improvements before undertaking them. In DoD, CPI efforts should consider the anticipated improvement in the context of lowest total cost to deliver targeted required value to the customer within the entire consumption and provisioning value streams at multiple levels under study.

Finally, CPI practitioners are obligated to align their efforts with the goals of the enterprise. For DoD, that is the National Military Strategy and all its subordinate operational plans. The strategic and operational plans provide the foundation and building blocks for a strong and institutionalized CPI culture in the organization. In DoD, such organizations should

- have effective methods for identifying processes whose improvement would most benefit the warfighter;
- train people to perform CPI analyses with a formal way of certifying their skills from, for example, Level 1 (novice) to Level 2 (intermediate), to Level 3 (expert);
- assess the maturity of the CPI work using an approach similar to the one addressed in Attachment D; and
- focus on knowledge management and sharing information and lessons learned, including peer groups that provide a forum for the cross fertilization and exchange of ideas and techniques.

Section 1 of this Guidebook mentions examples of impressive improvements in lowering costs and speeding up process cycle times. Initial CPI efforts often lead to a large first-time improvement in processes, but the lasting value of CPI lies in continuous improvement and ongoing fact-based measurement of results. Each time we measurably improve our work processes, we are enhancing our value-added support to the warfighter. CPI should become a daily part of how we think about and do our work. The remainder of Section 2 addresses five areas: fundamental concepts of CPI, the CPI Deployment Cycle, the operational plan, change management, and metrics.

Area 1—Fundamental Concepts of CPI

There are several concepts that are fundamental to effective CPI implementation in DoD. They include a set of “musts,” a set of principles, a value stream focus, and a recognizable CPI culture.

CPI "Musts"

Experience in both the public and private sectors indicates that the following are required to ensure effective CPI implementation:

1. An established infrastructure to support CPI implementation—In DoD, the CPI infrastructure for each organization should consist of a Champion, Steering Committee, Support Team, and Work Groups, as appropriate. Peer groups should also be used to strengthen performance across the DoD functional areas.

2. Outcome-focused goals that are strategically aligned, mission related and add real customer value through the operations of the organization.

3. Thorough problem Definition, Measurement, Analysis, Improvement and Control (DMAIC) within a logical methodical CPI plan of action for all projects and other initiatives.

4. Strong and continuously visible leadership commitment from the very top of the organization that stresses and supports a CPI culture of innovation and team work.

CPI Principles

Several principles evolved from organizations that have engaged in CPI planning and implementation; they represent the best of current CPI thinking:

1. Determine the current situation using objective (fact-based) data analysis.

2. Analyze problems as a variation from a known or expected standard.

3. Set a goal to holistically improve the entire system and avoid sub optimization through isolated focus on process sub elements.

4. Focus on the people, machines, and systems that add value.

5. Improve processes through continuous controlled experimentation.

6. Make decisions based on long-term improvement.

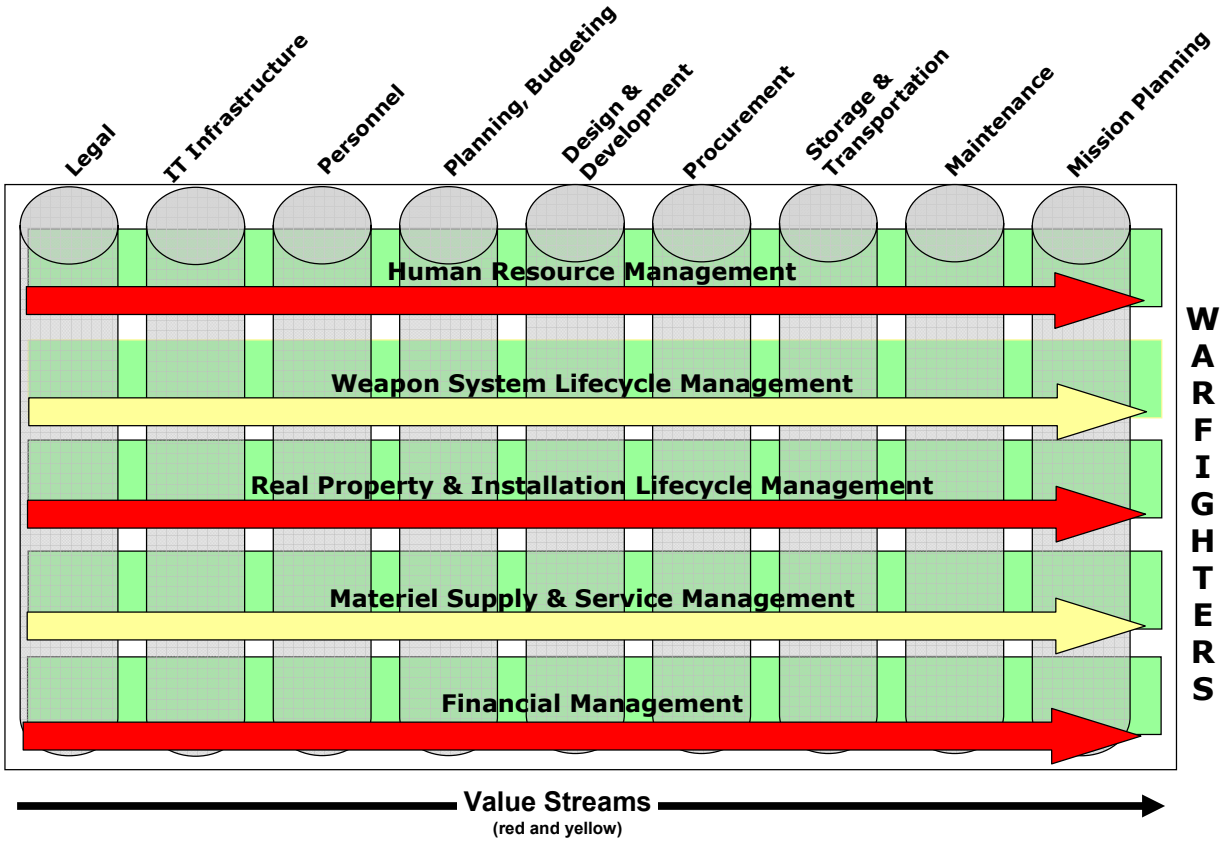
7. Employ partnering with suppliers, customers, and other stakeholders.

A Value Stream Focus Within the Enterprise

Successfully applying CPI requires a comprehensive value stream focus within the enterprise being transformed. As illustrated in Figure 2-1 (which is meant to be notional and not all inclusive), there are numerous functional areas within the DoD enterprise as well as many management communities that may engage in CPI activities. DoD's complex enterprise creates myriad nodes, interfaces, activities, and other "touch points" that may need to be considered as parts of the specific value stream–the enterprise–that may contribute to the improved process and support activity. For example, the notional and high-level end-to-end value stream for a DoD weapon system includes all of the functional

areas and communities identified in Figure 2-1 including acquisition processes, the use of the weapon system for its intended purpose, all maintenance activities required at the O/I/D levels, supply and transportation activities, and mission planning.

Figure 2-1. Value Streams and the DoD Enterprise



The focus of value stream mapping at any level of the enterprise should be centered on the customer. Individual CPI projects must address all of the potential related nodes, interfaces, and activities within the affected enterprise–as they center on measuring value to the customer or warfighter. Typically 3 to 5 metrics are determined on an organization by organization basis to describe each step in the process.

CPI Culture

Throughout this Guidebook, various CPI-related roles are defined and specific activities are identified. A supportive and innovative culture must underlie this formal framework. At the core of this transformed culture is the ever vigilant lookout for waste and the unshakeable belief that there is always a better way to get things done. If nurtured, it will increasingly flourish as the number of successful CPI projects increases. Several core values comprise an effective CPI culture. These should be recognized and developed throughout the organization:

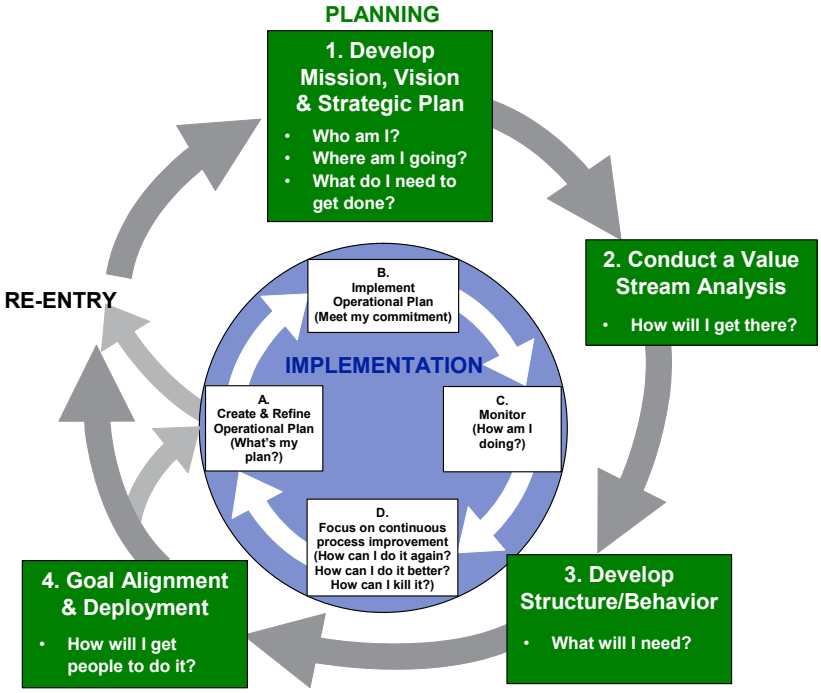
- *Mutual trust* and *respect* within the extended enterprise beyond the organization's four walls
- Keeping the *voice of the customer first in mind at all times*

- Using dissatisfaction with the status quo to continually drive further performance improvement
- Always being *conscious of the total cost* of your actions as they impact customer value and your organization
- Staying receptive to new CPI concepts and tools as they might evolve and become applicable, while avoiding becoming locked in on a single school of thought that precludes other useful approaches and perspectives.

Area 2—The CPI Deployment Cycle

The underlying CPI concepts are put into practice through a disciplined CPI deployment approach that should change how we view and think about work. It provides a customer satisfaction focus that is value-driven, not task driven, with value being defined by the customer. Operations are viewed in the context of customer expectations and requirements, operational environments, resource requirements, and technology. Figure 2-2 illustrates the steps in the CPI deployment cycle. The following paragraphs outline each of these steps.

Figure 2-2. CPI Deployment Cycle



Develop Mission, Vision, and Strategic Plan *(Fig. 2-2, Block 1)*

The first step in the deployment cycle is to establish the organization's mission and vision, and strategic plan for achieving them. A focused mission, a clearly articulated vision, and well-thought out strategic plan provide the framework to achieve the organization's objectives through the following:

1. Common vision and marching orders that foster teamwork, inter-departmental cooperation and alignment between goals, metrics and actions
2. Focus on reducing constraints to achieve better utilization of resources and capacity
3. Continued acceleration of improvement efforts
4. Better foundation for fact-based analysis and decision-making
5. Expanding perspective on the entire (end-to-end) value stream.

Mission

The CPI Mission is a concise, unambiguous, and measurable description of the organization's role in the overall objectives of DoD, with a clear connection to the Strategic Planning Guidance (SPG) and Contingency Planning Guidance (CPG).

Vision

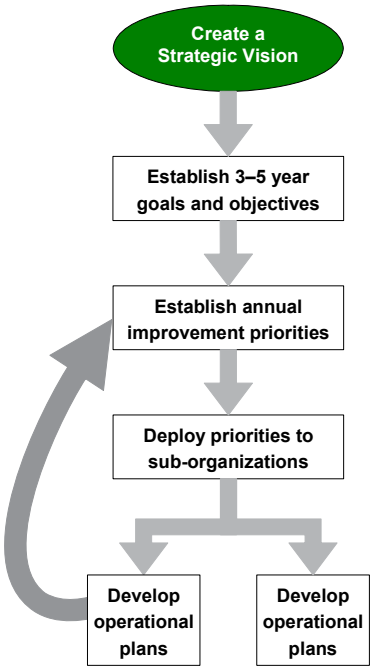
The CPI Vision is a view into the future that succinctly describes how the organization will conduct business. It implies a gap between the current state and a better future state. A future state can be defined as better only when it supports effective fulfillment of the organization's mission.

Strategic Plan

The Strategic Plan provides the high-level actions (as depicted in Figure 2-3) to be taken over the timeline of the plan to make the Vision a reality. The purpose is to portray a comprehensive, integrated roadmap for an organization that supports its goals for completing its mission. The plan coordinates the requirements to be placed on the organization with the resources to meet those requirements. Requirements are defined by the nature and the volume of work to be processed, and resources include virtually any element of the organization and its extended supply chain.

The Strategic Plan must be a living document that is formally redrawn based upon the environment in which the organization operates. In the DoD setting, CPI-related strategic planning efforts must also support the overall performance management framework (e.g.; the President's Performance Management Agenda (PMA) and associated organizational planning and budget documents). This enables more informed decision-making at the leadership level because the value and priority of particular performance improvements and CPI efforts can be evaluated in terms of strategic goals and objectives.

Figure 2-3. Strategic Deployment

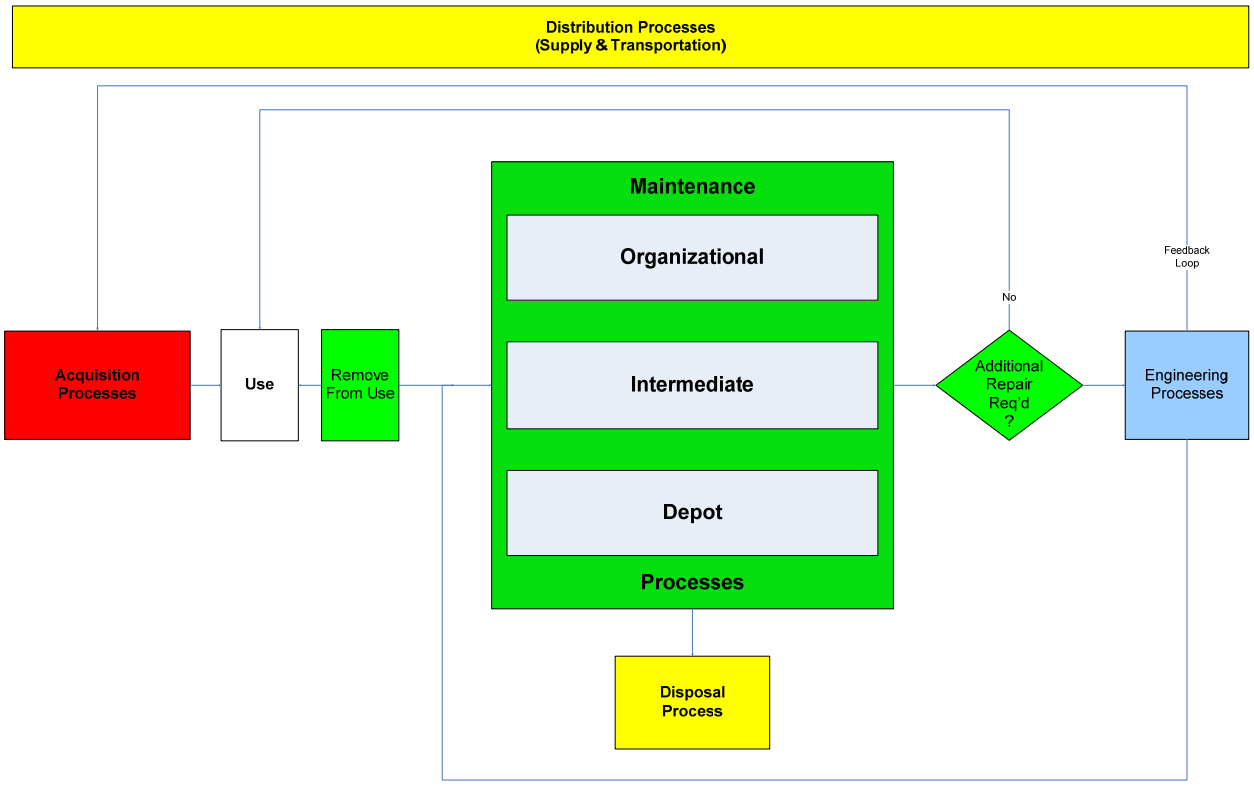


Conduct Value Stream Analysis *(Fig. 2-2, Block 2)*

A value stream encompasses all the planning, execution, products, and services that go into a process to create value for a customer. With the mission, vision, and strategic plan in place and communicated to the workforce, the first task is to align the processes to support that direction. The best way is through a value stream mapping process that helps illustrate the opportunities for improvement. Figure 2-4 depicts an example of an enterprise-level notional weapon system value stream at a very high level. Value stream mapping and analysis must focus on value to the customer and typically includes development of a current state map (such as the high-level example) which describes the existing process and uncovers improvement opportunities, and a future state map that the describes the desired future process vision and through gap analysis reveals potential leverage points for process improvement. Typically, an organization's value stream mapping activities will also involve the identification and analysis of both the "value-added" and "non-value added" time in the process.

Value stream mapping tools continue to advance with new emphasis on consumption and provisioning, in addition to consideration of people, process, material, and information systems support. The need for customers to have a direct role in the mapping and analysis process is being increasingly emphasized by the originators and practitioners of this tool. Value stream analysis helps guide the sequencing of efforts in addressing process inefficiencies with effective CPI projects. The value stream analysis is conducted at multiple levels within an enterprise and is usually better accomplished as a top down activity. The enterprise could be a major functional area, such as depot maintenance, or it could focus on a weapon system. However the enterprise is defined for a particular CPI effort, the approach must engage knowledgeable representatives and stakeholders from every element of the enterprise so that a coordinated solution is achieved.

Figure 2-4. Weapon System Generic Value Stream Map Example



Develop Structure and Behavior *(Fig. 2-2, Block 3)*

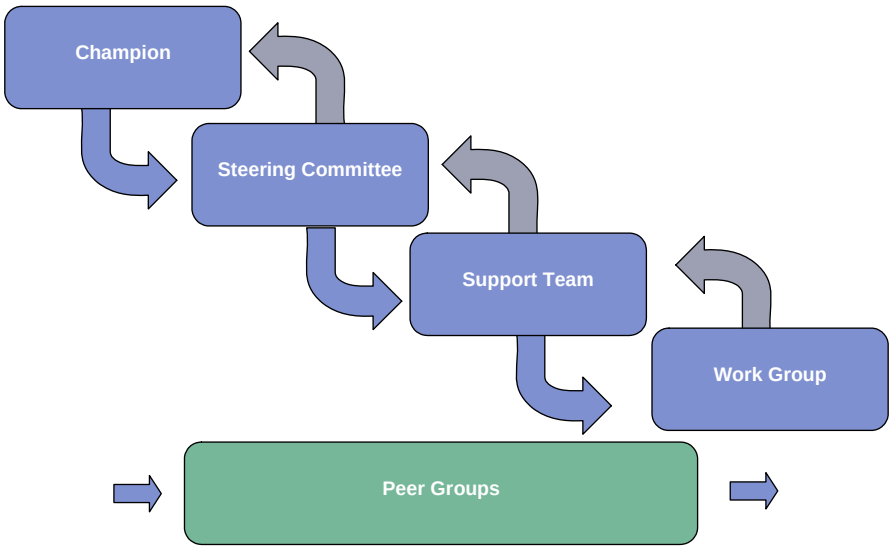
Successful mission completion on a reliable and cost-wise basis depends on the development of an effective supporting infrastructure. The general framework for implementing CPI projects is depicted in Figure 2-5. Although this framework is generally appropriate for initiating and formal project's review, it should be noted that interactions will be required across all elements of the framework and not simply in a step-wise hierarchical manner.

Within this framework, the Champion articulates the core values and sets the top-level expectations in terms of the enterprise's mission and vision. The champion needs to insure a connection with all elements of the enterprise regarding what CPI means and what must be done. The champion must slice through organizational barriers and filters to insure these connections are made and continued, such as in the example of champion sponsored town hall meetings in General Electric.

The Steering Committee is the Champion's main vehicle for keeping the CPI efforts aligned with expectations. The CPI Support Team provides the technical expertise and consistency of approach. This enables CPI to become a repeatable process that is engrained in the behavior and language of the organization and ultimately becomes a defining element of its culture. The Working Group accomplishes the detailed analysis of current operations, obtains the input of peer groups when appropriate, and develops options for improvements. Peer groups operate within and across functional areas to share experiences, best practices, and benchmarks.

In DoD, the focus typically is multi-functional, which means that many functional experts will be required to participate at some level of effort with the Support Team and Working Group in developing solutions consistent with the Champion's expectations. The functional participants need not be assigned to CPI work full time, but they do need to respond in timely manner and proactively when called upon. Specific roles and responsibilities are detailed in Section 3.

Figure 2-5. CPI Implementation Structure



Align and Deploy Goals *(Fig. 2-2, Block 4)*

One of the key elements in moving an organization forward in a coordinated manner is through the alignment and deployment of goals. The goals of an Army platoon need to align with and support the goals of its company, which need to align with and support the goals of its battalion and so on up to the goals of the Army, which in turn need to align with and support DoD's goals. An Air Force squadron's goals need to align with overall wing and headquarter goals and a Navy ship's goals need to align with task force and fleet goals. The goals established for each sub-unit need to align with and support the organization's goals and so on down to the lowest level of the organization. Ultimately, there should be a "line-of-sight" connection between the goals for the lowest level unit in the organization (i.e., the person) and those of the highest level organization, the DoD.

It is essential that progress toward goal accomplishment be formally measured and visible. Metrics should be outcome based as a tool for daily operations and aligned with the organization's goals. There needs to be a direct, identifiable, causal relationship between each metric and one or more goals. CPI efforts should be selected and implemented in alignment with organizational goals and strive to have the greatest possible effect on the value stream.

Create and Refine Operational Plan *(Fig. 2-2, Block A)*

This is the first step at the implementation level. An operational plan is a detailed plan of action for a work group. The operational plan is a commitment to accomplish specific organizationally aligned CPI-related tasks in a specific timeframe.

Implement Operational Plan *(Fig. 2-2, Block B)*

Each Operational Plan is carried out with the support of the CPI Support Team, the oversight of the Steering Committee and sponsorship of the Champion. This plan represents the commitment to align actions with the goals.

Monitor *(Fig. 2-2, Block C)*

The Steering Committee (sometimes called Deployment Teams in the early stages of CPI or Lean Six Sigma implementation) guides and provides business focus as the CPI Support Team's senior practitioners. They use appropriate metrics and data in coordination with each Work Group to determine how the work is proceeding and report progress back to the Champion. Coaching is an outgrowth of the oversight process. This is the time to evaluate progress toward the goals as laid out in the operational plan.

Focus on CPI *(Fig. 2-2, Block D)*

CPI should be a basic strategy for accomplishing the operational plan. CPI enhances current practices by capturing and standardizing the positive results achieved by the Work Groups.

Reentry

Periodically, the overall process should be revisited to check whether the organization is moving toward the end state expressed by the Mission and Vision and captured in the Strategic Plan. This requires returning to the beginning and revisiting the Mission, Vision, and Strategic Planning steps. All the steps should be revisited in the same disciplined way to ensure that the organization is moving in the right direction.

Area 3—Operational Plan

The Operational Plan's CPI element must support the Strategic Plan and is a list of actions that should be taken to achieve an effective CPI program. The goals for the plan are as follows:

1. Provide the actions to achieve the specific organizational transformation.
2. Recognize and build on current good practices.
3. Provide consistent expanding CPI deployment within the organization.

The Operational Plan ensures a common understanding of CPI within the organization and the alignment of mission, goals, and objectives of all organizations within the end-to-end value stream. Key activities and the relationships necessary for a successful Operational Plan are identified and discussed in Attachment B.

Area 4—Change Management

Managing the change process is an integral element of a successful CPI implementation. In DoD, the following are considered keys to systematic change management:

1. *Educate leaders*. Educate key organization leaders on the concepts of CPI, the roles and responsibilities of CPI practitioners, initial and long-term decisions critical to successful change, and why the change is important.

2. *Challenge presumptions*. Challenge the status quo, empirically demonstrate the competitive benefits of change, and answer the "What's in it for me?" question with a compelling rationale.

3. *Secure agreement*. Secure the agreement of key leaders on the need for change, the objectives necessary to implement that change, and the course of action to begin implementing that change.

4. *Prepare leaders to lead*. Educate and train leaders in defining the new standards for success, and creating the mechanisms necessary to set new expectations and generate results.

5. *Prepare staff to manage the change*. Educate and train the staff to manage the transition from the old culture to the new culture, and assume new roles during the change.

6. *Educate the organization membership*. Educate and train everyone about the new standards and expectations. The investment in this process saves difficulties downstream and helps to ensure a successful process. Continuous improvement is everyone's responsibility.

7. *Use DMAIC to identify and carry through with CPI initiatives*. A formal DMAIC or similar approach should be integral to the implementation of CPI and execution of all CPI projects.

Change management begins with a review of current performance and measuring it against the standard set by management for the organization. It is not possible to improve what is not measured. This measurement gauges the current level of performance against the desired future performance level. The resulting analysis can highlight a variance that needs to be corrected as well as performance that is inconsistent with achieving the overall goals.

The next system element is to determine the sense of direction for the organization. This element is accomplished through an understanding of where the organization needs to go to reach its goals. This sense of direction comes from understanding the answers to the following questions:

1. What are the priorities of the organization and are they aligned with higher level enterprise priorities?

2. What are the environmental elements—internal and external—that will help achieve the goals?

3. What available opportunities can be accomplished given the current organizational capability?

4. What are promising "quick wins" that can be tackled with the initial CPI deployment while the organization is learning the methodology and realizing its positive benefits?

At this point, we should be ready to communicate the priorities for the next planning period. At the end of this segment of the management cycle, the goals are communicated to those who are required to successfully meet those goals.

Communication begins with the manager discussing the priorities with his/her subordinates. This interaction instills a sense of ownership in the process and provides the opportunity to influence the outcome. Final goals are developed through disciplined DMAIC with explicit expectations in terms of timing, resources to be used, delegation, and capability. The process of delegating is achieved through dialogue between superiors and subordinates through dialogue that ensures the goals are clearly understood and the necessary resources are arranged and made available to complete the goals. The result of delegation is an agreed-to plan that drives the commitment of time and resources. The plan that results from the delegation of goals is monitored and coaching is given as needed.

The last review is the final opportunity to assess overall performance. Some goals may have to be carried over depending on the priorities of the upcoming year. This information could become a basis for the next planning cycle.

Using the CPI deployment cycle creates a model for several important aspects of CPI implementation:

1. Management's input to the process is more predictable and explicit.

2. Management has clearly communicated what is important and who is responsible for what actions.

3. The focus is on coaching and facilitating to achieve successful results.

4. Successes should be celebrated and communicated to reward and encourage continued improvement.

Area 5—Metrics

Metrics are the means to identify worthy goals and determine whether they are achieved. The metrics used to evaluate how an organization is doing need to be aligned with the organization's goals. If, for example, the goal is to optimize cost in all operations, we need to measure costs to do the work that provides customers with recognizable value. The key is to measure total cost. Otherwise, reducing cost in one area might unknowingly and unexpectedly increase it elsewhere in the organization.

If the goal is cycle time reduction and an organization reduces its own cycle time and simultaneously unknowingly reduces the effectiveness and reliability (an undesirable affect) of another part of the system, the burden is then passed to another activity with possibly a longer overall cycle time. DoD organizations should have a set of metrics and CPI projects, all of which are actively tracked and reported, that together achieve improvements without adding unintended offsetting additional expense in other organizational processes.

Leading Metrics Versus Lagging Metrics

Quality, delivery (e.g., throughput and cycle time), and cost metrics are typically measured on a regular basis. They are called lagging metrics because they are collected and reported after something has happened. These metrics are results oriented and fine for tracking overall performance trends, but by the time a lagging metric reflects a problem it may have a more major impact.

Outcome-based (leading) metrics help predict what will happen, allowing at least some problems to be anticipated and avoided. A leading metric might be a frequently recorded basic process metric coupled with a defined set of expectations or limits. An example of a leading metric is first pass yield measured at each workstation. Operations personnel need leading metrics to minimize problems.

When a cost budget is set, the organization should manage independent metrics, such as overtime hours, to stay within that budget. Cycle time and delivery to schedule are representative dependent metrics. Dependent metrics can generally be used as lagging metrics. Independent metrics can generally be used as leading metrics.

Customer-Oriented, Outcome-Based Metrics

The outcomes to measure are those that are perceived to have value in supporting the customer's mission. Several DoD organizations are currently employing customer-oriented, outcome-based metrics. The Navy, for example, uses a Ready For Tasking (RFT) metric to calibrate key processes and measures in its enterprise value chain in terms of aircraft that are available to Fleet Commanders. Management of this kind of metric requires focusing on preventive and predictive actions.

Criteria for Evaluating Metrics

CPI metrics should have five key characteristics:

1. *Valid* metrics actually measure what they are intended to measure.
2. *Obtainable* metrics can actually (and practically) be gathered in a timely manner.
3. *Accurate* metrics can be trusted to give the right information.
4. *Repeatable* metrics give the same answer under the same conditions every time.
5. *Actionable* metrics allow us to do something with the information they provide, which requires both relevance and timeliness.

Other considerations related to metrics include:

1. *Face validity*—e.g., It may not be obvious that a given metric actually relates to a given goal even though a causal analysis shows that it does.

2. *Level of aggregation*—Some metrics are only valid or reliable at certain levels of aggregation. For example, when costs at a depot are determined based on depot-wide overhead rates applied to labor, the cost information is only valid when the depot is taken as a whole. The actual cost for any given piece of the organization is likely different from the calculated value. In other cases, aggregated metrics can be misleading or incorrect even though the individual metrics are correct (this is generally known in the statistics community as "Simpson's Paradox").

3. *Data ownership*—Even if the data exists, we might not be able to get access if it is under the control of an individual or organization that chooses not to make it available. This might require elevation to a higher level to achieve cooperation and overcome resistance to cultural change.

Section 3.
CPI Roles and Responsibilities

Successful CPI implementation requires a variety of responsibilities spread across the organization. Some of the responsibilities fall upon existing roles, especially top-level leadership. These roles are applicable to various different organizational levels and the functions performed are basically the same at each level.

Primary Roles

CPI Champions lead CPI within their respective organizations through active sponsorship and drive the development of the mission, vision, strategic plan and attention to results. They ensure the necessary resources are available to the CPI Steering Committees, CPI Support Teams, and Work Groups, while monitoring the implementation and sustainment of CPI across the organization.

CPI Steering Committees participate in creation and sharing of the vision, and acknowledge its importance to the organization's success. The Steering Committee members develop vision aligned strategies, define operational plans and metrics, monitor performance and provide guidance and business focus. This group is often referred to as a Deployment Team in the early stages of CPI or Lean Six Sigma implementation.

CPI Support Teams provide organizational education and training and facilitate DMAIC project management of CPI initiatives. The Support Team works closely with the steering committee and CPI Working Groups to eliminate barriers to improved performance through CPI initiatives.

CPI Work Groups accept process ownership and employ applicable CPI tools to analyze the current situation, identify ways to improve operations, seek approval for change and execute process transformation. These groups utilize the know-how and experience of the individual members and consult, as necessary, with peer groups to accelerate process improvement.

CPI Peer Groups share common functional responsibilities and provide an opportunity for sharing information about CPI goals, challenges, approaches, activities, and accomplishments. Peer groups share a larger common performance goal above their specific subsets of effort and collectively can influence optimization of CPI initiatives to improve overall organizational performance at affordable cost.

The following paragraphs describe CPI related organizational roles and assignments, including specific responsibilities, and identify how these responsibilities relate to the CPI Deployment Cycle.

CPI Champions

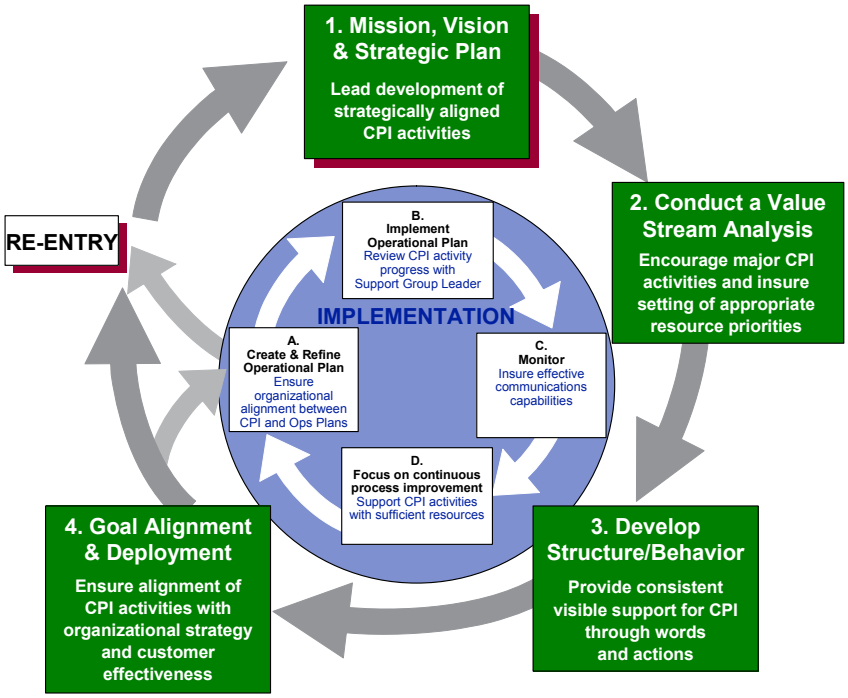
The top management Champion has the primary responsibility for creating the vision and leading the development of the enterprise strategic plan. Goals and objectives will be used to align subordinate strategic and operational plan elements that cascade down through the entire organization. CPI Champions may also be needed at multiple levels within the organization with similar responsibilities at their respective levels. It is imperative that CPI Champions sustain visible support of CPI through consistent words and actions. In DoD, a CPI Champion should be the designated leader of the organization or a highly placed executive, whether an Under Secretary of Defense, commanding officer, or other clearly defined leader for whatever level of organization is building a CPI culture.

The following are the ongoing responsibilities of the top management Champion:

- Support the prioritized efforts of all CPI-related functions (CPI Steering Committees, Support Teams, and Work Groups) to the organization's enterprise strategic plan.
- Conduct periodic reviews of CPI related resource allocations with the CPI Steering Committee, assess CPI projects' effectiveness via progress against aligned metrics, and encourage sharing of ideas and CPI lessons learned across the organization.
- Promote the exchange of CPI knowledge both inside and outside of the organization.
- Remove barriers that drive waste or inhibit improvement opportunities.
- Remove fear of failure (punishment) to encourage risk taking.
- Publicly recognize and reward CPI successes.
- Continually convey a sense of urgency and dissatisfaction with the status quo.

The involvement of a top management Champion is critical to CPI organizational success beyond isolated islands of excellence. Subordinate organizational CPI Champions have the responsibility to align their organizations with the top management Champion's vision, the organizational mission, and the enterprise level strategic plan. It is essential that CPI Champions stay well informed of CPI progress, through their respective CPI Steering Committees and CPI Support Group leaders. Key emphasis on monitoring is the timely and accurate feedback regarding project results and leading the overall alignment of CPI projects to the organizational vision, mission, and strategic plan. Figure 3-1 illustrates the CPI Champions' primary roles and responsibilities.

Figure 3-1. Key CPI Champion Activities



CPI Champions play key roles in each stage of CPI implementation, as described below.

Develop Mission, Vision, and Strategic Plan (Fig. 3-1, Block 1)

- Create the organizational vision, support the organization's mission.
- Lead strategic planning for the organization.
- Ensure alignment throughout the organization of subordinate plans, objectives and priorities.

Conduct Value Stream Analysis (Fig. 3-1, Block 2)

- Support the ongoing value stream analysis of enterprise level and subordinate organizational processes.
- Charge respective CPI Steering Committees to identify CPI projects, set priorities, and periodically review CPI projects' performance to plan with CPI Support Teams and reallocate appropriate organizational resources as necessary to insure cost effective CPI success.

Develop Structure and Behavior (Fig. 3-1, Block 3)

- Provide consistent visible support through meaningful interactions with all levels of the organization.
- Take appropriate actions to support funding, review, and recognition support of CPI initiatives on an ongoing basis.

Align and Deploy Goals (Fig. 3-1, Block 4)

- Review ongoing CPI deployment to insure continued alignment with organizational strategy and customer effectiveness goals and objectives.
- Act as the final point of appeal on decisions for support of particular CPI projects or activities.
- Participate in the decision of how and when to provide incentives for those who actively work to move CPI forward.
    - Reward worthy problem identification
    - Reward successful project teams.
    - Reward risk taking project teams that put their best effort into a project that ends up not providing the expected result.

Create and Refine Operational Plans (Fig. 3-1, Block A)

The CPI Champion is responsible for the overall ongoing alignment between the strategic plan and the subordinate operational plans. This requires timely and accurate feedback on organizational performance.

Implement Operational Plans (Fig. 3-1, Block B)

The CPI Champion should receive formal regular feedback from the CPI Steering Committee on progress in supporting the operational plan to realize the organization's vision and strategic plan. The results need to be expressed in metrics that are directly related to the overall goals set in the strategic planning process.

Monitor Progress (Fig. 3-1, Block C)

The CPI Champion requires timely, accurate, regular feedback on the organization's results. The CPI Champion needs to ensure the necessary steps are taken to provide effective organizational communications capabilities.

Maintain CPI Focus (Fig. 3-1, Block D)

The CPI Champion should receive regular feedback on how the results from executing the operational plan are being standardized and being used to identify follow-on CPI projects. The CPI Champion should communicate achieved results and further opportunities enterprise-wide.

Reentry

Periodically, the CPI Champion and subordinate staff need to assess the overall organization's progress in moving toward the end state expressed by the Mission and Vision and Strategic Plan.

- Revisit and revise the Strategic Plan.
- Drive the organization back through the strategic steps and into a new round of implementation steps.

CPI Steering Committees

CPI Steering Committees should include the decision makers that control the resources for all major functions within the organization. These committees, which are sometimes called Deployment Teams, make critical decisions regarding CPI priorities and resource allocation for the entire organization. They provide the level and prioritization of resources necessary to accomplish CPI goals. CPI Steering Committees are normally chaired by a senior leader of the organization and are accountable for CPI deployment actions within the respective organizations of the members; their role may lessen as the organization reaches CPI maturity.

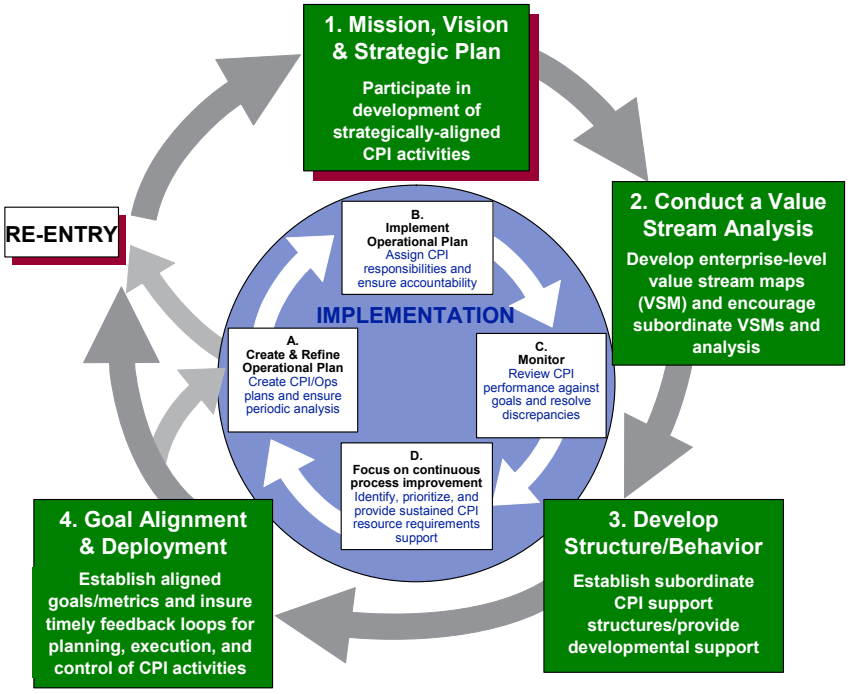
At each level in the organization, a CPI Steering Committee serves to initiate and monitor deployment and culture change. Although much of the pre-deployment work and early decisions are the responsibility of the CPI Steering Committee, the need for "steering" will remain until CPI becomes the standard way of operating. As the deployment rolls out, the CPI Steering Committee monitors progress via the deployment metrics established during pre-deployment and addresses organizational barriers that impede progress toward results.

The following are among the CPI Steering Committee's primary responsibilities:

- Develop and manage CPI results, goals, objectives, guidelines, and measures. Determine what is needed for successful deployment and evaluate and report how deployment is performing relative to those needs.
- Establish and manage CPI management processes. Understand risks to deployment; develop contingency plans and execute as needed.
- Execute ongoing deployment of CPI. Ensure the deployment within the organization is aligned with the strategic plan.
- Ensure integration between CPI activities and other processes to prevent or reconcile conflicts of interest.

Key CPI Steering Committee roles and responsibilities are depicted in Figure 3-2.

Figure 3-2. Key CPI Steering Committee Activities



CPI Steering Committees are dedicated to the organizational vision and mission while working with CPI Champions to develop and support the strategic plan and aligned major goals and objectives. CPI Steering Committees also ensure the plans and actions of all the subordinate organizations are collaboratively aligned and embrace continuous process improvement.

Develop Mission, Vision, and Strategic Planning (Fig. 3-2, Block 1)

- Support creation of business cases for CPI change initiatives aligned to strategic plans, objectives and goals. What is the gap that needs to be closed? What is the quantifiable benefit to be gained from closing the gap?
- Work with the CPI Champion to create, communicate and sustain the sense of urgency across the organization.
- Proactively mitigate risk.
- Integrate the strategic value stream.
  - Aligning strategy and measures at all levels of the organization.
  - Capture the voice of the customer and enhance continuing customer communications to anticipate and respond to changing requirements.
  - Develop and sustain the audit process for the CPI deployment.

Conduct Value Stream Analysis (Fig. 3-2, Block 2)

CPI Steering Committees are responsible for developing an enterprise level value stream analysis of the organization. This value stream analysis is used to identify key performance leverage points for CPI initiatives.

CPI Steering Committees are also responsible for the following actions:

- Map and analyze the enterprise value stream. This is not a trivial effort and is most likely to continue evolving over time if CPI driven business transformation is actually embraced.
- Create a future state that accomplishes the mission, vision and strategic plan.
- Establish aligned goals and metrics with stretch goals.
- Identify performance gaps.
- Identify and engage key stakeholders.

Develop Structure and Behavior (Fig. 3-2, Block 3)

CPI Steering Committees play a critical role in managing CPI deployment. This includes providing CPI leadership as well as establishing the supporting infrastructure. CPI Steering Committees are specifically responsible for the following actions:

- Determine the necessary organizational structure and the staff requirements for successful CPI implementation. Adapt current organizational structure and business systems to meet those needs.
- Align incentives to support established goals and metrics.
- Define and communicate desired organizational behaviors and set expectations.
- Support education, training, certification, and coaching of organizational personnel.

Align and Deploy Goals (Fig. 3-2, Block 4)

CPI Steering Committees ensure the organization's goals are aligned and deployed throughout all of its operational elements and sponsored CPI projects.

Create and Refine Operational Plans (Fig. 3-2, Block A)

CPI Steering Committees identify and prioritize the activities necessary for achieving the collaborative goals and objectives of the organization.

CPI Steering Committees are also responsible for the following actions:

- Create the operational plan for the organization.
- Develop supportive CPI plans to complement the strategic and operational plans.
- Ensure periodic analysis and corrective action to keep plans on schedule to deliver expected results.

Implement Operational Plans (Fig. 3-2, Block B)

CPI Steering Committees implement the top level Operational Plan and monitor the progress of subordinate organizations. CPI Steering Committees are also responsible for assigning responsibilities, providing necessary resource prioritization leadership, and establishing accountability for elements of the operational plan.

Monitor Progress (Fig. 3-2, Block C)

CPI Steering Committees periodically review the progress of the organization and all its elements. This information is used to evaluate the organization's progress toward achieving its major goals.

Maintain CPI Focus (Fig. 3-2, Block D)

CPI Steering Committees should continue an organizational scan to identify emerging CPI challenges and opportunities. They should also prioritize available resources to sustain CPI progress and encourage a cultural environment of continuous improvement. Employees who have identified new CPI opportunities that are not able to be funded at the time deserve timely encouraging feedback on the status of their suggestions to encourage continued engagement.

Reentry

CPI deployment is a never-ending cycle. Each year, the CPI Steering Committee with the CPI Champion should conduct a major review of the past year, and update the strategic plan, goals, and objectives to continue the cycle of continuous process improvement. Interim monthly or quarterly updates may be warranted depending upon the nature of the organization and its processes.

CPI Steering Committees are also responsible for the following actions:

- Perform formal periodic reviews of the state of CPI deployment within the organization.
- Establish interim updates for CPI activities to insure progress against stated objectives. Support initiatives that continue to be relevant and proactively cancel those that are no longer justified through DMAIC analysis.

CPI Support Teams

CPI Support Teams are responsible for direct transfer of knowledge to all employees, encouragement to create critical mass for cultural change and sustaining support for CPI as a journey rather than a project with an end point. The CPI Support Team's ultimate goal is to create the capacity to sustain a CPI culture without CPI Support Team involvement. A CPI Support Team is a collection of individuals that may be full and part-time, depending upon the needs of the organization. External CPI expert facilitators may likely be required at the beginning of an organization's CPI experience to overcome initial inertia and lack of expertise, but they should be expected to transfer CPI related knowledge to facilitate internalization of all facilitator and training requirements as soon as practicable. Internal change agents and instructors are more effective in the long-term movement toward the required organization's cultural change due to their insider acceptance and knowledge of processes, people, and obstacles.

The CPI Support Team's resource requirements should be offset by the savings that are being enabled through their activities. The number of CPI Support Team members depends on several variables, including available funding, current staffing levels, importance of the goals to be accomplished and availability of competent resources. It is possible to have a CPI Support Team that individually does not represent the entire range of required competencies but collectively supports all the competencies. Cross-training is encouraged so that each member will eventually have multiple competencies

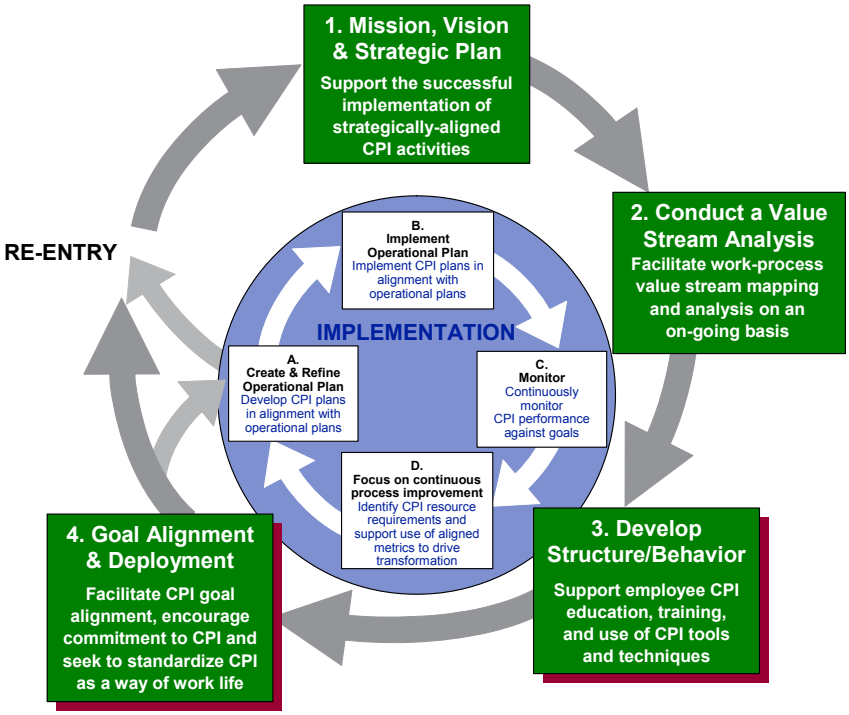
CPI Support Teams are integral to the implementation of CPI; therefore, it is essential that the team members possess extensive knowledge of CPI tools, techniques and concepts as well as the knowledge of how to facilitate the development of a CPI culture. CPI Support Team members should ultimately take the CPI skills learned back into the operational organizations in another capacity.

CPI Support Team key responsibilities include the following:

- Transfer of CPI knowledge to the work group.
- Plan for and overseeing the development of the culture to support CPI.
- Employ DMAIC to identify and manage opportunities for CPI improvement.
- Serve as coaches to all CPI initiatives' participants.

Key CPI Support Team activities are depicted in Figure 3-3.

Figure 3-3. Key CPI Support Team Activities



Develop Mission, Vision, and Strategic Planning (Fig. 3-3, Block 1)

CPI Support Teams are responsible for providing expertise throughout the cycle of strategic and tactical CPI improvement. The CPI Support Team focus is on teaching the organization to operate in a CPI environment with continually improving competency.

The primary role of the CPI Support Team is to facilitate the operational mission using CPI tools, techniques and processes. This is accomplished by working with the CPI Steering Committee in relation to decisions on elimination of waste and variation through CPI.

Conduct Value Stream Analysis (Fig. 3-3, Block 2)

CPI Support Teams facilitate value stream mapping and analysis of processes. CPI Support Teams are also responsible for ensuring that the future state reflects the use and implementation of CPI to support the mission.

CPI Support Teams focus on the following decisions:

- Appropriate initial implementation areas to map?
- What level of detail in the gaps is necessary to achieve for CPI direction decision-making?

Develop Structure and Behavior (Fig. 3-3, Block 3)

CPI Support Team efforts are integral to cultural transformation to a continuous improvement mindset. The following are key team efforts in this area:

- Organize for CPI implementation.
  - CPI Support Team members should be trained, ready, and available to teach the organization CPI.
  - CPI Work Groups should have team leaders who are capable of solving problems of a wide variety of issues.
- Provide education and training.
  - Training can come in three forms: on-the-job, classroom, and individual self development.
  - Required resources must be funded, time must be provided, and all training should demonstrate relevance to the accomplishment of the goals.
  - Assessment should be accomplished frequently to validate the payback for resources being spent on training.
- Identify and empower change agents.

CPI Support Teams should be involved in the following decisions:

- What is the selection process for CPI Support Team members?
- How can CPI Support Teams help to translate the status quo into new behavior?

Align and Deploy Goals (Fig. 3-3, Block 4)

This activity is the lynchpin of the CPI effort. Its purpose is to make sure the tasks for implementing CPI are consistent with operational success. Two aspects of the goal deployment are important for the Support Team to emphasize:

- *Goal alignment*—The alignment of CPI goals to ensure satisfaction of the required performance metrics.
- *Gaining commitment*—The gaining of commitment from all those who accomplish tasks to be willing to go above and beyond what is normally expected. The plan should be complete, doable, measurable, realistic, and written at a level to achieve understanding by anyone involved. Ownership comes from the freedom to determine "how" the goal is accomplished after the superior issues the "what" needs to be done in their goals statement.

CPI Support Teams share responsibility for the following decisions:

- How can deployment become a universal process for linking CPI and operations?
- How can the review process be standardized?

Create and Refine Operational Plans (Fig. 3-3, Block A)

CPI Support Teams need to ensure CPI activity is fully aligned from the top to the bottom of the organization with the operational plan. CPI Support Teams are also responsible for the following:

- Evaluate and recommend how fast the training should progress to meet operational performance improvement plans.
- Advise on prioritization of CPI initiatives in alignment with major operational plans.
- Facilitate visual displays that should be used to communicate operational plans and the resulting performance to plan.

Implement Operational Plans (Fig. 3-3, Block B)

The CPI plan needs to be implemented to align with the organizations operations planning. The process for changing the plan should require formal effort to preclude divergence between the operations plan and the plan for process improvement.

1. Develop detailed CPI planning. Plan activities should be written by the person who is responsible for performance of the plan in sufficient detail and clarity for thorough understanding.
2. DMAIC should be utilized as a standard process for planning through execution of CPI initiatives and projects.
3. CPI tools must be "fit for purpose."

Monitor Progress (Fig. 3-3, Block C)

CPI performance against goals needs to be continuously monitored by the CPI Support Team. Performance against metrics should be made visible to the enterprise at large.

Maintain CPI Focus (Fig. 3-3, Block D)

- CPI Support Teams have a primary responsibility to identify changing CPI resource requirements and support consistent metrics to drive process improvements.
- The goal should be to transform the organization to a "Learning Organization" as it progresses through the phases of deployment. This type of organization systematically learns from its experiences of what works and what does not work. The goal of learning is increased innovation, effectiveness, and performance.

- The organization should adopt a formal knowledge management and communication process such as a web page or Community of Practice (COP) to collect lessons learned and make them available to all employees.
- Capture lessons learned and post them internally and communicate them externally to other stakeholders.
- Ensure peer groups' cross-functional teaming support of CPI initiatives and projects and elevate for higher level support if required.

Reentry

CPI Support Teams should assist the CPI Champion and CPI Steering Committee as they reenter the strategic process.

CPI Work Groups

CPI Work Groups consist of three types of roles: process owner, team leader, and team members. These groups are ultimately responsible for studying and changing processes to improve their effectiveness and efficiency in accomplishing the organization's goals. The most important task for CPI Work Group is to align the goals and activities of their process with those of the organization. CPI Work Groups are primarily focused on accomplishing the four implementation steps of the mission deployment cycle, although they also have an often unrecognized impact on organizational strategy through their level of support for strategic initiatives.

CPI Work Group P*rocess Owners* are the individuals who have ultimate responsibility and authority for the performance/results of the processes being improved. It is essential that process owners be involved in any CPI activity regarding their respective processes. Process owners can exist at a variety of levels within an enterprise, from weapons system program managers to shop floor or staff employees responsible for specific work processes.

CPI Work Group *Team Leaders* are responsible for the overall improvement efforts for processes under their cognizance. The team leader for an improvement effort could be chosen from a variety of organizational roles such as process owner, engineer, manager, planner, or practically any other function that would participate in the CPI initiative. The team leader's responsibilities are as follows:

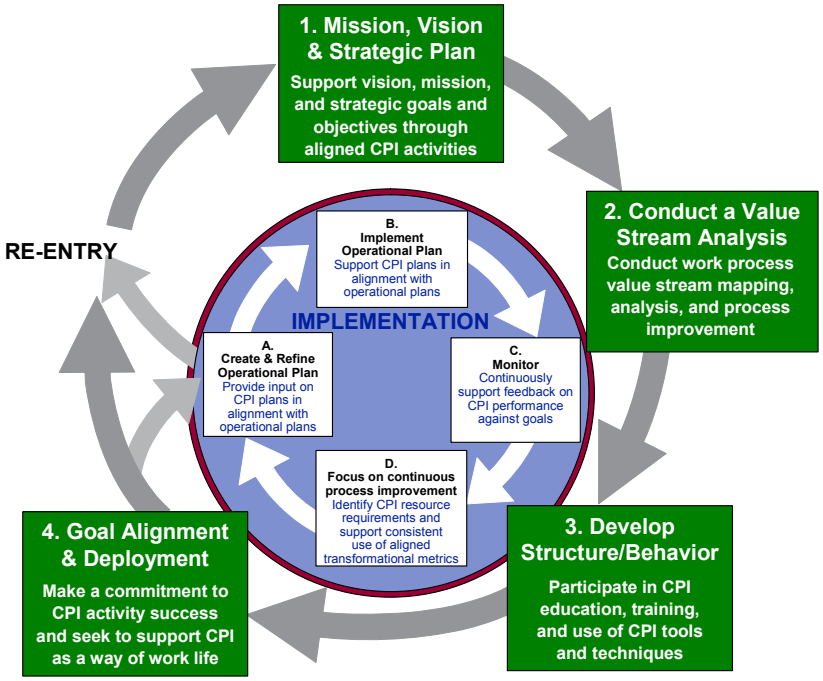
- Coordinate and facilitate team activity.
- Maintain regular communication with all other CPI participants at various levels as needed.
- Monitor, manage, and insure documentation of team progress through metrics tracking.

CPI Work group *Team Members* are knowledgeable about and have a stake in the process being improved. They are the ones who directly employ DMAIC and physically change the actual process. Their responsibilities are as follows:

- Participate in charter development and abide by it.
- Seek simplified and/or new ideas and ways to perform their jobs.
- Participate in appropriate Peer Groups.
- Participate in ongoing education and training to continuously improve their performance contributions.

Key CPI Work Group activities are depicted in Figure 3-4.

Figure 3-4. Key CPI Work Group Activities



Develop Mission, Vision, and Strategic Planning (Fig. 3-4, Block 1)

CPI Work Groups have a supportive role regarding the organization's vision, mission, and strategic goals and objectives through aligned CPI activity and focus on performance to organizational metrics. Process owners play a key role in respective process strategic planning input and performance improvement. They also stress alignment with organizational metrics and movement toward CPI transformation and improved business results.

Conduct Value Stream Analysis (Fig. 3-4, Block 2)

CPI Work Groups and process owners play a critically active role in the value stream mapping/analysis and improvement of their organizational processes.

Develop Structure and Behavior (Fig. 3-4, Block 3)

CPI Work Groups and process owners participate in CPI education, training, and use of CPI tools and techniques.

Align and Deploy Goals (Fig. 3-4, Block 4)

CPI transformation cannot occur without the cultural change within work groups and process owners to their commitment to continuous improvement as a way of work life.

Create and Refine Operational Plans (Fig. 3-4, Block A)

Though not a direct responsibility except in the case of higher level process owners, CPI Work Groups provide inputs and participate in discussions to identify and prioritize improvement activities. This includes "close-to-the-process" expert opinion and familiarity with process issues.

Implement Operational Plans (Fig. 3-4, Block B)

This is the primary CPI Work Group responsibility and consists of the following tasks:

- CPI Work Groups provide recommendations and suggestions for the CPI plan.
- Implement continuous process improvement activities. The work activities are accomplished by the work group members using the tools, techniques and processes of CPI.

Monitor Performance (Fig. 3-4, Block C)

Performance reporting and monitoring by CPI Work Groups ensure timely feedback and corrective action. CPI Work Group activities are monitored periodically by the CPI Support Team and process owner. CPI Work Groups establish and manage metrics that align with the accomplishment of organizational goals. These metric should be managed visually. This allows the team to conduct self monitoring.

Maintain CPI Focus (Fig. 3-4, Block D)

CPI Work Groups have direct responsibility for all CPI tasks related to their part of the operational plan, and need to actively communicate their results to the CPI support team, as well as the CPI Steering Committee.

Reentry

CPI Work Groups and process owners might not have a direct role in reentry to the strategic planning stage, although they might assist the CPI Champion and CPI Steering Committee as requested since they are the first line of process knowledge within the organization.

CPI Peer Groups

CPI Peer Groups are functionally-aligned committees which should be established to facilitate sharing of CPI insights and lessons learned regarding particular areas of expertise (e.g., gas turbine engine repairs, human resource management, or CPI training and certification). Cross-service peer groups can be very helpful in maintaining an enterprise-wide focus and ensuring consistent application of CPI concepts and tools throughout DoD. All participants in the CPI process, particularly CPI Support Teams, should foster establishment of such groups to help facilitate knowledge sharing and best practice performance information. Service and Agency headquarters activities should be aware of all cross-Service or Joint peer groups and ensure appropriate participation and support is provided.

Other Important Roles and Responsibilities

Successful implementation of CPI depends on the development of a supporting infrastructure that has a number of elements. The contribution of the following organizations may not be obvious but may be necessary for effective CPI implementation. Consider all such functions as potential stakeholders who may need to participate in CPI activities to achieve the planned improvements. An end-to-end value stream approach will help identify all organizational elements that have an impact on value stream operations. Similarly, CPI activities within any one of these elements (or, indeed, within any DoD discipline) should consider all other stakeholders no matter what discipline is the principal focus or genesis of the CPI activity.

IT Personnel and Vendors

One of the key elements of a CPI program is that it is driven by data. That requires appropriate systems to be in place to gather the data, analyze it, and present the results. Support from both organic information technology (IT) personnel and outside IT systems vendors may be necessary. IT staff and vendors should ensure that clarity exists in the function to be performed before the system form takes place. Simplify first, then apply technology as an enabler where warranted.

Contracting

CPI frequently involves understanding and/or seeking modifications to contractual arrangements, particularly when a particular scope of work involves contractor support. Also, CPI implementation sometimes involves the need for contractor support to facilitate improvement efforts. Contracting personnel should be involved as appropriate in CPI efforts in order to anticipate and resolve contract related issues and foster supply chain partnering as warranted.

Facilities Management

Implementing CPI frequently means moving equipment to get a better flow of material. Facilities support is often required to ensure electrical, hydraulic, pneumatic, and water systems support the new layout. In some cases, the changes can be substantial. For example, a repair process may go from individual bays to a sequential process laid out as a pulsing or moving line. One result of CPI efforts is that space requirements usually go down, often dramatically. This may allow a process to be moved into a different building, freeing up the original building for other use. One of the responsibilities of facilities personnel is to create a master layout that incorporates flexibility for continued physical improvements through re-layout.

Human Resources

Successful CPI deployment often involves modifications to work-related behavior and the incentives that drive it. There are also important training, certification, and role-related issues inherent in building an effective CPI organizational capacity. Human resource staffs and points of contact may be instrumental to structure and sustain CPI efforts and should be integrated into planning and deployment activities as appropriate.

Supply

Many CPI efforts involve the need for dramatic improvement in inventory/material availability. This can involve issues of materiel delivery, scheduling, and location. Supply personnel are essential to identifying and resolving such problems. This happens in industrial, field and office settings. Supply should be a full team player in CPI implementations.

Labor Unions

The support and involvement of union representatives is essential and vital to successful CPI initiatives. Seek a win-win approach to partnering for continuous improvement of processes.

Finance

A hallmark of a good CPI program is the ability to act quickly to make a change that addresses a problem. The assistance of the financial staff of the organization is an enabler of such changes in costing potential improvements, those achieved and eliminating unnecessary financial barriers. Additionally, it is important that DoD's evolving enterprise financial management infrastructure be supportive and integrated with CPI efforts. Financial management staffs are necessary to assist with the structure and validation of CPI investments and savings.

Engineering

Engineering groups will be needed to support CPI implementation in several ways:

- Engineering help is often needed to support CPI implementation on the shop floor. Process changes are important in achieving the most efficient results. Such changes may need Engineering contributions and approval, which often need to happen quickly to keep the shop floor moving forward.

- Engineering personnel make key contributions to applying CPI to reliability and obsolescence issues and processes. Engineering assists in determining the processes that need to be improved, setting the requirements for those processes, and participating in the change effort.

- Engineering plays a critical role in the approval of parts being purchased, both in establishing specifications, participating in design reviews (if not taking outright responsibility for the design), and evaluating first-article test results. All of these activities directly affect the lead time for procuring the parts needed to repair or upgrade weapon systems.

- Engineering assists in resolving difficult technical problems.

- Engineering accumulates the standards achieved in the organization and incorporates them into new opportunities.

- Engineering seeks to develop expanded process owner and work group involvement in day-to-day work area technical processes that might not need an engineer for problem solving decision-making and correction.

Attachment A.
Resources

This reference list has five sections: Books, DoD Resources, Educational Resources, Professional Associations and Other Useful Information Sources. Each section is alphabetized by title.

Books

Change Management

Decision Making for Leaders by T.L. Saaty ISBN 0-9620317-0-4
The key book for understanding the Analytic Hierarchy Process, what it is and how to use it for making decisions in a complex world.

Defense Acquisition Review Journal (ARJ), Aug-Nov 04 Edition, Special edition devoted entirely to Lean, http://www.dau.mil/pubs/arq/2004arq/arq2004.asp

Good to Great: Why some companies make the leap…and others don't by Jim Collins; Harper Business, NY: 2001. ISBN 0-06-662099-6
Results of a study of 28 companies that made the leap from good to great. The findings serve as a guide for change management and leadership.

The Leader: Developing The Skills And Personal Qualities You Need To Lead Effectively by Normand L. Frigon Sr. and Harry K. Jackson Jr.; MAF Publishing, San Diego, CA: 2003. ISBN 0-9747135-0-3
Basic guide on leadership. Includes process, tools and techniques needed to develop or refine leadership ability.

Leading Six Sigma by Snee, Ronald D. and Hoerl, Roger W. ISBN: 0130084573
A Step-by-Step Guide Based on Experience with GE and Other Six Sigma Companies. An excellent resource from leaders in the Six Sigma movement who have lead Six Sigma efforts at leading companies.

Making Change Work: Practical tools for overcoming human resistance to change by Brien Palmer; ASQ Quality Press, Milwaukee, WI: 2003. ISBN 0-87389-611-4
Provides tools for evaluating an organization's readiness for change, and for successful change management.

Why Change Doesn't Work: Why initiatives go wrong and how to try again and succeed by Harvey Robbins and Michael Finley; Peterson's, Princeton, NJ: 1996. ISBN 1-56079-944-7
Examines the challenges faced when embarking on a course of organizational change. The authors provide suggestions and guidance for dealing with the challenges.

CPI

The 5S Pocket Guide by J Peterson, and R. Smith ISBN: 0527763381
A good pocket guide about the 5S's and how to apply them.

Activity Based Costing: Making It Work for Small and Mid-Sized Companies (2nd Edition) by Douglas Hicks ISBN: 0471249599
An outstanding book that shows how to apply ABC in an effective manner without a massive investment in resources, although titled for "small and mid-sized", larger companies would do well to read and understand. If you are interested in ABC, this is a must read.

The Balanced Scorecard: Translating Strategy into Action by Robert Kaplan and David Norton ISBN: 0875846513
How do we measure ourselves for the past, present and future ? Read The Balanced Scorecard. The traditional financial measures alone do not tell us the whole story, we need more. This book tells us what and how to measure ourselves better.

Basic Statistics: Tools for Continuous Improvement 4th Edition by Mark J. Kiemele, Stephen R. Schmidt and Ronald J. Berdine; Air Academy Press, Colorado Springs, CO: 2000. ISBN 1-88-156-06-7
Basic statistical reference for all CPI practitioners.

Developing Lean Supply Chains—A Guidebook, by Phelps, Thomas A, Hoenes, Teri, and Smith, Michael, Altarum Institute, 2003
A guide to applying value stream mapping and other Lean concepts to supply chains as systems. Based on work with a Boeing supply chain.

A Field Guide to Focused Planning: Hoshin Kanri-American Style by Joseph F. Colletti ISBN: 0965071812
Shows how to generate and link the high level metrics of the enterprise down to the processes in the enterprise that are generating the actual product or service.

The Goal: A Process of On-Going Improvement by E.M. Goldratt and Jeff Cox ISBN: 0884270610
Introduces the Theory of Constraints and applies it in manufacturing (first in a series of books on understanding and applying TOC, It's Not Luck is about TOC applied to marketing; Critical Chain is about TOC as applied to project management).

The Kaizen Blitz: Accelerating Breakthroughs in Production and Performance by Anthony Laraia, Robert Hall and Patricia Moody, February 1999.
Dr. Robert Hall and Pat Moody are pioneers in the development and application of the Kaizen Blitz and this book presents their lessons learned since the inception of this key process improvement activity. A systematic approach to planning, executing, and achieving results with a kaizen blitz are provided and case studies are used to emphasize the potential.

Lean Enterprise Value: Insights from MIT's Lean Aerospace Initiative, Earl Murman, et al, 2002
Based on the eight-year Lean Aerospace Initiative study at MIT, this book develops a value creation framework for the aerospace industry, presenting five principles for creating lean enterprise value. After an overview of the recent history of the industry, the book delves into the origins of lean thinking in TQM and Six Sigma, and highlights applications of lean thinking in commercial and military aircraft, software, missiles, and space

launch systems. It shows how to implement lean principles, and examines the interrelatedness of corporate and government enterprises in aerospace. Contributors include members of the American Institute of Aeronautics and Astronauts, as well as a former secretary of the US Air Force and a former head of MIT's Department of Aeronautics and Astronautics. Copyright © 2004 Book News, Inc., Portland, OR.

Lean Extended Enterprise: Moving beyond the Four Walls to Value Stream Excellence, Steven Boeder and Terence Burton. Format: Hardcover, ISBN: 1-932159-12-6. This book looks at lean from a big picture enterprise level across a broad spectrum of CPI concepts and tools. It contains helpful checklists, guides and progress measurement tools.

Lean Logistics: The Nuts and Bolts of Delivering Materials and Goods, Michael Baudin, Format: Hardcover, ISBN 1-56327-296-2. Lean in the logistics world.

Lean Manufacturing: A Plant Floor Guide, John Allen, Charles Robinson, and David Stewart. 2001 This guide to implementing lean manufacturing methods outlines the necessary elements, articulates the rationale behind the initiative, and provides an overview of the process. The book offers advice on identifying the causes of waste, profiling the business' needs, mapping the value stream, crafting policies, problem solving, and applying lean tools. A five-phase framework for implementation is explained one step at a time. Copyright © 2004 Book News, Inc., Portland, OR.

*Lean Manufacturing for the Small Shop***,** By Gary Conner, Format: Hardcover, ISBN: 0872635201.

The Lean Manufacturing Pocket Handbook, Kenneth Dailey, Format: Paperback, ISBN: 0-9747221-0-3.

Lean Six Sigma by Michael George ISBN: 0071385215
Very complete treatment of the integration of Lean and Six Sigma and the strong reasons for combining them.

Lean Six Sigma: Combining Six Sigma Quality with Lean Production Speed, Michael George, April 2002
This book explains how to integrate Lean Production and Six Sigma. The difference between these two concepts is that Lean focuses on eliminating waste and reducing cycle time while Six Sigma focuses on improving quality and minimizing process variation. The author shows how Lean and Six Sigma complement each other and provides a detailed roadmap for integrated implementation.

Lean Six Sigma for Service: How to Use Lean Speed and Six Sigma Quality to Improve Services and Transactions, by Michael L. George ISBN: 0071418210
A "how to" for applying the Lean Six Sigma methodology in non-manufacturing environments.

The Lean Six Sigma Pocket Toolbook: A Quick Reference Guide to 70 Tools for Improving Quality and Speed, by Michael L. George, John Maxey, David T. Rowlands, Mark Price ISBN: 0071441190
Outstanding Quick Reference Guide for 70+ Lean Six Sigma Tools.

Lean Solutions: How Companies and Customers Can Create Value and Wealth Together, James Womack and Daniel Jones, September 2005.
This book moves beyond lean from a supplier's perspective to place the customer in charge of the value mapping and leaning process. This offers a win-win approach to customer-supplier efforts with representative case study examples. The authors coin the term 'lean provisioning' as a new perspective that goes beyond the original lean focus and approach.

Lean Thinking: Banish Waste & Create Wealth in Your Corporation by James Womack and D. T. Jones
Overview on lean thinking and three in-depth write-ups of how a small, medium and large firm accomplished it. If you are interested in Lean Thinking, this is a must read. ISBN: 0684810352.

Lean Transformation: How to Change Your Business into a Lean Enterprise, By Bruce A. Henderson and Jorge L. Larco, Format: Hardback, ISBN: 0-9646601-2-1. A guide to leaning an enterprise from a business perspective.

Learning to See: Value Stream Mapping to Add Value & Eliminate Muda, Mike Rother and John Shook, June 1999
This book was published by the Lean Enterprise Institute as a "tool kit" for value stream mapping. It is divided into the following sections: getting started, current state mapping, lean value stream concepts and thinking, future state mapping, and achieving the future desired state. Numerous graphics and hands-on examples are included to facilitate the learning process.

Office Kaizen: Transforming Office Operations into a Strategic Competitive Advantage by William Lareau, Format: Paperback, ISBN: 0873895568.

Quality Essentials: A Reference Guide from A to Z by Jack B. ReVelle; ASQ Quality Press, Milwaukee, WI: 2004. ISBN 0-87389-618-1
Compendium of CPI topics alphabetized and illustrated for easy reference. An essential reference for all CPI practitioners.

Quality Improvement Tools & Techniques by Peter Mears ISBN: 0070412197
Outstanding book for concise explanations of all the tools and each explanation ends with a problem for the reader to solve "Now it's your turn" (with many of the solutions in the Appendix). Covers basic tools (Pareto to control charts) to advanced techniques (Quality Function Deployment, Hoshin Planning, Gap Analysis, Taguchi Methods).

Revolution in Manufacturing: The SMED System, by Shingo, Shige, Productivity Press, 1985
Initial text by father of single minute exchange of dies concept.

Reengineering the Corporation: A Manifesto for Business Revolution, Michael Hammer and James Champy, Format: Paperback, ISBN: 0060559535. The original guide to reengineering.

The Six Sigma Handbook by Thomas Pyzdek ISBN: 0071410155
Deals with problem solving, team building issues. Tom has a long history of writing clearly on performance improvement topics.

Six Sigma for Managers, Greg Brue, Format: Paperback, ISBN: 0-07-138755-2. Managerial guide to using Six Sigma in any organization.

Six Sigma: The Breakthrough Management Strategy Revolutionizing the World's Top Corporations, Mikel Harry (Ph.D.) and Richard Schroeder, Format: Hardcover, ISBN: 0385494378.

The Six Sigma Way by Peter Pande, et al ISBN: 0071358064
Excellent book (business best seller) on Six Sigma with special importance for transactional processes. Pande is a consultant who works with GE Capital, American Express and Sears & Roebuck. For a manager wanting quick insight into Six Sigma, read the first five chapters.

Statistical Methods for Quality Improvement 2nd Edition by Thomas Ryan; John Wiley & Sons, NY: 2000. ISBN 0-471-19775-0
A text on variability reduction for Black Belt and Master Black Belt level practitioners.

Statistical Quality Control: Strategies and Tools for Continual Improvement by Johannes Ledolter and C. W. Burrill, ISBN: 0471193784
A very well thought-out book covering both the team problem-solving aspects (excellent explanation of Nominal Group and Delphi Techniques) and the statistics (analysis of data, hypothesis testing, control charts, DOE (both classical and Taguchi methods) and Response Surface Methodology).

Theory of Constraints by Eliyahu Goldratt, December 1999
This book discusses the key concepts involved in Goldratt's theory of constraints: the five focusing steps; the process of change; how to prove effect-cause-effect; and how to create simple solutions to complex problems. In addition, the author discusses the adverse impact that organizational and cultural issues can have on process improvement efforts.

TPM for the Lean Factory: Innovative Methods and Worksheets for Equipment Management, by Sekine, Keniche; Arai, Keisuke, Productivity Press, 1999
A description of the Total Productive Maintenance process. Includes description of how to implement TPM.

Toyota production system: beyond large-scale production, by Ohno, Taiichi. Productivity Press, 1988
The basic description of the Toyota Production System.

The Complete Lean Enterprise: Value Stream Mapping For Administrative And Office Processes, Beau Keyte and Drew Locher, Format: Paperback, ISBN: 1563273012.

The Toyota way: 14 management principles from the world's greatest manufacturer, by Liker, Jeffrey K., 2004 ISBN: 0-07-139231-9
The book reveals the 14 foundational management principles behind the automaker's world-famous system of "Lean production." Principles are discussed in four categories: philosophy, process, people, and problem-solving.

The Toyota way field book: a practical guide for implementing Toyota's 4P's, by Jeffrey Liker and David Meier
An excellent reference aid for anyone implementing the Lean principles modeled from Toyota's production and management methods.

Understanding Industrial Designed Experiments (4th Edition) by Stephen R. Schmidt & Robt. Launsby, ISBN: 1880156032.
A very practical text that "Blends the best of the best designed experiment techniques." Deals with Taguchi, Shainin and classical DOE, tells you which is best for a given situation and why. Has a great "Rule of Thumb" appendix and includes a floppy with data and simulation packages to assist understanding of setting up and running a DOE.

Understanding Variation by Donald Wheeler ISBN: 0945320353
A great book for starting the process of understanding process variation and how to make rational decisions about it–a short and very concise read.

The Visual Factory: Building Participation Through Shared Information by Michel Greif ISBN: 0915299674
What's the best way to make process performance known throughout the organization? Read this book and put it into action.

Value Stream Management: Eight Steps to Planning, Mapping & Sustaining Lean Improvements, Don Tapping, Tom Shuker and Tom Luyster, January 2002. This is a how-to manual for implementing and sustaining lean improvements. It is very well organized, simple to follow and provides ready to use reference material in the form of hard copies and a compact disc (CD). The authors use a manufacturing case study to illustrate each learning point. This is a valuable reference for those wanting a down to earth approach to implementing lean improvements.

Value Stream Management for the Lean Office: Eight Steps in Planning, Mapping and Sustaining Lean Improvements in Administrative Areas, Don Tapping and Tom Shuker, Paperback, ISBN: 1563272466.

Design for Lean Six Sigma

Better Designs in Half the Time: Implementing QFD Quality Function Deployment by Bob King; GOAL/QPC: ISBN 1-879364-018
Basic reference on QFD. The book that introduced QFD to the US.

Design and Management of Service Processes by Rohit Ramaswamy ISBN: 0201633833
An excellent book on characterizing and improving service (transactional) processes (one of the AT&T series).

Design for Six Sigma: A Roadmap for Product Development by Kai Yang and Basem El-Haik; McGraw Hill, NY: 2003. ISBN 0-07-141208-5
Fundamental handbook for all designers.

Fast Innovation by Michael L. George, James Works, Kimberly Watson-Hemphill ISBN: 0071457895
Achieving Superior Differentiation, Speed to Market, and Increased Profitability by understanding the art of innovation.

Function Deployment: How to Make QFD Work for You, Cohen, Lou, ISBN: 0201633302
The book to buy if you are trying to learn QFD (after you have Terninko's book, see below)

The Innovation Algorithm: TRIZ, Systematic Innovation and Technical Creativity by Genrich Altshuller, translated by Lev Shulyak and Steven Rodman; Technical Innovation Center, Inc., Worcester, MA: 2000. ISBN 096407404-4
Description of ARIZ, TRIZ's problem solving algorithm.

Patterns of Problem Solving 2nd Edition by Moshe Rubenstein and Iris R. Firstenberg; Prentice-Hall, Inc., Englewood Cliffs, NJ: 1998. ISBN 0131227068
An engineering approach to fact based decision making.

The QFD Handbook by Jack ReVelle, J.W. Moran and C. A. Cox ISBN 0471173819
Covers a wide variety of techniques and applications for assisting the translation of customer needs into the design of products and services and the related processes necessary to produce/deliver them.

Quality Engineering Using Robust Design by Madhav S. Phadke ISBN: 0137451679
Background and application of Taguchi experimentation methods (one of the AT&T series). Good book on Taguchi and Robust Design methods.

Step-By-Step QFD: Customer Driven Product Design (2nd Edition) by John Terninko ISBN: 1574441108
Great introduction to QFD as well as TRIZ and Taguchi.

Today and Tomorrow by Ford, Henry Productivity Press: 1926, 1988 (reprint)
Ford's early text on mass production. One of the source documents for the thinking that drove the Toyota Production System.

Tools for Thinking and Problem Solving by Moshe Rubenstein; Prentice-Hall, Inc., Englewood Cliffs, NJ: 1986 ISBN 0-13-925140-5
A compendium of tools for problem solving and decision making.

Reliability Engineering

Reliability Engineering Handbook, Dodson and Nolan, Basic reliability engineering text.

Practical Reliability Engineering 4th Edition by Patrick D. T. O'Connor; John Wiley and Sons, NY: 2003. ISBN 0-470-84463-9. Text on reliability engineering and management. Provides preparation for ASQ Certified Reliability Engineer examination.

Reliability-Centered Maintenance 2nd Edition by John Moubray; Industrial Press Inc., NY: 1997. ISBN 0-8311-3146-2, Basic reference on RCM.

Repairable systems reliability, Ascher and Feingold, 1984, Marcel Dekker. Specifics of applying reliability to repairable systems.

Systems Engineering and Analysis, Blanchard and Fabrycky, 1990, Prentice Hall, Basic introductory text on systems engineering.

DoD Resources

Defense Acquisition University (DAU)

The DAU coordinates acquisition education and training programs to meet the training requirements of DoD Acquisition, Technology and Logistics (AT&L) workforce personnel. The DAU website contains an excellent tutorial on lean concepts and tools. http://www.dau.mil/educdept/mm_dept_resources/navbar/lean/default.htm

DoD Maintenance Policy Programs and Resources (ADUSD(MPP&R))

The lean section of the ADUSD(MPP&R) website contains briefings on a broad range of productivity improvement initiatives in the DoD maintenance arena and hyperlinks to numerous resources regarding lean concepts and other productivity improvement tools (e.g., Six Sigma and Theory of Constraints). http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/mppr/html/lean.htm

Air Force Material Command Lean Transformation

The AFMC Depot Maintenance Transformation (DMT) Office web site contains a variety of information on the DMT Trailblazers, material initiatives, change management information and a library of briefings. https://afkm.wpafb.af.mil/ASPs/CoP/openCoP.asp?Filter=OO-LG-CC-DM

Army Material Command (AMC) Lean Six Sigma

The AMC Lean Six Sigma website contains information about how AMC activities are using Lean and Six Sigma to improve productivity, decrease turnaround time and return savings to customers. http://www.amc.army.mil/LEAN/index.aspx

Marine Corps Logistics Command (MATCOM)

The MATCOM website contains links to productivity improvement initiatives being pursued by the Marine Corps Maintenance Centers at Albany and Barstow. http://www.matcom.usmc.mil/

Navy AIRSpeed

The Navy's AIRSpeed website contains information about AIRSpeed concepts and tools (e.g., lean six sigma and theory of constraints) and links to other AIRSpeed-related sites. https://logistics.navair.navy.mil/airspeed/index.cfm

Educational Resources

Massachusetts Institute of Technology Lean Aerospace Initiative

The Lean Aerospace Initiative (LAI) was formally launched in 1993 when leaders from the U.S. Air Force, Massachusetts Institute of Technology (MIT), labor unions, and defense aerospace businesses forged a trail-blazing partnership to transform the industry, reinvigorate the workplace using lean concepts and tools.
http://lean.mit.edu/

University of Dayton Center for Competitive Change

The Center for Competitive Change provides educational tools that are designed to capture and deliver the "how to's" of competitive change in a way that blends theory with successful practice and incorporates easily implementable, take-home methodologies.
http://www.competitivechange.com/

University of Kentucky Lean Manufacturing Program

The UK Center for Manufacturing offers a comprehensive program of assistance to companies in all phases of implementing lean manufacturing. Program elements include consultation, workshops, education and training courses, and in-plant workshops designed so that follow up activities may be conducted by internal facilitators.
http://www.mfg.uky.edu/lean/

University of Tennessee Greenwood Lean Enterprise Center

The Greenwood Lean Enterprise Center is dedicated to spreading knowledge about lean through academia and industry. It offers a broad range of lean-related educational resources, some of which focus on maintenance, repair and overhaul (MRO) operations.
http://lean.utk.edu

Professional Associations

APICS—The Association for Operations Management

APICS is a global provider of information and services in production and inventory management and related areas to enable members, enterprises, and individuals to add value to their business performance. It offers educational resources for a broad range of process improvement concepts and tools (e.g., lean, six sigma and theory of constraints).
http://www.apics.org/

ASQ—The American Society for Quality

ASQ is a professional association dedicated to the advances of learning, quality improvement, and knowledge exchange to improve business results, and to create better workplaces and communities worldwide. ASQ offers technologies, concepts, tools, and training to quality professionals, quality practitioners, and everyday consumers, encouraging all to "Make Good Great."
http://www.asq.org/

Association for Manufacturing Excellence

The Association for Manufacturing Excellence (AME) is dedicated to cultivating understanding, analysis and exchange of productivity methods and their successful application in the pursuit of excellence throughout the manufacturing sector. The AME website contains resource materials, seminar information and a learning center.
http://www.ame.org/

Lean Enterprise Institute

The Lean Enterprise Institute (LEI) was founded by James P. Womack, PhD, to promote lean thinking based on the Toyota Production System and explained in a series of books and articles co-authored by Womack and Professor Daniel T. Jones. LEI website contains a community section for sharing knowledge, a training section with information about workshops, a store section with books and other training materials, and a "who we are" section with points of contact for lean experts.
http://www.lean.org

National Shipbuilding Research Program Lean Shipbuilding Initiative

The National Shipbuilding Research Program Lean Shipbuilding Initiative (NSRP LSI) provides the Lean community a virtual gathering place in order to accelerate shipyard Lean transformation by facilitating a joint learning curve. LSI offers a single access point for details about Lean in the shipbuilding industry, significantly reducing time spent searching for this information on other websites and in a variety of publications.
http://www.nsrp.org/lean/

SAE Lean Enterprise Services

SAE Lean Enterprise Services provides seminars, symposia, professional meetings, conferences, and distance education programs facilitate the rapid deployment of lean principles at all levels of the organization including: engineering design; manufacturing; business functions; and supply chain relationships.
http://www.sae.org/manufacturing/lean/

Society of Manufacturing Engineers

The Society of Manufacturing Engineers (SME) offers a broad range of conferences, training courses and certification programs that are designed to help engineers, companies, educators and others achieve success in their quest to advance the manufacturing industries. http://www.sme.org/

Other Useful Information Sources

Mid-America Manufacturing Technology Center (MAMTC)

MAMTC is a service organization that helps small and mid-sized manufacturers increase their sales and productivity, reduce costs, and improve quality. Their web site provides a variety of lean resources, explanations of concepts, and links to other sites. http://www.mamtc.com/lean/index.asp

Superfactory

This is a website that began in 1997 as a simple compilation of internet links for manufacturing excellence resources. Since that time, Superfactory has continued to expand and now contains a broad range of learning aids, PowerPoint presentations and resource materials. Some of these materials are free and others require purchase http://www.superfactory.com/

iSixSigma

This website provides a great deal of information on how six sigma and lean can be integrated. It also contains an online dictionary, events calendar, resource center and many other reference materials. http://www.isixsigma.com/me/lean_manufacturing/

Attachment B.
Organizational Implementation Planning Framework

This implementation planning framework can be used by any organization—from a military service or other major organization to a small unit when deploying a CPI culture change. The framework is separated into sections that align with the CPI Deployment Cycle and is designed to include tasks that are necessary to initiate a CPI culture. Appropriate inputs and approval for planning should be obtained from organizational CPI champion(s) as well as members of the steering committee and support team. Publication of formal plans, where appropriate, will provide an effective means to communicate with each member of the organization.

If an organization has already been working on implementing CPI, they may want to ensure they have accomplished these tasks and then move on to the acceleration and sustainment phases of implementation. It should be emphasized that the elements in this planning framework apply to organizational functions that may be present in a specific organization to include, but not limited to: Administration, Contracting, Finance, Personnel, Operations, Program Management, Supply Chain Management, and Maintenance. Table B-1 identifies the planning elements, which are then discussed in more detail in the paragraphs below.

Table B-1. Organizational Implementation Planning Elements

CPI Step	Action description
Develop Enterprise Strategic Plan	1.1 Get Leadership Commitment
	1.2 Obtain Expert Help
	1.3 Identify/Select Steering Committee and Support Team
	1.4 Identify Strategic Goals, Vision, Metrics
	1.5 Convey Urgency/Burning Platform
	1.6 Commit to Develop People
	1.7 Focus on Customer Value
	1.8 Communicate
	1.9 Develop a Transformation Strategy
	1.10 Identify and Assign Deployment Actions
	1.11 Conduct a Risk Assessment
	1.12 Identify Funding/Resource Requirements and Sources
Conduct a Value Stream Analysis	2.1 Establish an Enterprise Approach
	2.2 Perform Customer/Stakeholder Analysis
	2.3 Value Stream Map Key Processes
	2.4 Identify Leverage Points
	2.5 Select Pilot Projects
	2.6 Determine How to Measure Benefits

Table B-1. Organizational Implementation Planning Elements

CPI Step	Action description
Develop Structure and Behavior	3.1 Conduct Initial Training
	3.2 Identify and Select Additional Champions
	3.3 Establish CPI Support Infrastructure
	3.4 Use the Steering Committee to Share Lessons
	3.5 Organize for CPI Implementation
Align and Deploy Goals	4.1 Deploy Aligned Goals Down Through Organization
	4.2 Align Sub-Organizations Commitments to Goals
Develop an Operational Plan	5.1 Align Plan to Strategy
	5.2 Establish Deployment Funding/Resources
	5.3 Establish Timing and Priorities
	5.4 Identify the Improvement Activities
	5.4 Address Retention/Improvement of Output Quality
Implement the Operational Plan	6.1 Conduct Initial Improvement Activities
	6.2 Baseline Key Processes
	6.3 Focus on Standardization: Policies, Procedures, Processes
	6.4 Focus on Quality
Monitor Progress	7.1 Monitor Performance to Established Organization Goals
	7.2 Coach for Results
Focus on CPI	8.1 Sustain Gains
	8.2 Nurture the Process
	8.3 Establish a Cross-Feed Process
	8.4 Ensure Senior Leader Participation
	8.5 Conduct a Self-Assessment
	8.6 Update Direction and the Plan

1. Develop Enterprise Strategic Plan

1.1 Get Leadership Commitment: The highest ranking individual (champion) in the organization should start the deployment with a strong statement of intent. This should preferably be a very visible kick-off that is witnessed by as many employees as possible and then communicated to every employee. The champion should clearly define the expectations that every employee participate and cooperate. They should also establish the capability to make other organizational leaders accountable for deployment and indicate the expectation for commitment, involvement, and cooperation. Sub-organization leaders and stakeholders need to echo this commitment immediately as part of the kick-off. Employees are looking for consistent messages and timely action and action signals inconsistency are essential to support the effort.

1.2 Obtain Expert Help: Few organizations have been successful with deploying a CPI culture without outside expert help. From the beginning, a trusted consultant or advisor should be hired to work directly with the champion, steering committee, support

team, and working groups (as necessary). This type of support may last upwards of two years until the organization can generate organic experts.

1.3 Identify/Select Steering Committee (SC) and Support Team (ST): At the outset, the senior leader of the organization should establish a SC to oversee the deployment along with a ST. The SC is typically more effective if it is a subset of the total senior leadership, i.e., involves leaders from all key functions in the value stream, but they should be able to speak for and influence all senior leaders. The organizational ST will be the action agency to support the deployment and will follow the direction of the SC as well as the other steps in deployment planning.

1.4 Identify Strategic Goals, Vision, Metrics: The organization leadership needs to start off the implementation by ensuring that they have clearly defined strategic goals, a vision, and metrics that support why the organization exists and what it is doing for its customers. The goals, vision, and metrics will be further refined during the enterprise value stream analysis in step two.

1.5 Convey Urgency, Burning Platform: Leadership should be able to answer the question from their employees: "Why are we implementing CPI?" Typically organizations have a burning platform when they start CPI, meaning they are being forced to immediate action because of a crisis. However any organization can implement CPI and gain great benefits from it if they convince their employees that they need to do it. Reasons sometimes cited include customers being unhappy with current support, excessive costs or budget reductions requiring drastic improvements, or an organization commitment related to owing customers more than is now being provided. Regardless of the reason identified, it must convey a sense of urgency to get the organization excited about changing.

1.6 Commit to Develop People: From the beginning of a CPI implementation, leadership should understand that their most important resource that will enable change is people. Developing people includes a commitment to support, care for, encourage, and grow employees as CPI improves processes.

1.7 Focus on Customer Value: From the very beginning of a CPI implementation, focus should be on the customer and satisfying their requirements. Each organization should relate why they exist in terms of the customers they support rather than tangentially-related outputs such as producing products or achieving certain levels of readiness. Customer value should be thought of as anything the customer would be willing to pay for.

1.8 Communicate: No organization can over-communicate during a CPI deployment. Leadership should use every opportunity to publicize their expectations and commitment to the deployment. A "rule of 7" always applies, meaning an organization should communicate a message in at least 7 different media for it to reach the majority of the employees. A CPI culture change requires continuous focus 100% of the time. Things that should be communicated are listed below:

- **Promotional Messages:** Vision/Purpose–This is the vision and purpose identified during the strategic planning. Burning Platform–Service members and civilian employees should understand why DoD is deploying CPI. Successes–Successes from other organizations should be published and used to show CPI is beneficial and

possible. Benchmarking organizational processes to analogous organizations that have used CPI is also helpful.

- **Results/Feedback Messages:** Metrics–If senior leadership identified meaningful metrics that the organization can relate to, then the results attributed to CPI related to these metrics can be very powerful. Successes–Success stories should be visible and show that a set of processes in your organization or in analogous organizations were improved. The message should be that there are similar processes remaining that can be improved.

- **Deployment Progress Messages:** Expectations–Leadership should clearly state that every service member must be committed to and participate in the deployment including accomplishing necessary training and putting to use what they learn for the organization. Metrics–Deployment metrics are different from customer-oriented metrics. Deployment metrics should give leadership indication of buy-in and participation by all sub-organizations. Examples of these metrics are number of employees trained in each category, number of facilitators trained and practicing, number of events or processes improved. These metrics will become less important as the deployment progresses, and should be replaced with meaningful metrics related to CPI output goals.

1.9 Develop a Transformation Strategy: This strategy should include general concepts and rules on how to implement a CPI Culture. More details will be listed in following sections.

1.10 Identify and Assign Deployment Actions: Identify specific actions and action points to deploy CPI such as Who, When, Where, and How.

1.11 Conduct a Risk Assessment: Identify the parts of the organization that may be expected to resist this deployment, and specifically counter that resistance with actions such as increased communication and publicity.

1.12 Identify Funding/Resource Requirements and Sources: Determine where long term funding and resources will come from and when. This needs to be considered as an ongoing requirement rather than a project. Organizations often delay deployment past initial efforts waiting for savings from events, but this can ultimately slow the CPI effort to a stop. Funding needs to be established up front, then savings may be re-invested as the effort progresses.

2. Conduct a Value Stream Analysis

2.1 Establish an Enterprise Approach: The organizational leadership should change the focus of the organization from a functionally oriented one to a single organization focused on customer satisfaction. This can be accomplished by conducting a senior strategy session that redefines the list of items below, and sometimes takes the form of an Enterprise Value Stream Mapping Assessment (EVSMA). The purpose of an EVSMA is to identify and publish the following organizational details.

- **Identify Vision and Purpose:** The organization should identify its vision of the organization in the future. The purpose is "Why the organization exists". The purpose is sometimes called the theme of the organization and it must relate to every employee.

- **Identify Products and Services:** This step should be self explanatory and should tie directly to the organization's vision and purpose statements; however, it is also a chance to clarify core competencies.

- **Identify Metrics and Track Process:** A single set of metrics should be established that every member of the organization can relate to. These metrics need to be communicated to every employee, and they need to be tracked and monitored. Organizational decisions should always directly support these metrics.

- **Set/Publish Goals:** Two sets of goals should be established. In the first phase of a CPI deployment, the organization should establish training and first event goals throughout the organization to show start up and buy-in. Goals should also be set on improving the key metrics identified above, and tracked aggressively, with timetables set on milestone goal levels.

- **Perform a Gap Analysis between Baseline and Goals:** The gap analysis should identify the areas where CPI efforts need to focus first to raise a key metric or resolve customer dissatisfaction. A prioritized list of CPI focus areas is the desired deliverable from the EVSMA, and becomes the action plan for the next time period.

- **Identify Criteria to Select and Prioritize CPI Action Areas:** The criteria identified in this action item should allow the organization to focus on issues that will affect the largest percentage of the organization and also have the largest impact. Examples of criteria are impact on the customer, ease of accomplishing, whether or not the action can be accomplished inside the organization, or if it needs outside support to do so, how long the action would take, or even if the impact will be short or long term.

- **Select CPI Action Areas:** Once the leadership prioritizes the action areas, a final decision must be made on which to accomplish first. Although it would always be better for the organization to attack the area that would have the most impact, most organizations start with smaller pilot projects in important areas to prove the CPI process works, and accomplish a quick win to generate further interest and buy-in from organization members.

- **Build an Action List (with Controls):** After the areas are selected, build a detailed list that identifies relevant dates for each effort and name of the working group lead. This list provides the details necessary to track and control the implementation effort as well as to document planned actions in the operational plan.

- **Establish Periodic Customer Surveys/Feedback:** Getting feedback from customers and stakeholders should be built into the CPI program. Routine surveys/feedback should be established to ensure the "Voice of the Customer" is heard and heeded.

2.2 Perform a Customer/Stakeholder Analysis: It is essential that leadership identify all customers and stakeholders–and then understand their expectations. Obviously, the organization should evaluate how well these expectations are being fulfilled.

2.3 Value Stream Map Key Processes: The organization should identify their key processes and map them out to provide visibility of problems. Eventually an organization should map all their processes, but they should start by identifying those that have the greatest impact on the organization and then work down the priority list. Leaders and managers should understand that the value stream mapping is not what we think it should be, but map it as it actually is operating. Until we understand how work is being conducted, we will not see and understand the waste and frustration our people are having to work around on a daily basis.

2.4 Identify Leverage Points: After mapping the key processes, you should identify the specific areas (e.g., activities and inputs) that can be changed that would have a greatest impact to the successful operation of the process (leverage points).

2.5 Select Pilot Projects: Most organizations start their CPI implementation by selecting pilot projects. These are processes that are important and will make a positive impact to the organization; they may not be the highest prioritized process to be improved. They should be processes that are very visible, but relatively easy to improve. This approach allows the organization to learn how to use CPI tools and gain some immediate benefit from the first events. This success should fuel the remainder of the implementation by convincing everyone that CPI will work and it is worth the resource and time investments.

2.6 Determine How to Measure Benefits: Savings in dollars, manpower, floor space, cycle time, quality, etc. should be validated against a common set of criteria agreed upon by OSD/service leadership. Financial personnel should be involved in the validation process. Savings determination is especially critical in determining rewards available to teams. Individuals outside the process owning organization should accomplish return on investment (ROI) calculations, to ensure objectivity.

3. Develop Structure and Behavior

3.1 Conduct Initial Training: Training should begin early and be continuous throughout deployment. Focus should be on awareness for all employees followed by specialized training for leadership and facilitators. Train-the-trainer courses should be established from the start to ensure an organic capability is generated over time. Implementing organizations should identify training required by audience group listed below.

- **Executives/Senior Management:** This should be the first training accomplished, and should focus on recognizing the culture change that is CPI, understanding CPI procedures and tools, and leading deployment. Includes members of the steering committee.
- **Mid-Level Supervisors:** Training should focus on change management and acceptance.
- **Total Population:** Mass training should be limited to awareness only. Other team training will give team members more tools as they are needed.
- **CPI Working Group:** Group members should receive training as they need it for their team activities. If trained too soon, they will not retain what they need. This training should focus on how to change processes and sustain the gains.
- **Newcomers:** All newcomers to the organization should be given awareness training and leadership expectations for their participation. This should be accomplished upon arrival as their introduction to the organization.
- **Facilitators:** The content of facilitator training will be identified in detail in the DoD CPI Guide. Training should be a combination of education in a classroom, as well as hands-on training with a mentor facilitating team. Includes members of the support team.

3.2 Identify and Select Additional Champions: Champions are typically the senior members of the organization that will drive and encourage the CPI implementation. The champions also act as change agents for their organization's CPI implementation.

3.3 Establish CPI Support Infrastructure: To successfully deploy a CPI culture, it must be internalized within the organization. Consider dedicating full time resources to deploying CPI. Train-the-trainer courses should help establish organic capabilities to sustain all activities.

- **Establish Initial Team Selection Process:** Initially, organizations will want to select highly qualified and motivated people to serve in the CPI implementation structure. This includes members of the steering committee, the support team, and the working groups. Leaders/members do not necessarily have to be the appropriate supervisors; rather, they may be the people most likely to lead successful change/projects.
- **Obtain Qualified Facilitators:** It would ultimately be optimal to use experienced facilitators. However, at the start of the deployment, select the best managers who

are open minded and can place the CPI program in the overall context of organization success. Facilitators should also have qualities that make them effective team leaders. Facilitators may have to be contracted for until organic assets are trained; however, this training should start on the first event in the organization and be part of every one thereafter.

- **Consider Career Impacts:** For both active duty military and civilian employees working in CPI positions, consider issues such as time in a position for training payback, what management positions may require CPI experience, and at what level, how long can/should individuals be in CPI positions before being returned to original careers.

3.4 Use the Steering Committee to Share Lessons: The steering committee is a natural forum for sharing ideas problems, techniques, and progress. Meetings should be more often at the beginning of deployment, with frequency being adjusted as time goes on, until they are monthly.

3.5 Organize for CPI Implementation: As processes change, it is important to modify the organization to support the new way of doing business. Typically, the fewer layers of management that exist the more successful the organization.

4. Align and Deploy Goals

4.1 Deploy Aligned Goals Down through Organization: As leadership identifies organizational goals, they should be able to communicate them clearly down to each level of the organization. Each sub-organization should be able to focus their activities to support the goals. In turn, each employee should be able to describe how their jobs support these goals. Similarly, leadership should ensure their goals are aligned with higher-level organizations' goals.

4.2 Align Sub-organization Commitments to Goals: As a goal is deployed to sub-organizations, it should be made clear how the sub-organization goal fits into the overall goal picture and what portion of the goal each sub-organization is responsible for.

5. Develop an Operational Plan

5.1 Align Plan to Strategy: Ensure the operational plan will accomplish things that are important to the organization's strategy and their stated goals.

5.2 Establish Deployment Funding/Resources: Ensure funding has been identified to support the CPI Support Team, and the time required to set aside a team of employees from normal operations to identify changes to the process targeted. Additionally, resources such as facilities, administrative supplies and consultant support may need to be identified for any effort**.** Organizations should also identify funding to make possible process changes. If these funds are not set up ahead of the team, it can seriously degrade or delay the effect of the team activities.

5.3 Establish Timing and Priorities: The heart of any plan is the timing and priorities of the organization. It needs to state when each sub-organization will start its deployment

and where in the organization if it is wide-spread. The organization should not worry about a completion date since the process should be continuous.

5.4 Identify the Improvement Activities: Identify the initial set of improvement activities to be carried out based on the EVSMA and the leverage points identified within processes as a result of that activity. Identify follow-on activities as appropriate using further process mapping.

5.5 Address Retention/Improvement of Output Quality: The elements of quality retention/improvement should be made a part of the operational plan. These elements identify how the organization will maintain or improve the level of quality in its operation while processes are being improved. Inclusion in the operational plan is meant to ensure the organization does not forget about quality as processes are made faster and more efficient.

6. Implement the Operational Plan

6.1 Conduct Initial Improvement Activities: This is the act of generating teams, having them trained on CPI basics and tools to be used, and then having the team identify changes to processes and implementing those changes. These are all the actions of the Work Group.

6.2 Baseline Key Processes (Map Processes): Every organization process should be mapped at some time to determine its health and prioritize it in those to be improved. Processes must be made visible through mapping before improvements can be identified. A phased approach may be used starting with the few critical processes, then continuing through 100% completion**.**

6.3 Focus on Standardization; Policies, Procedures, Processes: Once process changes are identified and implemented, the organization's policies, procedures and processes that support the new process must also change. If there is more than one area of the organization that performs the process, then the change needs to be implemented in all areas. Once all associated items are changed, focus on making the changed processes the standard to ensure there is no regression.

6.4 Focus on Quality: A focus needs to remain on producing quality products and services. Quality should not suffer when processes are improved. If it does, that means that value added steps were adversely affected, and the changes need to be reevaluated to ensure they are not the cause of any quality degradation**.**

7. Monitor Progress

7.1 Monitor Performance to Established Organization Goals: The organization should establish how it will track and monitor deployment progress. Initially reports should track activities like training accomplished, teams established, and events under way. As the organization matures, focus should shift to achieving the goals of individual and integrated projects. Reporting, which should be measured against established metrics, should be more often at first, then, extend to no longer than monthly.

7.2 Coach for Results: Managers should take on the role of coaches as their employees are empowered to make changes to their processes. They need to encourage new ideas, remove barriers to progress, and support changes that positively affect operations. They also need to keep the coaching focused on process results. Changes should have a measurable result on the process or they should continue looking for other options.

8. Focus on Continuous Process Improvement

8.1 Sustain Gains: Ensure that recommendations from the teams actually change the processes, and the changes are sustained through regular management review. If not monitored, improved processes often revert back to what they were before, generating a huge demotivator for future actions and teams. As soon as processes are changed, it is important to document the changes and standardize the new processes across like organizations.

8.2 Nurture the Process: Rewards should be team oriented rather than for individuals and be established to promote, distinguish, and publicize successful activities. They do not have to be elaborate or complicated, but need to be recognized by employees as worth their time and effort. Recognition awards should be of higher priority than monetary awards.

8.3 Establish a Cross-Feed Process: Like organizations should come together periodically to share CPI deployment lessons learned. These conferences should focus on the same levels of organizations so they will have more in common, and so they can use each other's lessons. Similarly, methods to capture new knowledge and share it within and across organizations need to be established (e.g., communities of practice and web pages).

8.4 Ensure Senior Leader Participation: A process should be established to track and monitor leadership participation. This may be events participated in monthly, time spent with teams and direct supports on CPI, or anything that shows the individual's commitment and active participation. Leaders who do not participate should be visibly removed immediately.

8.5 Conduct a Self Assessment Periodically: Use of a tool such as a maturity assessment periodically will keep the organization focused on proper criteria to support the CPI deployment. A high level maturity assessment tool is included in the DoD CPI Guide.

8.6 Update Direction and Planning: Enterprise strategic planning should be updated at least annually to reflect current achievement levels, new/revised customer imperatives, and other fact- of-life changes. Similarly, operational planning should also be updated no less than annually, although this level of planning will most likely be updated more frequently due to the completion of ongoing projects and the identification of new projects.

Attachment C.
Training and Certification

Training is necessary to ensure the success of any CPI program. CPI training needs to address three essential elements:

- Core competencies
- Goal alignment
- Common terminology and conceptual approach.

Training alone does not suffice for certification. Certification requires that the candidate demonstrate effective choice and application of the methodologies, tools, and techniques learned in training. That is, the candidates must demonstrate that they have learned the relevant material and know how to properly apply what they have learned. DoD CPI certification levels (I, II, and III) indicate the degree of proficiency an individual has attained (i.e., I is the beginner level, II is the intermediate level, and III is the expert level). To provide consistency and interoperability across DoD Components, an individual's expertise should be depicted within this framework. However, Components may establish alternative corollary proficiency characterization schemes such as the "belt" system used by some CPI disciplines.

Certification is accomplished by successfully completing an authorized training curriculum with a training project and appropriate proficiency test, and mentoring of others in CPI. For higher level certifications (i.e., levels II and III), more complex and/or multiple projects must be successfully completed before certification is granted.

The primary objective of CPI training is to provide personnel involved in CPI with the understanding and skills in the core competencies necessary for successful launch and sustainment. The DoD CPI body of knowledge includes, but is not limited to, the core competencies listed in Table C-1. Based on these core competencies, the breadth and depth of training for each individual depends on the individual's designated role and responsibility in the CPI program.

Besides addressing the technical aspects of the core competencies, CPI training should cover conceptual and motivational factors as well. One of the most important of aspects of training is communication and reinforcement of the importance of alignment of goals throughout an enterprise. This requires that everyone know and understand the end objectives and expected results of their organization and how their tasks should contribute. This includes the selection, monitoring, and tracking of appropriate lower level metrics (process measures) to ensure compliance with and alignment to higher level organizational or enterprise goals (results measures).

Another important factor that CPI training should address is the dissemination of a common terminology and conceptual approach that can function as a universal language for CPI deployment throughout the enterprise. This will facilitate effective communication and the ability of personnel to become active and productive participants when transferred to a new assignment or location.

The CPI training program is best conducted in two phases: initial training for start-up success and continued training for sustained success. The initial training should ensure that key leadership and staff personnel are prepared to inaugurate the CPI program with minimal risk of failure. This requires that initial training be performed in a concentrated, intense manner. The training curriculum needs to concentrate heavily on motivational and informational issues during this phase as well as technical skills. Training in this phase should cover the required technical skills for initial deployment. However, it should also concentrate heavily on educational and informational issues. The initial training phase should be followed with a more level-loaded, sustained training effort. In this phase training candidates should be chosen based on the CPI deployment schedule and development of those being looked to as key CPI personnel.

Core Competencies

The core competency topics and techniques listed in Table C-1 provide a basis for comprehensive CPI training for DoD:

Table C-1. CPI Core Competencies Topics and Techniques

CPI Philosophy:	• Customer Focused • Goal Alignment • Cultural Assessment • Systems Approach • Empowerment • Effectiveness vs. efficiency • Lean thought and emerging service perspective • Six Sigma Principles/tools
Leadership:	• Transformational Leadership • Setting a common vision • Applying the 3Cs: Communication, cooperation, coordination • Leading by Example • Setting Expectations
Project Management:	• Major Functions of Management • Planning, Organizing, Staffing, Directing, Controlling • Developing Work Breakdown Structures • Developing POA&M • Meeting Management • Budgeting • Setting/aligning organizational goals
Process Management:	• Understanding and refining process flow • Determining Key Process Parameters • Monitoring/controlling Processes • Understanding process variability

Table C-1. CPI Core Competencies Topics and Techniques

Change Management:	• Why change is difficult • Implementing change with minimal resistance • The role of the change agent

Conflict Resolution:	• Types of Conflict
	  ○ single-party
	  ○ between individuals
	  ○ between individuals and groups
	  ○ between groups
	  ○ between organizations
	  ○ between functional entities (engineering vs. purchasing)
	• Sources of conflict
	  ○ goal incongruities
	  ○ resource competition
	  ○ communication failure
	  ○ performance standards
	  ○ org. structure
	• Strategies for managing conflicts
	  ○ avoidance
	  ○ smoothing
	  ○ negotiating
	  ○ power/dominance intervention
	  ○ compromise
	  ○ confrontation
	• Dealing with difficult people

Team Dynamics:	• Types of teams • Team interactions and relationships • Team meetings • Coaching and mentoring
Systems Thinking:	• Types of systems • Systematic systems approach • Defining systems components • Determining systems boundaries • Determining interactions • Preventing the “law of unintended consequences”

Table C-1. CPI Core Competencies Topics and Techniques

Systems Engineering:	• Top down design
	  ○ determine systems requirements
	  ○ design to systems requirements
	  ○ design tools
	• Bottom up integration
	  ○ allocate systems requirements to sub-systems
	  ○ integrate sub-systems requirements
	• Life cycle design and management
	• Users' perspective
	• Balanced Value Systems Design
	• Systems test and validation

Problem Solving:	• Identifying/defining the problem • Discovery tools • Root Cause Analysis • Verifying root cause
Decision Analysis:	• Fact-based decision making vs. opinionated decision making • Generating alternatives (brainstorming, subject matter experts, etc.) • Organizing alternatives (management and planning tools) • Evaluating alternatives (dominated vs. feasible ideas) • Determining optimal solution(s) • Implementing solution
Value Analysis:	• Value vs. non-value added activities • Cycle time vs. Takt time
Waste Analysis:	• 7 common wastes (from lean principles)

Risk Analysis:	• What is risk
	• Measuring risk
	  ○ managing risk
	  ○ contingency planning

Flow Analysis:	• Value stream mapping
Metrics:	• Discrete vs. Continuous • Data collection and storage • Data analysis
Probability and Statistics:	• Descriptive statistics • Inferential statistics • Probability theory • Probability of combined events • Conditional Probability • Counting rules • Probability distributions

Management Responsibility

Management has the responsibility for the CPI training program. To support the substantial amount of training that needs to be accomplished, management should develop a CPI training plan. This plan should address the training schedule, timing of training, selection of candidates, method of delivery (contractual, DoD/DAU, in-house classroom lecture, case studies, hands-on, on-the-job training), organization for maximum development of personnel with the least possible disruption to the work flow, and monitoring/controlling for effectiveness.

Schedule

The training schedule should be coordinated with deployment planning to ensure that training is synchronized with the goals and milestones of the program.

Timing and Selection of Trainees

Initial start-up and continued training should be accomplished as needed with minimal disruption to the organization's mission. Candidates should be selected to ensure that the competencies necessary to support roles and responsibilities are met in time to minimize the risk of failure. The initial training program may employ outside, contract training providers but they should meet or exceed the body of knowledge for the core competencies as listed in the training/certification matrix below (see Table C-3).

Method of Delivery

It is important that an organization accept responsibility for CPI education and training requirements as soon as practicable. Experience suggests internal educator/trainers are more believable to the culture and continuity is achieved through their sustained presence.

Organization

The training should be organized to promote progressive immediate application, e.g., on actual CPI projects, and minimize disruption to the value-added work flow. If there is little or no work in the area for a time, then there is an opportunity to train all personnel in the area. Individuals trained should have the opportunity to apply their newly acquired skills immediately upon on completing training. Otherwise, the newly acquired knowledge will be lost.

Review and Control

Management needs to review the CPI training program periodically and revise it as appropriate to ensure its continued effectiveness. To do this, proper metrics need to be chosen, analyzed, and tracked over time and against program standards and goals. No one measurement is enough to provide the information needed to properly assess CPI training effectiveness. Metrics should be selected to measure both direct and indirect effectiveness. These metrics should address customer satisfaction from the standpoint of the student, the organization, CPI management and accomplishments, and the workforce. Student evaluations of the training should be completed

immediately after training and again some time later. The student evaluations should include, but are not limited to, the following:

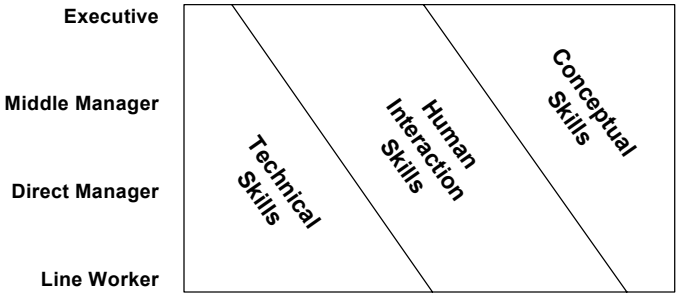
> Content, length, format, instructor's knowledge, instructor's teaching ability, instructor's responsiveness to questions, presentation materials, handout materials, exercises/case studies, facilities, and an overall rating

After the students have applied the material covered in the training to their work activities, they need to complete another training evaluation form with all of the previous topics as well as additional topics to include how the training helped in applying the subject matter and what, if any, would they change in the course to improve learning and practical application.

CPI Training and Certification Guidelines

A training program needs to provide the fastest and most effective way to achieve the required levels of competency and comprehension needed to accomplish a particular task or mission. Required competency for training candidates are determined by the roles and responsibilities they will play. In general, there are three overarching categories of competencies: technical skills, human interaction skills, and conceptual skills. As the role and responsibility of a candidate moves from line worker to middle management to top management, the emphasis on the three categories changes from highly technical/medium human interaction/low conceptual to low technical and medium human interaction/high conceptual. This is illustrated graphically in Figure C-1.

Figure C-1. Fundamental Categories of Competencies



DoD will establish standards for certification of competency for leadership roles in the CPI Deployment Cycle and course materials for use in training programs to provide certifications. CPI leaders and managers are expected to have CPI-related awareness and proficiencies even if they are not certified at a particular level. The three general categories of Technical Skills, Human Interaction Skills, and Conceptual Skills can be expanded into twenty specific areas (see Table C-2).

Table C-2. CPI Core Competencies

Conceptual Skills	Human Interaction Skills	Technical Skills
CPI Philosophy	Conflict Resolution	Value Analysis
Project Management	Leadership	Waste Analysis
Process Management	Change Management	Risk Analysis
Systems Thinking	Team Dynamics	Flow Analysis
Systems Engineering	Communications	Constraints Analysis
Problem Solving		Metrics
Decision Analysis		Probability/Statistics
		TPM/RCM

These topics constitute the CPI body of core competencies. Their relationship to the DoD CPI levels of competency is illustrated in Table C-3 below.

Table C-3. DoD CPI Body of Core Competencies per CPI Level

CPI Core Competencies	Level III	Level II	Level I
CPI Philosophy	4	3	2
Leadership	4	3	2
Project Management	3	3	2
Process Management	4	3	2
Change Management	3	2	2
Conflict Resolution	4	3	2
Team Dynamics	3	3	2
Systems Thinking	4	3	2
Systems Engineering	4	3	2
Problem Solving	4	4	3
Decision Analysis	4	2	2
Value Analysis	4	3	3
Waste Analysis	4	3	3
Risk Analysis	4	3	1
Flow Analysis	4	3	3
Constraints Analysis	4	3	2
Metrics	4	3	2
Probability & Statistics	4	3	2
TPM/RCM	3	2	1

In Table C-3, each core competency is related to each role by a required level of comprehension (indicated by the number and the following cross-reference). Four levels of comprehension are used: (1) Awareness, (2) Appreciation, (3) Application, and (4) Authority.

1. **Awareness** is the lowest level of comprehension and requires that a candidate possess only a basic understanding of the subject matter. This minimum level of comprehension is needed to successfully participate as a working contributor to a task/project.

2. **Appreciation** is the next level of comprehension and requires that the candidate have a broader view and understanding of the material. This level of comprehension is needed for self-starters and higher order contributors.

3. **Application** requires that the candidate have more in-depth knowledge and understanding of the material. This level of comprehension is needed to succeed at a lower level of technical leadership.

4. **Authority** is the highest level of comprehension and requires that the candidate have a thorough knowledge/understanding of the material and can confidently teach it to others and take the lead in applying the tools/techniques to practical situations.

Level I, II, and III certification is based on meeting both training and practical application. It is required that candidates attain a minimally accepted degree of CPI proficiency. If the required proficiency is not achieved, the candidate should be required to take remedial study and re-tested, or retake the applicable training class.

The following qualifications are considered necessary for CPI certification recognition. A variety of recognized professional sources for training and certification for Lean, Six Sigma, and Theory of Constraints (TOC) exists. Separate certification in any of these areas contributes to CPI certification recognition which encompasses more than one school of thought. These separate certifications indicate progress toward achieving mastery of CPI and can be referenced against the total requirements necessary for DoD CPI level recognition.

The DoD CPI certification levels are an evolution beyond separate Lean, Six Sigma, and TOC schools and their certification processes. The DoD certification levels shape DoD CPI expertise by incorporating existing CPI-related methodologies and tools through a standard certification framework. The levels standardize and provide a consistent DoD CPI professional development path to channel Service/agency-specific programs. The following minimum requirements must be achieved for CPI certification and formally documented.

Level I

Education

- High school or equivalent and relevant training in the candidate's field of expertise.

Work Experience

- 3 years of operational, operational support, business, technical, or managerial experience.

Technical Capability

- High school mathematics proficiency and basic CPI training and instruction to lead process improvement projects.

Computer Proficiency

- Word processing software.

Team Skills

- Ability to facilitate or lead problem solving activities in a group setting.
- Understanding and application of the DMAIC or equivalent Service CPI framework in a team environment.

Training and CPI Project Experience

- Completion of a Service-approved Level I CPI training program.
- Leadership of at least 1 successful CPI project and active participation in 2 or more successful CPI projects/events within 1 year or less.

Level II

Education

- High school or equivalent and relevant training in the candidate's field of expertise.

Work Experience

- Minimum of 3 years of operations, operational support, business, technical, or managerial/supervisory experience.
- Technical application of education and experience as a member or leader of functional and cross-functional CPI-related project teams.

Technical Capability

- Project management experience and basic principles of process management.
- Proficiency in algebra.
- Ability to conduct a cost and benefit and/or business case analysis.
- Ability to teach and apply the DMAIC or equivalent Service CPI framework.
- Demonstrated ability to apply statistical methods.

Computer Proficiency

- Proficiency in word processing, spreadsheet, presentation, and project management skills.

Communication

- Excellent oral and written communication skills.

Team Skills

- Ability to conduct meetings, facilitate small groups and successfully address conflicts.
- Ability to mentor and motivate people.

Training and CPI Project Experience

- Achievement of DoD Level I CPI certification.
- Attendance in a total of 200 hours of Service-approved CPI training.
- A minimum of 2 CPI projects and participation in a minimum of 3-5 CPI events.

Level III

Education

- High school or equivalent and relevant training in the candidate's field of expertise.

Work Experience

- 3 or more years of CPI-related experience.

Technical Capability

- Demonstrated expertise in the application of the DMAIC or equivalent Service CPI framework.
- Capability to perform advanced statistical analysis using a range of available tools.

Computer Proficiency

- Word processing, spreadsheet, presentation and project management capabilities.
- Proficiency to use advanced statistical methods and applications.

Communication

- Excellent organizational skills as evidenced in oral and written communication skills.

Team Skills

- Demonstrated formal/coaching education and training.
- Proficient instructional and mentoring skills.
- Graduation from a Service-approved "train the trainer" program.
- Knowledge/application of strategic planning and SWOT analysis.

Training and CPI Project Experience

- Achievement of DoD Level II CPI certification.
- Completion of 5 to 10 CPI projects at the Level II.

Continuing Education

Continuing education for each DoD CPI level is required at regular periodic intervals to maintain currency and applicability. This may be attained through demonstrated leadership and participation in CPI projects and events as well as documented continuous improvement through attendance and participation in CPI educational process and/or events. A combination of a specified amount (hours) of training and/or CPI-related participation must be documented.

Attachment D.
CPI Progress Assessment

This attachment provides techniques for assessing organizational CPI performance and maturity level. CPI assessment techniques are helpful when determining how well an organization is doing in implementing CPI for internal purposes, external reviews, and application for recognition and awards. A good assessment tool can be used by organizational members as well as outsiders for determining progress toward the perfection of CPI as a system of improvement, the result of which is a measure of organizational achievement.

When an organization's assessment is completed, planning for higher levels of performance should begin. CPI efforts should be consistently aligned with the priorities in an integrated organizational strategic plan. Deficiencies against CPI expectations should have countermeasures in support of organizational goals and objectives.

CPI Performance Quick Assessment

The CPI Performance Quick Assessment is intended as a simple checklist for making an overall assessment of an organization's CPI progress. This approach is intentionally kept simple without numerical evaluation. The following questions collectively comprise this checklist:

1. Immediate impressions of 5S plus 1 implementation in every organizational area:

    a. Sorting: elimination of all excess materials from all office/work environments

    b. Straightening: everything is positioned in a specific consistent organized manner

    c. Shining: everything is clean, allowing undesirable changes to be immediately visible

    d. Standardizing: best practices and processes are formally positioned and consistently embraced

    e. Sustaining: CPI gains have been sustained as observable in CPI progress charts and other documents

    f. Safety: no visible safety hazards unaddressed throughout the viewed facilities.

2. Performance against aligned CPI metrics is visible to all of the organization's members and updated on a daily/weekly basis (customer response/cost effective readiness, quality/reliability, cycle time reduction, and lowering total cost). Does the randomly selected employee understand the metrics and how they can personally impact them?

3. Visible evidence of kaizen events being conducted and specific quantification of results achieved.

4. While observing any work processes, estimate what percent of current observable human activity is actually value-added as compared to non value-added at the time of the snapshot (value-added as what the end customer would be willing to pay for if observing the process right now).

5. While observing any work processes, estimate what percent of current observable material is being worked upon by comparison to total estimated material visible (rough estimate only).

6. Are the CPI champion's sustained efforts visible and understandable to the employees at large? Does the culture relate to the need for dissatisfaction with the status quo?

7. Is cross-functional teaming evident and encouraged by comparison to traditional functional stove piping and isolation?

8. Are value stream maps in visible design and continued refinement in work environments?

9. Is a formal CPI education and training program in place and exercised for the benefit of all employees?

10. Are areas of CPI excellence connected or in relative isolation from other areas of excellence within the organization?

CPI Maturity Assessment Tool

The CPI Maturity Assessment Tool is intended for evaluating overall organizational CPI maturity.

CPI Maturity Assessment Tool

Organization:_____

Scope (Area) of Assessment: _____

Date of Assessment: _____

Name and Position of Person Filling out the Form: _____

Cumulative Average Score: _____

Cumulative average score of less than 3 = beginner stage of CPI organizational action

Cumulative average score of 3 to 4 = intermediate stage of CPI organizational action

Cumulative average score of 4 to 5 = advanced stage of CPI organizational action

Planning

1. Mission, Vision & Strategic Planning

These questions determine whether the organization knows what it is, where it is going, and why.

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Has the organization clearly defined its initial Vision?					
Have the organization's Champion and Steering Committee success-fully conveyed a sense of urgency to the rest of the organization?					
Are there clear signs of management commitment from the perspective of the people below them?					
Have the Champion and Steering Committee obtained organizational buy-in?					
Is there a clear commitment by the Champion and Steering Commit-tee to develop people's skills and abilities in support of change?					
Have the Champion and Steering Committee created a sense of urgency for change?					
Is there strong evidence of a clear focus on providing value to the customer, including a definition of who the customer(s) is (are)?					
Is there a clear commitment to leverage the extended enterprise, the customer(s) and suppliers outside the organization itself?					

2. Conduct a Value Stream Analysis

These questions focus on whether the organization has determined how it will get to its desired future state.

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Have the Steering Committee and CPI Support Team mapped the enterprise value streams?					
Have the Steering Committee and CPI Support Team internalized the Vision in well defined future state?					
Have the champion and Steering Committee set clear goals and metrics?					
Have the champion and Steering Committee identified and involved key stakeholders?					
Have the Champion and Steering Committee, with the help of the stakeholders, identified the key leverage points that define where they should concentrate their efforts?					

3. Develop Structure/Behavior

These questions look at how much progress the organization has made toward overall implementation.

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Has the organization been organized in a way that supports CPI implementation?					
Have the Champion and Steering Committee identified and em-powered Change Agents?					
Have the Champion and Steering Committee aligned incentives with the goals of the CPI implementation?					
Have the Champion and Steering Committee adapted the organi-zation's structure and system to support CPI?					
Have the Champion and Steering Committee defined expected organizational behaviors and set expectations accordingly?					

4. Goal Alignment & Deployment

These questions look at how far the organization has moved toward putting the elements in place that encourage people to implement CPI?)

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Have the Champion and Steering Committee deployed the organization's goals to everyone in the organization?					
Have the Champion and Steering Committee brought their commitment to everyone in the organization?					

Implementation

5. Create & Refine Operational Plan

These questions look at whether the organization has created an operational plan.

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Has the Steering Committee clearly identified and prioritized all CPI activities?					
Have the Champion and Steering Committee committed the necessary resources to carry out the plan?					
Have the Champion and Steering Committee ensured that the people have the necessary education and training to support CPI?					
Have the Champion and Steering Committee deployed the operational plan throughout the organization?					

6. Implement Operational Plan

These questions look at whether the organization is meeting its commitment.

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Have the various pieces of the organization tasked with improvement activities developed detailed plans?					
Have the various pieces of the organization tasked with improvement activities implemented CPI activities?					

7. Monitor

These questions look at whether the organization has established the necessary means to monitor progress toward CPI implementation.

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Have the Champion and Steering Committee identified the right metrics to monitor performance?					
Are the data relevant to those metrics being gathered and analyzed to determine the extent of improvement?					

8. Focus on Continuous Process Improvement

These questions look at whether the organization has made the cultural change required to sustain CPI.

Question	1 Not yet started	2 In-process	3 Demon-strated	4 High Visibility	5 Trans-formation Evident
Do all levels of the organization regularly evaluate their progress toward the stated goals?					
Do the Champion, Steering Committee, and CPI Support Team actively nurture the process?					
Do the Champion, Steering Committee, and CPI Support Team regularly refine the Plan?					
Do the Steering Committee and CPI Support Team capture and adopt new knowledge, spreading it across the organization?					
Do the Steering Committee and CPI Support Team capture and standardize successful improvements?					
Do the Champion, Steering Committee, and CPI Support Team actively work to institutionalize PDCA thinking?					

Advanced CPI Assessment Tool

This advanced CPI assessment tool is designed for use by organizations who are striving for world class excellence. It is based in large part on a tool used extensively for similar purposes by John Allen at Total Systems Development (TSD) within both public and private sector organizations. Several DoD maintenance organizations have already received CPI world class excellence recognition by pursuing similar assessment criteria provided by sources such as the Lean Aerospace Initiative and the Shingo Prize. This tool acts as both a leadership guide and progress measurement process, focusing on CPI elements in eight areas critical to CPI transformational activity. In the current state assessment, each of the CPI elements is scored based on observation and input from key organizational personnel. Then the organizational leadership is asked to describe their desired state in 2–3 years. Each of the elements is then reviewed and scored in terms of the future plan and transformational change vision. These goals are then plotted for comparison with the results of the current state assessment. Examining the gap between the current and the desired states provides a picture of needs and goals that can be easily converted to a work plan and specific action steps needed to kick off the implementation.

This assessment is designed to be periodically used during the CPI implementation to measure the trend of progress. Results of a current state analysis can be plotted against the desired expectations for different phases in the implementation process. The resulting data can then be used to decide where efforts are flagging and where energy needs to be applied to bring the implementation into uniformity. By having an easily understood breakdown of world-class CPI benchmarks, organizations can better plan how to allot resources and plan for improvement.

An additional benefit of this assessment is that during the data collection and interpretation of results there are numerous opportunities to discuss important differences in viewpoint between the members of the implementation team and promote a more aligned and unified effort.

Instructions

Review the entire set of assessment questions before beginning to score the elements. Note that for each element there are five descriptions of the status of the element ranging from the complete absence of the element to world-class implementation of the element. When you fill out the form, read the descriptions and choose which description fits the current state in your plant and then “score” the element in the empty box at the end of the row.

Try to score the entire form in one sitting. It is anticipated to take approximately 45 minutes to complete the form. Do not leave any elements blank. The goal is to achieve meaningful comprehensive results.

Assessment

Organization:

Scope (Area) of Assessment:

Date of Assessment:

Name and Position of Person Filling out the Form:

Leadership Vision and Commitment

A CPI implementation must be led from the top down. Without the sponsorship and commitment of those who have the power and resources to sustain a change effort, a CPI initiative will die. A bottom-up initiative that lacks sponsorship from organizational leadership may result in short-lived or limited success and not transformation to a sustainable CPI culture. Three critical elements are leadership vision, commitment and policy deployment.

1.1 Vision. Early in a CPI implementation, organizational leaders must come together to agree on what form the CPI initiative will take. There must be agreement and buy-in on a fairly specific and detailed vision such that any one of the leaders could describe what the goals and final result will look like. This shared vision must be the same vision so that conflicting messages are not created about the goal. This vision then must be communicated to the rest of the organization at every opportunity. The communications must be frequent and done with conviction so that there is no doubt of the leaders' commitment to the vision.

	1.	2.	3.	4.	5.	Score
1.1 Vision	Org. leaders are not informed about CPI	Some Org. leaders have partial understanding of CPI, but it is not shared	Most Org. leaders have an understanding of CPI but they do not communicate the vision	Most Org. leaders make a disciplined effort to share a CPI vision	All Org. leaders share and communicate the identical vision of CPI	

1.2 Commitment. Organizational leaders must provide a genuine sustained and visible commitment to the CPI vision. The level of commitment likely requires some personal inconvenience and change. CPI transformation is not achieved through compliance behaviors alone. Ideally, all organization leaders should privately commit to one another that they will stand behind the vision regardless of the challenges that might be experienced. The private commitment must be made public to those who look to them for leadership. Appropriate actions, not just words, are required. The commitment of resources and effort will demonstrate that there is real substance behind the rhetoric.

	1.	2.	3.	4.	5.	Score
1.2 Commitment	Org. leaders are not committed to achieving the CPI vision	Some Org. leaders privately commit to achieving the CPI vision	Most Org. leaders privately commit to achieving the CPI vision	All Org. leaders privately commit, but only some publicly commit to achieving the CPI vision	All Org. leaders privately and publicly commit to achieving the CPI vision	

1.3 Policy Deployment. A disciplined policy deployment process should be used to carry out the implementation and then become standard practice in the new CPI system. An effective policy deployment process is one that sets goals with input from those who must achieve the goals and then holds regular reviews to assure that progress towards the goals is being achieved. CPI implementation requires involvement from all levels of the organization. Commitment to the changes must be secured not just from the leaders, but from all stakeholders in the change effort. A policy deployment process becomes the means by which that commitment is made and the organization becomes aligned toward the same goals. As the organization matures, the policy deployment process is the means by which all become aligned around the continuous improvement goals.

	1.	2.	3.	4.	5.	Score
1.3 Policy Deployment	There is no effective means of tracking organization implementation policies	A plan to deploy CPI policies and processes is made but not used	CPI goals are developed with input from all levels of the organization	Managers hold regular reviews during the year which focus on progress toward CPI goals	A policy deployment process is used to set annual goals and achieve buyin and contributions from everyone	

Change Management

CPI implementers must be sensitive to change issues, since many employees might not have experience working in a CPI environment. Behavior change is typically required for success in a new CPI environment. During a change initiative some roles are critical and need to be clarified and agreed to in order to move forward. The following change management roles and responsibilities are critical to the success of the effort.

2.1 Change Leadership. Organizational leadership plays a critical role in the cultural conversion to CPI. In the process of sponsoring and leading change, the senior management has specific responsibilities that cannot be avoided through delegation. In the beginning, leadership defines the need for change and creates the vision of how things can be different. As others in the organization begin to embrace the vision, leaders must continue to communicate the need for change and support efforts being made to realize the vision.

	1.	2.	3.	4.	5.	Score
2.1 Leadership	Org. leaders are not involved in CPI implementation	Org. leaders are create a steering committee to oversee CPI implementation	Org. leaders periodically communicate the need for change	Org leaders effectively communicate the urgency of the need for change	Org. leaders are full sponsors of the CPI effort	

2.2 Steering Committee. The steering committee is intimately involved at the strategic level, creating the plan for change and dealing with specific issues that arise during design and implementation. This committee must have cross-functional representation composed of leaders who control the major resources within the organization. Members of the steering committee need to stay engaged in CPI on a daily basis to promote the CPI process and remove barriers to change.

	1.	2.	3.	4.	5.	Score
2.2 Steering Committee	There is no steering committee or oversight of change effort	Steering committee creates business case and initial work plan	Steering committee chooses first area to begin effort and checks readiness for change	Steering committee oversees changes made in first application area	Steering committee is actively involved in evaluating and sustaining the changes	

2.3 Support Team. Knowledgeable and respected organizational members are selected to support CPI as key process change agents. They must become committed to the CPI conversion, as they will likely face resistance to change on a daily basis. Training should occur before they start their CPI team involvement. A portion of these change agents will need to be engaged full time in CPI, while others might provide supplemental support.

	1.	2.	3.	4.	5.	Score
2.3 Support Team	Support teams are not established	Support teams begin current and future state mapping	First CPI application area is prepared	Changes begin in first application areas	Support team effectively executes the work plan	

2.3.1 Value. All employees need to understand the concept of what is value added and what is not, according to the customer's perspective. Each employee should have access to this training and it should be emphasized in every organization. This concept should drive all organizational decisions and be updated periodically with the customer.

	1.	2.	3.	4.	5.	Score
2.3.1 Value	Value is not being taught to employees	Value training is available but not being used	Value is being taught to limited groups	Value is taught to all and used in some areas	Value is understood and used by all in all areas	

2.3.2 Value Stream Mapping (VSM). VSM is an important step in improving the understanding of what has value and what is waste. It is a valuable method for making processes more visible and identifying opportunities for improvement. There is an increasing variety of VSMs for potential application including current state, future state, consumption, and provisioning maps that focus on material, information, and/or people/process flows. VSMs should be updated for use as training aids to new employees and as a record of standard procedures. Employees gain valuable CPI experience by mapping their processes.

	1.	2.	3.	4.	5.	Score
2.3.2 Value Stream Mapping	VSM is not being taught to employees	VSM training is available but not being used	VSM is being taught to limited groups	VSM is taught to all and used in some areas	VSM is understood and used by all in all areas	

2.3.3 Flow. This concept defines what should be happening in an optimized process with minimized waste. Products or services should flow continuously from each value-adding step to the next, with minimal or no waiting or traveling time between them. Kanbans are often used when flow cannot be seamlessly accomplished, but should not be accepted as permanent replacements for continually refining uninterrupted real flow.

	1.	2.	3.	4.	5.	Score
2.3.3 Flow	No process flow	Flow occurs in isolated areas	Flow in small batches	Product flows continuously	Single piece flow with mixed	

2.3.4 Pull. The concept of Pull is one that is not intuitive and must be reinforced through training employees. The concept is to only generate a product or service when the customer triggers a need for it. Push is the alternative to pull, where the need for a product or service is forecasted and then provided in accordance with a work plan that might be removed from the customer's actual experience for timely support.

	1.	2.	3.	4.	5.	Score
2.3.4 Pull	Product is being pushed	Material accumulates at end of process	Some material is pulled into the workplace	Material is pulled into process by kanban	Material is pulled into each process based on takt	

2.3.5 Continuous Process Improvement (CPI). Every organization that deploys CPI must help employees to understand that process improvement is not something done just once. Process improvement must be continuous. Although this contradicts the previous "Law of Diminishing Returns", it has been proven repeatedly in CPI organizations. Each employee should have access to this training and it should be emphasized in every organization. Formal update schedules should exist on process updates until the employees accept the true concept and every day becomes an opportunity to improve their processes.

	1.	2.	3.	4.	5.	Score
2.3.5 CPI	CPI is not being taught to employees	CPI training is available but not being used	CPI is being taught to limited groups	CPI is taught to all and used in some areas	CPI is understood and used by all in all areas	

2.3.6 Champions. Champions are individuals who through their stature and/or position are able to shape opinion about the value and sense of urgency of CPI. By showing interest and encouraging results, the Champion is able to make the implementation move ahead more smoothly. Champions may exist at many levels within an organization, but the top management champion is the focus here and a must from the beginning of a CPI transformation initiative.

	1.	2.	3.	4.	5.	Score
2.3.6 Champion	Champion is not involved	Champion is partially involved	Champion is encouraging	Champion is used to conduct reviews	Champion is a normal part of operations, walking the floor, and encouraging CPI	

2.3.7 Supply Management. Supply management ensures the right kind of materiel, in the right quantity are available precisely when and where needed to support any worthy organizational process. Supply organizations and employees need to understand the impact of managing their supplies from the customer's perspective and be actively pursuing improvements in their processes as part of the larger enterprise.

	1.	2.	3.	4.	5.	Score
2.3.7 Supply Management	Suppliers are treated as adversaries	Suppliers are given CPI to consider	Suppliers are doing parts of CPI	Suppliers are listened to	Suppliers are treated as partners	

Organizational Structure and Support System

To implement a CPI culture change, the organizational structure must be changed to provide support to the value-adding process owners who perform the work of the enterprise. The structural and support system changes include (1) creating team-based workgroups, (2) creating an aligned organization, (3) changing management mindsets and behavior, and (4) aligning human resources.

3.1 Team-Based Workgroups. A CPI focused organization is one in which empowered and involved employees work together in team-based workgroups focused on the needs of the customer. The workgroups must function as teams with a trained team leader and sufficient organizational support to do their important work. Workgroups hold regular meetings and engage in problem solving as a group. When fully functioning they are semi-autonomous, capable of evaluating and reporting on their progress towards continuous improvement.

	1.	2.	3.	4.	5.	Score
3.1 Team-based Workgroups	There are no workgroups	Workgroups are formed but do not yet function as a team	Team Leader in place and workgroup is beginning to function as a team	Workgroups hold regular meetings and engage in problem solving as a group	Workgroups are semi-autonomous, evaluating and reporting on their progress	

3.2 Aligned Organization. In a world-class CPI focused organization, the entire organization is aligned to support value-add operations and the employees who do the work. In order to do this, traditional organizations must shift the structure and scope of virtually everyone's roles and responsibilities. Reorganization around processes rather than functions is often required. The overall management approach must change to an emphasis on span of support rather than span of control. True alignment is reached when the policy deployment process aligns production activities with the business objectives.

	1.	2.	3.	4.	5.	Score
3.2 Aligned Manufacturing Organization	There is no effort at alignment	An organizational plan for CPI is established	Efforts are made to organize around process, not function	Span of support is emphasized over span of control	Policy deployment process aligns all activities with business objectives	

3.3 Management Mindset and Behavior. Managers seem to think and act differently in world-class CPI facilities. Changes in both mindset and behavior are required of supervisors and managers in traditional organizations implementing CPI. Three of the most important changes are as follows.

3.3.1 Disciplined Management Process. A consistent, fact-based approach to managing is characteristic of what you would find in a CPI focused environment. Training in plan-do-check-act (PDCA) or another disciplined problem-solving approach is the foundation for how CPI managers address issues with their employees. This approach is the continuous improvement method used for problems with operations as well as performance issues with employees.

	1.	2.	3.	4.	5.	Score
3.3.1 PDCA Management Process	There is no disciplined management process	Managers must receive training in fact-based management	Managers are expected to promote the use of PDCA or another problem-solving approach	Managers conduct developmental discussions with employees using a PDCA process	Manages consistently use a disciplined PDCA process addressing all issues with employees	

3.3.2 Empowering, Facilitating and Coaching Styles. The command and control style of management is rarely most effective in CPI focused organizations. When the team-based workgroups learn to work in a semi-autonomous fashion, they do not need to be told what to do. Instead, providing support through empowering, facilitating and coaching styles become an important way of sustaining continuous performance improvement.

	1.	2.	3.	4.	5.	Score
3.3.2 Empowering, Facilitating, & Coaching Styles	Command and control is the main management style	Managers must receive training in different management styles	Managers are coached in using different management styles	Empowering and coaching is used as often as directive style	Empowering, facilitating, and coaching are the main management styles	

3.4 Human Resources. The human resource function is redesigned in world-class CPI facilities. An integral and visible part of the support system to the value-adder, the human resource function is a crucial component in the lean equation. Four important elements include (1) training, (2) compensation and recognition, (3) selection process for new employees, and (4) employee relations.

3.4.1 Training. Training is important in the conversion to CPI as the roles and responsibilities change along with the culture. Even after a CPI conversion, training remains a priority as one of the vehicles for continuous improvement. All employees must take part in ongoing training in both interpersonal and team skills as well as technical skills. For the training to be successful, employees must be encouraged and then freed up from their regular responsibilities on a continuing basis to be able to attend the training sessions.

	1.	2.	3.	4.	5.	Score
3.4.1 Training	Training is not a priority	Introductory CPI courses are offered	Everyone has been through introductory CPI training. CPI skills training is offered	Employees are trained in interpersonal and team skills as well as technical	Training is ongoing and employees are freed up to attend on a regular basis	

3.4.2 Compensation and Recognition. In most traditional organizations, employees are not rewarded for going the extra mile. In world class CPI organization, some portion of compensation is tied to the achievement of goals and there is recognition of team and individual achievement. Recognition activities are significantly higher in CPI environments and there is often employee involvement in formulating reward and recognition activities.

	1.	2.	3.	4.	5.	Score
3.4.2 Compensation and Recognition	Compensation is not tied to performance. Contributions outside compensation system go unrecognized	Performance and contribution are defined	Standard performance metrics established. monetary & non-monetary monitors are present	Individual development plans are operational	Team-level compensation and rewards are identified and implemented.	

3.4.3 Selection Process for New Employees. CPI organizations involve workers in the selection process for new employees. Employees are often directly involved in the interviewing and assessment process and team members play a role in selecting new members of the team. The selection process focuses not just on technical skills and experience but teamwork and interpersonal skills, willingness to learn and participate in workgroup activities are evaluated as well. When an employee joins a work group, the team members play a role in orienting and evaluation during probationary periods.

	1.	2.	3.	4.	5.	Score
3.4.3 Selection Process for New Employees	Sole focus is technical skill. Workers are not involved in selection or orientation	HR agrees to revise selection and orientation process to reflect CPI principles	HR adopts an inclusive approach involving employees and planning new procedures	Selection focuses on teamwork, interpersonal skills, and willingness to learn, as well as technical skills	Workers are involved in selecting and orienting new team members	

Corporate Culture/Workplace Climate

The values, attitudes and climate of a world-class CPI focused organization set them apart from their traditional counterparts. Cultural factors are often overlooked in an implementation that focuses primarily on technical improvements. Three critical aspects of the corporate culture are worker attitudes, employee empowerment and involvement, and customer focus.

4.1 Worker Attitudes. The attitudes of the work force toward their work, to each other and to the management are an important factor in the work climate of any organization. A CPI focus tends to result in a higher degree of trust, teamwork and cooperative spirit.

4.1.1 Employee Attitudes towards Improvement. Everyone in the organization is involved in the effort to continuously improve for it to be a success. The employees must value the effort to make improvements and there must be a systematic approach for eliminating waste.

	1.	2.	3.	4.	5.	Score
4.1.1 Employee Attitudes towards Improvement	Employees don't care or feel there is any need to improve	Some employees are interested in improvement	There is no systematic approach but most employees are interested in improvement	There is a systematic approach to improvement and employees are involved	There is enthusiasm for eliminating waste. Small improvements viewed as important	

4.1.2 Cooperation, Trust, and Respect. CPI focused workers and management enjoy a trusting relationship and cooperate to improve performance. For this to be possible the management must nurture an open environment and reward cooperation. A trusting atmosphere is created by frequent and substantive communication from management that is consistent with their actions. Otherwise, there will distrust will impair any efforts to create collaborative solutions.

	1.	2.	3.	4.	5.	Score
4.1.2 Cooperation, Trust and Respect	Worker-management relationship is generally adversarial, with little contact	Limited trust between work force and management. Distrust still predominant	Communication by management is frequent and consistent with actions. Individual acts of cooperation are evident.	Management nurtures an open environment and rewards cooperation	Workers and management enjoy a trusting relationship and cooperate do improve performance	

4.1.3 Employment Security. For employees to work toward performance improvements, they must know that they will not lose their job if they succeed. Job security means that the employees engaged in CPI improvements will not lose their jobs directly as a result of their improvements, although extenuating circumstances beyond the control of organizational leadership cannot be ruled out or guaranteed.

	1.	2.	3.	4.	5.	Score
4.1.3 Employment Security	No job security policy	There is an unwritten assurance of job security but not formal policy	There is a policy in place of no layoffs due to productivity improvements	Everyone is assured of a job as long as the Org. makes profits	There is an official policy that the org. will use layoffs only as a last resort	

4.2 Employee Empowerment and Involvement. The goal of employee empowerment is to have work group members gradually assume greater responsibility for organizing, planning, controlling, coordinating, and improving their daily work. Decisions, with appropriate boundaries, are delegated to work teams. As a result, decisions are made closer to where the work is done and are made faster. The dominant decision-making style is participative. Management develops and facilitates the workgroup's ability to make sound business decisions.

4.2.1 Learning/Continuous Improvement. CPI focused organizations are committed to continuous learning. Employees have access to ongoing training and a systematic approach to improvement through a standardized problem solving approach is the norm. With everyone involved in a standard process for eliminating waste, performance improvements become the norm.

	1.	2.	3.	4.	5.	Score
4.2.1 Learning/ Continuous Improvement	Training and development is not a high priority for the Org.	Org. is committed to ongoing training and developments	Org. begins training in problem solving	PDCA thinking guides Org./employee problem solving	Work groups participate in continuous improvement activities	

4.2.2 Suggestion Systems. An active suggestion system is a benchmark for a CPI focused organization. If the employees feel valued and involved the suggestions for improvement will far exceed the cost of implementation. Management must be prepared to follow through on their commitment or employees will see it as yet another way in which their ideas are not really valued.

	1.	2.	3.	4.	5.	Score
4.2.2 Suggestion Systems	There is no suggestion system in place	Decision is made to implement a suggestion system	The system is implemented & employees are aware of it	Employees begin to experiment with system to test management commitment	Employees freely use and are comfortable with suggestion system	

4.3 CPI Support Team. A typical CPI Support Team will consist of change agent oriented managers and staff. CPI Level III and II personnel (Master Black Belts and Black Belts or the equivalent), criteria for which are defined by the organization at large, would typically be developed and participate in the support team of an organization. This team is tasked to implement the CPI Deployment. They are the primary advisors to the organizations most senior leaders and are the experts on the use of tools, facilitating teams, and assisting teams in changing processes. This team is supervised by a change agent leader, who preferably has CPI Level III or II (Master Black Belt or Black Belt or equivalent) experience. As members leave this group of experts, they should be given special consideration for future leadership positions that will continue to take advantage of their advanced CPI knowledge and experience. This will help spread and accelerate the use of CPI throughout the enterprise. As these experts transition to successively higher levels of management, there may no longer be as large a need for separate CPI Support Team members and it can slowly be reduced as CPI experienced managers replace them in the organization.

4.3.1 Selection Process. Members of the CPI Support Team should be chosen from the "Best and Brightest Future Leaders" in the organization. They should be junior enough for them to progress up the ranks of facilitator, but the ultimate goal is to return them to formal management roles in the organization and continue rotating and growing the CPI culture.

	1.	2.	3.	4.	5.	Score
4.3.1 Selection Process	There is no selection process in place	Selection occurs using the old merit promotion system or assignment	A selection process exists but emphasis is not on the best and brightest	A selection process exists but bosses refuse to assign their best and brightest	A selection process exists and picks the best and grooms them for future leadership	

4.3.2 Certification. Certification of facilitators at every level should follow the criteria identified in the DoD CPI Guide. Someone on the CPI Support Team should be tasked to monitor and track certification. These records should be integrated into the normal training and career records.

	1.	2.	3.	4.	5.	Score
4.3.2 Certification	There is no certification system in place	Each sub-Org. is using its own system and they don't match	A standardization system is in place abut is not used by all sub-Orgs.	A standardized system is in place and is used by all local sub-Orgs.	A standardized system has been agreed to and is used across the extended enterprise	

Process Stability

To sustain the continuous flow of product and services in a CPI environment, it is essential that the processes be stable and reliable. Productivity and quality are compromised if the support equipment and methods used in the organization's processes are not reliably able to maintain the required specifications. Substantially higher levels of productivity might be achieved by simply improving the availability of the support equipment used in the work process.

5.1 Workplace Organization. The foundation of stability is an organized workplace. Ensuring that there is a place for everything and everything is in its place is one of the first steps in a CPI implementation.

	1.	2.	3.	4.	5.	Score
5.1 Workplace Organization	There is no workplace order or organization	There is some organization, but most things are not in their proper place	Most of the workplace is clean and organized. The aisles and equipment & material locations are marked	Tools are organized and labeled. Rules usually followed. Visual workplace	Workplace organization is self-maintaining with continuous improvement the norm	

5.2 5S+1 Discipline for a Clean Workplace. A 5S+1 program or equivalent is essential to maintaining and sustaining a clean workplace. Such programs structure the cleaning activities so that they occur on a regular basis and the usual result is that employees take pride in a clean working environment. These processes are then standardized and applied to the entire organization. World Class CPI organizations are dramatically cleaner through employee involvement.

	1.	2.	3.	4.	5.	Score
5.2 5S+1 Discipline for a Clean Workplace	Workplace areas are dirty and there is no organized effort to improve them	Workplace areas are cleaned on an irregular basis	Workplace areas are cleaned on a daily basis and workers take some pride in working environment	Working environment changes are documented and standards are consistently applied	5s+1 principles are in use throughout the entire organization	

5.3 Operational Effectiveness. The first step in managing lost process time is to identify the process systems constraint and related impediments and take baseline measurements of process reliability. Employees perform an ongoing role of preparation by making the process tools ready for use immediately after their previous use.

	1.	2.	3.	4.	5.	Score
5.3 Operational Effectiveness	Frequent lost time with no effort to manage downtime	Critical constraints are identified and baselines on reliability are obtained	Physical and operational constraints are addressed	The process is restored and maintained through planned formal effort	Continuous improvement of overall process effectiveness is the norm	

5.4 Preventive Maintenance. An organized and discipline preventive maintenance program is part of every world-class CPI focused organization where process equipment is required. To prevent downtime, equipment should be cleaned and checked systematically with the operators playing a role in ensuring that the required maintenance is done.

	1.	2.	3.	4.	5.	Score
5.4 Preventive Maintenance	There is no attention given to preventive maintenance	Maintenance department performs only minimal preventive checks	Machines are cleaned and checked but not systematically or on a regular basis	Machines have regular cleaning checks. Operator checklists are in use	Preventive maintenance schedule is in place, regularly followed, and work on machines is conducted during non-production hours	

5.5 Total Productive Maintenance. TPM is a comprehensive approach to processing equipment continuous improvement in production and maintenance environments. TPM includes preventive maintenance, employee involvement and a focused attention on continuous improvement of equipment for improving the work processes cycle times and costs, not just meeting existing equipment capability specifications.

	1.	2.	3.	4.	5.	Score
5.5 Total Productive Maintenance	No plan or practice of TPM	Decision to implement. Goal and policies are established. A plan for implementing TPM is created	Critical equipment reliability and effectiveness is improved. Operators are trained and begin autonomous maintenance	Maintenance department is engaged in a planned maintenance system	Early equipment management program in place. TPM program is in place and continuously improved upon	

Process Quality

There are different CPI tools and procedures for improving quality. Four of the most important are mistake proofing, in-station process control, work standardization and visual control.

6.1 Error Proofing. Error proofing a process means that a method of intervention is placed in that process to either find defects or prevent them from being passed on. Prevention is preferred because it eliminates the costs of re-work, carrying defective inventory, and material handling to

move the defective product in and out of repair operations. Error proofing is one of the key ingredients to achieving stability; it is the first stage on the road to becoming a lean organization.

	1.	2.	3.	4.	5.	Score
6.1 Error Proofing	There is no error proofing in place or awareness of the need	There is awareness of the need for error proofing but no attempt to implement	Some error proofing tools are applied occasionally and with little lasting gains	Error proofing is applied in a planned and effective manner but not widespread in the plant	Error proofing is applied in a planned and effective manner and is widespread	

6.2 ISPC. In-station process control integrates the inspection process within the ongoing work process. Employees performing work must understand what constitutes quality and have simple methods of measuring and controlling it. This is commonly referred to as quality and responsibility at the source.

	1.	2.	3.	4.	5.	Score
6.2 ISPC	No inspection or inspection standards	Both inspection and repairs is made off-line	Inspection is made in-line, but repair is made off-line	Both inspection checks and repair or rework are made in-line	In-line inspections are ongoing	

6.3 Standardized Work. Standardized work is a method used to organize tasks in a predictable, safe, and efficient manner. Standardized work documentation should be used anywhere there is a definable and repeatable process.

	1.	2.	3.	4.	5.	Score
6.3 Standardized Work	No standards are visible	Only quality standards are posted	Quality and job standards are posted but not followed	Many plant operations are standardized. Standards are usually followed	Standards are current, clearly posted, and followed nearly every time	

6.4 Work Balance. When the customer need is known, a "takt time" or drumbeat to the pattern of those needs can be set and that determines the pace and type of work performed throughout the entire value stream for satisfying customer requirements. Work must be rebalanced as necessary to meet changing demand patterns. The goal is developing a flexible process capable of rapid response to specific customer needs with little or no need for excess inventory or wait time.

	1.	2.	3.	4.	5.	Score
6.4 Work Balance	Employees set a slow pace	Employees set an uneven work pace	Employee work pace contains rhythmic movement, but hidden wait time	Employee movement is rhythmic and pace is set by takt time	Good work balance between throughput and current customer demand replenishment	

6.5 Visual Control/Visual Display. Visual Control of any process is achieved through elimination of barriers to current process activity visibility and visual aids to organize the environment ensure consistent quality and provide support for productivity standards.

	1.	2.	3.	4.	5.	Score
6.5 Visual Control/ Visual Display	It is difficult to recognize the differences between standard and non-standard conditions	The differences between standard and non-standard are recognized but reaction time is slow	Mechanisms are in place to deal with differences (line stop or andon), but response is slow	Line stop or andon is in place and response time for their use is quick	There is systematic approach for quickly responding to differences/problems and applying countermeasures	

6.6 Customer Focus. The ultimate customer is the focus of all process efforts. Customer requirements drive process work efforts. Customer satisfaction is regularly measured and this information drives improvements of quality, cost, and delivery.

	1.	2.	3.	4.	5.	Score
6.6 Customer Focus	There is little concern with the customer satisfaction	Effort is begun to determine customer requirements	Customer satisfaction is measured. Customer information drives improvements of quality, cost and delivery	Quick responses to customer needs are systematically communicated and anticipated	All work processing is scheduled and paced to customer requirements	

Just-In-Time

Just-in-time is a philosophy and methodology focused on ensuring the elimination of waste in any form to ensure the right product, at the right cost and in the right quantity is delivered to the customer at the right time. Representative JIT elements include quick setup and changeovers, streamlined cellular layouts, customer demand pull systems, and continuous balancing between customer demand and supplied goods and services.

7.1 Setup and Changeovers. Quick changeover is a method to shorten the changeover and setup times in any work environment using continuous improvement methods to eliminate waste.

	1.	2.	3.	4.	5.	Score
7.1 Setup and Changeovers	Changeovers are not standardized or regulated	Standardized work is established for changeovers	Changeover teams set up and improvement projects have begun	Changeover teams reduce changeover times by moving internal elements to external elements	Changeovers are accomplished within cycle times and changeover teams use continuous improvement to reduce changeover times	

7.2 Cellular Layout. Although not all office, shop, and field support processes are best served by a cellular layout, many traditional process flows could be improved upon. The basic approach is to focus on layout changes based on process rather than function with the goal of eliminating material handling and streamlining operations.

	1.	2.	3.	4.	5.	Score
7.2 Cellular Layout	Layout is haphazard	Current and future state analysis has taken place. Placed layout has started by instituting a logical flow	There are clear and well-defined input and output areas between cells	Operations within cells are streamlined to reduce waste. Standardized mins/maxs created as well as standardization applied to all processes	Smoothly operating cells are organized with one piece flow within and between cells. A system of continuous improvement is used.	

7.**3 Material Planning and Processing.** World Class CPI organizations move from push to pull of materials wherever possible to eliminate waste of time, labor, and material resources.

	1.	2.	3.	4.	5.	Score
7.3 Material Planning and Processing	No systematic method to move material	Push methods are used to direct material flow	Push methods are used, with assigned jobs or areas	Next process picks up needed material	Triggers are used to pull material to the consuming process	

Information Management

Timely managing of information and maintaining a flow of communication is critical to achieving the goals of CPI focused organizations. Three important elements in information management are knowledge of customer response status, communication of performance to aligned metrics that drive performance.

8.1 Problem Solving Activities. World-class CPI focused organizations are continuously involved in problem solving. Active problem solving is a crucial part of the culture. Continuous improvement teams seek opportunities to apply problem-solving skills.

	1.	2.	3.	4.	5.	Score
8.1 Problem Solving Activities	No structured problem solving in evidence	Operators are offered training in problem solving	Workgroups engage in problem solving activities on a regular basis	Continuous improvement teams	Active problem solving is crucial part of the culture	

8.2 Communication. For the work force to feel involved and empowered it is important that they have needed information about how the organization is doing and what is required of them.

	1.	2.	3.	4.	5.	Score
8.2 Communication	Communication between management and workforce is non-existent	Communication between management and workforce is sporadic	Communication from the site leader are frequent and direct	Management's actions are generally consistent with what it says it will do.	Management communicates priorities and strategies directly and honestly to all levels and trusts the workforce	

8.3 Metrics. It is essential that metrics, aligned with organizational strategic plans, goals and objectives, be used when implementing CPI. The same metrics need to be aligned down through every level of the organization. Metrics should be focused on the areas of improving cost effective customer response capability (readiness), achieving required quality/reliability of products and services, reducing total customer response cycle time, and achieving lowest total cost for providing products and services.

	1.	2.	3.	4.	5.	Score
8.3 Metrics	No consistent visible metrics driving Org. actions	Org. leadership recognizes new metrics for CPI but use is sporadic	Different metrics are used in different process activities	Consistent metrics are aligned with Org. goals and objectives	Aligned metrics are used with near real time, two-way feedback	

Example Assessment Scoring

Table D-1 is an example worksheet for scoring an assessment based on the set of questions above. The results from a filled out worksheet can be captured in a "spider" diagram of the sort that follow it (Figure D-1).

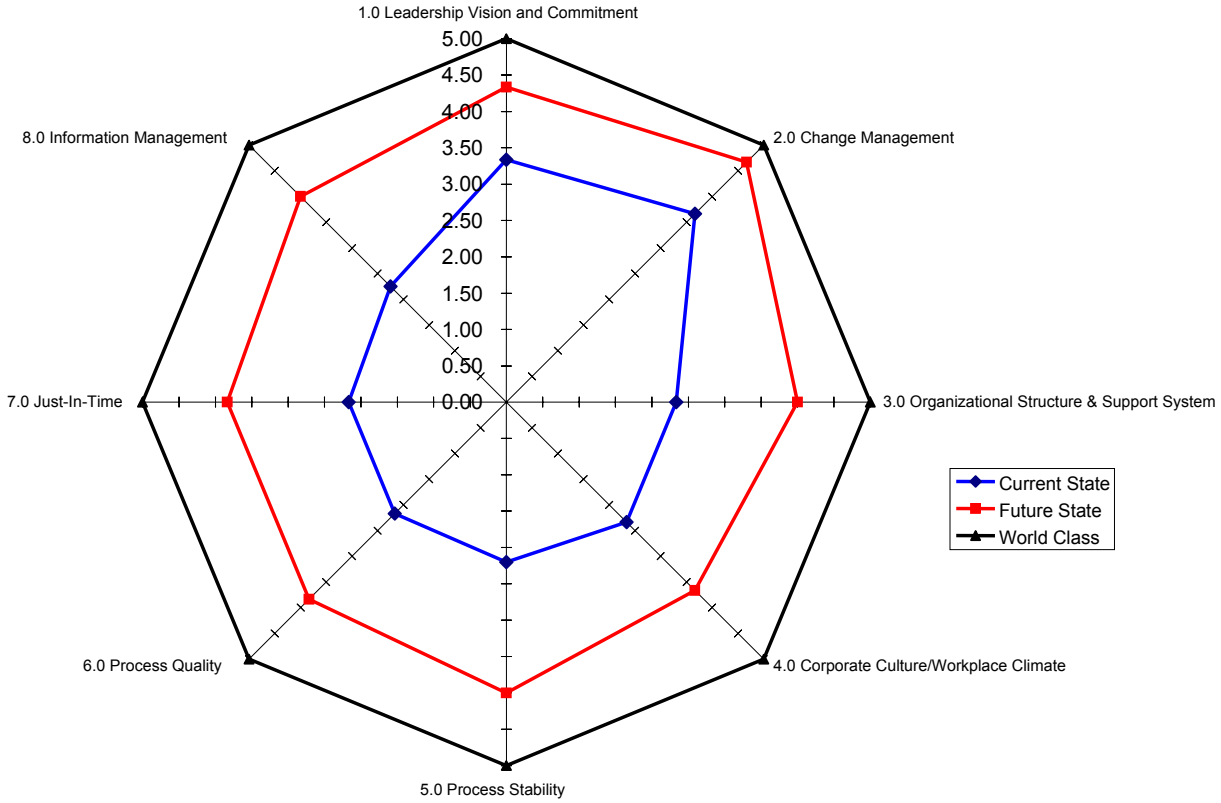
Table D-1. Assessment Scoring Worksheet

Item	Gap Analysis	Current State	Future State	Gap	Importance	Evaluator rating
1.1	Vision					
1.2	Commitment					
1.3	Policy Deployment					
2.1	Leadership					
2.2	Steering Committee					
2.3	Support Team					
3.1	Team-Based Workgroups					
3.2	Aligned Organization					
3.3.1	PDCA Management Process					
3.3.2	Empowering, Facilitating, Coaching Styles					
3.4.1	Training					
3.4.2	Compensation and Recognition					
3.4.3	Selection Process					
4.1.1	Employee Attitudes towards Improvement					
4.1.2	Cooperation, Trust and Respect					
4.1.3	Employment Security					
4.2.1	Learning/Continuous Improvement					
4.2.2	Suggestion Systems					
4.3.1	Selection Process					
4.3.2	Certification					
5.1	Workplace Organization					
5.2 5S	Discipline for a Clean Workplace					

Table D-1. Assessment Scoring Worksheet

Item	Gap Analysis	Current State	Future State	Gap	Importance	Evaluator rating
5.3	Operational Effectiveness					
5.4	Preventative Maintenance					
5.5	Total Productive Maintenance					
6.1	Error Proofing					
6.2	ISPC					
6.3	Standardized Work					
6.4	Work Balance					
6.5	Visual Control/Visual Display					
6.6	Customer Focus					
7.1	Setup and Changeovers					
7.2	Cellular Layout					
7.3	Planning and Processing					
8.1	Problem Solving Activities					
8.2	Communication					
8.3	Metrics					

Figure D-1. Advanced CPI Assessment Example Spider Diagram



Attachment E.
CPI Toolbox

An organization pursuing CPI should embrace all applicable concepts, tools, techniques, and methodologies that will drive it toward better attainment of enterprise objectives. While no organization is likely to (or needs to) master every improvement technique, the objective is to seek out the best means available to effectively address challenges to continuous improvement. There are key tools, concepts and techniques that have evolved to support an organization in its continuous improvement journey.

There will no doubt be additional tools and techniques created through human ingenuity to respond to difficulties which process owners have not yet faced. An unfortunately common error is to become overly focused on a single methodology or tradition to the exclusion of others. Attempting to apply the same tool or technique to every problem will inevitably result in some sub-optimization or possibly failures. A more holistic approach defines each problem carefully and applies the appropriate improvement tool or technique.

This attachment briefly describes the evolution of continuous improvement as an organizational imperative, and then identifies a sampling of the more common tools, concepts and techniques currently available to drive CPI. There are numerous detailed publications on specific continuous improvement techniques so their discussion is limited in number and scope within this guidebook. Following that, helpful documentation guides and checklists are provided. Additional insight and knowledge can be gained from the resources identified in Attachment A.

The Evolution of Continuous Improvement

Just-In-Time

Just-In-Time (JIT) was pioneered at Toyota in the 1950s. JIT is a philosophy of continuous improvement with a set of concepts and techniques geared to better meet the needs of customers through elimination of waste that negatively impacts process flows and the value-added component of any product or service. JIT is thought to originate in Japanese study of American grocery stores replenishment processes where meeting customer changing demands and spoilage challenges have to be carefully balanced. JIT was originally focused on production shop floor improvement and gradually expanded to focus on a variety of staff functions.

Lean

Lean is the evolution of JIT over the past decade leading into the 21st century. Several lean refinements include value stream mapping and refined continuous improvement application

to any type of organization generating a product or service. Lean is a mindset that drives individual behavior and ultimately culture change. In Lean organizations,

- waste is highlighted as it is encountered,
- waste is relentlessly attacked using a variety of simple and effective tools,
- the environment challenges employees to expand their capabilities and creativity,
- leaders challenge traditional processing conventions and metrics,
- the ability to respond to the customer is quicker, with higher quality products and services at lower cost, and
- everyone listens intently to the voice of its customers in providing new and improved products and services, striving for continuous quality, cycle time, and cost improvements.

Continuous Process Improvement (CPI)

CPI for the purposes of the DoD Enterprise is the evolution of JIT, lean, and other best practices to support cost effective readiness support to the warfighter. CPI contains a toolbox with an open architecture that welcomes any effective combination of continuous improvement tools and techniques. These combinations may or may not be organized to be pulled out to achieve specific objectives. All remain at the immediate access to the CPI practitioner. An example of the components of a typical toolbox might include elements of Lean, Theory of Constraints (TOC), and Six Sigma (6σ). No single set of components in a toolbox is ideal to fully drive CPI under all circumstances.

Tools, Concepts, and Techniques

Cellular Processing

Cellular flow as a technique consists of grouping nodes in a supply chain, people and machines dedicated to production or repair operations, and service activities so that a process can advance from one step to the next without waiting for a batching to be completed. Opportunities for continuous improvement have increased visibility in a cellular flow environment (see Figure E-1). Cells and flow are set up to make it easy to see the work flow, the operational status, and identify problems.

Cellular flow results in improved predictable customer response, product and services' quality, cycle times.

A cell utilizes minimal time, space, and materials to get the job completed. This is by design to minimize travel distances as well as allow for ease of movement of material from step to step.

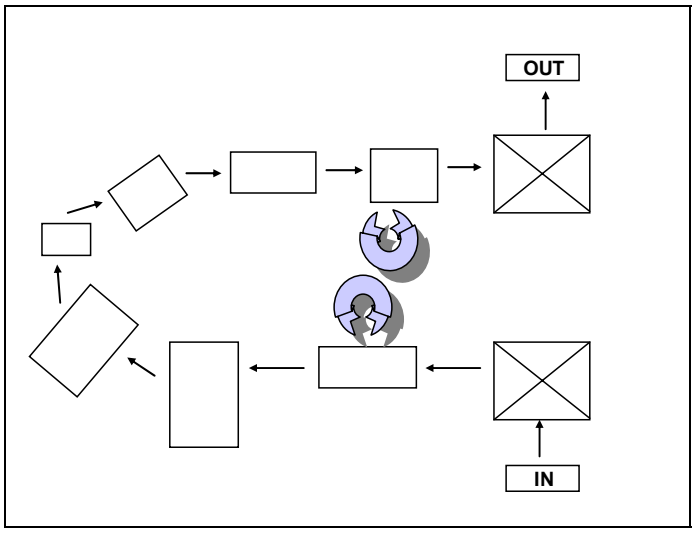


Figure E-1. Notional Cellular Flow

DMAIC (Define-Measure-Analyze-Improve-Control)

DMAIC is an ordered problem-solving methodology applied widely in private and public sector organizations. The letters are an acronym for the five phases of Six Sigma improvement. These phases direct a process improvement team logically from problem definition to implementing solutions that are linked to root causes. The methodology also focuses on establishing best practices to help ensure the improvement solutions stay in place. DMAIC is typically implemented through two primary modes in Six Sigma improvement efforts, the project team approach–which normally involves full time deployment of key team members for 1 to 4 months or the kaizen approach–which stresses rapid, intense progress through all DMAIC stages except full-scale implementation.

Error Proofing (Poka Yoke)

Finding and correcting defects caused by errors costs more and more as a system or component flows through a process. To prevent this expense industrial sites have long been placing a great deal of attention on the concept of error-proofing. Shigeo Shingo introduced the concept of Poka-Yoke at Toyota Motor Corporation. Poka Yoke (pronounced "poh-kah yoh-kay") translates to "avoid unintentional errors."

The heart of error proofing is simply to pay careful attention to every activity in the process and to place checks and problem prevention at each step. It is a matter of constant, instantaneous feedback that is implemented by using simple objects like warning devices to make common mistakes virtually impossible. These devices have the following characteristics:

1. User-friendly
2. Simple to install
3. Do not require continuous attention from the employee (ideally, it should work even if the employee is not aware of it)
4. Low-cost
5. Provides instantaneous feedback, prevention, or correction

Error proofing is designed to prevent mistakes, not merely catch them. Mechanisms such as limit switches, optical inspection systems, guide pins, or automatic shutoffs are common error-proofing strategies. These devices can be electrical, mechanical, procedural, visual, human, or any other form that prevents incorrect execution of a process step. They can be implemented in areas other than production such as logistics, procurement, information systems, maintenance and service, or product development, where the cost of mistakes can be as much as in industrial operations.

Kanban

Kanban is a signal that is sent from a costumer to a supplier within an organization's internal operations and/or throughout an entire supply chain to link a customer's demands to the entire supplier chain for quick replenishment. The concept of Kanban has been extended beyond the original card concept to include other forms of triggering signals. The key is that the Kanban signal is a precise trigger that happens at precisely the same time as a demand arises for a product or service, such as a warfighter's need for replacement of a weapons system or component and serves to trigger the timely required response.

Automated Resource Planning

As manufactured products and volumes became more complex, and computer technology advanced, Materials Requirements Planning (MRP) and Manufacturing Resources Planning (MRP II) tools were designed and implemented to replace manual scheduling processes and support expanded operational organizational information sharing. When applied with well-structured disciplines, MRP is capable of accurately tracking inventory, ordering materials, and capacity planning. MRP is best used as a planning device and decision-making tool for the intermediate and long-term planning of material requirements. The effectiveness of this planning tool is a function of the accuracy of the planning parameters used, the predictability of both supply and demand, the careful configuration of the system to the enterprise needs, and the rigid disciplines with which it must be employed. A variant of this methodology in maintenance, repair and overhaul (MRO) activity considers repair, replace, and use-as-is probability factors. MRP II is the

expanded application of MRP logic and related data gathering and sharing capabilities across an organization to support planning, execution, and control activities.

Enterprise Resource Planning (ERP) is the evolutionary tool originating from MRP and MRP II. World class users of enterprise resource planning systems (ERP) take advantage of their planning capabilities to ensure integrated effectiveness of the physical, material, and human resources required within their organizations and with their external supply chains to meet customer requirements. MRP II and ERP are automated technologies that promote cross-functional multi-level intra and extra-organizational information sharing, which important elements in continuous improvement.

Mixed Model Scheduling

In the situation where an organization is asked to produce or service more than one model of anything, the usual tendency is to set up dedicated lines for each product. This, in essence, is building in batches and not in the proportion of the customer expectation. Mixed model scheduling is a technique that aims to provide in the exact proportion what the customer orders. This approach requires very quick changeover and high process reliability.

Pull

Pull is the concept related to only providing material, products or services to the following customer process when they are required. Customer-supplier relationships are viewed as existing within any organization as well as between an organization and its external customer. Pull relies on predictability in time and quality for effectiveness. Pull is exerted to generate products and services based on the rate of actual consumption, such as replacement of a working weapons system to the warfighter. Pull allows the organization to reduce inventory while simultaneously improving quality cost-effective response to the end customer.

Pull production or maintenance means moving a subassembly or product to the next step only when that step or customer is ready to accept it and needs to actively work with it. Pull is contrasted to a push system where the upstream step determines when the unit is sent to the downstream operation and usually results in excess inventory and an adverse impact on capacity.

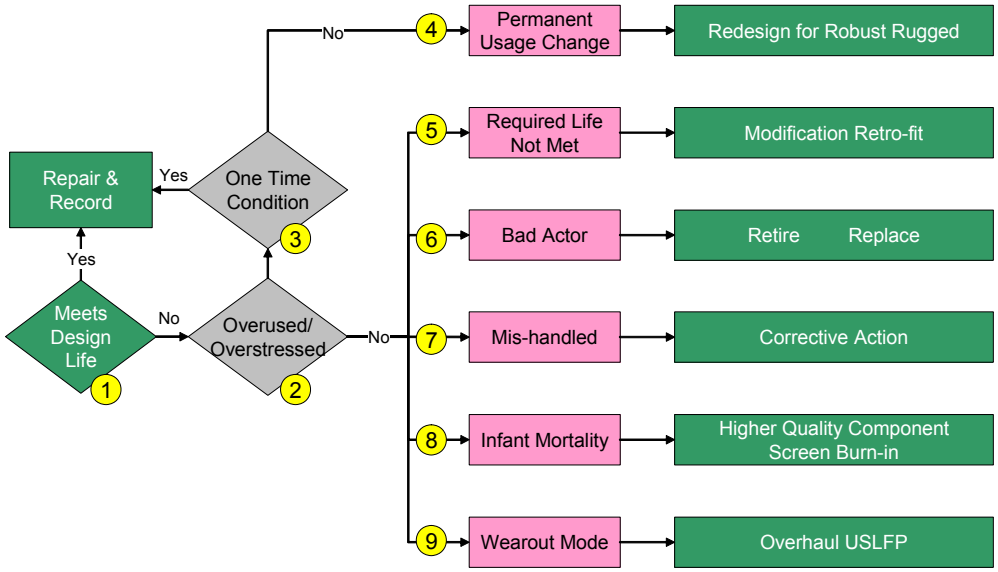
Rapid Improvement Event

Rapid Improvement Event (RIE) is a relatively short-term, high-intensity effort tool to address a specific problem. The focus may be an effort over several days, a week, or several months and the preparation begins several weeks in front and follow-up continues after. An RIE may also be called by other names, including Rapid Improvement Workshop, Kaizen Event, Kaizen Blitz, and Accelerated Improvement Workshop. The focus is on improving upon the situation as regards the existing problem, not striving for absolute perfection which might take much longer or fail in the complexity of follow-through.

Reliability Centered Maintenance

Reliability is a risk assessment method stated as the probability a system or component will operate, as intended, in a given environment for a specified period of time, within specified maintenance guidelines. Reliability Centered Maintenance (RCM) is a process for determining maintenance requirements of any asset in its operating context. Certain basic questions are asked during the RCM process as depicted in Figure E-2.

Figure E-2. Reliability Fact-Based Decision Making Process



RCM 2 is a revised approach to reliability centered maintenance being implemented by organizations today to continually improve asset reliability. Environmental consequences, revision of terms for clarity, and the addition of a secondary decision process for handling hidden functions were the primary areas of change in the RCM 2 approach.

Scientific Method

A number of problem solving methodologies rely basically on the Scientific Method:

1. Observe and describe the situation.
2. Formulate a problem statement.
3. Use the problem statement to predict results or determine the root cause.
4. Perform controlled tests to confirm initial problem statement expectations.

The Plan-Do-Check-Act (PDCA) and design-measure-analyze-improve-control (DMAIC) methodologies are representative derivatives of these methodologies.

Six Sigma (6σ)

Six Sigma (6σ) concepts and tools were originally developed by the University of Tennessee and adapted by Motorola to minimize process variation. Literally speaking, Six Sigma means quality at the plus or minus six standard deviations from the mean level or approximately 3.4 defects per million units of something processed. Six Sigma drives improvement from the top down using a well defined structure. There are well-defined roles within the Six Sigma approach:

- Executives are trained as "Champions" to help break down barriers
- "Master Black Belts" serve as trainers
- "Black Belts" lead projects and "Green Belts" provide the bulk of the leg work.

Six Sigma does not directly accelerate cycle time and responsiveness, but is essential to reducing variation that adversely impacts on cycle time and cellular flow improvements.

Takt Time

Takt Time is a pull concept that was developed to tune the rate of processing to the customer's rate of need. Synchronizing supply with demand is an important step in eliminating many forms of waste. Takt as a word is usually considered to represent a drumbeat, such as the drumbeat of a process that controls the pace of activity. It is calculated by dividing the amount of available process time by the number of units required to meet customer demand. Takt time can be used to pace the work in any environment.

Takt time is a computed rate that any individual process in a value stream should ideally require in order to exactly satisfy the customer. Takt time analysis is comparing actual process cycle times to the takt time to understand where flow is missing and non value added steps exist.

Theory of Constraints

Theory of Constraints (TOC) is a concept with a set of tools developed by Eliyahu Goldratt that focuses on:

1. Identifying the system's constraint that limits overall operational performance.
2. Exploiting the system's constraint to get the most out of it without additional investment, such as running extra shifts, through breaks, etc.
3. Subordinating everything else that is not the system's constraint to the attention on it, such as giving preferential support to the system's constraint since it alone determines the cycle time of the total operation.
4. Elevating the system's constraint to alleviate its influence through purchase of additional equipment, additional personnel capacity, elimination of waste that reduces this process'

requirements, or redistribution of effort across other process steps to rebalance flow. As a result, some other process element or step now becomes the system's constraint.

5. Go back to step one and repeat the process for the new system's constraint.

Critical Chain (CC) is a planning process tool that respects the constraints across a number of different projects or production/service activities such that the practical capacities of key resources are respected and constraints receive elevated visibility in order to be addressed and improve overall organizational throughput and cost performance. CC is often supported by software due to the typical complexity of juggling multiple variables across potentially a number of different project/item flows.

Value-Added

Value-added activities change a product or service in a way that customers view as important and necessary. From the opposite perspective, a non-value added (NVA) activity is any step that the customer would not miss if there was a way to eliminate it. If, for example, the delivery of a perfect product without the inspection steps would make the customer just as satisfied.

This strict definition keeps the list of value-added activities very short. That intentionally causes an organization to look hard at every task. As the stack of NVA activities grows, every organization will find that they need to prioritize those they want to attack first. It is not uncommon to find 90 to 99% of the time consumed in a process to be NVA when considering waste in any form. One useful criterion is to separate the pure waste from what is often described as "necessary" NVA. Pure waste can and should be attacked immediately. Necessary NVA activity however may currently be required for a variety of reasons. That is not to say that these NVA activities can be ignored. As technology improves, processes are brought into control, and business conditions change, currently necessary NVA activities can often be minimized or eliminated in the CPI driven enterprise.

Value Stream Mapping

Value Stream Mapping is a technique that begins with the objective of identifying the waste in the current state of a production, repair or other service process. The purpose is to use this identification of waste to focus resources on the issues that will make the largest improvements on the process as a whole. The technique draws together process owners, contributors, and users in a cross-functional team setting. Using interview and illustration techniques, a team quickly defines the process steps and the data pertinent to those steps. A subsequent deep review of the sequence and nature of those steps, the transitions between steps, time required and distance spanned, and the information systems employed reveals the level of opportunity for improvement available. There are typically four steps to driving improvement from value stream mapping:

1. Selecting the Value Stream to be mapped

2. Creating the current state map

3. Creating the future state map
4. Implementation.

A value stream is a set of activities to convert customer needs into delivered products or services. A Value Stream Map (VSM) is a tool that helps visualize and understand the flow of material and information as a product or service makes its way through the value stream. The VSM is displayed at a broad level that visually presents the flow of a product or service from customer to supplier and presents both current state and future state visions. A VSM helps an organization

- visualize multiple process levels;
- make "hidden" decision points apparent;
- look at the "big picture" as opposed to a single process step;
- quickly see sources of waste in your value stream;
- question current material and information flow;
- describe how your facility should operate;
- see the links between material and information flow;
- form the basis of a plan to implement form door-to-door;
- identify areas where lean and six sigma tools/techniques are applicable for problem solving;
- allocate the appropriate resources to solve the specific problems; and
- describe what is going to be done to improve baseline metrics.

A VSM is able to do all of the above, because it is an effective way for people to visualize the following when chosen to be documented during the data analysis:

- Lead times
- Cycle times
- Takt time
- Uptime
- Changeover time
- Shipping frequencies
- Scrap percentages
- Yields
- Value added & non-value added steps
- Customer forecasts
- Raw material orders
- Information flow
- Material flow
- Changeover times.

A recent addition to the VSM process is consumption value stream mapping by the customer and provisional mapping by suppliers to reduce waste in any form (Womack & Jones, 2005). These alternative maps tend to be less complex and heighten focus on direct customer involvement and voice.

Waste

Waste is anything that uses resources without providing value to the customer. Resources may be materials, people, time, tools, etc. The customer may be the internal series of customers or any customer along the extended value stream. Waste exists in all work at all levels within an organization. The ideal goal of CPI is the elimination of all waste within an organization. Typical examples of waste are poor quality, inventory, over production or excess repaired items beyond current demand, unnecessary processing steps, transportation/moving, waiting/delays, and excessive motion beyond the minimum required.

Documentation and Checklists

The purpose of this section is to give facilitators a common set of helpful documentation and checklists for use when engaged in CPI tasks/events. These documents might be especially useful to new facilitators of CPI change. It is assumed that these guides will be used by all levels of facilitators to ensure common methodology and consistent efforts.

This documentation begins with the description of a Generic Flow when implementing CPI. It is assumed that the organization leadership received CPI awareness training and is pursuing a CPI approach. The first checklist provided in the guide allows the facilitator to conduct a pre-team meeting with leadership to set the stage for change. The second checklist describes establishing a team charter for the organization's CPI steering committee. The additional checklists and other documentation describe specific activities that the implementation team should accomplish as well as those that may be used for facilitation purposes. The checklists are provided in a likely sequence of use during CPI implementation. Example: Value Stream Assessment, then SIPOC, then Value Stream Map, then Rapid Improvement Events. An overview of each document is provided below, followed by a corresponding template for each document.

1. **Generic Flow and Facilitation Guide:** This is a description of how CPI activities typically begin and how they should progress.

2. **Pre-Team Meeting Guide:** This describes the information the facilitator should ask the organization's leadership when starting up an implementation team. Attendees: Champion, Process Owner, Steering Committee key members, facilitator.

3. **CPI Event Analysis and Results Report:** This document is modeled after the A3 report pioneered by Toyota to identify a problem and document the analysis and results.

4. **Steering Committee Charter Accomplishments Checklist:** The next step in this process is to get a Steering Team identified and assist them in writing a charter. The charter checklist shows the minimum information required and care should be taken to make the

charter clear but short and simple. Attendees: Steering Team, Sponsor, Process Owner, Implementation Team leader, facilitator.

5. **Team Kick-Off Meeting Checklist:** This is the first time the implementation team meets. The steering team first reviews and clarifies the team charter, and they all agree upon its details. Then basic CPI team training is accomplished with the steering team in attendance. Attendees: Steering Team, Sponsor, Implementation Team leader and members, facilitator.

6. **Value Stream Assessment Guide:** This is used to identify and prioritize the value streams in the organization. This effort should consider the enterprise level of the organization and ensure Implementation teams are focused on processes that affect the organizations aligned goals. Attendees: Senior Leadership, Steering Team, Sponsor, Facilitator.

7. **SIPOC Guide:** A Supplier, Input, Process, Output (SIPOC) is a top level checklist approach for addressing the process to be improved. It ensures the implementation team understands where their process starts and ends and who are there customers and suppliers. Attendees: Implementation Team Leader and members, facilitator.

8. **Value Stream Mapping Guide:** This describes the steps to create a Value Stream Map of any process. Attendees: Implementation Team Leader and members, facilitator.

9. **Operational Plan Tracking Sheet:** Used to document CPI projects.

10. **Basic Lean Steps Guide:** This describes the minimum activities that should be accomplished when leaning out a process. Some of the steps are the same as the other guides and can be used to explain the lean process to the implementation team.

11. **Rapid Improvement Event (RIE) Checklist:** This describes the specific steps that should be completed to accomplish an RIE. The RIE process is broken down into three main parts: Pre-Event Activities, the Event itself, and Post-Event Activities.

12. **Six Sigma DMAIC Basic Steps Checklist:** This checklist will outline and explain the basic steps of the Six Sigma tool for the facilitator's reference and use.

13. **Logical Problem Solving Process:** This document provides a basic approach to solving problems once the have been identified.

14. **VSM Data Collection Checklist:** This lists the minimum data inputs the facilitator should ask the implementation team to collect on the process being improved. Data items that support the organization's goals and strategic metrics should be added as required to ensure alignment of efforts.

15. **Steering Committee Agenda Checklist:** Identifies the major elements in a steering committee's typical meeting.

16. **CPI Climate Survey:** This survey should be used before the organization attempts CPI events to determine if they are ready to conduct CPI efforts. If the score is too low in any

area, then more education and training should be accomplished to gain these groups support before beginning CPI. The survey consists of 10 questions to tell a facilitator three things:

a. Is there senior Leader support for CPI?

b. Is there mid-level management support for CPI?

c. Is there floor or basic employee support for CPI?

17. **Meeting Guide and Checklist:** This describes proper meeting dynamics and will help a facilitator make team meetings more effective. It is based on the concept of shared responsibilities in any meeting and control of the time each meeting topic takes. Although it requires the team to identify set times for each topic and stop the discussion if time has expired, the team can add time as it sees fit. The objective is to control the meeting to ensure all topics are covered and tem members leave the meeting feeling that they have accomplished something and know what their next tasks are.

GENERIC FLOW & FACILITATION GUIDE

Generic Flow

1. Awareness Training (Transformation and/or LEAN)
2. First Contact from Organization requesting assistance
3. Pre-Team Meeting
4. Steering Committee Charter Accomplishment
5. Team Kick Off Meeting
6. Follow steps of TOOL
7. Implement Changes to Process selected
8. Sustain new Processes and Gains

Facilitator Guides

1. Generic Flow
2. Pre-Team Meeting Guide
3. Steering Committee Charter accomplishment
4. Team Kick Off Meeting Guide
5. Value Stream Assessment Guide
6. SIPOC Guide
7. Value Stream Mapping guide
8. LEAN Basic Steps
9. LEAN Rapid Improvement Event (RIE) Steps
10. Six Sigma Guide
11. Logical Problem Solving Process
12. Data Template
13. Steering Committee Update
14. Implementation Plan Template
15. Climate Survey
16. Meeting Guide

PRE-TEAM MEETING GUIDE

DATE: _____

_____1. Confirm Team Title
_____ a. Project Description (Background, Problem, Business Case)
_____
_____
_____

_____ b. Goal: _____
_____ c. Scope: Process Start: _____ Stop: _____
_____ d. Dates: Start: _____ ECD: _____

_____2. ID Players
_____ a. Champion: _____
_____ b. Process Owner: _____
_____ c. Steering Committee: _____
_____ d. Tentative Team Lead: _____
_____ e. Implementation Team (by Function): _____
_____
_____ f. Facilitator/Mentor: _____

_____3. Coordinate Stakeholder Survey and Analysis

_____4. ID Event/Tools to Use: SIPOC, VSM, RIE

_____5. Plan Steering Committee Charter Accomplishment (60 Minutes)
_____ a. Date/Time: _____

_____6. Plan Team Kick Off Mtg.
_____ a. Agenda
_____ b. Attendees (1st Half. 2nd Half)
_____ c. Deliverables: Charter, Training

_____7. Finalize Team Logistics
_____ a. Meeting Location
_____ b. Dates/Times
_____ c. Duration
_____ d. Frequency
_____ e. Equipment Needed

_____8. Other Issues/Questions

EVENT ANALYSIS AND RESULTS REPORT

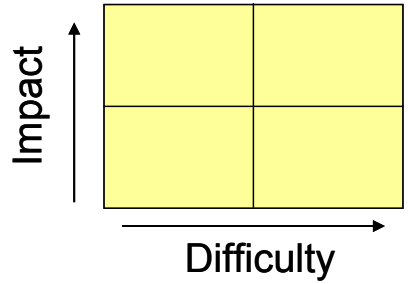
Project Title: _____

Topic: _____

☐ JDI

☐ RIE

☐ Project



Estimated Event Date (From / To):

Process Owner:

Team Leaders & Members:

Problem Description:

Event Description:

Goals / Deliverables:

Implementation Costs:

Savings:

ACCOMPLISHMENTS CHECKLIST

B. Complete Draft 10-Block
   1. ID Event Type
   2. PICK Chart Priority Location
   3. Problem Description
   4. Event Description
   5. Goals/Deliverables
   6. Estimated Event Dates
   7. Process Owner
   8. Implementation Team
   9. Implementation Cost
   10. Savings

C. Team Members and Responsibilities
   1. Steering Committee Members
      a. _____
      b. _____
      c. _____
      d. _____

   2. Steering Committee Responsibilities
      Examples:
      • Set Vision/Scope of Effort
      • Establish Goals of Effort
      • Assist team in developing Charter
      • Select Initial Leader
      • Provide Team members
      • Release team members from other duties
      • Fund team effort
      • Ensure team is Facilitated
      • Ensure team has appropriate Training
      • Monitor team Progress
      • Remove Barriers
      • Communicate Team progress to Senior Leadership
      • Reward Team Successes

   3. Team Lead Responsibilities
      Examples:
      • Make Assignments
      • Follow the Lean Methodology
      • Learn Lean Tools
      • Help Team Accomplish Goals
      • Regular Communication with Steering Team

   4. Team Responsibilities:
      Examples:
      • Attend weekly meetings
      • Be innovative, take risks, and ask Y-Not
      • Update steering committee as required
      • Generate new process recommendations

   5. Facilitator Responsibilities
      • Help Leader get organized
      • Be the Process Guide
      • Train and Mentor Team Members

   6. Signatures
      a. Process Owner
         _____
      b. Steering Committee
         1. _____
         2. _____
         3. _____
         4. _____
      c. Team/Project Leader
         _____

TEAM KICK OFF MEETING GUIDE

DATE _____

*****USE of MEETING DYNAMICS REQUIRED*****

_____1. Introductions/Icebreaker

_____2. Identify special team members

- **_____a. Process Owner**
- **_____b. Steering Committee**
- **_____c. Team Leader**
- **_____d. Facilitators, Mentor**

_____3. Review/Modify Charter

_____4. Work Group/Implementation Team Code of Conduct

- **_____a. Start and End on Time (including breaks & lunch)**
- **_____b. Use Meeting Dynamics**
- **_____c. Maintain Focus**
- **_____d. Break Plan (50/10)**
- **_____e. Cell Phones/Pagers (VIBRATE ONLY)**
- **_____f. Everyone Participates**
- **_____g. One Conversation at a Time**
- **_____h. No Side Discussions**
- **_____i. No Retribution**
- **_____j. Decisions By Consensus**
- **_____k. Use a "Parking Lot"**

_____5. Work Group/Implementation Team Logistics

- **_____a. Location**
- **_____b. Dates/Times**
- **_____c. Frequency**
- **_____d. Duration**
- **_____e. Equipment**
- **_____f. Reporting Process**

_____6. ID Events

_____7. Event Training (SIPOC, VSM, RIE)

VALUE STREAM ASSESSMENT GUIDE
Current State

1. Identify Vision, Scope, Goal (Dir, Div, Branch, Process)
2. Ensure you have Senior Leader Buy-In
3. Identify the right participants (SME, Management, Facilitator)
4. Identify Data Requirements
5. First Team MTG: - Team Introduction
   -- Team Building: Code of Conduct, Logistics
   -- Roles: Leader, Facilitator, Scribe, Recorder, Timer
   -- Team Training: VSM, LEAN Basics
6. Confirm Data and Sources
7. Identify/Group Major Processes in Organization (brainstorm) (Major Groups are the Value Streams)
8. Identify Stakeholders in the 9 Groupings on TT Chart
9. List Stakeholder Group Expectations/Contributions on TT Chart
10. Identify Top 3-5 Expectations for each Stakeholder Group
11. Prioritize Each Stakeholder Group top 3-5 Expectations on separate PICK Charts
12. Identify Common Thread Expectations
13. Prioritize Value Streams on a PICK Chart
14. Build a Prioritized Focus List of Value Streams from PICK Chart
15. Identify VSM Implementation Plan details

SIPOC GUIDE

1. Describe SIPOC Template/Blocks
    a. Suppliers: Provide Inputs to Process
    b. Input: ID All Process Inputs Relative to Project Scope
    c. Process: High-Level Map, 5-6 Steps
    d. Outputs: Process Outputs Delivered to Customer
    e. Customer: Internal, External (End User)

2. ID Customers

3. ID Outputs to Meet Customer Requirements/Expectations

4. ID High-Level Process Steps

5. ID Inputs to Process

6. ID Suppliers
    a. ID Suppliers Who are also Customers

7. Request Process Feedback from Workers (post sheets, e-mails)
    a. Requires Management Approval

8. Walk/Document High-Level Process
    a. Product Spaghetti Chart
    b. Manpower Spaghetti Chart
    c. Collect Step Data (see template)
    d. ID Existing Metric Data (Production Number, Time)
    e. ID/Collect Other Process Data

VALUE STREAM MAPPING GUIDE

1. Validate Data/Sources
2. Review VSM Steps (show visual)
3. Expand Current State (SIPOC Process Steps) (Product and Information Flows)
   a. Touch Time (Active Work Time)
   b. Cycle Time (Receipt to Release)
   c. Number of People in Step
   d. Cost of Step
4. ID Perfect State Map
5. ID Undesirable Effects (UDEs) on T-Chart
6. ID Why UDE is a Problem (T-Chart, Left side)
7. List Possible Solutions to UDEs (T-Chart, Right side)
8. Prioritize UDEs (Pick Chart)
9. ID Future State(optional before or after UDEs)
10. Generate an Implementation Plan (Prioritize UDEs, Categories of:
    a. Just Do It (JDI)
    b. Rapid Improvement Event (RIE)
    c. Project (PROJ)
11. Outbrief Steering Team, Senior Leaders
12. Task Teams with JDIs, RIEs, and Projects

OPERATIONAL PLAN TRACKING SHEET

OPERATIONAL PLAN								
TEAM NAME								
GOAL:								
Priority	Projects	Rapid Impr Event	Just-Do-It	PROJECT DESCRIPTION	TEAM LEAD	START DATE	ECD	COMMENTS

BASIC LEAN STEP GUIDE

DATE

_____1.Management selects Focus for the Process Improvement event

_____2.ID Team Members and Baseline Data

_____3.Conduct a Climate Survey

_____4.Finalize Team Logistics

_____5.Conduct 1st Team Meeting

_____6.Train Implementation Team on Basic LEAN

_____7.ID “AS IS” and “TO BE”

_____8.Map Out existing Process

_____9.ID Value Added and Non-Value Added Steps

_____10.Map out Optimum Process

_____11.ID and Prioritize Changes

_____12.Implement Changes with Detailed Plan(s)

_____13.Follow up and Recycle

_____14.Identify Additional Changes

RAPID IMPROVEMENT EVENT STEPS

3 Main Parts

1. Pre Event Activities
   - Management selects Focus, Scope
   - Identify Team Lead and Alternate
   - Identify Steering Team and Implementation Team Members
   - Identify Baseline Data to collect
   - Conduct Organizational Climate Survey
   - Collect Data
     - Customer Demand
     - Customer requirements
     - Historical Production data
   - Communicate team intent/expectations
   - Schedule Team participation
   - Finalize Logistics: Location, dates, times

2. 3-5 Day Event:
   Day 1: Identify Current State
   Day 2: Identify Changes
   Day 3: Prioritize Changes and Detail Actions
   Day 4: Implement Changes and Control Plan
   Day 5: Outbrief Steering Team

3. POST Event Activities
   - Process Owners must manage new Process to Control Plan
   - Identify Problems on Control Boards
   - Identify Solutions to Problems
   - Implement Solutions to New Process
   - Sustain Team commitment and new Process
   - Ensure Solutions Working
   - Sustain Standard Work
   - Stabilize new Process
   - Update Work Documents on all Changes
   - Compare/Analyze Metrics

SIX SIGMA GUIDE (DMAIC)

Steps: D M A I C

The phases of Six Sigma are intended to improve the effectiveness of a process by identifying process variation in satisfying customer requirements and expectations, and then reducing or eliminating the variation. Once the process is stabilized, and achieving the desired level of effectiveness it is then Leaned to optimize the efficiency.

1. Define

The first phase in the DMAIC process is to define the project, develop an improvement project plan, define the process and evaluate progress. The steps include:

- Establish purpose and scope for the improvement project
- Develop improvement project plan, including schedule and resources
- Develop process map, including key elements and boundaries
- Conduct a Failure Modes and Effects Analysis (FMEA)
- Identify critical parameters

2. Measure

In the Measure phase existing process data is collected, measurement systems are evaluated and the process capability requirements are identified. The steps in this phase include:

- Determine process capability requirements or specifications
- Establish measurement method and tools
- Determine sampling plan to meet goals
- Collect data
- Present status report

3. Analyze

In this phase the process is evaluated to determine its capability. Process data is analyzed to identify opportunities for improvement and to develop plans for improving the process, The steps in this phase include:

- Convert data into information
- Determine process capability
- Develop priority list of parameters
- Perform root cause analysis

- Update FMEA
- Develop improvement plan
- Present status report
- Determine path forward

4. Improve

In the Improve phase the improvement plan, developed in the Analyze phase, is implemented. The results are evaluated, conclusions are drawn, improvements are finalized and tested. After the desired improvements are implemented the changes to the process are documented and new instructions and procedures are developed. The steps in this phase include;

- Implement improvement plan
- Perform designed experiment if applicable (DOE)
- Measure improvements
- Develop conclusions, recommendations and next steps
- Update documentation
- Present status report

5. Control

The Control Phase is where the improvements become institutionalized. The process changes were documented in the Improve phase. In this phase, control plans are developed to ensure the process continues to be measured and evaluated. This includes implementing process audit plans, data collection plans and plans of action for out-of-control conditions, if they occur. The steps in the Control Phase of the DMAIC process include:

- Establish control system for each critical parameter
- Establish data collection plan
- Establish out-of-control plan
- Establish internal audit plan
- Develop and present final report

Logical Problem Solving Process

1. Identify Problems
2. Prioritize Problems based on impact
3. Choose Problem to attack
4. State problem in simple, direct manner
5. Analyze problem (reach root cause)
6. Generate solutions
7. Generate criteria to evaluate solutions against
8. Determine solutions that are not dominated (dominated solutions = there are other solutions that are better in all criteria)
9. From non-dominated solutions, determine feasible solutions (those that are legal, ethical, and meet organization requirements)
10. From feasible solutions, determine optimal solution(s) based on overall effectiveness
11. Perform sensitivity analysis
12. Select and implement final solution

VSM DATA COLLECTION TEMPLATE

OVERALL DATA REQUIRED

1. Customer Demand
2. TAKT TIME
3. Cycle Time
4. Budget Breakdown
5. # of Personnel involved

STEP DATA: (collect for each step of a VSM)

1. Title/Name of Process Step
2. Touch Time: Active Work Time
3. Cycle Time: Time from receipt to release
4. # of People involved
5. Cost of Step Activity

STEERING COMMITTEE UPDATE AGENDA

1. Welcome Steering Team, Visitors

2. Identify Steps Accomplished since last Update

3. Identify Next Steps to Accomplish

4. Identify Risks and Barriers

5. Questions from Imp. Team for Steering Team

6. Questions from Steering Team for Imp. Team

Process Improvement Climate
Survey

Questions 2-10 will use the following 1-10 rating scale: 1 = Strongly Disagree. 10 = Strongly Agree. Please CIRCLE the appropriate number for each question.

1. Which of the three categories would you place yourself?

   Senior Leader (Dir, Dep, Div, Div Dep)

   Middle Manager (Sup./Leader)

   Process Owner/Worker

2. I feel my organization's Senior Leaders Support Process Improvement Efforts.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

3. I feel my Immediate Supervisor Supports Process Improvement Efforts.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

4. I feel I would Support Process Improvement Efforts in my work area.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

5. I feel my Organization Senior Leadership would Resource Process Improvement Efforts.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

6. I feel my Immediate Supervisor would Resource Process Improvement Efforts.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

7. I feel I would Resource Process Improvement Efforts in my work area.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

8. I feel that there are plenty of Processes in my organization that could be improved.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

9. I feel I have an Open Mind to new ways of doing business in my work area.
   Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

10. I feel I would initiate or participate in a Process Improvement Effort in my work area if I saw the opportunity.
    Strongly Disagree 1 2 3 4 5 6 7 8 9 10 Strongly Agree

RULES OF ENGAGEMENT for the CPI Climate SURVEY

SURVEY GOAL: To determine three things: Organization's Support of CPI, Organization's willingness to Resource CPI Efforts, and Individuals willingness to Initiate/Participate in CPI Efforts.

1. Give to any organization before they start their First Major Process Improvement effort
2. At least 24 Surveys must be completed and averaged to have valid data.
3. Representation from each category should be: 100% of Senior Leaders (Dir, Dep, Div, Div Dep); 50% of Middle Managers (Supervisors/Leads); at least 60% of total Surveys should be from the Process Owner/Worker category. **NOTE:** This survey should be kept anonymous and Voluntary for Union Employees.
4. Decision Points on Average scores:
   - 8.0 or higher: Support PI. Ready to start an initiative. Management should continue what they are doing. TR will Facilitate LeaEAn efforts in this organization.
   - 4.0 – 7.9: Neutral to PI. Management must strongly articulate support as the Initiative begins. TR will Facilitate LEAN efforts, but must see Leadership involvement.
   - 1.0 – 3.9: Against PI. Opposed to PI. Delay any PI initiatives for 1-2 months until management can change Culture and Attitudes toward PI. Retake Survey before starting Initiative.
5. Expected Averages by Categories and Attitude toward PI:

	Opposed to PI	Neutral to PI	Support PI
Senior Leaders	6-7	7-9	9-10
Middle managers	1-3	3-5	6-8
Process Owners/Workers	2-4	5-7	9-10

6. Suggest Survey be handed out by the DIR/DEP at a Staff MTG with a pitch by Senior Leader. Return in two days.
7. Analysis of the Survey data will be returned two days after turned in to TR for analysis.
8. Refer any questions on the Survey or analysis to your organization's CPI Core Team.

MEETING GUIDE

ROLES:

LEADER: _____ PURPOSE OF MEETING:_____
TIMEKEEPER: _____
_____
FACILITATOR: _____
_____
SCRIBE: _____
_____
RECORDER: _____
PROCESS GUIDE: _____

AGENDA:

MES		TI
1.	Set Roles, Purpose, agenda items, and times.	5 MIN
2.	_____	___ MIN
3.	_____	___ MIN
4.	_____	___ MIN
5.	_____	___ MIN
6.	_____	___ MIN
7.	Wrap Up	5 MIN

WRAP UP SPECIFICS:

NEXT MEETING:

DATE:_____

TASKINGS: WHAT, WHEN, to WHOM?

TIME:

_____

1. _____

LOCATION:

_____

2. _____
3. _____
4. _____
5. _____

PROCESSING THE MEETING:

PLUSES	DELTAS
_____	
_____	
_____	
_____	
_____	
_____	
_____	
_____	

MEETING GUIDE WORKSHEET:

MEETING DYNAMICS GUIDE

The Purpose of these Instructions is to briefly describe how to use the Meeting dynamics Worksheet to help you organize a meeting. If you use this worksheet and this format on all your meetings, you should see a reduction in meeting times, a clearer purpose and better organization of your meetings, and more participation and satisfaction from meeting attendees. These changes normally make for better, more effective meetings and communication.

GENERAL INSTRUCTIONS

The Meeting Dynamics Worksheet must be used at the START of every meeting to be effective. As the first Agenda item lists, use the first 3-5 Minutes of each meeting to Identify people for ROLES, state the PURPOSE of the meeting, and set the AGENDA. If you have already sent out a Pre-Agenda to all the meeting attendees or this is a standard meeting, like a Staff Meeting, then show the Pre-Agenda, but still offer an opportunity to add/delete, set/change times for the agenda items. Pick people for each Role who understand the job or quickly tell them what they are to do. People pick up the roles very quickly and you can use the brief description of the roles listed below if you need to explain one. Do your best to Start ON TIME, STAY ON TIME, and END ON TIME, and keep the meeting Focused.

ROLES

LEADER: This is typically the person who requested/called the meeting. However, for Team meetings, it is often effective to rotate leadership. This person directs the group and manages the meeting to accomplish the meeting objectives. The Leader and Facilitator work closely together to make the Meeting. effective and efficient. Both are responsible to ensure the meeting covers the planned topics and accomplishes the stated purpose of the Meeting.

TIMEKEEPER: The Timekeeper is the most important role in the meeting. If you do not have a Timekeeper, you are not using Meeting Dynamics. This person tracks the time against the agenda time for each topic. He/she calls out “Two Minutes” and “Time’s Up”, or whatever number of minutes that was identified by the group, to announce the end of each topic. Then the group can decide to add time or stop discussion and go to the next topic. It is very important that you first establish reasonable times per topic, and then STICK TO THE TIMETABLE. The Objective of having a timekeeper is to allow the Team to control the time the team spends on each topic. It is NOT to restrict discussion or hinder communication. Don’t be afraid to call time even when the BOSS is talking. If they agreed to use meeting dynamics, they have agreed to accept the process.

FACILITATOR: The facilitator’s job is to keep the group on track. He/she stops the group from getting off the subject or telling “War Stories” by simply stating “We are getting off track. Lets get back to the subject.” The Facilitator also encourages silent members to speak up and share their thoughts with the team. The facilitator also can act as a Process Guide if the team decides to use a Process tool during the meetings and a separate guide is not available. He/she should know the tool sufficiently to guide the team through the steps and clarify the intent of each step.

SCRIBE: This person mans a Flip Chart or Dry-erase board, or anything used in the meeting to show group progress. In meetings where you Brainstorm ideas or follow a set process like a Problem Solving Process (PSP) or Quality Improvement Process (QIP), this person documents comments so the group sees where they are at all times. The Scribe is a very powerful position since they often paraphrase what the group says. Be careful to ensure the scribe does not take over the Leader’s Role or solve conflicts by writing down just THEIR inputs on the flip chart.

RECORDER: This person functions as the Secretary. They capture notes on the meeting for the minutes and tasking to be reviewed during the Wrap Up. They would also publish Minutes if requested. They must ensure an Attendance sheet is passed around the room to capture names, office symbols, and E-mails of attendees. The recorder should not try to capture every statement made in the meeting, only the agreements or results of the discussions. Keep Minutes Short, and always start the minutes by duplication the Meeting Guide and the agenda that was used.

PROCESS GUIDE: This person leads the team through the steps and special rules when using a tool, as needed. If you do not have an expert on a specific tool, then the Facilitator assumes the responsibility of the Process Guide and must learn enough to implement the tool in the meeting.

PURPOSE

Stating the purpose of the meeting after designating Roles is critical to keep the group FOCUSED. Typical Categories of purposes are: Information Sharing, Decision Making, or Conduct a team Process. If you cannot state the Purpose of the meeting, you probably are not ready to call the meeting . The purpose is especially important for attendees covering the meeting. for others.

AGENDA

Although you may present a draft agenda at the beginning of the meeting, it is NOT FINAL until everyone in the meeting agrees upon it. The first and last topics in the Agenda are always the same. The first is to take time and set up the meeting itself by agreeing on the Roles, Purpose, and Agenda topics and times. The last is always a Wrap-Up of the meeting, described below. The topics themselves can be briefings, in which case the times should be identified by the briefer, to get their buy into the process. Agenda discussion topics, identify the desired outcome, not just to discuss "XXX". Briefing times should include enough time for questions, not just for the briefing itself. If the group wants to add a topic after the meeting begins, it must be determined if you will add more time, or take time away from another topic. Remember, that there IS FLEXIBILITY to add time or topics, but do it in a controlled environment, decided by the group members themselves.

WRAP UP

The Leader performs the Wrap Up by helping the group decide When and Where the next meeting will be, and Summarizing Taskings and suspended items. Taskings can be a request for an attendee to brief something at the next meeting, a requirement to draft a response back to a customer, or any action that the group feels needs to occur. Ensure a suspense is identified for each tasking. This can be as simple as "By the next meeting." Or " By a specific date/time." The Final step in the Wrap Up should be to PROCESS the Meeting. Processing is the act of gaining feedback on how the meeting went and asking for ways to make the next one better. This is accomplished by listing Pluses and Deltas as shown on the worksheet. The pluses are what attendees Liked about the meeting, and Deltas are things that could be Done Better or constructive criticism on member inputs/conduct. Ask yourself, "How could we make the meetings Better?"

KEYS TO SUCCESSFUL MEETING DYNAMICS

1. ASK yourself: "DO we REALLY need a Meeting?" Use Phones, e-mails, VTCs, or telecoms first. Face to face meetings should be our last resort to communicate, especially if travel is required.

2. Pre-Meeting with Leader: Draft Agenda, ID attendees, decide on tools before Meeting

   Rule of Thumb: Use Guide if > 6 people AND > 1 Topic

   (however, the guide can be used at any meeting)

3. Follow Guide: Set Roles, Purpose, Agenda. TK –Critical

4. Explain Meeting. Flexibility and Consensus Voting – THUMBS Rules!
   - Thumbs Up: I agree completely."
   - Thumbs Level: I don't completely agree, but I can Live with it."
   - Thumbs Down: I disagree and cannot accept."
   - Identify Time Calls at 2 min and Time's up (<30 min topics); halfway, 5, 2, and Time's Up (> 30 min)

5. Keep Your Sense of HUMOR. Have FUN!

6. STOP when you said you would. NO Exceptions.

7. Add Agenda Topics or Time only on Consensus.

8. Wrap Up completely:
   - TASKS: What, Who, When due?
   - Next MEETING: When (Date/Time), Where?
   - Process MEETING Itself. (Participation, Times, Topics, Focus)

Attachment F.
Sample CPI Project Selection Criteria and Project Charter

Sample CPI Project Selection Criteria

The most successful CPI projects are targeted at processes and value streams critical to the organization's customers and the warfighter. Projects should support strategic planning documents and align with relevant tactical goals and objectives.

CPI project selection should consider targeting the process(es) within a value stream that have the highest priority for improvement as well as fact-based justification for improvement. Selection should consider the following:

- "Burning Platform" Issues
- Cost of Poor Quality (COPQ) Analysis
- Strategic Linkage.

"Burning Platform Issues" could include:

- Customer demands and/or complaints
  - Delivery times are too slow
  - Costs are too high
  - Too many failures in product(s) and/or service delivery
- "Urgent" business needs
  - Expenses are too high
  - Erosion of customer base
- Shareholder/Stakeholder requirements
  - Quarterly goals, end-of-year goals, etc.
- Excessive warranty costs or customer complaint costs.

Costs of Poor Quality Analysis could include:

- Internal Failure Costs (incurred prior to reaching the customer)
- External Failure Costs (incurred after reaching the customer)
- Appraisal Costs
- Prevention Costs
- Lost Opportunity Costs.

Strategic Linkage could include strategically driven business measures such as:

- Customer retention rate
- Overall product/service yield rates
- Customer satisfaction rate
- Revenue
- Cost Recovery Rate
- Employee turnover
- "Operational Excellence"
- Capacity
- Growth
- Expenses.

CPI projects–What could make a project successful–Predictors

- Strong business case
- Project goals and scope clearly defined and realistic
- Identification of key stakeholders and plan for getting buy-in
- Measurements/data available and a data collection plan
- Good project planning, management, and documentation
- Cross-functional team effort
- Results shared and applied across the business.

Making a Business Case for a Project:

- Business Case for change must be clear and concise, to help create a "shared need" and understanding
- Key elements to address:
  - Why do we need to change? (current pain, burning platform)
  - What if we fail to act? (cost of doing nothing)
  - What will the new environment look like? (desired outcome, compelling future state)
- Business Case should be summarized in one to four sentences (or bullet points). Keep it simple … make sure all team members can articulate it.

Business Case (Examples):

- <u>Why do we need to change?</u>
  - Receiving over 100 customer complaints each month
  - 5 full time people dealing with complaints
  - Losing an average of 30 customers each month, amounting to $470,000 lost business each year
- <u>What if we don't act?</u>
  - Continued stream of dissatisfied customers and loss of future business
  - In jeopardy of losing XXXX contract/business and won't meet sales goals for the year
- <u>Desired Outcome?</u>
  - Reduction in complaints and lost business by understanding and resolving the top complaints
- <u>Why do we need to change?</u>
  - Receiving $500,000 in damaged shipments from suppliers each year which has been steadily increasing
  - Over $50,000, including overtime hours, spent each year dealing with shipping problems
- <u>What if we don't act?</u>
  - Will have to add additional staff to handle problems

- Risk failing to meet delivery requirements to 20% of our customers or having to stockpile inventory to compensate

- Desired Outcome?
  - No significant loss of time or money due to damaged shipments
  - 100% on time delivery to our customers

Defining the CPI Project:

The Champion, Steering Committee, and Support Group should discuss the project and agree on the goals and objectives up front. Project documentation, in a charter, should include things like the list below. Project leaders should be prepared to provide periodic status on both project activities and results in accordance with the categories of information suggested below:

- A description of the product or process you are working on defining or improving.
- Clear definition of goals and objectives of the project. What is the problem statement?
- A description of the business impact of the project. What is the business case? Include financial information such as cost of poor quality (COPQ) impact, expected return on investment, etc.
- Who are your core team members? What are their roles? What time commitment is expected?
- What specific metrics will be tracked? You should identify one (or two) primary metrics. Consider metrics related to reliability, cycle time and/or cost.
  - What is the baseline data for each?
  - What is your specific improvement goal for each? (for example, you may be working to improve the cycle time for processing applications … current (baseline) cycle time shows an average of 6 days (standard deviation = 1 day), and your goal is to achieve an average cycle time of no more than 2 days (with a certain standard deviation or Cpk). The DMAIC approach or other structured methodology can be helpful in this activity.
  - Note: Identify any secondary metrics which you will track as well. Secondary metrics are used to ensure that you don't meet your project goals at the expense of harming others. For example, reducing manufacturing cycle time but increasing the percentage of defective items produced. Secondary metrics are the "conscience" of your project.
- Who are the customers and suppliers for the product or process? What are their critical requirements or concerns?
- What percent of your time will be dedicated to the project?

The sample Project Charter below could be considered as a guide for proper alignment of project objectives and expected results.

Sample Project Charter

Project Information

Sponsor(s) Name:	
Project Name:	
Project Lead:	
Issue Date:	

Project Evaluation Criteria

Business Case: Describe how completing this project will improve organizational goals. In addition, state how completion of this project is in alignment with organizational objectives.	
Problem Statement: Describe the nature of the problem in quantifiable terms.	
Scope: Describe parameters and key leverage points within the process.	
Impact: Define the impact the problem is having on the organization and business.	
Goal: Describe the goal of the project in quantifiable terms.	
Customers: Describe the person(s) or organization which will benefit (directly and indirectly) from the project.	
Stakeholders: Stakeholder is any person, organization or function which has an interest (positive and negative) in the project.	

Project Team

Project Team Member	Role	Organization	Contact Information
1.			
2.			
3.			
4.			
5.			

Plan of Action and Milestones and Key Performance Indicators

Milestone	Scheduled Date of Completion	Actual Date of Completion
Define Phase		
Measure Phase		
Analyze Phase		
Improve/Lean Phase		
Control Phase		

State in quantifiable terms, how the success of the project will be measured in any or all the measures below.

Measurement	Description
1. Quality	
2. Cost	
3. Schedule	
4. Risk	

Project Costs

List the costs for the project to include labor, training, contractor fees, and or solution development costs.

Project Approval

Champion	Steering Committee Lead	Support Group Lead
Name:	Name:	Name:
Title:	Title:	Title:
Date:	Date:	Date:
Signature:	Signature:	Signature

Attachment G.
Terminology

The terminology provided in this attachment has been largely derived from a variety of continuous improvement-related publications and programs. Not all of the terms defined are found in this guidebook; rather many of the terms are provided as background information.

Key terms used in this guidebook that were not readily available in the continuous improvement lexicon but are important to DoD CPI have been identified and defined.

5S..... Traditional Lean manufacturing approach to cleaning up, organizing, and standardizing work: Originally five Japanese words starting with the letter S, translated several combinations of English words, one set

- sort (organize)
- stabilize (eliminate variations)
- shine (clean)
- standardize (make standard the best known way to do something)
- sustain (consciously continue to work the previous four items)

6S..... 5S plus safety

Action Item ..... A formally assigned requirement to accomplish something within an assigned time frame. Very often action-item tracking numbers are used to assure accountability.

Action Plan ..... A time-phased schedule for executing Events, Projects and Do-Its that transitions a process from the current state to the desired future state, as determined by members of the Lean Event.

Activity Based Costing ..... A management accounting system that assigns cost to products based on the amount of resources used (including floor space, raw materials, machine hours, and human effort) in order to design, order, or make a product.

Alignment ..... The disciplined agreement within an organization between top level strategic plans, goals and objectives with all subordinate levels' plans, goals and actions.

Advanced Planning System (APS)..... Computer program that seeks to analyze and plan a logistics, manufacturing, or maintenance schedule to optimize resource use to achieve desired results.

AVCOM ..... Avionics Components Obsolescence Management, a software tool that helps provide forecast and other information on electronic parts obsolescence

AWP ..... Awaiting Parts–A special status for an item held up in a repair process while it waits for parts needed to complete the repair. In DoD, this time is generally not considered in determining the time a repair organization spends repairing something.

Backflow..... A flow that returns towards its source. In a production or maintenance environment, it is any step in the process that must be corrected or redone.

Balanced Scorecard..... A strategic management system used to drive performance and accountability throughout the organization. The scorecard balances traditional performance measures with more forward-looking indicators in four key dimensions:

- Financial
- Integration/Operational Excellence
- Employees
- Customers

Baseline Measure ..... A statistic or numerical value for the current performance level of a process or function. A baseline needs to be taken before improvement activities are begun to accurately reflect the rate of improvement or new level of attainment of the performance being measured.

Benchmark..... A qualitative and/or quantitative performance measure of an activity or activities enacted at one or more enterprises that are considered best in class. A benchmark helps a DoD organization set goals in the strategic or tactical phase of an implementation. The comparison is usually made between companies competing for the same market shares, but can also be done based on a single similar function even if the enterprises are from different industries and participate in different markets.

Brainstorming..... A method of unlocking creativity and generating ideas that is very effective for teams. In the first step, ideas are offered without the constraints of critical evaluation or judgment. The idea is to "let go". After all ideas have been listened to, no matter how "far-fetched," the ideas are then critically evaluated to select the best ones.

Breakdown Maintenance... A Total Productive Maintenance technique: Time it takes to accomplish a fix after breakdown occurs.

Buffer Stock ..... Maintaining some small portion of finished products/goods to temporarily satisfy variations in demand.

Business Case ..... A written document describing why an organization is planning to implement a process improvement initiative, to include a goal and objectives that are specific and measurable based on cost, performance, or schedule.

Business Value ..... Not identified by the customer, but required to satisfy some other need (e.g., policy, law or regulation, operational security).

Capability Maturity Matrix.. A framework for assessing organizational capability in terms of various characteristics (e.g., lean practices). Level 1 normally represents rudimentary capability and level 5 represents world-class industry leader capability.

Capacity Constraint..... Anything that hinders production or process flow (the weak link in the chain).

Catchball ..... A participative approach to decision-making. Used in policy deployment to communicate across management levels when setting annual business objectives. The analogy to tossing a ball back and forth emphasizes the interactive nature of policy deployment."

CDOV..... Concept-Design-Optimize-Verify. An acronym for a systems approach to requirements development and effective problem solving. The steps suggest a process from development of an improvement idea to a feedback loop that monitors performance in relation to process goals.

Cell..... A logical, efficient, and usually physically self-contained arrangement of personnel and equipment to complete a sequence of work. The cell enables one-piece flow and multi-process handling. Typically, each cell has a leader who manages the workflow and is responsible for maintaining performance and productivity.

Cell Design..... The technique of creating and improving cells to optimize their one-piece flow. A quality cell design results in improved space use, higher value-adding ratios, shorter lead times, lower work in process, and optimal use of employees.

Champion..... An individual with primary responsibility for creating the vision and leading the development of the strategic plan. Champions are needed at multiple levels and have a strategic view of his/her organization. Champions guide CPI initiatives through critical understanding of how the organization fits into the enterprise at large.

Change Agent ..... Natural leader who actively supports the transformation to CPI. The person in an organization that can effect change. This is the person who leads/directs that organization on goals and expectations and holds lower levels of management accountable for accomplishment of those expectations.

Change Manager ..... The Change Manager is the person designated by the Change Agent to lead the Core Team.

Communication Plan ..... The strategy a Change Agent uses to convey his or her CPI beliefs and commitment to every level of the organization. This is spelled out in each organization's "CPI Implementation Plan."

CONOPS ..... Concept of operations–description of how an organization will implement a certain program or effort.

Continuous Flow ..... the mechanism to transform a product, service or information by which the request for the item is triggered by a customer demand, and the production process creates the needed item without delay or inventory in just the right quantity and delivered at the right time to satisfy the triggered demand.

Core Team ..... The full-time personnel within an organization dedicated to CPI operations on a day-to-day basis. The Core Team is lead by the organization's Change Manager. The Core Team will typically be comprised of one-to-three percent of the organization's population.

Corrective Action..... The action an identified group takes to reverse a downward trend in process metrics.

Corrective Maintenance .... A Total Productive Maintenance technique: Improving or modifying equipment to prevent breakdowns or to make maintenance activities easier.

CPI ..... Continuous Process Improvement–a comprehensive philosophy of operations that is built around the concept that there are always ways in which a process can be improved to better meet the needs of the customer and that an organization should constantly strive to make those improvements.

CPI Deployment Cycle ..... For DoD CPI, a multi-step cycle that shows how DoD views CPI progression and management. The cycle begins with strategic planning and culminates in CPI project implementation. It is an iterative cycle that builds upon achieved results.

CPI Maturity ..... The degree of process improvement across a defined set of process areas where management goals have been set and metrics for measuring attainment of the goals are in place. The reliability of repeatability of CPI application.

Culture Change..... A major shift in attitudes, norms, sentiments, beliefs, values, operating procedures, and behavior of a group or organization.

Current State..... Part of the Value Stream Analysis, this depicts the current or "as is" process - how it actually works in terms of operations, materiel, and information flow.

Customer ..... Someone for whom a product is made or a service is performed. There are internal and external customers. The external customer is the end user of an organization's product or service. Internal customers are those who take the results of some internal process step (i.e., a report, an electronic file, or a component) as an input for their work. When applied to a supply chain, entire companies become customers of one another.

Customer Relationship Management (CRM)	A philosophy that puts the customer at the design point, it is being customer-centric. It should be viewed as a strategy rather than a process. It is designed to understand and anticipate the needs of current and potential customers.
Cycle Time	The time duration of a process, e.g., from request of a part to fulfillment of the order. The beginning and end of a specific cycle time are defined as part of a CPI project and used to set the baseline for related value stream analysis and improvement goals.
DMAIC	Acronym for Define-Measure-Analyze-Improve-Control. DMAIC is an ordered problem-solving methodology applied widely in private and public sector organizations. The DMAIC phases direct a process improvement team logically from problem definition to implementing solutions that are linked to root causes, towards establishing best practices to help ensure the solutions stay in place.
DMALC	A derivative of DMAIC. Acronym stands for Define-Measure-Analyze-Lean-Control. DMALC is an application of the DMAIC problem solving methodology in the Lean environment.
DMSMS	Diminished manufacturing sources and material shortages–an inclusive term for the general problem of parts becoming unavailable by becoming obsolete or through suppliers going out of business or leaving a particular market.
DoD	U.S. Department of Defense
DoD CPI	A strategic approach for improving reliability (of outputs and products), cycle time (shorter process times), cost (less resource consumption), quality, and productivity through the use of contemporary continuous improvement tools and methodologies.
Do-It	A desired change to the current state that can be done quickly and easily—usually within days.
Driver	An action that forces an expected reaction.
Enterprise Resource Planning (ERP)	A type of software package that attempts to consolidate all the information flowing through the enterprise from finance to human resources. ERP is being employed in DoD to standardize data, streamline the analysis process, and manage long-term planning with greater ease.
Enterprise Value Stream Mapping and Analysis (EVSMA) or Enterprise Analysis and Action Planning (EA&AP	A powerful tool for analyzing material and information flow throughout and between organizations in order to identify and plan improvements. EVSMA and EA&AP use simple diagrams to depict a current process and provide clarity to support improvements in lead time and inventory reductions. Organizations use these tools to identify and plan kaizen/related events for improved effectiveness. Use also encourages participants from all parts of the organization to gain an understanding of the current material and information flow.
Event	A short-term, high intensity effort to address a specific problem. The focus is typically a week, though the preparation normally begins several weeks in front and follow-up continues after. Also called by other names, including Rapid Improvement Event, Rapid Improvement Workshop, Kaizen Event, Kaizen Blitz, Accelerated Improvement Workshop.
Event Summary	The summary provided to management of what was accomplished during an Event. This includes the resulting Action Plan and seeks approval from management to proceed with the action plan as briefed.
Facilitator	Consultant, advisor, or subject matter expert that leads or drives the pace and direction of a group participation event.
Firefighting	Using emergency fixes for problems without eliminating the root cause; managing by crisis instead of proactive planning.

Five Whys ..... Taiichi Ohno's and Shigeo Shingo's practice of asking "why" five times whenever a problem was encountered. Repeated questioning helps identify the root cause of a problem so that effective countermeasures can be developed and implemented.

Flow ..... The sequential, coordinated movement of information, product, or service through a process.

Flow Thinking ..... Production or other work areas are grouped according to various classifications (product, material used, service provided, etc.) and located close to each other to allow unimpeded coordination.

Flow Time ..... The amount of time it actually takes a product, information or service to move through a process, including wait time.

Footprint space ..... The amount of physical space it takes to execute a step in a process.

Future State ..... A vision of the optimum operating environment with new/improved processes in place.

Gap Analysis ..... An analysis that compares current performance to desired performance so that solutions can be found to reduce the difference (close the gap).

HQ..... Headquarters

Ideal State ..... A vision of the future state that depicts what the system should look like if there were no constraints. Based on the "King or Queen for a Day" mentality.

Just-in-time ..... A strategy for inventory management in which raw materials and components are delivered from the vendor or supplier immediately before they are needed in the transformation process.

Kaikaku ..... A rapid and radical change process, sometimes used as a precursor to kaizen activities.

Kaizen ..... A Japanese term that means continuous improvement, taken from words 'Kai' meaning continuous and 'Zen' which means improvement.

Kanban..... A term that means "signal". It is one of the primary tools of a Just-in-Time system. The kanban signals a cycle of replenishment for production and materials in order to maintain an orderly and efficient flow of materials. It is usually a printed card that contains specific information such as part name, description, quantity, etc.

Lead Time ..... Interval of time between the established need for something and its successful delivery.

Lean ..... A systematic approach to identify waste, focus activities on eliminating it, and maximize (or make available) resources to satisfy other requirements.

Lean Enterprise..... A business organization that delivers value to its stakeholders, with little or no superfluous consumption of resources (materials, human, capital, time, physical plant, equipment, information or energy).

Level Scheduling..... Planning an output so that the fabrication of different items is evenly distributed over time.

Leverage Point ..... The point at which attention and/or application of resources would result in tangible improvements/benefits to the entire end-to-end value stream.

Maintenance Prevention ... A Total Productive Maintenance technique: Designing and installing equipment that needs little or no maintenance.

MAJCOM ..... Major Command–the highest level distinct commands within the Services, normally led by four-star flag officers.

Management Review ..... A report to management on progress made during an Event. A heading check to ensure that management agrees with the approach taken by the Team, normally done in the middle of an Event.

Manual Cycle Time ..... The amount of hands-on time it takes to move a product or information through a process.

MC rate ..... Mission capable rate–a calculated rate that describes the portion of aircraft or vehicles that make up a weapon system that are, at least nominally, in a mission-ready condition. It excludes from consideration any aircraft or vehicles that have been shipped to a depot for repair. When the MC rate falls below some Service-defined target, then expediting becomes necessary to get that weapon system back up to full speed.

Mission ..... The Mission is a concise, unambiguous, and measurable description of the organization's role in the overall objectives of the Department of Defense with a clear and explicit connection to the Strategic Planning Guidance (SPG)/Contingency Planning Guidance (CPG). The declaration should also have specific reference to the effective achievement of that mission.

Monument ..... Part of a process that cannot easily be altered whether because of physical constraints or legal or regulatory requirements.

Muda ..... A Japanese term for waste. Lean thinking references use this term as a synonym for waste.

NCO ..... Non-commissioned officer

Non-Value-Added..... Any activity that takes time, materiel or space, but does not add value to the product or service from the customer's perspective. For example, inspections or reviews normally are non-value-added because they are checking to see whether the work was done right in the first place. A non-value added process step violates at least one of the following criteria:

- The customer is willing to pay for this activity.
- It must be done right the first time.
- The action must somehow change the product or service in some manner.

OSD ..... Office of the Secretary of Defense

One Piece Flow..... The concept of moving one work piece at a time between operations within a work cell. Sometimes referred to as a lot size of one.

Operational Plan ..... The second of two key plans that guides DoD CPI. Usually done at the organization level, the operational plan identifies the actions that support achieving stated organizational transformation. The operational plan recognizes and builds on current good practices and integrates them, providing consistent CPI deployment within the organization.

Outcome ..... The resulting effect of outputs as they relate to an organization's mission and objectives. They are the critical performance measures to capture.

Pareto Principle..... In 1906, Italian economist Vilfredo Pareto observed that twenty percent of the people owned eighty percent of the wealth. In the late 1940s, Dr. Joseph M. Juran inaccurately attributed the 80/20 Rule to Pareto, calling it Pareto's Principle. In general, the concept is that for any given distribution of results, the majority of the distribution (80%) is determined by a small part of the (20%) potential contributors or causes. For example: one would expect that in a typical manufacturing operation, 80% or more of manufacturing costs will be driven by 20% or less of the cost drivers.

Peer Groups..... In DoD, a group that shares common functional responsibilities and carries out similar activities. Peer groups provide an opportunity for cross feeding information about CPI goals, challenges, approaches, activities, and accomplishments. Examples of potential peer groups include turbine engines, fighter aircraft, and communications-electronics.

Performance measure..... A measurable characteristic of a product, service, process, or operation the organization uses to track and improve performance. The measure or indicator should be selected to best represent the factors that lead to improved customer, operational, and financial performance.

PDCA ..... Plan-Do-Check-Act–A process based on the scientific method for addressing problems and opportunities.

PM..... Program Manager–in the DoD, the PM is in charge logistics support for one or more specific weapon systems. Program managers, in collaboration with other key stakeholders establish logistics support program goals for cost, customer support, and performance parameters over the program life cycle.

POA&M ..... Acronym for Plan of Action and Milestones. A common management and reporting tool for CPI projects.

POC ..... Point of contact–key person representing a given organization.

Point of Use (POU) ..... The condition in which all supplies are within arms reach and positioned in the sequence, in which they are used to prevent hunting, reaching, lifting, straining, turning or twisting.

Policy Deployment ..... The process of cascading or communicating a policy from top to middle management, and throughout the rest of the organization using a give-and-take process called “catchball”.

PR ..... Purchase Request–how an Item Manager initiates a purchasing process.

Preventive Maintenance.... A Total Productive Maintenance technique: Actions taken performing a specific task to prevent breakdowns from occurring.

Process Cycle Efficiency (PCE) ..... A lean metric derived by assessing total value added time (to customer) against total lead time (duration of process from beginning to end.

Product Families ..... Items of like kind or units linked to specific material or a common end product; all equipment, workers, and support personnel arranged in a logical sequence to support a common product or product line.

Product Life Cycle Management (PLCM) ..... A technology for managing the entire life cycle of a product from initial development through end of life management (EOL). PLM focuses on collaboration across the enterprise as well with external customers and suppliers

Production leveling..... Configuring the workload and output of a workstation so that the workstation produces items at a rate close to takt time and in an even distributed mix over a time period with minimal slack or nonproductive time through balancing and rebalancing.

Pull ..... A system by which nothing is produced by the upstream supplier until the downstream customer signals a need.

Pull scheduling ..... The flow of resources in a production process by replacing only what has been consumed.

Pure Value ..... Task demanded by the customer to satisfy a requirement to add form, fit or function.

Push..... A system by which suppliers produce arbitrary amounts of an item and advance it to the next stage without regard for overall demand.

Quad Chart ..... The Quad Chart is used to display the status of implementing a process, especially the Enterprise Processes. These charts quickly show the steps required to develop the new process; the schedule and success in deploying the new process; the internal benefits, measured in terms of personnel, dollars or space saved; and the impact on the War fighter, based on improved availability, affordability, performance, deployability, or survivability.

Rapid Improvement Event ..... A short-term, high intensity effort to address a specific problem. The focus is typically a week, though the preparation normally begins several weeks in front and follow-up continues after. Also called by other names, including Rapid Improvement Workshop, Kaizen Event, Kaizen Blitz, Accelerated Improvement Workshop.

Red-Tag Campaign ..... Part of a 6S Event, the red-tag campaign places red tags on furniture or items that are not used, need repair, or should be turned in to Defense Reutilization and Marketing Office (DRMO). Red tags remain on the items until the appropriate action is taken.

Reliability ..... Refers to the degree of certainty that a product or service will perform as intended over a set period of time.

Return on Investment (ROI) ..... The ratio between the predicted or computed savings or cost avoidance (the return) that will result from some action and the cost of completing the action (the investment). Should take the time value of money into account.

RFT ..... Ready for tasking–measure of the number of an operational military unit's equipment is ready and capable of supporting the unit's current tasks. Expressed as a percentage only of the current requirement, not as a percentage of total. For example, if unit has 10 aircraft and 8 are needed on a given day but only 6 are capable of performing the task, then the ready-for-tasking rate is 75%.

Senior Change Agent ..... Champion or head change agent who supports the transformation to CPI .

Senior Leader ..... The person at the top of an organization's chain of command.

Setup Time ..... Also called **changeover time**. The time it takes to change a system or subsystem from making one product to making the next. Typically divided into external setup time, which covers preparations that can be done while the previous operation is still in process, and internal setup time, which cover preparations that are done while the process is idle.

Shingo Prize ..... A prize established in 1988 in honor of Shigeo Shingo, as an annual award presented to organizations that achieve superior customer satisfaction and business results related to Lean "excellence".

Single Minute Exchange of Die (SMED) ..... A detailed approach to reducing any machine setup time to less than 10 minutes.

Single Piece Flow ..... The movement of a product or information, upon completion, one at a time through operations without interruptions, backflow or scrap.

Six Sigma (6σ) ..... A strategy that espouses increasing profits by eliminating variability, defects and waste that undermine customer loyalty. Six Sigma can be understood/perceived at three levels:

- Metric—3.4 defects per million opportunities.
- Methodology—a structured problem solving roadmap.
- Philosophy—reduce variation in your business and take customer-focused, data driven decisions.

SMART ..... Acronym for Specific-Measurable-Attainable-Results Focused-Timely. It is used in relation to objective setting in CPI initiatives. A sound objective will meet each of the letters of the acronym.

SME ..... Subject matter expert–A recognized expert in a given area of knowledge (subject).

Spider Diagram or Assessment	An assessment tool used to gauge CPI commitment and maturity within an organization. Also called a Radar Chart. A common variant has the spokes of the diagram measure (Levels zero through four) commitment and maturity by assessing the following: Leader's Commitment, the Organization, Value Stream Analysis, Rapid Improvement, Process Control, Strategy Alignment & Deployment/Policy Deployment, 3P Breakthroughs, On-Demand, Defect-Free, Achieving Lot Size of One, Lowest Cost, and Visual Management.
SPO	System Program Office–Home of the Air Force Program Director, the person in charge of managing a weapon system, including acquisition.
Stakeholder	Person internal or external to an organization who has a stake in the outcomes of a process.
Standard Work	An agreed upon set of work procedures that: effectively combine people, materiel, and machines to maintain quality, efficiency, safety, and predictability. Work is described precisely in terms of cycle time, work in process, sequence, takt time, layout, and the inventory needed to conduct the activity.
Strategic Buffer	A predetermined quantity kept on hand to combat variability and lead time impacts.
Strategic Plan	The process an organization uses to achieve and document long-term goals and objectives. For DoD CPI, one of two key plans that guides CPI activity.
Steering Committee	The steering committee comprises senior-level stakeholders who carry out CPI-related planning, identify key metrics, establish CPI infrastructure, monitor performance, and facilitate process improvement when necessary.
Support Team	The support team comprises dedicated and ad hoc resources that facilitate and implement CPI planning. The support team may be organizational based or may have experts brought in as needed from other activities (e.g., HQ) or the commercial sector.
Supply Chain Management (SCM)	Proactively directing the movement of goods from raw materials to the finished product delivered to customers. SCM aims to reduce operating costs, lead times, and inventory and increase the speed of delivery, product availability, and customer satisfaction.
Surge	Rapid increase in demand.
Takt Time	Takt is German for beat (as in the beat of music). In CPI thinking, takt time is the available production time divided by the rate of customer demand. Takt time sets the pace of production to match the rate of customer demand and becomes the heartbeat of the system.
TDY	Temporary Duty/On duty (military or civilian) at other than home station.
Theory of Constraints (TOC)	A philosophy and a methodology for addressing logical thinking, scheduling and controlling resources, and measuring performance. The philosophy emphasizes that a systems constraint exists in any process and controls the output from the entire process.
Total Lead Time	Duration of a process from beginning to end.
Total Productive Maintenance	A set of techniques to ensure every machine in a process is always able to perform its required tasks. Focused on avoiding and eliminating breakdowns or maintenance delays, and increasing capacity. Includes: Preventative Maintenance, Corrective Maintenance, Maintenance Prevention and Breakdown Maintenance.
Total Quality Management (TQM)	A concept which requires management and resource commitment to adopt a perpetual improvement philosophy, through succinct management of all processes, practices and systems throughout the organization to fulfill or exceed the customer expectations.
Total Value-Added Time	The total time in a process during which the value of the product going through the process to the customer is increased.
Value	A need the customer is willing to pay for, expressed in terms of a specific required product or service.

Value-Added ..... The parts of the process that add worth to the customer's product or service. To be considered value added, the action must meet *all three* of the following criteria:

- The customer is willing to pay for this activity.
- It must be done right the first time.
- The action must somehow change the product or service in some manner.

Value Categories..... Pure Value, Business Value, Non-value added.

Value Stream ..... The specific activities required to design, order, and provide a specific product or piece of information, from concept to launch, order to delivery into the hands of the customer. In DoD, a term used to encompass all the planning, execution, products, and services that go into an organization-wide process to create value for the customer.

Value Stream Map ..... Identification of all the specific activities occurring along a value stream for a product or product family.

Variability ..... An aspect of an item or process that is likely to be unstable or has an inherent/inborn chance of unpredictability.

Vision ..... The Vision is a clear depiction of the future that describes clearly yet succinctly how the organization will conduct business on a day-to-day basis.

Visual Management ..... Tools which allows management to quickly visually determine whether a process is proceeding as expected or is in trouble.

Warfighter ..... For DoD CPI, the ultimate customer. The warfighter is the ultimate focus of CPI activity and should drive the key metrics that serve as the focal for alignment of subordinate metrics and for the synchronization of CPI activity.

Waste..... Anything that adds cost or time without adding value. Generally, waste includes: injuries, defects, inventory, overproduction, waiting time, motion, transportation, and processing waste. Waste is often placed into the following categories:

- Overproduction - to produce an item before it is actually required.
- Waiting - whenever goods are not moving or being processed, the waste of waiting occurs.
- Transporting - moving product between processes is a cost that adds no value to the product.
- Inappropriate Processing - Often termed as "using a bazooka to swat flies," many organizations use expensive high precision equipment where simpler tools would be sufficient.
- Unnecessary Inventory - stockpiles of both in-process and finished goods inventories are a direct result of overproduction and waiting.
- Unnecessary/Excess Motion - this waste is related to ergonomics and is seen in all instances of bending, stretching, walking, lifting, and reaching.
- Defects - having a direct impact to the bottom line, quality defects resulting in rework or scrap are a tremendous cost to organizations.
- Underutilization of Employees - failure of organizations to capitalize on employees' creativity.

Work in Process (WIP)..... At any given time, items currently somewhere between the start of a process and the end of the process. In a CPI system, standardized work-in-process is the minimum number of parts (including units in machines) needed to keep a cell or process flowing smoothly.

Work Group..... The work group is the key implementation activity for CPI projects that improve operations. Work groups are comprised of members who have functional expertise in operations in the value stream being assessed and improved. Work group members also have expertise in CPI tools or the team is augmented with such capabilities.

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