The ROI Dashboard©
Understanding the Benefits of CMMI

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Objective: Transition from Anecdotal Evidence to Industry Trends

Captures 10 Years of Open and Public ROI Data from Industry and Acquisition Organizations

Organizes and Displays Data from Similar Improvements and Benefits
Published Data

Attribute Displays:
- ROI
- Reduction in Rework
- Impact on Productivity
- Impact on Quality
  - % Defect Reduction
  - % Defects Found
- Impact on Schedule
  - Cycle Time
  - Schedule Variance
- Reduction in Project Cost
- Cost of Improvement
Box Plots

Impact on Quality (% defect reduction)

For further explanation of box plots and hinges please see (Tukey 1972) J. W. Tukey, *Exploratory Data Analysis*, Addison Wesley.
ROI Dashboard© Analyzes Benefit Data from Best Practices

Number of Data Points

Mean (average) value in Red

Median value in Green

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Bar Plot

Impact on Quality (% defect reduction)

CMM
Software
Process
Improvement

\[ \bar{x} = \frac{x_1 + x_2 + \ldots + x_n}{n} \]

\[ s = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \ldots + (x_n - \bar{x})^2}{n-1}} \]
Sample ROI Dashboard© Bar Plot

- Individual Observation
- Number of Data Points
- 1-standard deviation lines
- Mean Value in Red
- 1-standard deviation lines

Ratio

- CMM
  - Software
  - Process
  - Improvement

- CMMI
  - Process Improvement

18
5
The Data & Analysis Center for Software

ROI Dashboard

Impvement: CMM Software Process Improvement

<table>
<thead>
<tr>
<th>Metric</th>
<th>Total Data Points</th>
<th>Minimum</th>
<th>Maximum</th>
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Text
ROI Dashboard© Provides Visibility into Data

ROI Dashboard© Provides Visibility into Data

In a 1994 SEI ROI study, GTE Government Systems Corporation observed a 6.7 to 1 ROI from the overall SPI effort.

In moving from CMM Level 2 to CMM Level 5, Motorola invested $30,180 and saved $633,200 on rework, for a ROI of 53.6%.

Based on a sample in 1990 of six large real-time embedded projects, Parthenon's Software Systems Laboratory achieved a 5.7 annual ROI while moving from CMM Level 2 to CMM Level 5. Investment was approximately $1 million per year, and the sampled projects used about 85% of SSL labor resources. Approximately $0.8 million in reduced rework was saved by 1995, of which $4.48 million were saved in 1990, ($15.8 million was saved by 1992).

Oklahoma City ALC gathered ROI information for 18 of 44 software process improvements. They invested $462,000 for a return of $2.935M, a ROI of 6.35 to 1.
Details Available When Needed
Combined - ROI Dashboard©

ROI

Impact on Productivity

CMMI Process Improvement
Inspections
PSP / TSP
Reuse

CMMI Process Improvement
Inspections
PSP / TSP
Reuse

Ratio

% Improvement
Combined - ROI Dashboard©

Impact on Quality (% defect reduction)

Impact on Cycle Time
Improvement Area Matrix

The following table shows which pairs of improvements are commonly performed together by organizations currently in the DACS ROI Database. Each cell contains the total count of records found in our database (where the improvement pair is defined by the row and column). You can view the matching records by clicking on the total count.

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Access Detailed CMM/CMMI Data

In response to increasing interest and attention from the software engineering and software acquisition community for benefits data from software technical and management improvements, the DACS presents the ROI Dashboard®. The ROI Dashboard® augments and updates the DACS Report “A Business Case for Software Process Improvement” with the latest published data on benefits. The ROI Dashboard® graphically displays open and publicly available data and provides standard statistical analysis of the data. To learn more about the features and usage of the ROI Dashboard®, please read the overview.

Step 1:
Select the improvement areas you are interested in examining. In the list below, ROI data is classified by the organizations national average level while an asterisk represents any previous CMM or CMMI level. Note: Improvements are split into two groups: those with extensive benefit data and those with only limited data. You are currently viewing CMMI-related data only, to view all data please click here.

- Extensive Data Available
  - Achieving CMMI 2 (CM2)
  - Achieving CMMI 3 (CM3)
  - Achieving CMMI 4 (CM4)
  - Achieving CMMI 5 (CM5)
  - Achieving CMMI L (CML)
  - Achieving CMMI M (CMM)
  - Limited Data Available
  - Achieving CMMI 4 (CM4)

Step 2:
What type of display are you interested in?
- Box Plot (details)
- Bar Plot (details)
- Text (details)

If you have data about the benefits from software process improvements at your organization and would like to submit them for inclusion in the ROI Dashboard®, please submit a case study. If you have concerns regarding privacy or proprietary information, please read about our data collection policy. If you submit data, you are entitled to receive a free gift: either our “A Business Case for Software Process Improvement” report or the DACS D00/IT Acronym list on CD-ROM.
ROI Dashboard Data

CMMI Data
Analysis of ROI Dashboard© Data

As of 10/6/05

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## CMMI Statistical Summary

### Improvement: CMMI Process Improvement

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Detailed Summary Data...
Detailed Summary Data...
CMM vs. CMMI

ROI

Impact on Productivity

Impact on Quality (% defect reduction)

Impact on Cycle Time

ROI Dashboard©
2005 CMMI Tech Conf

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Challenges in Open Reported Data

- Data reported from commercial organizations being reported is inherently competition sensitive.
- Only successes/improvements reported. Few failures.
- Some observations are vague.
- Some authors only report notional data.
- Data not adequately defined/quantitative. e.g. “Near Zero Defects Delivered.”
- Benefits reported, but not cost of the improvement.
- Some only report averages. How to combine with specific case studies?
- Variability in units and definitions.
- Inconsistent use of terms in reporting. What part of the lifecycle was measured?
Building the Business Case

- CMMI has demonstrated with quantifiable evidence of improvements in cost, schedule, and quality
- Use data in process modeling
- Compare your data to Dashboard data
  - Does it agree? If not, why not?
- Build simple spreadsheets for what if analysis
Next Steps

• Need More Data: CMMI and other
• Need Feedback from You on the ROI Dashboard© for Problems & Enhancements
• Coordination with SEI on CMMI Data
Thank You!

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