CMMI® for Executives

NDIA Systems Engineering Division

in partnership with:
Software Engineering Institute
Carnegie Mellon University

November 2011

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Topics

Do You Need CMMI?

What Is CMMI?

How Can CMMI Benefit You?

Who Is Using CMMI?

How Can You Get Best Value from CMMI?

Do You Need CMMI?

Recognize these symptoms?

- **Missed commitments**
  - Late delivery
  - Last minute crunches
  - Spiraling costs
- **Inadequate management visibility**
  - Too many surprises
- **Quality problems**
  - Too much rework
  - Functions not working correctly
  - Customer complaints
- **Poor morale**
  - Crisis atmosphere
  - High turnover
  - Low productivity

Does the following occur?

- **Poor planning**
  - Plans not realistic or followed
  - Work is not tracked against the plan; plans are not adjusted.
- **Baselines not controlled**
  - Inconsistent requirements
  - Changes not managed
- **Ineffective organizational structure**
  - Functions not well integrated
  - Designs not producible
- **Unable to repeat successes**
  - Staff skills and knowledge not available when needed
  - Dependent on heroic individuals

CMMI Features Help Address Common Issues

CMMI Feature	Description and Examples
Results Oriented	• Industry best practices for project planning and execution • Performance-driven measures for consistent outcomes
Priorities Based on Business Value	• Investments and maturity prioritized to align with business goals • Appraisals relative to model to set direction ("map and compass")
Customer Focus	• Validation of customer needs across the project life cycle • Manage product/service quality (verification, validation, reviews)
Proactive Management	• Forward-looking measurement, monitoring, risks, corrective action • Management decisions based on plans, data, alternatives
Flexibility	• Adaptable to a variety of businesses (domain, size, products) • Non-prescriptive (required, expected, informative components)
Business Process Integration	• Cross-functional stakeholder involvement • Coordinate various improvement strategies and methods (Lean, Six Sigma, ISO, Agile, etc.)
Continuous Learning	• Standardized assets tailored for project characteristics • Leverage experience and history across projects

Why Focus on Process?

The quality of a system is highly influenced by the quality of the process used to acquire, develop, and maintain it.
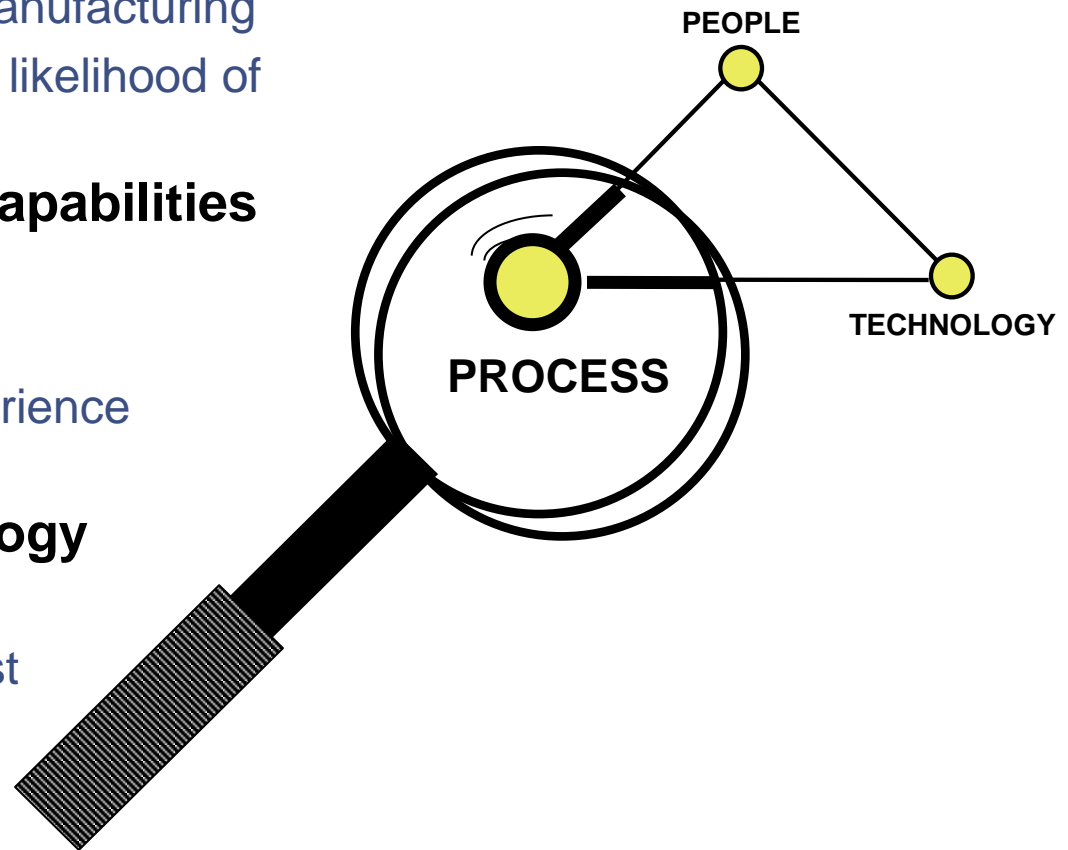
- A long-standing premise in manufacturing
- Good processes increase the likelihood of successful projects

Process can enhance the capabilities of your workforce

- Work smarter, not just harder
- Leverage organizational experience and best practices

Process integrates technology with resources

- Technology, by itself, will most likely not be used effectively

PEOPLE

TECHNOLOGY

PROCESS

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What Is CMMI?

CMMI is a model representing a collection of best practices proven effective in industry

- A framework for developing, improving, and sustaining business performance
- Provides a process focus on work activities
- Developed by industry (commercial and defense), government, academia

CMMI targets three primary environments:

- Development -
  Engineering a product or service
- Services –
  Providing services
- Acquisition –
  Acquiring products and services

The CMMI product suite consists of:

- Models and primers
- Appraisal methods
- Training courses

CMMI-ACQ

CMMI-DEV

CMMI Model Framework

CMMI-SVC
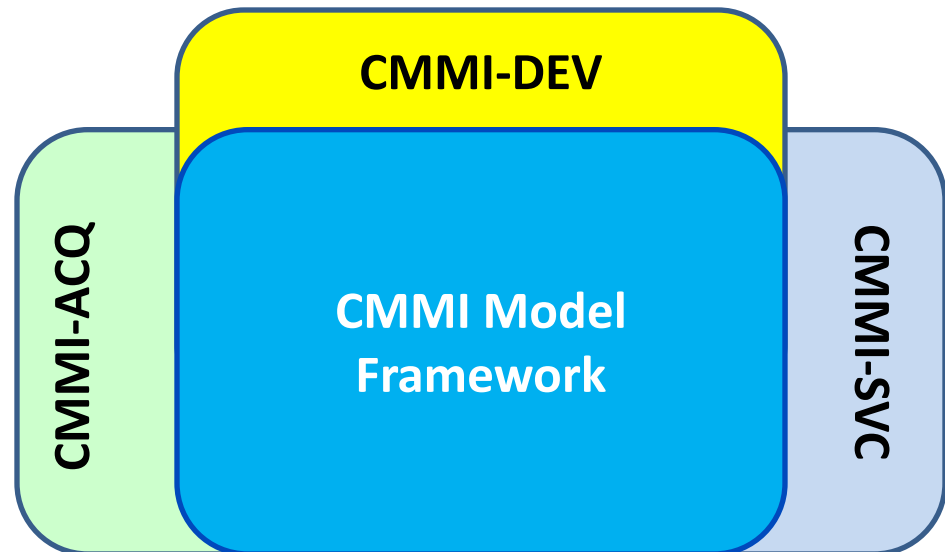
Capability Maturity Model Integration (CMMI®)

What CMMI Can Add to Your Organization

- Integration of business processes across functions based on industry best practices

- Visible project and organizational measures aligned with achievement of business objectives

- Commonly accepted process framework for inter-company coordination and competitor benchmarking

- Repeat project successes through standardization, tailoring, and capture of organizational process assets

- Avoid project performance issues through process discipline, proactive management, and early stakeholder engagement

- Predictable project performance, with fewer surprises

CMMI Model Overview

Process Areas	**Clusters of related practices, in several categories** •**Project Management** – planning, monitoring, suppliers, risk, … •**Support** – CM, QA, measurement, decision analysis, … •**Process Management** – organizational processes, training, … •**Engineering** – requirements, development, integration, … •**Services –** development, delivery, transition, … •**Acquisition** – requirements, solicitation, agreements, …
Generic Practices	**Enable process management, deployment and improvement** •Plans, monitoring, CM, stakeholders, objective evaluation, …
Goals	**Describes characteristics for implemented processes**
Capability Levels	**Achievement of process improvement within an individual process area**
Maturity Levels	**Achievement of overall process improvement across a predefined set of process areas (stages)**

CMMI Appraisals

Appraisals compare organization and project processes against CMMI models to determine improvement priorities

Senior management's role in appraisals:

- Provide sponsorship and resources
- Set appraisal scope and objectives
- Ensure follow-through on appraisal findings and prioritized improvement actions

CMMI provides a family of appraisal methods, with varying intent, confidence levels, data collection, resources needed

- Flexible focus: approach, deployment, institutionalization
- Rigorous benchmark rating method (for maturity levels)
- "Quick look" diagnosis of process weaknesses

Licensed SEI partners deliver SCAMPI^{SM} appraisal services

- http://www.sei.cmu.edu/partners/directory/

Note that for internal process improvement, company-developed and other methods can be effective

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Reasons You Should Adopt CMMI

1. **Increase customer satisfaction**
   - Deliver products and services that satisfy user needs
   - Deliver products and services on time and within budget
2. **Increase probability of capturing new and repeat business**
   - Improved ability to meet commitments
   - Reduces customer-perceived risk of award to your organization
   - Can be a discriminator relative to your competition
3. **Increase profit through improved quality and less rework**
   - Better predict actual costs through repeatable processes
   - Better visibility into projects due to established measures and analysis techniques
   - Significantly reduce the probability of problem programs
   - Reduce costs by capitalizing on organizational infrastructure, processes, training, tools and early/often stakeholder involvement
4. **Increase productivity**
   - More efficiency through implementation of common processes, tools and training
   - Improved productivity by implementing process improvement that are directly aligned key organizational goals and objectives.
   - Higher employee morale and less turnover

Benefits of CMMI-Based Process Improvement

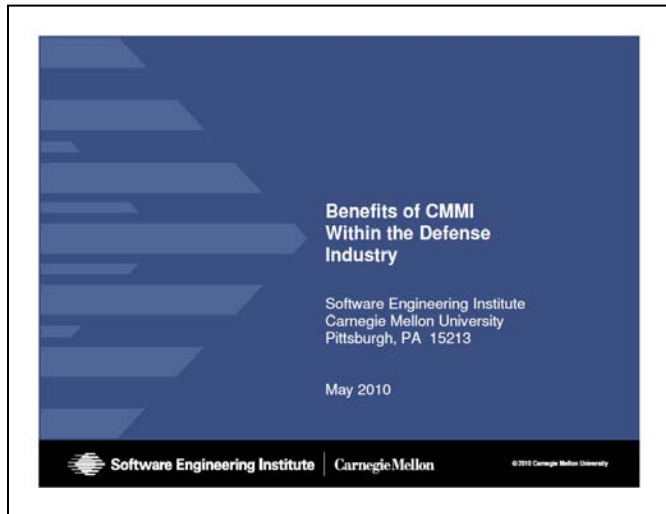**Many companies cite performance benefits from CMMI**

- Published in conferences, articles, papers, studies, surveys, reports

SEI collects quantitative measures of CMMI performance improvement

- Technical reports, including:
    - "Performance Results of CMMI-Based Process Improvement" (http://www.sei.cmu.edu/pub/documents/06.reports/pdf/06tr004.pdf)

Performance Category	Median Improvement
Cost	34%
Schedule	50%
Productivity	61%
Quality	48%
Customer Satisfaction	14%
ROI	4.0 : 1

CMU/SEI-2006-TR-004.
Data from 35 organizations.

Industry Benefits from CMMI

Benefits of CMMI
Within the Defense
Industry

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

May 2010

Software Engineering Institute | CarnegieMellon

Example measures reported by NDIA member companies:	
Defect repair effort	•Defect repair hours: -58% (ML3 to ML5) •Defect cost savings: -105 hrs per defect •I&T hrs/defect: -24% •Hours/KLOC: -22% (ML3 to ML5)
Defect density	•62% fewer high-severity defects (ML5) •Defect phase containment: +240% (ML5) •>85% defects removed prior to sys test •Acceptance test: < 0.15 defects/KLOC
Development cost	•SW development cost: -28% (ML3 to ML5) •Potential project savings: $1.9M–$2.3M
Productivity	•Productivity gain: +42% (ML5, 9 yrs)
Cost/schedule	•Over 6X less likely cost/schedule impact

The new data presented in this report demonstrates that effective implementation of good practices aided by use of CMMI can improve cost, schedule, and quality performance.

Benefits of CMMI in the Defense Industry, Software Engineering Institute, May 2010.
http://www.sei.cmu.edu/library/abstracts/presentations/CMMI-Benefits-to-Defense-Industry.cfm

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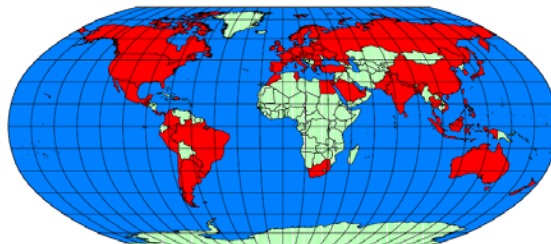
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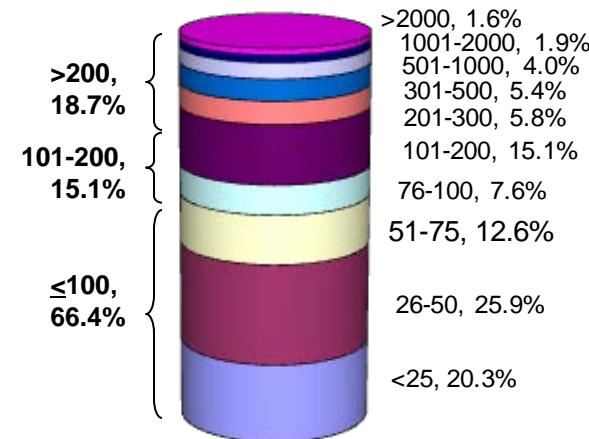
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How Can You Get Best Value from CMMI?

CMMI Adoption

CMMI appraisals are conducted worldwide…

	USA		Non-USA	
	Qty	**%**	**Qty**	**%**
Commercial In-House	316	36.6%	3040	92.0%
Contractor for Military/Government	468	54.2%	191	5.8%
Military/Government Agency	80	9.3%	73	2.2%
	864	100.0%	3304	100.0%

…in small and large organizations and projects

>2000, 1.6%
1001-2000, 1.9%
501-1000, 4.0%
301-500, 5.4%
201-300, 5.8%
101-200, 15.1%
76-100, 7.6%
51-75, 12.6%
26-50, 25.9%
<25, 20.3%

>200, 18.7%
101-200, 15.1%
≤100, 66.4%

Organization Size (Employees)
(4197 organizations reporting)

…in a wide range of businesses

Services
- Business Services
- Engineering and Management Services
- Health Services
- Other Services

Manufacturing
- Electronic and Electric Equipt
- Transportation Equipment
- Instruments & Related Products
- Industrial Machinery
- Other Mfg Industries

Other
- Finance, Insurance, Real Estate
- Public Administration/Defense
- Transportation, Communication, Utilities

…at all levels of process maturity

	Commercial In-House	Contractor for Military/ Government	Military/ Government Agency
No Rating Given	3.5%	2.9%	15.7%
Initial (ML1)	0.4%	2.0%	0.7%
Managed (ML2)	20.4%	27.6%	43.1%
Defined (ML3)	61.7%	58.3%	39.9%
Quantitatively Managed (ML4)	1.9%	0.3%	1.3%
Optimizing (ML5)	4.6%	5.8%	2.6%
	(3356 orgs)	(659 orgs)	(153 orgs)

Source: SEI Process Maturity Profile, Sept 2011.
http://www.sei.cmu.edu/cmmi/casestudies/profiles/cmmi.cfm

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Getting Value from CMMI
Your Role as an Executive

Set the vision and direction for CMMI-based improvement

- Establish measurable objectives
- Be a visible sponsor – set expectations for involvement
- Manage process improvement like a project

Provide resources and support

- Funding, staffing, tools
- Choose the best people to lead - respected opinion leaders

Keep it real

- Maintain relentless focus on business value and program performance
- Involve projects and practitioners for the best ideas
- Hold people accountable
- Track and communicate progress
- Recognize and reward achievement

The Effective Use of CMMI®

Summary of NDIA industry position statements for obtaining best value from CMMI investments*:

1. **Good processes** increase the likelihood of achieving successful project performance

2. **CMMI is a model, not a standard** – adapt CMMI to your business environment, resources, and objectives

3. **Focus on business improvement objectives** – a primary emphasis on achieving levels may not achieve significant benefits and may increase rather than decrease costs

4. **High maturity is a business case** – justify the investment; many organizations find business value in improving processes even at lower CMMI maturity levels

5. **Maturity level ratings are not alone a predictor of project performance** – many other factors can be significant contributors

6. **Don't specify maturity levels in acquisitions** – use CMMI to probe supplier capability and process execution risks

7. **Greatest benefits of appraisals are from improvements, not evidence or ratings -** disproportionate effort on appraisal preparation risk can diminish business returns

"The Effective Use of CMMI®", NDIA Systems Engineering Division, June 2009.
http://www.ndia.org/Divisions/Divisions/SystemsEngineering/Pages/CMMI_Working_Group.aspx

Want to Learn More about CMMI?

SEI CMMI web pages:

What is CMMI?	Models	Adoption
Conferences	Performance Results	Appraisals
FAQs	Background Information	Contacts

CMMI focus topics, guidance, technical reports:

CMMI and Agile	CMMI and Six Sigma	Product Line Practices
CMMI in Small Settings	CMMI in Acquisition	Interpretive Guidance
Earned Value Management	SW-Only Organizations	Operations Organizations

Training:

Process Improvement	Introduction to CMMI	Intermediate Concepts of CMMI
CMMI Level 2-3 for Practitioners	Understanding High Maturity	SCAMPI Appraiser training

User Networks

SEI Partner Network	Newsgroups, Blogs, Wikis	Books, Periodicals, Articles
Consultants	Conferences	Asset Repositories

Questions? Comments?

Web: http://www.sei.cmu.edu/cmmi

Email: cmmi-comments@sei.cmu.edu

SEI Customer Relations: (412) 268-5800, customer-relations@sei.cmu.edu