

TADS / DIATINF / CNAT / IFRN
Disciplina de Processo de Desenvolvimento de Software
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Capability Maturity Model® Integration (CMMI®) Version 1.2 Overview

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< Common Process Problems

Process Improvement Basics

Process Models

The CMMI Concept

Appraisals and Training

The Benefits of Using CMMI

CMMI Adoption

The Bottom Line

- Problemas comuns de processos
- Fundamentos sobre o melhoramento de processos
- Modelos de processo
- O conceito CMMI
- Treinamento e avaliações
- Benefícios da utilização do CMMI
- Adoção do CMMI
- O ponto principal



Settling for Less

(Contentando-se com Pouco)

Do these statements sound familiar? If they do, your organization may be settling for less than it is capable of and may be a good candidate for process improvement.

“I'd rather have it wrong than have it late. We can always fix it later.”

– a senior software manager (industry)

(Eu prefiro entregar um produto errado do que atrasar a entrega. Nós sempre podemos consertar depois)

“The bottom line is schedule. My promotions and raises are based on meeting schedule first and foremost.”

– a program manager (government)

(O ponto principal é o cronograma. Minhas promoções e aumentos são baseados primeira e principalmente no cronograma das reuniões)



Symptoms of Process Failure

(Sintomas de Falha no Processo)

Commitments consistently missed

- Late delivery
- Last minute crunches
- Spiraling costs

No management visibility into progress

- You're always being surprised

Quality problems

- Too much rework
- Functions do not work correctly
- Customer complaints after delivery

Poor morale

- People frustrated
- Is anyone in charge?

- Compromissos constantemente quebrados
 - Entregas atrasadas
 - Correrias de última hora
 - Custos espirais
- Nenhum gerenciamento do progresso
 - Você sempre está sendo pego de surpresa
- Problemas de qualidade
 - Muito retrabalho
 - Funções que não funcionam corretamente
 - Cliente reclama depois da entrega
- Moral baixa
 - Pessoas frustradas
 - Alguém está no comando?

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The Process Management Premise

(Premissa do Gerenciamento do Processo)

The quality of a system is highly influenced by the quality of the process used to acquire, develop, and maintain it.

This premise implies a focus on processes as well as on products.

- A qualidade de um sistema é diretamente influenciada pela qualidade do processo usado para aquisição, desenvolvimento e manutenção do mesmo.

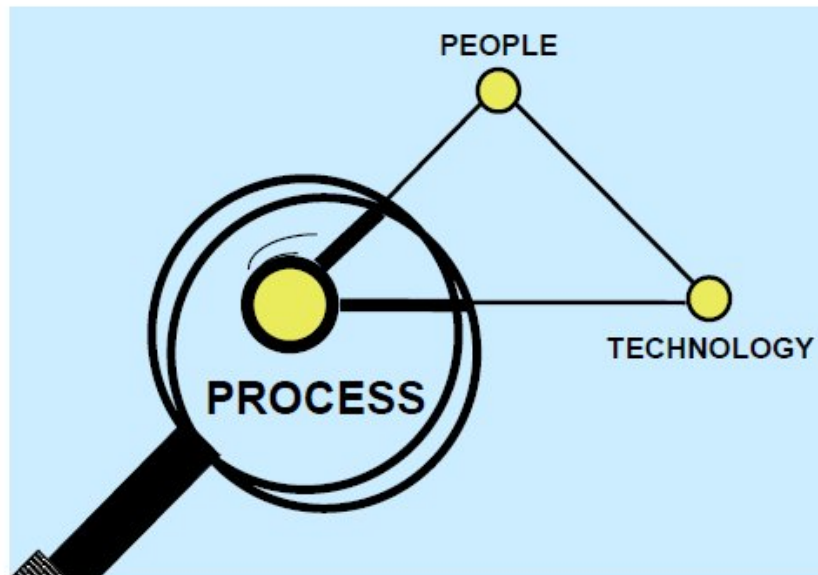
- This is a long-established premise in manufacturing (and is based on TQM principles as taught by Shewhart, Juran, Deming, and Humphrey).
- Belief in this premise is visible worldwide in quality movements in manufacturing and service industries (e.g., ISO standards).



Quality Leverage Points

(Pontos de Nivelamento da Qualidade)

While process is often described as a node of the process-people-technology triad, it can also be considered the “glue” that ties the triad together.



Everyone realizes the importance of having a motivated, quality work force but even our finest people cannot perform at their best when the process is not understood or operating at its best.

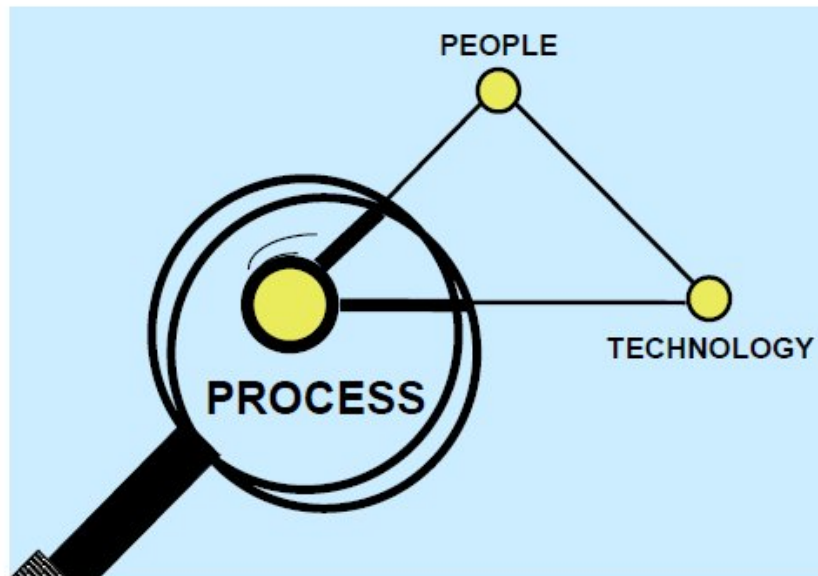
Process, people, and technology are the major determinants of product cost, schedule, and quality.

Quality Leverage Points



(Pontos de Nivelamento da Qualidade)

While process is often described as a node of the process-people-technology triad, it can also be considered the “glue” that ties the triad together.



Todos percebem a importância de se ter uma força de trabalho motivada e de qualidade, mas até as pessoas mais capazes não podem realizar o seu melhor quando o processo não é entendido, nem é operacionalizado da melhor forma

Process, people, and technology are the major determinants of product cost, schedule, and quality.



Common Misconceptions

(Enganos Comuns)



I don't need process, I have

- really good people
- advanced technology
- an experienced manager

Process

- interferes with creativity
- equals bureaucracy + regimentation
- isn't needed when building prototypes
- is only useful on large projects
- hinders agility in fast-moving markets
- costs too much

- Eu não preciso de um processo, eu tenho
 - Pessoas muito competentes
 - Tecnologia avançada
 - Um gerente experiente
- Processo
 - Interfere na criatividade
 - Igual a burocracia + controle
 - Não é necessário quando estou desenvolvendo protótipos
 - Só é útil em grandes projetos
 - Atrapalha a agilidade em mercados que necessitam de respostas rápidas
 - É muito caro



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What Is a Process Model?

(O que é um Modelo de Processo?)

A process model is a structured collection of practices that describe the characteristics of effective processes.

Practices included are those proven by experience to be effective.

- Um modelo de processo é uma coleção estruturada de práticas que descrevem as características de processos efetivos.
- Práticas incluídas em tais modelos são aquelas que se provaram ser efetivas pela experiência

How Is a Process Model Used?

(Como um Modelo de Processo é Usado?)

A process model is used

- to help set process improvement objectives and priorities
- to help ensure stable, capable, and mature processes
- as a guide for improvement of project and organizational processes
- with an appraisal method to diagnose the state of an organization's current practices
- Um modelo de processo é usado para:
 - Ajudar a definir melhoramentos nos objetivos e prioridades dos processos
 - Ajudar a garantir processos estáveis, capazes e maduros
 - Como guia para os melhoramentos em um projeto e nos processos organizacionais
 - Com um método de avaliação e diagnóstico para o estado das práticas correntes de uma organização



Why Is a Process Model Important?



(Por que um Modelo de Processos é importante?)

A process model provides

- a place to start improving
- the benefit of a community's prior experiences
- a common language and a shared vision
- a framework for prioritizing actions
- a way to define what improvement means for an organization
- Um modelo de processo provê:
 - Um lugar para iniciar os melhoramentos
 - O aproveitamento das experiências prévias da comunidade
 - Uma linguagem comum e uma visão compartilhada
 - Um framework para priorização das ações
 - Um caminho para definir o que “melhoramento” significa para a organização



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CMMI for Process Improvement -1



(CMMI para o Melhoramento de Processos -1)

Use CMMI in process improvement activities as a

- collection of best practices
- framework for organizing and prioritizing activities
- support for the coordination of multi-disciplined activities that might be required to successfully build a product
- means to emphasize the alignment of the process improvement objectives with organizational business objectives

CMMI incorporates lessons learned from use of the SW-CMM[®], EIA-731, and other standards and models.



CMMI for Process Improvement -1



(CMMI para o Melhoramento de Processos -1)

Use CMMI in process improvement activities as a

- Coleção de melhores práticas
- Framework para organização e priorização de atividades
- Suporte a coordenação de atividades multidisciplinares que podem ser requeridas para construir um produto com sucesso
- Meio de enfatizar o alinhamento dos objetivos de melhoramento de processos com os objetivos de negócio da organização

CMMI incorporates lessons learned from use of the SW-CMM[®], EIA-731, and other standards and models.



CMMI for Process Improvement -2



A CMMI model is not a process.

A CMMI model describes the characteristics of effective processes.

**“All models are wrong,
but some are useful.”**

George Box
(Quality and Statistics
Engineer)



The CMMI Framework

(O Framework CMMI)

The CMMI Framework is the structure that organizes the components used in generating models, training materials, and appraisal methods.

The CMMI Product Suite is the full collection of models, training materials, and appraisal methods generated from the CMMI Framework.

The components in the CMMI Framework are organized into groupings, called **constellations**, which facilitate construction of approved models.

- During v1.2 development, CMMI-SE/SW/IPPD/SS was moved to the **CMMI for Development (CMMI-DEV)** constellation.
- Two new constellations have been commissioned by CMMI Steering Group:
 - CMMI for Services (CMMI-SVC)
 - CMMI for Acquisition (CMMI-ACQ)

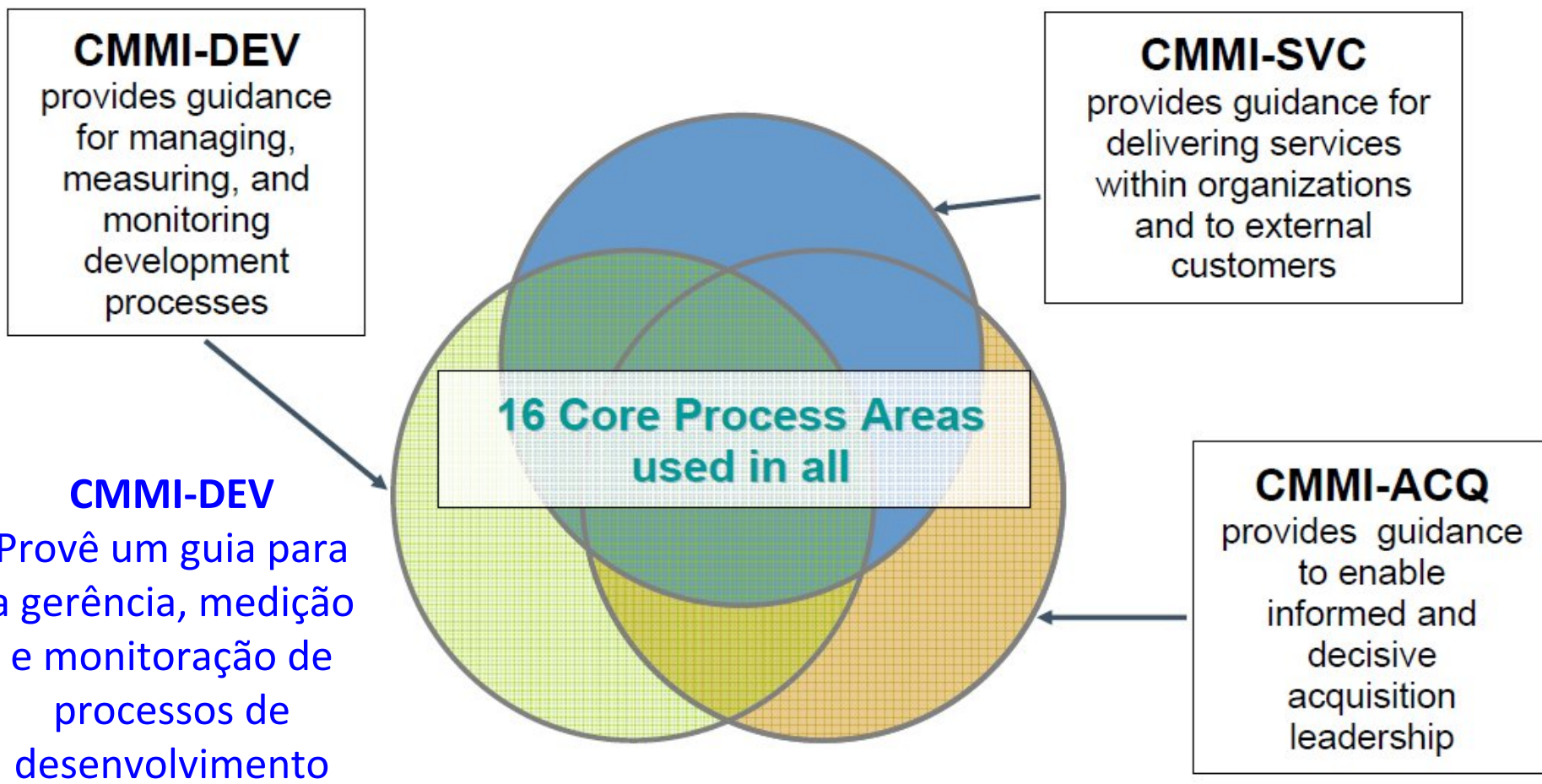
The CMMI Framework

(O Framework CMMI)

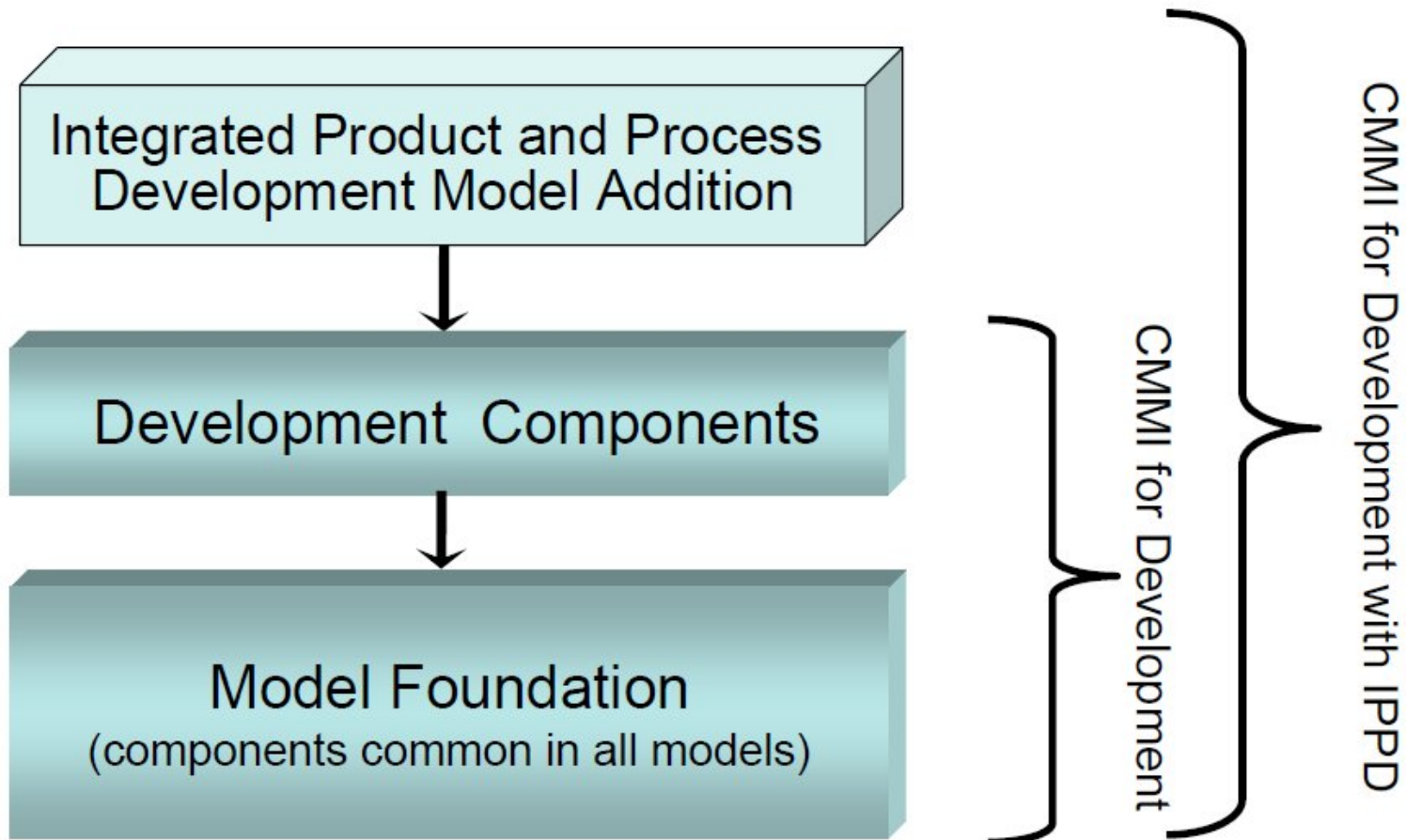
- O Framework CMMI é uma estrutura que organiza os componentes para geração de modelos, materiais de treinamento, e métodos de avaliação.
- A suíte de produtos CMMI é coleção completa de modelos, materiais de treinamento, e métodos de avaliação gerados a partir do Framework CMMI.
- Os componentes do Framework CMMI estão organizados em grupos, chamados de constelações, as quais facilitam a construção de modelos aprovados.
 - During v1.2 development, CMMI-SE/SW/IPPD/SS was moved to the **CMMI for Development (CMMI-DEV)** constellation.
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Three Complementary Constellations

(As Três Constelações Complementares)



Development Constellation Models



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Appraisal Requirements for CMMI

(Requisitos de Avaliação para CMMI)

The Appraisal Requirements for CMMI (ARC) defines the requirements considered essential to appraisal methods intended for use with CMMI models:

- based on appraisal principles common to source methods
- defines three classes of appraisal methods that reflect common usage modes of appraisal methods

ARC requirements are allocated to each method class to align with usage mode characteristics.

- Os requisitos de avaliação para CMMI (ARC) definem os requisitos considerados essenciais para avaliar os métodos que desejam usar os modelos CMMI

ARC Appraisal Principles

(Princípios da Avaliação ARC)

Start with an appraisal reference model (e.g., CMMI for Development).

Use a formalized appraisal process (e.g., SCAMPI A).

Involve senior management as the appraisal sponsor.

Focus the appraisal on the sponsor's business objectives.

Observe strict confidentiality and non-attribution of data.

Approach the appraisal collaboratively.

Focus on follow-on and decision-making activities by producing actionable appraisal results.

ARC Appraisal Principles

(Princípios da Avaliação ARC)

- Inicia com um modelo de referência para avaliação (ex.: CMMI para desenvolvimento).
- Usa um processo de avaliação formal (ex.: SCAMPI A).
- Envolve um gerenciamento experiente como responsável pela avaliação.
- Foca a avaliação nos objetivos do negócio.
- Observa a confidencialidade dos dados.
- Realiza uma avaliação colaborativa.
- Foca nas atividades de acompanhamento e de decisão produzindo resultados de avaliação mensuráveis.



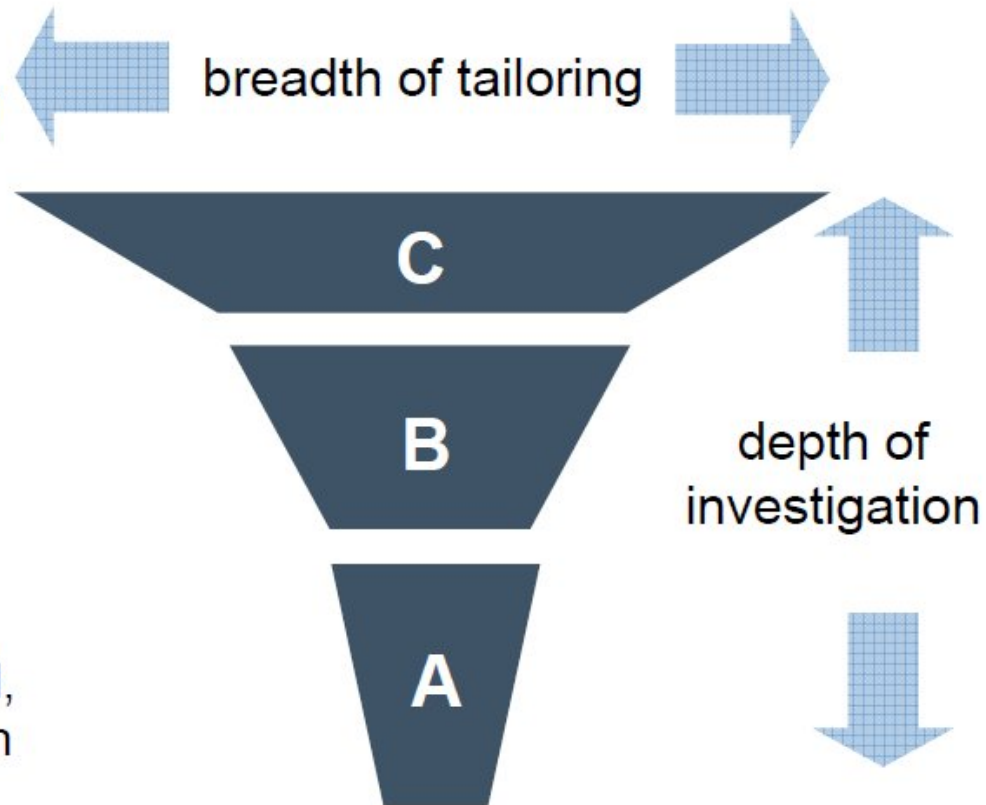
SCAMPI Family: 3 Classes of Appraisal Methods



SCAMPI C provides a wide range of options, including characterization of planned approaches to process implementation according to a scale defined by the user.

SCAMPI B provides options in model scope and organizational scope, but characterization of practices is fixed to one scale and is performed on implemented practices.

SCAMPI A is the most rigorous method, and is the only method that can result in ratings.



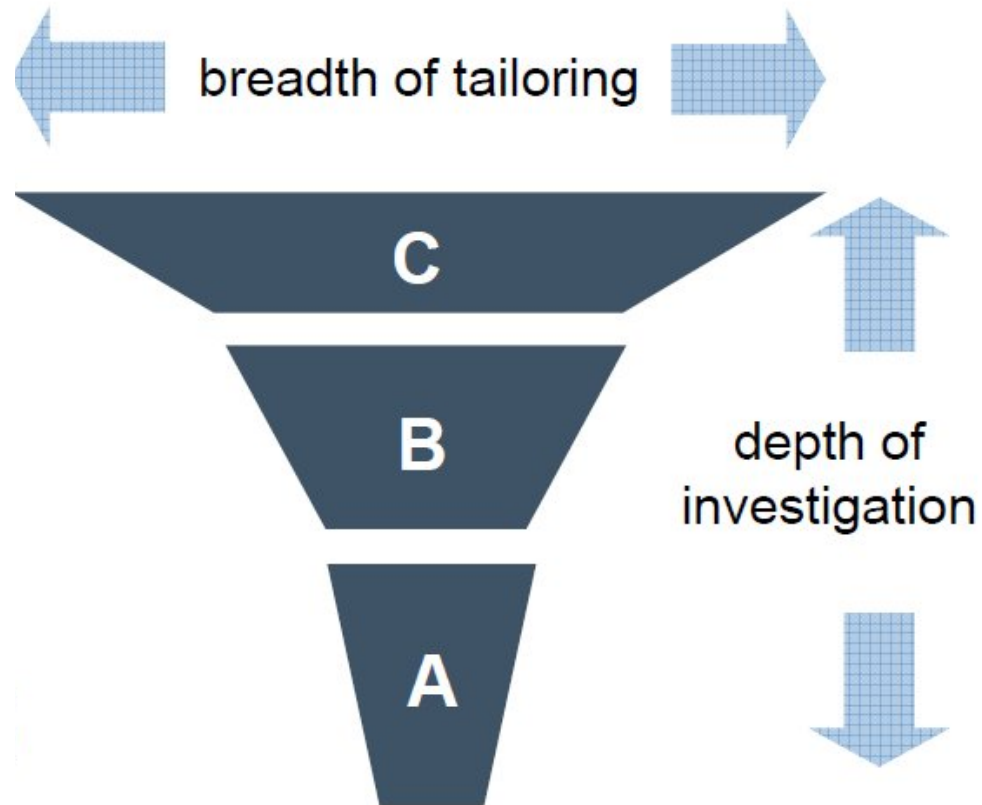
SCAMPI Family: 3 Classes of Appraisal Methods



SCAMPI C provê um grande conjunto de opções, incluindo a caracterização da abordagem planejada para implementação do processo de acordo com uma escala definida pelo cliente

SCAMPI B provê opções no escopo do modelo e no escopo organizacional, mas a caracterização das práticas usa uma escala fixa e é aplicada às práticas implementadas

SCAMPI A é o método mais rígido, e o único método que pode resultar em “pontuações”

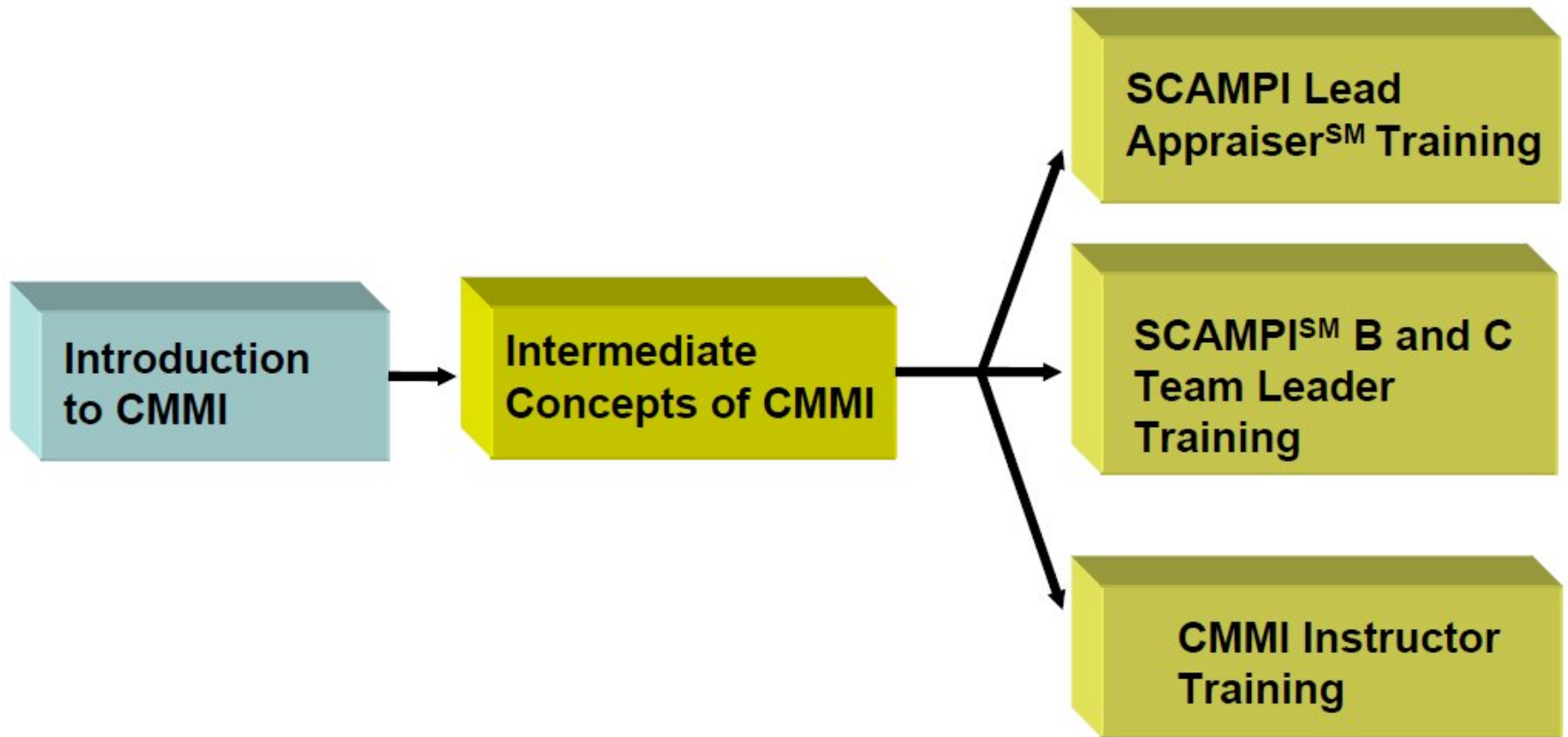


SCAMPI Requirements



Requirement	SCAMPI A	SCAMPI B	SCAMPI C
Types of Objective Evidence Gathered	Documents and interviews	Documents and interviews	Documents or interviews
Ratings Generated	Goal ratings required	No ratings allowed	No ratings allowed
Organizational Unit Coverage	Required	Not required	Not required
Minimum Team Size	4	2	1
Appraisal Team Leader Requirements	SCAMPI A lead appraiser	SCAMPI B and C team leader	SCAMPI B and C team leader





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Benefits Information

(Informações sobre os Benefícios)



Information about CMMI benefits is available on the **CMMI Performance Results Web site** and in the July 2006 SEI technical report, *Performance Results of CMMI-Based Process Improvement (CMU/SEI-2006-TR-004)*.

- This report is based on public reports, interviews, supplementary materials, and comprehensive literature review and is available on the SEI Web site at <http://www.sei.cmu.edu/publications/documents/06.reports/06tr004.html>.
- The following three slides are adapted from this technical report.
- For more information, see the **CMMI Performance Results Web site** at <http://www.sei.cmu.edu/cmmi/results.html>.



Performance Measures - CMMI



(Medidas de Performance depois do Uso do CMMI)

The performance results in the following table are from 30 different organizations that achieved percentage change in one or more of the six categories of performance measures below.

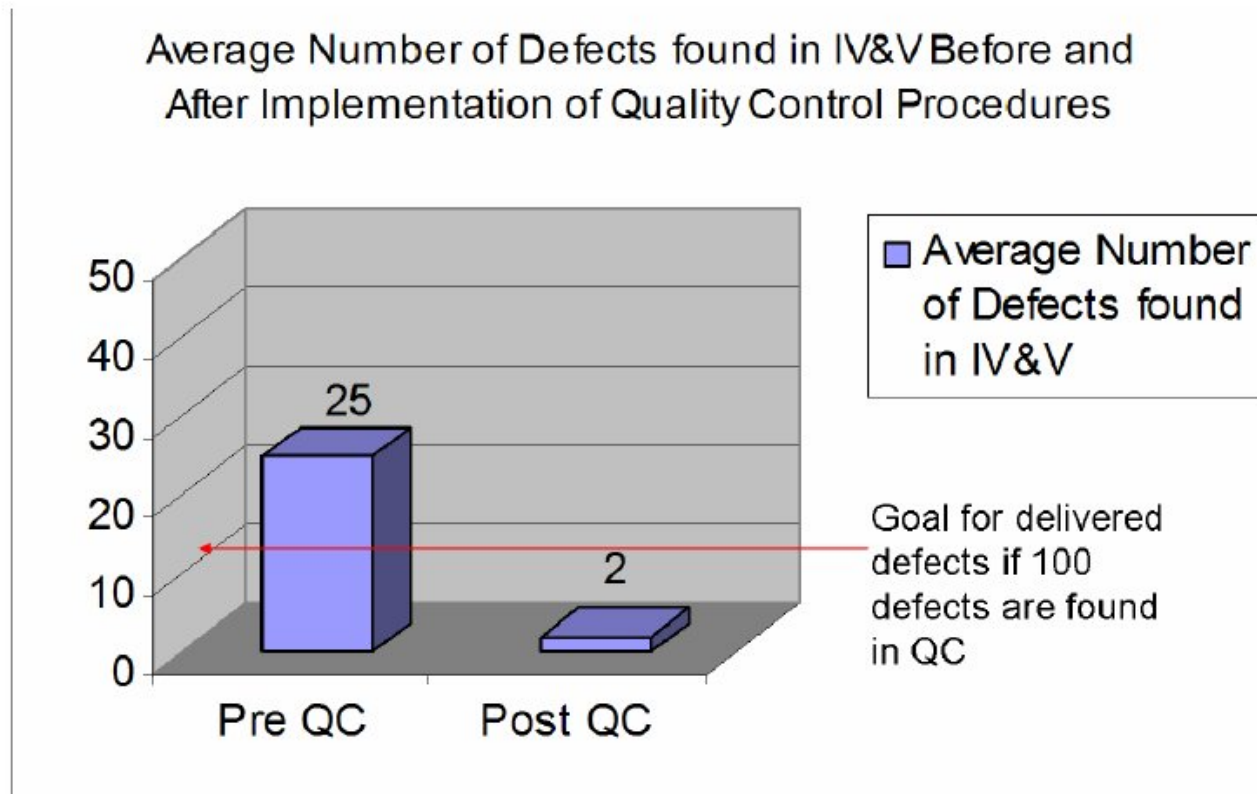
Performance Category	Median Improvement
Cost	34%
Schedule	50%
Productivity	61%
Quality	48%
Customer Satisfaction	14%
Return on Investment	4:1



Example Benefit -1

(Exemplo de Benefício - 1)

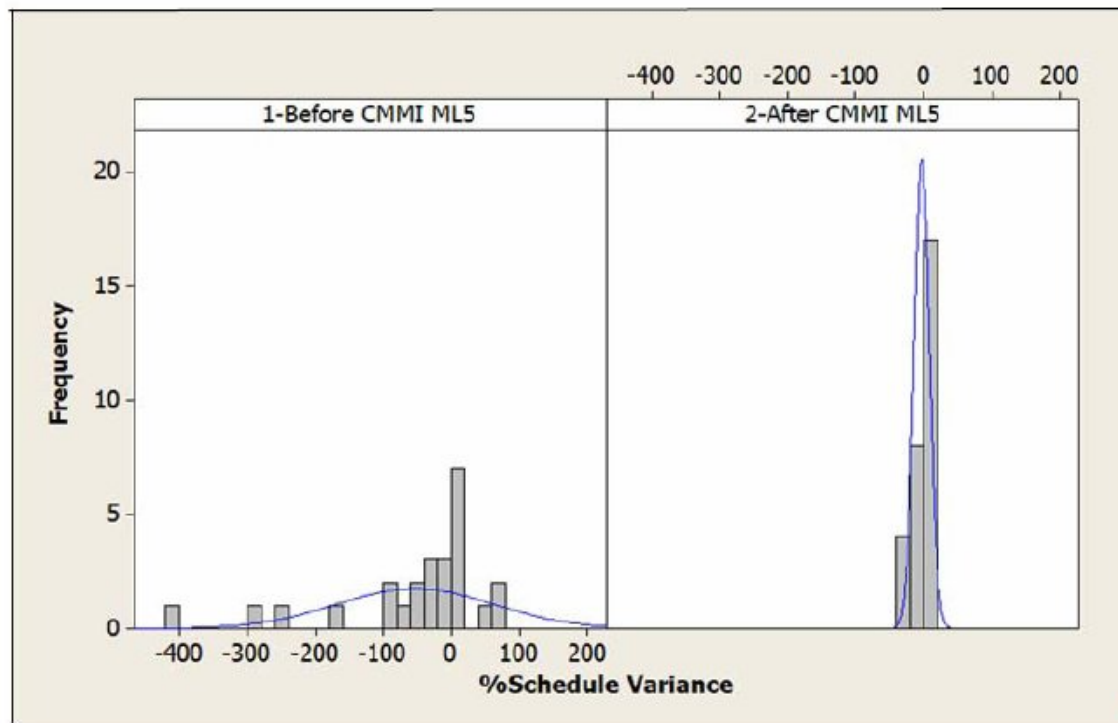
The organization 3HT, with a little over 2 years of CMMI-based process improvement, showed significant improvement in average number of defects found.



Example Benefit -2

(Exemplo de Benefício - 2)

The Software Maintenance Group at Warner Robins Air Logistics Center, a maturity level 5 organization, significantly reduced schedule variance.



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Some of the Organizations Using CMMI



Accenture	Bank of America	BMW
Boeing	Bosch	Ericsson
Dyncorp	EDS	Fujitsu
FAA	Fannie Mae	Hitachi
General Dynamics	General Motors	Infosys
Honeywell	IBM Global Services	KPMG
Intel	J. P. Morgan	Motorola
L3 Communications	Lockheed Martin	NEC
NASA	NDIA	NRO
Nokia	Northrop Grumman	NTT DATA
Polaris	Raytheon	Reuters
SAIC	Samsung	Social Security Administration
Tata Consultancy Services	TRW	U.S. Air Force
U.S. Army	U.S. Navy	U.S. Treasury Department
Wipro	Zurich Financial Services	



CMMI Service Providers (as of 7/31/06)



SEI Partners are licensed by the SEI to provide appraisal services and/or training services.

- There are 226 SEI Partners that offer the Introduction to CMMI training course.
- There are 248 SEI Partners that offer SCAMPI appraisal services.

Instructors and appraisers are authorized by the SEI. There are currently 385 SEI-authorized Introduction to CMMI V1.1 Instructors and 436 SEI-authorized Lead Appraisers.

Since the release of CMMI in 2000, there have been many people trained in CMMI:

- Introduction to CMMI: 54,460

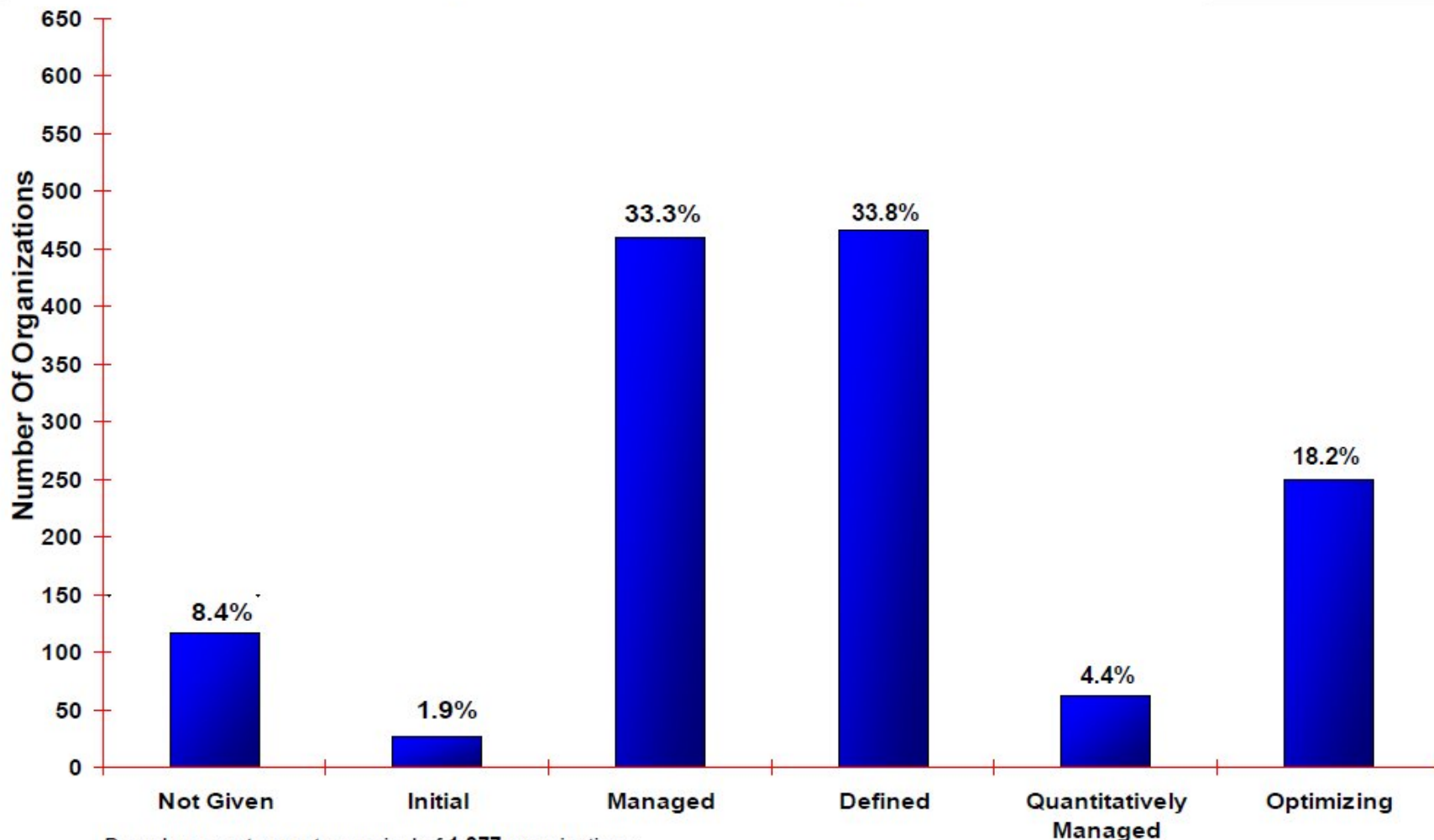


The following data shows the number of SCAMPI V1.1 Class A appraisals that were conducted since the April 2002 release through June 2006 and reported to the SEI by July 2006:

- 1,581 appraisals
- 1,377 organizations
- 840 participating companies
- 169 reappraised organizations
- 6,001 projects
- 63.8% non-USA organizations



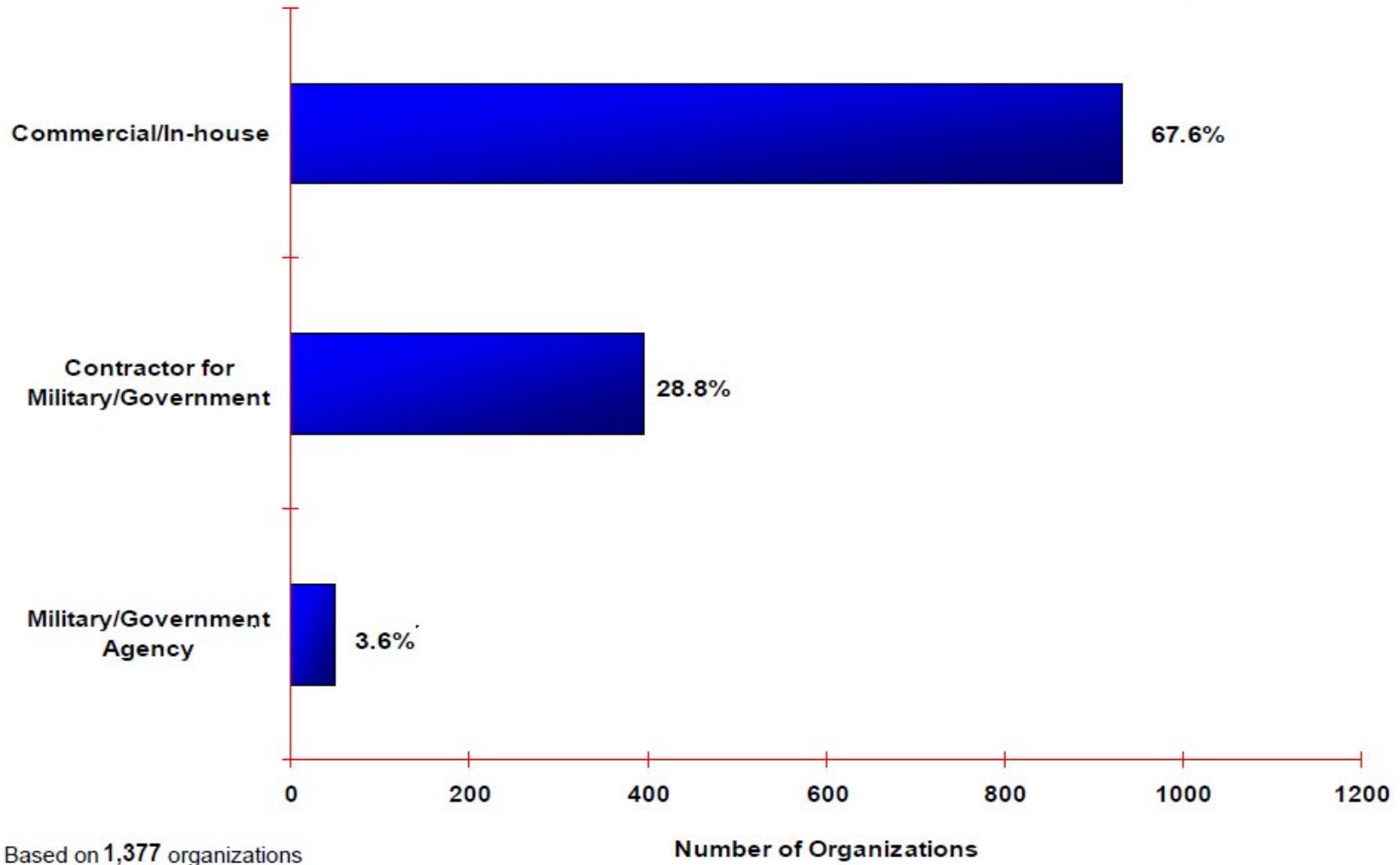
Process Maturity Profile by All Reporting Organizations (as of 6/30/06)



Based on most recent appraisal of 1,377 organizations



Reporting Organizational Categories (as of 6/30/06)



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The Bottom Line



Process improvement should be done to help the business—not for its own sake.



“In God we trust,
all others bring data.”
- W. Edwards Deming



CMMI Can Benefit You

(CMMI Pode Beneficiar Você)



CMMI provides

- guidance for efficient, effective improvement across multiple process disciplines in an organization
 - improvements to best practices incorporated from the earlier models
 - a common, integrated vision of improvement for all elements of an organization
-
- Orientação para uma melhoria eficiente e efetiva em múltiplas disciplinas dos processos de uma organização
 - Adoção das melhores práticas incorporados por modelos mais recentes
 - Uma visão comum e integrada da melhoria de todos os elementos de uma organização



CMMI Benefits

(Benefícios CMMI)



CMMI-based process improvement benefits include

- improved schedule and budget predictability
- improved cycle time
- increased productivity
- improved quality (as measured by defects)
- increased customer satisfaction
- improved employee morale
- increased return on investment
- decreased cost of quality

CMMI Benefits



(Benefícios CMMI)

CMMI-based process improvement benefits include

- Otimizar a previsibilidade de cronograma e gastos
- Otimizar o ciclo de tempo
- Aumentar a produtividade
- Melhorar a qualidade
- Aumentar a satisfação do cliente
- Aumentar a moral dos empregados
- Aumentar o retorno do investimento
- Diminuir o custo da qualidade

Improve Your Bottom Line



Improvement means different things to different organizations.

- What are your business goals?
- How do you measure progress?

Improvement is a long-term, strategic effort.

- What is the expected impact on the bottom line?
- How will impact be measured?



For More Information About CMMI



Go to CMMI Web site:

- <http://www.sei.cmu.edu/cmmi>
- <http://seir.sei.cmu.edu>

Contact SEI Customer Relations:

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