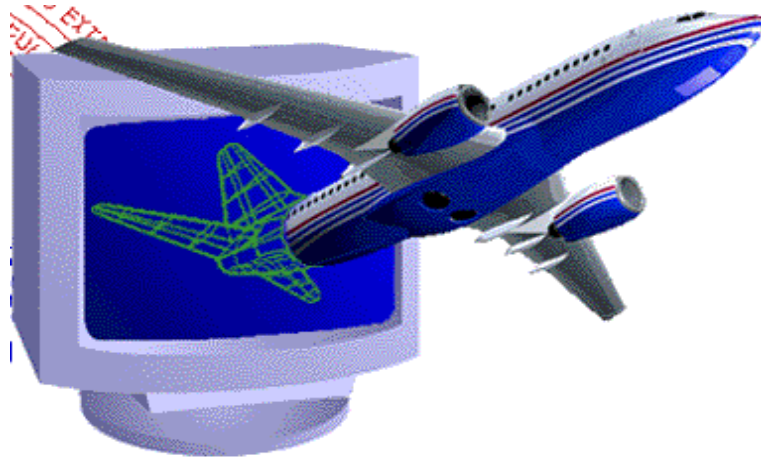


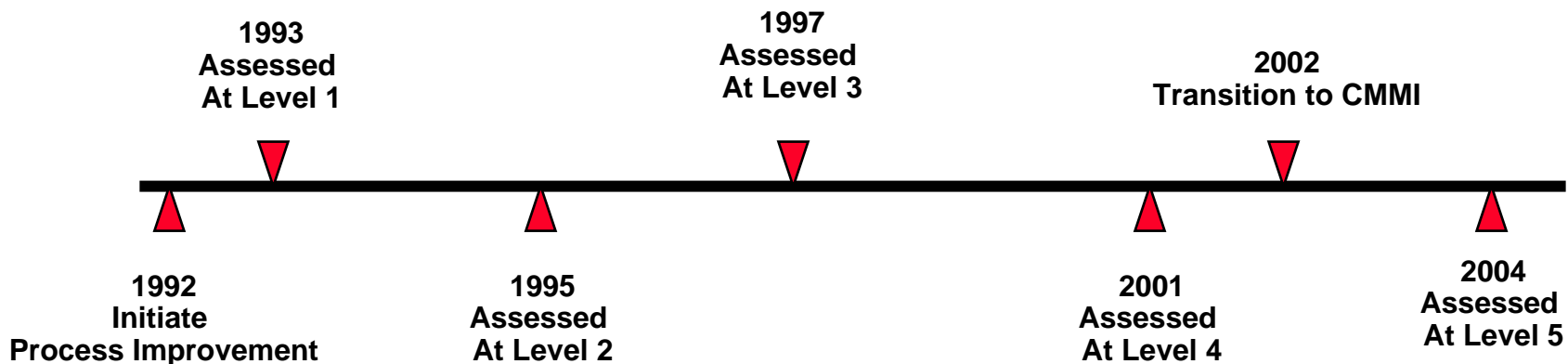
The Process Improvement Journey Of Boeing Information Services, Wichita



John Vu
Technical Fellow
The Boeing Company

Boeing Information Services in Wichita

- Provide software to support Wichita division.
- Focus on software design, architecture, application development & maintenance, COTs integration, technology evaluation, selection, and transfer.
- Support all Boeing commercial aircraft and some military airplanes (KC135, KC 10, B52, E-3 AWACS etc.)



Why Boeing Information Services, Wichita?

Boeing Wichita is

- **Part of a company-wide improvement.**
- **One of 72 organizations identified in an improvement strategy plan.**
- **Pilot site for SW-CMM validation study (1991-1994)**
- **Unique since it was not re-organized during merger.**
 - Management commitment is at all levels
 - Data collection is not disrupted
 - SEPG members rotational process is still active
- **Leading software activities in Boeing**
 - Major contribution to DCAC/MRM program
 - Key contribution to 3D Graphic design of airplane (CATIA)
 - Pilot site for several new technologies
- **Activities & Lessons Learned are shared among organizations**
 - Templates & Techniques are being used by many organizations
- **First IS organization in Boeing to achieve SW-CMM level 4 in 2001**

Process Improvement Results

10 year study on process improvement

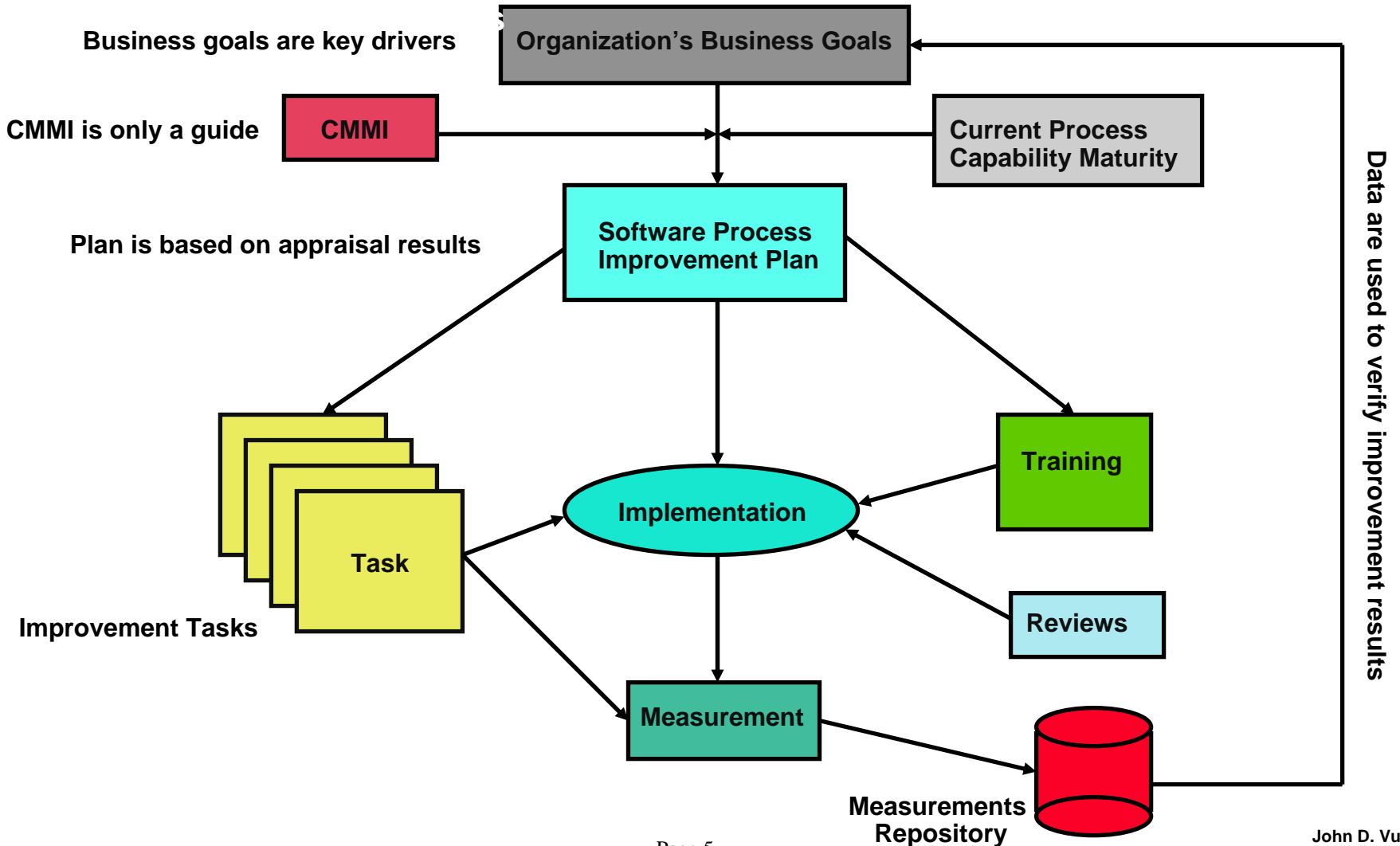
120 projects in Boeing Information Services in Wichita participated in the validation study of the SW-CMM between 1991-1994

Measurement baseline established in 1991 and re-established in 1996

Pilot site for CMMI Transition

Data collected and analyzed independently by Dr. Kay Nelson of University of Kansas

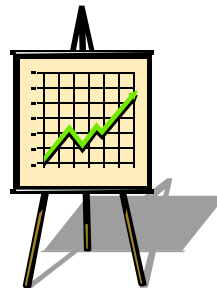
Process Improvement Context



Measurements Are Key To Success

Core Measurements:

- **Defects: Post & Pre-released**
- **Estimates: Plan vs. Actual (Schedules, Efforts, Costs)**
- **Cycle Time: Time to complete an activity**
- **Customer Satisfaction: Monthly Survey**
- **Employee Satisfaction: Bi-Annual survey**
- **Number of management decisions based on metrics**

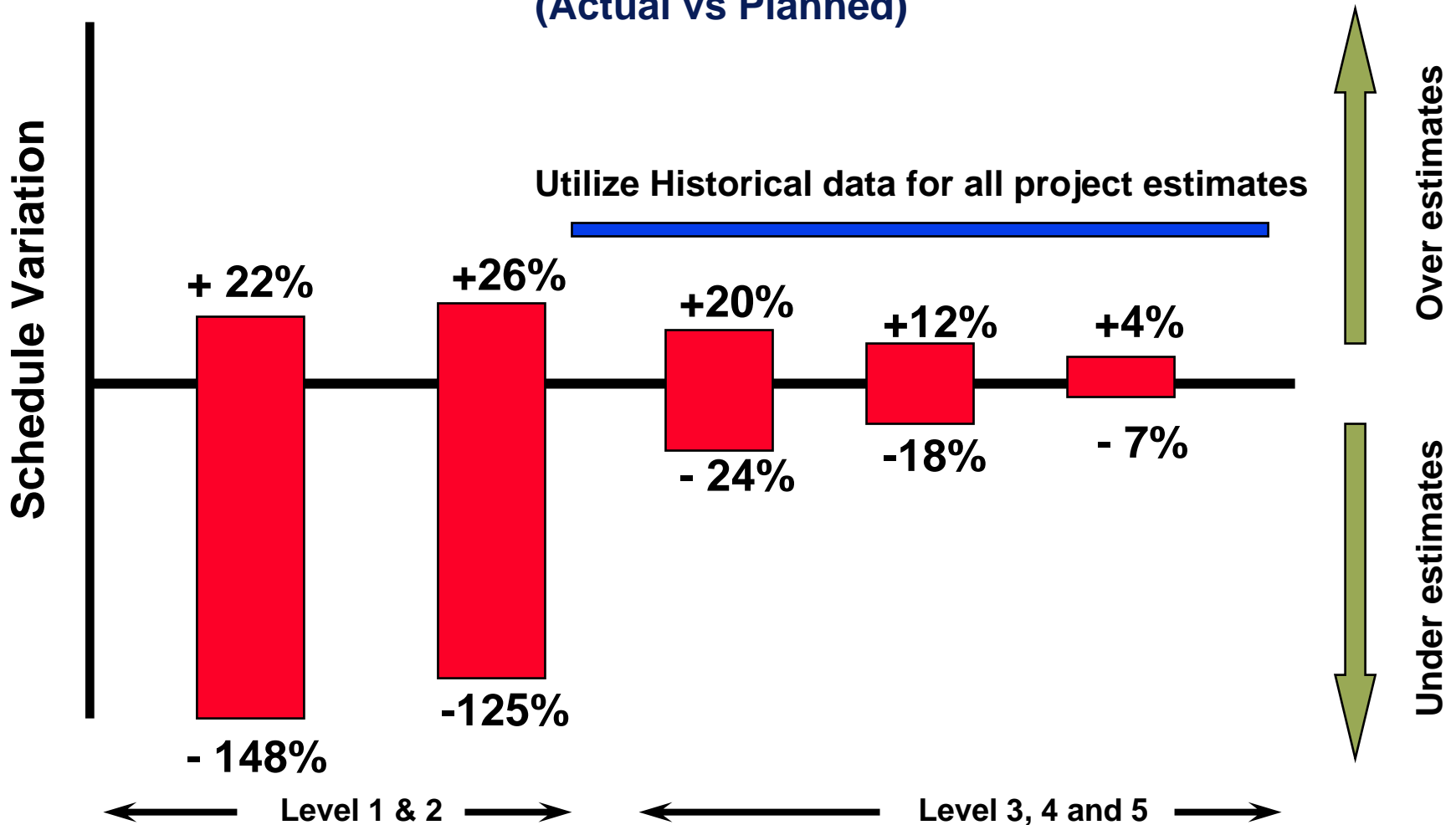


It All Started With Project Estimates

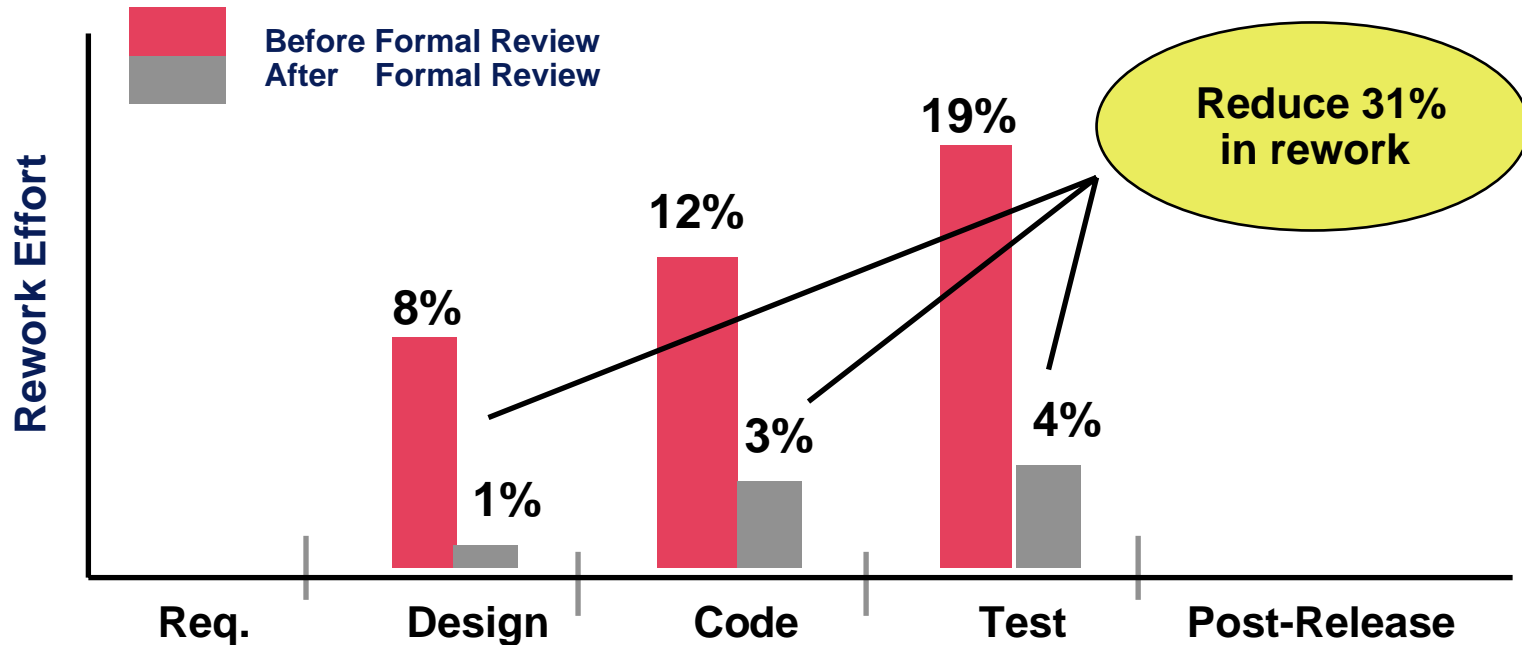
- **The utilization of historical data will improve project performance by reducing the variation in estimates**
- **Better estimates will improve project schedules**
- **Better schedules will improve project management**
- **Better project management will improve project quality and reduce costs**
- **Better project quality and reduced costs will improve customer satisfaction**
- **Satisfied customers will improve relationships**
- **Better relationships will improve the business**

Software Estimates

(Actual vs Planned)



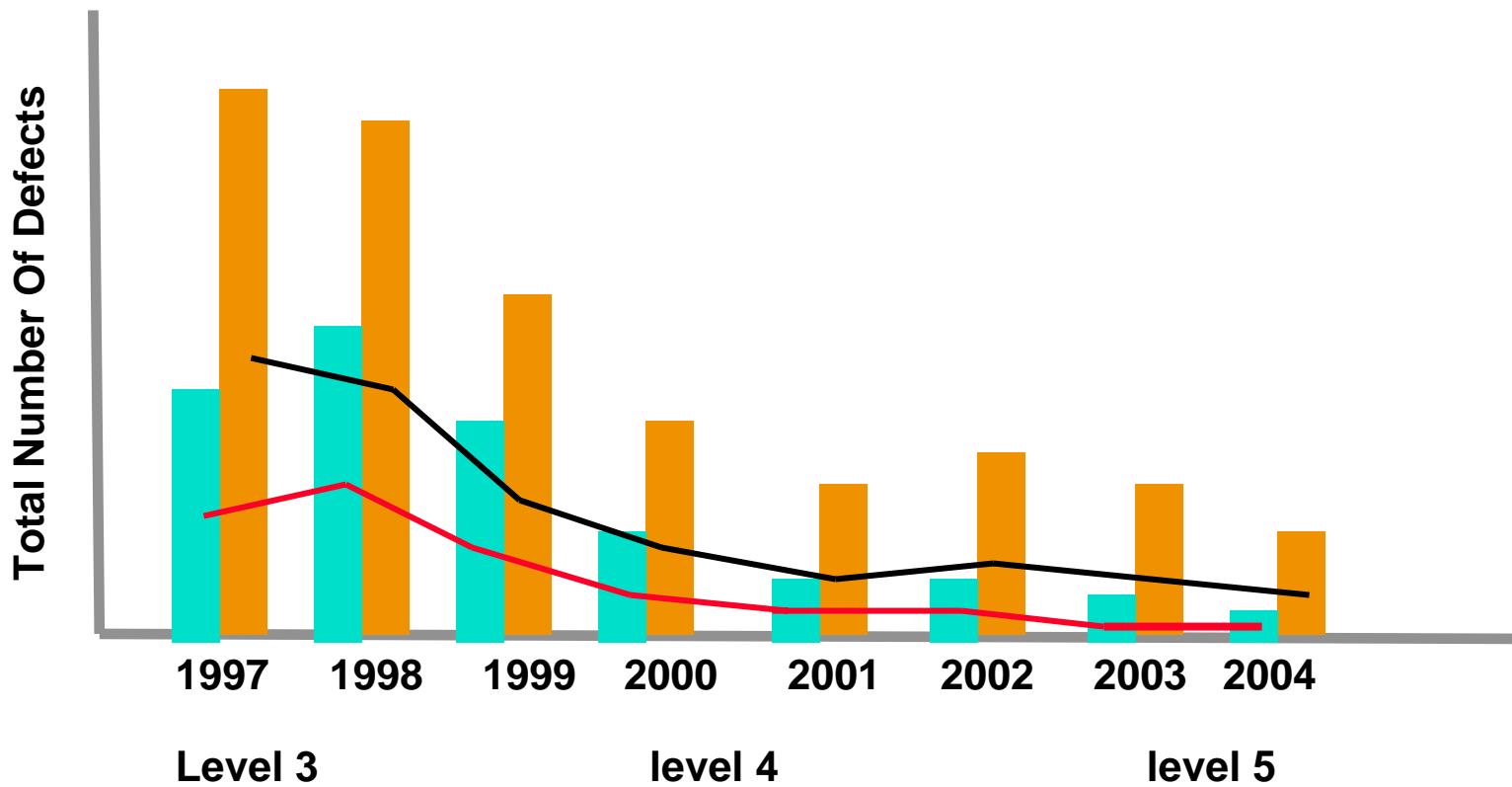
Establish Formal Gate Reviews



Implementing Formal Review increased Design effort by 4%
decreased Rework effort by 31%

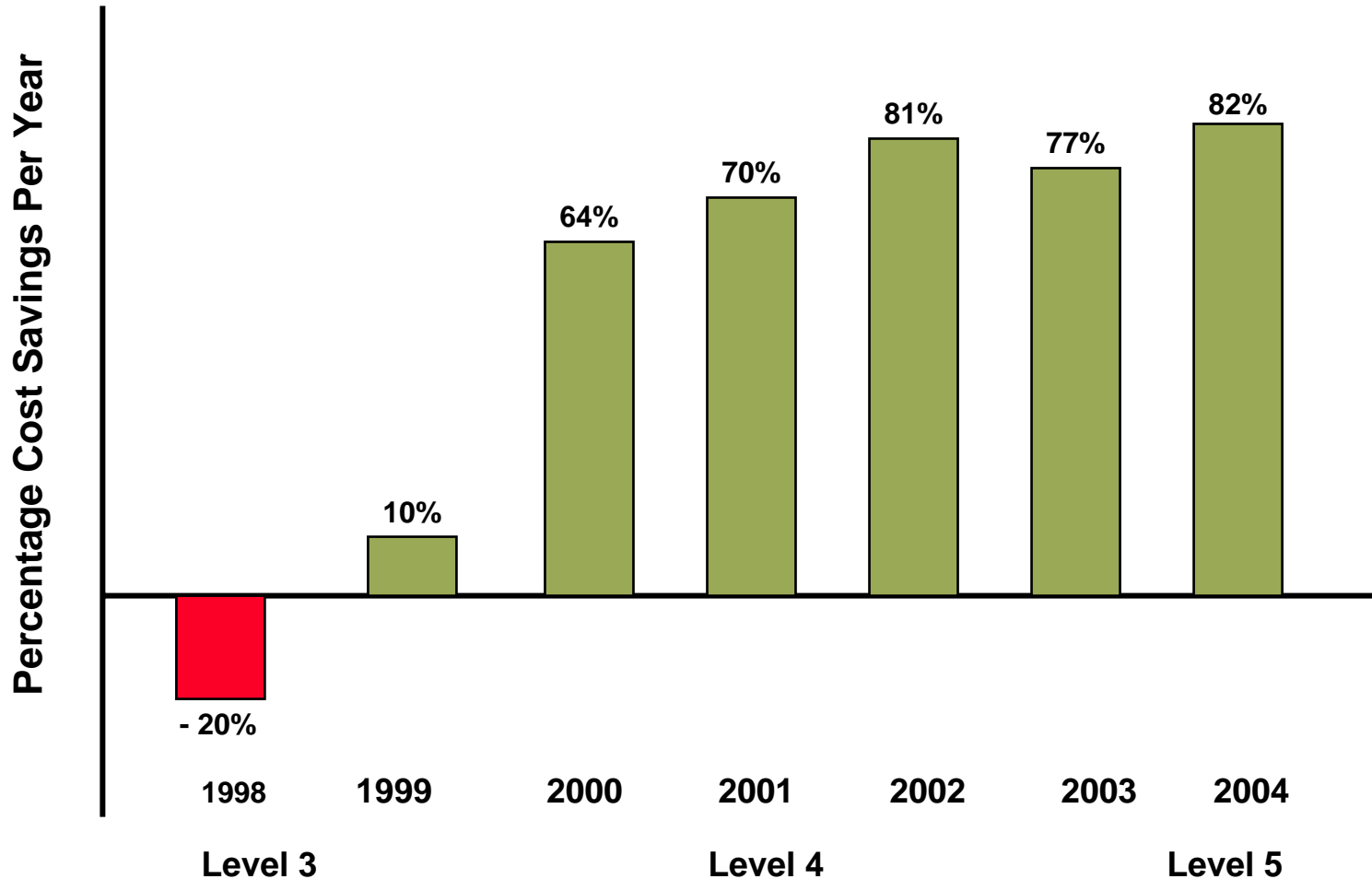
Cost: Benefit ratio is 4% : 31% or 1 : 7.75

Total Number Of Defects Per Year

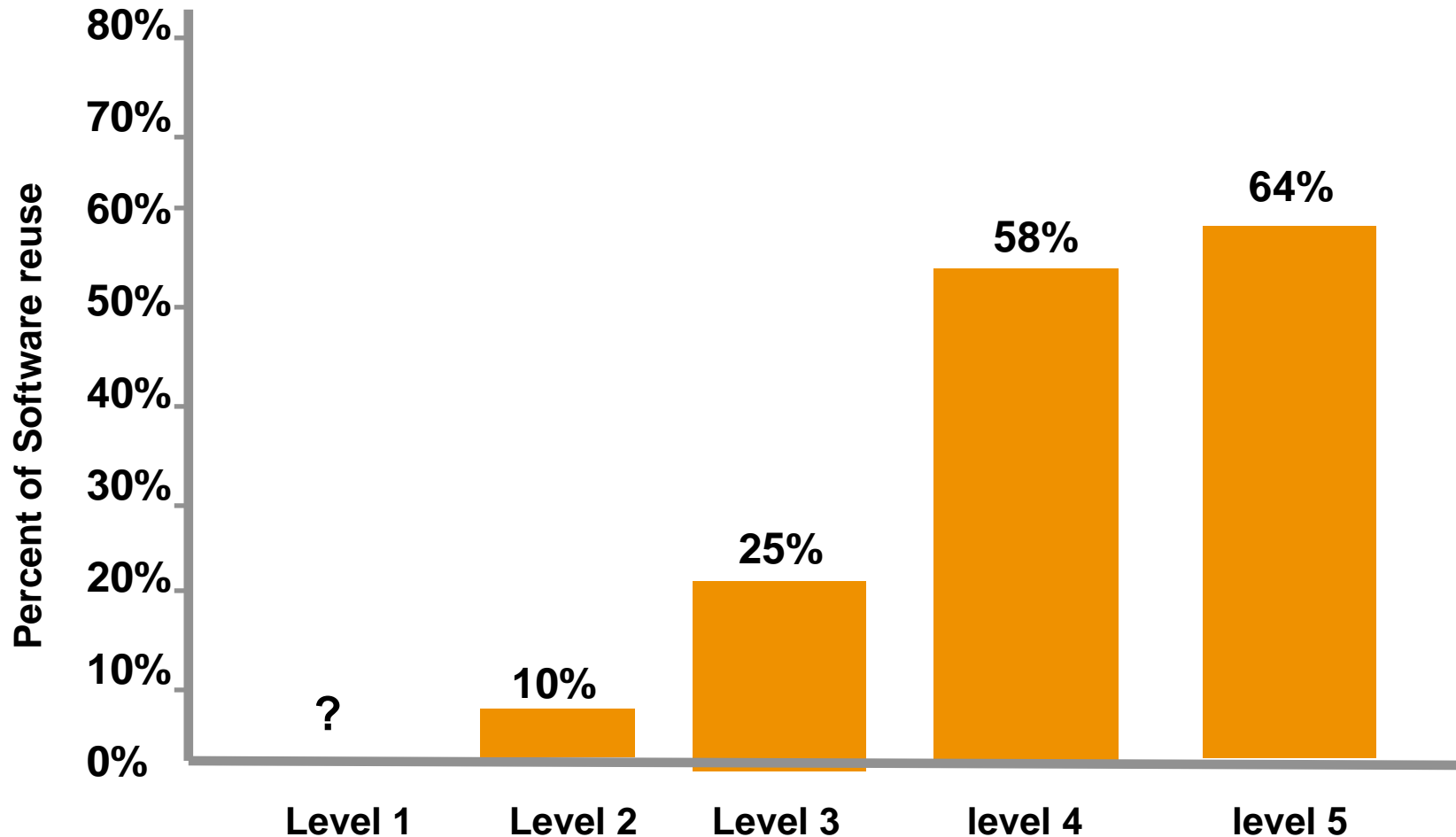


■ : Total Pre-released defects
■ : Total Post-released defects

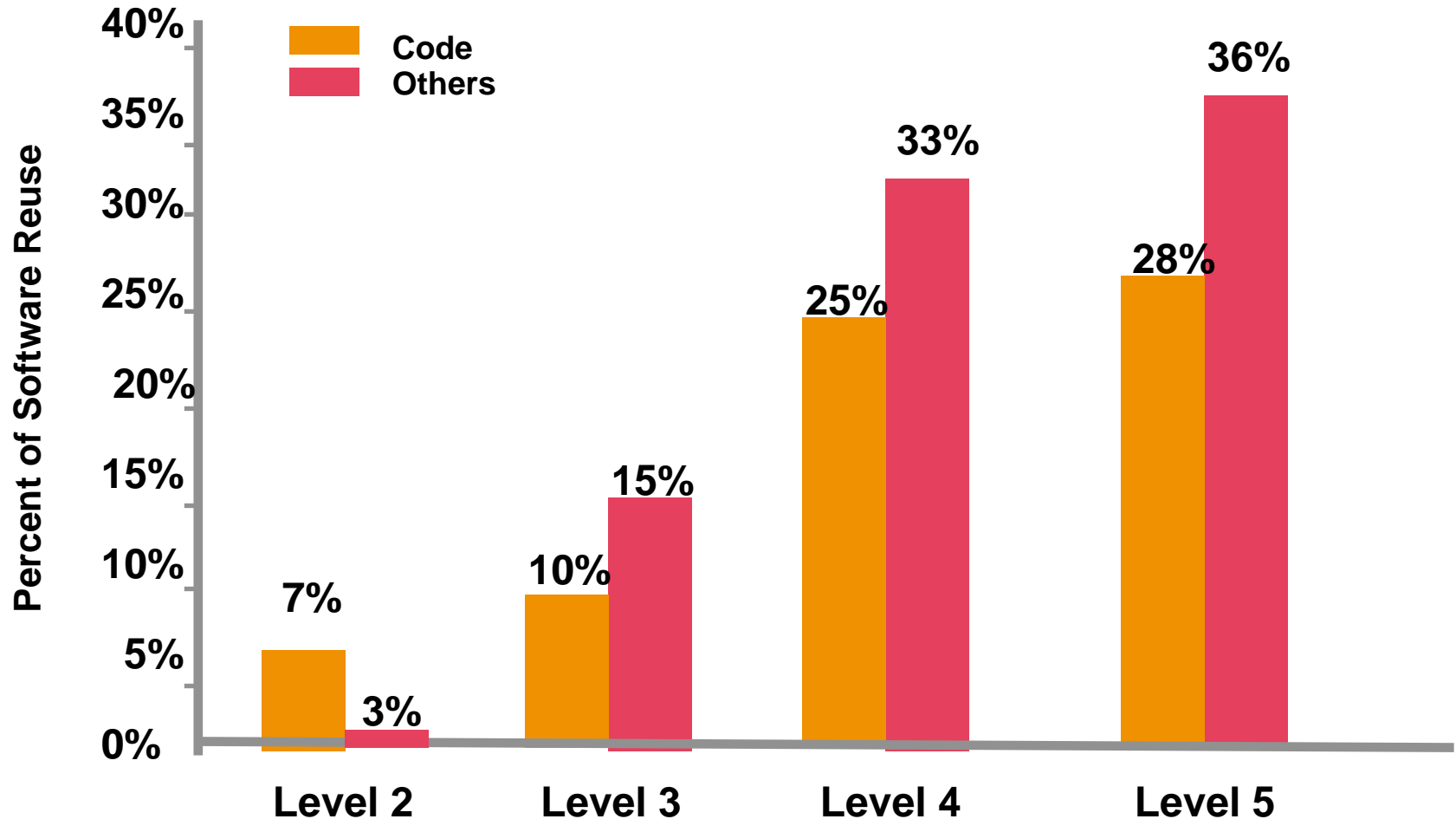
Defect Prevention Cost Savings



Increased Software Reuse = Reduced Costs

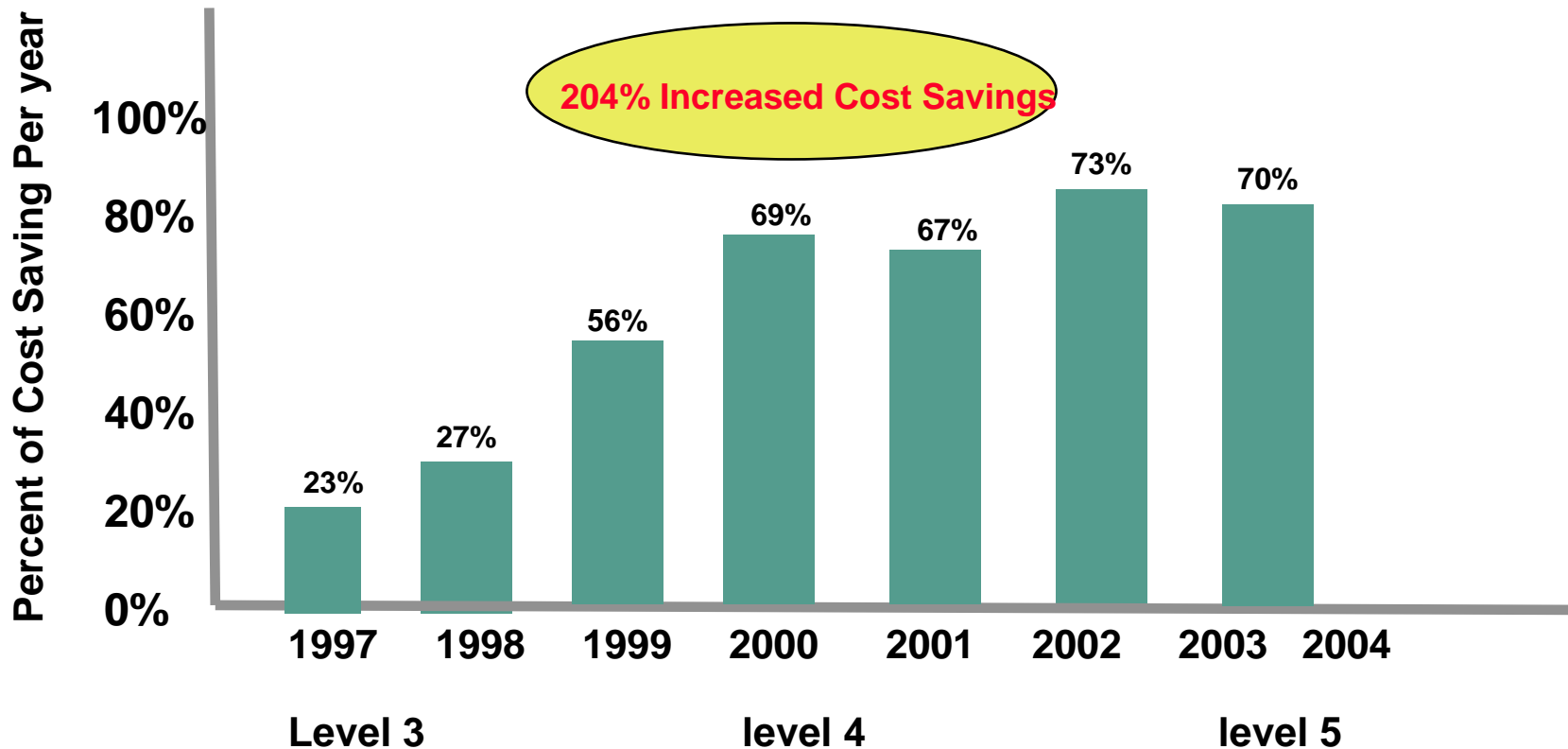


Increased Software Reuse = Reduced Costs



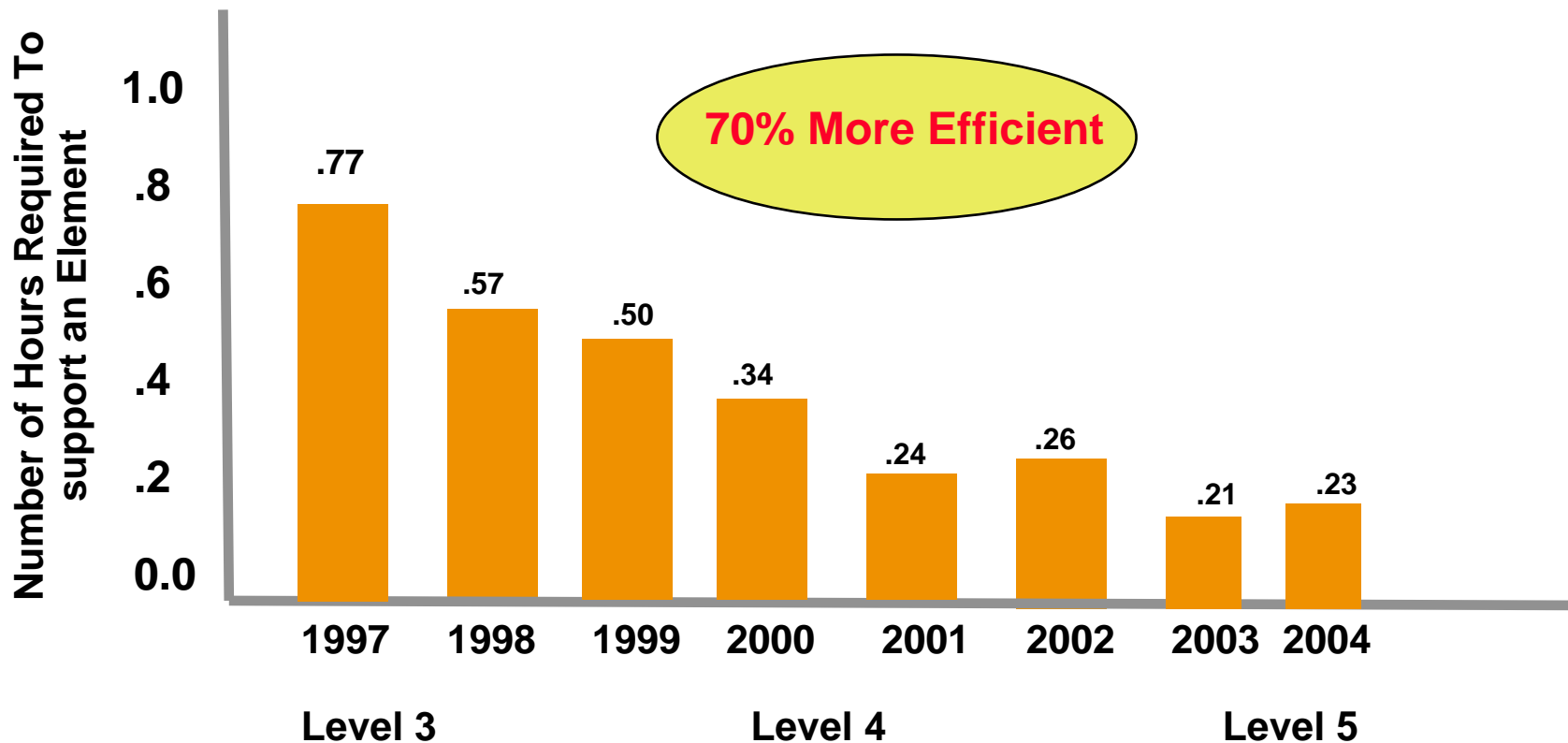
Code reuse: No modification
Other reuse: Templates, Test cases etc.

Software Maintenance Cost Savings



 : Average percentage of cost savings based on 1997 baseline

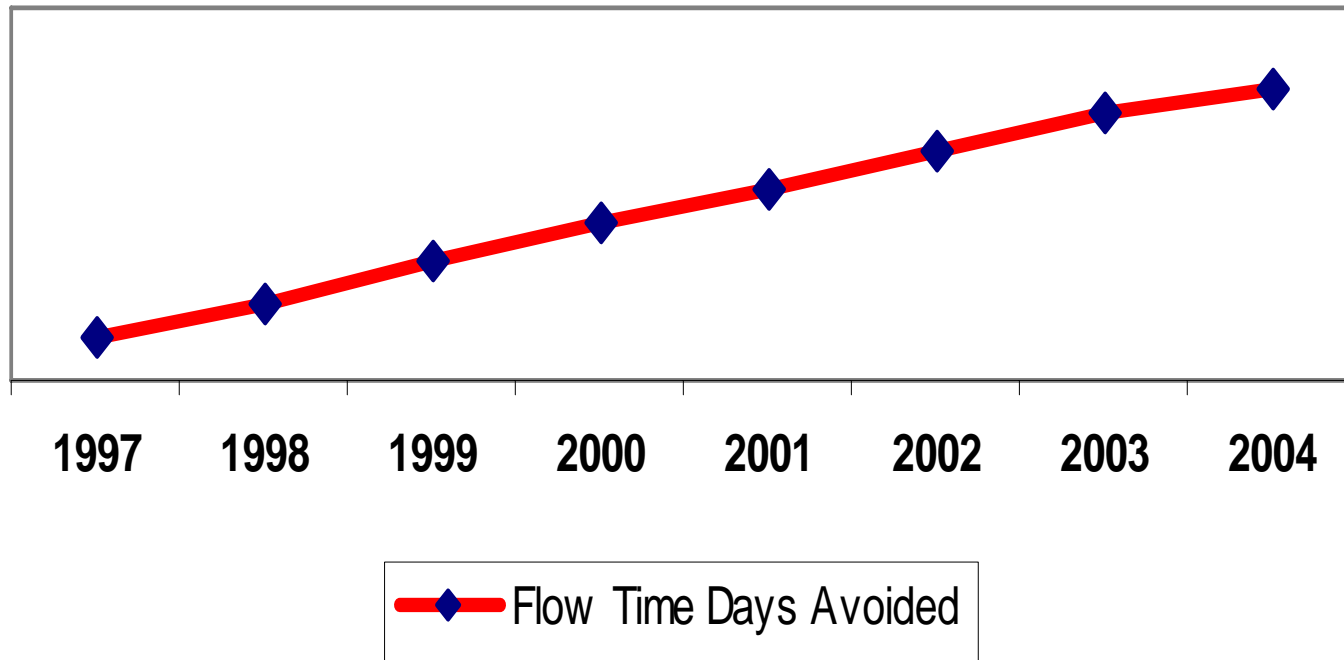
Cycle Time = Supported Hours Per Element



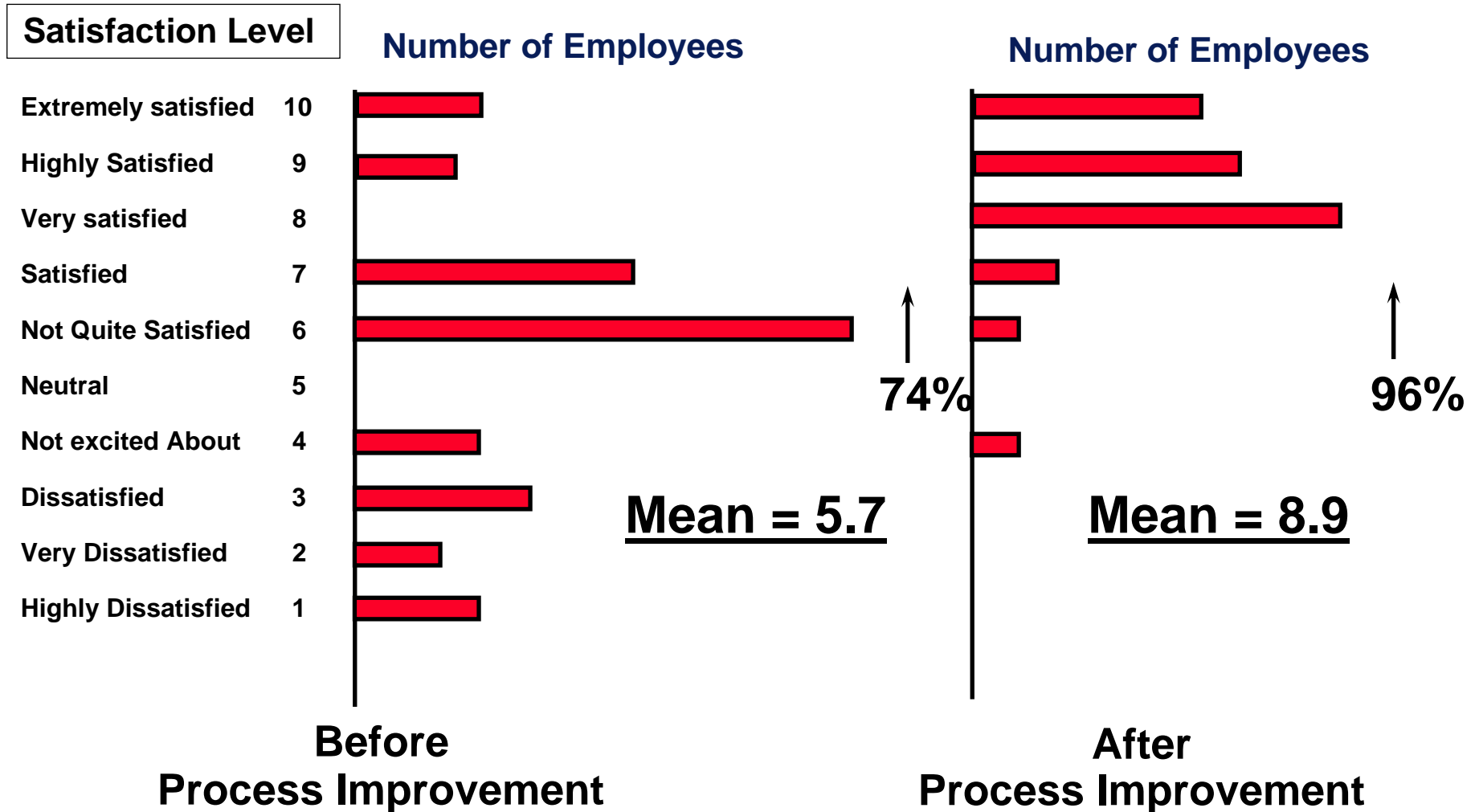
 : Average number of hour required to supported an Elements in maintenance

Element = Configuration Item

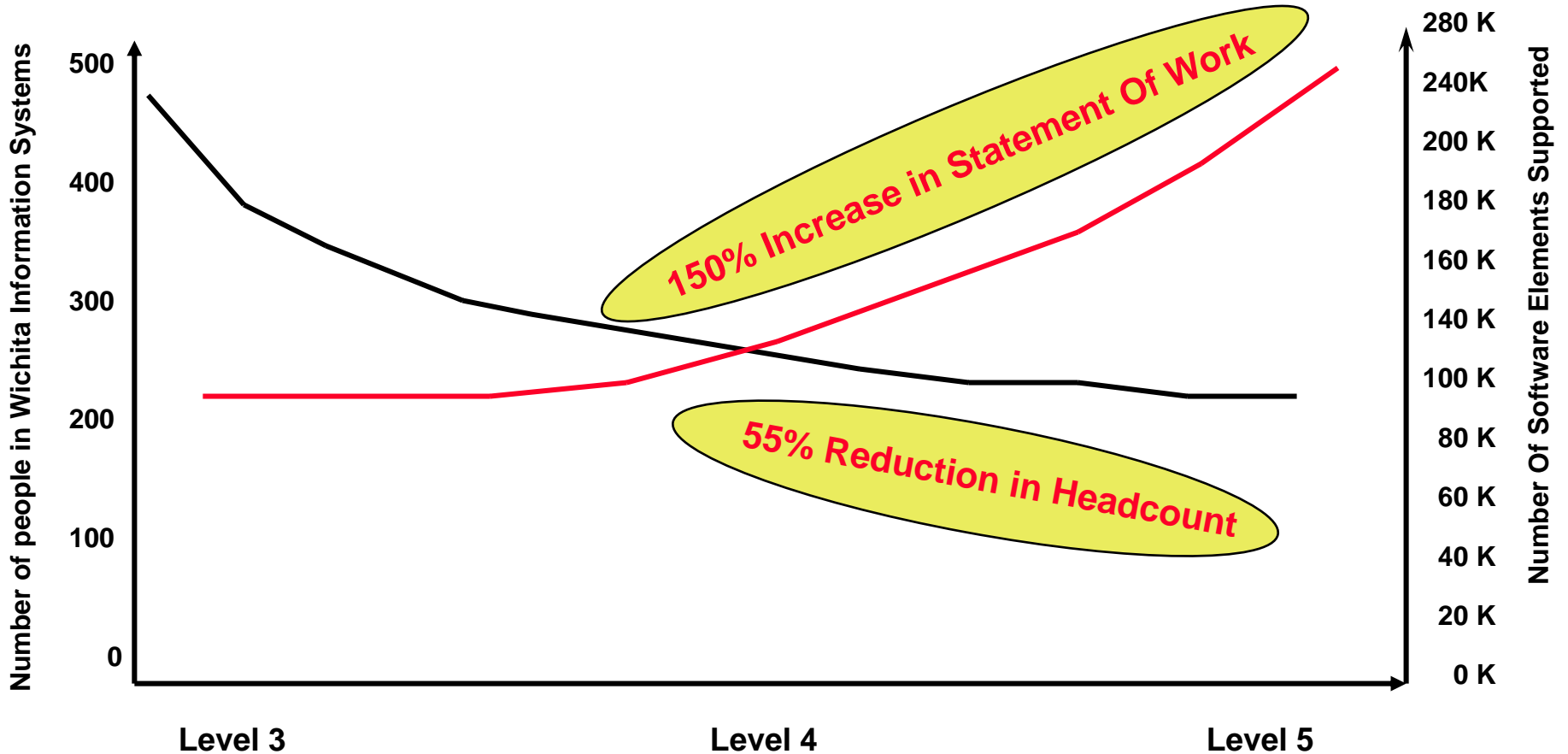
Flow Time Days Avoided (1996 Baseline)



Employee Satisfaction



Productivity = Less People - More Works



Return On Investment

There is no perfect formula to calculate Return On Investment for Process Improvement. Different organizations use different methods. Our 10 year study indicated a significant return on investment when maturing from a Level 1 to Level 5 as calculated by the following formula:

$$\text{ROI} = 2740\%$$

$$\text{Return On Investment} = \frac{\text{Benefit realization} - \text{Cost of Process improvement}}{\text{Cost of Process Improvement}} \times 100\%$$

Where:

Benefits Realization = Labor cost savings

Cost of Process Improvement = Cost of SEPG (Labor + SPI Tools + Training)

Benefit Cost Ratio

Our Benefit Cost Ratio is a measure of how much money is gained from following the CMMI improvement framework.

Our 10 year study indicated a significant benefit cost ratio when maturing from Level 1 to Level 5.

Benefit Cost Ratio = 28.5

$$\text{Benefit Cost Ratio} = \frac{\text{Benefit Realization}}{\text{Cost of Process Improvement}}$$

Where:

Benefits Realization = Labor cost savings

Cost of Process Improvement = Cost of SEPG (Labor + SPI Tools + Training)

CMMI Transition

We found

- **No evidence of difficulty transitioning from SW-CMM to CMMI**
- **CMMI makes engineering work more visible to management**
- **The notion that CMMI Level 3 has many processes and is difficult to implement is not true**
- **Transition from CBA/IPI to SCAMPI is an improvement**
- **Investment in process improvement can be (and should be) explained in business terms**

Process Improvement works

Capability Maturity Models

Based on our 10 year study, we concluded that:

There is a systematic approach to improving an organization's software and systems, and achieving business goals and objectives

There are stages of process maturity in which an organization can significantly improve its products and services by following a recommended sequence

By following an evolutionary path of a well defined model the organization can continuously improve its products and services, and at the same time meet or exceed its business goals and objectives