SEI Approach to Harmonization

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Workshop: Hard Questions for Process Improvement in Multimodel Environments

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SEI Outline

Value Proposition for Harmonization

Harmonization of Improvement Technologies

The Path Ahead
Value Proposition for Harmonization
What Do We Mean by *Multimodel Environments*?

Multiple improvement technologies\(^1\)
- Concurrently implemented
- At different hierarchical levels
- Across different organizational functions

For example…
- Enterprise governance
- Process infrastructure
- Engineering methods
- Government regulations
- IT operations
- Sector-specific regulations or technologies
- And so on…

\(^1\) We use the terms *improvement technologies, technologies, or models* interchangeably when referring to reference models, standards, best practices, regulatory policies, and other types of practice-based improvement technologies
Value Proposition at a Glance

Challenges

- Competition for implementation resources
- Technology overlaps
- Overwhelming amount of “programs”

Leading to

- Excess implementation cost
- Eroded benefits from any single improvement effort

Opportunity

- Cost and cycle-time reductions
- Simpler, more elegant, technically stronger improvement solutions
- Process and organizational robustness and agility
Harmonization IS about…

- Mission
- System thinking
- Performance-driven improvement
- Value contribution of technologies
- Technology neutrality
- Process system design and alignment from strategy to implementation

Based on 2004 CMMI & Six Sigma research findings and much field work
Harmonization *IS NOT about*…

- Creating a master metamodel
- Developing a
  - new single technology that encompasses all other technologies
  - universal combination to suit every organization
- Promoting any single combination of technologies as the best
- *(Necessarily)* adding more technologies

Harmonization is NOT another process—it relies on an underlying improvement process paradigm
Harmonization Layers and Considerations

An Initial View

Mission

Technology Selection and Composition
- Strategic choices, aligned with mission
- Feature overlaps and differentiators

Organizational Process
- Robust process architecture and standard processes
- Aligned with organizational mission
- Comprises properties of technologies of interest

Implementation
- Improvement infrastructure and resources
- Improvement project portfolios
- Measurement system
- Audit and appraisal
Harmonization:
An Initial Reasoning Framework
Key Guidance Questions

What is your mission?
What are your goals?

Are you achieving your goals?
What stands in your way?

What process features are needed to support your goals?

What technologies provide or enable these features?

What is the design of a cohesive (integrated), internal standard process that is rapidly and effectively deployed, easily updated, compliant to models of choice?
Mission Translation

Practices to Leverage

- FAST-based Goal Structures
  ("front end" to Goal-Question-Indicator-Metric)
- Y to X Decomposition
- Quality Function Deployment (QFD)
- Critical Success Factors
- Theory of Constraints: Systems Thinking Diagrams
- Strategy Maps
- Roadmapping

Translating organizational goals and metrics to individuals and teams continues to be one of the most difficult management activities and is often a stumbling block to implementation

- from “How the Learning Organization Manages Change” by Ronald Recardo, Kathleen Molloy, and James Pellegrino
Strategic Classification Taxonomy

Governance
(including external mandates, regulations, and internally chosen governance)

Organizational infrastructure and readiness
(including business, engineering, and change/improvement practices)

Tactical
(procedural, for both improvement and engineering tasks)

Enterprise specific

- EFQM
- Lean
- FDA/510K
- ISO 9000
- Six Sigma
- SOX
- eSCM-CL
- eSGM-SP
- COBIT
- CMMI
- P-CMM
- ISO 12207
- SCOR
- ITIL
- SWEBOK
- GQM
- IDEAL
- ATAM
- 6S/DFSS
- PSM
- RUP
- TSP
- Agile

Discipline/domain specific

Increasing decision authority of process group

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## Technology Composition via Element Classification

<table>
<thead>
<tr>
<th>Good Practice Elements</th>
<th>Improvement Method Elements</th>
<th>Institutionalization Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMMI PAs and PLA</td>
<td>Change management techniques:</td>
<td>CMMI Generic Goals and Practices:</td>
</tr>
<tr>
<td>ISO 15504 and ISO 12207</td>
<td>IDEAL and Six Sigma</td>
<td>GG3, GG2, and GG1</td>
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<td>COBIT</td>
<td></td>
<td></td>
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<tr>
<td>EFQM</td>
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<tr>
<td>ISO 9001</td>
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Process Architecture

Emerging Research

Definitions

- **CMMI**: ordering, interfaces, interdependencies and other relationships among process elements in a standard process.
- **Kasser**: function of process architecting is to design, set up and continuously optimize, the process for the development of the specific system being produced.
- **Business Analysis BoK**: processes needed to conduct business, how those process interact and how they are managed and modified over time.
  
  — A process architecture should remain fairly intact even as the details of process execution evolve and change.

Features

- Functional properties, including classes, flow, and attributes
- Outputs, including flow and relationships
- Roles and responsibilities, including users and actors
- Information flow
- Overall interrelationships, dependencies, and constraints

[Kasser], [BABOK]
Harmonization Layers

- Mission Translation
- Strategic Technology Selection
- Technology Composition
- Process Architecture
- Standard Process
- Tailored/Executed Process
The Path Ahead
Multimodel Harmonization Builds on Existing Works

Publications generating awareness, ideas, approaches, methods

- Armstrong: Systems Approach to Process Infrastructure
  - Best practices, tools, improvement, measurement
- Kasser: Process Architecting
- Halvorsen et. al.: Taxonomy to compare SPI Frameworks
- Mutafelija: Process Architecture Views and Properties
- Bendell: Structuring Business Process Improvement Methods
  - Problem-solution decision model
- Osterweil: Little JIL process language
- Amescua, Garcia, Sanchez et. al.: Patterns
- Others
Multimodel Harmonization Builds on Existing Works

Guidance, frameworks, metamodels – for specific combinations - from the SEI and others

SEI research and publications

- CMMI & Six Sigma sponsored research, book, courses
- Tech reports: CMMI & ISO, CMMI & Agile, CMMI & TSP…..
- Resiliency Engineering Framework

Numerous Mappings & Relationship Diagrams

Integrated Systems Framework (ISF) [Byrnes-Vasques]

Change Engine [Ghetto-Klar]

OPEN Process Framework (OPF) [Firesmith]

eSourcing Capability Model (eSCM) [Hyder et. al.; Hefley et. al]

Internal corporate endeavors

- Many in progress; mostly proprietary

Others?
But there is much more work to do....

An SEI-led project on harmonization, Process Improvement in Multimodel Environments (PrIME) will span a breadth of topics that are needed for an organization to be successful with process improvement in multimodel environments.

<table>
<thead>
<tr>
<th>Year</th>
<th>Focus Areas</th>
<th>Activities and Deliverables</th>
</tr>
</thead>
</table>
| 1    | • Strategy  
      • Decision Tools  
      • Selection of Technology Combinations for Study | Workshops  
      Pilots  
      Case Studies  
      Surveys  
      Guidebook  
      Training  
      Publications |
| 2    | • Technology Decision Guidance  
      • Technology Composition  
      • Appraisal Guidance | |
| 3    | • Process Architecture  
      • Technology Design  
      • Scalability | |
Summary: Multimodel Improvement is Our Reality

Value of Harmonization

• Performance driven
• Cost and cycle-time reductions
• Robustness

Reasoning Framework for Harmonization

• Mission translation and alignment
• Technology adoption scenarios, selection patterns and decisions, sequencing
• Technology classification and composition
• Process architecture and process architects
• Measurement as integrating platform
• Implementation considerations

Recipes for Specific Technology Combinations
Everything should be made as simple as possible, but not one bit simpler

- Albert Einstein
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[BPD] Process Maturity / Capability Maturity, http://www.betterproductdesign.net/maturity.htm, a resource site for the Good Design Practice program, a joint initiative between the Institute for Manufacturing and the Engineering Design Centre at the University of Cambridge, and the Department of Industrial Design Engineering at the Royal College of Art (RCA) in London.


[Firesmith] Firesmith, Don, see the Open Process Framework web page http://www.opfro.org


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[Hefner 04] Hefner, Rick, Accelerating CMMI Adoption Using Six Sigma, CMMI Users Group, 2004

[Hyder et al] The eSCM-SP V2.01: Model Overview – The eSourcing Capability Model for Service Providers v2.01; Elaine B. Hyder, Keith M. Heston and Mark C. Paulk


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[Osterweil 2] Osterweil, Leon J., Unifying Microprocess and Macroprocess Research, white paper, Laboratory for Advanced Software Engineering Research, Department of Computer Science, University of Massachusetts

[PDIM] SEI Course, Performance-Driven Improvement "Measure" Workshop, see http://www.sei.cmu.edu/products/courses/s08.html


[Siviy 04] Siviy, Jeannine and Eileen Forrester, Accelerating CMMI Adoption Using Six Sigma, CMMI Users Group, 2004


[Siviy 05-2] excerpted from working documents from internal SEI research on the joint use of Six Sigma and CMMI; refinement of guidance and subsequent publication is in progress; for more information, contact jmsiviy@sei.cmu.edu

[Siviy-Hefner 06] Siviy, Jeannine and Rick Hefner, Six Sigma Tools for Early Adopters, SEPG 2006


[Stoddard 02] Adapted, with permission, from information provided by Robert Stoddard, Motorola, Inc.

[Vickroy 03] Idea to strategically select MA, OPP, QPM as first PAs in which to achieve capability 5 offered by Robert Vickroy, ABS Group, at CMMI course on 17 January 2003

[wipro1] www.iqa.org/publication/c4-1-38.shtml

Challenges in Multimodel Environments

Competition for implementation resources

- Infrastructure
- Training
- Compliance
- Performance measurement

Independent, non-aligned project portfolios

Unclear relationships between technologies

- Overlaps
- Differentiators

Consequences

- Excess costs
- Erosion of benefits from any single effort

2007 VOC
Top 7 significant challenges

- Separate improvement technology ownership
- Change management
- Technical connections
- Senior management understanding
- Training and resources
- Strategy determination
- Senior management sponsorship
Benefits of Harmonization

Business focus

Cost and cycle-time reduction

- Implementation
- Audit

Robustness

- Process robustness for a dynamic world of models and regulations
- Long-term and robust organizational approach to technology selection

2007 VOC
Top 7 significant benefits

- Holistic, more complete views
- Efficient
- Synergy
- Acceleration
- Effective
- Understanding of the specific connections for specific combinations
- Measurement
A Process Paradigm

First Remember: Everything is a Process!

Technology R&D Organizations

Managers

Establish business mission/drivers

Technology
Transition
Develop

Project/Operations Teams

Establish project mission

Execute work

Evaluate results

Select technology

Implement technology

Evaluate impact

Implement/integrate technology

Business results

Compliance ratings

Process Improvement Professionals

Organization’s Process Group

Establish project mission

Execute work

Evaluate results

Select technology

Implement technology

Evaluate impact

Implement/integrate technology

Science and Technology
Strategy/Selection Guidance

*Emerging Research*

Methods

- Affinity groups
- QFD
- Pugh’s concept selection
- TRIZ
- Benchmarking, pattern matching and “Positive Deviance”
- Methods from the field of Operations Research

Considerations

- Technology readiness
- Organizational readiness and culture
- Decision authority, regulatory compliance requirements
- Scenarios
- Interoperability