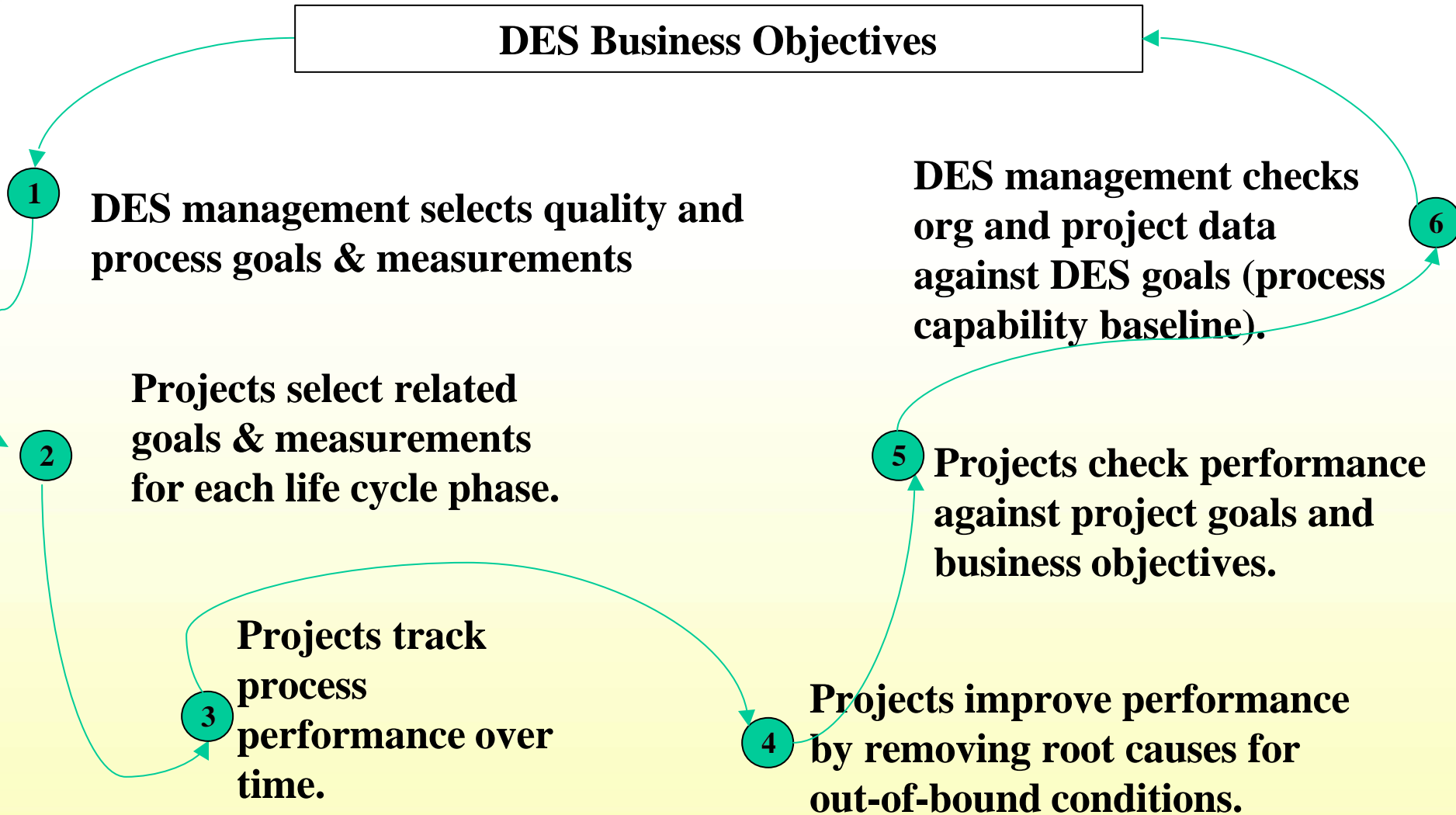# CMMI^{sm} Technology Conference and User Group November 2002

Business Value and Customer Benefits Derived from High Maturity

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- **Purpose:**
  - Communicate business value and customer benefits derived from an application of "high maturity" system/software engineering processes, and
  - How an integrated process framework helps
- **Discussion Agenda**
  - Business Value/Customer Benefits & Process Highlights
    - Quality and Process Goals
    - Quality and Process Performance
    - Process Highlights
  - Integrated Process Improvement (CMMI)
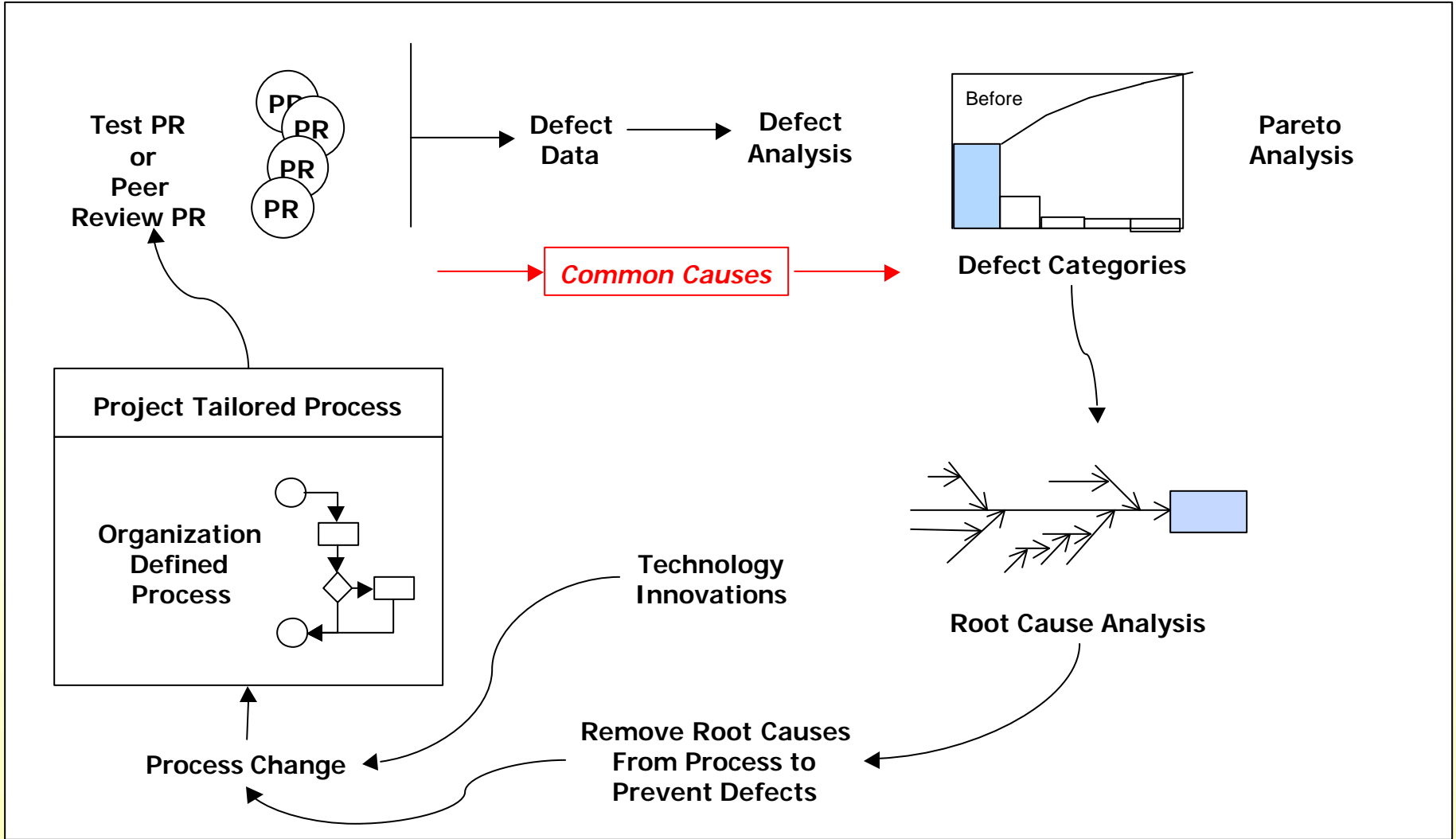- **Limit – 40 minutes including questions**

DES Business Objectives

1 **DES management selects quality and process goals & measurements**

DES management checks org and project data against DES goals (process capability baseline). **6**

2 **Projects select related goals & measurements for each life cycle phase.**

5 **Projects check performance against project goals and business objectives.**

3 **Projects track process performance over time.**

4 **Projects improve performance by removing root causes for out-of-bound conditions.**

DES Process and Quality Measures

Acronym	Measurement	Process
CPIm	Cost Performance Index monthly	Earned Value System
SPIm	Schedule Performance Index monthly	Earned Value System
EPVPm	ETC Performance Variance Percentage monthly	Earned Value System or other financial process
DDr	Defect Density from Peer Review	Peer Review (all Life Cycle Stages)
DDt	Defect Density from Test & Operations	Test

| DES Business Objectives	DES Process & Quality Performance Goals
Annual Operating Plan	**Collective across participating projects**
Achieve revenue and margin objectives	1. Achieve Cost Perf. Index $= 1 \pm 5\%$ 2. Achieve Schedule Perf. Index $= 1 \pm 5\%$ 3. Achieve Est-To-Complete-Var $= 0 \pm 5\%$. 4. Achieve 5% improvement in Defect Density for each life cycle phase.
Improve customer satisfaction rating	1. Achieve Cost Perf. Index $= 1 \pm 5\%$. 2. Achieve Schedule Perf. Index $= 1 \pm 5\%$. 3. Achieve Est-To-Complete-Var $= 0 \pm 5\%$. 4. Achieve 5% improvement in Defect Density for each life cycle phase.

Test PR
or
Peer
Review PR

PR
PR
PR
PR

Defect
Data

Defect
Analysis

Before

Pareto
Analysis

Defect Categories

Common Causes

Project Tailored Process

Organization
Defined
Process

Technology
Innovations

Root Cause Analysis

Process Change

Remove Root Causes
From Process to
Prevent Defects

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S **Technical**

- Goal: 20 +/- 5 defects/KLoC
- Actual: 22.9 defects/KLoC
- Action: Implementing DDt
- Technical Highlights: Only 2% of all defects are found in the fielded system

Defect Density at Review (all defects)
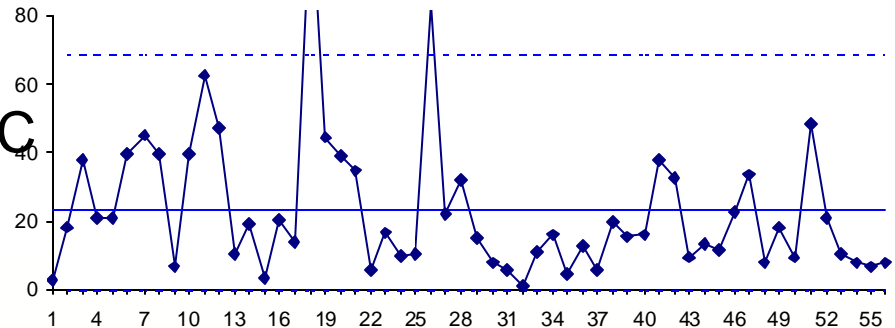
S **Financial**

- Goal: 1.0 +/- 0.1
- Actual: 0.98
- Action: DP cycle for SCoV in April; Countermeasures – improve estimation; change EV tracking
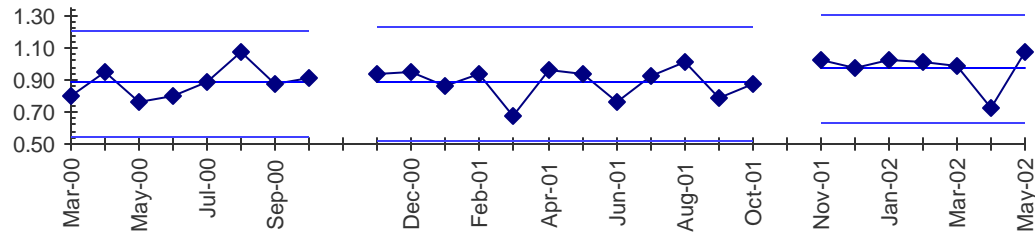- Technical Highlights: CPI is still on target

Cost Performance Index (Monthly)

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Schedule Performance Index (Monthly)
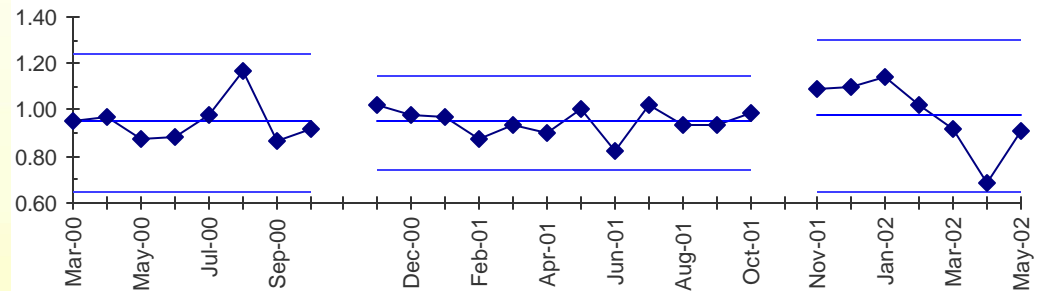
M Schedule

- Goal: 1.0 +/- 0.1
- Actual: 0.975
- Action: Watching closely, DP cycle for SCoV in April; Countermeasures – improve estimation; change EV tracking
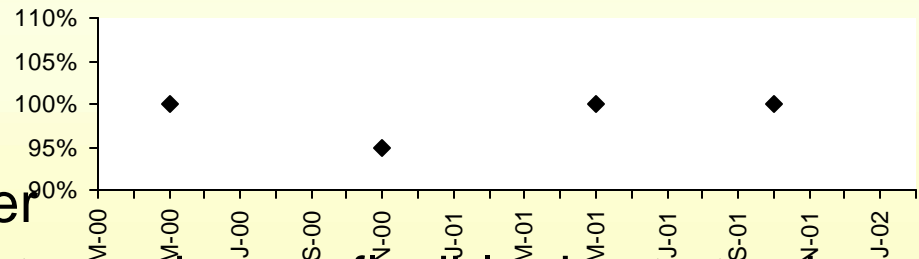- Technical Highlights: will be Satisfactory by 7/02

E Customer Satisfaction

Award Fee Scores
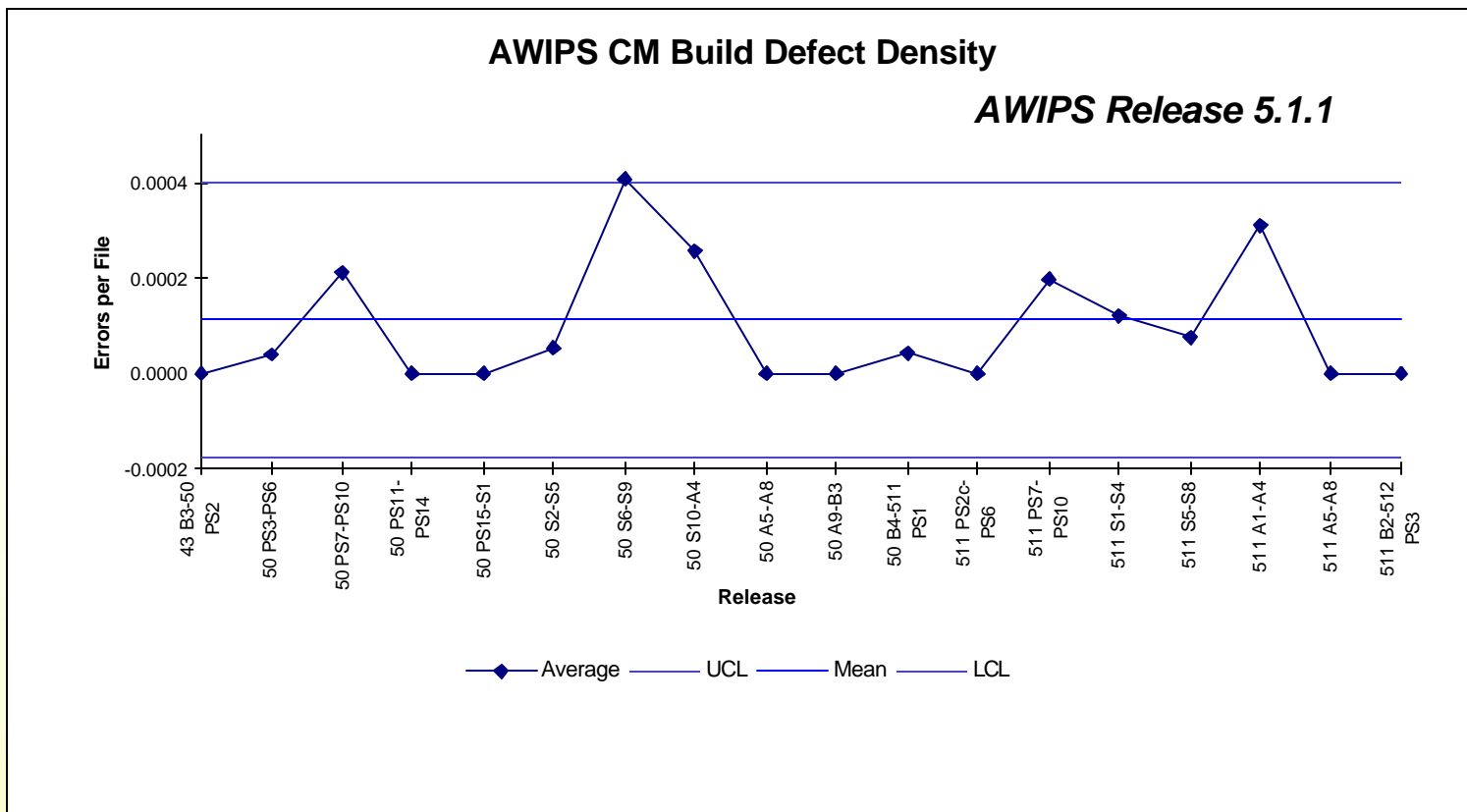
- Goal: >= 95%
- Actual: 98.8%
- Action: Continue to deliver
- Technical Highlights: Customer is very flexible due to track record

Controlling Quality Performance — Build

AWIPS CM Build Defect Density

AWIPS Release 5.1.1

Statistical process control identifies build issues that can impact the development schedule.

AWIPS Release 5.1 Monthly CPIm X Chart

AWIPS Release 5.2 Monthly SPIm X Chart
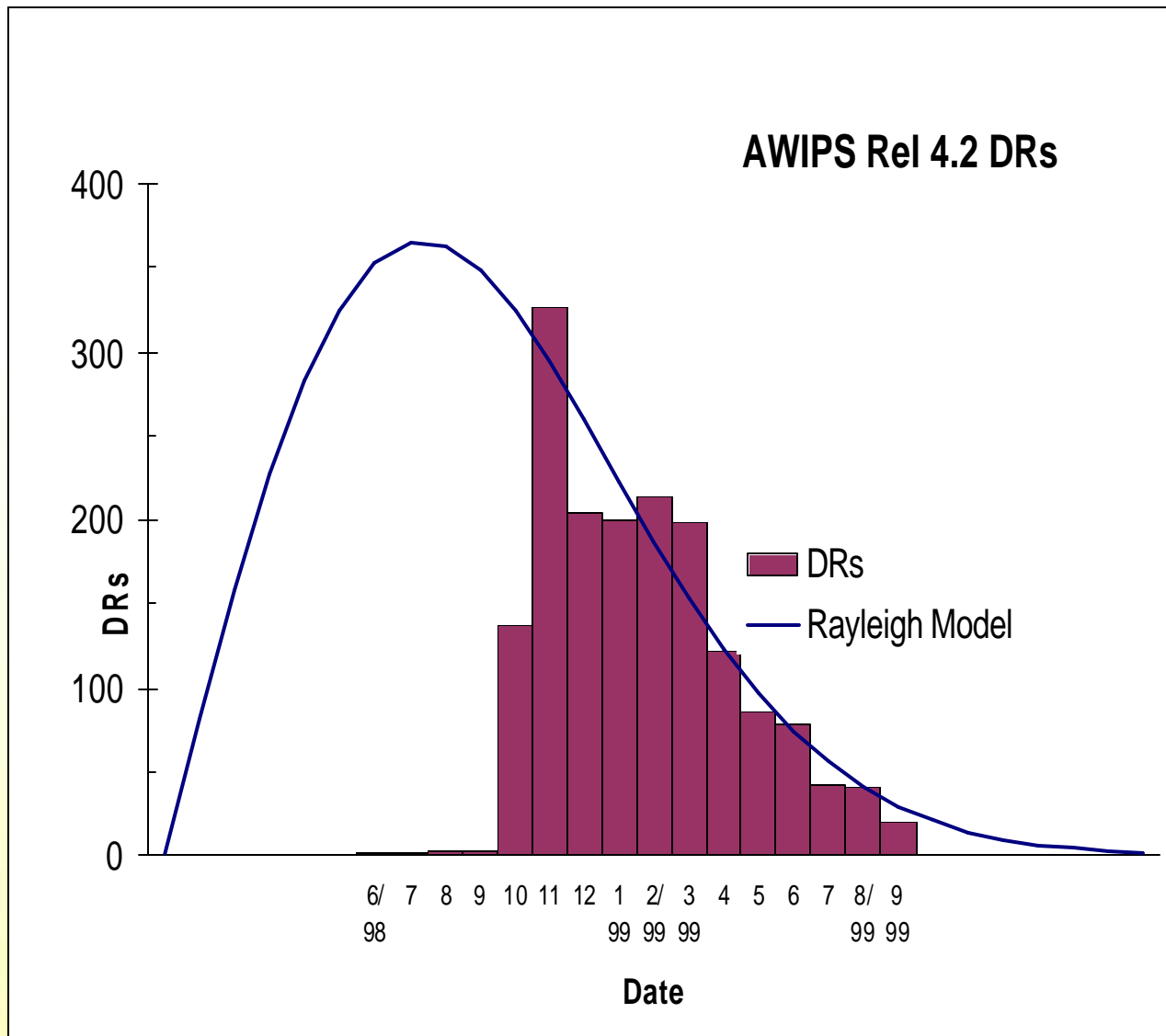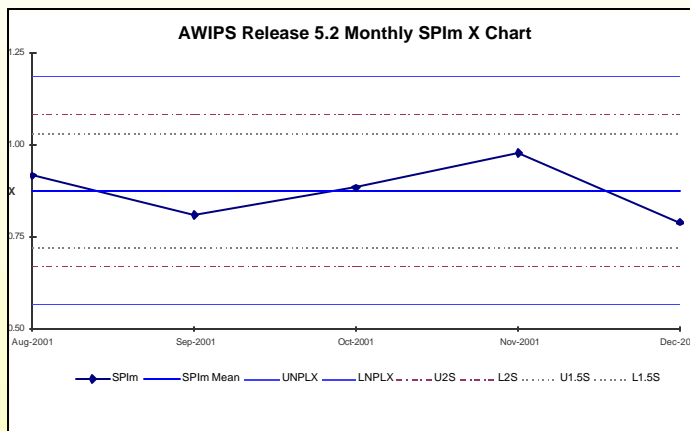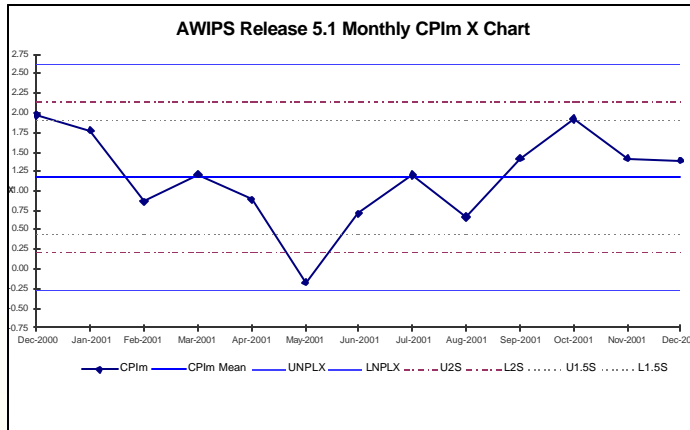
- **Cost and schedule can be managed with statistical process control**
- **Improves predictions of future performance**
- **Results:**
  - Build 4, 2% underrun
  - R5.0, 4% underrun
  - R5.1, 5% underrun
  - Build 5 variance in last 12 months, 10%

Statistical process control improves cost & schedule performance.

JEDMICS Defect Density & Customer Satisfaction Survey

Mean Defect Density by Phase
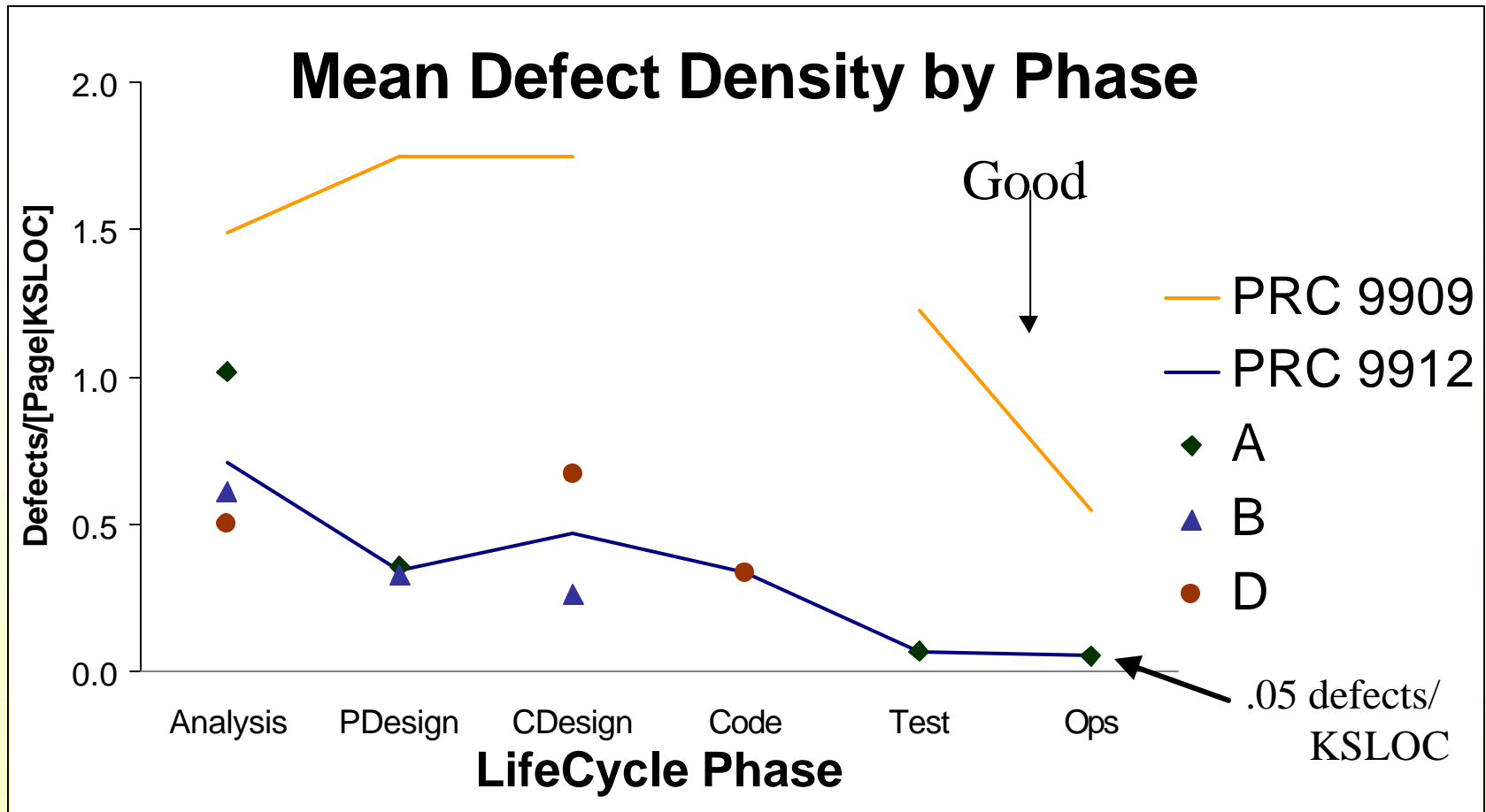
Process Implementation Support – Best Practice

- **Process**
- **Product**

- **Links to other KPAs/PAs**
- **Links to SIM**
- **Links to other processes**

- **Process Champion**
- **Internal Consultant**
- **Subject Matter Experts**

- **One Per Domain**
- **Shows Variations in each Process/ Asset**
- **Expert Knowledge**

- **Templates**
- **Samples**

- **Per Process, Asset**

- **Policy Statements**
- **Quality Assurance**
- **Audits**

- **SWCMM**
- **SECMM**
- **ISO**
- **Customer Stds**

- **Proposals**
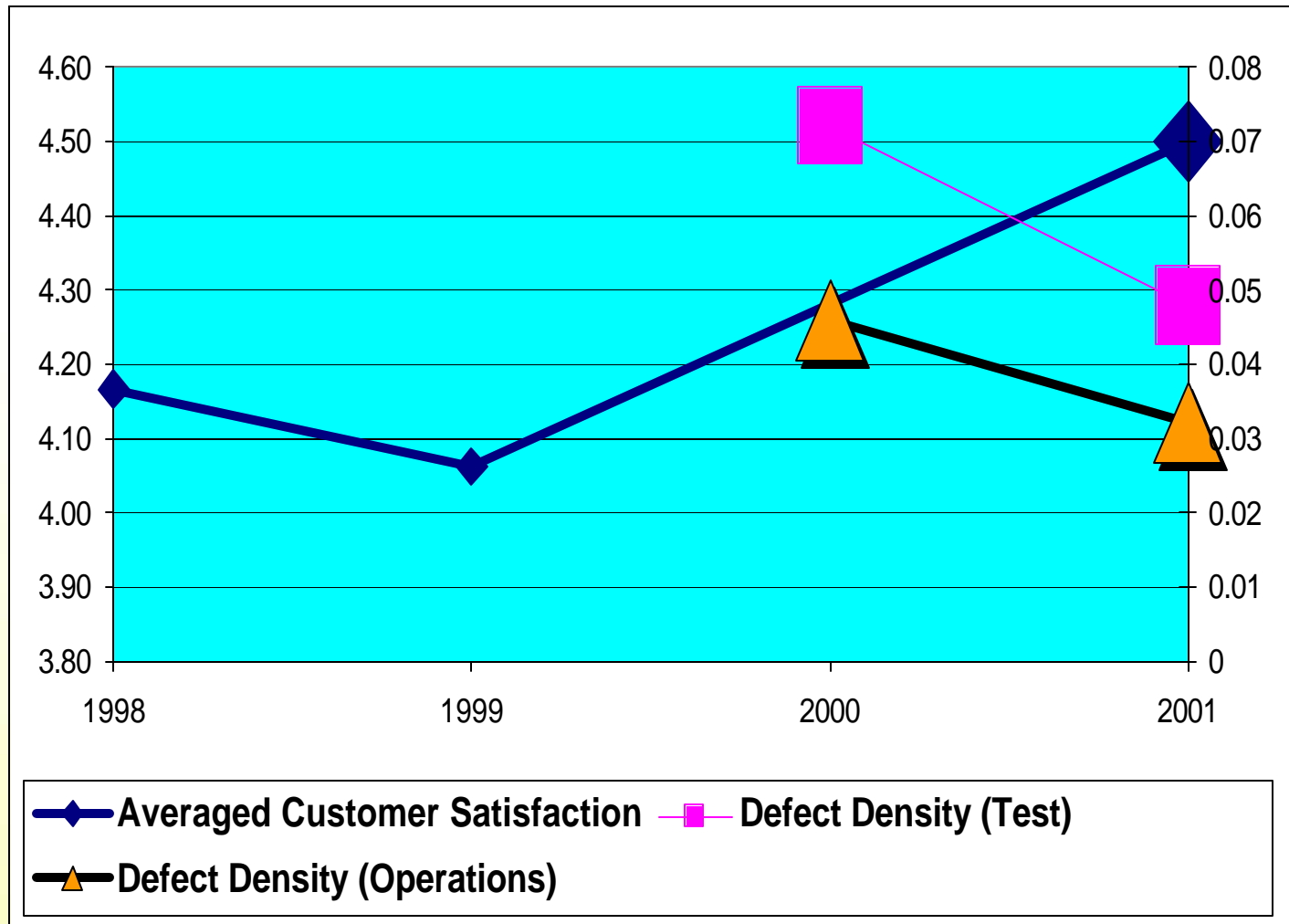- **Pilot Projects**
- **Startups**
- **Ongoing Projects**

- **Corporate**
- **OJT**

- **Corporate**
- **Customer**
- **Internal**

- **COTS & "Glue"**
- **Support**
- **Compatible Formats**

Processes

Wheel segments:
- Check-lists
- Support
- Process Integration
- Tailoring Guidance
- Output Work Products
- Roles & Responsibilities
- Policy & Verifications
- Requirements
- Rollout Plans
- Training
- Metrics
- Tools

Core Processes Common to Multiple Disciplines

Information Technology Products & Services in Constant Change

IT Consulting

Sys Arch, Engin & Delivery

Enterprise Integration

Data Center Operation

IT Infrastructure Management

Applications Management

SETA

Functional Process Outsourcing

SW Discipline

SE Discipline

Core Processes

IPD Discipline

CMMI

SW CMM → Core / SW

SE CM → Core / SE

IPPD-CMM → IPD / Core

→ Other CMM's

Acquirer ↑

Mismatch	**Matched Team**
•Mature buyer must mentor low maturity developer •Outcome not predictable	•Match of maturity •Team risk approach •Execution to Plan •Measurable performance •Predictable results
Disaster •No discipline •No process •Adhoc •Crisis Management •Outcome not predictable	**Mismatch** •"Customer is always right" •Customer encourages "shorts cuts"

increasing ↑

Process Maturity → increasing

Developer

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Mission Shortfalls →

Mission Area Planning **Budgeting Priority**

Decision Analysis and Resolution

Requirements Definition

Requirements Development

← Directives, Constraints

Contracting

Supplier Agreement Management

Activity Planning

Project Planning

Concurrent Front-End Activities

Product Control

Integrated Project Management

Risk Management

Project Monitoring and Control

Program Management

Requirements Management

Configuration Management

Quality Assurance

Causal Analysis and Resolution

Technical Solution

Product Integration

Technical Execution

Deficiencies

Outcome & Feedback

Assessment & Certification

Product Verification

Measurement and Analysis

Validation

Products

System Product Deliveries →

Organizational Process Management

| Process Focus | Process Definition | Innovation and Deployment | Training | Process Performance | Quantitative Mgmt |

Process Maturation

Courtesy: Mitre/Mike Bloom