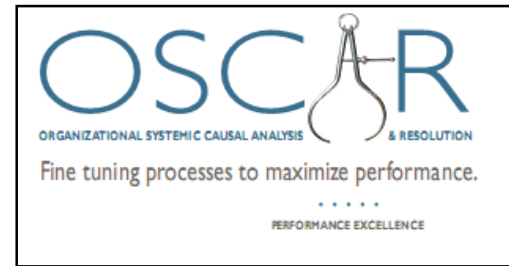
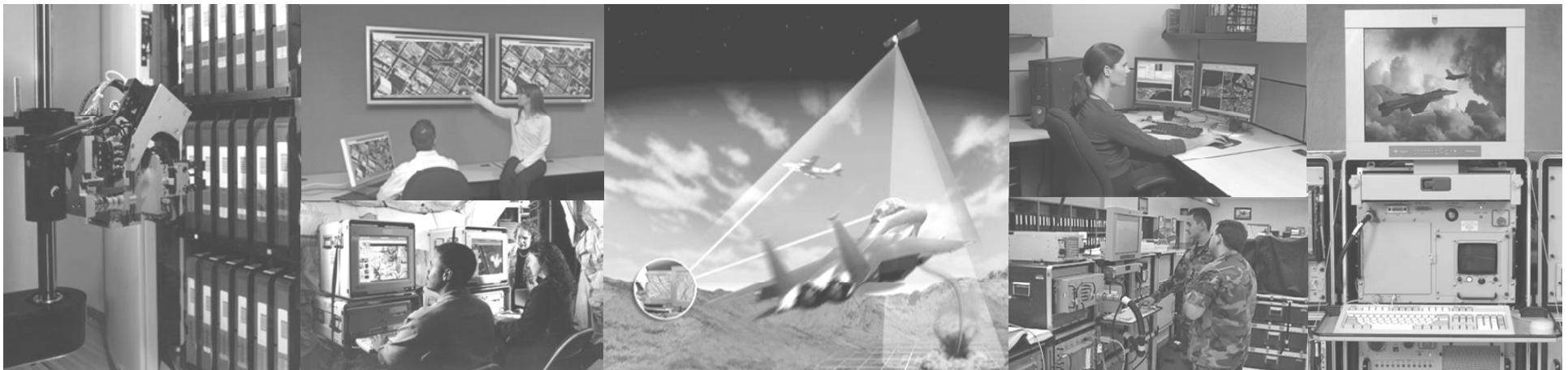


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“Proof” that Process Improvement Works! *(Individual Mileage Will Vary!)*

Or How I Learned to Stop Worrying and Love Quantitative Management ...



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4 Scenarios In Attaining High Maturity

The following set of scenarios are based on true stories!

These events actually occurred
within real-life organizations on real-life projects
that employed real-life people!

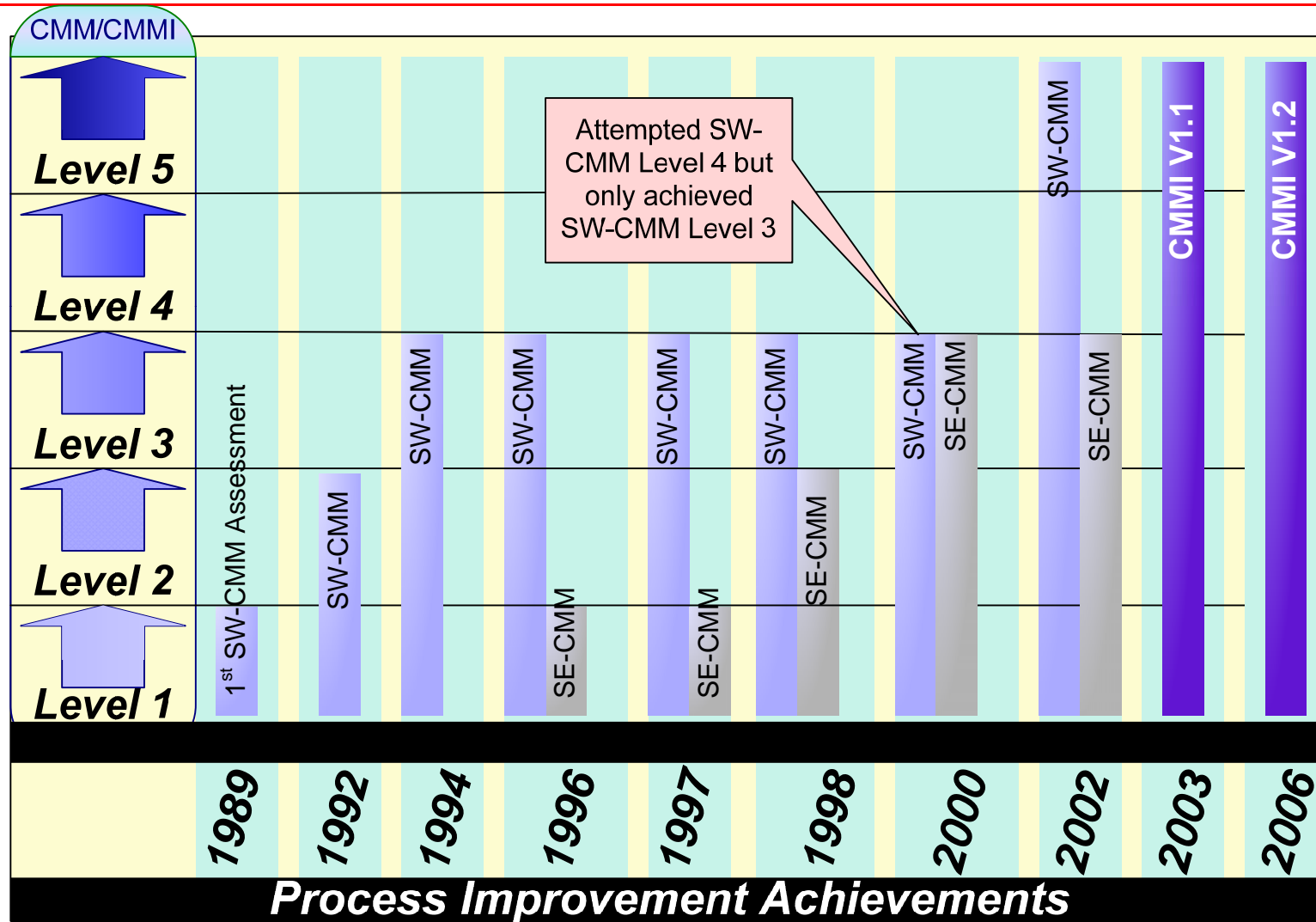
The measurements shown came from
actual reported data!



Project names have been changed to
protect the “innocent”!

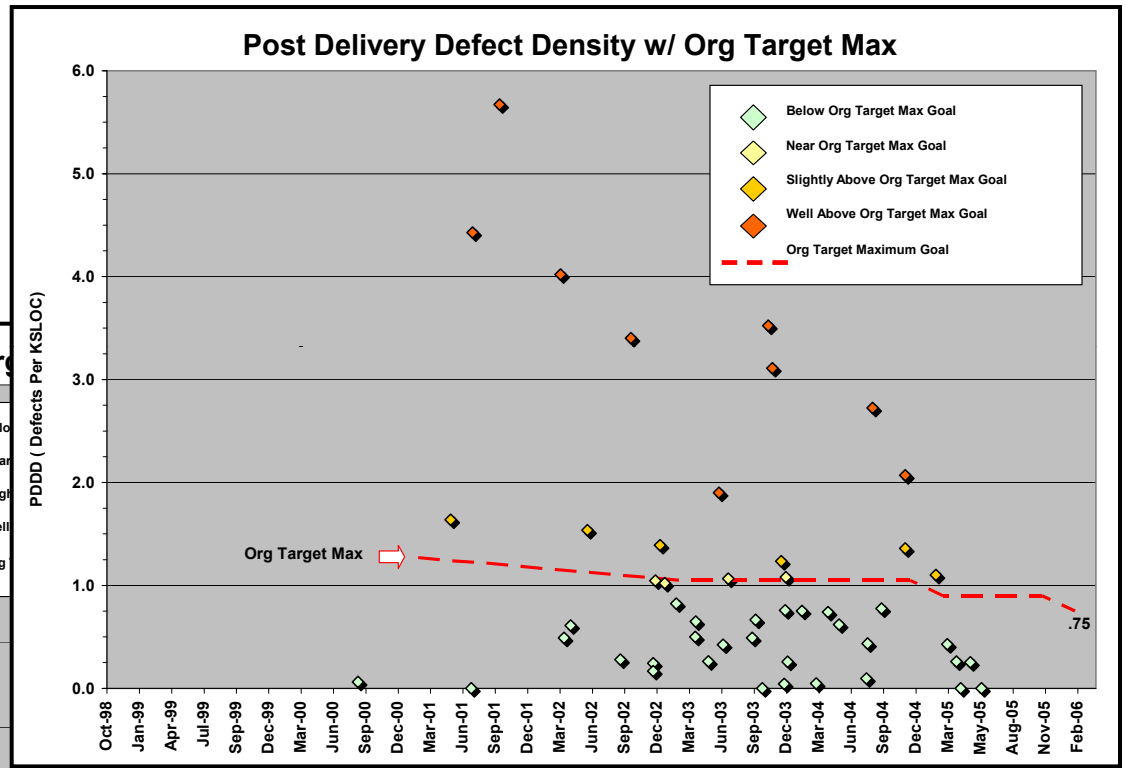
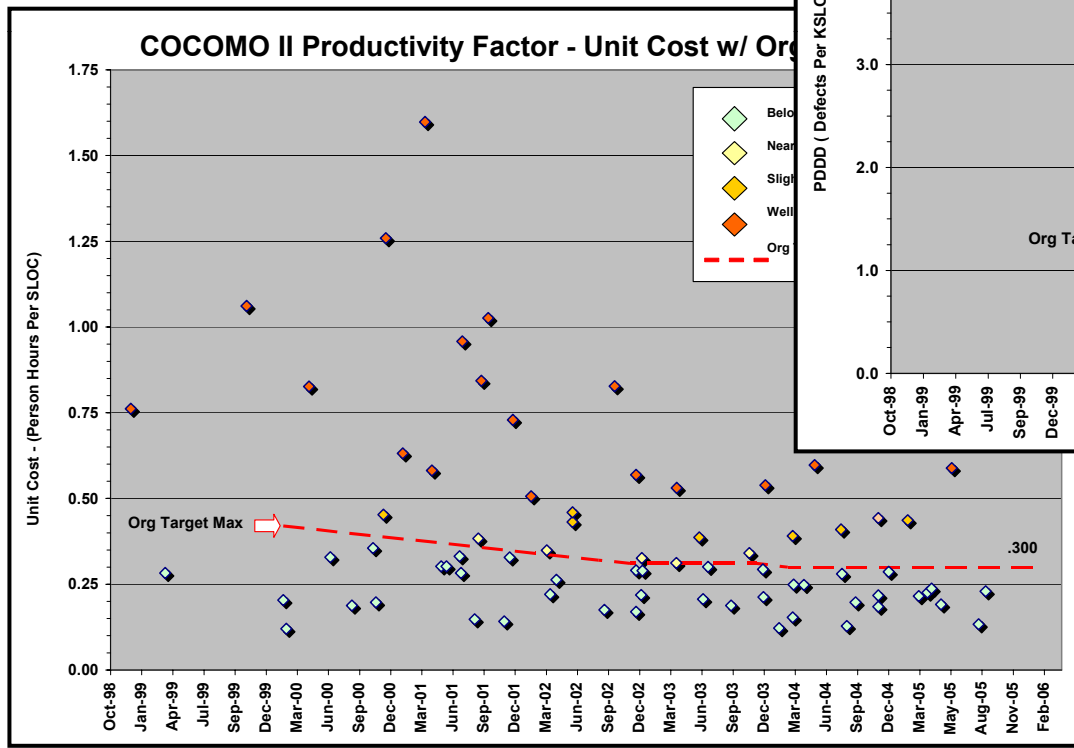


(Setting the Stage – Our History with CMM/CMMI)



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(Setting the Stage – The Measures)



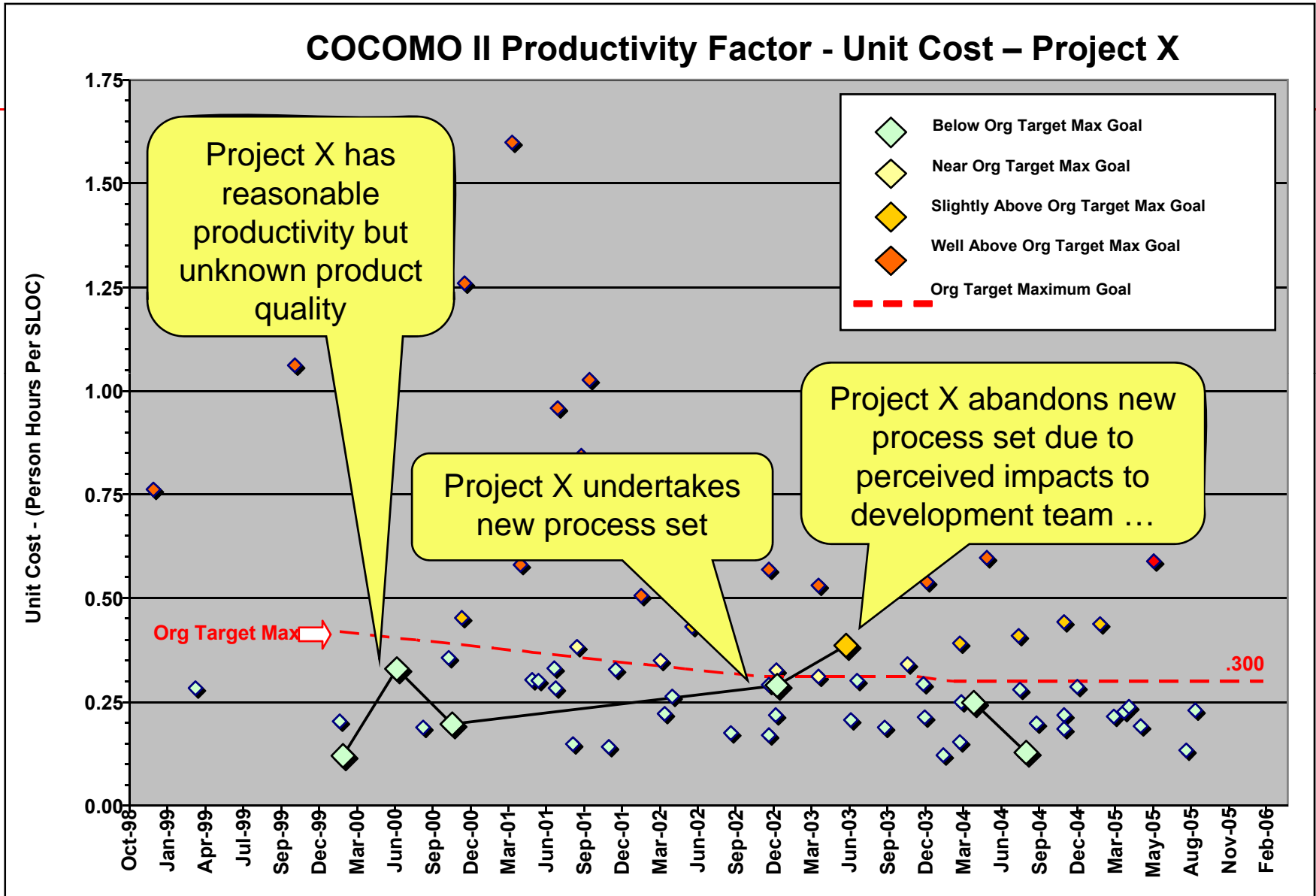
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Scenario 1) Project X

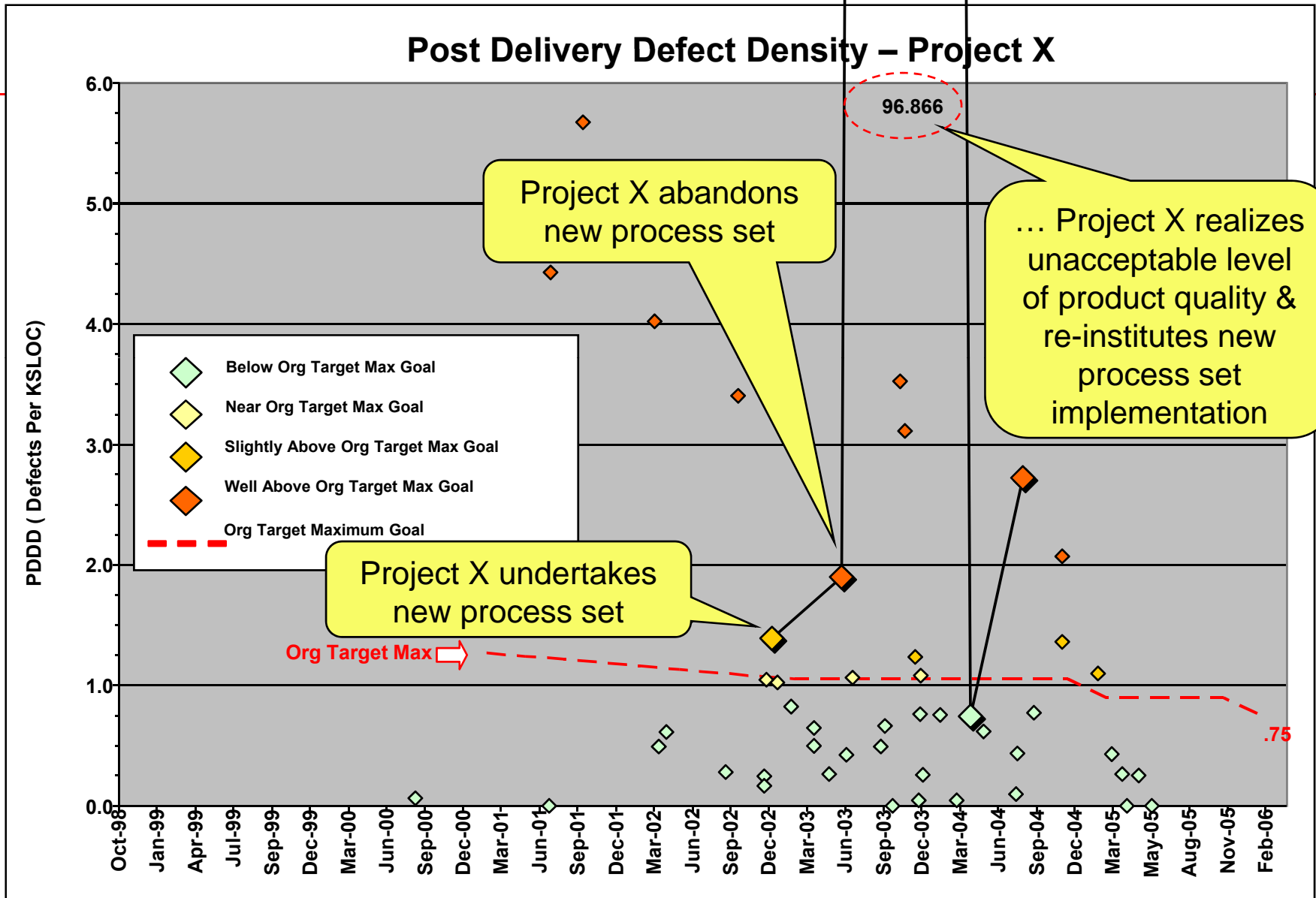
Project X's initial attempt at implementing the company's standard engineering process set is abandoned after just 2 baseline releases due to a perceived decrease in its Productivity measure.

However, instrumentation for Product Quality was left in place when project attempted to return to its previous development processes.

Project X's subsequent release realizes an extremely poor Product Quality measure and Project X decides it should re-adopt the company's standard development processes, ultimately becoming a champion and pilot for more modern development methodologies.



Proof that Process Improvement Works!



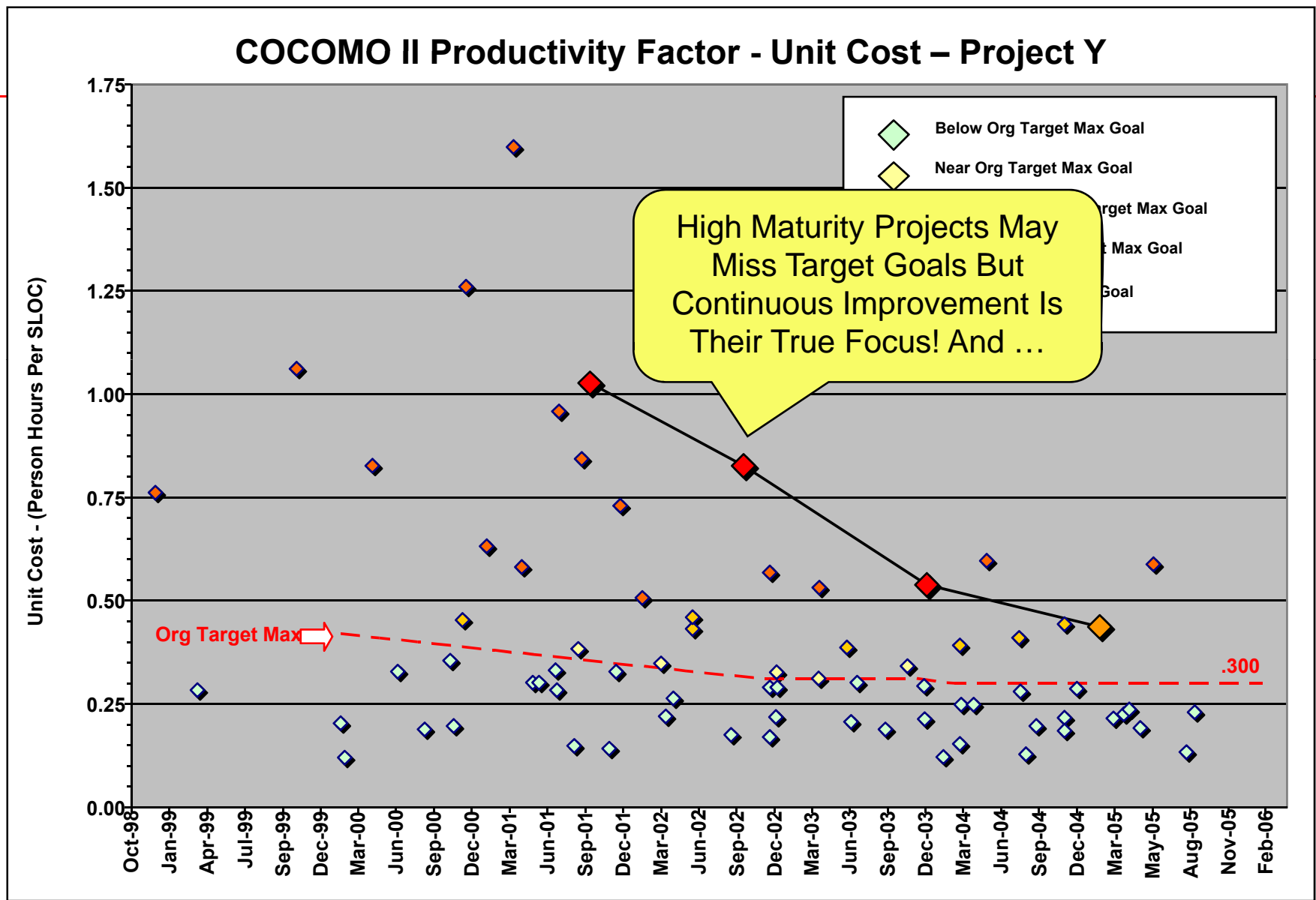
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Scenario 2) Project Y

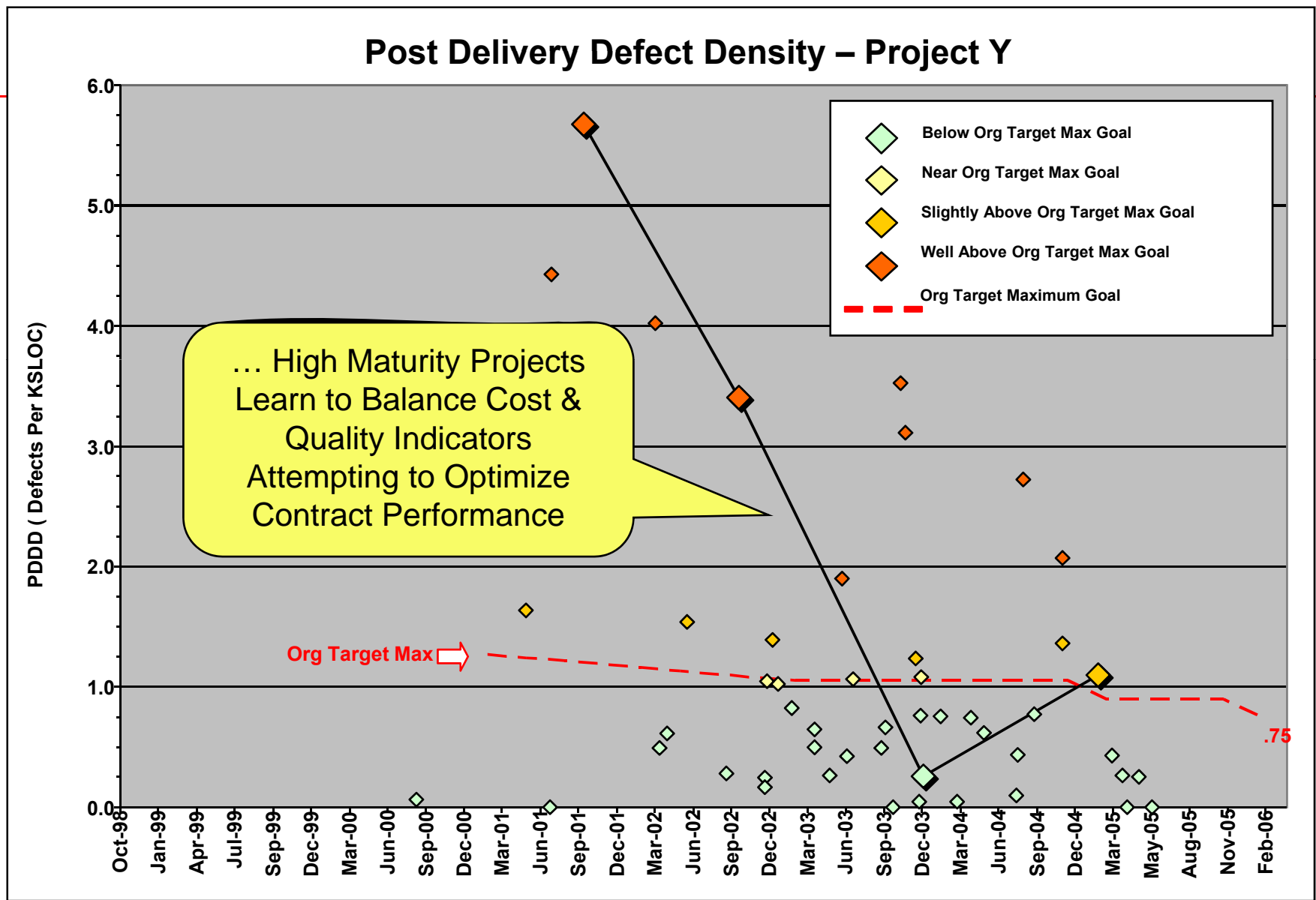
Project Y (a sustaining/maintenance effort) has difficulty implementing the standard development processes which have been designed primary for the needs of full-scale development efforts.

Subsequently, 4 consecutive releases for Project Y are measured and 7 of 8 data points (4 of 4 data points on Productivity and 3 of 4 data points on Product Quality) miss the Organizational Target Goals.

Still, improvement trends in both measures, as well as the evident balancing of Productivity vs. Product Quality performance, prove that Project Y is operating at High Maturity!



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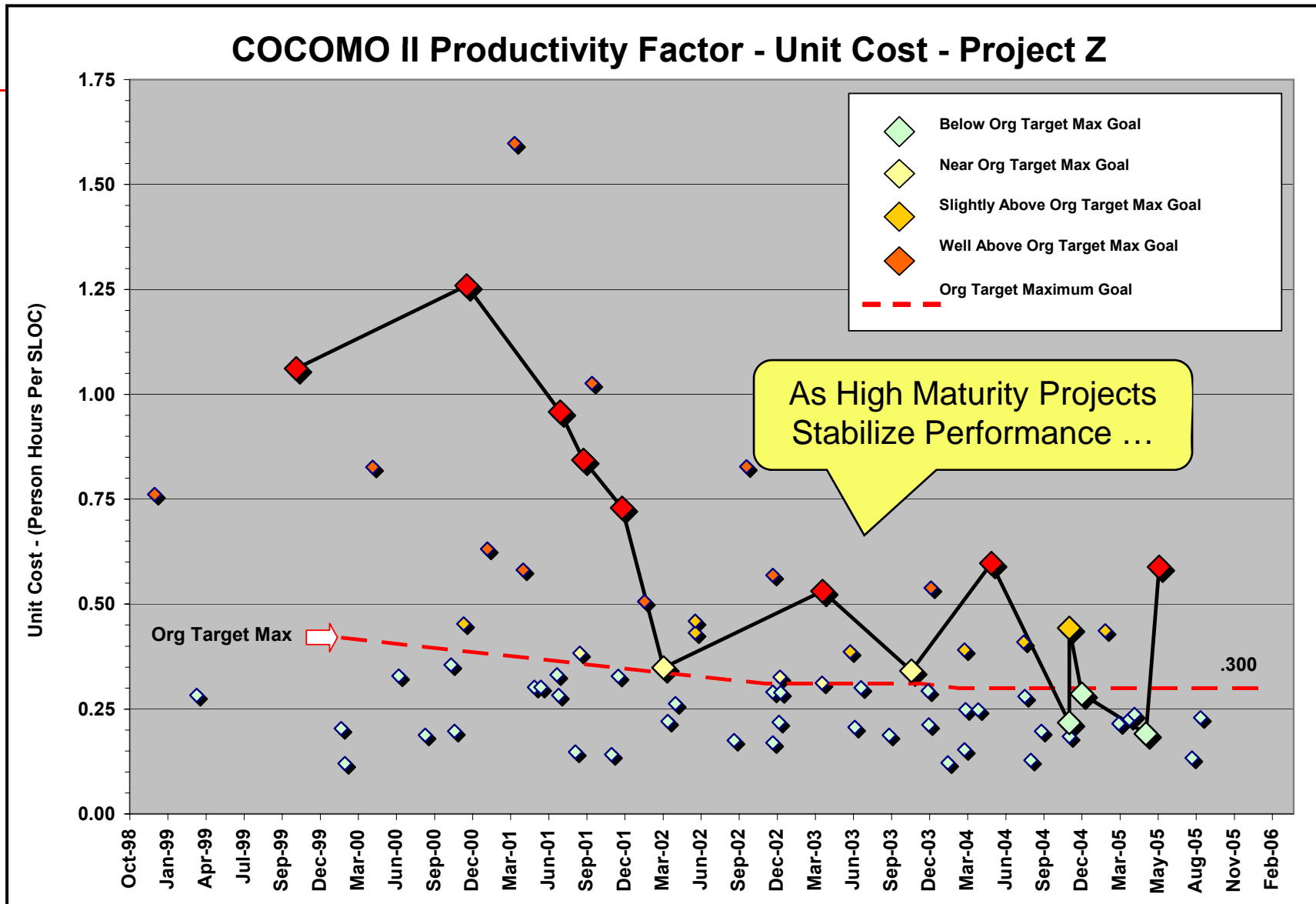
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Scenario 3) Project Z

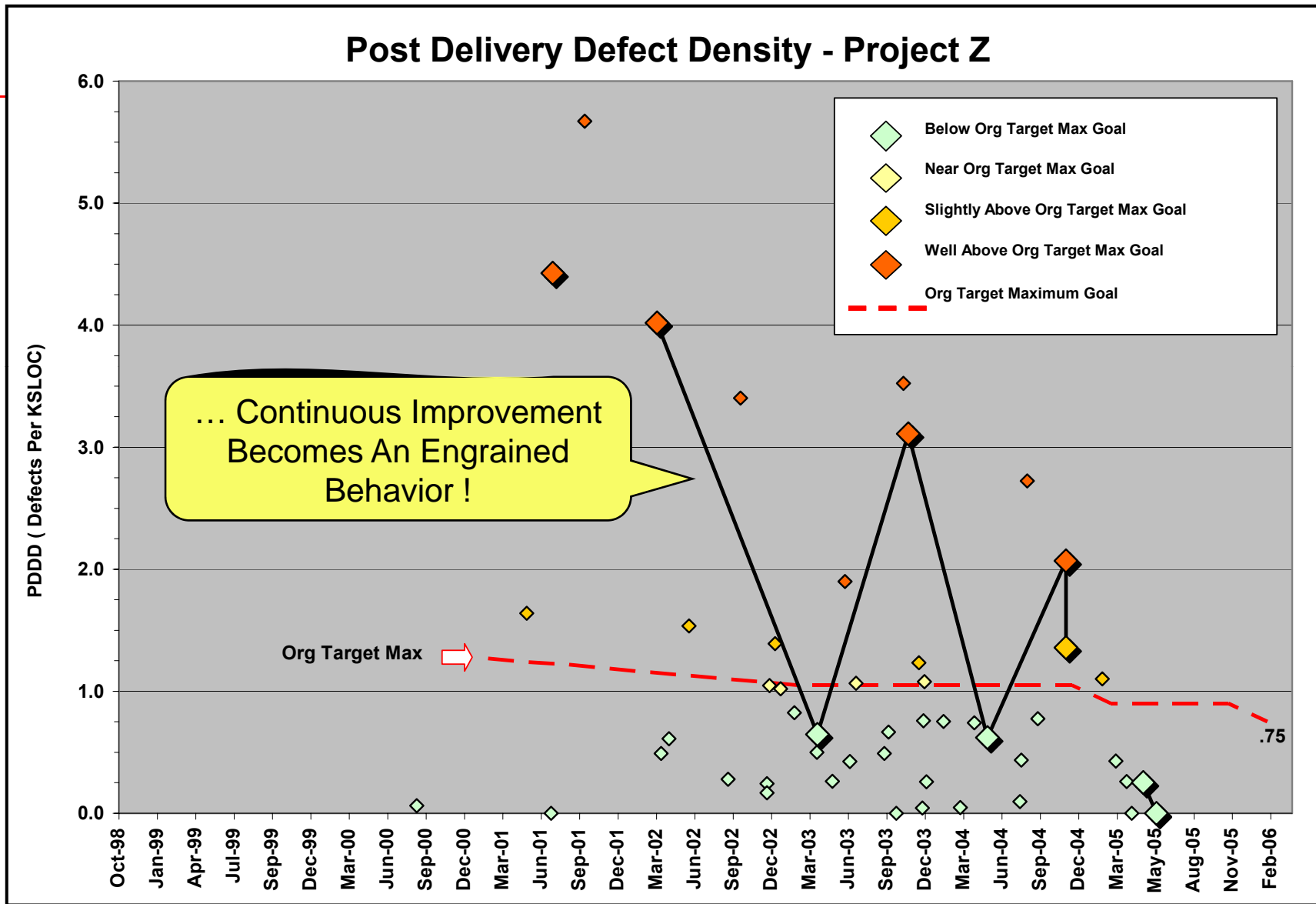
Project Z is a Large Scale Development program with numerous overlapping development efforts and does experience some difficulty implementing the company's standard development processes.

Initially, customer / project management pushback is high due to perceived added cost of the more rigorous development, review, measurement and analysis processes but the engineering team is persistent in implementing higher maturity practices.

Ultimately, Project Z starts to realize increased Process Capability through better analyses of measurements and appropriate corrective actions.



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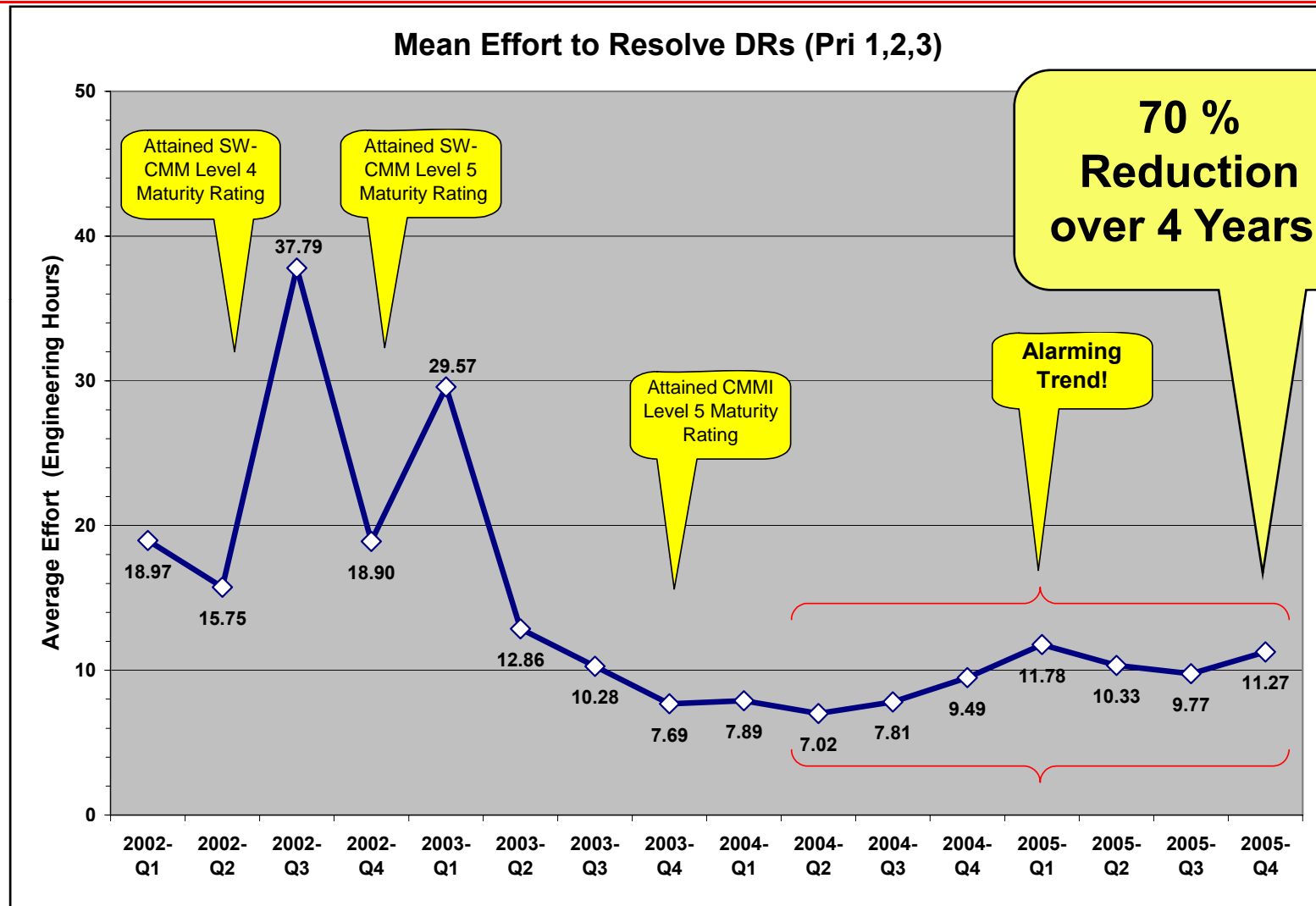


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Scenario 4) The Organization

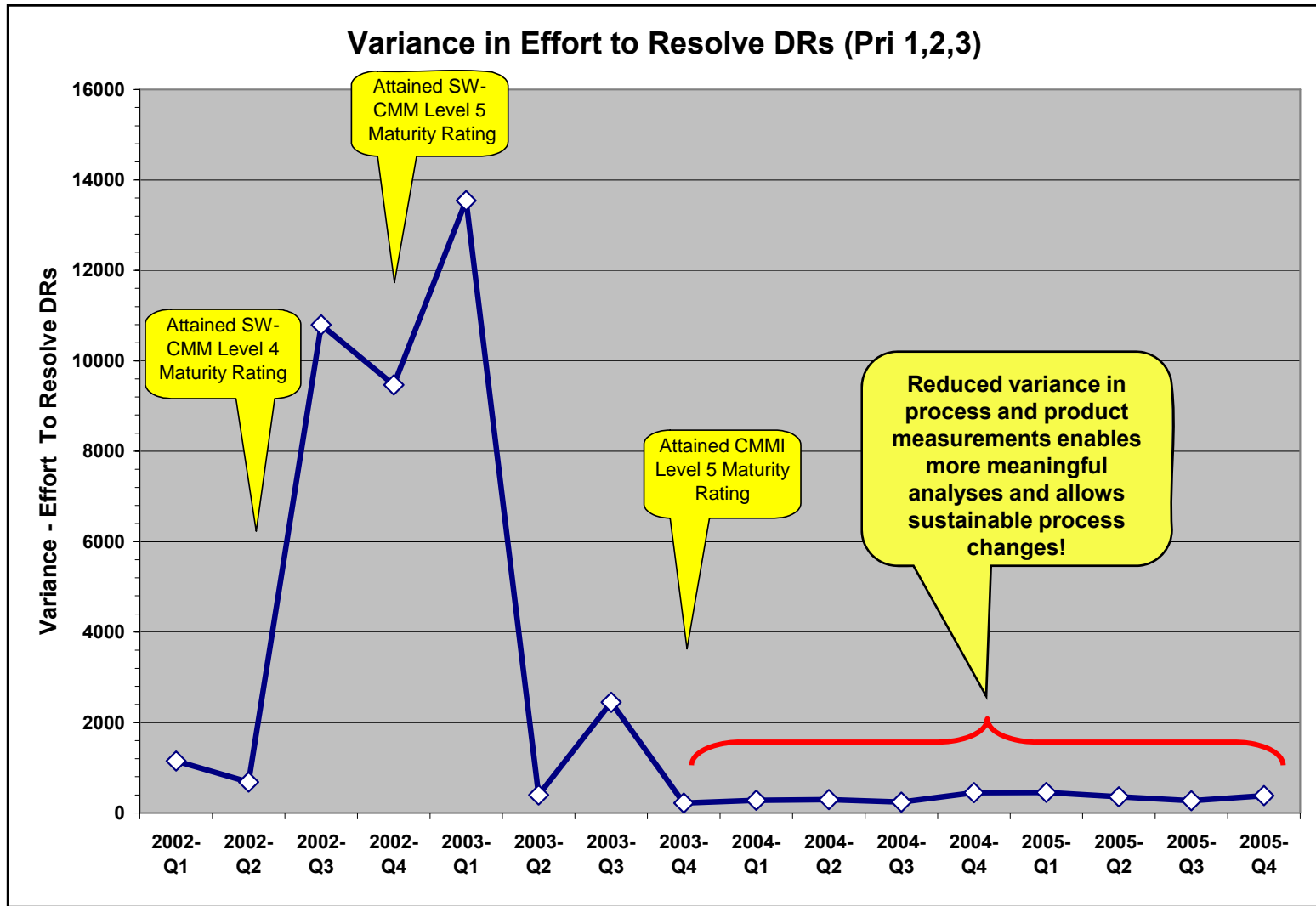
As development and maintenance efforts like Projects X, Y and Z adopt a more rigorous and uniform set of engineering development and project management processes, the Organization as a whole will also start to realize increased Process Capability and Process Stability in its Organizational Performance Measures. Additionally, a standardized company-wide set of engineering development and project management processes reduces the impact of the “Learning Curve” for engineering and support personnel who transfer between projects, programs and lines of business.

As Organizational Process Capabilities Improve ...



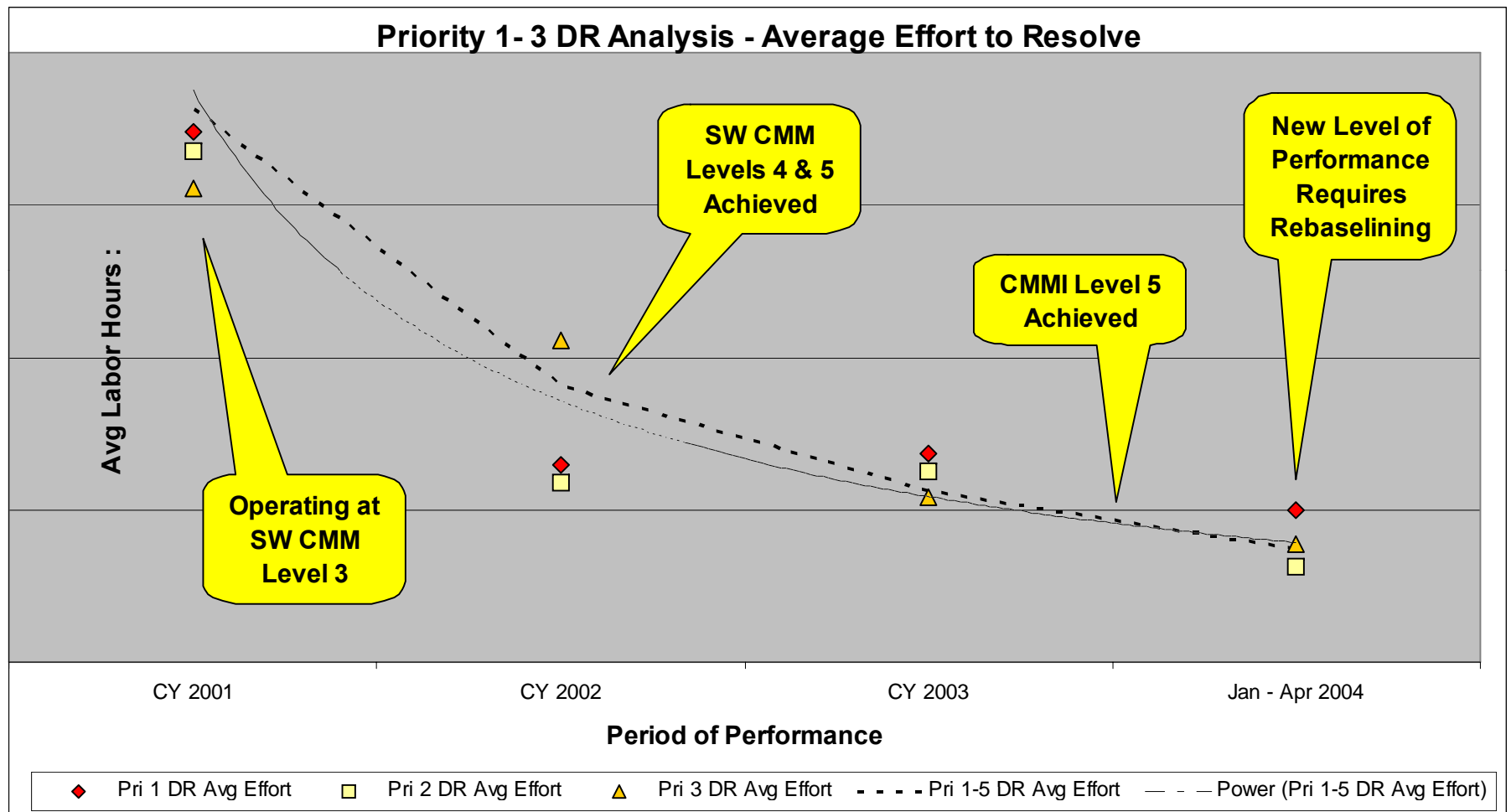
Organizational Systemic Causal Analysis & Resolution Group
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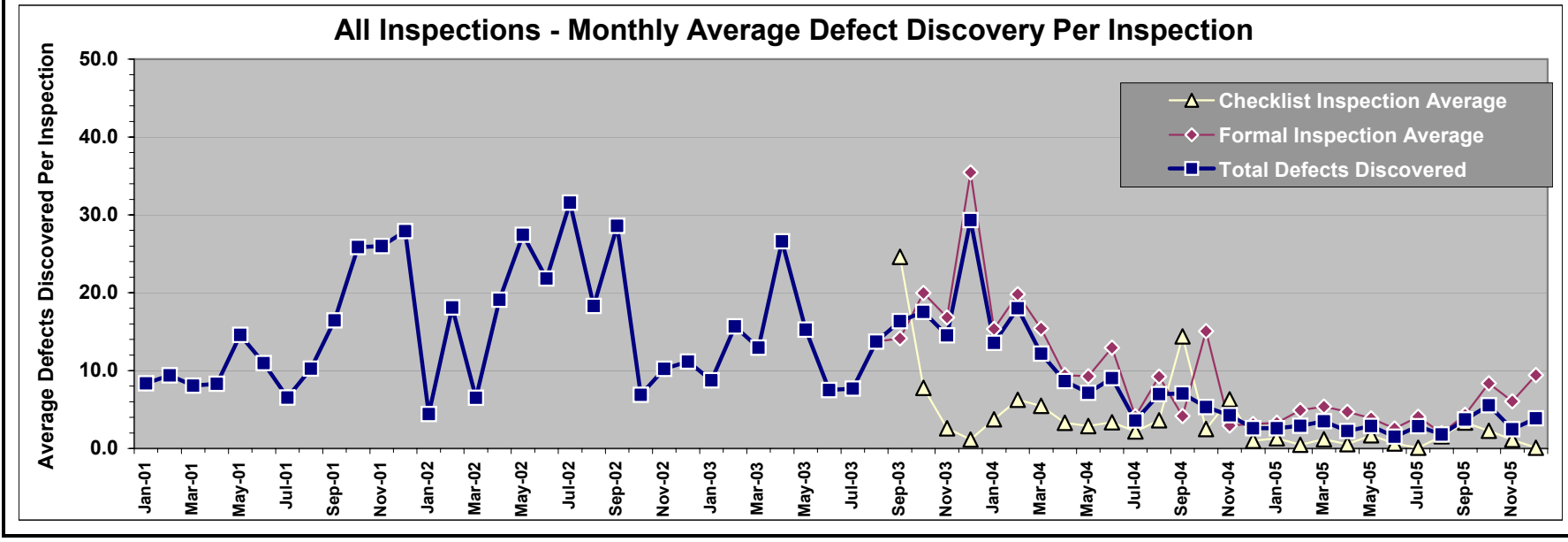
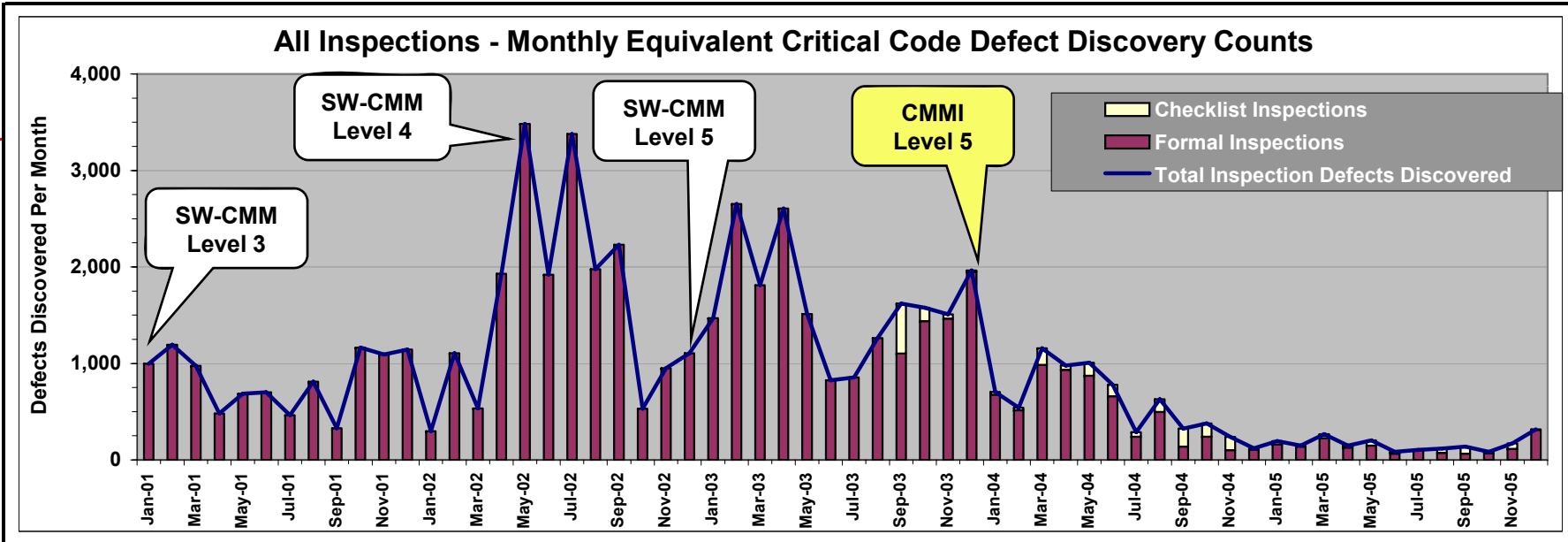
... And Process Variances Stabilize...



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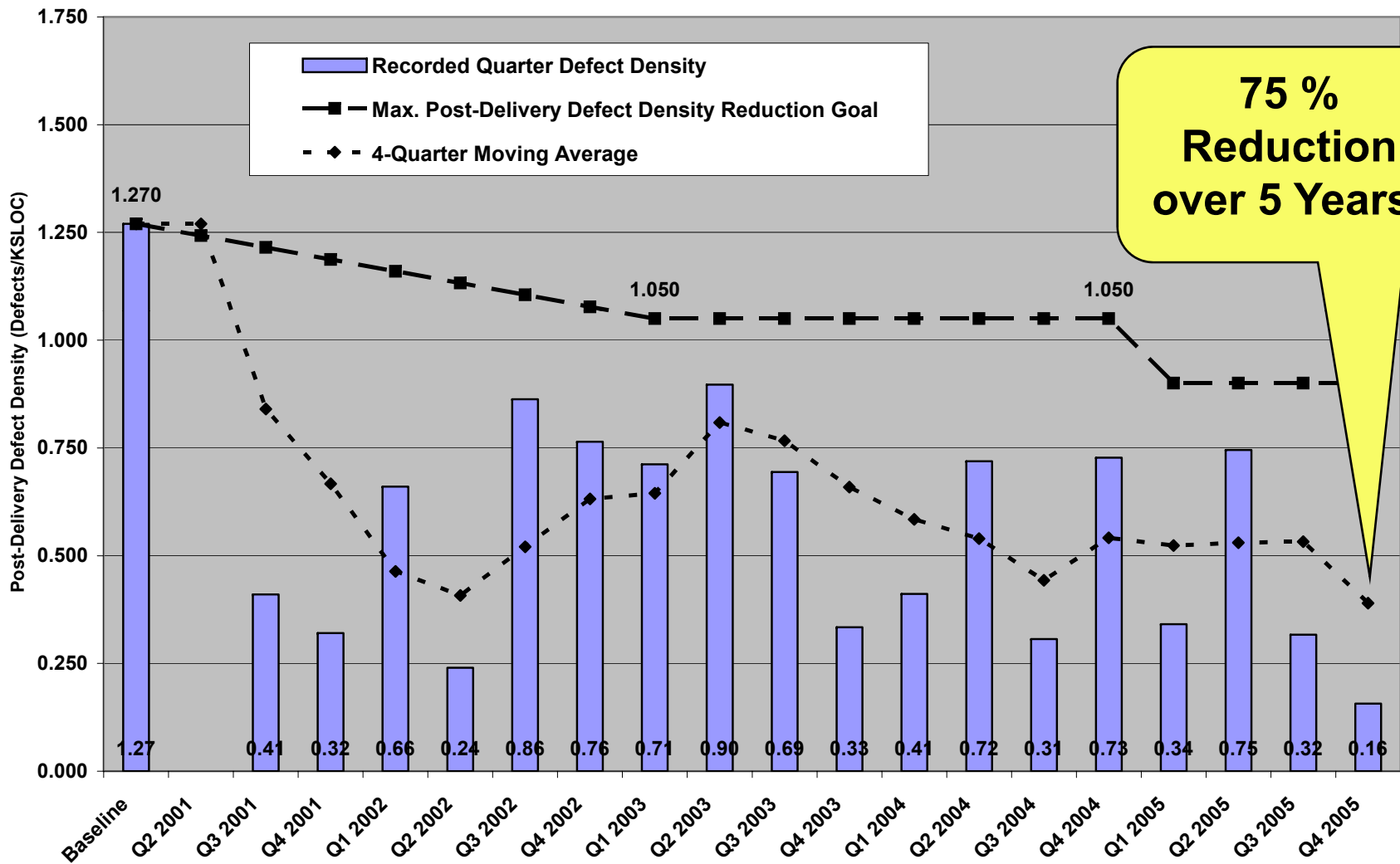
Organizational Performance Can Be Optimized!





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Post Delivery Defect Density Reduction Goal (2001-2005)

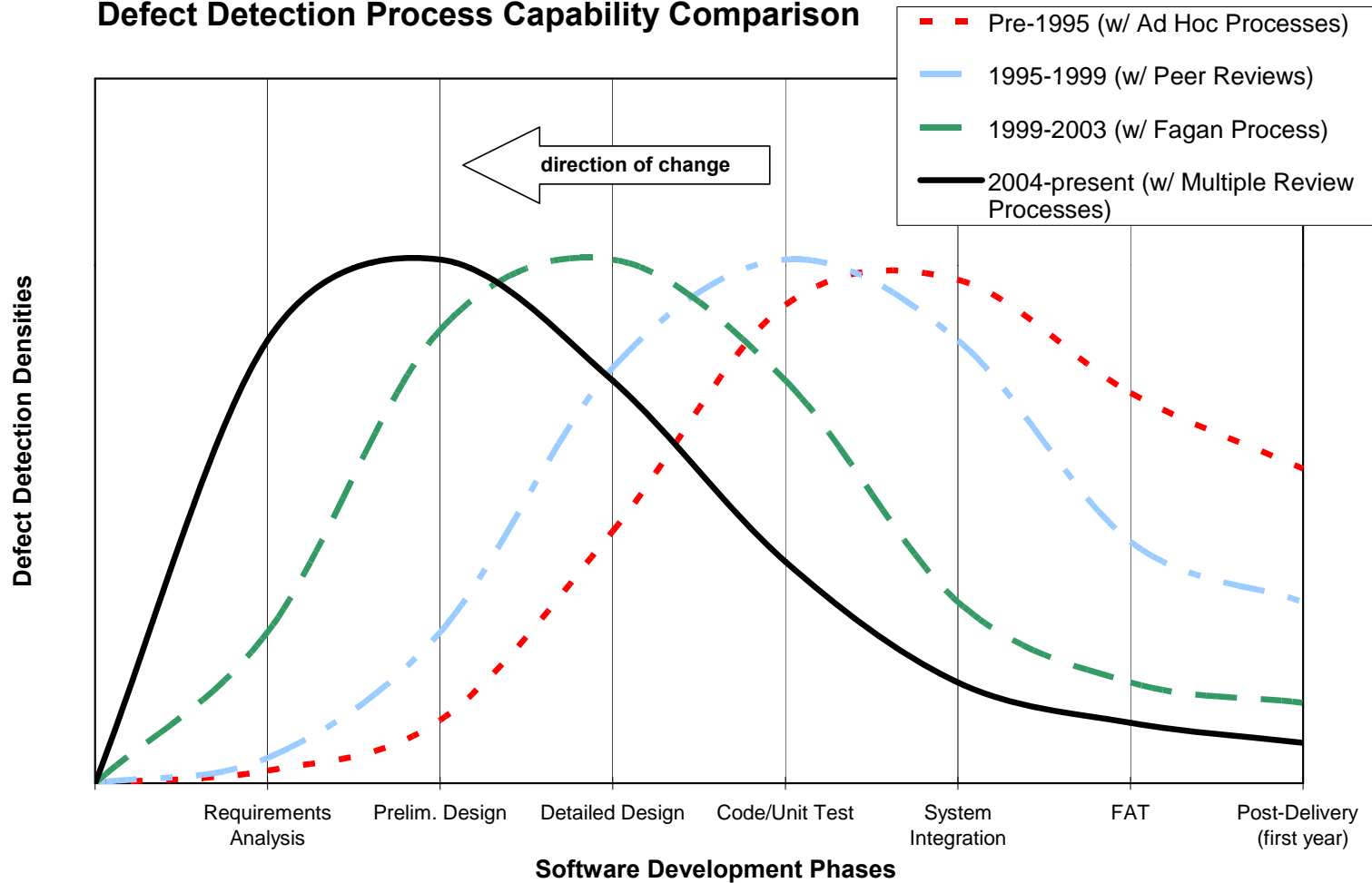


**75 %
Reduction
over 5 Years!**

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Improved Defect Detection Enables ...

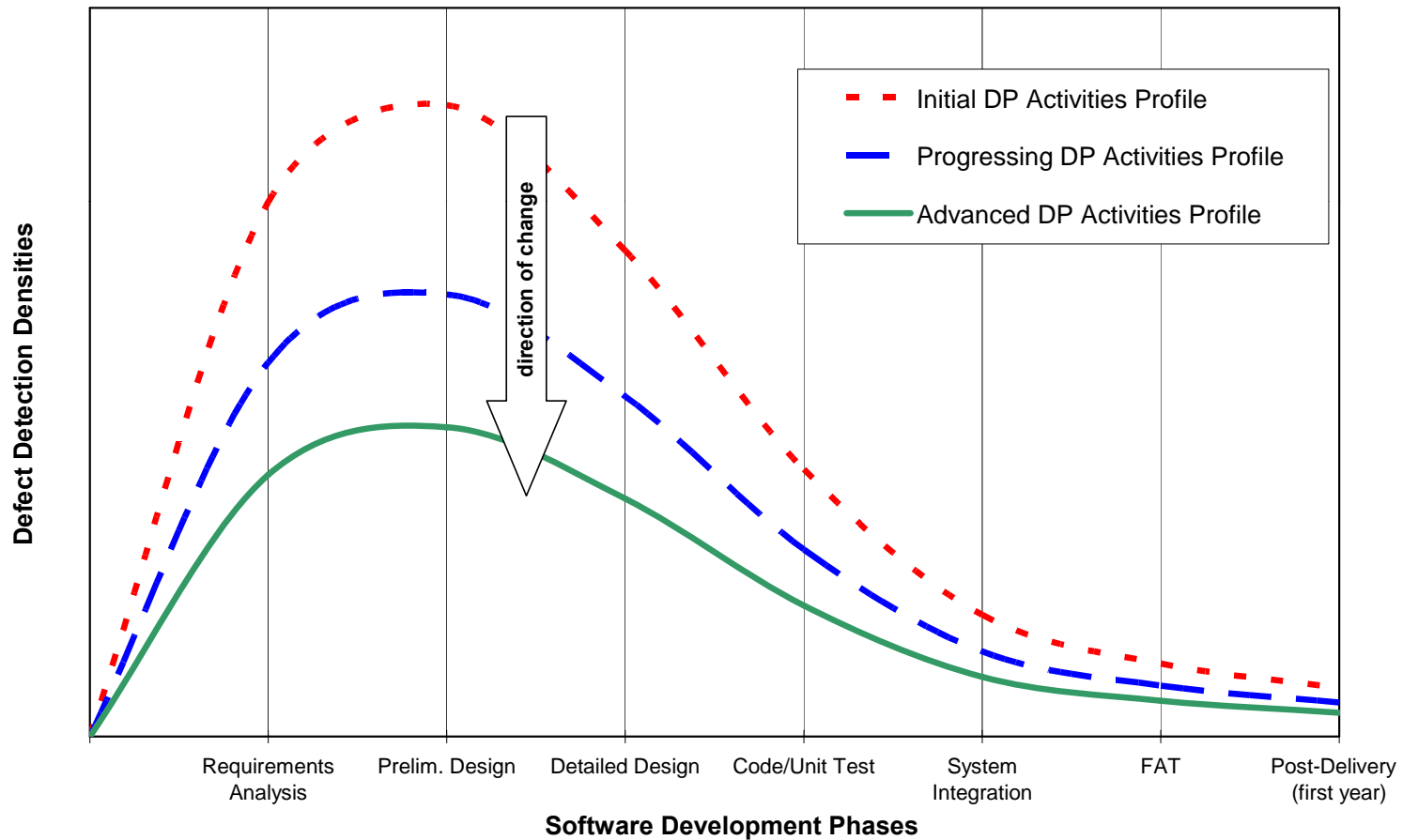
Defect Detection Process Capability Comparison



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... Improved Defect Prevention!

Defect Prevention Process Capability Comparison



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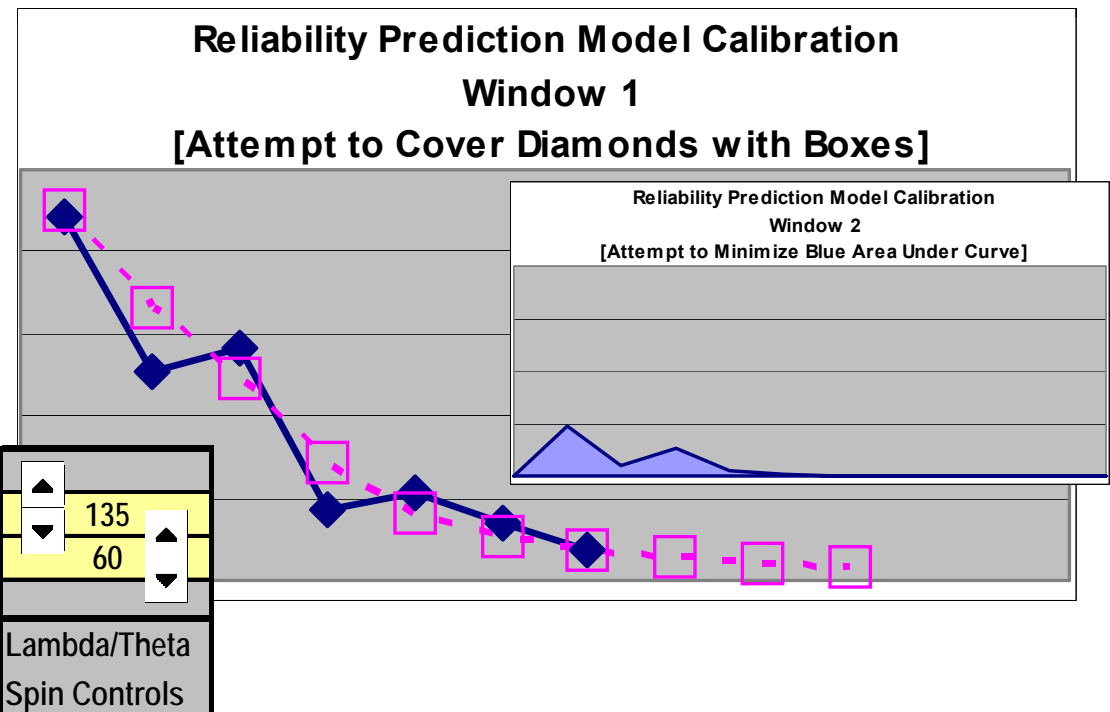
When the Defect Well Starts to Dry Up ...

Projects that have cut their teeth on quantitative management of defect injections/detections must ultimately look for new ways to apply their statistical tool set and quantitative management skills.

Integration & Testing Reliability Prediction is one such advanced model.

$$y \approx \lambda e^{-\theta t}$$

Reliability Prediction Model Parameters	
Weekly Reliability Threshold	0.0500
Calculated Lambda - Method 1	0.7061
Calculated Lambda - Method 2	1.4123
Calculated Lambda - Method 3	1.0147
Calibration Lambda	1.3500
Calibration Theta	0.0060
Sum of Squared Differences	
	0.0051



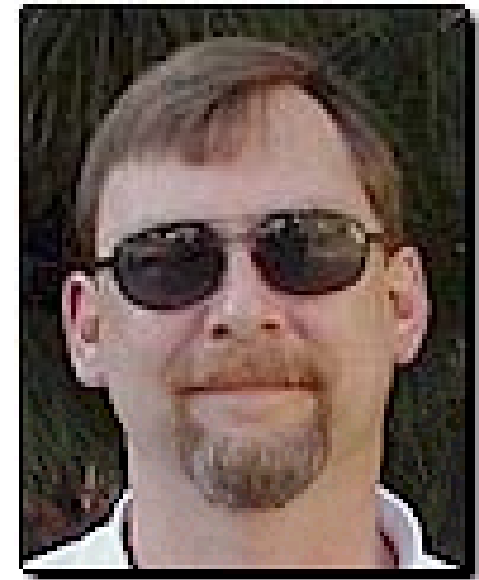
Key Take-Aways!

1. Starting Down the Process Improvement Path Can Be Both Scary & Risky. Danger Lurks Around Every Bend. Choose a Pathfinder That You Can Trust!
2. Every Perceived Failure Can Also Be Viewed as a Potential Opportunity for Improvement. Think Positively!
3. Limiting Process Variance is the Key to Any Successful, Repeatable, Reliable and Sustainable Process Improvement Implementation. Don't Just Focus on Mean Values!
4. Institutionalization Requires Time & Energy. Build Up & Maintain Momentum. Starting & Stopping & Restarting Again Is A Very Poor Use of Project Funds!

Questions?

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 - San Diego, CA 92127
 - Email: kevin.domzalski@baesystems.com



About the Presenter

- **Kevin Domzalski** is a seasoned member of the Process Improvement Group at BAE Systems (C3I Systems) headquartered in San Diego, California, as well as a Systems Engineering Specialist.
- Kevin joined the company in 1983 (or at least one of the precedent companies that have now been formed into BAE Systems, Inc.) but took a 5-year hiatus between 1993 and 1998 to work as an automotive industry engineering consultant.
- Kevin has developed and teaches many company courses as well as the Systems Engineering Software Overview course at the University of California at San Diego (UCSD) Extension Studies Program as a adjunct faculty member.
- In addition, Kevin was awarded the PSM Users Group's "Most Successful PSM Implementation" award in July of 2005 having been nominated by David Card, co-author of PSM and the ISO/IEC 15939 Standard.

Acronyms

CMM[®]	Capability Maturity Model
CMMIsm	Capability Maturity Model Integration
COCOMO	Constructive Cost Model
ISO/IEC	International Organization for Standardization / International Electrotechnical Commission
MAG	Metrics Analysis Group
OSCAR	Organizational Systemic Causal Analysis & Resolution
PSM	Practical Software (& Systems) Measurement
UCSD	University of California San Diego