



# CMMI<sup>®</sup> Executive Overview



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# Report Documentation Page

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# Topics

Do You Need Process Improvement?

What Is CMMI?

How Can CMMI Benefit You?

Who Is Using CMMI?

Where Do Executives Fit In?



# Have These Symptoms?

## Missed commitments

- Spiraling costs
- Late delivery to the market
- Last-minute crunches

## Inadequate management visibility

- Too many surprises

## Quality problems

- Customer complaints
- Too much rework
- Functions not working correctly

## Poor morale

- Burned-out people
- Inadequate control of project results





# Why Focus on Process?

It complements your focus on technology:

- Technology, by itself, will most likely not be used effectively.
- Technology, in the context of an appropriate process roadmap, can provide the most benefit.



It complements your focus on people:

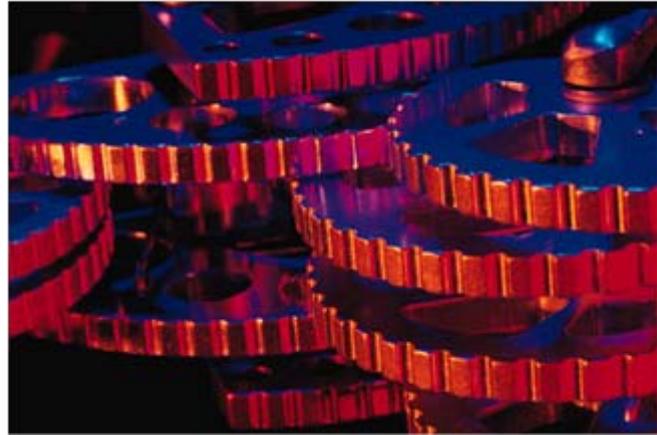
- The experience and training of your work force is not always enough.
- Working harder is not the answer.
- A well-defined process can provide the means to work smarter.
- It shifts the “blame” for problems from people to the process.



# The Importance of Process

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

- a long-established premise in manufacturing
- visible worldwide in quality movements in manufacturing and service industries (e.g., ISO standards)



# Common Fallacies

## I don't need process, I have ...

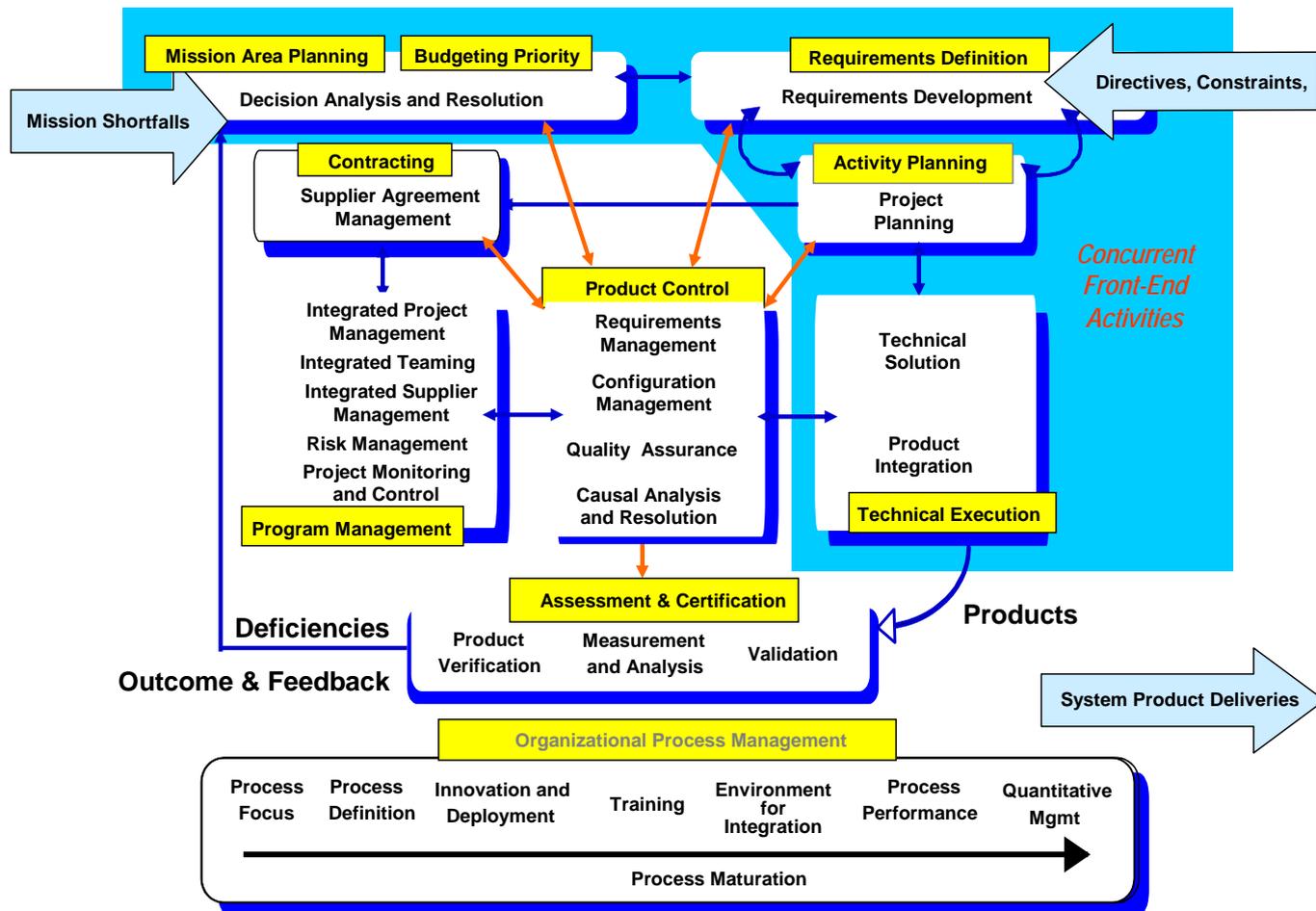
- really good people
- advanced technology
- an experienced manager



## Process ...

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

# Relevant Engineering Processes





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# What Is CMMI?

Capability Maturity Model<sup>®</sup> Integration (CMMI) is a suite of products used for improving processes.

- Models
- Appraisal Methods
- Training Courses

# CMMI Model 1

A framework that describes key elements of effective process

A guide to evolutionary improvement from ad hoc, immature activities to mature, disciplined processes

A description of practices for planning, engineering, and managing business processes that can help you achieve business goals related to things such as:

- cost
- schedule
- functionality
- product/service quality



## CMMI Model 2

A yardstick against which the maturity of an organization's product development, acquisition, and/or service-related processes can be measured and compared with industry state of the practice

A basis for planning improvements to your business processes

CMMI best practices tell you WHAT to do but neither HOW to do it nor WHO should do it.



# Model Features

## CMMI

- supports process integration and product improvement
- enables the integration of multiple disciplines into one process-improvement effort that helps to eliminate inconsistencies and reduces duplication
- provides a framework for introducing new disciplines as needs arise and therefore reduces the cost of expanding or implementing model-based process improvement
- is designed to build on legacy process improvement efforts and investments

# CMMI Best Practices Are Used for...

The development, acquisition, and maintenance of products and services

Software-intensive products and services

Product and service life cycles from conception through delivery and maintenance

Benchmarking your organization against others in a variety of industries



# CMMI Appraisals (SCAMPI<sup>SM</sup>)

Measures the capabilities of an organization's processes using a CMMI model as a yardstick

Uses a standardized appraisal process

Involves senior management sponsorship

Focuses the appraisal on the sponsor's business objectives

Observes strict confidentiality and non-attribution of data

Focuses on follow-on improvement activities and decision making based on the appraisal results





## SCAMPI Classes A, B, and C

SCAMPI C – Approach to process improvement

SCAMPI B – Deployment of processes

SCAMPI A – Institutionalization of processes and benchmarking



# Maturity Levels: How Long to Move Up?

Empirical evidence suggests that there is variability in the amount of time it takes organizations to move from one maturity level to the next using the SW-CMM. Early CMMI results appear to be comparable.

**1992 to June 2005\***

| Maturity Level | Median # Months |
|----------------|-----------------|
| level 1 to 2   | 19              |
| level 2 to 3   | 20              |
| level 3 to 4   | 25              |
| level 4 to 5   | 13              |

\* Software CMM® Appraisal Results through June 2005



# CMMI Adoption: Not One-Size-Fits-All

Some upgrade from SW-CMM or EIA 731

Some adopt only CMMI

Some adopt CMMI with or in addition to other approaches, such as

- Six Sigma
- Agile Methods
- TSP/PSP
- ISO 9000/9001
- IEEE Standards
- RUP
- Balanced Scorecard





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# How Do You Want to Work?

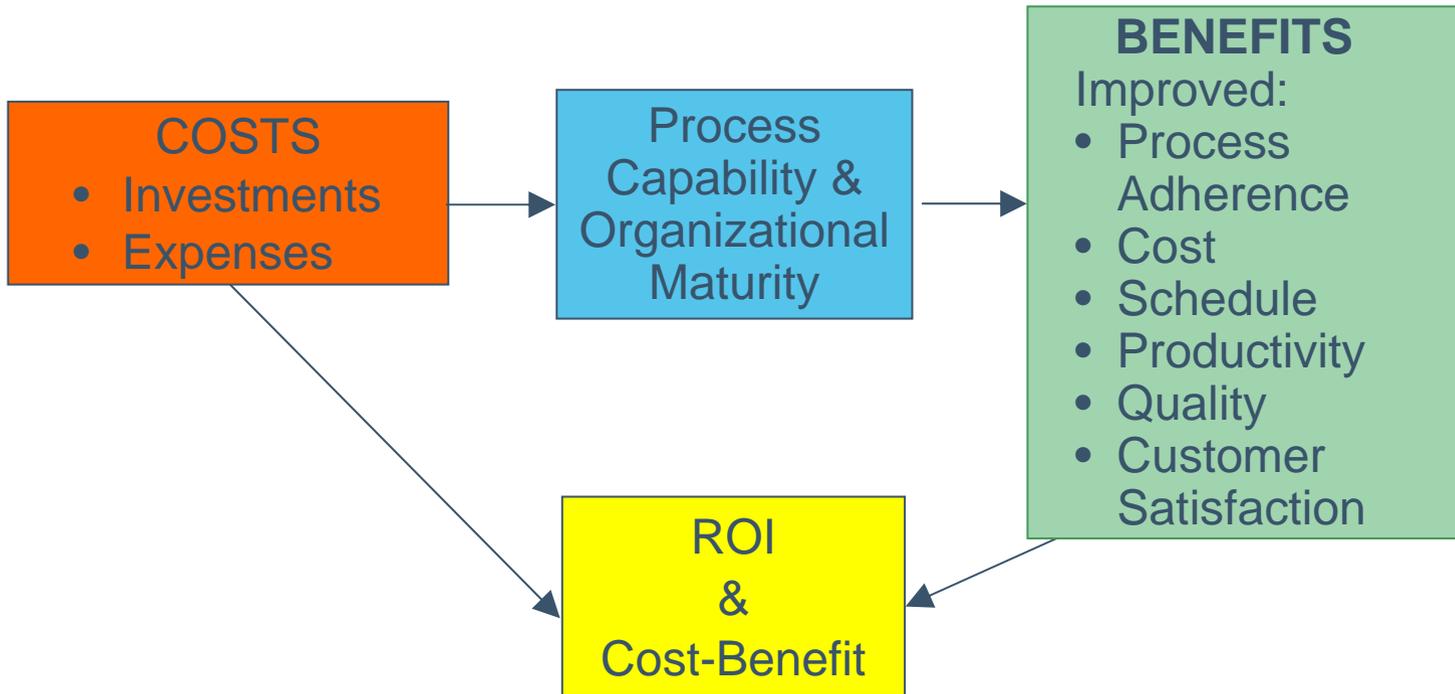
- Random motion – lots of energy, not much progress
  - No teamwork – individual effort
  - Frequent conflict
  - You never know where you'll end up
- 
- Directed motion – every step brings you closer to the goal
  - Coordinated efforts
  - Cooperation
  - Predictable results



Processes can make the difference



# Costs and Benefits of CMMI



## Costs May Vary

The cost of CMMI adoption is highly variable depending on many factors, including organization

- size
- culture
- organization
- current processes



Regardless of the investment, we've found that organizations experience a respectable return on their investment.

# Performance Results: CMMI

The next slide provides examples from 25 different organizations that achieved benefits in one or more of the following six categories of performance measures:

- Cost
- Schedule
- Productivity
- Quality
- Customer Satisfaction
- Return on Investment



# Performance Measures

| Improvements          | Median  | # of Data Points | Low   | High     |
|-----------------------|---------|------------------|-------|----------|
| Cost                  | 20%     | 21               | 3%    | 87%      |
| Schedule              | 37%     | 19               | 2%    | 90%      |
| Productivity          | 62%     | 17               | 9%    | 255%     |
| Quality               | 50%     | 20               | 7%    | 132%     |
| Customer Satisfaction | 14%     | 6                | -4%   | 55%      |
| ROI                   | 4.7 : 1 | 16               | 2 : 1 | 27.7 : 1 |



## Examples of Impact: Schedule\*

- 50% reduction in release turn around time (Boeing, Australia)
- Increased the percentage of milestones met from approximately 50 percent to approximately 95 percent (General Motors)
- Decreased the average number of days late from approximately 50 to fewer than 10 (General Motors)
- Increased through-put resulting in more releases per year (JP Morgan Chase)
- Met every milestone (25 in a row) on time, with high quality and customer satisfaction (Northrop Grumman Defense Enterprise Systems)

\* Results shown on this slide and the following slides are from publicly available conference presentations, published papers, and individual collaborations with the SEI, and are used with permission. To see additional detailed CMMI results, see [www.sei.cmu.edu/cmmi/results.html](http://www.sei.cmu.edu/cmmi/results.html).

## Examples of Impact: Productivity

- Improved productivity substantially, with “significantly more rigorous engineering practices” due to CMMI® (Fort Sill Fire Support Software Engineering Center)
- Improved software productivity (including reuse) from a 1992 baseline by approximately 80 percent at SW-CMM® maturity level 5 In 1997 to over 140 percent at CMMI ML 5 in 2001 (Lockheed Martin Systems Integration)
- 25 percent productivity improvement in 3 years (Siemens Information Systems Ltd, India)
- Used Measurement & Analysis to realize an 11 percent increase in productivity, corresponding to \$4.4M in additional value (reported under non-disclosure)



## Examples of Impact: Quality

- Reduced software defects per million delivered SLOC by over 50 percent compared to defects prior to CMMI (Lockheed Martin Systems Integration)
- Reduced defect rate at CMMI ML5 approximately one third compared to performance at SW-CMM ML5 (Lockheed Martin Maritime Systems & Sensors – Undersea Systems)
- Improved defect removal before test from 50 percent to 70 percent, leaving 0.35 post release defects per KLOC (Siemens Information Systems Ltd, India)
- 44 percent defect reduction following causal analysis cycle at maturity level 2 (reported under non disclosure)



## Examples of Impact: ROI

- 5:1 ROI for quality activities (Accenture)
- 13:1 ROI calculated as defects avoided per hour spent in training and defect prevention (Northrop Grumman Defense Enterprise Systems)
- Avoided \$3.72M in costs due to better cost performance (Raytheon North Texas Software Engineering)
  - As the organization improved from SW-CMM level 4 to CMMI level 5
- 2:1 ROI over 3 years (Siemens Information Systems Ltd, India)
- 2.5:1 ROI over 1st year, with benefits amortized over less than 6 months (reported under non disclosure)

# Examples of Impact

## Quality

- Reduced software defects per million delivered SLOC by over 50 percent compared to defects prior to CMMI (Lockheed Martin Systems Integration)

## Schedule

- Decreased avg # of days late from 50 to < 10 (General Motors)

## Productivity

- Improved software productivity from a 1992 baseline by approximately 80% at SW-CMM ML 5 in 1997 to over 140% at CMMI ML 5 in 2001 (Lockheed Martin Systems Integration)

## Overall

- Met every milestone (25 in a row) on time, with high quality and customer satisfaction (Northrop Grumman DES)



## Published Benefits

For more detailed information about CMMI benefits, see [www.sei.cmu.edu/cmmi/results.html](http://www.sei.cmu.edu/cmmi/results.html) and the SEI special report, *Demonstrating the Impact and Benefits of CMMI: An Update and Preliminary Results*

- Based on case studies, supplementary materials, and comprehensive literature review
- On the SEI Web site at <http://www.sei.cmu.edu/publications/documents/03.reports/03sr009.html>



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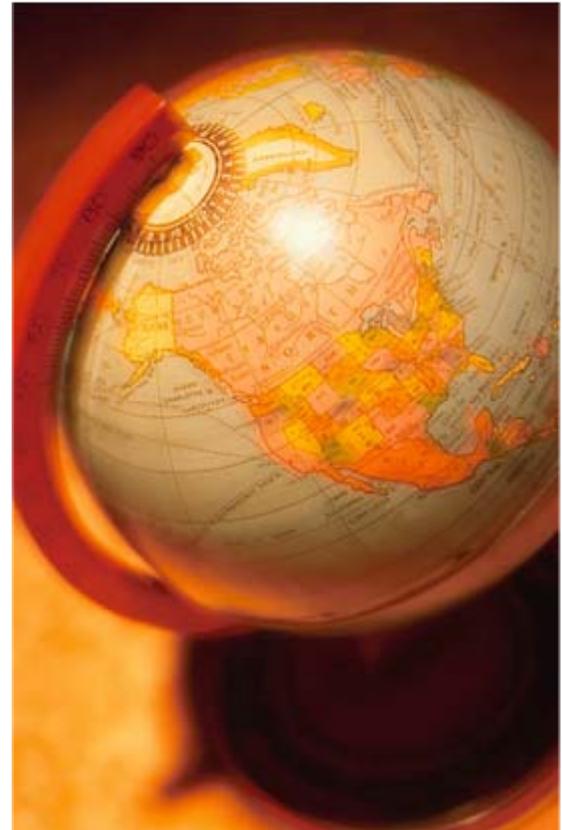
Where Do Executives Fit In?



# CMMI Worldwide Adoption

Appraisals of organizations using CMMI have been conducted in the following countries:

Argentina, Australia, Belarus, Belgium, Canada, Chile, China, Columbia, Denmark, Finland, France, Germany, India, Israel, Japan, Korea, Republic of Malaysia, Philippines, Portugal, Russia, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom, Vietnam, United States



## Early Adopters

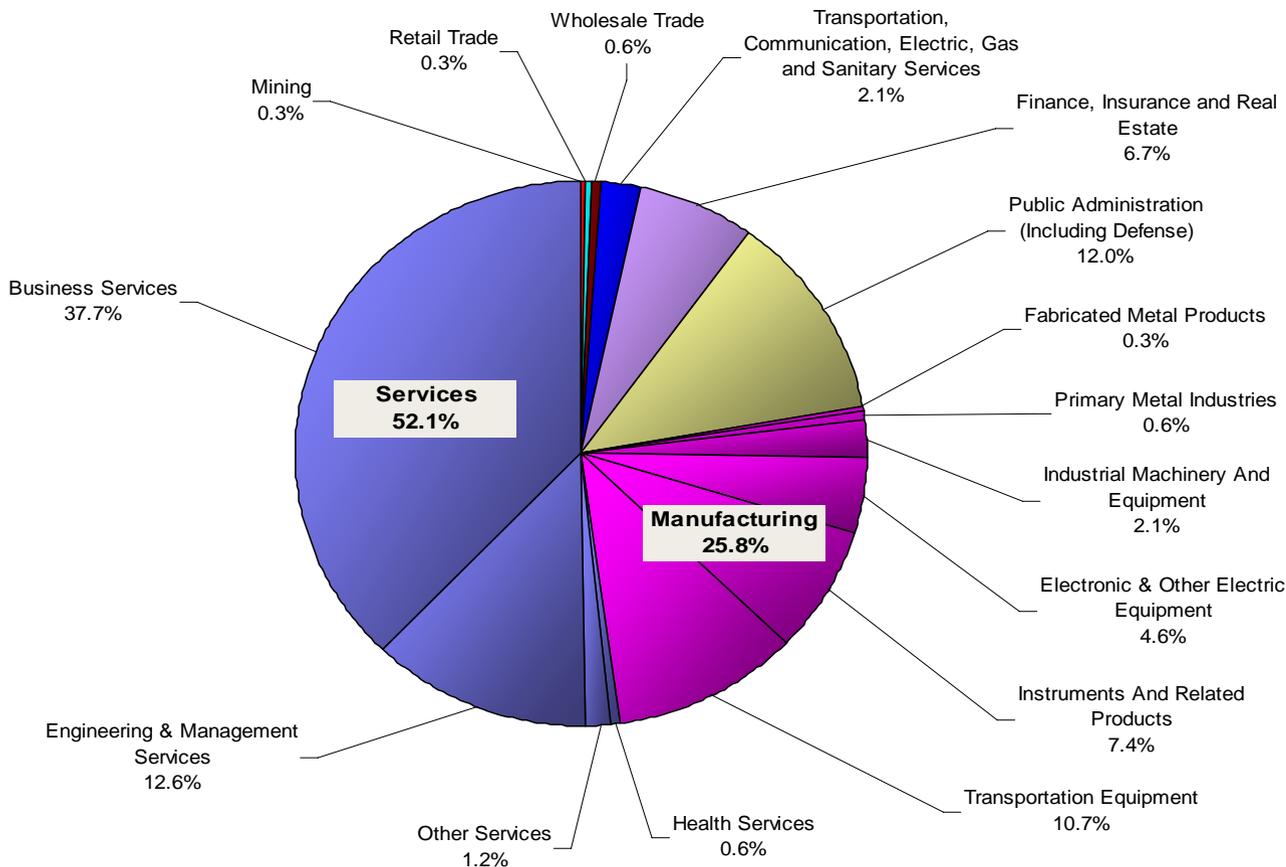
CMMI Early Adopters are people who have agreed to talk to you about their experiences, including benefits. Here are just a few:

- Alan Brown at Boeing
- Jan Unruh at Bosch
- Sarah Bengzon at Accenture
- Alan Kennedy at General Dynamics
- Gary Natwick at Harris Corporation

For a full list of Early Adopters and their contact information see:  
<http://www.sei.cmu.edu/cmami/adoption/early-adopters.html>



# CMMI Is Domain-Independent

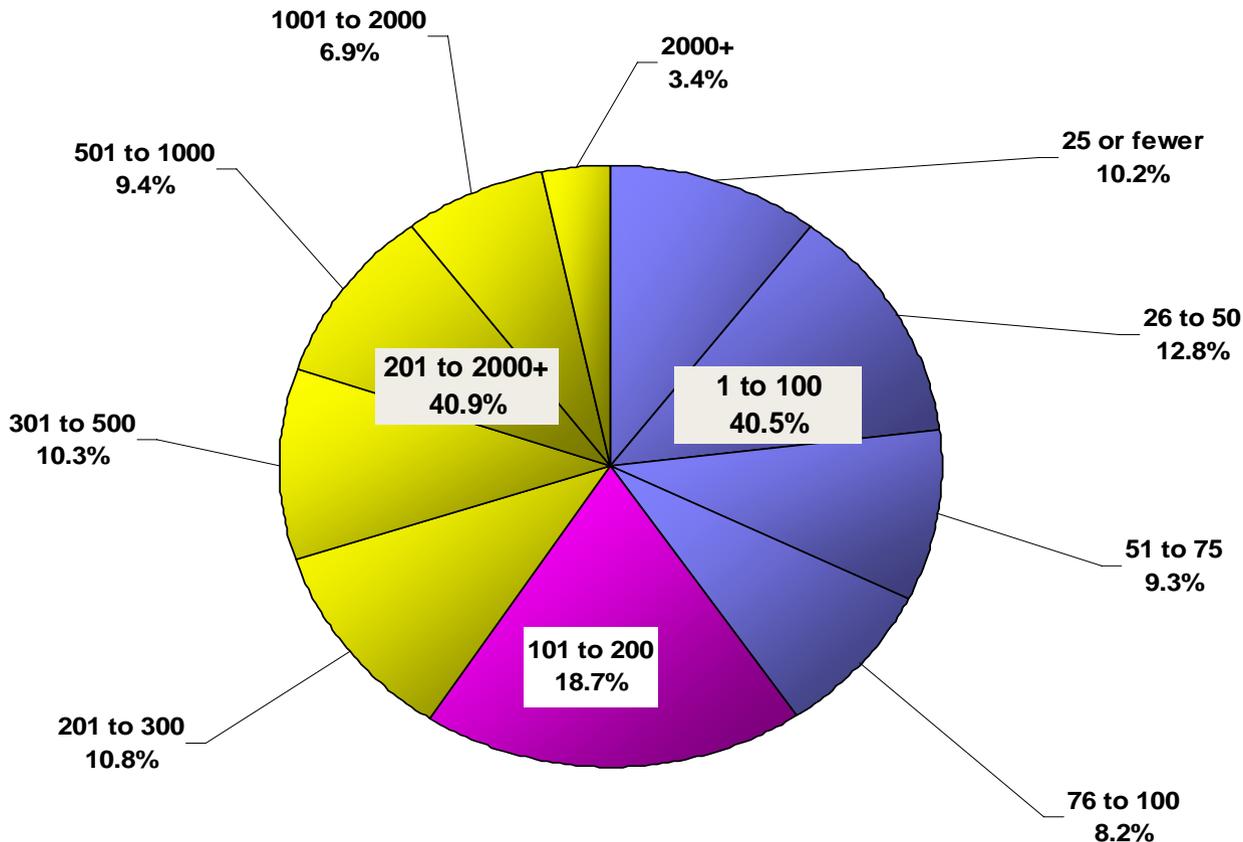


Based on 326 organizations reporting Standard Industrial Classification (SIC) code.

9-30-05



# CMMI Is Size-Independent



Based on **766** organizations reporting size data

9-30-05

## Organizations Using CMMI

The following is an abbreviated list of organizations that are 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               | Polaris                      |
| NTT Data            | OUSD (AT&L)                    | SAIC                         |
| Raytheon            | Reuters                        | TRW                          |
| Samsung             | Social Security Administration | U.S. Navy                    |
| U.S. Air Force      | U.S. Army                      | Zurich Financial<br>Services |
| U.S. Treasury Dept. | Wipro                          |                              |

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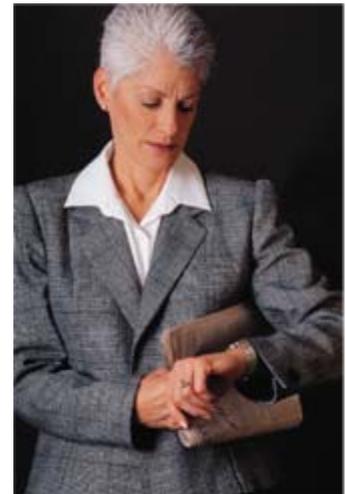
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# Your Role as an Executive

To ensure success of your process improvement program, take these steps:

1. Use your influence to help the organization adopt CMMI.
2. Choose the best people to manage the process improvement effort.
3. Be a sponsor and monitor the process improvement effort.
4. Be an advocate and spokesman.
5. Ensure that resources are available:
  - people
  - money



## Barriers to Expect

As an executive, you can identify these barriers and help the organization get past them:

- “This doesn’t apply to me” syndrome
- Resources drained from process improvement by other “more important” work
- Resistance to change of any kind

# Five Reasons to Adopt CMMI

CMMI helps your organization to ...

1. Improve delivery of product and service **performance, cost, and schedule**
2. Collaborate with external **stakeholders** and meet their expectations in day-to-day activities
3. Provide **competitive** world-class products and services
4. Implement an **integrated** enterprise business and engineering perspective
5. Use common, integrated, and **improving processes** for systems and software



## Where to Start

Ask someone you trust to **learn more** about CMMI and report back to you. Ways to learn more include the SEI Web site, Introduction to CMMI training, and written publications.

**Talk to others** who have adopted CMMI to see how they did it. Early adopters that have agreed to talk to potential adopters are listed on the SEI Web site.

**Participate** in Discussion Groups and Bulletin Boards or attend a conference to learn from others who have adopted CMMI. A list of a few such forums is at [www.sei.cmu.edu/cmmi/adoption/knowledge-exchange.html](http://www.sei.cmu.edu/cmmi/adoption/knowledge-exchange.html).



# 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:

Customer Relations  
Software Engineering Institute  
Carnegie Mellon University  
Pittsburgh, PA 15213-3890  
FAX: (412) 268-5800  
[customer-relations@sei.cmu.edu](mailto:customer-relations@sei.cmu.edu)

The screenshot shows the CMMI Web Site homepage. The header includes the Carnegie Mellon Software Engineering Institute logo and navigation links: Home, Search, Contact Us, Site Map, and What's New. A secondary navigation bar lists: About Management, Engineering, Acquisition, Work with Us, Products and Services, and Publications. The main content area features a 'Welcome to the CMMI® Web Site' message. Below this, there is a section for 'CMMI News' with several news items, including updates on CMMI version 1.1, performance results, and the launch of the CMMI for Acquisition Organizations Project. A sidebar on the left contains a 'MANAGEMENT' section with links to CMMI Main Page, What is CMMI?, Models, Adoption, Training, Events & Forums, Performance Results, Assessments, Frequently Asked Questions (FAQs), Reclamation, and Contact Information.