Lessons learned in motivating Software Engineering Process Group to focus on achieving business goals, and not just on achieving a maturity level

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Preamble

Don't think of business as a life without greatness

Unless the distant goals of meaning, greatness, and destiny are addressed, we can't make an intelligent decision about what to do tomorrow morning – much less set the long-term strategy of the company

First decision must be to commit to an ethical world, a civilized existence, a moral order

Nothing is more practical than for people to deepen themselves.

- Peter Koestenbaum (pkipeter@ix.netcom.com)

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Topics

- Issues
  - Quality and Schedule
  - Rational Management and Commitment
  - Insanity and Malpractice
- Goals and Measurement – Myths, Facts
- SEPG and Top Management
- Balanced Scorecard
  - Objectives, Core Outcomes, Performance Drivers
  - Linkage, Alignment
- GQM – Six Step Process
- AIS SEPG – Role, Examples, Results
- Lessons Learned

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Quality Is More Important Than Schedule

"In today's software marketplace, the principal focus is on cost, schedule, and function; quality is lost in the noise. This is unfortunate since poor quality performance is the root cause of most software cost and schedule problems."

Watts Humphrey

Irrational Management

➢ Why do competent software professionals agree to delivery dates when they have no idea how to meet them?

➢ Why do rational managers accept schedule commitments when engineers offer no evidence that they can meet the commitments?

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Rational Management - Principles

➢ Set challenging goals

➢ Get the facts

➢ Use facts and data

➢ Anticipate and address problems

Insanity or Malpractice?

Insanity

Doing the same thing over and over and expecting a different result

Malpractice

An organization which does not have a

top-management-sponsored

continuous improvement initiative in place

Goals and Measurement Myths and Facts - 1

➢ Dr. Deming

  – Numerical goals accomplish nothing

  – Extrinsic motivation leads to the destruction of the individual

  – Rewards motivate people to work for the rewards

  – Various components should work together for optimization of profit and joy in work

  – System must create something of value, in other words, results

  – Life is variation
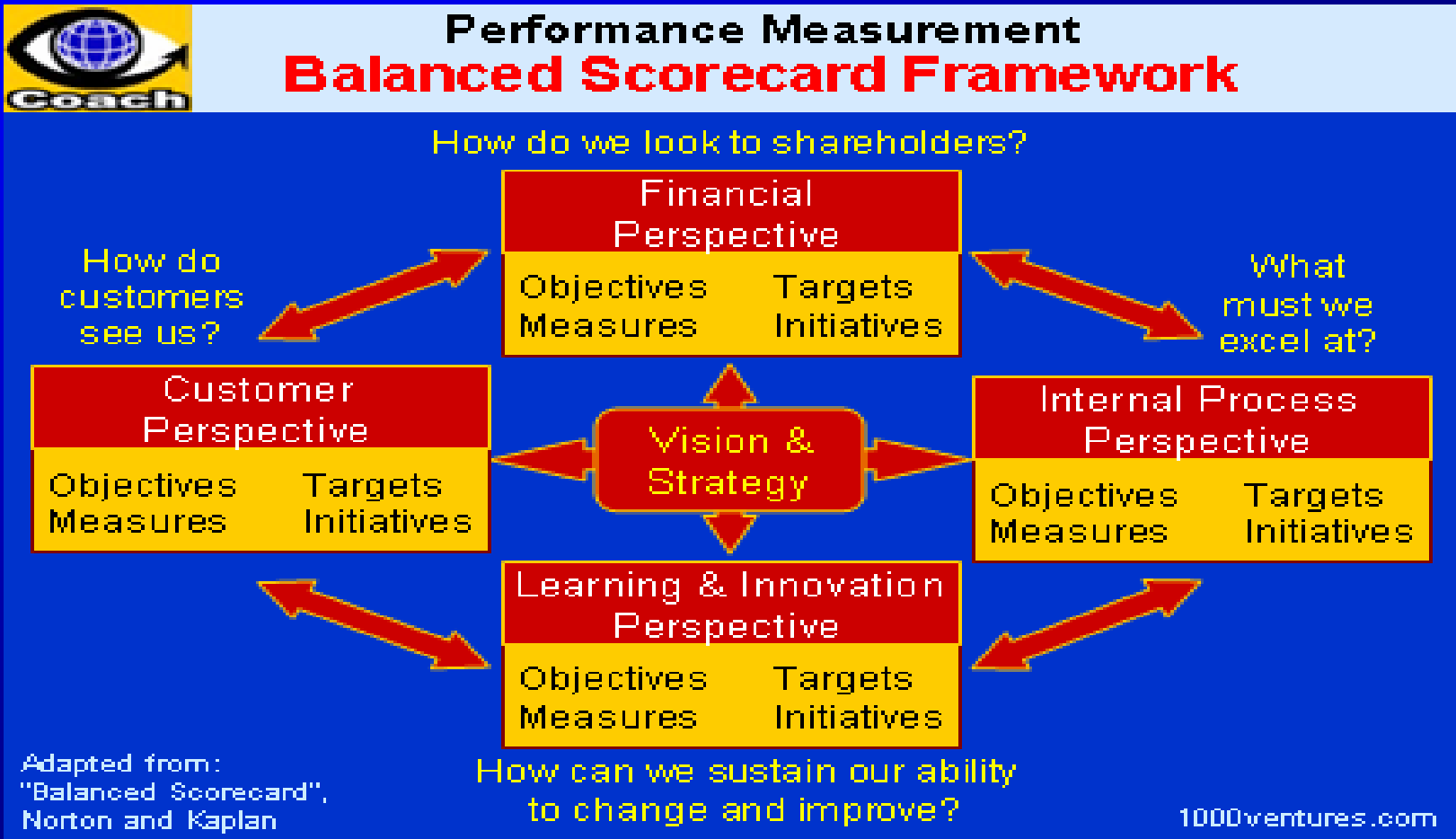
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Goals and Measurement Myths and Facts - 2

➢ Watts Humphrey
  – Undisciplined or unmotivated people can not do timely or predictable intellectual work; quality work is not done by accident
  – Disciplined and motivated people need aggressive goals
  – Support goals with specific programs and plans
  – You can't easily tell the quality of a program, but you can ask if it was properly developed
  – If measures can not detect one-day slip, you can not anticipate problems and prevent them
  – Defining measures is not always easy, but it is almost always possible
  – Business is prediction

SEPG and Top Management

➢ SEPG has highly visible responsibility for improving organization process capability and achieving high maturity level certification

➢ Software Process Improvement (SPI) and high maturity level achievement are long term propositions

➢ Management has short term expectations

➢ The language of top management: money, return on investment, customer satisfaction, business objectives

➢ No direct linkage between SPI goals and business objectives

➢ Only common agreed upon goal– desired maturity level by a mandated date

Linking SPI Goals and Business Objectives
Balanced Scorecard

Performance Measurement
Balanced Scorecard Framework

How do we look to shareholders?

Financial Perspective
Objectives   Targets
Measures   Initiatives

How do customers see us?

What must we excel at?

Customer Perspective
Objectives   Targets
Measures   Initiatives

Vision & Strategy

Internal Process Perspective
Objectives   Targets
Measures   Initiatives

Learning & Innovation Perspective
Objectives   Targets
Measures   Initiatives

How can we sustain our ability to change and improve?

Adapted from:
"Balanced Scorecard",
Norton and Kaplan

1000ventures.com

AIS BSC Business Strategic Objectives

Our Purpose:
Continuously advance the boundaries of quality

OBJECTIVES

FINANCIAL	CUSTOMER	EMPLOYEE	INTERNAL BUSINESS PROCESS	LEARNING & GROWTH
Consistently meet or exceed shareholder expectations for • Revenue growth • Profitability • Valuation increase	Consistently meet or exceed customer expectations for • Defect free delivery • On-time delivery • Value for products & services	Consistently meet or exceed employee expectations for • Training • Compensation • Communication • Work environment • Performance management • Career development	• Individuals achieve the highest possible quality in their work products • Individuals and teams achieve results for effort, schedule, and defects within the known range of their process capability • Continuously optimize organizational processes	• Invest in people, process, and technology to enable achievement of customer, employee, and shareholder satisfaction goals • Innovate and offer new products and services

AIS BSC Core Outcomes, Performance Drivers

FINANCIAL	CUSTOMER	EMPLOYEE	INTERNAL BUSINESS PROCESS	LEARNING & GROWTH
CORE OUTCOMES – LAGGING INDICATORS				
•Quarterly revenue increase •Annual valuation increase	•Customer feedback indicating met or exceeded customer expectations for: - Quality - Timeliness - Value for Products & Services	•Targeted employee turnover rate	•Work products with less than or equal to targeted rework effort •Work products with zero post development defects •Commitments with actual effort equal to or less than committed effort •Commitments with actual schedule equal to or less than committed schedule	•Teams achieving quantitative goals •Employees advancing to the next level in the career path •New products developed and released •New services offered
PERFORMANCE DRIVERS – LEADING INDICATORS				
•Monthly percent of revenue from targeted customers •Monthly percent of revenue from targeted services •Monthly percent of employees meeting or exceeding their budgeted revenue target	•Defect free delivery •On-time delivery	•Assessment indicating targeted P-CMM Key Process Areas fully satisfied	•Individuals following the PSP •Work products with targeted percent of defects removed before peer review	•Teams using the TSP •Employees achieving training goals •Internal products being developed •Identified market needs

Linkage Between Internal Business Process, Customer and Financial Perspectives - 1

When *individuals follow the PSP*, they will develop *work products with targeted percent of defects removed before peer review* which will lead to *work products with zero post development defects* as well as *work products with less than or equal to targeted rework effort* thereby achieving the strategic internal business process objective –

Individuals achieve the highest possible quality in their work products

Linkage Between Internal Business Process, Customer and Financial Perspectives - 2

This in turn helps project teams *deliver nearly defect free product on time* which leads to *Customer feedback indicating met or exceeded customer expectations for Quality, Timeliness and Value for Products & Services* which leads to achieving financial objective of *profitability and revenue growth*

Goal, Questions, Metrics (GQM)

Victor Basili's six step process

1. Develop a set of corporate, division and project business goals and associated measurement goals for productivity and quality
2. Generate questions (based on models) that define those goals as completely as possible in a quantifiable way
3. Specify the measures needed to be collected to answer those questions and track process and product conformance to the goals
4. Develop mechanisms for data collection
5. Collect, validate and analyze the data in real time to provide feedback to projects for corrective action
6. Analyze the data in a postmortem fashion to assess conformance to the goals and to make recommendations for future improvements

SEPG Role

➢ We motivated SEPG to

- Focus on achieving business objectives and not just achieving a maturity level

- Use GQM to determine what measurements are needed for leading/lagging indicators

- Present "vital few" project and organization data along with process maturity and process improvement information

- Speak the language of top management

What SEPG Accomplished

- ➢ Identified 23 organizational level metrics related to 9 BSC objectives
- ➢ Identified 7 project level goals, questions, and metrics
- ➢ Collected the data systematically during phase reviews and project postmortems
- ➢ Presented the data in Quarterly Status Reviews

AIS GQM Example - 1

Goal (objective)	**To consistently meet or exceed customer expectations for defect-free delivery**
Question	**Have we met or exceeded customer expectations for defect-free delivery?**
Metric (Measures)	**# of Customer Feedback Forms** **# of Customer Feedback Forms with exceeded needs or met needs for quality** **# of post-delivery defects**
Source of Goal	**BSC - Customer**
Source of Measures	**Customer Feedback Form indication of exceeded needs or met needs for quality** **SEPG Data Collection Form**
How Reported	**QSR by SEPG**
Current Capability	**90%**
Target	**Goal - 100%**

AIS GQM Example - 2

Goal (objective)	**Individuals achieve the highest possible quality in their work products**
Question	**Have teams produced** **-work products with less than or equal to targeted rework effort?** **-work products with zero post development defects?**
Metric (Measures)	**Estimated rework effort vs. actual rework effort** **# of work products with 0 post-development defects** **# of Acceptance test defects**
Source of Goal	**BSC - Internal Business Process**
Source of Measures	**Project's planned rework effort vs.. actual rework effort from tracking tool** **# defects found in peer review and beyond**
How Reported	**QSR - Components with 0 post unit test defects; acceptance test defects per KLOC by SEPG**
Current Capability	**Average AT defects = 0.311/KLOC**
Target	**Goal 100% at 0 AT defects**

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AIS GQM Example - 3

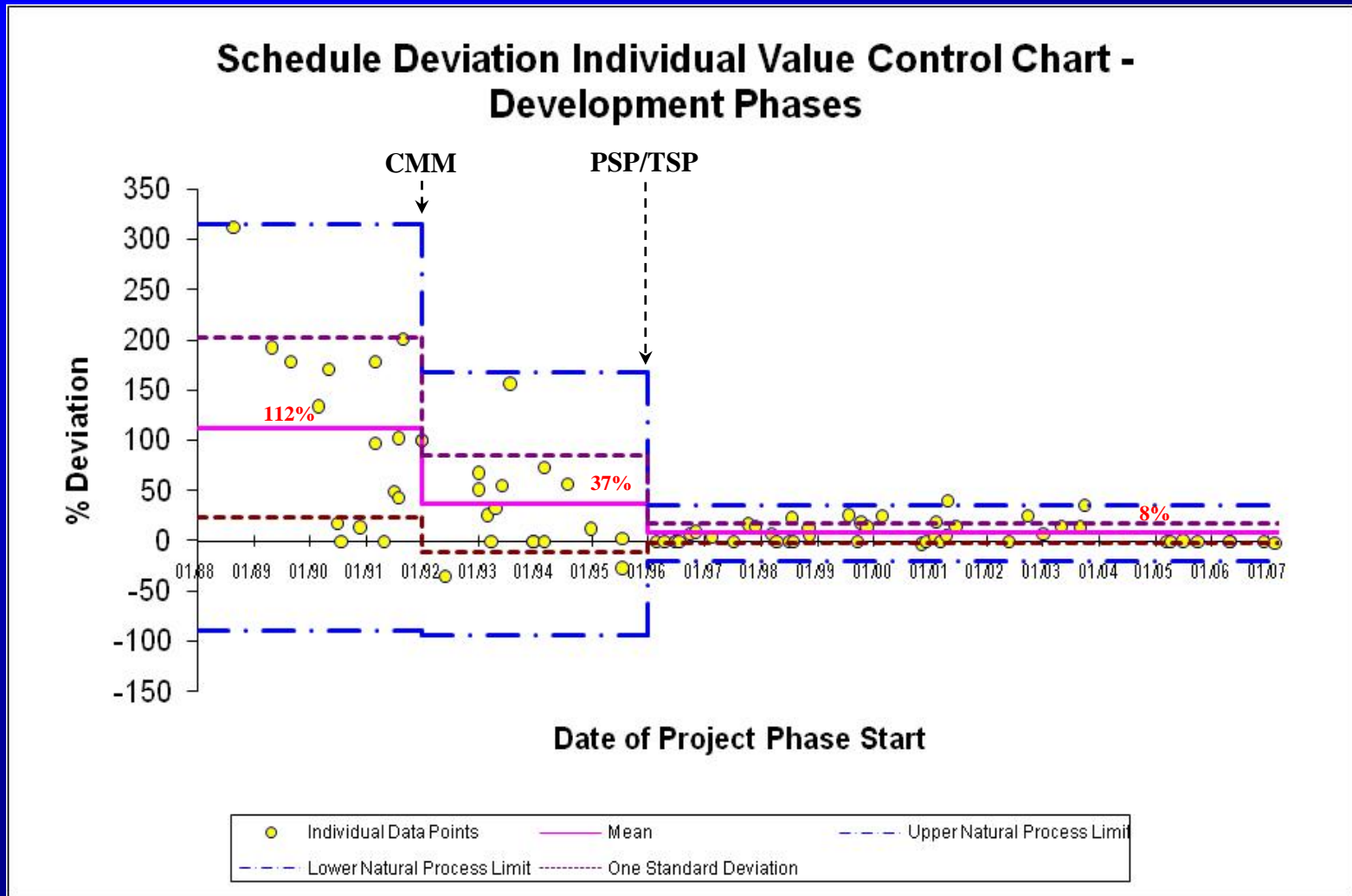| Goal (objective)	Individuals and teams achieve results for effort, schedule, and defects within the known range of their process capability
Question	What is the organization's range of process capability? Are the results in range?
Metric (Measures)	Planned vs. Actual effort, schedule; variance
Source of Goal	BSC - Internal Business Process
Source of Measures	SEPG Data Collection form
How Reported	QSR - Effort deviation; Schedule deviation; Effort Commitments; Schedule Commitments by SEPG
Current Capability	Average deviation - Effort - 9.44, Schedule - 14.06,
Target	100% within range

AIS GQM Example - 4

Goal (objective)	**Deliver substantially defect free product**
Question	**Are we catching defects early in the lifecycle?**
Metric (Measures)	**Yields**
Source of Goal	**Project Manager/TSP**
Source of Measures	**SOLONsys***
How Reported	**Weekly TSM**
Analysis	**On target?, action needed? Use PSP/TSP analysis methods.**

* AIS TSP Tool

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AIS Results – Predictable Schedule Performance

Schedule Deviation Individual Value Control Chart - Development Phases

AIS Results – Predictable Cost Performance

Effort Deviation Individual Value Control Chart - Development Phases
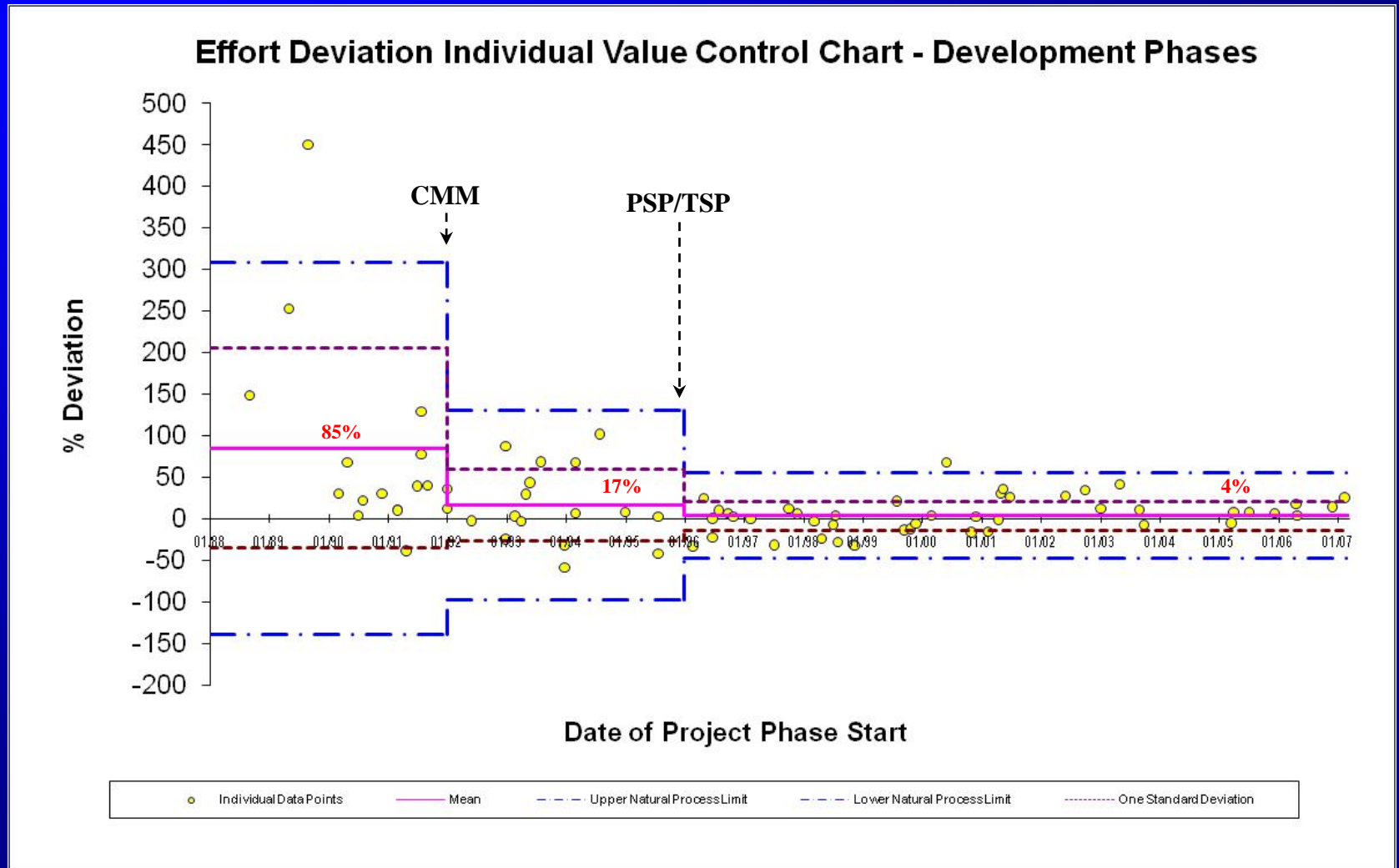
AIS Results – Substantially Defect Free Deliveries

User Acceptance Test Defects Per KLOC - New Development Projects
(Avg=0.15, UCL=0.66)
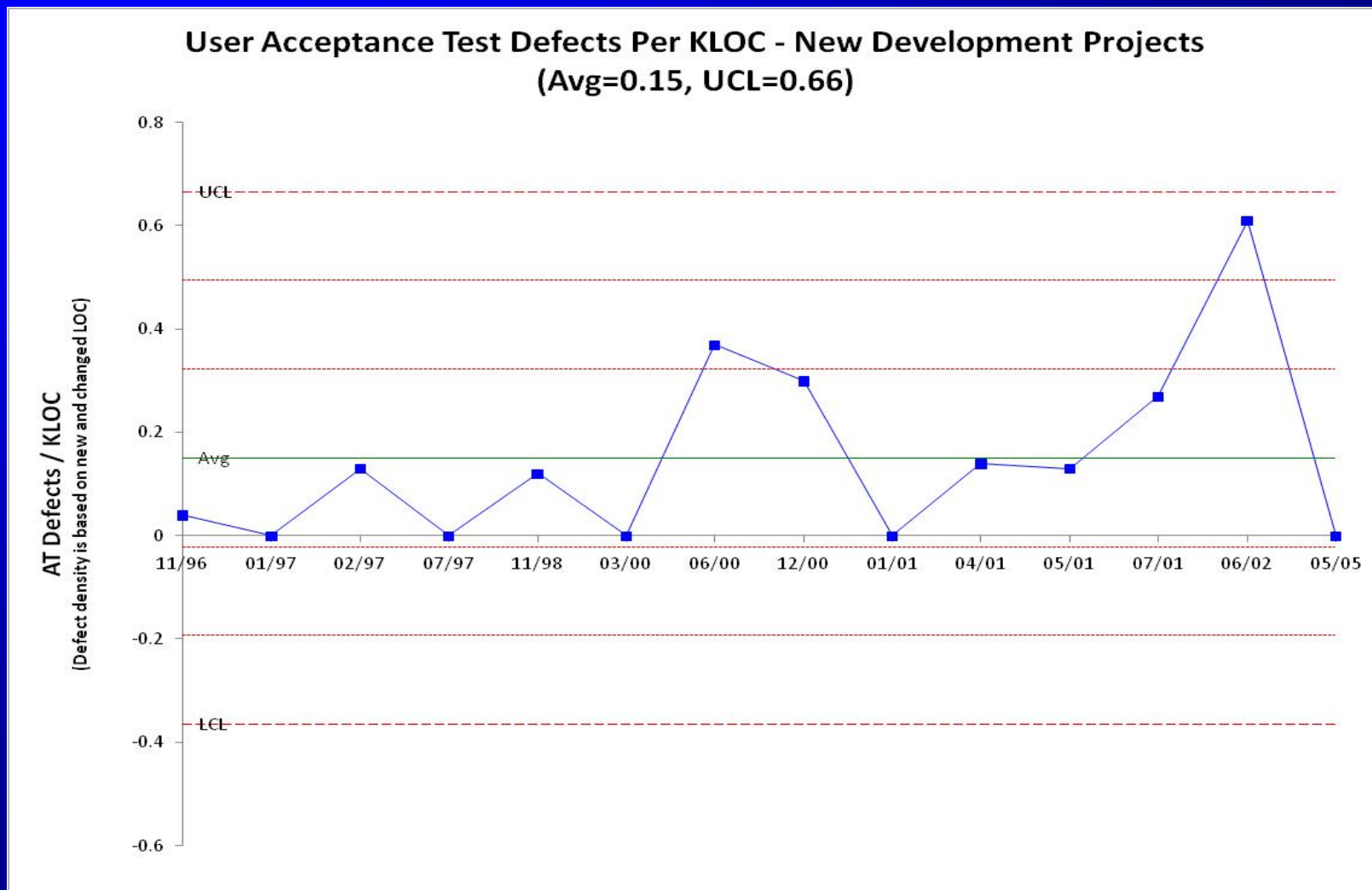
Lessons Learned - 1

➢ Keep BSC objectives simple

➢ Top management must articulate financial, and customer perspectives

➢ Brainstorm with employee participation

- Cause and effect between internal process / learning objectives and customer / financial objectives

- Lagging, leading indicators

Lessons Learned - 2

- Motivate employee part time participation in SEPG activities as broadening assignment in career development
- PSP training is key to transitioning to culture of precision and accuracy in data collection/analysis
  - Basic data – size, time, defect
- Assign SEPG the responsibility for quarterly status reviews and presentation of "vital few" organizational and project data

Lessons Learned - 3

- Include BSC objectives in new employee orientation

- Provide direct linkage by aligning employee objectives to BSC strategic objectives

- Aligning business goals such as market share, win/loss ratio of new business etc to process and employee objectives is not easy

- Keep everyone focused on business results; maturity level is not an end in itself

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