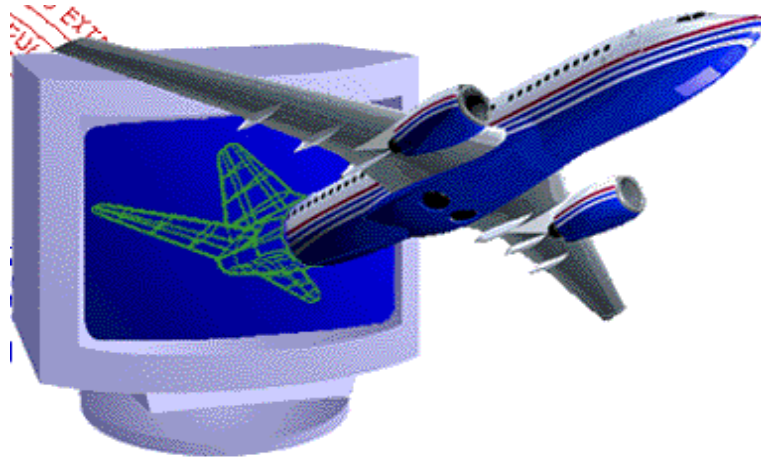


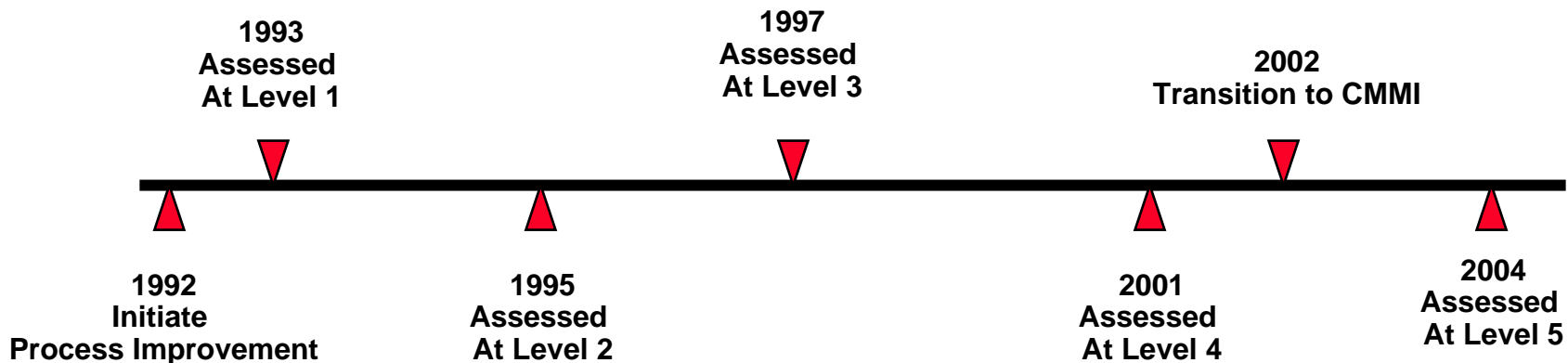
# The Process Improvement Journey Of Boeing Information Services, Wichita



**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**

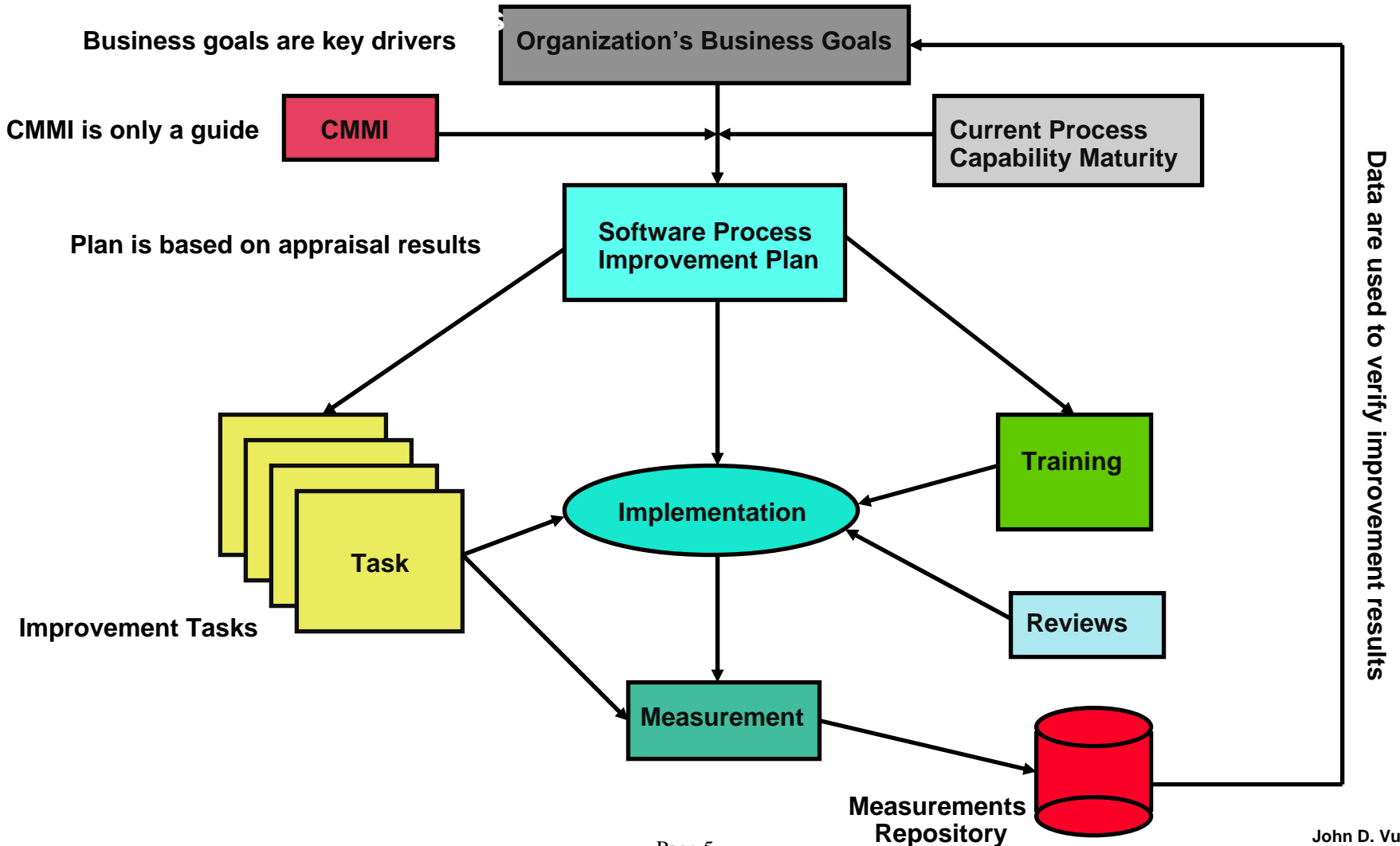
**120 projects in Boeing Information Services in Wichita participated in the validation study of the SW-CMM between 1991-1994**

**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**

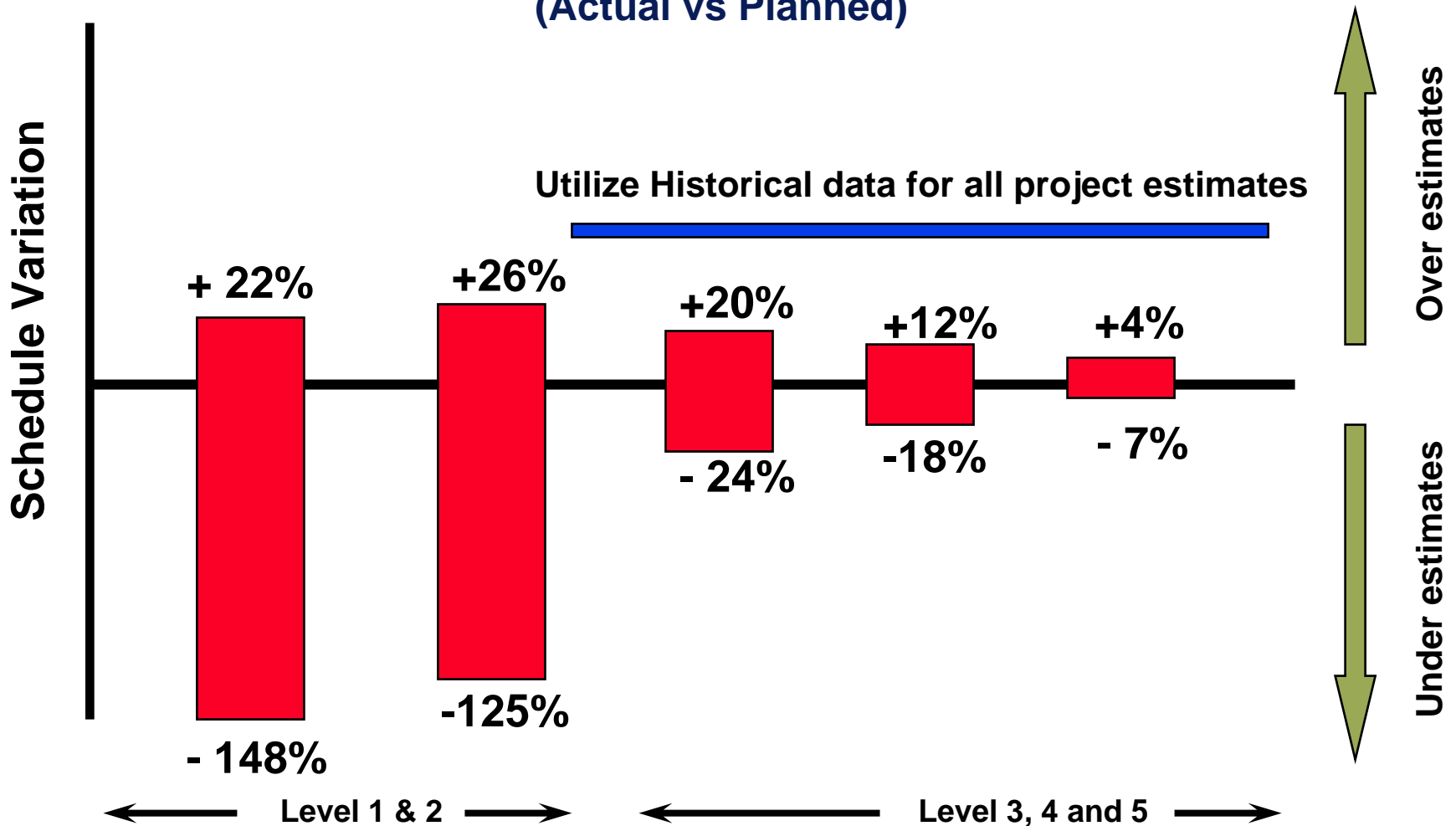


## **It All Started With Project Estimates**

- **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**

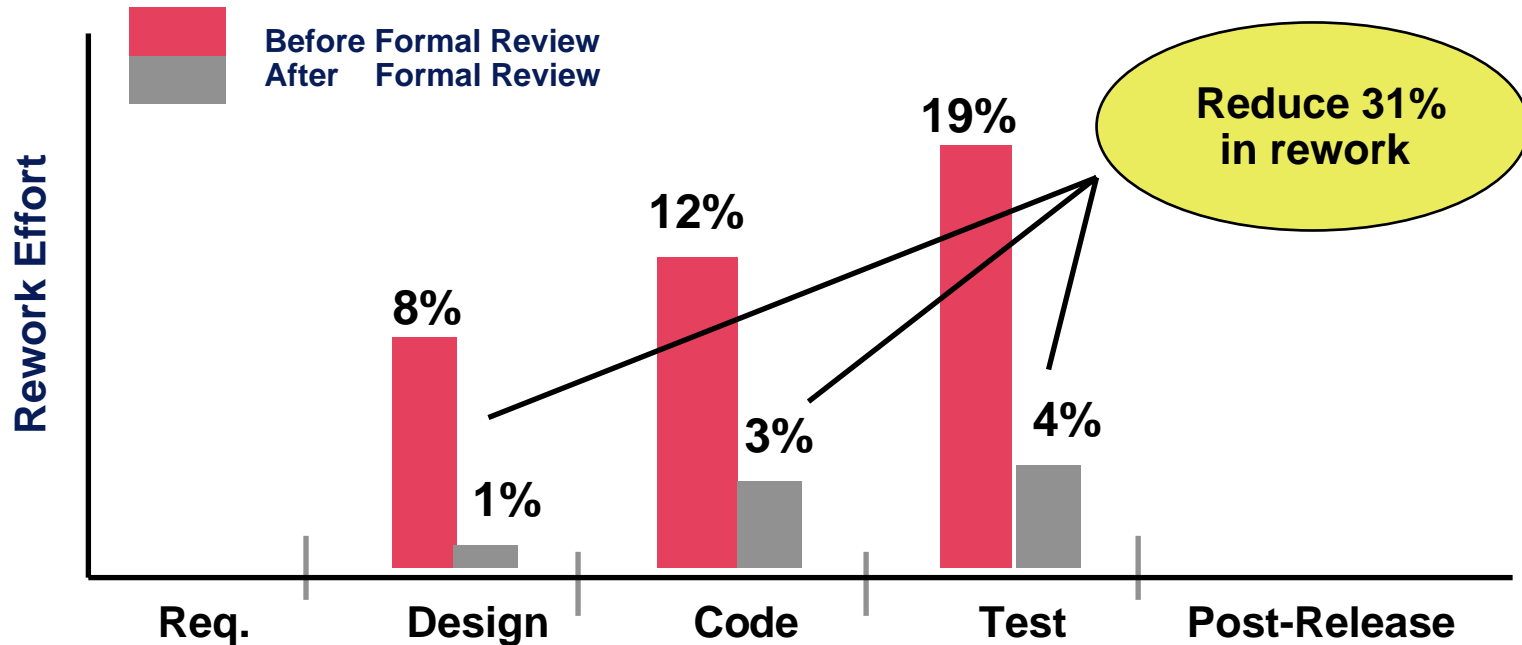
# Software Estimates

(Actual vs Planned)





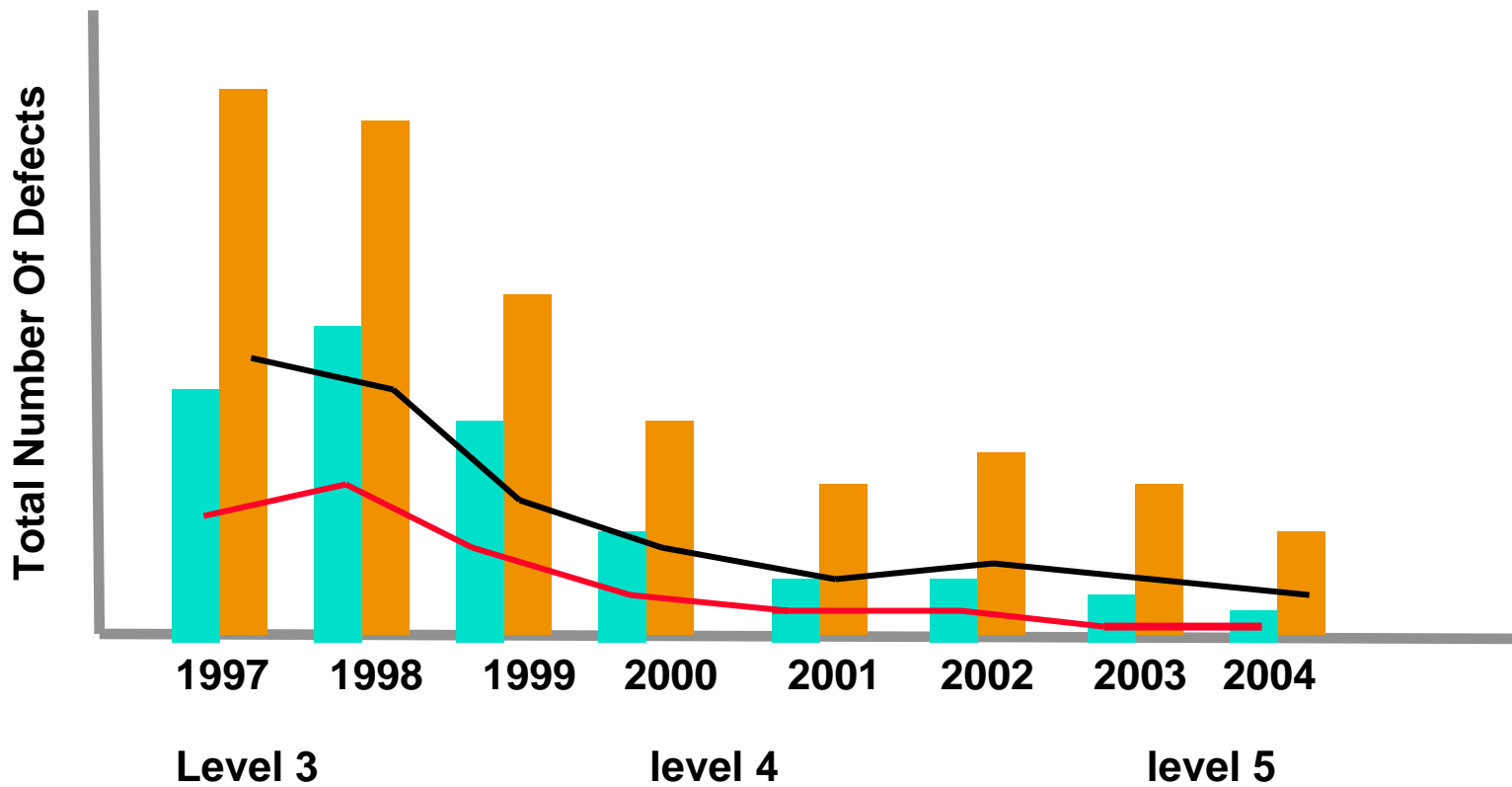
## Establish Formal Gate Reviews



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

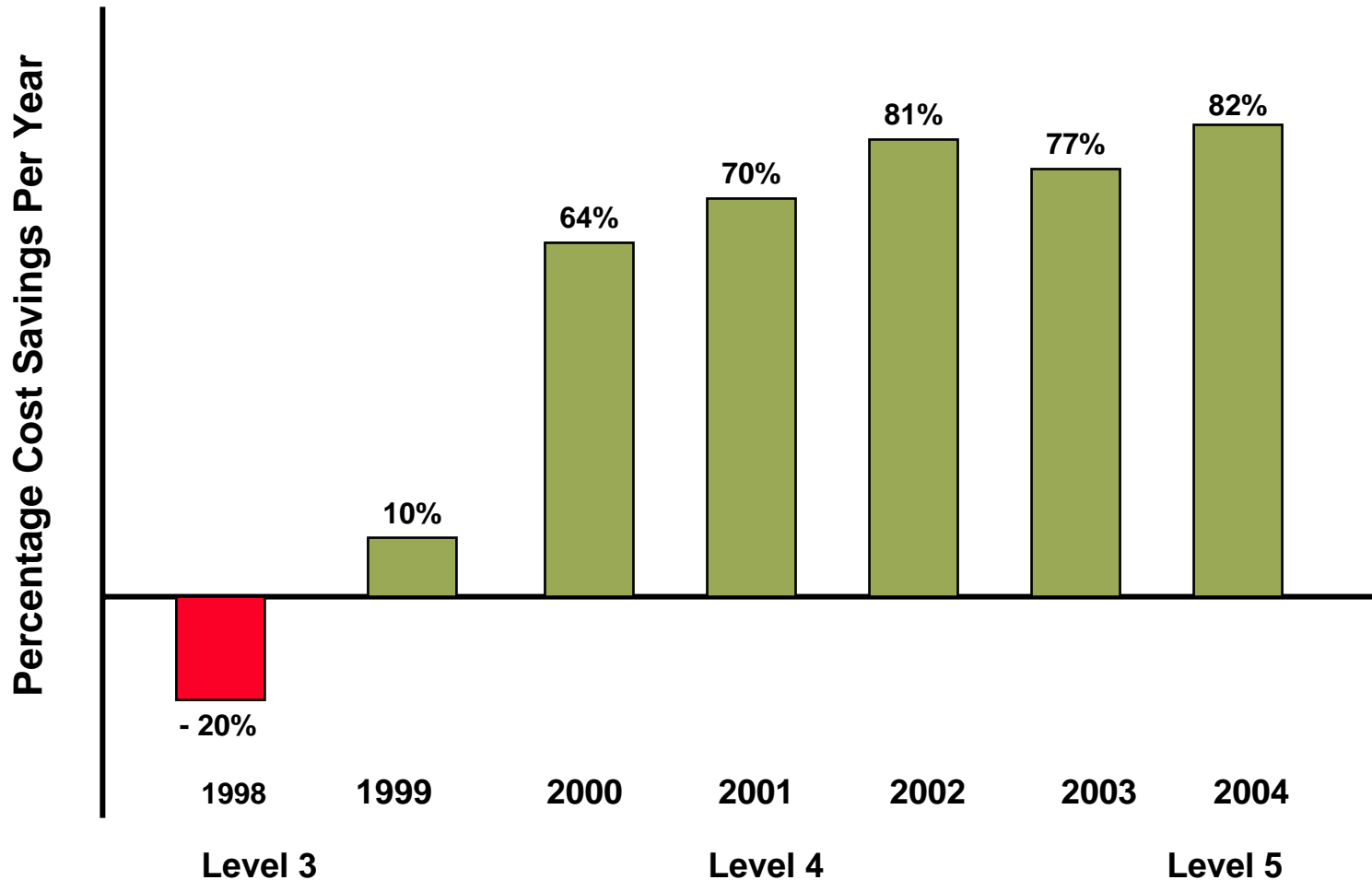
**Cost: Benefit ratio is 4% : 31% or 1 : 7.75**

# Total Number Of Defects Per Year

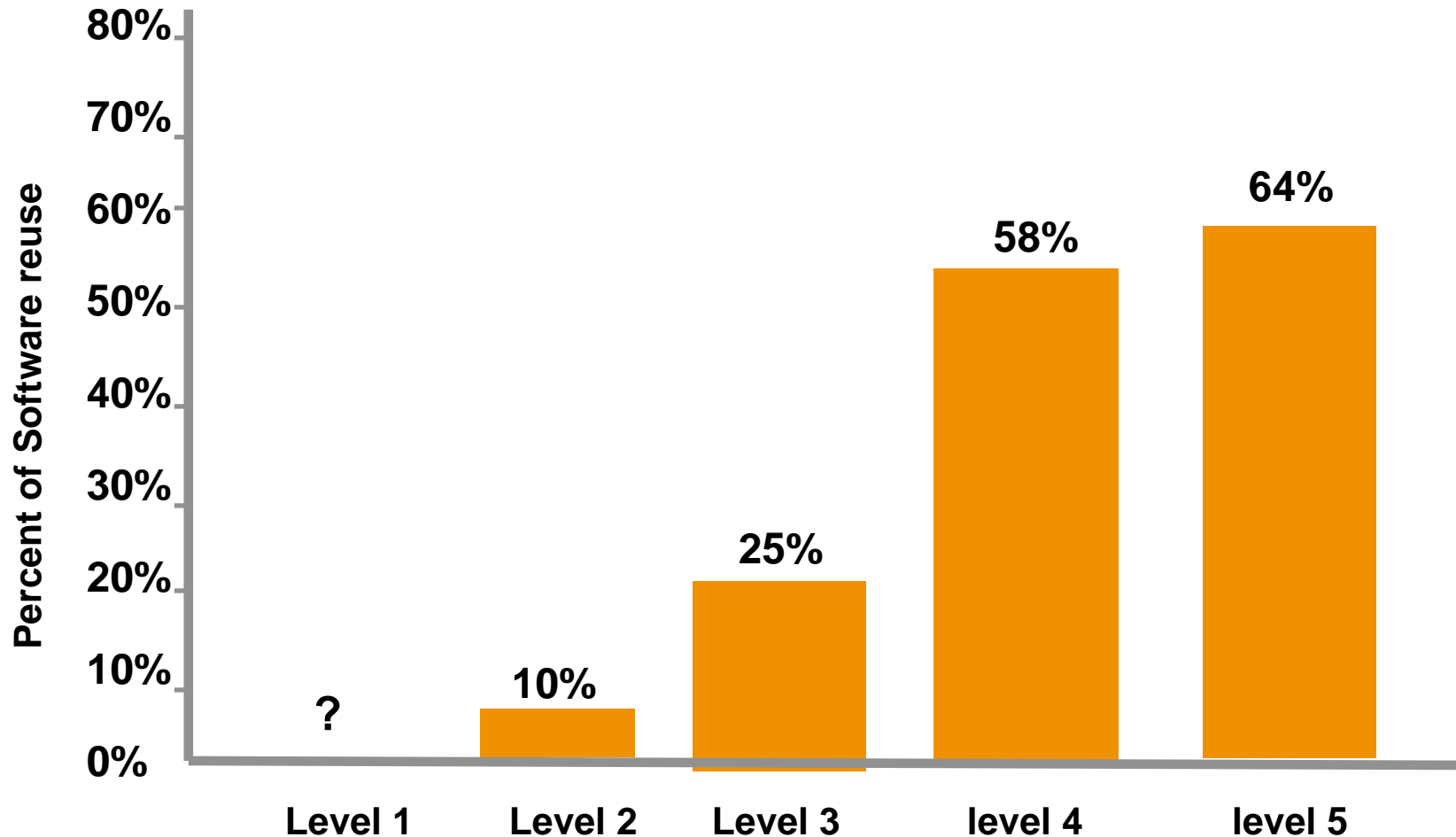


■ : Total Pre-released defects  
■ : Total Post-released defects

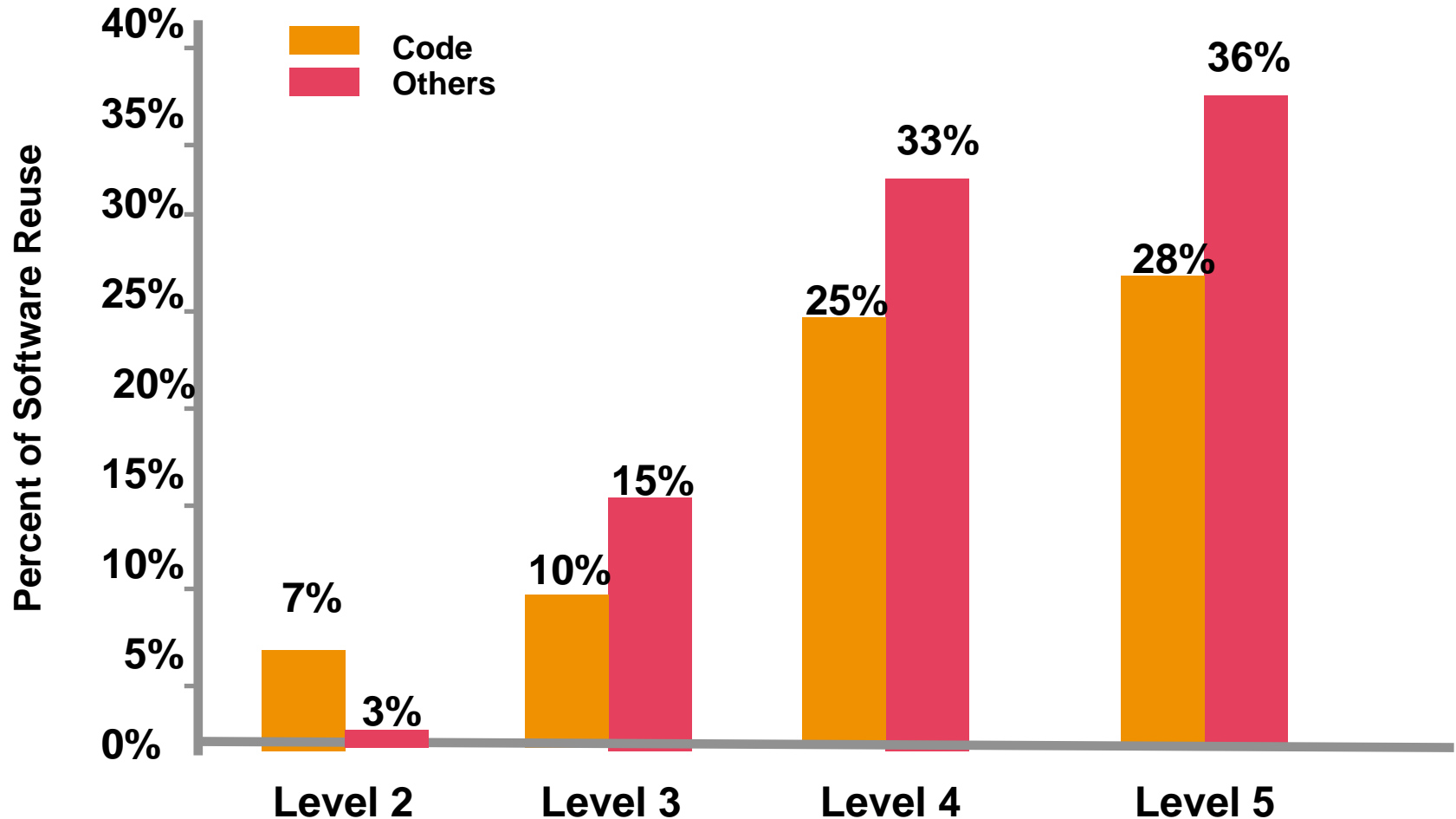
## Defect Prevention Cost Savings



# Increased Software Reuse = Reduced Costs

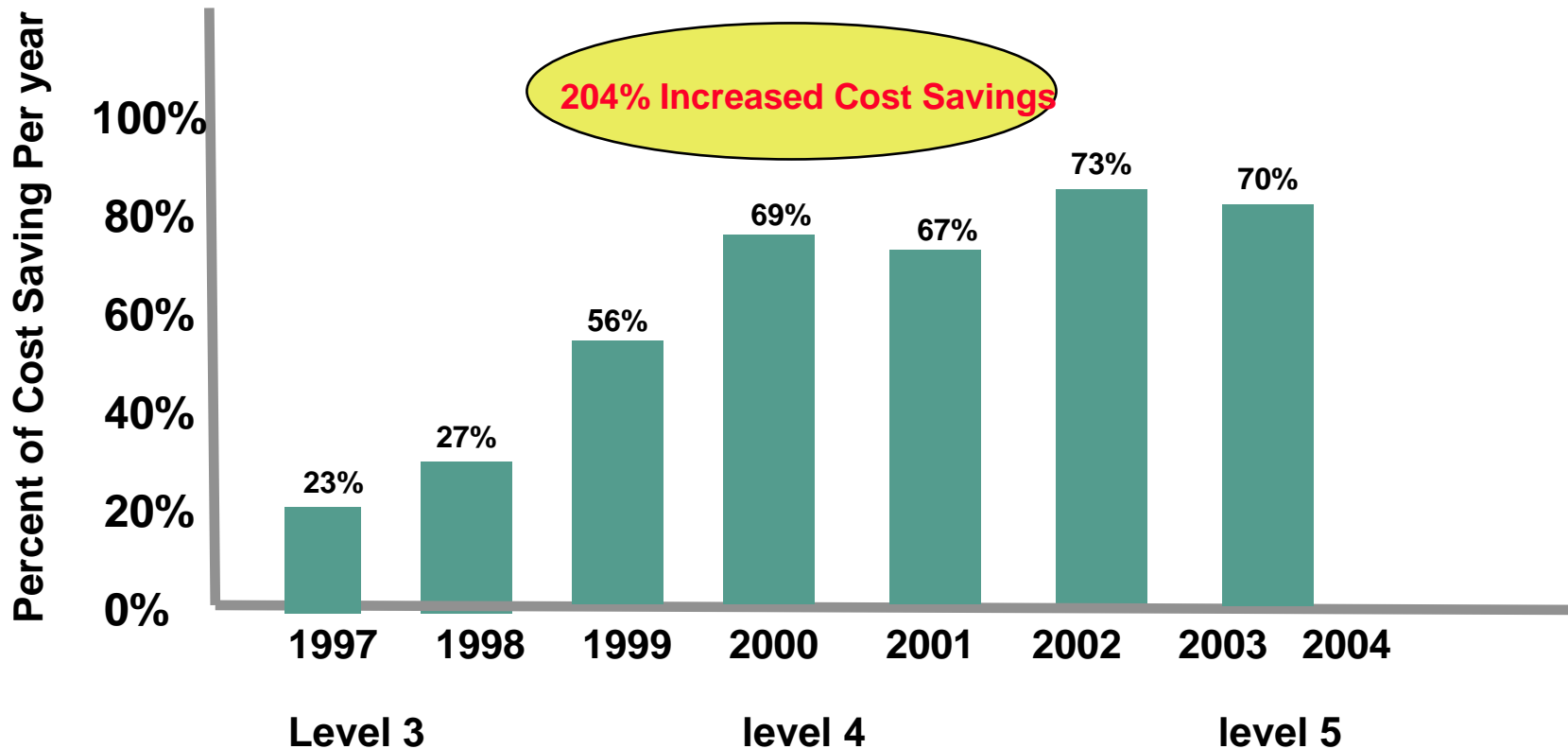


# Increased Software Reuse = Reduced Costs



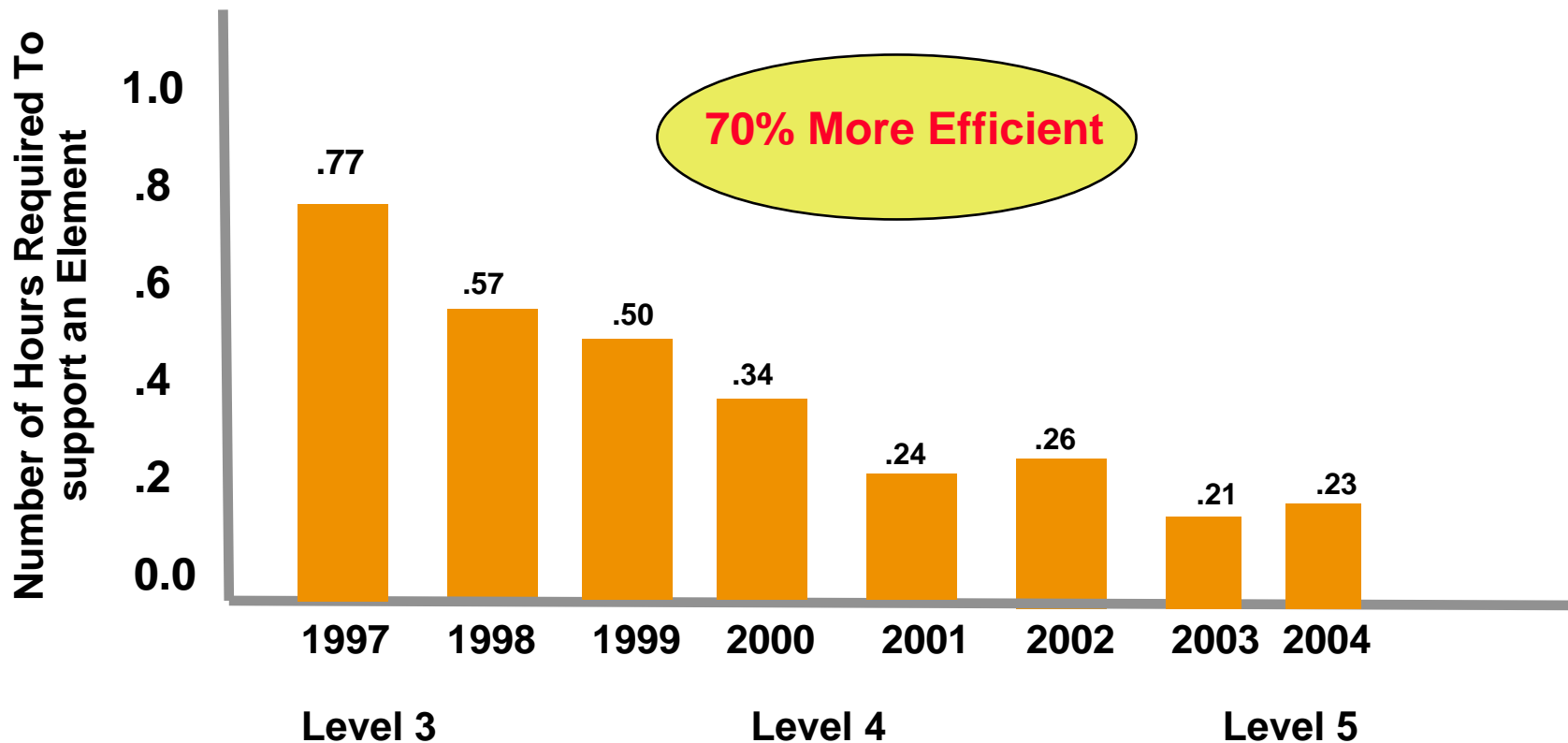
Code reuse: No modification  
Other reuse: Templates, Test cases etc.

# Software Maintenance Cost Savings



 : Average percentage of cost savings based on 1997 baseline

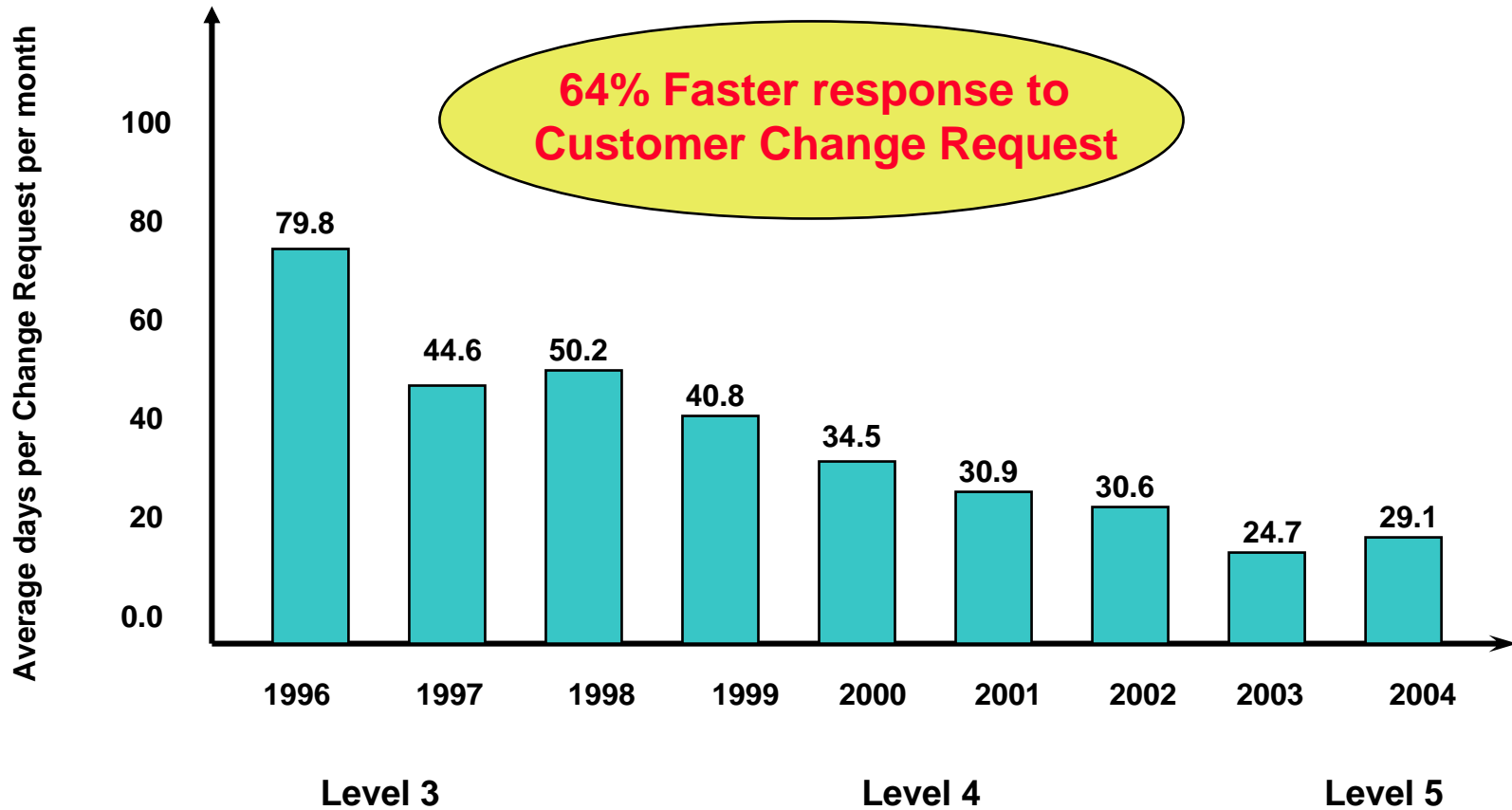
# Cycle Time = Supported Hours Per Element



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

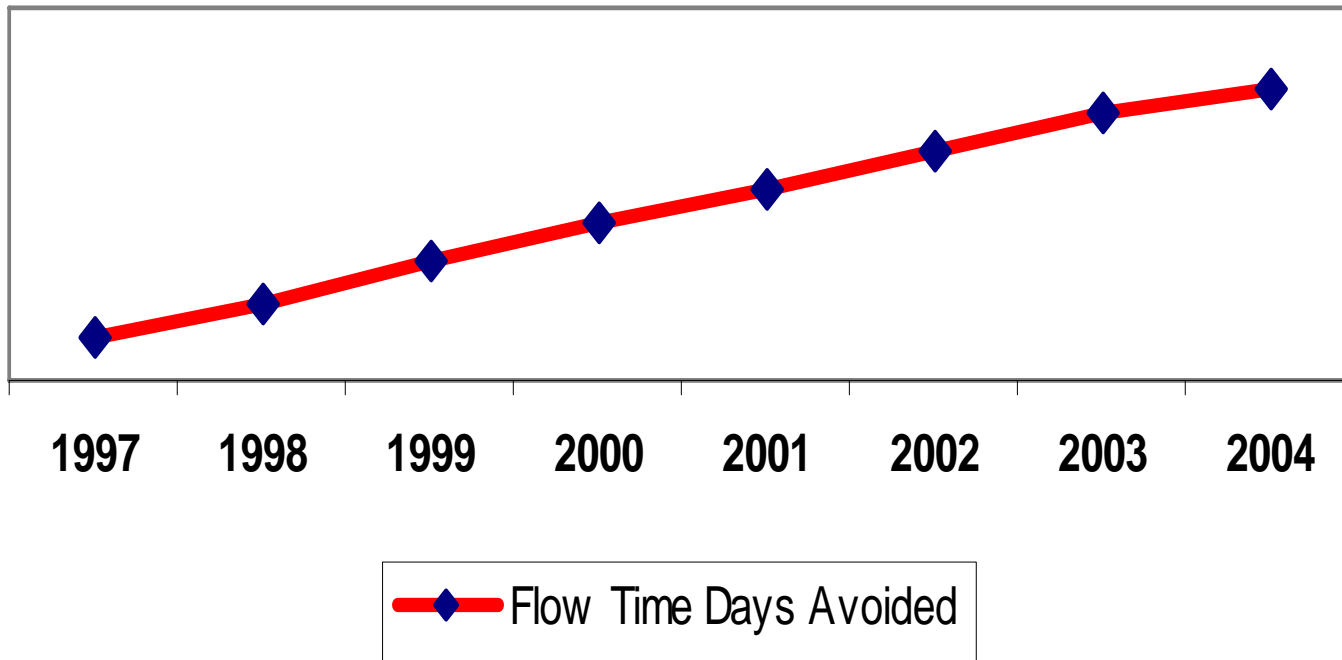
Element = Configuration Item

# Cycle Time





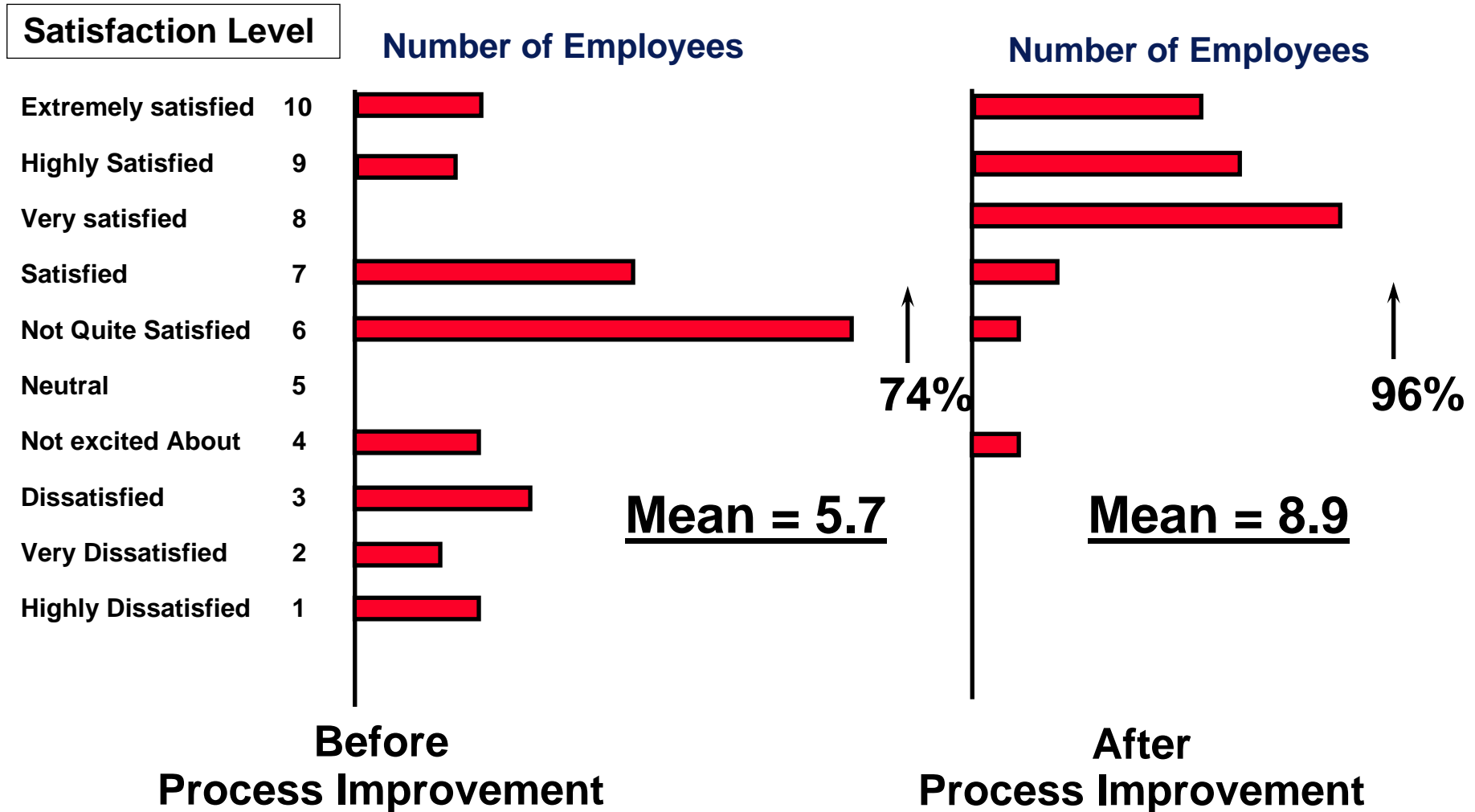
## Flow Time Days Avoided (1996 Baseline)



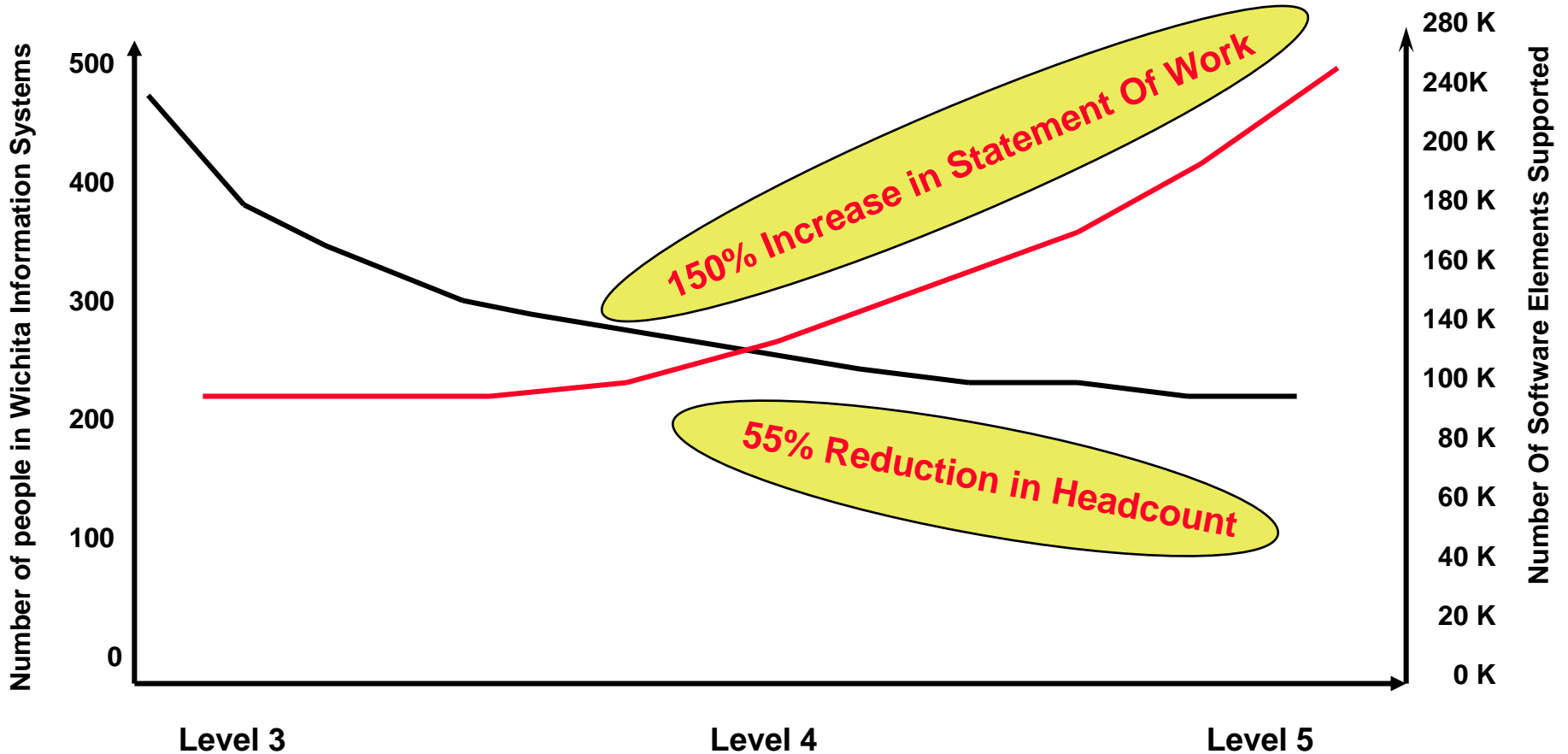
## Customer Satisfaction



# 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**