



OFFICE OF DEPUTY CHIEF MANAGEMENT OFFICER
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MAR 03 2009

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Department of Defense (DoD) Continuous Process Improvement (CPI) /
Lean Six Sigma (LSS) Program Office Practitioner Body of Knowledge and
Certification Requirements

- References: (a) Department of Defense Directive 5010.42, "DoD-Wide Continuous
Process Improvement/Lean Six Sigma Program," May 15, 2008
(b) Office of the Under Secretary of Defense Memorandum, "Department
of Defense Lean Six Sigma Program Office Green Belt
and Black Belt Certification Requirements," January 18, 2008
(c) Department of Defense, "Continuous Process Improvement/Lean Six
Sigma Guidebook Revision 1," July 2008

In accordance with reference (a), the attached documents establish minimum certification criteria for DoD CPI/LSS Master Black Belts, Black Belts, and Green Belts, and establish the standard DoD Body of Knowledge (BoK) requirements for DoD Champion, Master Black Belt, Black Belt, and Green Belt training. This memo supersedes reference (b) and updates reference (c).

DoD organizations/entities that execute CPI/LSS training and certification shall begin to incorporate this criteria immediately. The enclosed certification requirements are based on existing DoD CPI/LSS certification standards and training plans; therefore, alignment is not expected to pose significant challenges.

Master Black Belt, Black Belt, and Green Belt certificates will continue to be issued by the appropriate CPI Program Offices.

Please contact the DoD LSS Program Office by either phone or email for further clarification. The program office phone number is 703/693-0300 and the email is dodcpi@osd.mil.

A handwritten signature in black ink, appearing to read "Elizabeth A. McGrath".

Elizabeth A. McGrath

Assistant Deputy Chief Management Officer

Attachment:
As stated



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February 24, 2009

DoD CONTINUOUS PROCESS IMPROVEMENT (CPI) / LEAN SIX SIGMA (LSS)
PROGRAM OFFICE MEMORANDUM 01/2009

SUBJECT: Department of Defense (DoD) Continuous Process Improvement (CPI)/Lean Six Sigma (LSS) Program Office Body of Knowledge (BoK) and Certification Requirements

This memorandum provides updated information regarding the DoD standard for Lean Six Sigma certification and training as listed in Attachments 1 and 2.

It is a Department-wide imperative to establish alignment and consistency of approach in training and certifying DoD CPI professionals. A common BoK and certification standards are necessary to properly align DoD CPI / LSS efforts, and form a baseline to establishing common training curricula. Additionally, this BoK will assist in developing a consistent language and terminology, and will align to best practice CPI methodologies to improve present performance.

These documents are established as minimum standards and are not intended to constrain innovation or continuous improvement. I anticipate and encourage experimentation and maturation of these and other CPI methodologies. The DoD LSS Program Office will conduct periodic, collaborative reviews as necessary to accelerate the Department's maturity. CPI/LSS Program Offices will reference and apply these DoD standards, encouraging replication to reduce cycle time and promote effectiveness.

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J.D. Sicilia

Director, Lean Six Sigma Program Office

Attachments:

1. DoD Lean Six Sigma Belt Certification Matrix
2. DoD LSS Bodies of Knowledge



Department of Defense CPI / LSS Certification Standards

Level 1 (Green Belt)	Level 2 (Black Belt)	Level 3 (Master Black Belt)	Additional Notes
40 hours instructed content covering the Body of Knowledge (BoK)	160 hours instructed content covering the Body of Knowledge (BoK)	120 hours additional ongoing training in CPI-related content	<p>Note that 40 hours of GB training may count toward the total of 160 hours required for BB training. GB / Level 1 is not necessarily a prerequisite for BB / Level 2 training but is encouraged.</p> <p>BB / Level 2 training IS a prerequisite for MBB / Level 3 training.</p> <p>For Level 3 / MBBs an additional 120 hours of ongoing CPI-related training is required; while this does not have to be a formal Level 3 / MBB training program, this is encouraged.</p>
GB Final Exam (70% Passing Score)	BB Final Exam (70% Passing Score)	<p>If formal Level 3 / MBB training <u>is</u> received, pass post-training exam (70% Passing Score)</p> <p>If formal Level 3 / MBB training <u>is not</u> received, pass a valid/recognized 3rd party Level 2 / BB certification exam.</p>	<p>Level 3 / MBBs who do not receive formal LSS MBB training are required to take and pass a third party certification exam. Examples include but are not limited to The American Society for Quality Certified Six Sigma Black Belt (CSSBB) exam, the Department of the Navy / ASQ Lean Six Sigma Black Belt (LSSBB) exam, and the AME/SME/Shingo Institute Silver Lean Certification.</p> <p><i>It is anticipated</i> that by 2010 the DoD will align to a common certification exam based on the common DoD Level 2 / BB Body of Knowledge and curriculum standards currently under development. This Level 2 / BB exam will be encouraged but <u>not</u> required for DoD Level 2 / BBs pursuing Level 2 certification. However, <i>it will be required</i> for certification as a Level 3 / Master Black Belt.</p>
n/a	n/a	<p>Minimum 3 yrs certified CPI experience supporting achievement of Level 3 / MBB core competency taxonomy levels.</p> <p>Industry internship recommended but not required.</p>	<p><i>Minimum</i> industry standard for Master Black Belt / Level 3 certification is 3-5 years. DoD is adopting the absolute minimum industry standard for experience in order to balance the need to rapidly stand up organic resources in the Level 3 / MBB role without compromising the indispensable element of real-world practitioner experience prior to moving into the role of leader and mentor. <i>Critical</i> to this certification requirement is recognition that there is no fast track to experience, and training alone cannot produce the caliber of Level 3 / MBB required to lead the DoD CPI efforts. Note that lack of experience does not preclude an individual from serving in the <i>capacity</i> of MBB; experience is required prior to <i>certification</i>. Non-Lean or Six Sigma certifications and experience may be considered on a case-by-case basis.</p>
1 Project or Rapid Improvement / Kaizen Event with measurable results	2 BB/Lvl 2 Projects (Notional 6 months ea.) w/ measurable results	2 Strategic-level projects (that is, cross-departmental, leveragable / replicable, multi-command or cross-agency - type projects) with measurable results. Notional 4-6 months each.	<p>Note that "Rapid Improvement Event" and "Kaizen Event" are considered synonyms and are expected to follow a standard planning, analyzing, implementation, and follow-up process (8-step, DMAIC, IOPPIA, or some similar problem-solving methodology). These events should require a team approach and are NOT simply "just do it" activities.</p> <p>For MBB / Level 3 projects, note that where appropriate the plan for deploying project replication may be acceptable in lieu of fully implemented replications. Goal is to demonstrate strategic-level thinking during project implementation.</p> <p>Also note that after 3 years or more of CPI experience, these experienced BBs should have completed MANY projects. If they have not leveraged at least two of these projects on a wider level, they are not demonstrating MBB-level strategic thinking and are not ready for certification.</p>
Awareness / Just-in-time (JIT) project team training	JIT team training for BB project team Where practicable, teach/assist w/ Level 1 / GB training	Assist in teaching one Level 2 / BB Wave	<p>Properly facilitated project work will meet the minimum Level 1 / GB and Level 2 / BB teaching and mentoring requirements. While Level 2 / BBs are encouraged to teach and mentor Level 1 / GBs, it is <u>not</u> required for certification.</p> <p>To serve in full capacity as a Level 3 / MBB requires more than just mentoring skills. Classroom skills must be demonstrated, and delivering training is therefore required, both to demonstrate the skill set and to encourage the additional level of understanding brought about by teaching.</p>
GB/Lvl1 experience validated by at least one BB/Lvl2, and approved by local CPI Program Office	BB/Lvl2 experience validated by at least one MBB/Lvl3 and approved by local CPI Program Office	MBB/Lvl3 experience validated by at least one MBB/Lvl3 and approved by CPI Program Office at HQ for Activity, Agency, or Service	<p>Note pull system for OSD to tap DoD-wide resources for cross-service work in order to meet cert requirements for MBB. All certified MBB / Level 3 personnel are known and approved by the Agency or Service HQ, ensuring high-level awareness and access to these highly trained personnel for deploying critical cross-agency, high impact improvement efforts.</p>

Note: Level 1 / GB training is not a required prerequisite for Level 2 / BB certification. However, successful completion of Level 2 / BB certification is mandatory prior to MBB certification.

DoD CPI / LSS Body of Knowledge

BoK Topic Number	Core Competency	Supporting Competency	Subtopics	Description	Level 1 / Core GB	Level 2 / BB	Level 3 / MBB	Champ
I. Soft Skills		A.	Mentor		Taxonomy Level (1-4)*			
I. Soft Skills	A.1.	Mentor	Initiating Teams	Describe and identify the elements required when launching a team (e.g., clear purpose and goals, commitment, ground rules, etc.) and how they affect the team's success (e.g., ability to gain support from management, team empowerment, team cohesion, etc.).	3	3	3	1
I. Soft Skills	A.2.	Mentor	Selecting Team Members	Determine the appropriate number and type of team members (e.g., skills sets, technical/subject-matter expertise, etc.) based on the team's charter and goals, and ensure appropriate representation of the stakeholders.	N/A	2	3	2
I. Soft Skills	A.3.	Mentor	Team Roles and Responsibilities	Define and describe team roles and responsibilities, including team leader, facilitator, etc.	3	3	3	1
I. Soft Skills	A.4.	Mentor	Team Stages	Identify and facilitate the stages of team evolution (forming, storming, forming, performing, adjourning/mourning).	3	3	3	n/a
I. Soft Skills	A.5.	Mentor	Team Building	Apply various techniques (e.g., coaching, mentoring, intervention, etc.) to build and guide a team, and use appropriate tools to overcome common problems such as overbearing, dominant, or reluctant participants, the unquestioned acceptance of opinions as facts, groupthink, feuding, floundering, the rush to accomplish/finish, digressions, and tangents.	2	4	4	n/a
I. Soft Skills	A.6.	Mentor	Team Facilitation and Management	Apply various facilitation techniques to maximize team buy-in and performance, including active listening and psychological assessments (MBTI, SDI, etc.), running effective meetings, agendas, roles, rolling action item lists, etc..	3	3	4	3
I. Soft Skills	A.7.	Mentor	Team Performance Evaluation	Measure team progress in relation to goals, objectives, and metrics that support team success, and recognize and reward accomplishments.	3	3	4	2
I. Soft Skills	A.9	Mentor	Team Tools	Define, select, and apply the following creative and management and planning tools used by teams in various situations: brainstorming, nominal group technique, multi-voting, affinity diagrams, tree diagrams, various matrix diagrams and interrelationship digraphs, activity network diagrams, etc.	3	3	4	n/a
I. Soft Skills		B.	Coaching		Taxonomy Level (1-4)*			
I. Soft Skills	B.1.	Coaching	Coaching Conversation	Understanding the difference between a coaching role and a mentoring role. Learning the 3 level technique of utilizing a coaching conversation to drive results and learning.	N/A	2	3	3

ATTACHMENT 2

* Taxonomy Levels:

1 = Awareness 2=Appreciation 3 = Application 4 = Authority

DoD CPI / LSS Body of Knowledge

I. Soft Skills	B.2.	Coaching	Coaching Skills - critical x's	enhancing and defining coaching skills regarding active listening, asking probing questions, coaching goal setting, effective feedback and offering options.	N/A	2	3	3
I. Soft Skills	B.3.	Coaching	Monitoring Progress	Establish and utilize a method for understand and adapting style to increase effectiveness	N/A	2	3	2
I. Soft Skills	C.	Change Agent	Taxonomy Level (1-4)*					
I. Soft Skills	C.1.	Change Agent	Effective Change Management Roles and Methods	Understand the role and importance of the change agent, as well as levels and types of change agents within the organizational structure.	2	3	4	3
I. Soft Skills	C.2.	Change Agent	Organizational Roadblocks	Identify the inherent structures of an organization (such as its culture and construct) and describe how they become barriers to improvement. (Understand) Tools may include organizational assessments, cultural assessments, evaporating cloud, etc.)	2	3	4	3
I. Soft Skills	C.3.	Change Agent	Motivational techniques	Define and apply various techniques used to support and sustain participation in process improvement efforts.	2	3	3	2
I. Soft Skills	C.4.	Change Agent	Conflict Resolution	Use various techniques to help conflicting parties recognize common goals and ways they can work together to achieve them. Includes identifying source of conflict, managing conflict, and dealing with difficult people	2	3	4	2
I. Soft Skills	C.5	Change Agent	Change Management	Includes change cycles, thought leadership, vision, day job integration, and to a limited extent strategic alignment (overlaps with Management / Leadership)	1	3	4	3
II. Management / Leadership	A.	Project Manager	Taxonomy Level (1-4)*					
II. Management / Leadership	A.1.	Project Manager	Project or Event Chartering	Create a project charter, including target or objectives, problem / opportunity statement, scope, boundaries, etc. for a kaizen event or Lean Six Sigma project. Use various negotiation techniques when changes to the charter are proposed by various stakeholders and team members, and determine when it is appropriate to make changes to the charter. Tools may include SIPOC, Charter, scope analysis, stakeholder analysis, Mission & Vision statement development, etc.	2	2	4	3
II. Management / Leadership	A.2.	Project Manager	Project Planning & Tracking	Create and manage a project plan, including expected implementation timeline, resources, milestones, tollgate reviews, deliverables, transition, and closure. Tools may include POA&M, Action Item Register, Gantt Chart, Project Newspaper, Tollgate Reviews, check lists, etc.	2	2	3	3
II. Management / Leadership	B.	Leadership	Taxonomy Level (1-4)*					
II. Management / Leadership	B.1.	Leadership	Business Systems and Processes	Identify the interrelationships between organizational structure and processes. Describe how the selection and management of value streams relates to the organizational structure and processes, and confirm the link of value streams to organizational strategic plans.	2	3	4	2

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DoD CPI / LSS Body of Knowledge

II. Management / Leadership	B.2.	Leadership	Managing/ Leading People	Includes dealing with difficult people, situational leadership, temperaments and personalities appreciation, as well as communication, influencing, building trust, and innovation. Overlaps with coaching and mentoring / team skills and conflict management.	1	3	4	2
II. Management / Leadership	B.3.	Leadership	Strategic Planning, Alignment, and Deployment	Enterprise or end-to-end value stream analysis, linking mission and vision to core and enabling value streams, identifying organizational and value stream constraints, mapping specific projects and improvement events to the strategic constraints, and managing the plan of action for value stream transformation. Includes understanding types of organizational and transactional systems, comprehension of systems components, and application of systems approach to ensure strategic project selection to maximize organizational impact of projects and events. Tools may include SIPOC, value stream mapping/analysis, VA/NVA identification, takt charts, inventory identification, DBR/constraint management, POA&M, hoshin-kanri, etc.	1	3	4	3
II. Management / Leadership	B.4.	Leadership	Resource Management	Applying sphere of influence and real and perceived rank in order to ensure appropriate team members and subject matter experts (SMEs) are available from across the value stream in order to support projects and improvement efforts. Applying the title of Champion to project activities, including breaking down barriers and supporting team implementation plans.	1	1	3	3
II. Management / Leadership	B.5.	Leadership	Process Governance/Ownership	Demonstrating ownership of processes beyond direct authority, including applying sphere of influence to on cross-departmental activities.	N/A	N/A	4	3
II. Management / Leadership	B.6.	Leadership	Enterprise Leadership Roles and Responsibilities	Identify the roles and responsibilities of executive leadership and how their involvement can affect the deployment of CPI / LSS initiatives (e.g., providing resources, accountability, etc.).	N/A	N/A	3	4
II. Management / Leadership	B.7.	Leadership	LSS Roles and Responsibilities	Define the roles and responsibilities of Level 1 (Green Belt), Level 2 (Black Belt), Level 3 (Master Black Belt), Value Stream Champion, Project Champion/Sponsor, Process Owners, Customers, and Stakeholders.	2	3	3	2
II. Management / Leadership	B.8.	Leadership	Strategic Communications	Sharing project and event results for maximum visibility and leveragability/knowledge sharing. Tools may include steering committees, A3 / 6-panel reports, storyboards, project management databases, hoshin, conferences, visual display of data and information, etc. Also, develop and deploy communication plans that support process improvement efforts and will help prevent rumor, false expectations, and other obstacles from interfering with successful implementation of the change. Tools may include stakeholder analysis, communication plans, hoshin-kanri, pareto analysis, etc.	2	3	4	2
II. Management / Leadership	C.	Deployment Skills			Taxonomy Level (1-4)*			

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DoD CPI / LSS Body of Knowledge

II. Management / Leadership	C.1.	Deployment Skills	Understanding, managing, and measuring risk	Understand the link between process change and organizational risk and apply appropriate risk management and risk mitigation techniques.	1	2	3	2
II. Management / Leadership	C.2.	Deployment Skills	Leveraging Improvements	Apply knowledge management, hoshin, and sphere of influence to maximize the communication and leveraging of new knowledge obtained from project. Overlaps with innovation transfer, methodology expert, strategic communications, and change agent skills	2	3	4	2
II. Management / Leadership	C.3.	Deployment Skills	Sustainability	CPI maturity model. Assessment of current state with expectation of driving toward self-sufficiency and sustainable improvement	N/A	N/A	3	4
III. Technical Skills	A.	Methodology Expert			Taxonomy Level (1-4)*			
III. Technical Skills	A.1.	Methodology Expert	Organizational-Specific Deployment Methods	Includes deployment model (8-Step, DMAIC, OODA, PDCA, loPPEA, etc.) as well as high- and mid-level CPI mission, vision, and objectives. Also includes implementation models (project, rapid improvement/kaizen events, 5-S, just-do-its, etc.) and historical context of the organization's deployment methodologies.	2	3	4	3
III. Technical Skills	A.2.	Methodology Expert	Metrics identification	Understand different types of and uses for data, including data categories at both a high level (voice of the customer, voice of the process, voice of the business), and a low level (qualitative vs. quantitative, continuous vs. discrete, binomial vs. count/Poisson). Also includes sampling strategy, and data collection and validation methodologies. Tools may include measurement system analysis, gage repeatability and reproducibility, balanced scorecard, data collection plans, etc.	2	3	4	2
III. Technical Skills	A.3.	Methodology Expert	Metrics analysis	Assessing meaning and importance of data through visual/graphical and statistical analysis. Tools may include pareto charts, histograms, control charts, correlation/regression, normality / distribution analysis, rational subgrouping, hypothesis testing, design of experiments, etc.	2	3	4	2
III. Technical Skills	A.4.	Methodology Expert	Project follow-up	Understand and implement project follow-up to ensure complete implementation, project effectiveness, and long-term sustainability. Tools may include control plans, control charts, gemba/waste-walks, management by walking around (MBWA), visual management methods, poka-yoke/mistake-proofing, work instructions/process standardization/training within industry (TWI) methods, institutionalized data collection/assessment, constraint monitoring, DOE, TPM, RCM etc.	2	3	4	2

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III. Technical Skills	A.5.	Methodology Expert	Project leveraging / repeatability	Post-deployment assessment of knowledge gained and potential opportunities for its application. Includes but is not limited to knowledge management, updating/maintaining project management/reference data bases, socialization/hoshin of key learning points vertically and horizontally. Tools may include hoshinkanri, improvement / success modes and effects analysis (IMEA/SMEA), lessons learned assessment, 8-D/Kepner-Tregoe, A3/6-panel reports, project replication teams, etc.	2	3	4	3
III. Technical Skills	A.6.	Methodology Expert	Performance Gap Analysis	Analyze process value stream and/or process performance and compare to organizational or process goals. Includes capability analysis, capability studies, and various capabilities indices and metrics (examples include PPM, DPMO, DPU, RTY, Cp, Cpk, process sigma, ABC, ROI, etc.).	2	3	4	1
III. Technical Skills	A.7.	Methodology Expert	Root cause discovery tools	Describe, use, and interpret various root cause analysis tools. Examples include five whys, fishbone (Ishikawa) diagrams, Cause and Effect (XY) Matrices, evaporating clouds, tree diagrams, 8 waste analysis, ideal state mapping, etc.	3	4	4	2
III. Technical Skills	A.8.	Methodology Expert	Process mapping	Visually displaying the process. Tools may include SIPOC, process maps, value stream maps, spaghetti diagrams, circle diagrams, etc.	3	3	4	2
III. Technical Skills	A.9.	Methodology Expert	Risk Analysis and Management	Understanding the law of unintended consequences. Assessing potential failure modes both within a process or value stream and within the process-improvement deployment. Tools may include FMEA, XY matrix, PDPC / tree diagrams, force field analysis, collateral Y brainstorming, etc.	2	3	4	n/a
III. Technical Skills	A.10.	Methodology Expert	Developing & implementing optimal solutions	Integrating data analysis and subject matter expert experience into determining and implementing best solutions for process improvement. Includes fact-based decision-making, generating and evaluating alternatives, and cost-benefit analysis. Tools may include benchmarking, graphical methods, piloting/beta-testing, hypothesis testing, correlation/regression, design of experiments, takt charts, Value-add/non-value-add assessment, work instructions, mistake proof/poka-yoke, quick change-over/SMED, just-in-time/kanban/pull systems, hijunka/level-loading, work cells/teams, drum-buffer-rope (DBR), critical chain management, total productive maintenance (TPM) / reliability-centered maintenance (RCM), point-of-use storage, Kaizen events etc.	3	3	4	2
III. Technical Skills	A.11.	Methodology Expert	Project selection	Describe how projects or kaizen / Rapid Improvement Events are identified and selected, such as identifying constraints in the value stream and knowing when to use Lean Six Sigma instead of other problem-solving approaches. (Understand). Tools may include XY matrix, value stream mapping / analysis, interrelationship digraphs, evaporating cloud, takt charts, pareto charts, etc.	1	3	4	2

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DoD CPI / LSS Body of Knowledge

III. Technical Skills	A.12.	Methodology Expert	Value stream identification	Understand and identify core, governing, and enabling processes. Determine system boundaries and/or project scope. Tools may include hoshin/strategic planning, value stream mapping and analysis, mission and vision statement development, etc.	1	2	4	3
III. Technical Skills	B.	Trainer			Taxonomy Level (1-4)*			
III. Technical Skills	B.1.	Trainer	Training Plan	Apply appropriate thoughtfulness to deliver appropriate training at the appropriate place and time. Tools may include just-in-time training, mission analysis, capabilities and task analysis, training plans, curricula development, story board/A3s, message mapping, audience alignment, etc.	n/a	2	3	2
III. Technical Skills	B.2.	Trainer	Critical thinking & taxonomy levels	Understand and apply taxonomy levels to ensure appropriate application of blended learning techniques to deliver appropriate training with most effective use of time and resources. Tools may include Bloom's taxonomy, learn-do methods, blended learning methods, outcome-based or task-based analysis, training style, managing a room, using multi media, successful environment, etc.	n/a	2	3	2
III. Technical Skills	C.	Financial Skills			Taxonomy Level (1-4)*			
III. Technical Skills	C.1.	Financial Skills	Financial Metrics	Includes understanding and application of financial metrics appropriate to your organization and project. Tools may include Net Present Value, Return on Investment, Activity Based Costing, Value Stream Accounting, Labor content planning, etc. as well as appropriate information technology to support financial tracking	1	1	3	3
III. Technical Skills	C.2.	Financial Skills	Types of Savings	Apply appropriate financial metrics to project / process improvements, including hard savings / year-over-year budget savings, soft savings / cost avoidance / prevention of future expenditures without decreasing budget line items, and safety/quality of life improvements which demonstrate no immediate link to current or future budgets, but that are known to have positive long-term / out-year fiscal impact due to reduced turn-over, reduced health risks, etc.	2	3	4	3
III. Technical Skills	D.	Lean Skills			Taxonomy Level (1-4)*			
III. Technical Skills	D.1.	Lean Skills	Eliminate Wasteful Activities (Muda)	Apply CPI tools to eliminate non-value-added activity from the process. Tools may include 5-S, process maps, value stream maps, gemba/"go-see", spaghetti diagrams, circle diagrams, work cells, quick change over/SMED, visual management / visual display of information, point of use materials, just-in-time, etc.	3	3	4	3

ATTACHMENT 2

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DoD CPI / LSS Body of Knowledge

III. Technical Skills	D.2.	Lean Skills	Eliminate inconsistencies in the system / Mura	Apply CPI tools to eliminate variation from the process. Tools may include 5-S, process maps, value stream maps, gemba/"go-see", standard work, flow analysis, visual management / visual display of information, process standardization, standardize training/training within industry (TWI) methods, error-proofing/poka-yoke, root cause analysis, tree diagrams, hypothesis testing, correlation/regression, design of experiments (DOE), control plans, descriptive and inferential statistics, probability distributions, measurement system analysis, gage repeatability and reproducibility, control charts / SPC, etc.	3	3	4	3
III. Technical Skills	D.3.	Lean Skills	Eliminate physical strain in the system / Muri	Apply systems thinking and logical thinking processes to value stream analysis and CPI tools to eliminate constraints from the process. Tools may include 5-S, process maps, value stream maps, gemba/"go-see", WIP analysis, flow analysis, circle diagrams, work cells, quick change over/SMED, critical chain project management (CCPM), drum-buffer-rope (DBR), supply chain management, takt charts, workload leveling, queuing theory, tree diagrams, etc.	3	3	4	3
III. Technical Skills	E.	Design and Innovation			Taxonomy Level (1-4)*			
III. Technical Skills	E.1.	Design and Innovation	Applied Innovation	Apply "creativity over capital" methodologies to increase value-added process steps, especially from a customer-focused perspective. Tools may include TRIZ/ARIZ, brainstorming, Quality Function Deployment (QFD), Design for Six Sigma / Design for "X" methodologies (Includes such items as Design for Safety, Reliability, Testability, Features, Manufacturability, Serviceability, Assembly, Maintainability, Ergonomics, Appearance, Packaging, Decreased Cycle Time, etc. In general, Design for Six Sigma encompasses DFX), etc.	N/A	2	3	n/a
III. Technical Skills	E.2.	Design and Innovation	Innovation Transfer	Apply leveraging and benchmarking techniques to maximize knowledge transfer, both from previous projects into your own, and from your own project into easy-access knowledge packets to transfer to similar improvement applications organization-wide. Tools may include benchmarking, Improvement/Success Modes and Effects Analysis (I/SMEA), data base / knowledge management software, etc.	2	3	3	2

ATTACHMENT 2

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