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Applying Lean Principles to CMMI® for Services and ITIL®

NDIA CMMI Conference - November 18, 2009

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> **"I have made this letter longer than usual because I lack the time to make it shorter."**
>
> *Blaise Pascal*

Presentation Objectives

Provide motivation, principles, and best practices.

Provide brief overview of lean.

Provide brief overview of CMMI® for Services (CMMI-SVC).

Provide a summary comparison of CMMI-DEV, CMMI-SVC, and ITIL®.

Answer any of your questions.

CMMI is a registered trademark in the US Copyright and Patent Office by Carnegie Melon University.

ITIL and IT Infrastructure Library are registered trademarks of the United Kingdom's Office of Government Commerce (OGC).

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Service/Maintenance Org.'s

Service/Maintenance organizations typically do not have much extra money (especially maintenance organizations).

Service/Maintenance organizations cannot afford large, complex, had to use processes.

Service/Maintenance organizations really need "lean solutions".

This presentation will describe "lean" CMM-DEV, and "lean" CMMI-SVC.

Some Best-In-Class Benchmarks

METRIC	WORLD-CLASS BENCHMARK
Costs of Poor Quality	Reduced from 33% to under 10%
Defect Removal Efficiency	70-90% total defects removed before test
Post-Release Defect Rate	Six Sigma (i.e., 3.4 defects per million)
Productivity	Doubled (e.g., in 5 years)
Return on Investment	5:1 ROI (or higher)
Schedule / Cycle Time	Continually reducing (e.g., 10% annually)

Learning from CMMI Efforts

For successful organizations, the average time to achieve CMMI Maturity Levels is about 2 years a level.

The cost of achieving CMMI Maturity Levels is too high, and the cost of appraisals is too high.

Major problems reported from CMMI Maturity Level 3-5 organizations are:
- CMMI processes usually aren't lean
- Can lose money on small projects
- Professionals not liking processes (e.g., usability problems)

Some Maint./Service Successes

CMMI Best Paper:
- CMMI tailored to maintenance/service
- Lean CMMI Processes (e.g., for small projects, maintenance, service)

HP Success Story:
- Lean CMMI L3 Process 25% of the size of HP India Process
- Very Small Projects (0.25 - 0.5 FTE projects)
- Includes website development
- Includes maintenance/service
- See References [Kellum 2006]

LSI has numerous maintenance/service successes.

HP Lean CMMI Success

Reduced Time: A small unit of HP implemented CMMI Maturity Level 3 in about 7 months (an average 4 year effort).

Reduced Money: Cost of about 30-50% of typical cost.

Reduced Size: The lean HP Maturity Level 3 process is about 20-25% of the size of the HP India Process (or a typical CMMI Maturity Level 3 process).

· Olson, Timothy G., Kellum, Julie, and Tufail,Zia., "Rapidly Defining a Lean CMMI Maturity Level 3 Process", Presentation, NDIA CMMI Conference, 2006.

More Lean CMMI Successes

According to LSI data, the number one compliant from CMMI Maturity Level 3-5 companies is that their process is "not lean".

LSI has many lean success stories. What are typical Lean CMMI Results?

- **Processes are 20-25% of the size, and are more visual and usable.**

- **CMMI Maturity Levels reached in half of the average time (average 1 year instead of 2 years per level).**

- **33-50% of the average cost.**

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Lean Problems

Most organizations have too much waste (e.g., non-value added).

Most processes have too many "non-value added" steps (especially CMMI processes).

How can organizations focus on "value added" and remove waste?

How can organizations measure value and waste?

Lean is a recent quality approach to help organizations focus on "value" and remove "non-value".

What is Lean?

Lean has its roots in quality and manufacturing, and is a recent popular movement in quality.

"Lean Production" is the name for the Toyota Lean Production System.

The following are major lean references (books):
- **"The Machine That Changed The World"**
- **"Learning to See"**
- **"The Toyota Way"**
- **"The Toyota Product Development System"**
- **"Lean Thinking"**

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Some Lean Principles - (1)

Establish customer defined value (i.e., identify the "value stream"). Process = "value".

Continuously eliminate non-value added activities (e.g., waste, rework, defects).

Use leadership and standardization to create a lean culture.

Align your organization through visual communication.

Create an optimized process flow (e.g., "Flow", "Pull", "Just-In-Time", "Leveled").

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Some Lean Principles – (2)

Use lean metrics to manage the value stream.

Front-Load the process for maximum design space.

Build a learning organization to achieve lean and continuous improvement.

Adapt technology to fit your people and processes.

Strive for perfection through continuous improvement.

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Common Process Problems

Too Big: Processes become too large and complex

Poor Usability: Not "fit for use" by process users. Many processes contain mixed information types

Poor Design: Process documentation usually violates good definition and writing principles

Not Visual: Processes need to be defined by well thought out diagrams, pictures, or models

Defined Sequentially: Processes are not novels

Shelfware or Unused Webware: Unused processes

Why Lean Processes?

Reduce Cost, Schedule, and Size: Lean processes are shorter, cost less, and take less time to use.

Better Usability: Lean processes are more usable (require defining "chunks" and labeling them for use).

Better Designs: Lean processes require good process design, definition, and writing principles.

Visual Diagrams: Lean processes are "visual" (e.g., well thought out diagrams or "lean process models").

Defined Non-Linearly: Designed to find something fast. Lean process models are dynamic and concurrent.

Guidelines for Lean Processes

Chunk steps (7 plus or minus 2) into usage scenarios (e.g., plan, control, improve, engineer).

Use process modeling and best practices (e.g., procedures, standards) to select the best chunks.
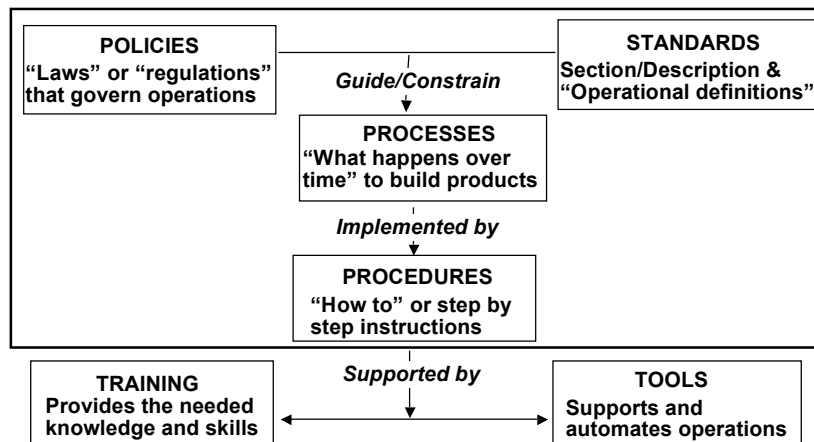
Question every step of the process.

Remove "non-value added" steps.

Combine similar steps.

Refine steps to be short and usable.

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Lean Framework

POLICIES "Laws" or "regulations" that govern operations		STANDARDS Section/Description & "Operational definitions"
	Guide/Constrain ↓	
	PROCESSES "What happens over time" to build products	
	Implemented by ↓	
	PROCEDURES "How to" or step by step instructions	

TRAINING Provides the needed knowledge and skills	*Supported by* ↔ ↓	TOOLS Supports and automates operations

• Adapted from, "A Software Process Framework for the SEI CMM", Olson, Timothy G., et al., CMU/SEI-94-HB-01

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Key Process Questions

Key Process Question	Process Element
Why is the activity performed?	1. Purpose
Who does what activity?	2. Role(s)
What work products are used?	3. Input(s)
What work products are produced?	4. Output(s)
When does the activity begin?	5. Entry criteria
When does the activity end?	6. Exit criteria
Where is activity performed?	7. Context (e.g., hierarchy)
What activities are performed?	8. Activities
How is the activity implemented?	9. Procedure

• Slide adapted from"A Software Process Framework for the SEI Capability Maturity Model", Olson, Timothy G., et al, CMU/SEI-94-HB-01

Process Definition Modes

Beginner Mode (Not Lean):
- **Assumes user has little or no experience**
- **Includes training material**
- **Includes process guidance and lessons learned**

Intermediate Mode (Lean):
- **Assumes user has some experience with process**
- **Includes process guidance and lessons learned**

Expert Mode (Very Lean):
- **Assumes user is very experienced**
- **Concise and precise as possible**

All Modes should be "Chunked" and Include:
- **Process models, checklists, forms, and tables**
- **Pointers to detailed explanations**

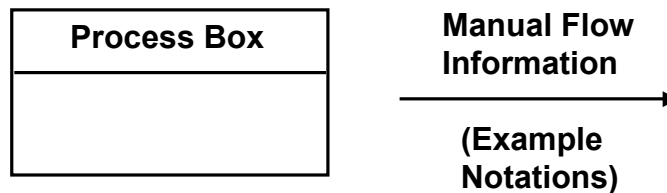# Value Stream Mapping

Define the product/service process to map.

Define the current value stream map.

Define the future value stream map

Implement the work plan (i.e., future state)

Process Box

Manual Flow Information

⟶

(Example Notations)

· Adapted from Keyte, Beau, and Locher, Drew. *The Complete Lean Enterprise: Value Stream Mapping for Administrative and Office Processes*, Productivity Press, New York, NY, 2004.

Process Models

Value Stream Mapping (VSM) is a lean best practice (primarily in manufacturing).

However, VSM currently lacks mature tool support.

Process Modeling can implement VSM, scales up to complex systems, and has automated tool support.
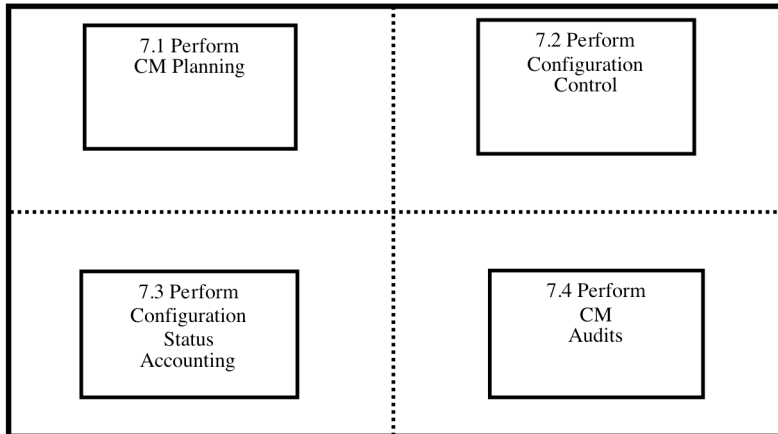
LSI has a lean process modeling approach that puts the 5 W's on one page in a diagram.

Please see handout for example process model and success stories at NASA.

Example CM Process

7.1 Perform CM Planning	7.2 Perform Configuration Control
7.3 Perform Configuration Status Accounting	7.4 Perform CM Audits

Example Plan CM Process

5 W's on 1 Page in a Process Model

7.1 Perform CM Planning
PURPOSE: **Develop CM Plans that meet project needs.**

PROCESS

INPUTS/ENTRY CRITERIA:
CONTEXT
· **Project initiated AND Draft Project Plan**
· **Organizational CM Plan is approved and meets CM Standard.**

ROLES & ACTIVITIES:
Project Manager   CM Lead   QA

Start

7.1.1 Assign Project CM Plan to CM Lead

7.1.2 Develop Project CM Plan according to CM Plan Standard

7.1.3 Review Project CM Plan

Patent Pending Approach

7.1.4 Perform Establish Project CM System Procedure

7.1.5 Approve?   No

Yes

7.1.6 Approve Project CM Plan
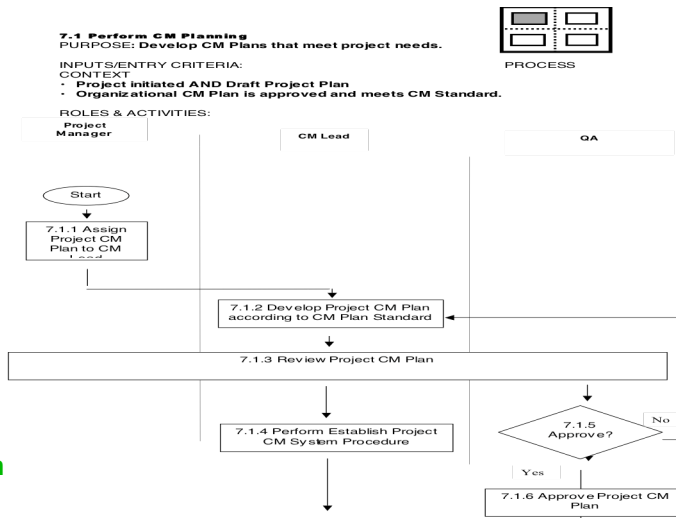
Example Service Plans (e.g., SLAs)
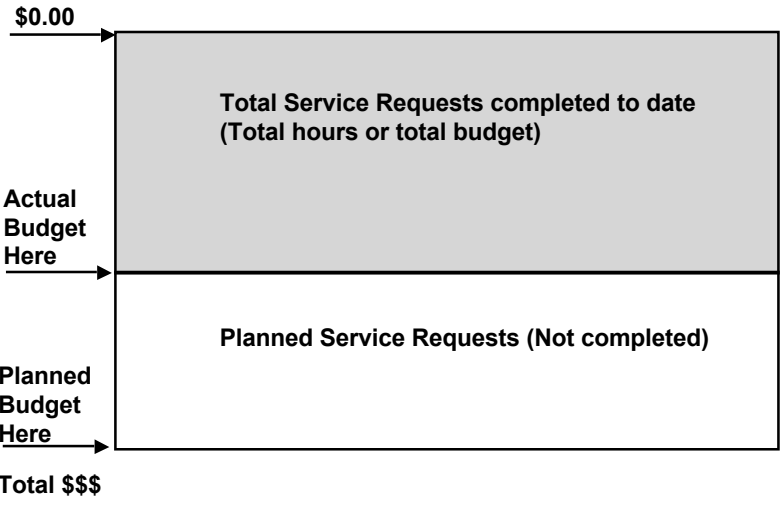
$0.00

**Total Service Requests completed to date
(Total hours or total budget)**

**Actual
Budget
Here**

Planned Service Requests (Not completed)

**Planned
Budget
Here**

Total $$$
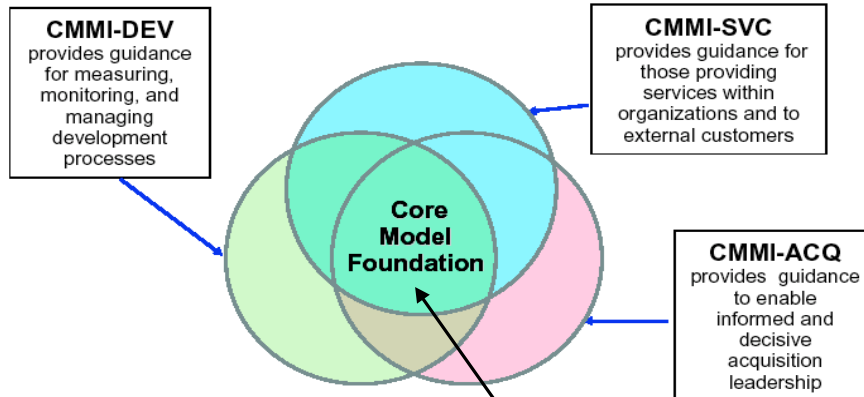

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Three complementary constellations

CMMI-DEV provides guidance for measuring, monitoring, and managing development processes

CMMI-SVC provides guidance for those providing services within organizations and to external customers

CMMI-ACQ provides guidance to enable informed and decisive acquisition leadership

Core Model Foundation

Courtesy of the SEI

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• Reference: Software Engineering Institute (SEI)

Why is the CMMI-SVC needed?

Service providers deserve a consistent benchmark as a basis for process improvement that is appropriate to the work they do and is based on a proven approach.

Demand for process improvement in services is likely to grow: services constitute more than 80% of the US and global economy.

Services constitute more than 54% of what the DoD acquires. In FY2006, DoD spent $146 billion on services. GAO reports a 72% increase in DoD service contracts between 1996 and 2005.

Other service models exist, but don't cover what CMMI covers. Many organizations are cobbling together their own ITIL + CMMI solutions, reinventing the wheel over and over, and that wheel is not designed for services other than IT.

Customers are requesting that their service providers demonstrate a CMMI rating or capability profile, but attempts to use CMMI-DEV in a service setting can distort the integrity of appraisal results.

A variety of potential stakeholders approached the SEI asking for help with services.

• Reference: Software Engineering Institute (SEI)

CMMI-SVC process areas by category

Process Management
- Organizational Innovation and Deployment (OID)
- Organizational Process Definition (OPD)
- Organizational Process Focus (OPF)
- Organizational Process Performance (OPP)
- Organizational Training (OT)

Support
- Causal Analysis and Resolution (CAR)
- Configuration Management (CM)
- Decision Analysis and Resolution (DAR)
- Measurement and Analysis (MA)
- Process and Product Quality Assurance (PPQA)

Project Management
- Capacity and Availability Management (CAM)
- Integrated Project Management (IPM)
- Project Monitoring and Control (PMC)
- Project Planning (PP)
- Requirements Management (REQM)
- Risk Management (RSKM)
- Quantitative Project Management (QPM)
- Service Continuity (SCON)
- Supplier Agreement Management (SAM)

Service Establishment and Delivery
- Incident Resolution and Prevention (IRP)
- Service Delivery (SD)
- (+) Service System Development (SSD)
- Service System Transition (ST)
- Strategic Service Management (STSM)

• Reference: Software Engineering Institute (SEI)

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CMMI-SVC: Process Areas - (1)

Strategic Service Management (STSM):
- Deciding what services you should be providing, making them standard, and letting people know about them.

Service System Development (SSD):
- Making sure you have everything you need to deliver the service, including people, processes, consumables, and equipment.

Service System Transition (SST):
- Getting new systems in place, changing existing systems, retiring obsolete systems, all while making sure nothing goes terribly wrong with service.

Service Delivery (SD):
- Setting up agreements, taking care of service requests, and operating the service system.

• Reference: Software Engineering Institute (SEI)

CMMI-SVC: Process Areas - (2)

Capacity and Availability Management (CAM):
- **Making sure you have the resources you need to deliver services and that they are available when needed—at an appropriate cost.**

Incident Resolution and Prevention (IRP):
- **Handling what goes wrong—and preventing it from going wrong in the first place if you can.**

Service Continuity Management (SCON):
- **Being ready to recover from a disaster and get back to delivering your service.**

• Reference: Software Engineering Institute (SEI)

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ITIL® v3

Five key volumes comprise the Information Technology Infrastructure Library (ITIL v3), published in May 2007:
1. Service Strategy
2. Service Design
3. Service Transition
4. Service Operation
5. Continual Service Improvement

The Service life cycle can be viewed as a phased life cycle, where the phases are:
1. Defining strategy for the IT Service Management (Service Strategy or SS)
2. Designing the services to support the strategy (Service Design or SD)
3. Implement the services to meet the designed requirements (Service Transition or ST)
4. Support the services managing the operational activities (Service Operation or SO)

The names ITIL and IT Infrastructure Library are registered trademarks of the United Kingdom's Office of Government Commerce (OGC).

• Reference: OGC and ITIL

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What is the relationship between CMMI-SVC and ITIL?

- CMMI-SVC complements ITIL
  - Summarizes ITIL best practices into a small set of specific practices.
  - Reuses about 80% of the current CMMI model, allowing users to leverage their investments in development-based process training, improvements, and infrastructure to service-based offerings.
  - Provides an industry-accepted maturity model, helping organizations to plan and track their incremental progress toward high maturity.
  - Uses the same SCAMPI appraisal method that is used with the current CMMI model, allowing organizations to leverage appraisal expertise, preparation methods, and selected artifacts.

• Reference: Software Engineering Institute (SEI)

• Reference: Software Engineering Institute (SEI)

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ITIL v3 and CMMI-SVC v1.2

ITIL Life Cycle Phase	CMMI-SVC Process Areas
Service Strategy (SS)	Strategic Service Mgt. (STSM)
Service Design (SD)	Service System Development (SSD)
Service Transition (ST)	Service System Transition (SST)
Service Operation (SO)	Service Delivery (SD) Capacity & Availability Mgt. (CAM) Incident Resolution & Prevention (IRP) Service Continuity Mgt. (SCON)

Individual vs. Organizational

ASQ, ITIL, and PMBOK focus on INDIVIDUAL certifications. For example, a Project Manager can be PMP certified in PMBOK. Organizations currently cannot not be certified in using these approaches.

Baldrige, CMMI, and ISO focus on ORGANIZATIONS. Baldrige is an award (an organizations received a score up to 1000 points), CMMI does formal ratings (e.g., Maturity Levels 1-5), and ISO does certification.

The advantage of organizational approaches are that the organization benefits the most (rather than a person's resume). CMMI-SVC has this advantage over ITIL!

"Lean" CMMI-SVC

LSI has already innovated "Lean Solutions™" for CMMI-DEV, and has numerous success stories.

CMMI-SVC has 17 core processes (common with CMMI-DEV). LSI already has these lean processes.

LSI works extensively with service/maintenance organizations on lean processes (e.g., ITIL).

LSI is currently piloting the 7 lean CMMI-SVC/ITIL processes.

Lean CMMI-SVC success stories coming soon! Please let us know if you are interested.

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