

**Construx**<sup>®</sup>

Software Development Best Practices

# Keys to Successful IT Projects: An Executive Guide

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Software Development Best Practices

# My Perspective

# My Perspective

- ❖ Software Engineering Expert
- ❖ Contact with C-Level Executives
- ❖ Business Owner/CEO
- ❖ Preoccupation with estimation...

# Six Insights that C-Level Executives Already Know

# Six Insights That C-level Executives Already Know

- ❖ Software projects are late
- ❖ Software projects are out of control
- ❖ Answers from software staff are often incomprehensible
- ❖ C-Level executives are rational and intelligent enough to understand these concepts
- ❖ Answers from software staff often seem evasive
- ❖ Software is the most unpredictable part of the business

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Software Development Best Practices

# The Seven Critical Insights

## Insight #1

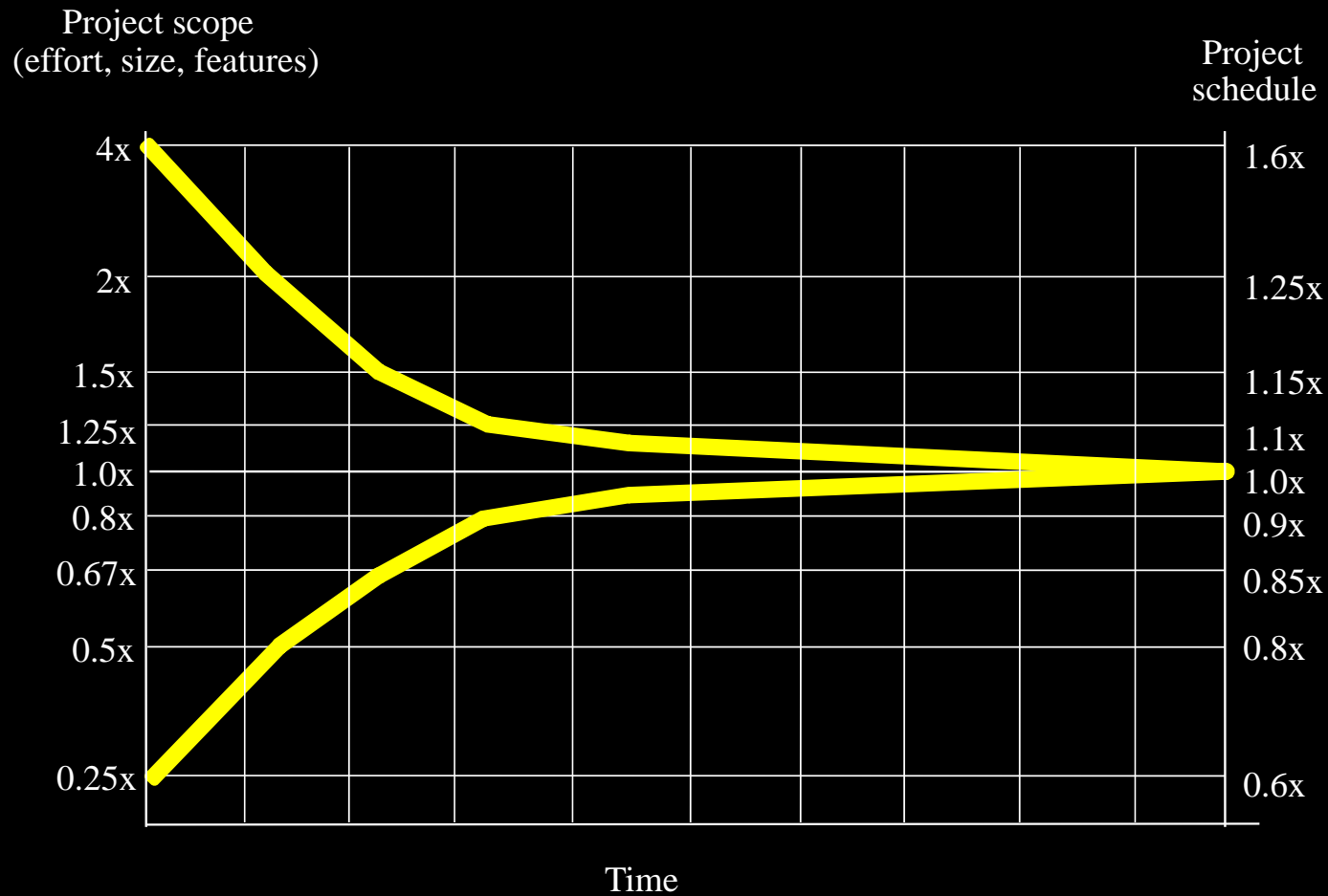
**Typical Budgeting  
Processes Undermine  
Effective Development**



# Typical Budgeting Processes Undermine Effective Development

- ❖ Many organizations use “One Phase” budgeting processes
- ❖ This is a poor match for the nature of software development

# The Cone of Uncertainty



# A Too-Common Response to the Cone...

“You encourage range-based reporting. At three places I have managed, it simply has not been an option. In fact, at one board meeting our Director of Program Management was asked to leave the board meeting because of an attempt to use ranges. The quotation was approximately, ‘You don’t seem to understand that your job is to give me a date. If you can’t give me a date, you can’t do your job.’”

# Implications of the Cone

- ❖ Accurate budgets can't be set before significant preliminary work is done
- ❖ Accurate budgets can be set after about 10-20% of the total project budget has been expended\*

\* You won't know what the total project budget is until you expend the 10-20%, and so you can't accurately calculate the 10-20% ahead of time

## Insight #2

**Stage-Gate Processes  
Are Prevalent In Leading  
Companies**

# Stage-Gate Processes Are Prevalent In Established Companies

- ❖ Example companies
- ❖ Some amount of preliminary work is necessary before an accurate budget or schedule can be set, because of the Cone

## Insight #3

**Low Quality Is The Single  
Largest Cost Driver**

# Low Quality Is The Single Largest Cost Driver

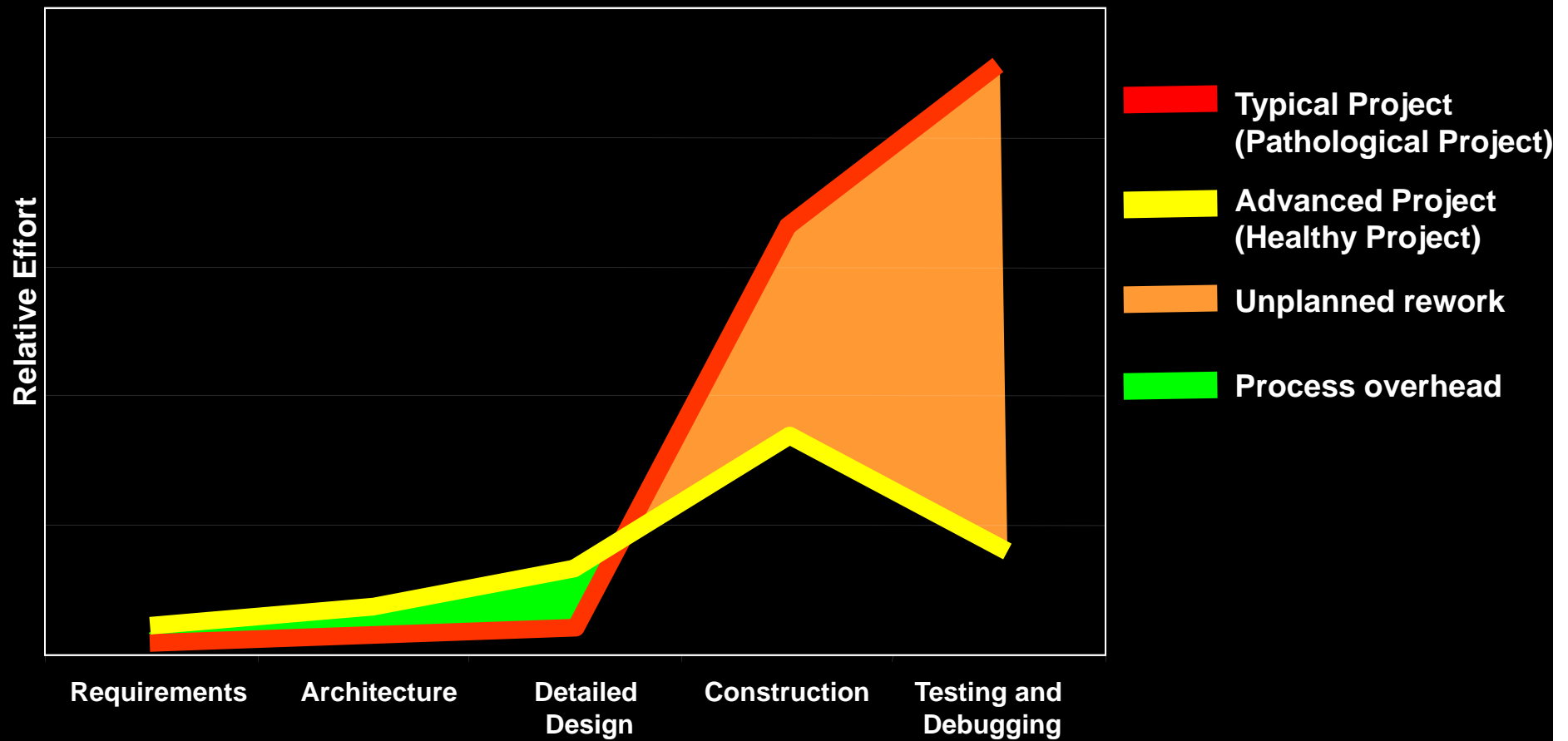
- ❖ 50-80% of the typical project's expense goes into unplanned rework
- ❖ The most common reasons for this are
  - ◆ Poorly defined requirements, which lead to changing requirements
  - ◆ Inadequate project planning
  - ◆ Inadequate project management
  - ◆ All of which are exacerbated by committing too early in the Cone



# Lifecycle Cost Profile



# Lifecycle Cost Profile (cont.)



# How to Respond to Low Quality

## ❖ IBM Study

Projects that focused primarily on schedule tended to overrun their schedule goals and were delivered with low quality; projects that focused primarily on quality tended to meet their schedule goals and were delivered with good quality”

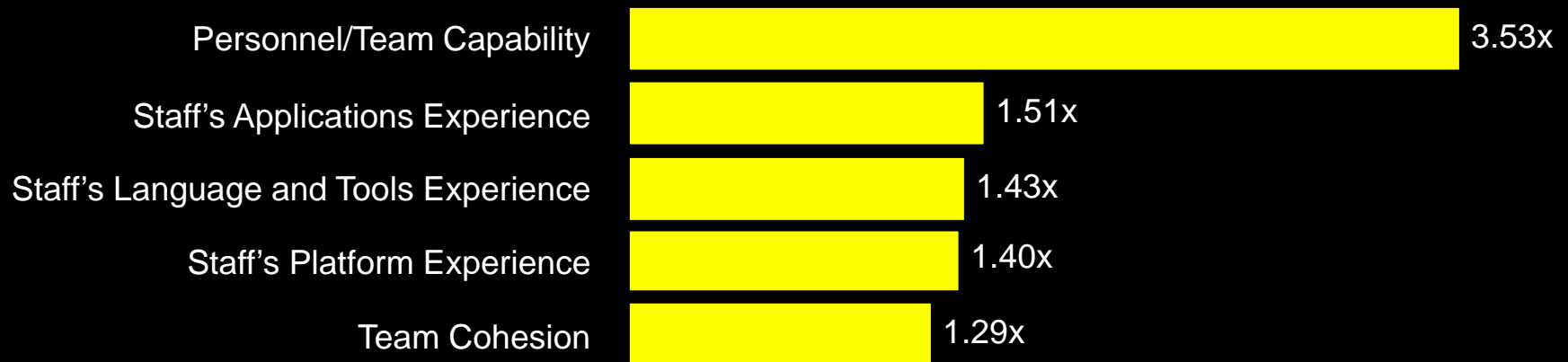
- ❖ Typical reaction when this is done well:  
“This project must not have been a good test case”

## Insight #4

**People (Staff) Exert The  
Largest Impact On Project  
Outcomes**

# Significance of Individual Variability

- ❖ According to Cocomo II calibrations, worst personnel will require 14x as much effort to produce software as best personnel



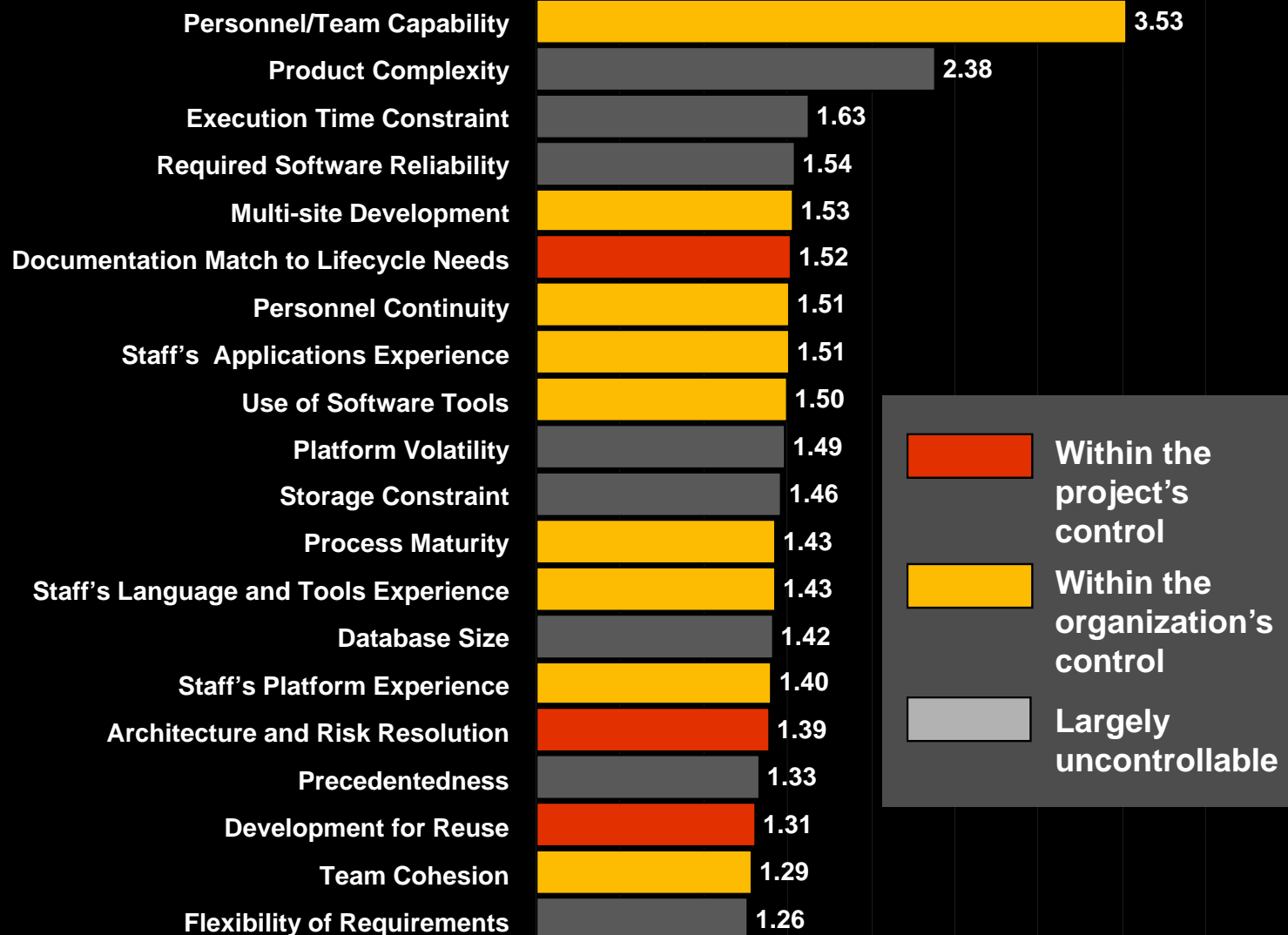
- ❖ This basic finding has been replicated many times

Source: *Software Cost Estimation with Cocomo II*, Barry W. Boehm, et al, Prentice Hall, 2000

## Insight #5

**Software Improvement  
Works Best When  
Supported at the  
Organizational Level**

# Where Can Organizations Improve?



# Organizational Level

- ❖ Many factors must be addressed at the organizational level
- ❖ Such as, the Cone
- ❖ Some work requires trading off short-term project performance to benefit long-term organizational effectiveness



## Insight #6

**The Tradeoffs Between  
Cost, Schedule, And  
Quality Might Not Be  
What You Think They Are**

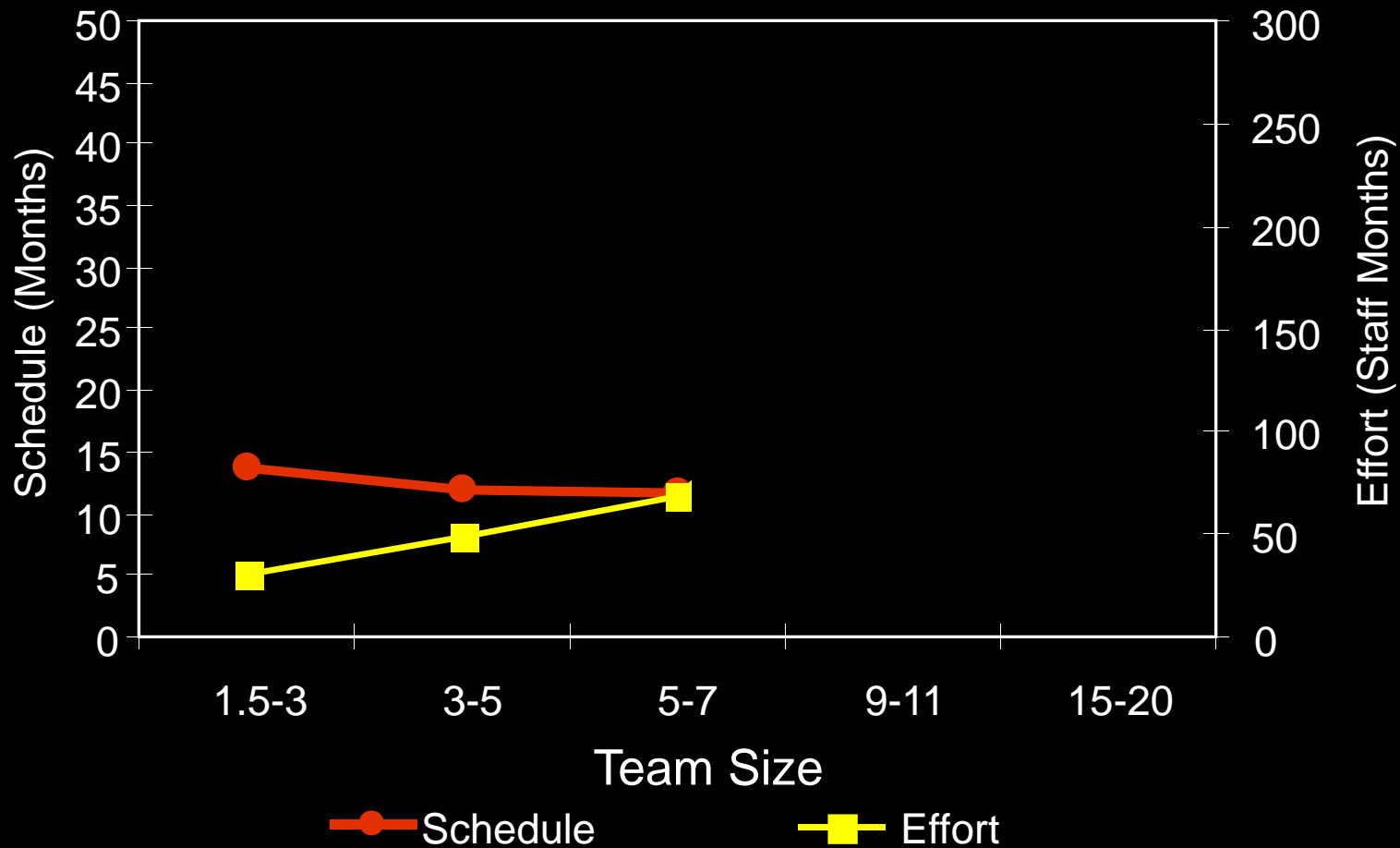
# Tradeoffs Between Quality and Cost or Schedule

- ❖ Low quality is already the largest cost driver for many organizations
- ❖ Attempting to tradeoff quality makes cost and schedule worse
- ❖ In addition, short schedules increase defects
- ❖ Focus on improving quality, and cost and schedule will follow

# Interrelationships Between Cost and Schedule

- ❖ Shorter-than-nominal schedules *increase* cost disproportionately
- ❖ Longer-than-nominal schedules *reduce* cost disproportionately
- ❖ Larger teams tend to take more time, introduce more defects, and cost more

# Example: Team Sizes on Similarly-Sized Business Systems Projects



## Insight #7

**Improved Software  
Practices Offer  
Exceptionally High ROIs**

# ROI for Selected Practices

Practice	12-month ROI	36-month ROI
Formal code inspections	250%	1200%
Formal design inspections	350%	1000%
Cost and quality estimation tools	250%	1200%
Long-range technology planning	100%	1000%
Productivity measurements	150%	600%
Process assessments	150%	600%
Management training	115%	550%
Technical staff training	90%	500%

*Source: Capers Jones, Assessment and Control of Software Risks, Prentice Hall, 1994.*

# Overall ROI

- ❖ Improved software practices pay an average ROI of 500% (including false starts), and continued improvement is sustainable for many years
- ❖ The best organizations have sustained ROIs of 900% from software improvement initiatives for many years

# Overall ROI

- ❖ Much of the ROI comes from avoiding rework (reducing costs)
- ❖ Some of the ROI comes from improving predictability (increasing business opportunities)

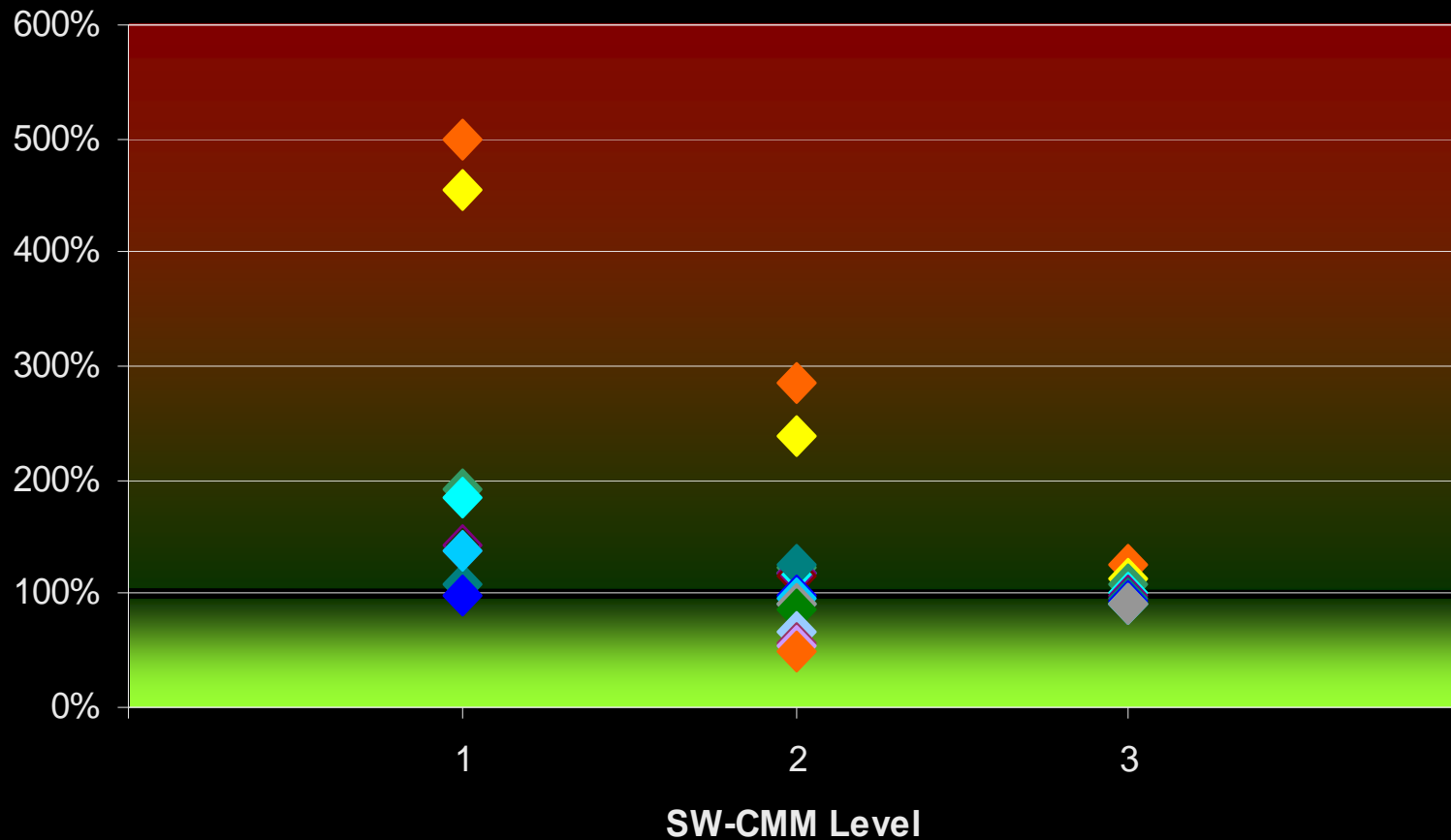


## Bonus Insight

**Some Organizations Are  
Doing Very Well Indeed**

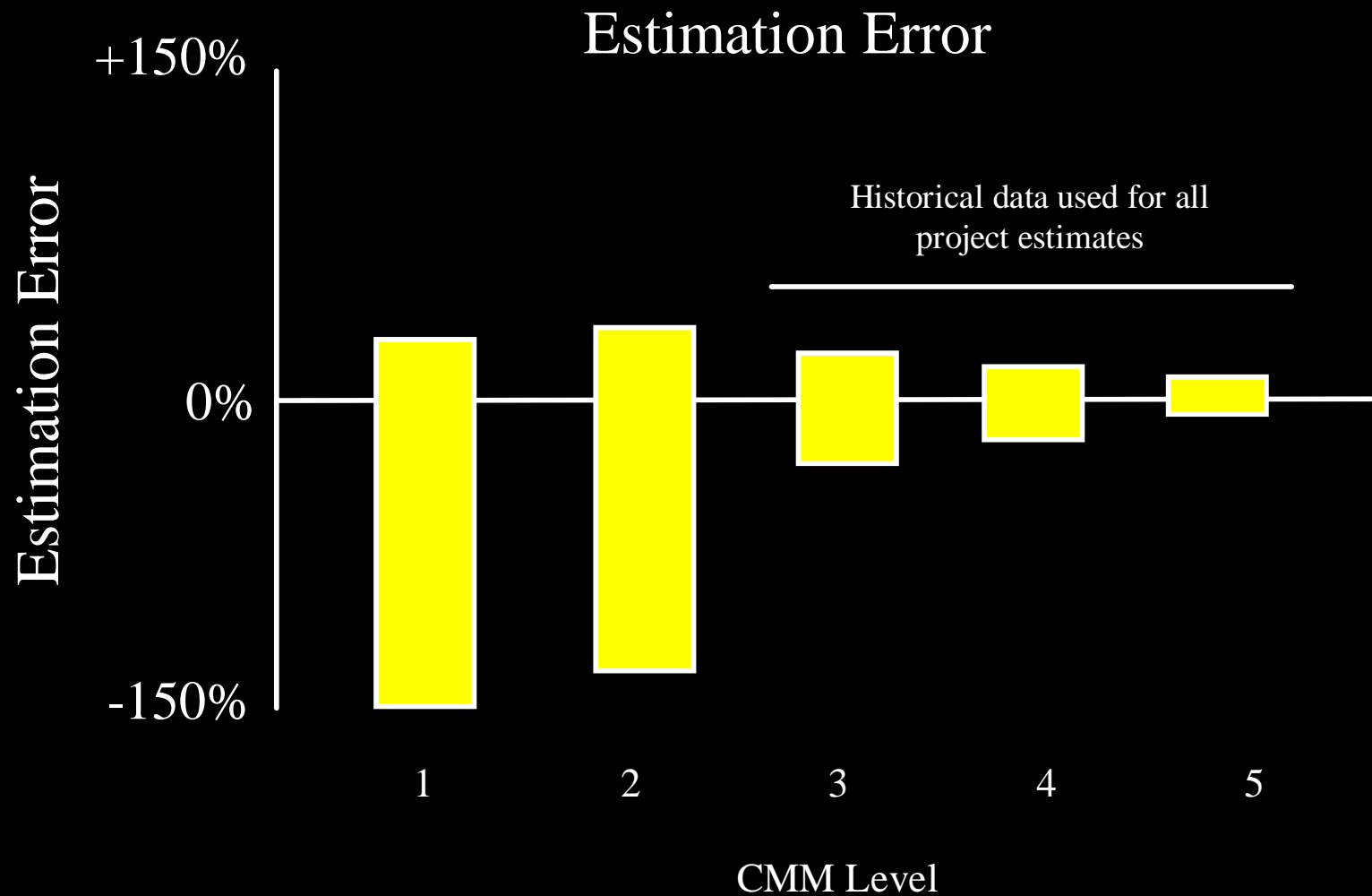
# Improved Predictability in Air Force Projects

## Project Performance Compared to Estimate

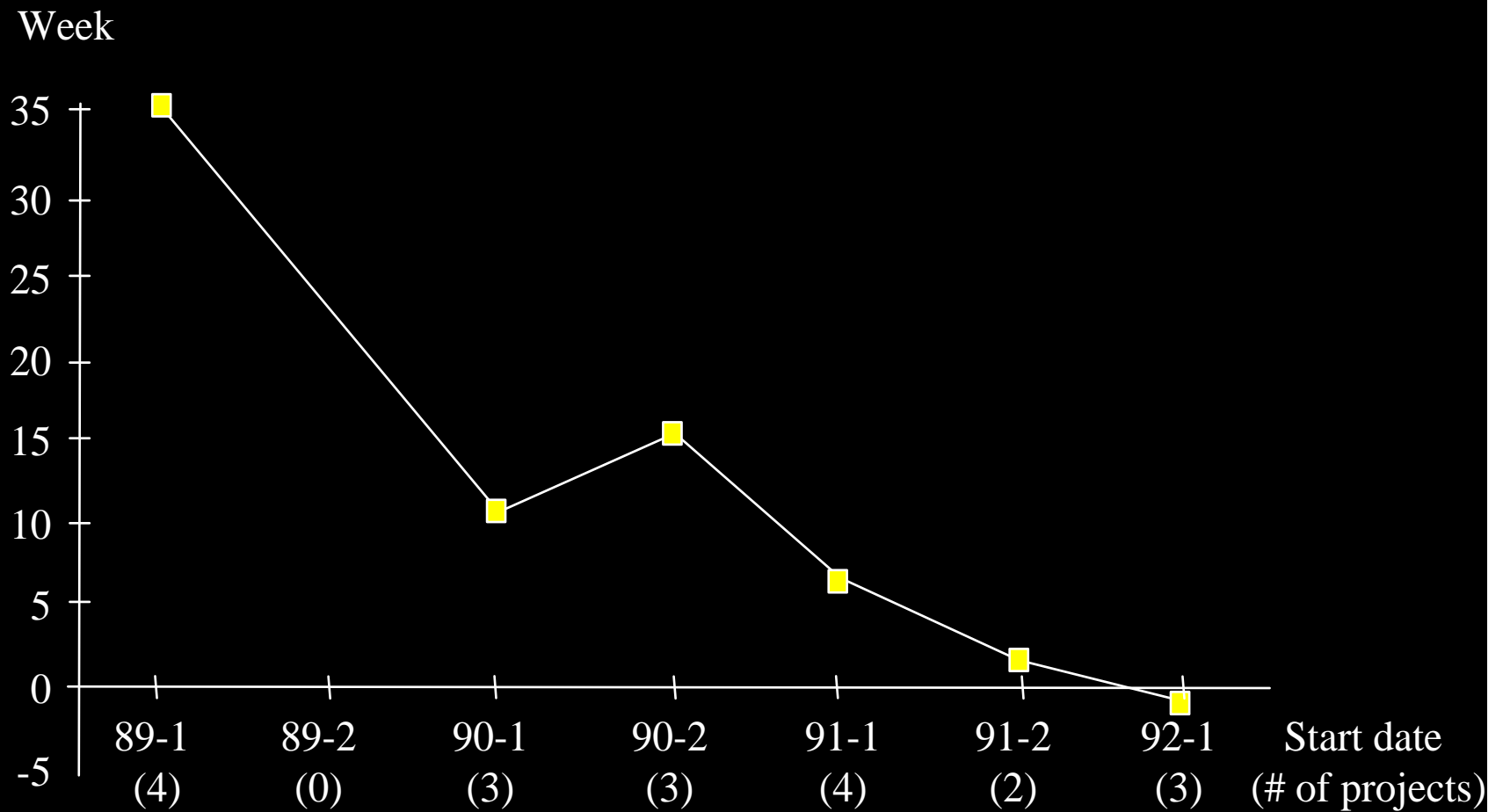


Actual Results as a Percentage of Estimated Results

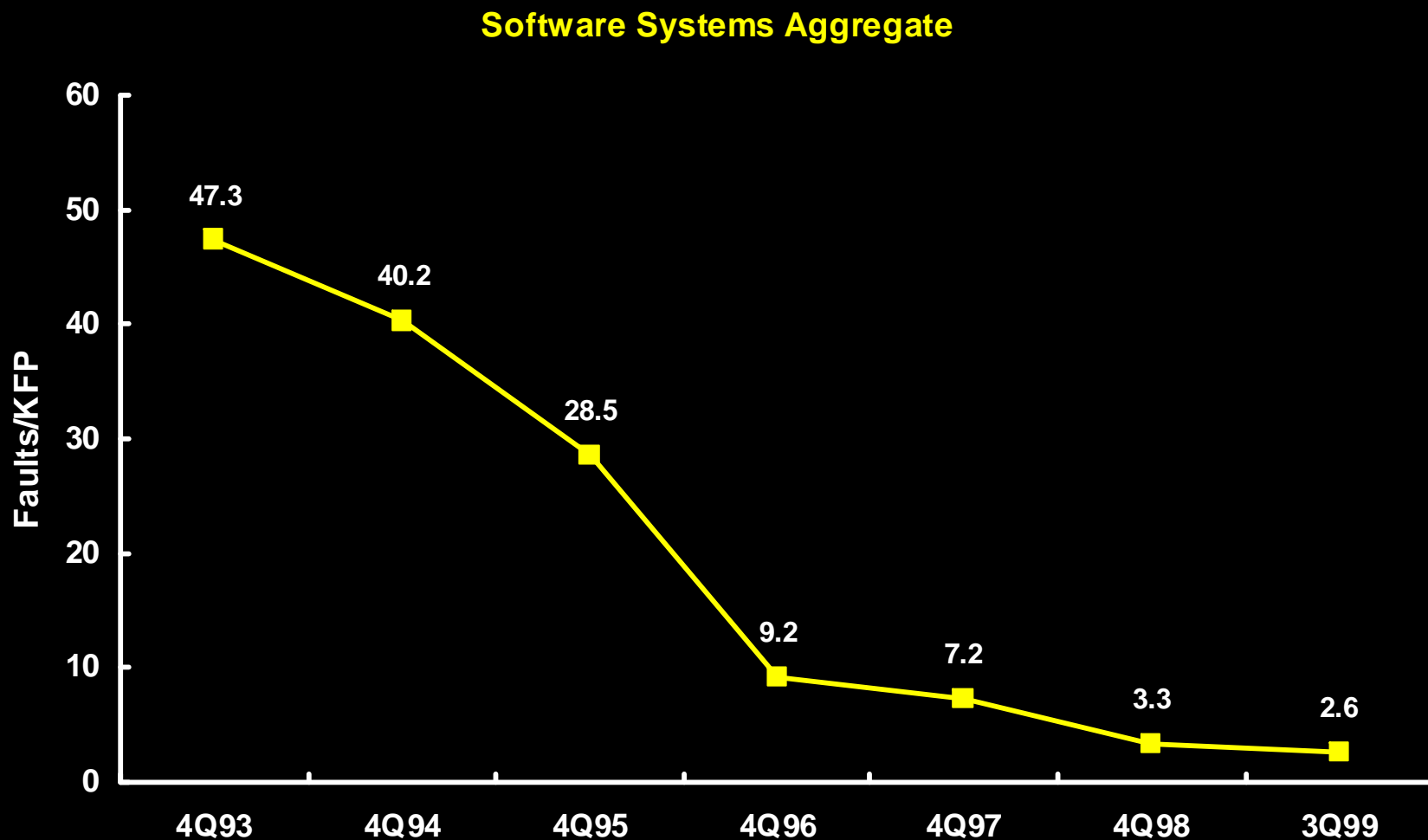
# Improved Predictability at Boeing



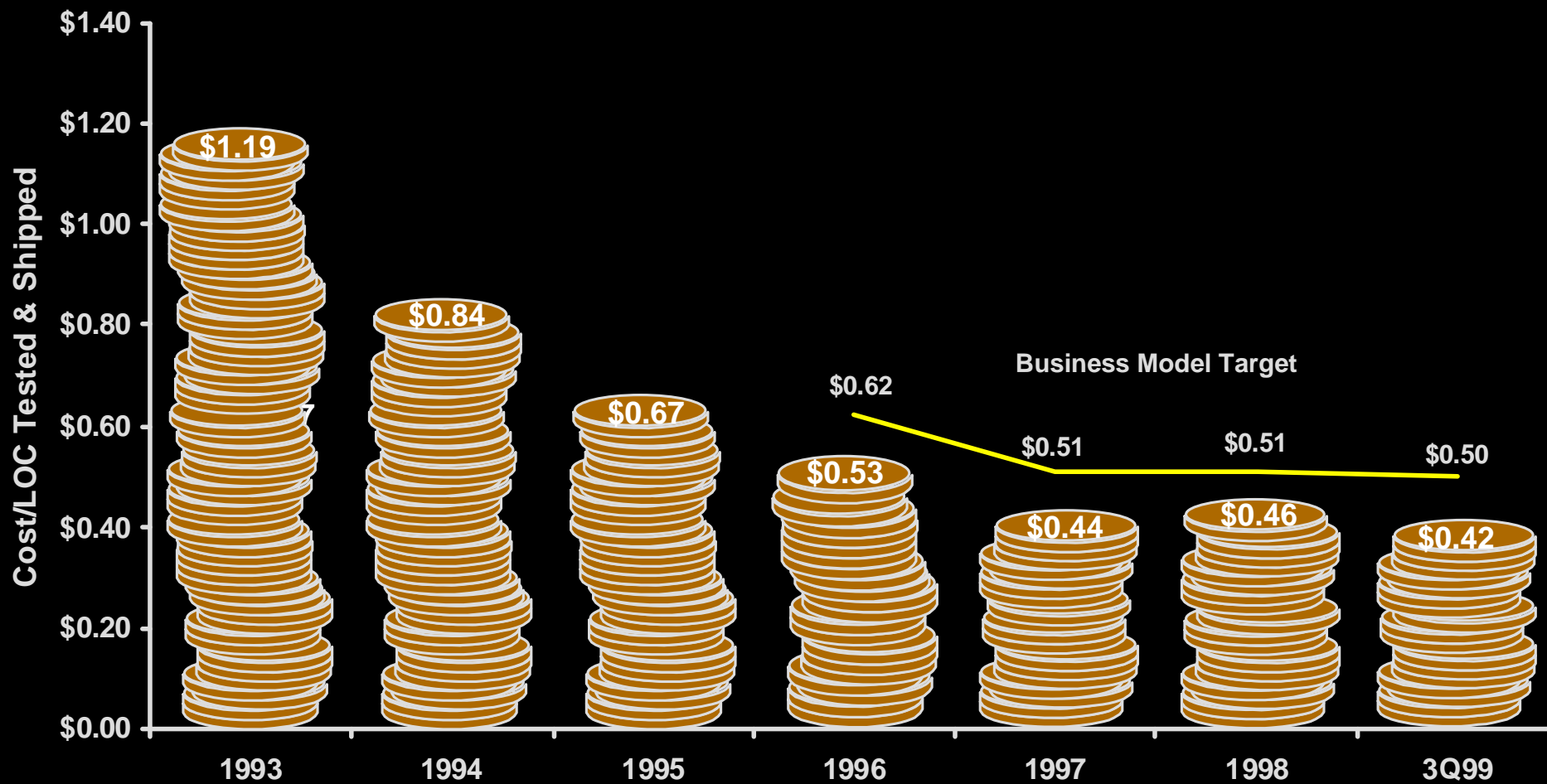
# Improved Predictability at Schlumberger



# Improved Quality at Telcordia



# Reduced Cost at Telcordia



## To Help Achieve These Results in Your Organization:

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