The Potential for Lean Acquisition of Software Intensive Systems

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The Lean Program Office…..

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 followé .

Lean Thinking has not be cquisition problemsé

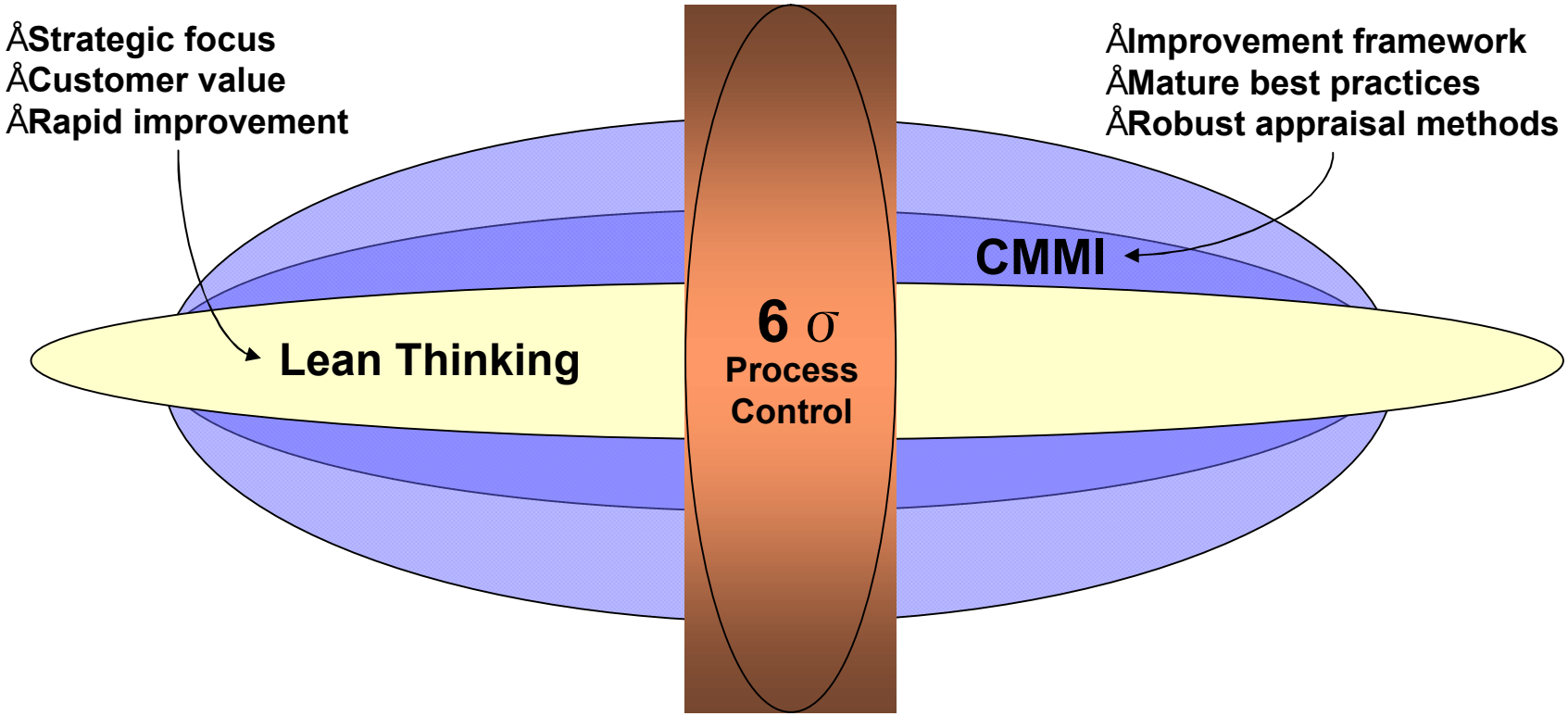
- Lean is MUCH mo esource reduction
- The full context of ironments is applicable to the Acquisition domai

The CMMI is a KEY ENA an Thinking in creative environments

Together, Lean Thinking solution space to some of the most stressing proble

Lean Thinking, the Sigma are perfectly interactive, mutua es, that, together, provide an improv paradigm that is at least an order of magnitude better than any of them alone.

Lean/CMMI/Sixσ Venn Diagram



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 ñbuy-inò 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 ñlean enablerò?

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 (ñacquisition cadenceò)

ñAgileòprogram management

Highly skilled individuals

Highly developed teams

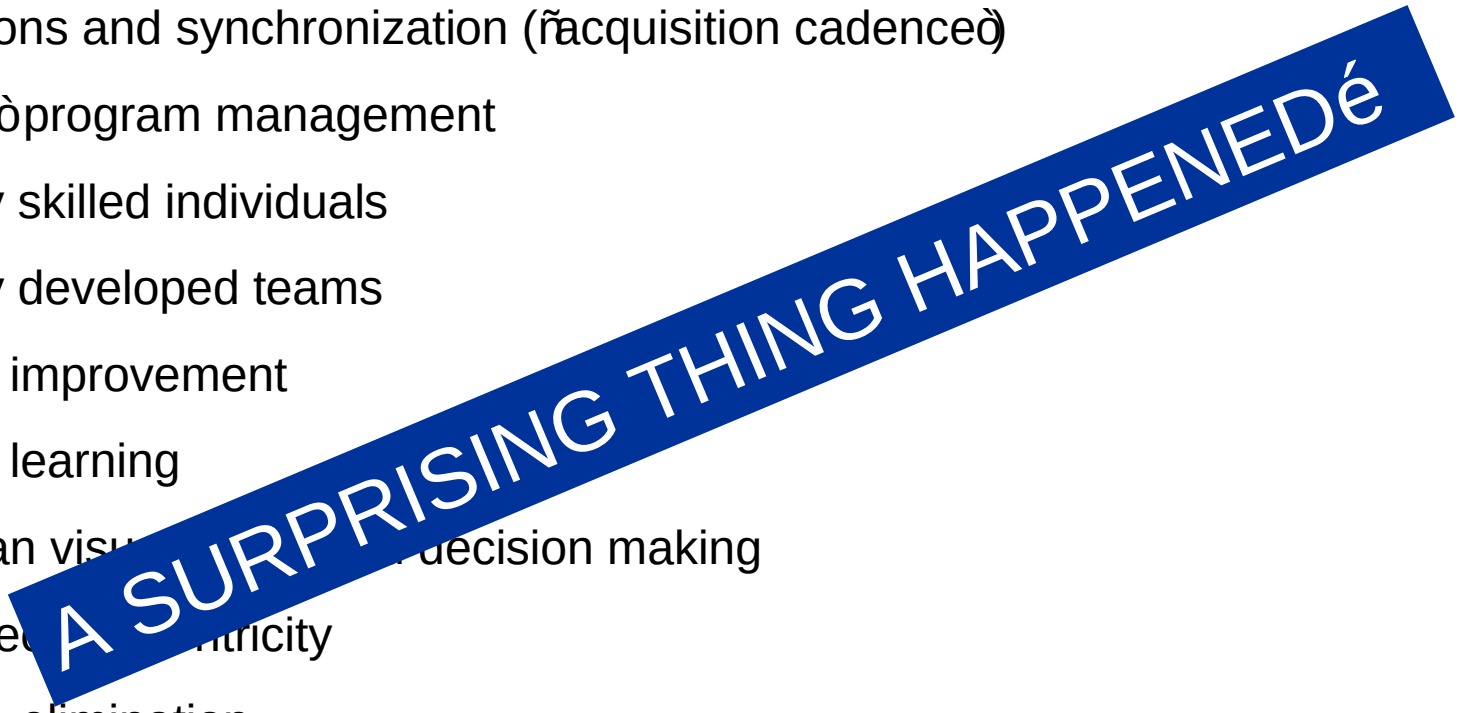
Rapid improvement

Rapid learning

Kanban visu decision making

Architec ntricity

Waste elimination



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 elementsé

- 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 ñleaningòCMMI practices

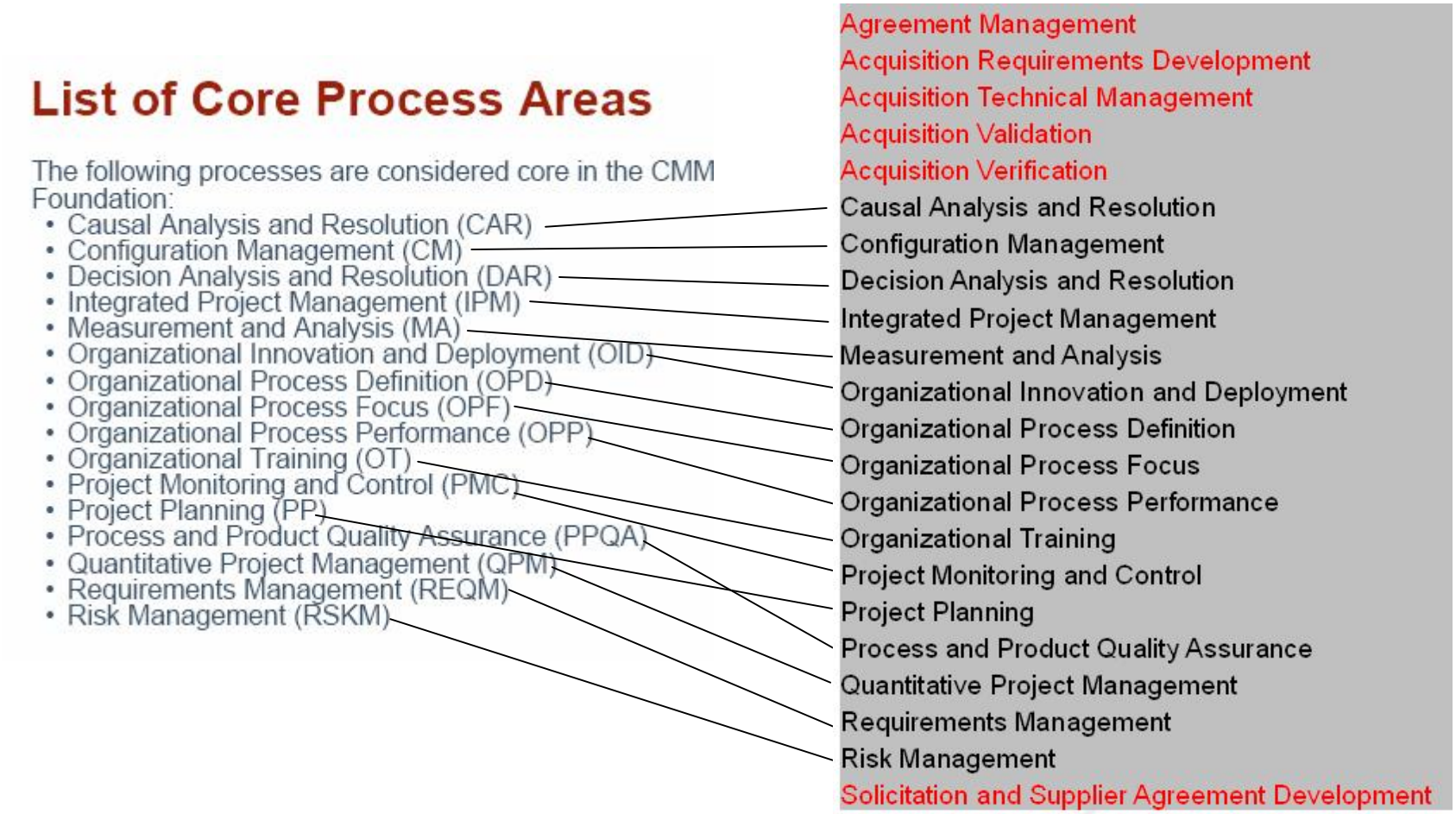
In the end, CMMI-ACQ will be a high-value Lean enabler for the Lean Program Office

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 (PCA)

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 Parame
- SP 1.3 Establish a Risk Ma

SG 2 Identify and Analyze Risks

- SP 2.1 Identify Risks
- SP 2.2 Evaluate, Categorize

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 En
- 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?

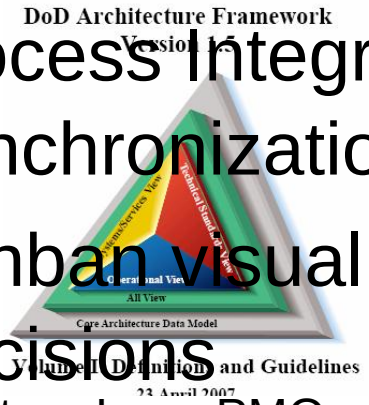
Fast learning and early maturity

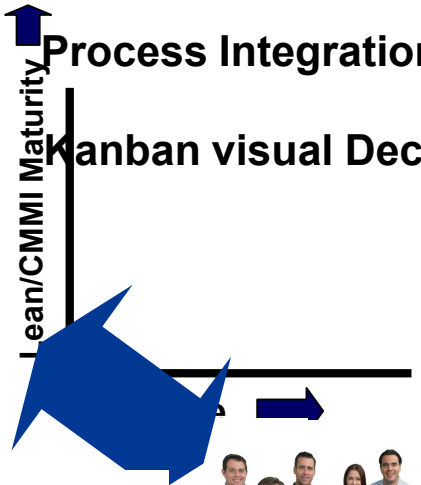
Led by an Agile Program Manager

Architecture-Centric Operations

Process Integration and Synchronization

Kanban visual Decisions





- Mature Lean PMO processes tightly coupled to development team processes
- Visual metrics or indicators ñpushedò to right person at right time
- NO mgt. ñdirectionò
- Activities are ñpulledòby PMO team
- VISUAL architectures are needed

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 ñdoerò

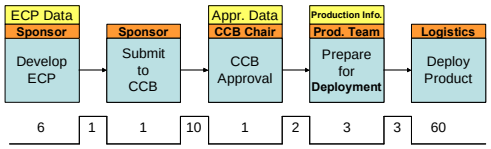
Visualization and Kanban actions

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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Visualization and Kanban actions

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

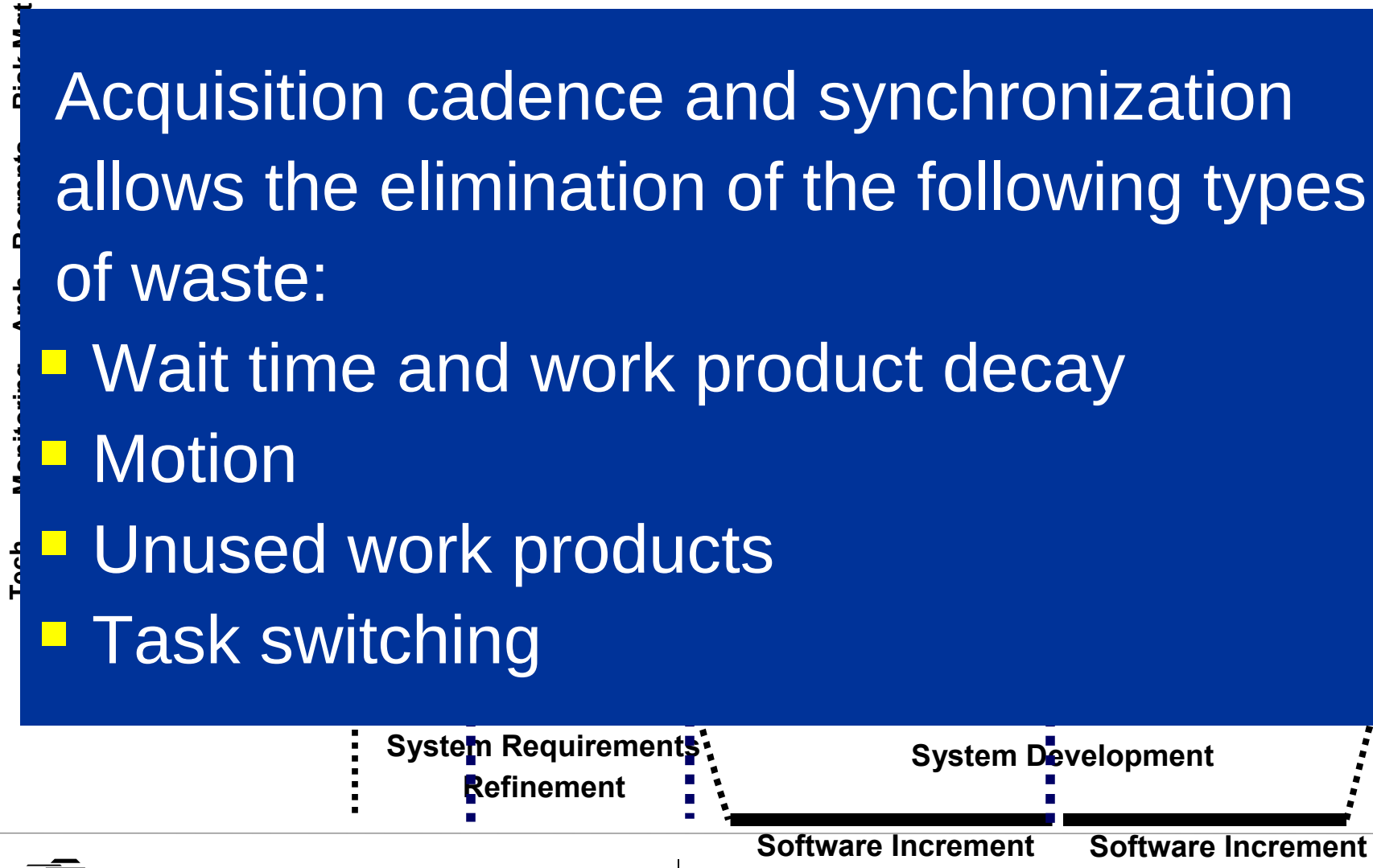
Program Execution

- 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 "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

Stimulate organizational learning

Understand process and technology discipline

Focus on customer-driven performance objectives

Allow lean functions and team to own their processes

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 ñfuture stateò

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 ñLean CMMIòPMO capability:

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

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