The Potential for Lean Acquisition of Software Intensive Systems

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The lean program office is sharply focused on customer value, and accomplishes its tasks with a cyclic rhythm that responds to the needs of its customers and stakeholders. Under lean program management, simultaneous teams accomplish their work in a highly synchronized manner, removing defects at the point of inception. The Chief Engineer owns the system architecture, and ensures that the activities of the highly skilled program staff are architecture-centric.

The lean program office team is fast, flexible, learns quickly, and responds to change quickly, using mature, controlled processes that are improved quickly. The improvement infrastructure is lean, CMMI-compliant, and uses six sigma mechanisms and process control approaches. The staff has eliminated waste in their processes (which are integrated with key contractor and stakeholder processes), and ensures support functions are accomplished in an efficient manner. They communicate with each other and with key stakeholders visually, employing Kanban decision making where appropriate.
“What, are you crazy?!”
(to Mr. Sakamoto -“Gung Ho”-1986)

Some outrageous claims follow.

Lean Thinking has not been fully brought to bear on acquisition problems.

- Lean is MUCH more than waste elimination and resource reduction.
- The full context of Lean Thinking in creative environments is applicable to the Acquisition domain.

The CMMI is a KEY ENABLER for the adoption of Lean Thinking in creative environments.

Together, Lean Thinking and the CMMI offer a unique solution space to some of the most stressing problems.

Lean Thinking, the CMMI, and Six Sigma are perfectly interactive, mutually reinforcing approaches, that, together, provide an improvement and operational paradigm that is at least an order of magnitude better than any of them alone.
Lean/CMMI/Sixσ Venn Diagram

- Strategic focus
- Customer value
- Rapid improvement

Improvement framework
- Mature best practices
- Robust appraisal methods

Lean Thinking

6σ

Process Control

CMMI
Experience in Lean Software Development

Application of Lean Software Development in a CMMI-DEV compliant environment has led to:

- Higher productivity
- Reduced product defects
- Much faster cycle times/product through-put
- Integration of project performance with CMMI capability or maturity
- Faster learning teams and organizations
- Absolute solution to "buy-in" issues
- (Much) faster improvement of processes and performance
The Real Content....
Outline

Background:
- What is Lean for creative environments about?
- Why is the CMMI a valuable “lean enabler”?

What is the Lean Program Office?
- What it looks like
- How it might operate

How can we get there from here?
Lean Thinking for Creative Environments

Sharp, continuously refreshed focus on customer value
Iterations and synchronization (acquisition cadence)
Agile program management
Highly skilled individuals
Highly developed teams
Rapid improvement
Rapid learning
Kanban visualization and decision making
Architecture-centricity
Waste elimination

A SURPRISING THING HAPPENED
The CMMI is a Lean Enabler

Mature set of domain-specific practices

- System, software, and hardware development
- Acquisition
- Lean interpretation is now an accepted practice
  - Required elements (goals)
  - Expected elements (practices)

Proven infrastructure for process management

- Responds to observed lack of lean process mgt.
- Multiple VSMs may lose data and process workflow/process interfaces

Accommodating appraisal method

- SCAMPI is a well respected method with three value/ROI propositions
- SCAMPI supports assessment of lean objectives and lean alternative practices
Lean Application of the CMMI-ACQ

16 core process areas

6 Acquisition-Specific process areas

Goals are all REQUIRED elements of the model

Practices are all EXPECTED elements

- Alternatives (for practices that may not support lean operations) may be substituted (even many-for-one if appropriate)

- The Goal must always be supported

Extensive experience base in “leaning” CMMI practices

In the end, CMMI-ACQ will be a high-value Lean enabler for the Lean Program Office
CMMI-ACQ Process Areas

List of Core Process Areas

The following processes are considered core in the CMM Foundation:

- Causal Analysis and Resolution (CAR)
- Configuration Management (CM)
- Decision Analysis and Resolution (DAR)
- Integrated Project Management (IPM)
- Measurement and Analysis (MA)
- Organizational Innovation and Deployment (OID)
- Organizational Process Definition (OPD)
- Organizational Process Focus (OPF)
- Organizational Process Performance (OPP)
- Organizational Training (OT)
- Project Monitoring and Control (PMC)
- Project Planning (PP)
- Process and Product Quality Assurance (PPQA)
- Quantitative Project Management (QPM)
- Requirements Management (REQM)
- Risk Management (RSKM)
Lean Application of CMMI Practices (Examples)

Technical Reviews

Examples of technical reviews that can be conducted include the following:

- Initial Technical Review (ITR)
- Alternative System Review (ASR)
- Integrated Baseline Review (IBR)
- Technology Readiness Assessment (TRA)
- System Requirements Review (SRR)
- System Functional Review (SFR)
- Preliminary Design Review (PDR)
- Critical Design Review (CDR)
- Test Readiness Review (TRR)
- System Verification Review (SVR)
- Production Readiness Review (PRR)
- Operational Test Readiness Review (OTRR)
- Physical Configuration Audit (FCA)

Lean would suggest:

- Creative iterations
- Continuous test and defect removal
- Visual metrics
- Kanban decisions
- Possibly synchronous teams
Lean Application of CMMI Practices (Examples)

Risk Management

SG 1 Prepare for Risk Management
- SP 1.1 Determine Risk Sources and Categories
- SP 1.2 Define Risk Parameters
- SP 1.3 Establish a Risk Management Team

SG 2 Identify and Analyze Risks
- SP 2.1 Identify Risks
- SP 2.2 Evaluate, Categorize, Prioritize

SG 3 Mitigate Risks
- SP 3.1 Develop Risk Mitigation Plans
- SP 3.2 Implement Risk Mitigation Plans

Lean would suggest:
- Rapid mitigation
- Mgt. focus on mitigation velocity
- Integrated risk management
- Predictable Risk Mgt. work cycles
Lean Application of CMMI Practices (Examples)

Process and Product Quality Assurance

SG 1 Objectively Evaluate Processes and Work Products
- SP 1.1 Objectively Evaluate Processes
- SP 1.2 Objectively Evaluate Work Products and Services

SG 2 Provide Objective Insight
- SP 2.1 Communicate and Ensure Process Understanding
- SP 2.2 Establish Records

**Lean would suggest:**
- Synchronous audit cycles
- Kanban notifications and “pull” audits
- Prepared teams, rapid audits
- Defects identified and eliminated in days, not weeks or months
What is the Lean Program Office?
What is the Lean Program Office?

- Fast learning and early maturity
- Led by an Agile Program Manager
- Architecture-Centric Operations
- Process Integration and Synchronization
- Kanban visual Decisions
  - Mature Lean PMO processes tightly coupled to development team processes
  - Visual metrics or indicators pushed to right person at right time
  - NO mgt. direction
  - Activities are pulled by PMO team
  - VISUAL architectures are needed

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What Makes Lean Work?

- Constant focus on customer value
- Waste elimination
- Shared vision/architecture
- Concurrency
  - Parallel cohesive activities
  - Information flow
- Iterations and synchronization
- Agile Project Management
- Rapid learning
- Skilled teams
- Rapid improvement
- Process ownership by the process "doer"
- Visualization and Kanban actions

Kaizen Team should OWN the process

Voice of the Customer

Value Stream Mapping

Continuous Waste Elimination

Mgt should NOT change the process except by going through Kaizen team

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When pointer enters yellow area, Mgt. Team takes a specific, immediate action

Enterprise or program dashboards

Eliminates much “wait time” and mgt. waste
What are Acquisition Iterations? (1 of 2)

Source Selection
- RFP generation and evolution
- Proposal evaluation

Program Execution
- Architecture evolution (creative iterations)
- Oversight of contractor team (operational cycles)
  - Contractor process capability
  - Requirements mgt.
  - Risk mgt. (lean risk mgt.)
  - Budget oversight
- Oversight of technical deliverables
  - Depends on developer life cycle (single step, incremental, spiral SW)
  - Preparation for technical evaluation
  - Technical evaluation
  - Feedback to developer in a timely manner
- PMO Team development
- Communications with stakeholders
What are Acquisition Iterations? (2 of 2)

[takt time drivers]

Acquisition cadence and synchronization allows the elimination of the following types of waste:

- Wait time and work product decay
- Motion
- Unused work products
- Task switching
Determining the Takt time... (added slide)

Takt Time: the rate that a completed product needs to be finished in order to meet customer demand. May be thought of as "cadence" or "heart beat" of the organization.

Drivers for Takt Time:

- Customer/user demands
- Congressional demands
- "System of systems" or "common system" demands
- Demands from other stakeholders
- Development team processes and schedules
Lean Teams

- Highly skilled team members
- Communicate openly
- Fast learners

Agile Program Manager
Chief Architect

Agile Engr. Support (CM/QA/Test)
Lean Organizations

- Provide rapid/lean improvement infrastructure
- Understand process and technology discipline
- Allow lean functions and team to own their processes
- Stimulate organizational learning
- Focus on customer-driven performance objectives
How Do We Get There from Here?
How do we get There from Here?

Perform Value Stream Mapping session for core PMO as early as possible

- Define PMO performance measures
- Identify near term "future state"

Add (lean) CMMI-ACQ as early as possible

Mentor lean/CMMI team members to develop tacit knowledge as quickly as possible

Adopt lean/CMMI processes based on workflows

Work toward a "Lean CMMI" PMO capability:

- Team Level 2 by RFP release?
- Team Level 3 by contract start?
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