The ROI Dashboard©
Understanding the Benefits of CMMI

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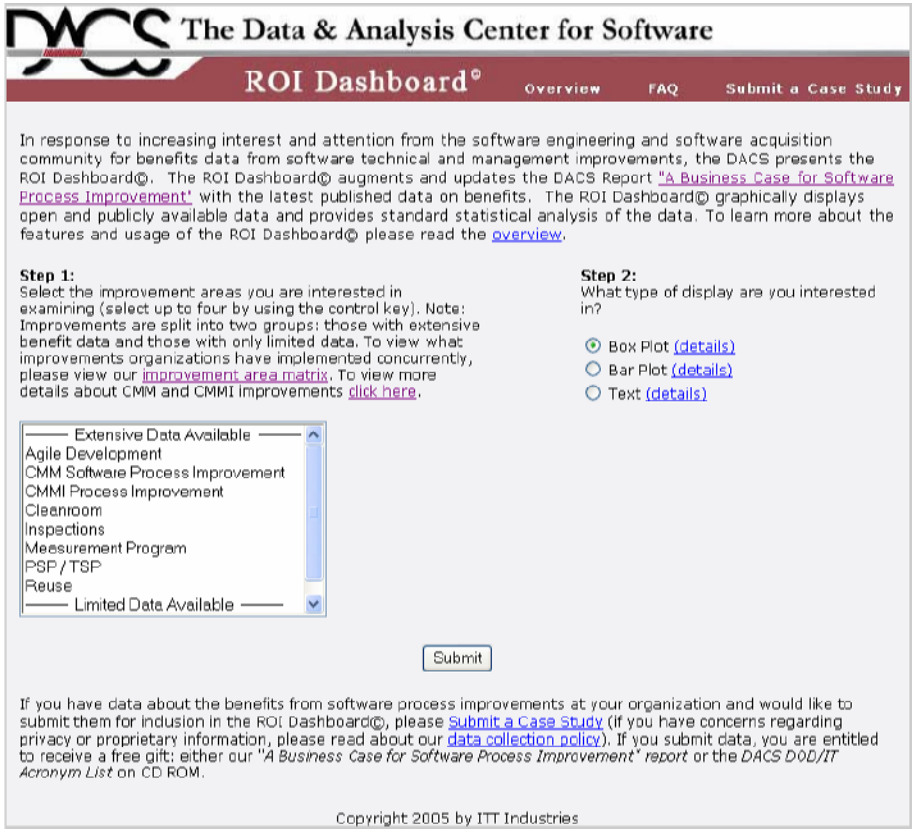
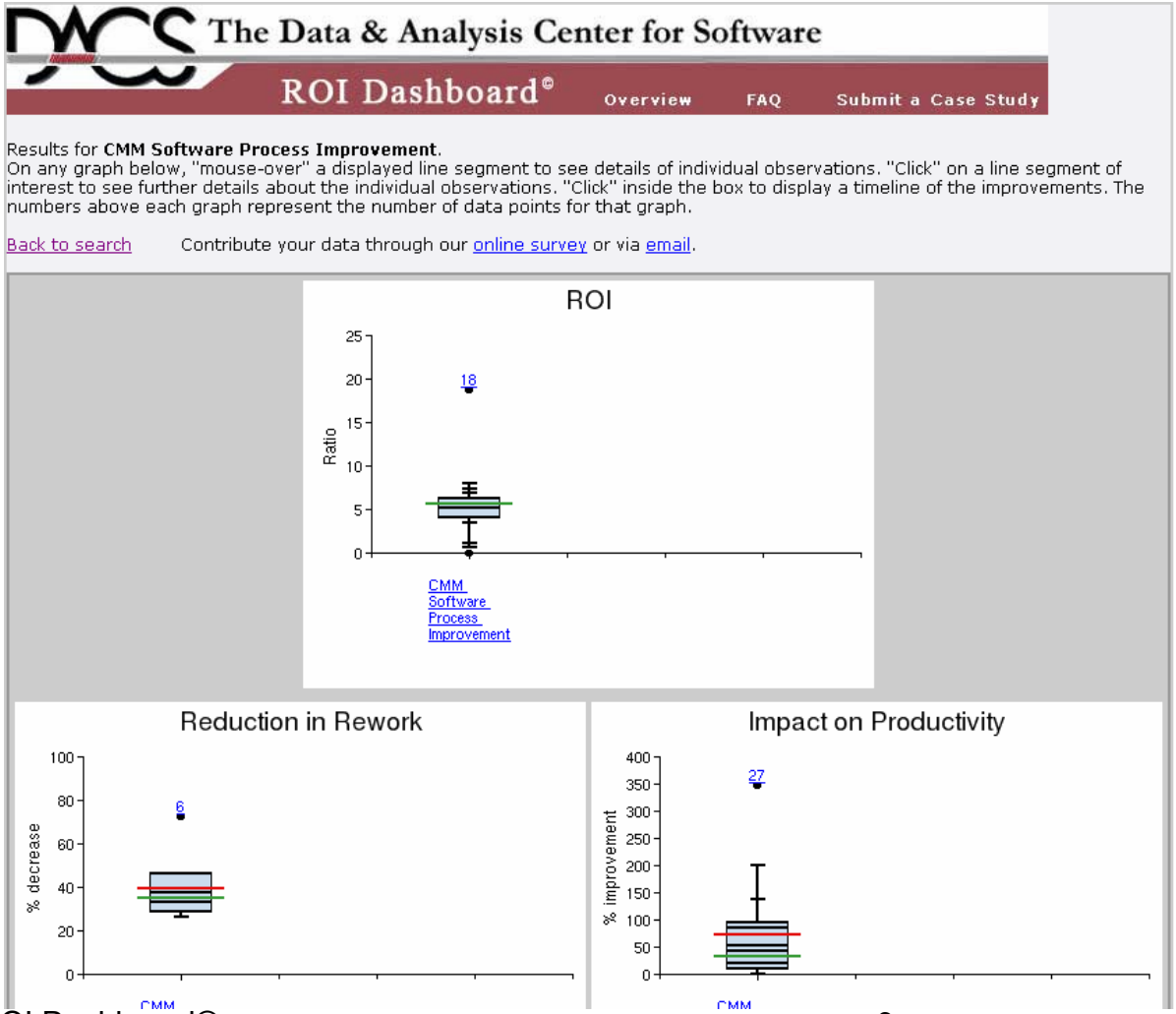
ROI Dashboard©
http://www.thedacs.com/databases/roi/



- 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

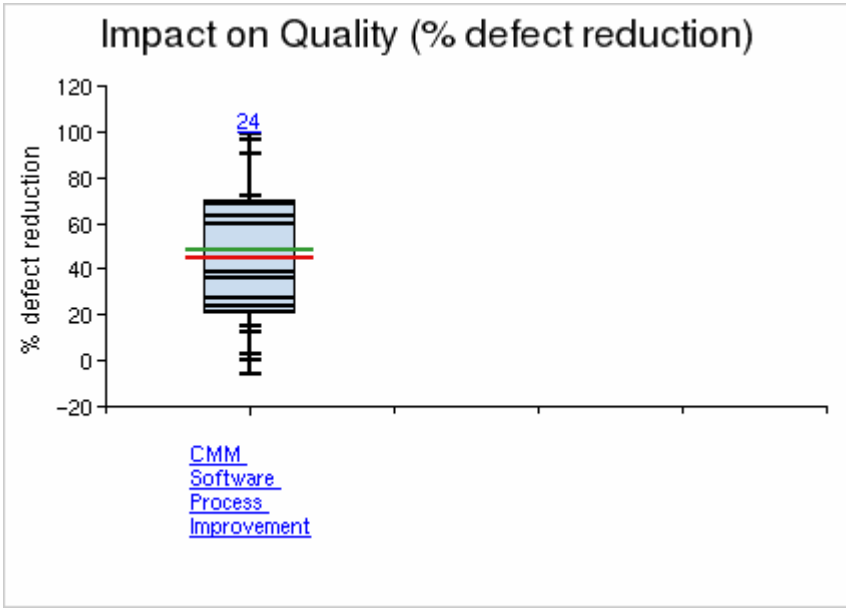
Published Data

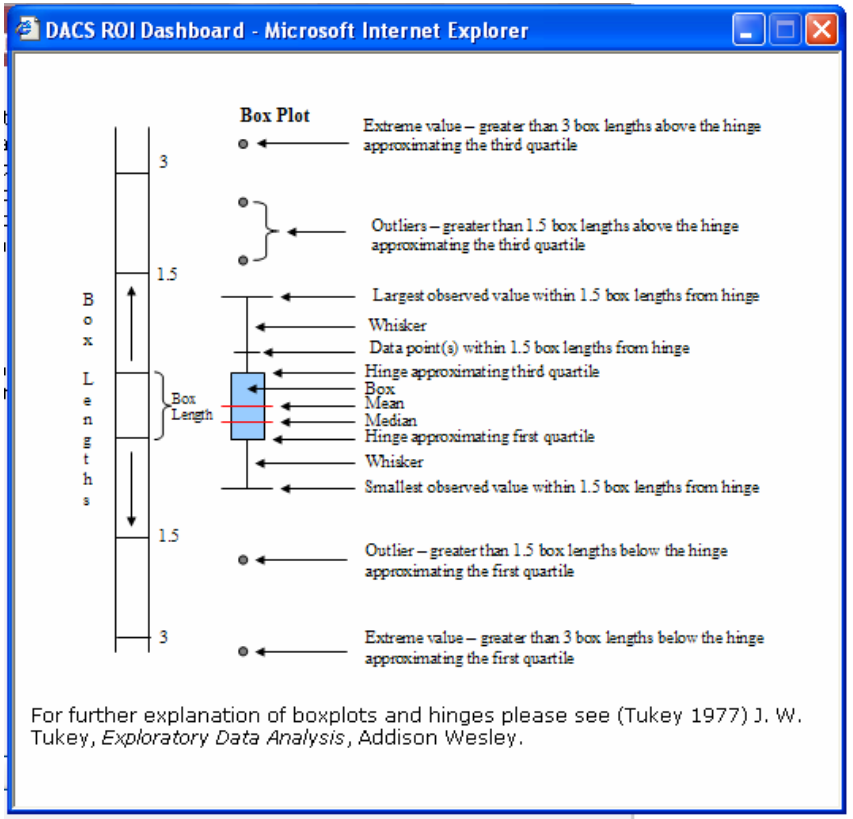


Attribute Displays:

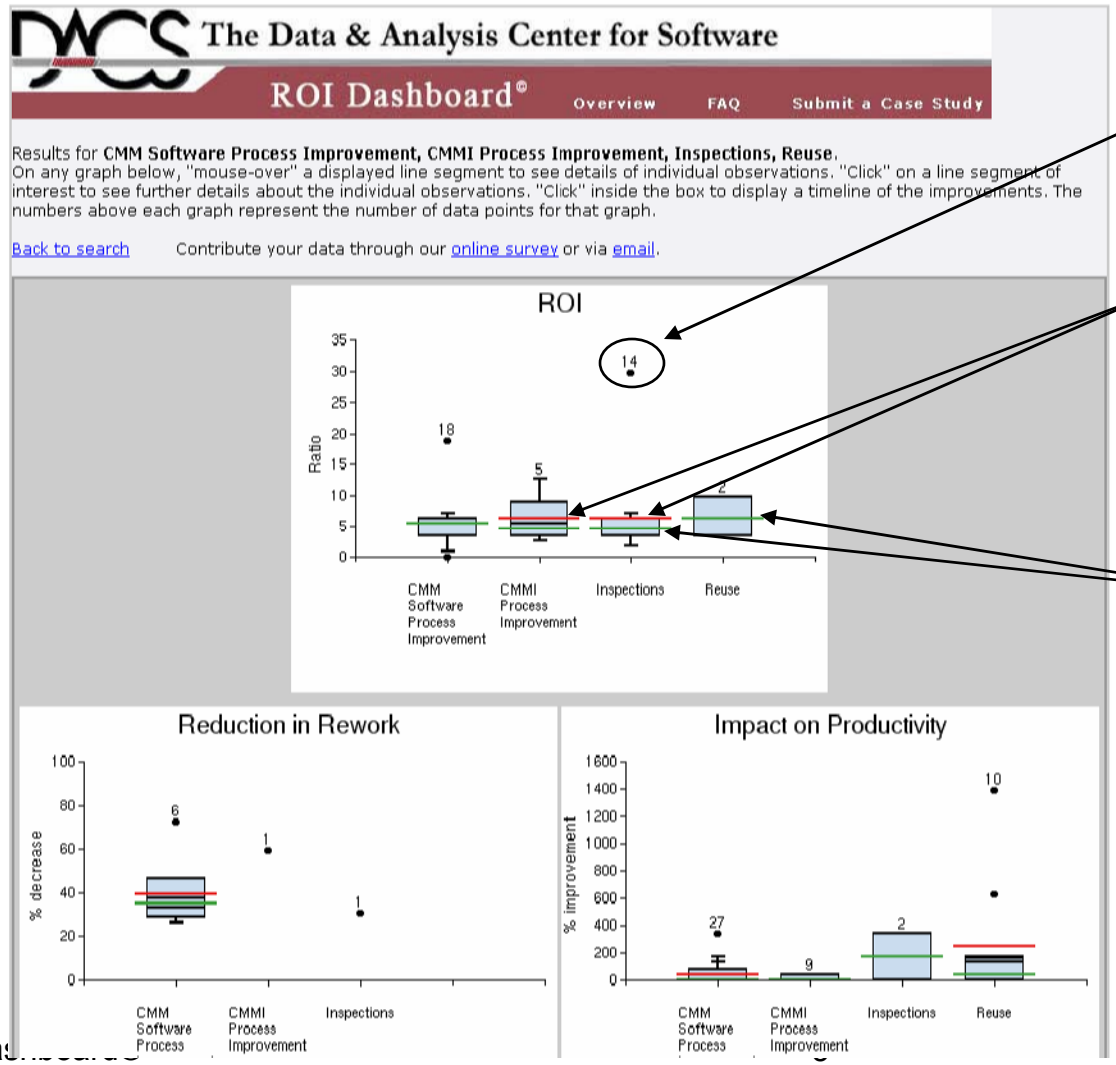
- ROI
- Reduction in Rework
- Impact on Productivity
- Impact on Quality
  - % Defect Reduction
  - % Defects Found
- Impact on Schedule
  - Cycle Time
  - Schedule Variance
- Reduction in Project Cost
- Cost of Improvement

Box Plots





ROI Dashboard© Analyzes Benefit Data from Best Practices

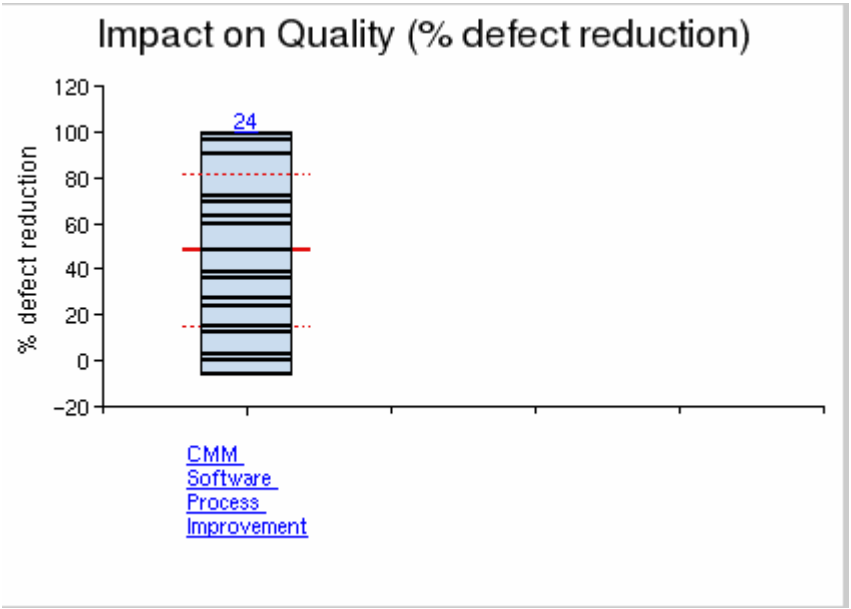


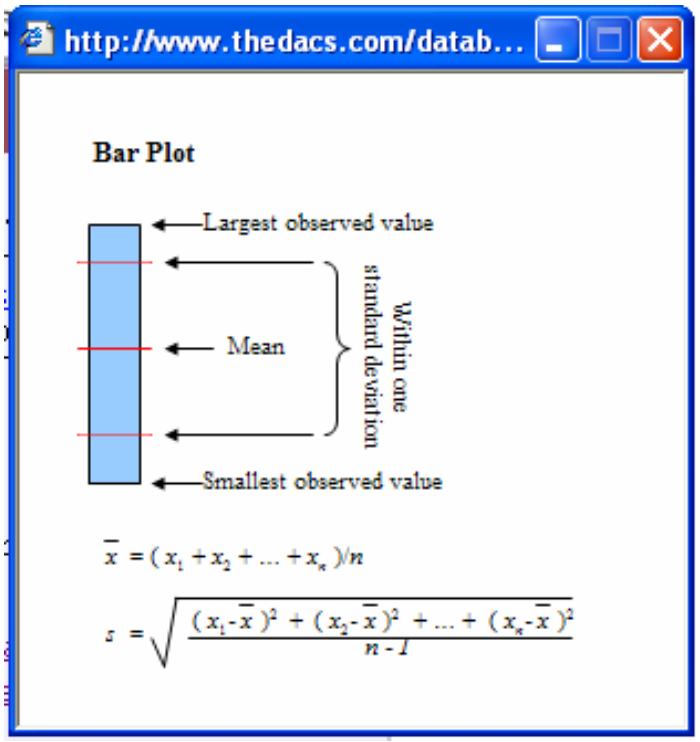
Number of Data Points

Mean (average) value in Red

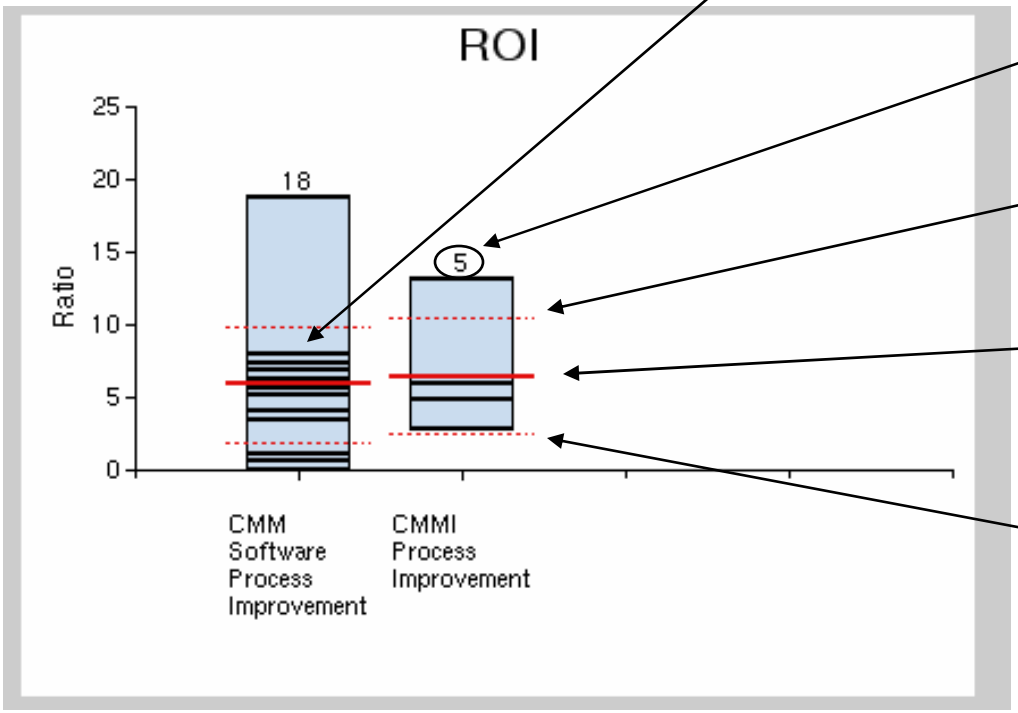
Median value in Green

Bar Plot





Sample ROI Dashboard© Bar Plot



Individual Observation

Number of Data Points

1-standard deviation lines

Mean Value in Red

1-standard deviation lines

Text

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Improvement: CMM Software Process Improvement

Metric	Total Data Points	Minimum	Maximum	Median	Mean	Standard Deviation	25th Percentile	75th Percentile
Impact on Quality (% of defects found)	3	90 % defects found	100 % defects found	94 % defects found	94.67 % defects found	5.03 % defects found	90 % defects found	100 % defects found
ROI	18	0.14 Ratio	19 Ratio	6 Ratio	5.9 Ratio	3.99 Ratio	4.3 Ratio	6.8 Ratio
Impact on Quality (% defect reduction)	24	-6 % defect reduction	100 % defect reduction	50 % defect reduction	47.9 % defect reduction	33.16 % defect reduction	22 % defect reduction	72 % defect reduction
Impact on Cycle Time	12	-19 % decrease	90 % decrease	43 % decrease	40.5 % decrease	36.09 % decrease	14.5 % decrease	70 % decrease
Impact on Schedule Variance	10	-50 % decrease	98 % decrease	46 % decrease	43.3 % decrease	40.73 % decrease	33 % decrease	67 % decrease
Impact on Productivity	27	-5 % improvement	350 % improvement	37 % improvement	81.78 % improvement	98.06 % improvement	18 % improvement	100 % improvement
Reduction in Rework	6	28 % decrease	73 % decrease	36 % decrease	41.5 % decrease	16.71 % decrease	30 % decrease	46 % decrease
Reduction in Project Cost	2	18 % decrease	20 % decrease	19 % decrease	19 % decrease	1.41 % decrease	18 % decrease	20 % decrease
Cost of the Improvement	2	2 % of total effort	3.15 % of total effort	2.58 % of total effort	2.58 % of total effort	0.81 % of total effort	2 % of total effort	3.15 % of total effort

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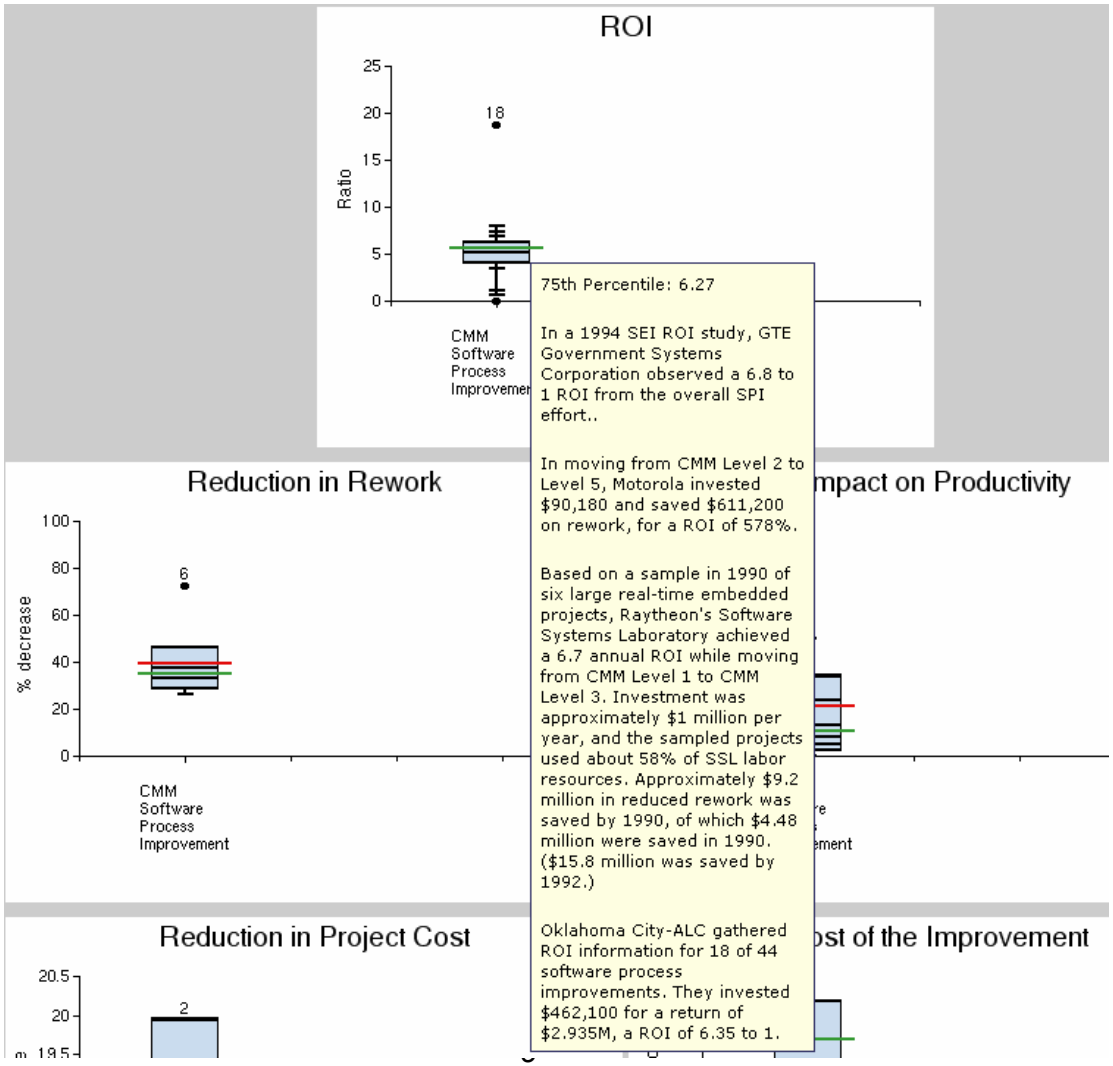
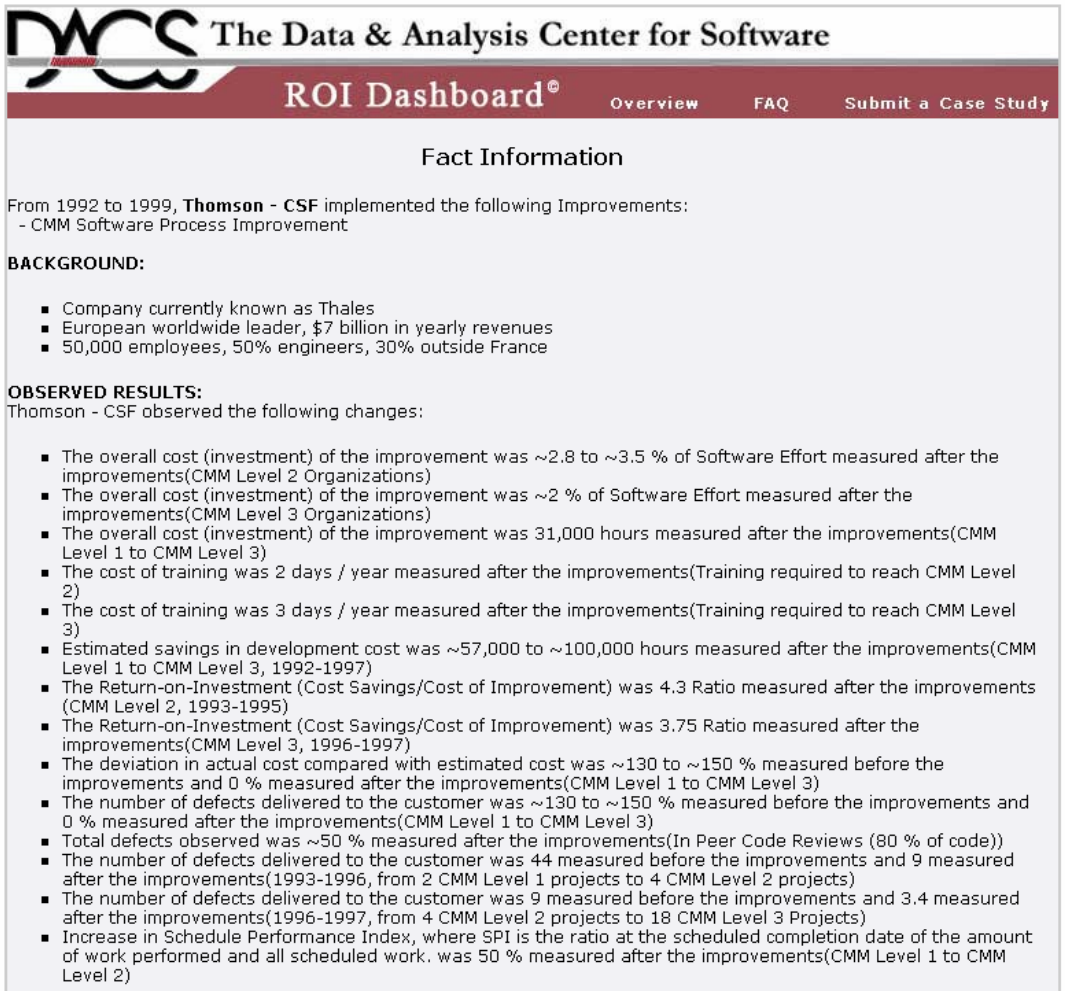
ROI Dashboard© Provides Visibility into Data



Details Available When Needed



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Fact Information

From 1992 to 1999, **Thomson - CSF** implemented the following Improvements:
- CMM Software Process Improvement

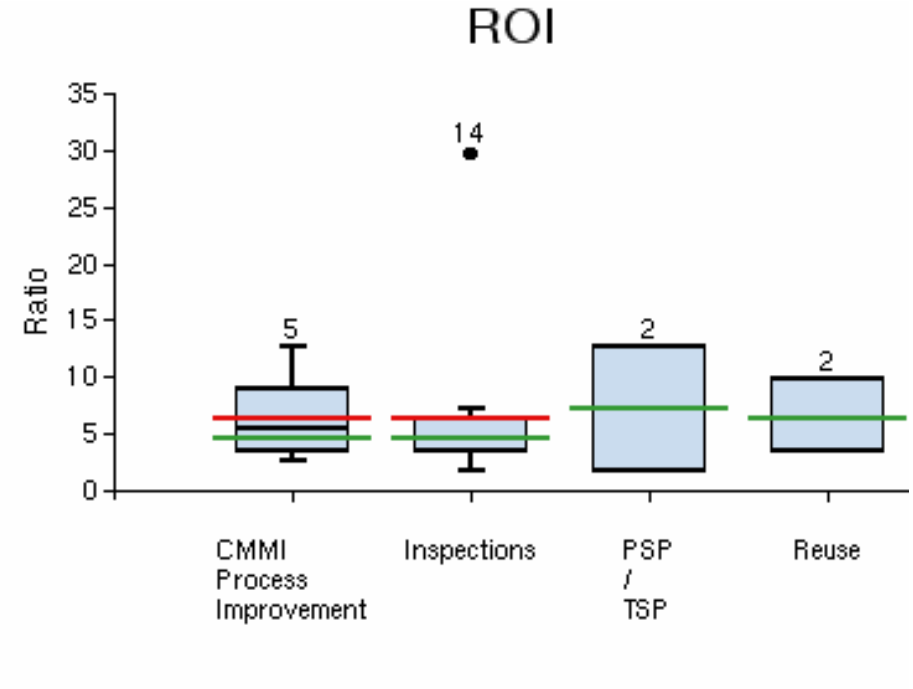
BACKGROUND:

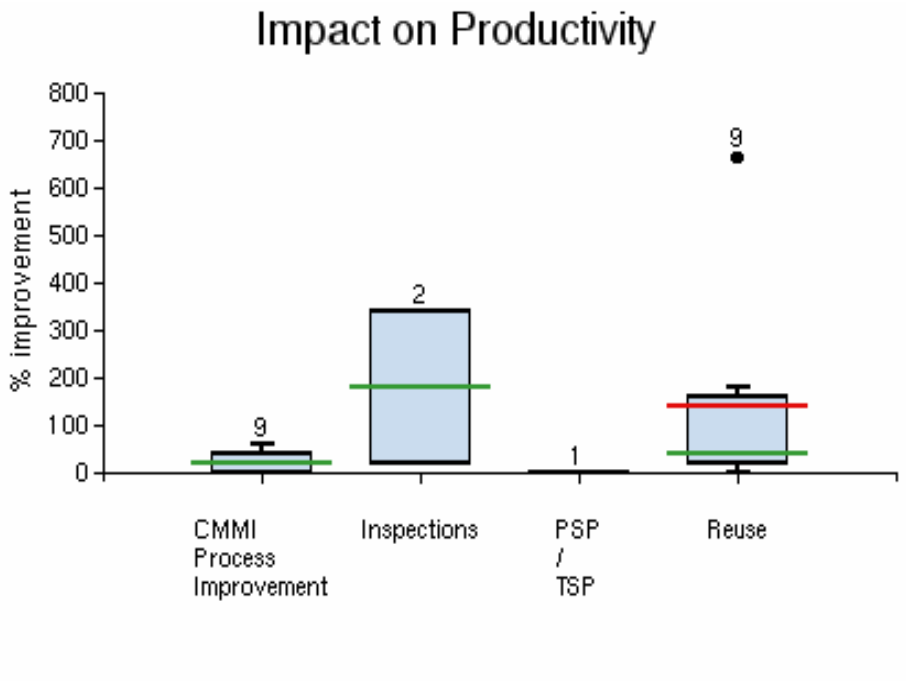
- Company currently known as Thales
- European worldwide leader, $7 billion in yearly revenues
- 50,000 employees, 50% engineers, 30% outside France

OBSERVED RESULTS:
Thomson - CSF observed the following changes:

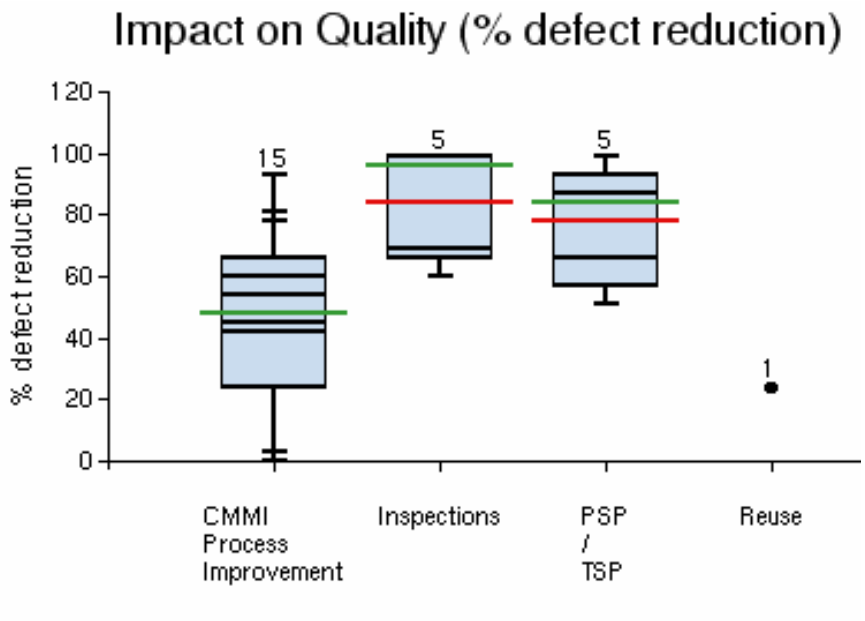
- The overall cost (investment) of the improvement was ~2.8 to ~3.5 % of Software Effort measured after the improvements(CMM Level 2 Organizations)
- The overall cost (investment) of the improvement was ~2 % of Software Effort measured after the improvements(CMM Level 3 Organizations)
- The overall cost (investment) of the improvement was 31,000 hours measured after the improvements(CMM Level 1 to CMM Level 3)
- The cost of training was 2 days / year measured after the improvements(Training required to reach CMM Level 2)
- The cost of training was 3 days / year measured after the improvements(Training required to reach CMM Level 3)
- Estimated savings in development cost was ~57,000 to ~100,000 hours measured after the improvements(CMM Level 1 to CMM Level 3, 1992-1997)
- The Return-on-Investment (Cost Savings/Cost of Improvement) was 4.3 Ratio measured after the improvements (CMM Level 2, 1993-1995)
- The Return-on-Investment (Cost Savings/Cost of Improvement) was 3.75 Ratio measured after the improvements(CMM Level 3, 1996-1997)
- The deviation in actual cost compared with estimated cost was ~130 to ~150 % measured before the improvements and 0 % measured after the improvements(CMM Level 1 to CMM Level 3)
- The number of defects delivered to the customer was ~130 to ~150 % measured before the improvements and 0 % measured after the improvements(CMM Level 1 to CMM Level 3)
- Total defects observed was ~50 % measured after the improvements(In Peer Code Reviews (80 % of code))
- The number of defects delivered to the customer was 44 measured before the improvements and 9 measured after the improvements(1993-1996, from 2 CMM Level 1 projects to 4 CMM Level 2 projects)
- The number of defects delivered to the customer was 9 measured before the improvements and 3.4 measured after the improvements(1996-1997, from 4 CMM Level 2 projects to 18 CMM Level 3 Projects)
- Increase in Schedule Performance Index, where SPI is the ratio at the scheduled completion date of the amount of work performed and all scheduled work. was 50 % measured after the improvements(CMM Level 1 to CMM Level 2)

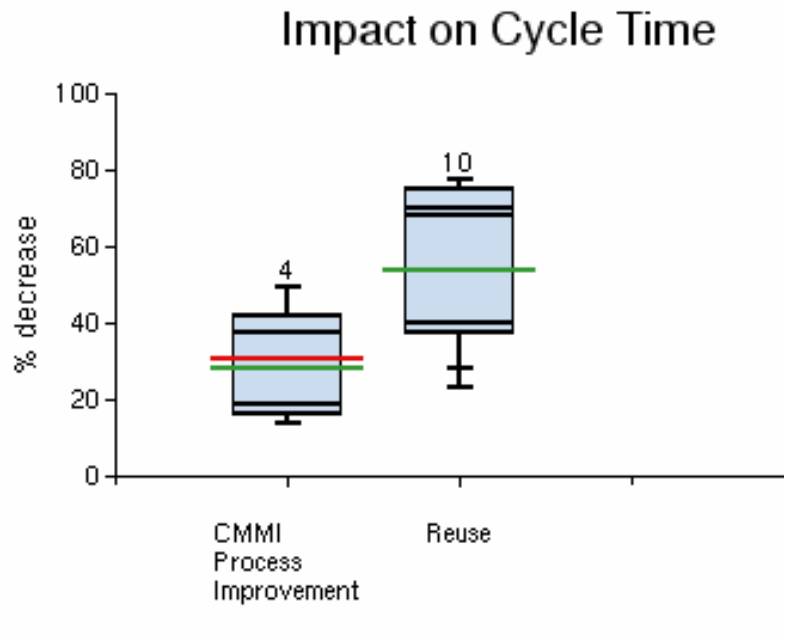
Combined - ROI Dashboard©



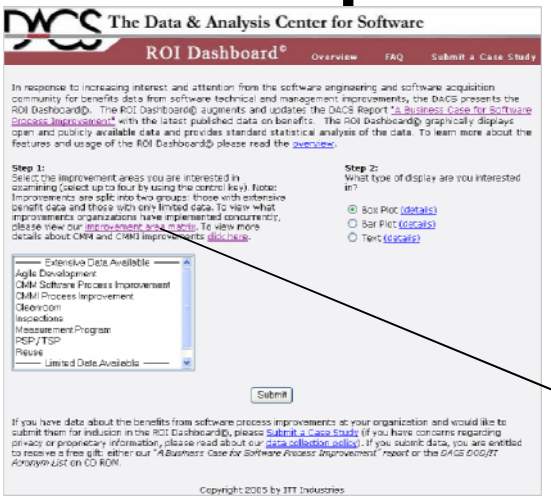


Combined - ROI Dashboard©





Improvement Area Matrix



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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.

	Agile Development	CMM Software Process Improvement	CMMI Process Improvement	Cleanroom	ISO 9001	Inspections	Measurement Program	PSP / TSP	Reuse
Agile Development	10	0	0	0	0	0	0	0	0
CMM Software Process Improvement	0	63	9	1	1	7	0	2	1
CMMI Process Improvement	0	9	23	0	0	0	0	2	0
Cleanroom	0	1	0	5	0	0	0	0	1
ISO 9001	0	1	0	0	1	0	0	0	0
Inspections	0	7	0	0	0	19	0	0	0
Measurement Program	0	0	0	0	0	0	3	0	0
PSP / TSP	0	2	2	0	0	0	0	11	0
Reuse	0	1	0	1	0	0	0	0	19

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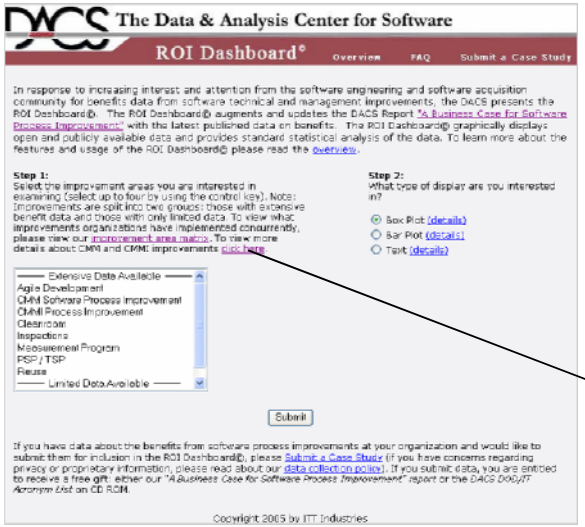
Access Detailed CMM/CMMI Data



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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 final maturity level while an asterick 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 CMM/CMMI related data only, to view all data please click here.

Step 2:
What type of display are you interested in?

- (•) Box Plot (details)
- ( ) Bar Plot (details)
- ( ) Text (details)

——— Extensive Data Available ———
Achieving CMM L2
Achieving CMM L3
Achieving CMM L4
Achieving CMM L5
Achieving CMMI L2
Achieving CMMI L3
Achieving CMMI L5
——— Limited Data Available ———
Achieving CMMI L4

Submit

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 DOD/IT Acronym List* on CD ROM.

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ROI Dashboard Data

CMMI Data

Analysis of ROI Dashboard© Data

As of 10/6/05	Agile Development	CMM SPI	CMMI PI	Cleanroom	Inspections	Meaurement Program	PSP/TSP	Reuse	ISO 9001	Total
Number of Reports	10	63	23	5	19	3	11	19	1	154
Quality: % Defect Reduction	4	24	16		5	1	5	1	1	57
Quality: % Defects Found		3	1	1	6		2			13
Quality: Reduction in Rework		6	1		1					8
Total Quality Related	*4*	*33*	*18*	*1*	*12*	*1*	*7*	*1*	*1*	78
Cost: Productivity Impacts	3	27	9	2	2		1	10		54
Cost: Reduction in Program Costs		2	2		1	1	1			7
Total Cost Related	*3*	*29*	*11*	*2*	*3*	*1*	*2*	*10*		61
Schedule: Impact on Cycle Time	2	12	4	1				10		29
Schedule: Schedule Variance Impact		10	1				2			13
Total Schedule Related	*2*	*22*	*5*	*1*			*2*	*10*		42
ROI: Return on investment		18	5	1	14	2	2	3	1	46
Cost of Improvement		2			1	1		1		5
Total Benefits Observed	9	104	39	5	30	5	13	25	2	232

CMMI Statistical Summary

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Improvement: CMMI Process Improvement

Metric	Total Data Points	Minimum	Maximum	Median	Mean	Standard Deviation	25th Percentile	75th Percentile
ROI	5	3 Ratio	13.3 Ratio	5 Ratio	6.46 Ratio	3.98 Ratio	4 Ratio	9.65 Ratio
Impact on Cycle Time	4	15 % decrease	50 % decrease	29 % decrease	30.75 % decrease	16.19 % decrease	17.5 % decrease	44 % decrease
Reduction in Rework	1	60 % decrease	60 % decrease	60 % decrease	60 % decrease	0 % decrease	0 % decrease	0 % decrease
Impact on Quality (% defect reduction)	16	0.5 % defect reduction	95 % defect reduction	48.5 % defect reduction	46.97 % defect reduction	29.52 % defect reduction	25.5 % defect reduction	67 % defect reduction
Impact on Productivity	9	5 % improvement	73 % improvement	30 % improvement	34.33 % improvement	25.9 % improvement	9 % improvement	59 % improvement
Impact on Schedule Variance	1	50 % decrease	50 % decrease	50 % decrease	50 % decrease	0 % decrease	0 % decrease	0 % decrease
Impact on Quality (% of defects found)	1	98 % defects found	98 % defects found	98 % defects found	98 % defects found	0 % defects found	0 % defects found	0 % defects found
Reduction in Project Cost	2	20 % decrease	40 % decrease	30 % decrease	30 % decrease	14.14 % decrease	20 % decrease	40 % decrease

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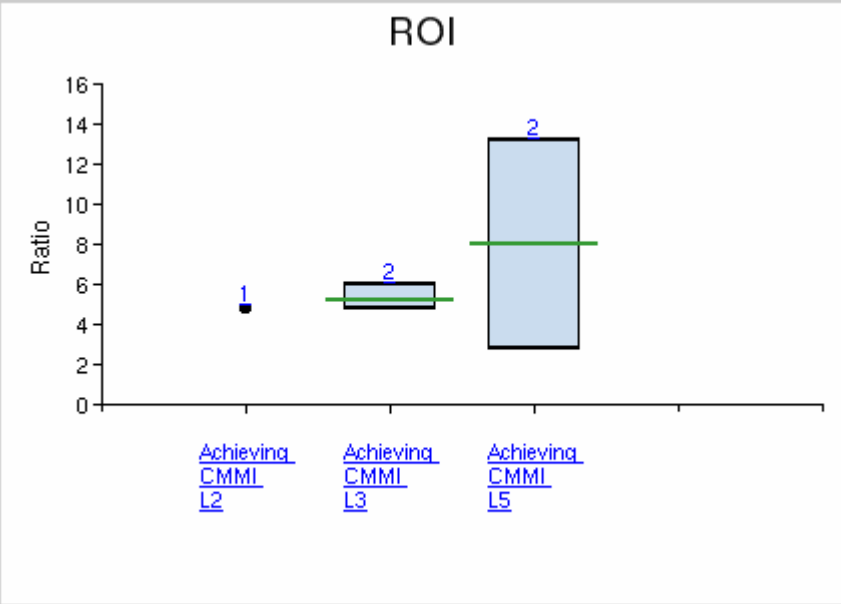
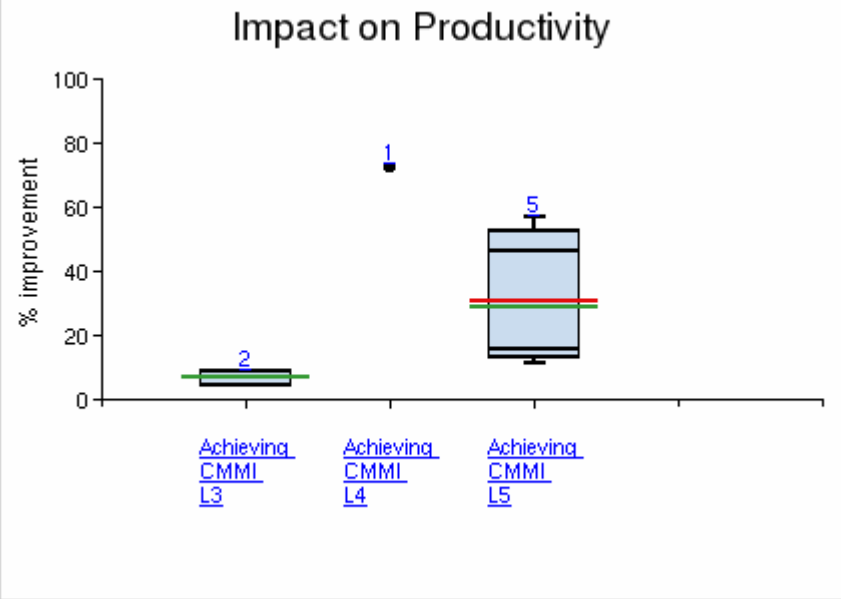
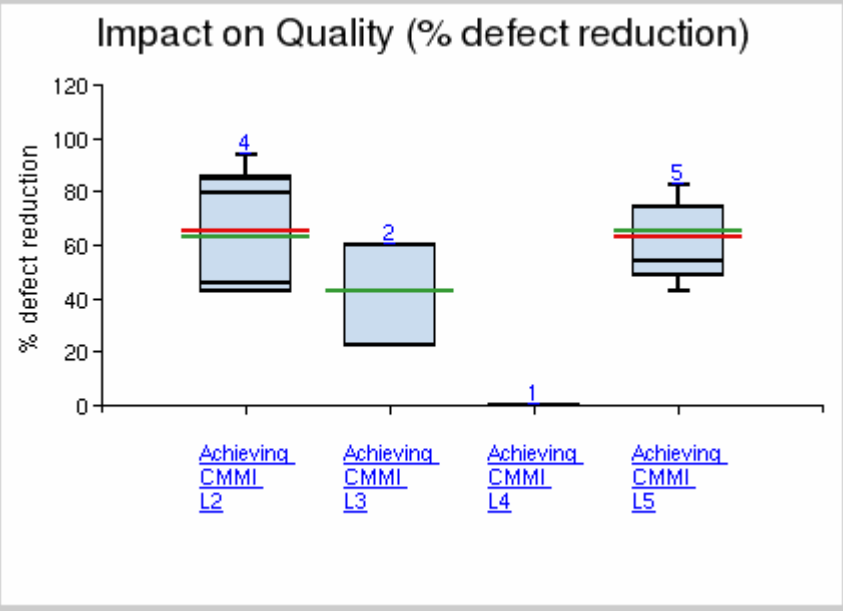
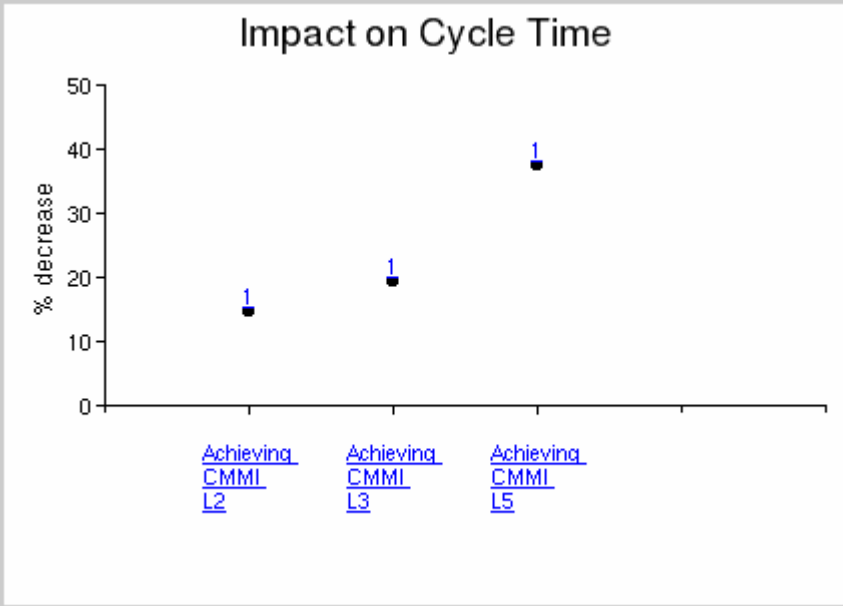
Detailed Summary Data…1



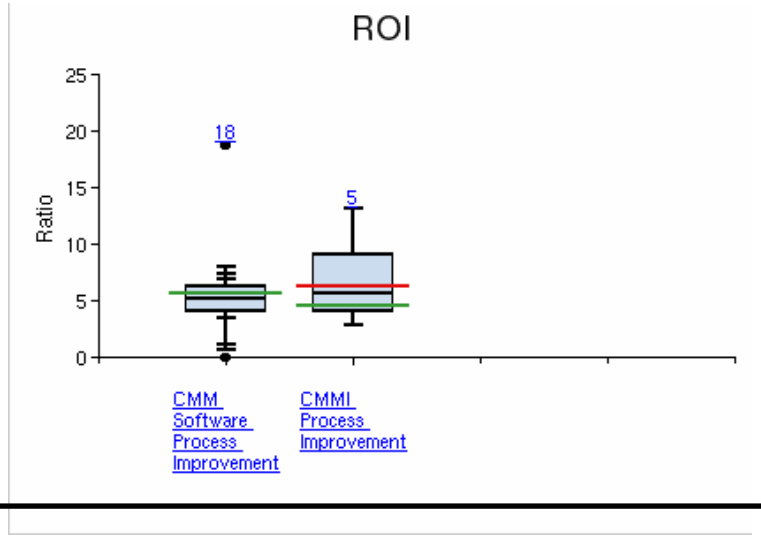


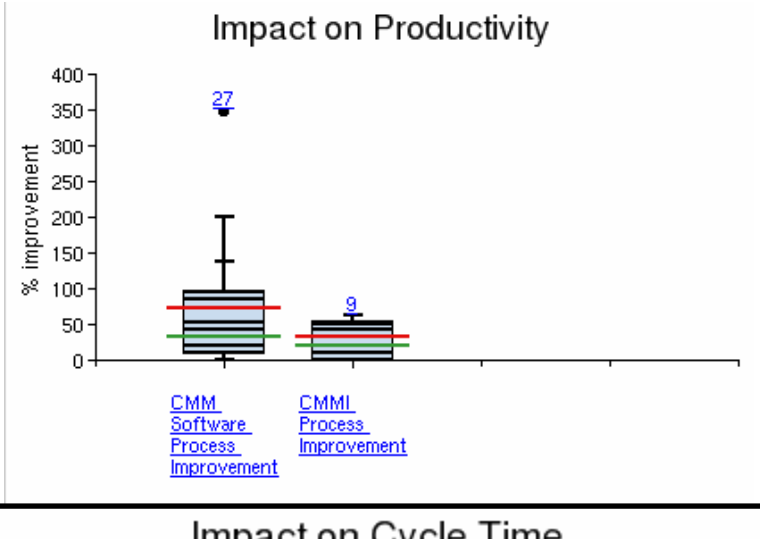
Detailed Summary Data…2

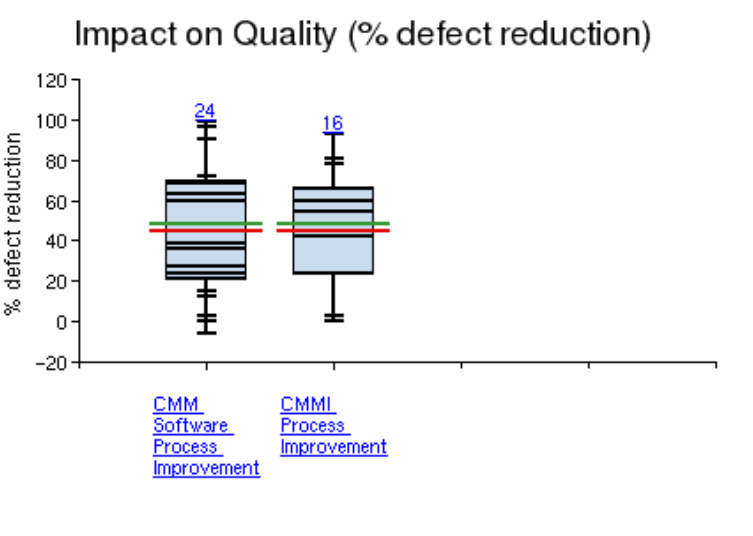


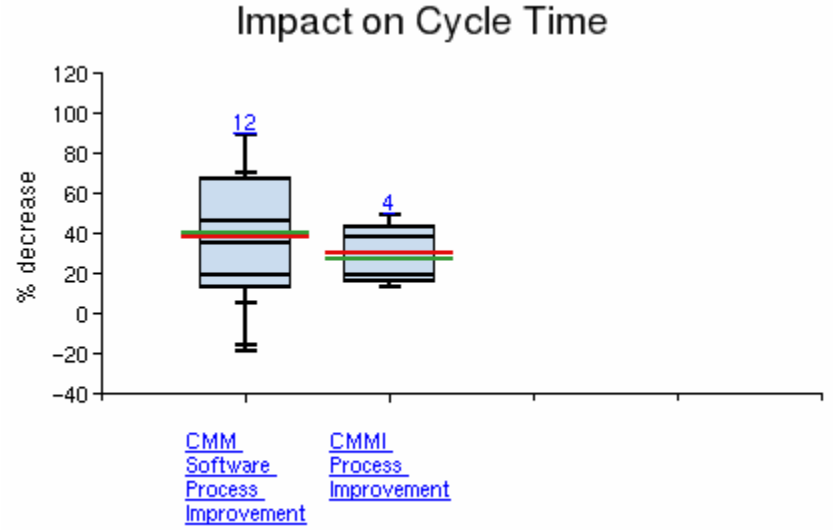


CMM vs. CMMI









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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