Process Improvement:
A Synergized Approach

A Panel Discussion
Japan SEPG Conference 2005

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John Vu

The SW-CMM

The Software CMM has become the de-facto standard for assessing and improving software processes

SW-CMM (earlier versions)	**– 1988**
SW-CMM V1.1	**– 1991**
CMMI V1.0	**– 1998**
CMMI V 1.1	**– 2001**

Process Improvement using CMMs is > 15 years

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Industry data found that

- **72% of organizations report little or no success in software improvement after an appraisal**

- **83% of organizations abandon their improvement efforts in the first 3 years**

- **57% of organizations that abandon improvement efforts restart them in the future**

- **Less than 1% of organizations claiming success in process improvement report improvement data**

Source: Software Industry Benchmarking Study 2001

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Why Do So Many Improvement Efforts Fail ?

1. <u>Over-emphasis</u> on having appraisal but not much attention to the commitment of making improvement happen

2. Focus mostly on <u>maturity levels</u> without clear direction and measurable objectives

3. Lack of a <u>skilled infrastructure</u> to coordinate and manage improvement activities

4. <u>Confusion</u> between terminology and actual practices

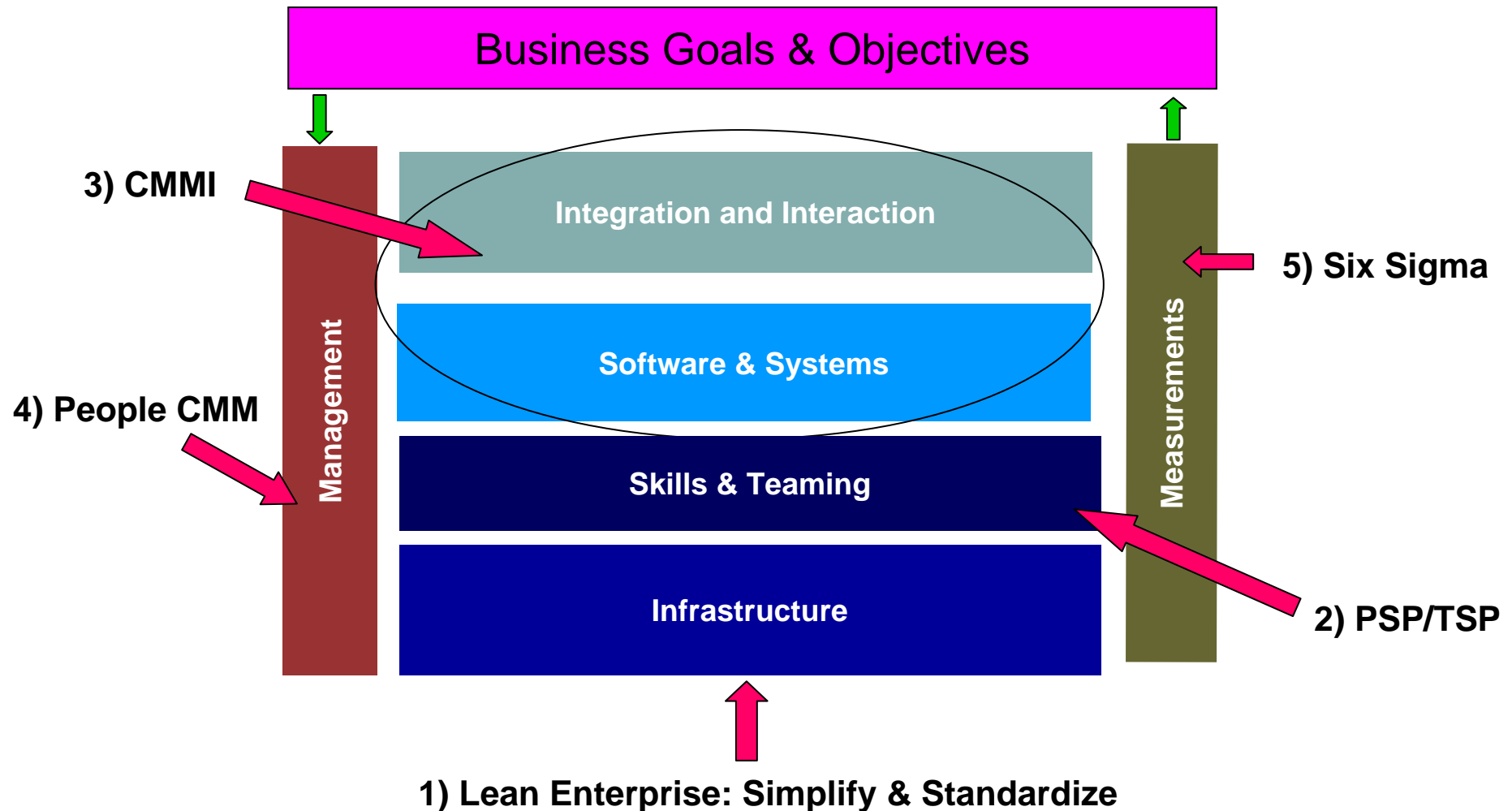5. Deployment of improvement solutions is <u>poorly managed</u>

Source: Software Industry Benchmarking Study 2001

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Process Improvement issues

- **Process Improvement was successful in improving quality and productivity in the 20th century but not yet fulfill the business requirements of the 21st century**

- **Incremental improvement using a single model is not sufficient enough in a complex environment**

- **An integrated framework of multiple models must be used to ensure success and provide value to the business in a fast changing global environment**

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Improvement Architecture: Multiple Models

Business Goals & Objectives

3) CMMI

Integration and Interaction

5) Six Sigma

4) People CMM

Software & Systems

Management

Measurements

Skills & Teaming

2) PSP/TSP

Infrastructure

1) Lean Enterprise: Simplify & Standardize

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Lean Enterprise = Simplify & Standardize

Enterprise must remove layers of complexity and variance by simplification and standardization of the information systems to facilitate better, faster communications and coordination among business units.
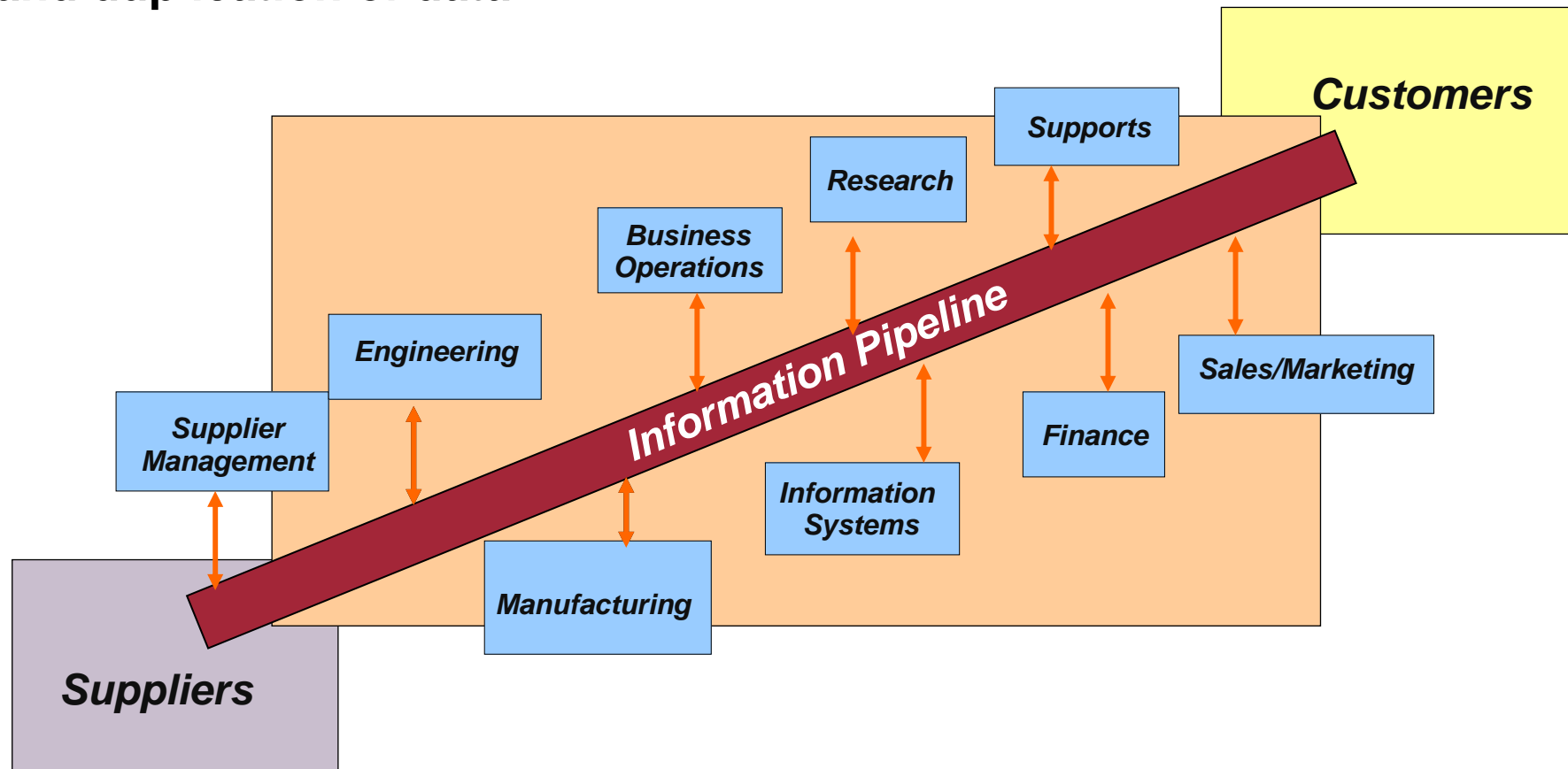
Information technology is the <u>key enabler</u> and a critical component of business strategy in the 21st century.

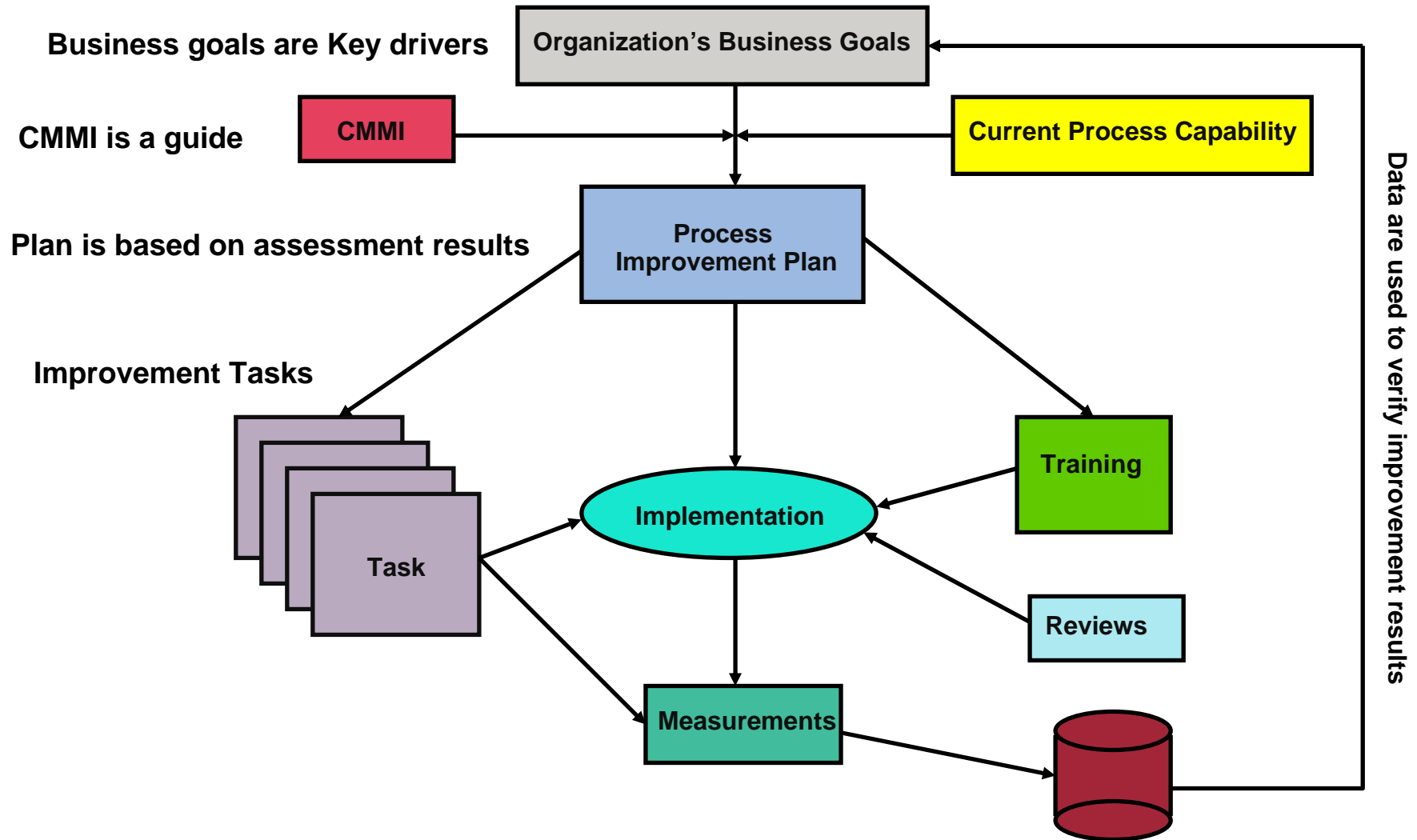John Vu 2005
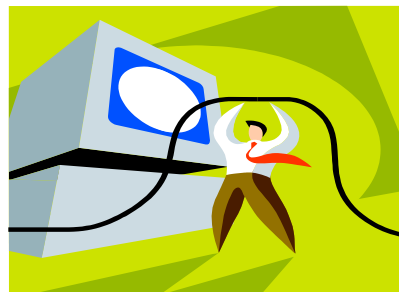
Better Information = Business Value

Information pipeline promotes efficiency by sharing information across the global enterprise, removing unnecessary communication and duplication of data.

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CMMI & Business Goals

Business goals are Key drivers

Organization's Business Goals

CMMI is a guide

CMMI

Current Process Capability

Plan is based on assessment results

Process Improvement Plan

Improvement Tasks

Task

Training

Implementation

Reviews

Measurements

Data are used to verify improvement results

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Institutionalization

For a process be considered fully institutionalized, it must be:

>	1) Defined
>	2) Documented
>	3) Used (Practiced)
>	4) Measured
>	5) Verified
>	6) Maintained (Training others to take over)
>	7) Continuously improved (Time 9-12 months)
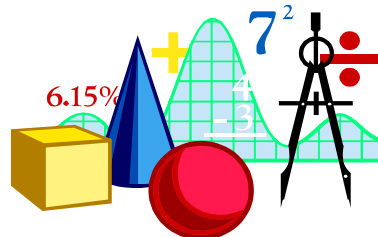
What To Look For in Process Improvement?

1. Can the organization demonstrate actual business *benefit* from process improvement ? (improvement trends or r*esults?)*

2. Which projects *follow* (or not) the standard processes?

3. Are these processes being *verified independently* that they are used and controlled at the project level?

4. Is the day-to-day *decision making* based on measurement data (where appropriate)?

5. How are business goals *prioritized* and intergroup *conflicts* resolved?

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Benefits Of Higher Maturity Levels (4 & 5)

- **Meet or exceed business goals 99%**
- **Capture 97% of defects before system tests**
- **98% of projects meet schedule estimates**
- **Systemic software reuse increases 64%**
- **Test time reduced 94%**
- **Productivity increases 70% over level 3**
- **Customer satisfaction increases 12% over level 3**
- **Employee satisfaction increases 20% over level 3**
- **Employee turnover = 3% compare with industry 12%**
- **Business revenue increases 45% over level 3**
- **Market share improved 18% over level 3**

Source: Software Industry Benchmarking Study - 2001

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Un-quantifiable Benefits:

- **Customers and developers working together as one team**

- **Greater cooperation between teams (different projects)**

- **Roles and responsibilities are clear and better defined**

- **Minimal impact when staff changes occur**

- **Employees appreciate this new way of working together**

- **Increased mentoring among senior & junior people**

- **Increased capacity to meet new challenges**
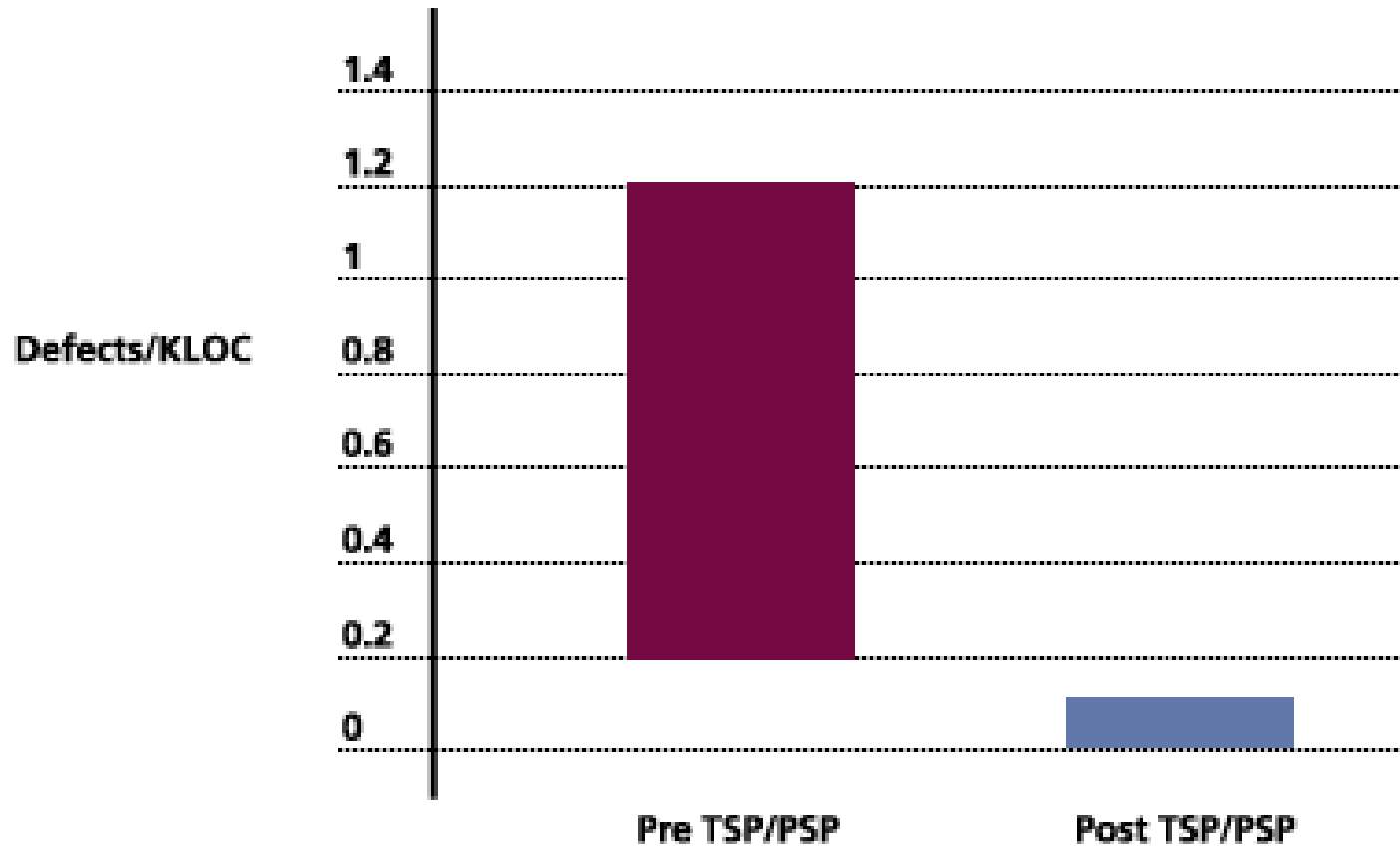
Source: Software Industry Benchmarking Study - 2001

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- **Personal Software Process (PSP) is a process-based approach for developing software where individual learn how to measure and analyze their own personal processes, use data to improve their performance, and apply it to other structured tasks.**

- **Team Software Process (TSP) is a process-based approach for team of PSP trained engineers to develop software-intensive systems where this self-directed team can plan and track their works, establish goals, and measure their processes and plans accordingly.**

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PSP/TSP Benefit: Post Released Defects

Post Release

Bar chart: Defects/KLOC (y-axis from 0 to 1.4). "Pre TSP/PSP" bar at approximately 1.2, "Post TSP/PSP" bar at approximately 0.1.

Source: SEI industry Study of PSP/TSP in 18 U.S companies - 2004

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System Test Duration

Source: SEI industry Study of PSP/TSP in 18 U.S companies - 2004

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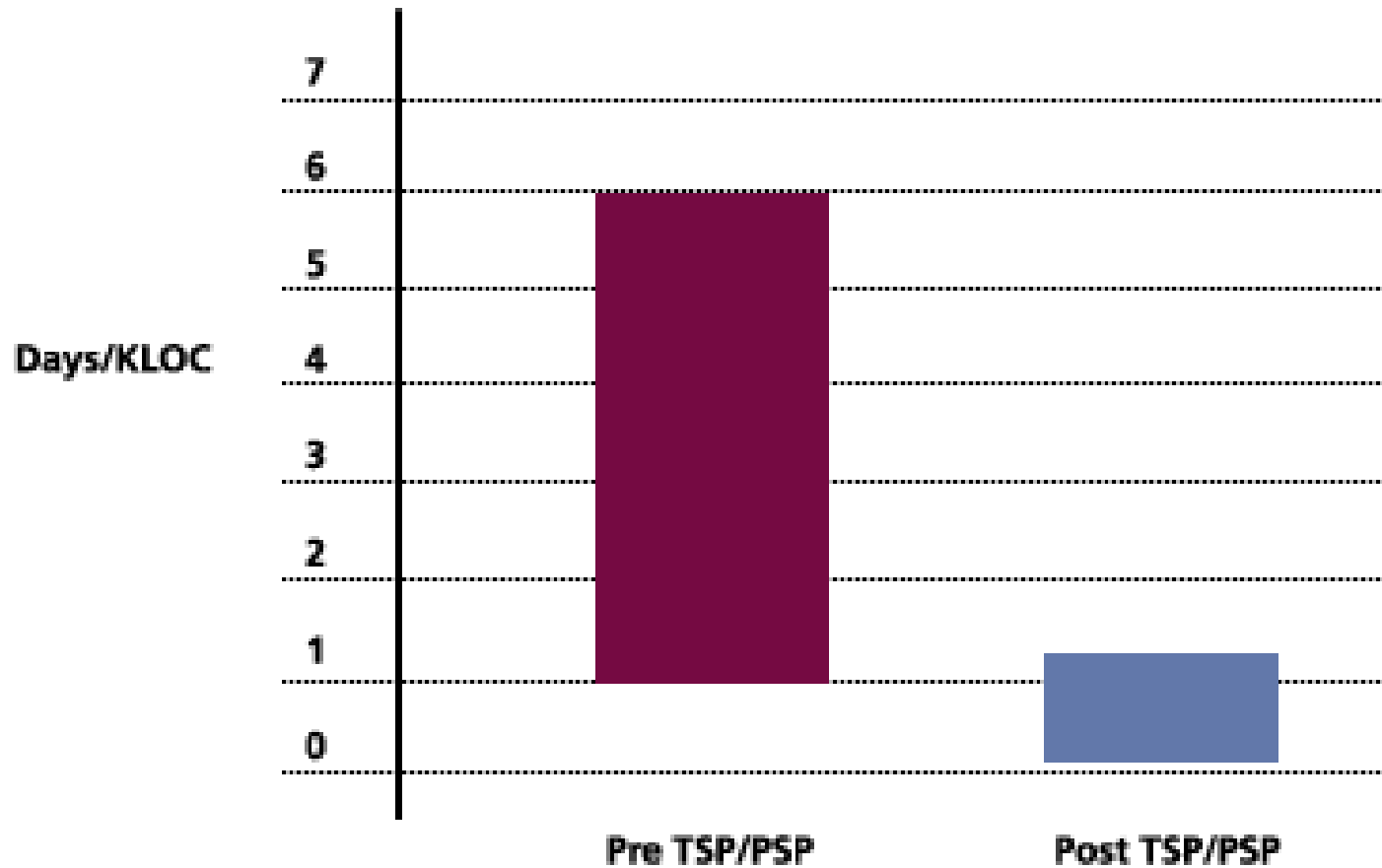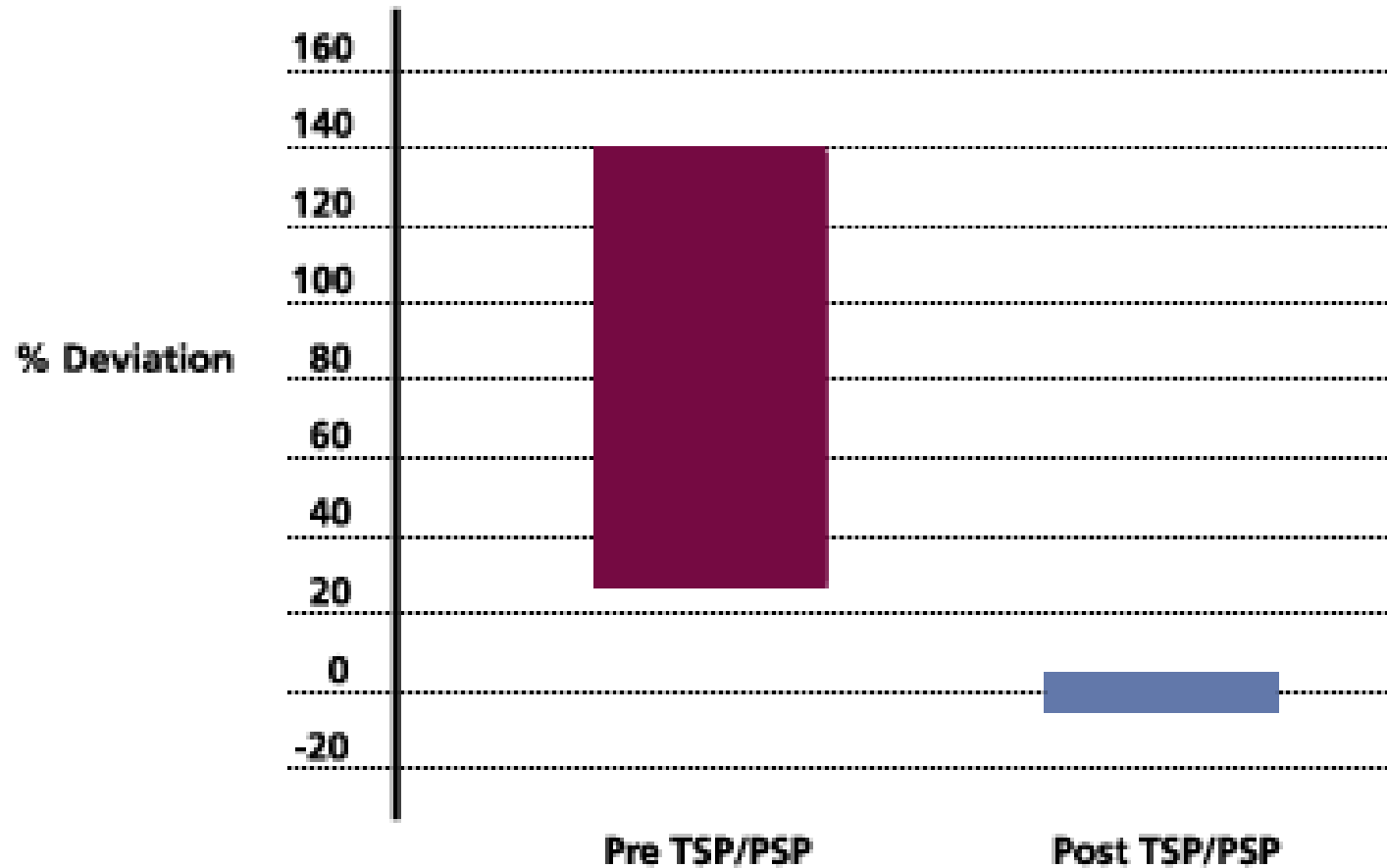
Acceptance Test

Source: SEI industry Study of PSP/TSP in 18 U.S companies - 2004

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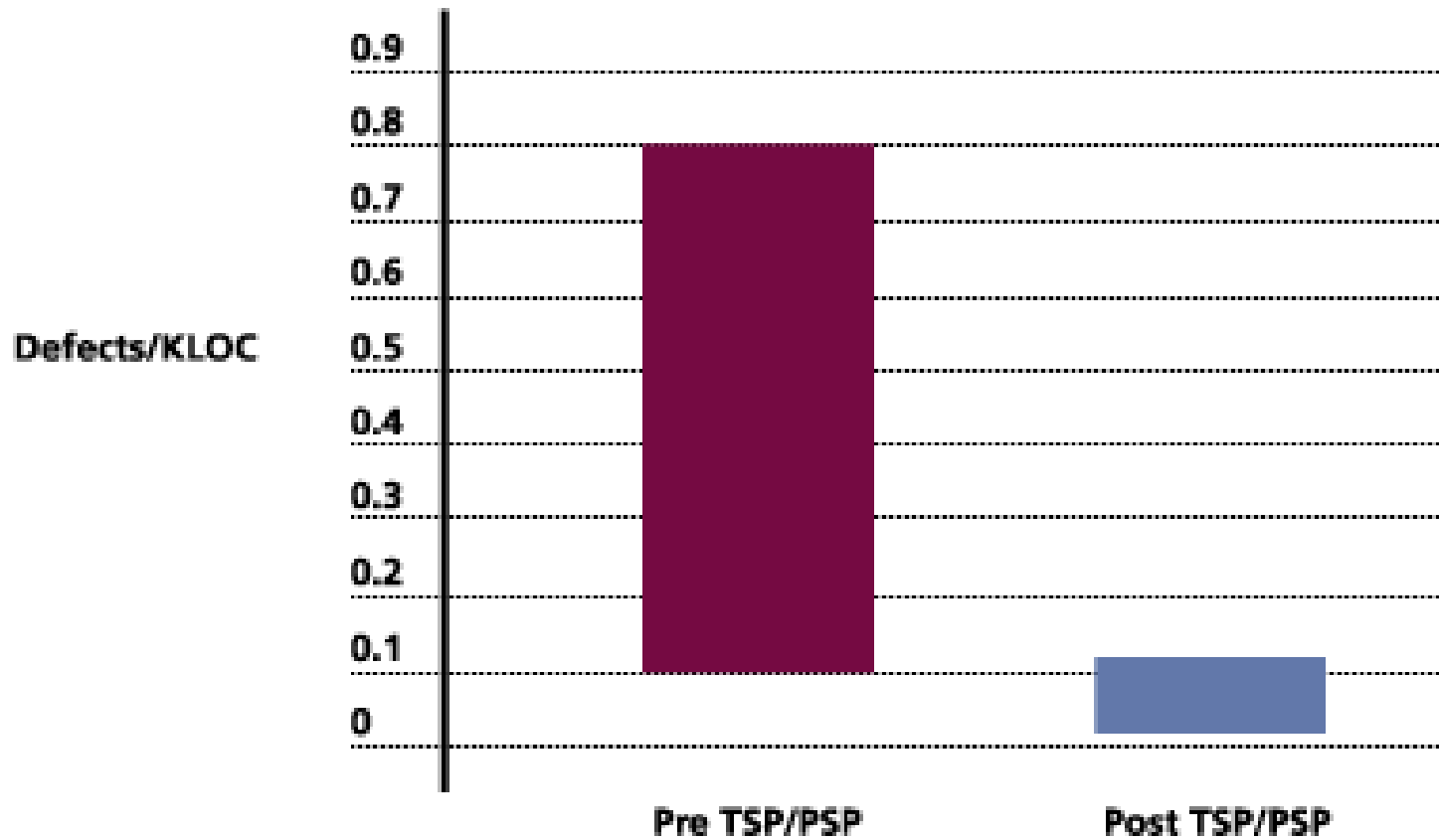
PSP/TSP Benefit: Schedule Performance

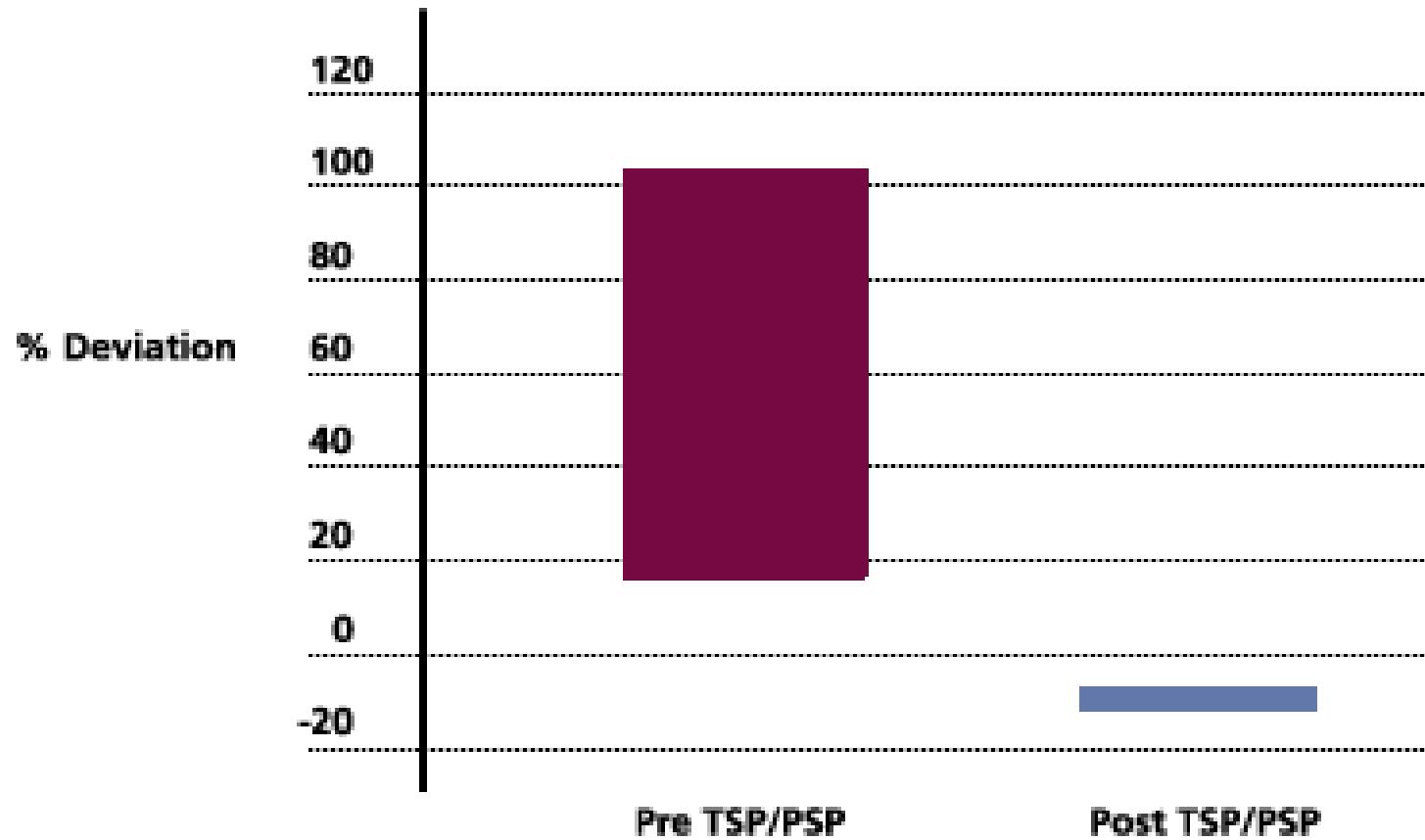Boeing Technology | Internal Services | **Information Technology**

Schedule Deviation

% Deviation — Pre TSP/PSP vs Post TSP/PSP

Source: SEI industry Study of PSP/TSP in 18 U.S companies - 2004

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PSP/TSP Benefit: Effort Deviation

Effort Deviation

Source: SEI industry Study of PSP/TSP in 18 U.S companies - 2004

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PSP/TSP Benefits

Software Size

2.36X more Sloc count

# of Defect Detected

75% lower Defect

Release # 6   Release # 7   Release # 8   Release # 9

PSP/TSP trained

Source: SEI industry Study of PSP/TSP in 18 U.S companies - 2004

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PSP/TSP Benefits

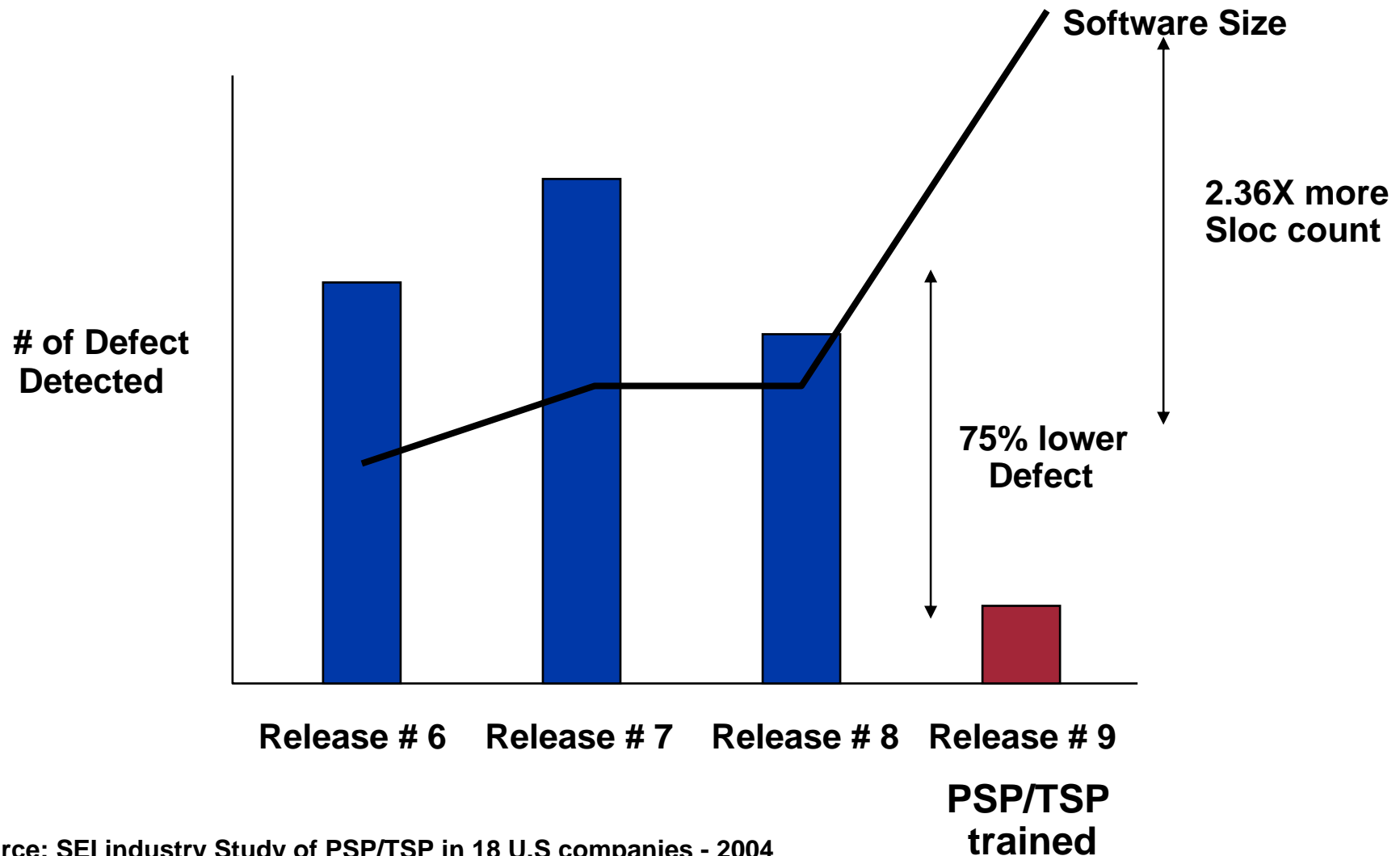Boeing Technology | Internal Services | **Information Technology**
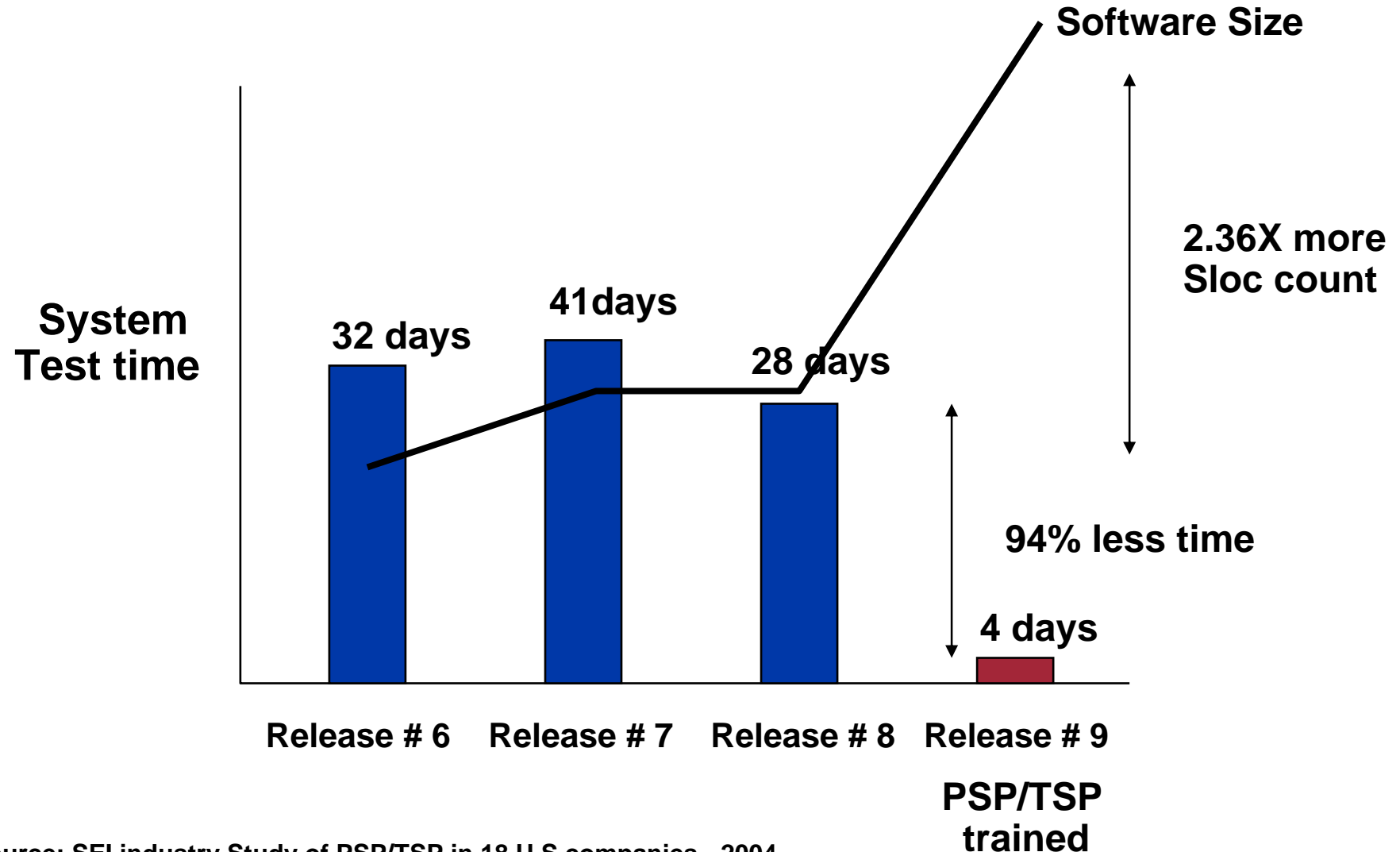
Software Size

2.36X more
Sloc count

System
Test time

32 days

41days

28 days

94% less time

4 days

Release # 6   Release # 7   Release # 8   Release # 9

PSP/TSP
trained

Source: SEI industry Study of PSP/TSP in 18 U.S companies - 2004

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The People Capability Maturity Model (P-CMM)

- **The People Capability Maturity Model (P-CMM) is a framework focusing on managing and developing an organization's work force.**

- **The goal of the P-CMM is to radically improve the capability of organizations to attract, develop, motivate, organize, and retain the talent needed to continuously improve the business.**

- **The P-CMM is designed to allow organizations to integrate work-force improvements with other process improvement programs guided by the CMM.**

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People = Assets of the Enterprise in 21st Century

- **Information Technology is the key factor for business success in the 21st century**
- **Knowledge and skills replace other tangible assets of company as the most important assets**
- **Successful companies always rely on their workforce's knowledge & skills**
- **Workforce planning is the key strategy in transforming the business to meet global changes**
- **Skill inventory is critical to identifying gaps and risks for company transition**
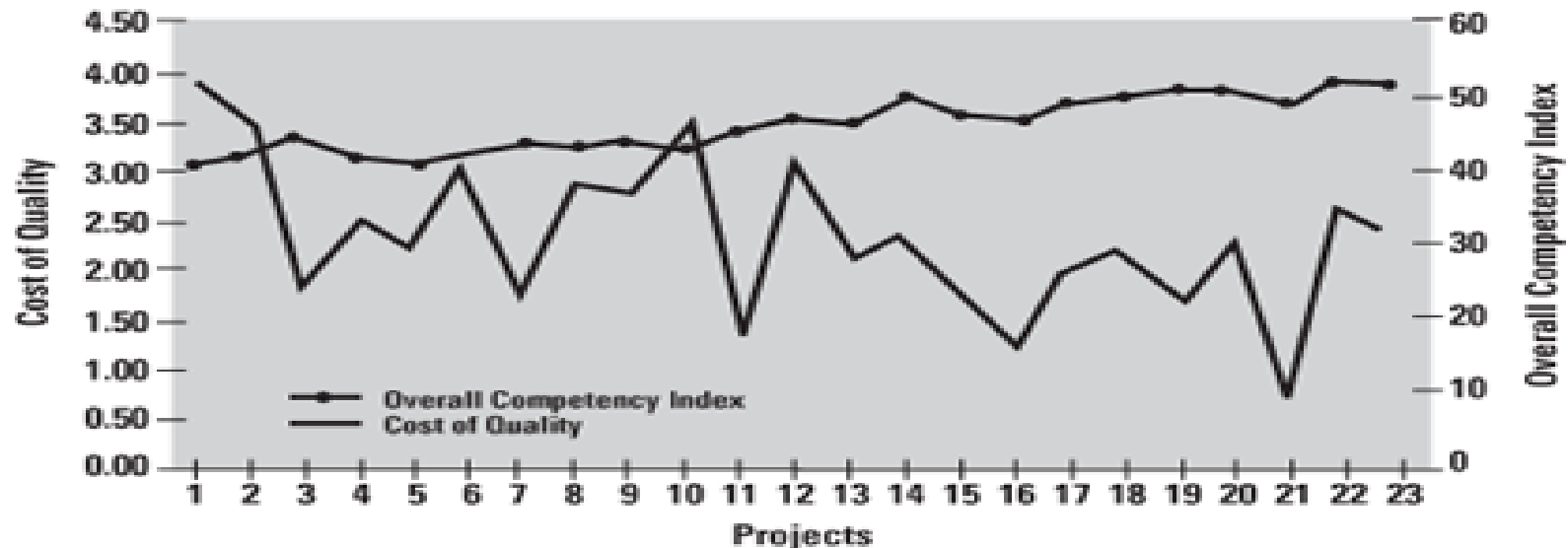- **Managing people and improve employees' satisfaction are essential for business success**

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P-CMM Benefits

Employee Turnover

Company	Before P-CMM	After P-CMM
Boeing BCS	7% (1998)	5% (1999)
Novo Nordisk	12% (1996)	8% (2000)
GDE Systems	7.8% (1996)	7.1% (1998)

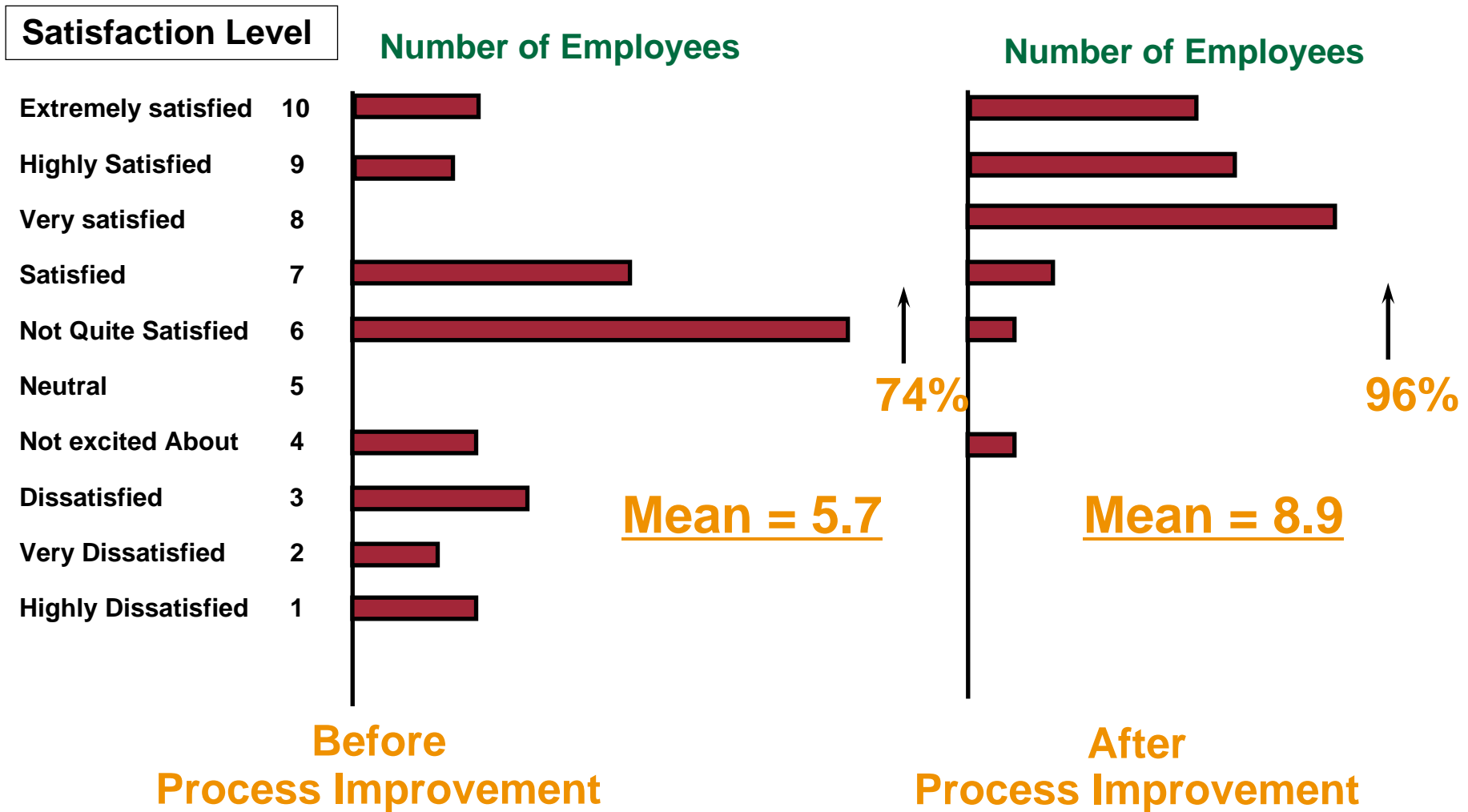### Correlation of competencies with cost and quality at Infosys

Source: SEI industry Study of P-CMM - 2004

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Employee Satisfaction

Satisfaction Level		
Extremely satisfied	10	
Highly Satisfied	9	
Very satisfied	8	
Satisfied	7	
Not Quite Satisfied	6	
Neutral	5	
Not excited About	4	
Dissatisfied	3	
Very Dissatisfied	2	
Highly Dissatisfied	1	

Number of Employees

Number of Employees

74%

96%

Mean = 5.7

Mean = 8.9

Before
Process Improvement

After
Process Improvement

Source: SEI industry Study of P-CMM - 2004

Page 25

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Has Your Organization Experienced:

- **Business Value Increased?**
- **Project Performance Improved?**
- **Quality Improved?**
- **Cost Decreased?**
- **Customers' Satisfaction Increased?**
- **Employees' Satisfaction increased?**

If NOT – Why?

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Is Your Organization Investing In Process Improvement For The Wrong Reason?

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Improving Process Is Creating Value In The New Market

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