Unleash the POWER of Inspections

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DID YOU KNOW????

INSPECTIONS:

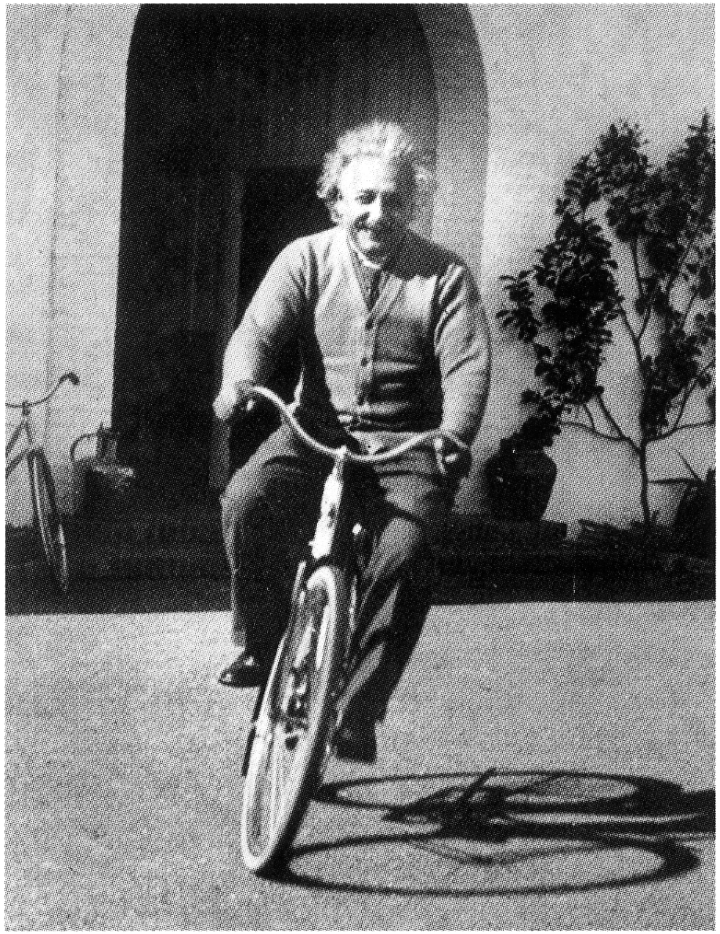
- Supported by 30 years of data
- Often more effective and cost efficient than testing
- Engine of increased productivity, maturity and Sigma level
- Find defects long before testing
- Most powerful source of data for process improvement

What are the Challenges to building or testing quality software?

- "Do more with less!"
- "Do this in Internet Time!"
- "Legacy processes don't apply!"
- "Nobody will pay for …!"
- "Why aren't you coding yet?"
- "We don't need no stinkin' process!"
- "We have state-of-the art test tools!"
- "Quality, schmality, we'll do it in Phase 2!"

The significant problems we face cannot be solved at the same level of thinking we were at when we created them.

-- Albert Einstein



Albert Einstein seeks inspiration, California, 1933.

Definitions

- Quality
- Quality Assurance
- Quality Control
- Quality Improvement

Continuous Improvement of All Processes

-- Dr. W. Edwards Deming

Fit for Use

-- JM Juran

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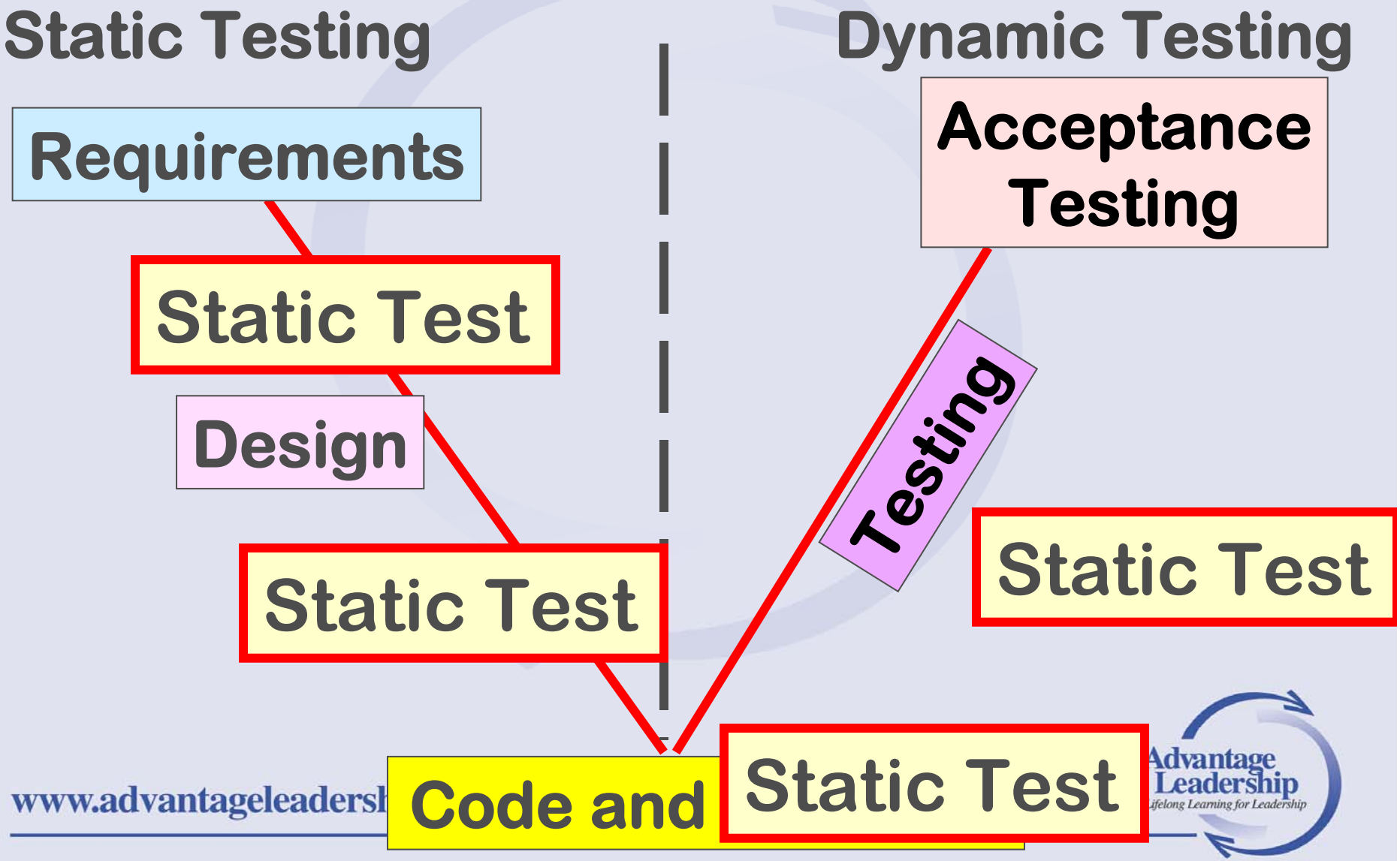
Quality Assurance: Process to Prevent Defects

- Process development and support
- Measurement
- Process management
- Prevention activities
- Standards, policies, procedures

Quality Control: Process to Find Defects

- Performed by Producers first
- Walkthroughs, Reviews, Inspections, Testing, Audits
- Data for improvement
- "V" Model: Static, Dynamic Testing

The "V" Model


Static Testing
Dynamic Testing
Requirements
Acceptance Testing
Static Test
Design
Testing
Static Test
Static Test
Code and
Static Test

Quality Improvement: Process to Reduce Variation

- Create predictable process
- Capture defect data
- Discover root causes of defects
- Modify process to prevent defects
- Measure and monitor progress

Traditional view: create quality through product quality control

- After the fact
- Dynamic Testing only
- Find and fix
- Blame
- Data not used strategically
- Process unchanged
- Defects continue

Progressive view: use quality control to power improvement

- Gather defect data
- Analyze defect trends
- Identify root causes
- Test solutions
- Evaluate results
- Improve process
- Monitor

Relationship among all quality elements

ISO MBNQA
Six Sigma/Lean
IEEE CMM(I)
TMM PMI ITIL
TickIT SPICE

Quality Improvement QI
REDUCE DEFECTS

- Improve product
- Improve process
- Reduce variation
- Reduce defects
- Re-engineer process

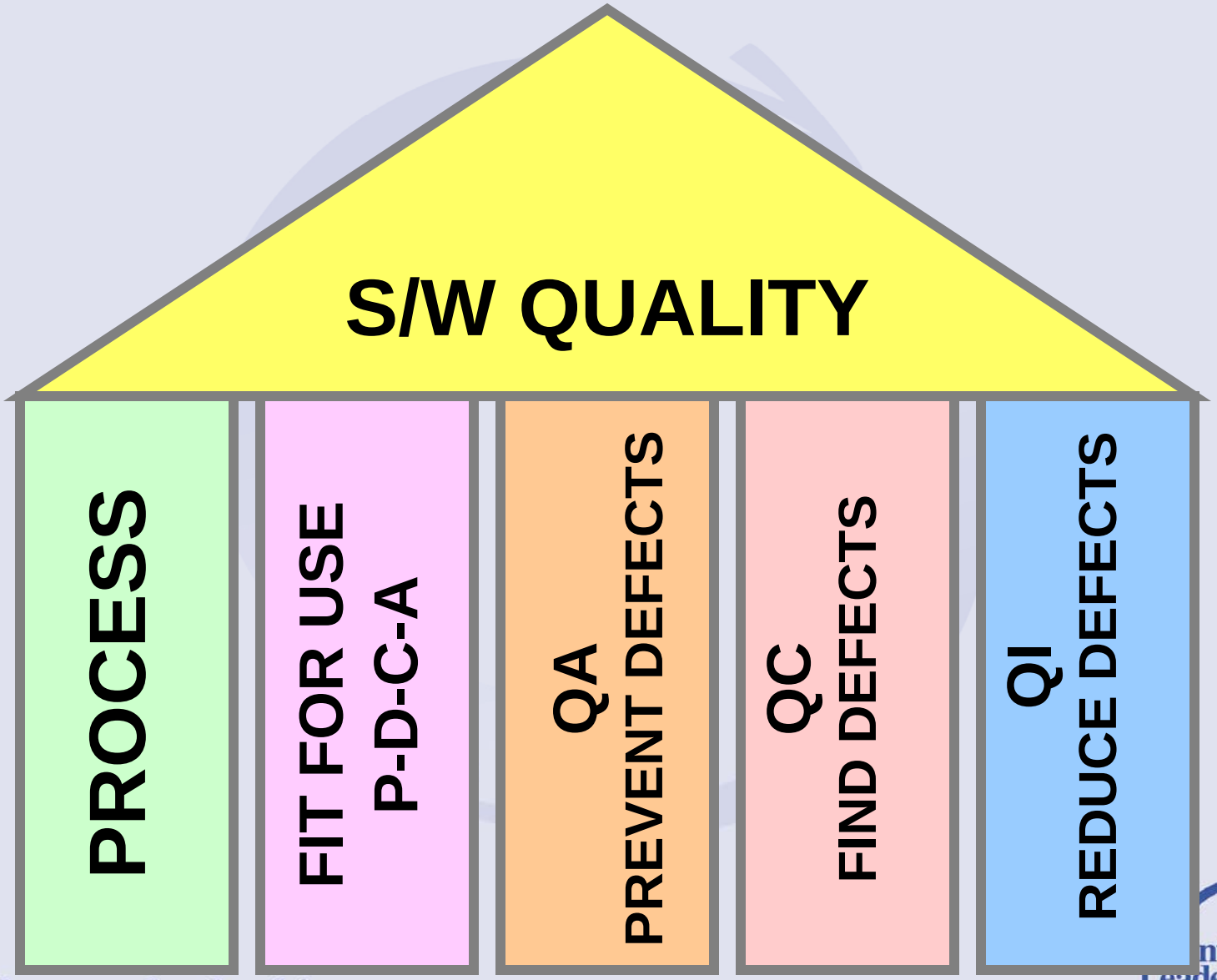
Quality Assurance QA
PREVENT DEFECTS

- Define SDLC Processes
  - Development/ Maintenance
  - Purchase
  - Outsource
- Define Standards
- Define Review Processes
  - Walkthroughs
  - Phase/Peer Reviews
  - Inspections
- Define Measurement
  - Analyze data
- Define Test Processes, Tools
- Define: QA, QC, QI, IT processes

Quality Control QC
FIND DEFECTS

- Reviews:
  - Walkthroughs,
  - Phase/Milestone/Peer
  - Inspections
- Audits: product, process
- Testing: All types, UAT
- Controls: Change, Configuration

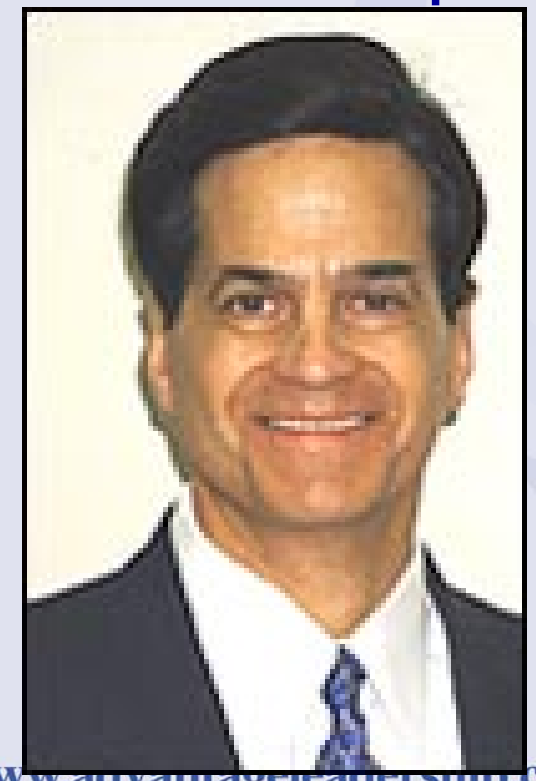
Defect DATA
Lessons Learned


S/W QUALITY
PROCESS
FIT FOR USE
P-D-C-A
QA
PREVENT DEFECTS
QC
FIND DEFECTS
QI
REDUCE DEFECTS

Formal (Fagan) Inspections

A powerful tool to improve

Software q



Michael Fagan

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Karl Wiegers

Tom Gilb

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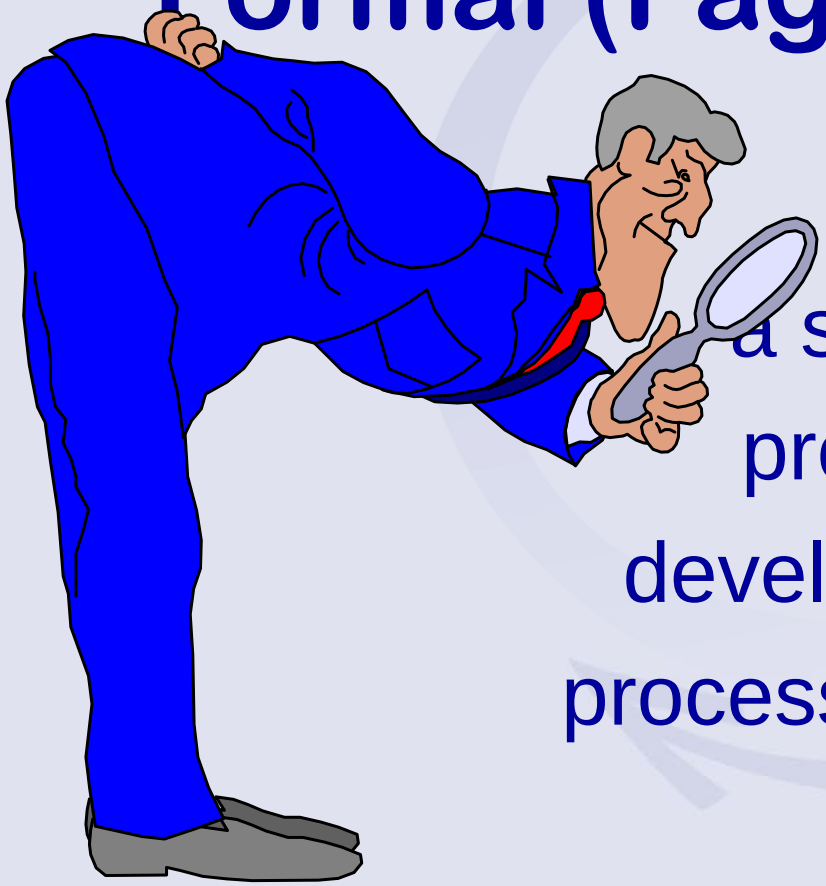
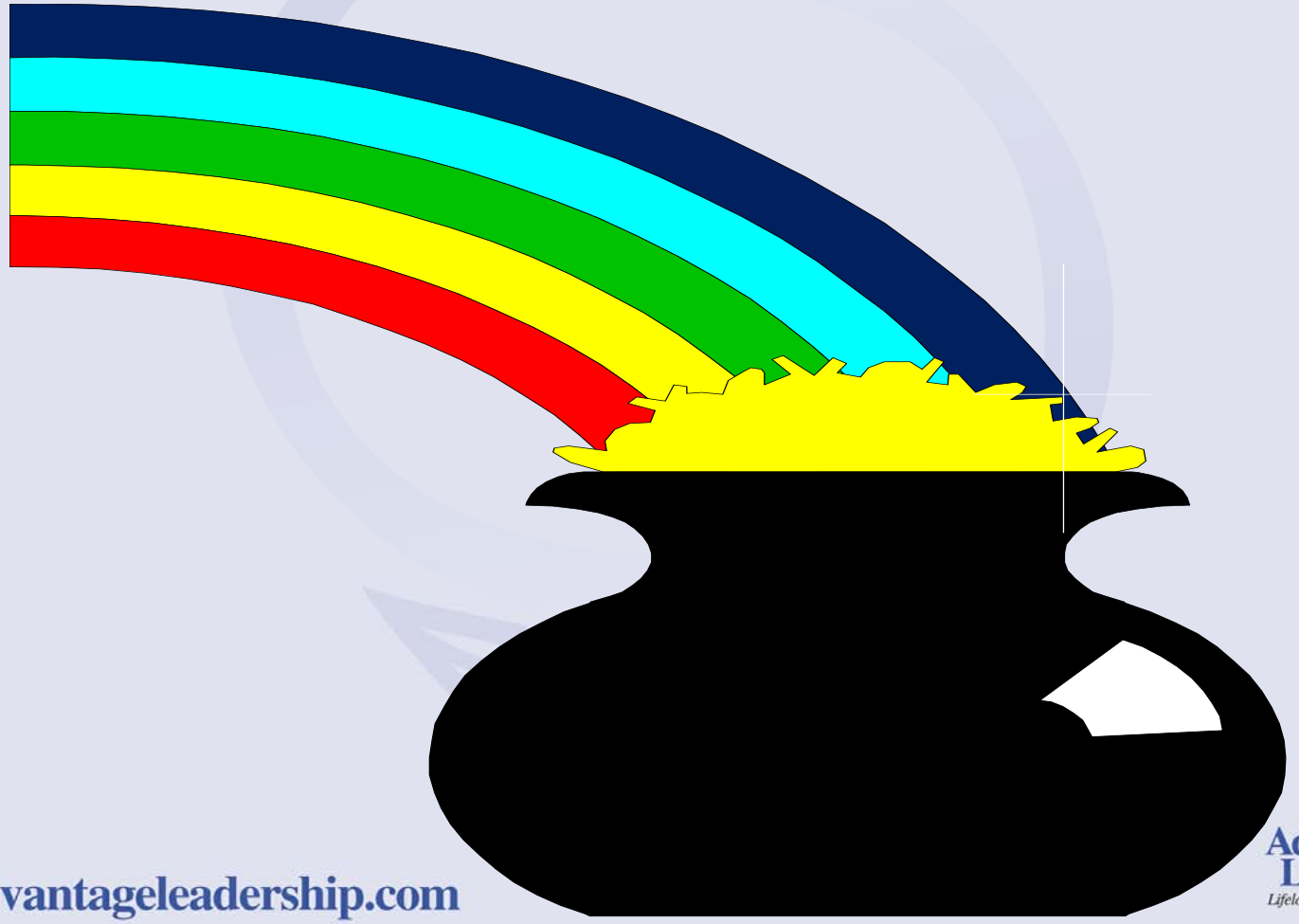
Formal (Fagan) Inspections



a structured review of a product in the software development or maintenance process designed to find defects

A Defect is a Treasure!



Inspections produce high quality software by:

- Performing rigorous examinations of work products at points of stability
- Using trained inspectors who follow defined steps to locate defects
- Capturing results of inspections to improve the development process

The Hidden POWER of Formal (Fagan) Inspections

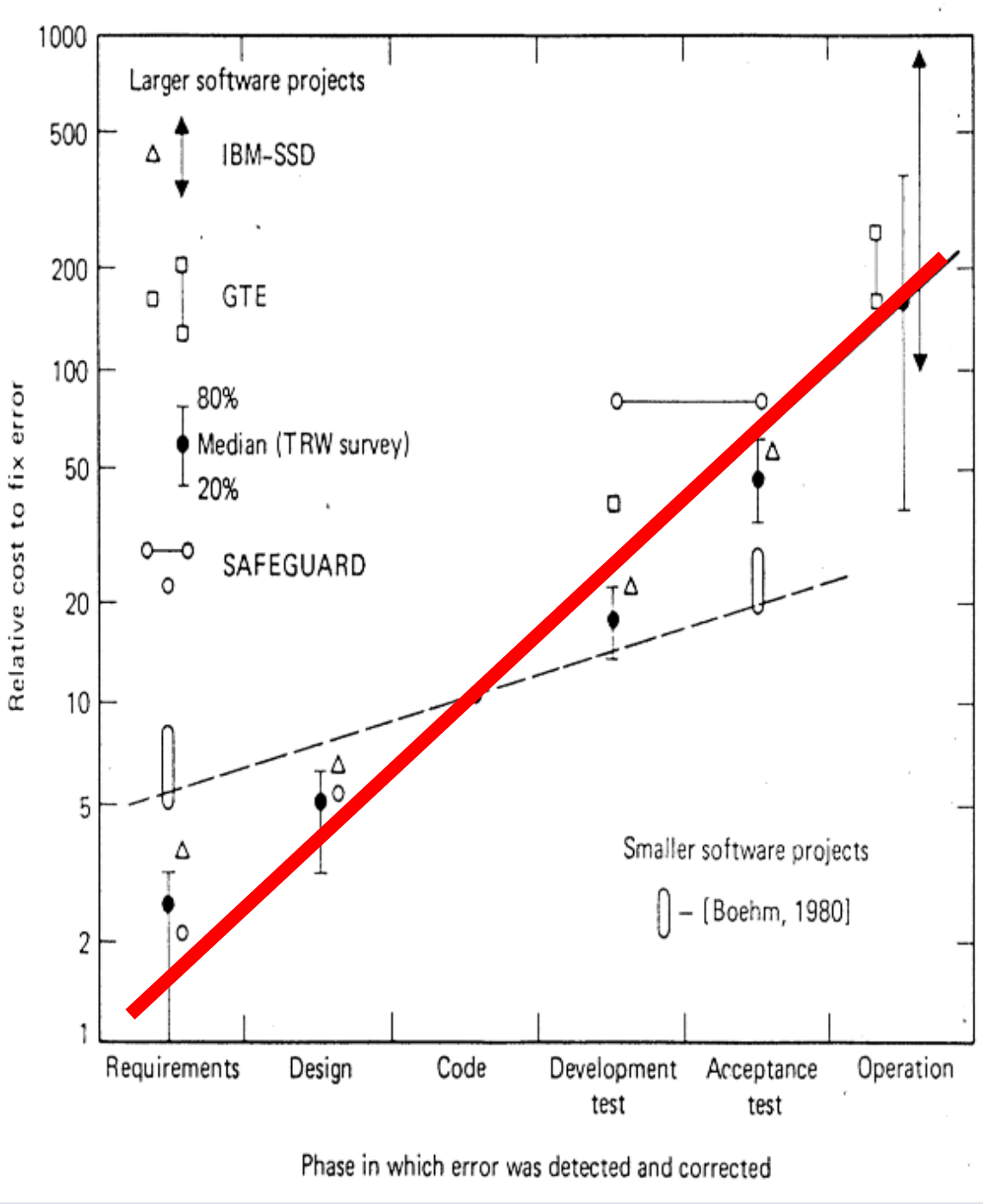
- Review the product, not the producer
- Capture synergy of group effort
- Ensure product quality at a reduced price and schedule
- Provide feedback for self-appraisal
- Provide data for process improvement

Why inspect? The data tell the story

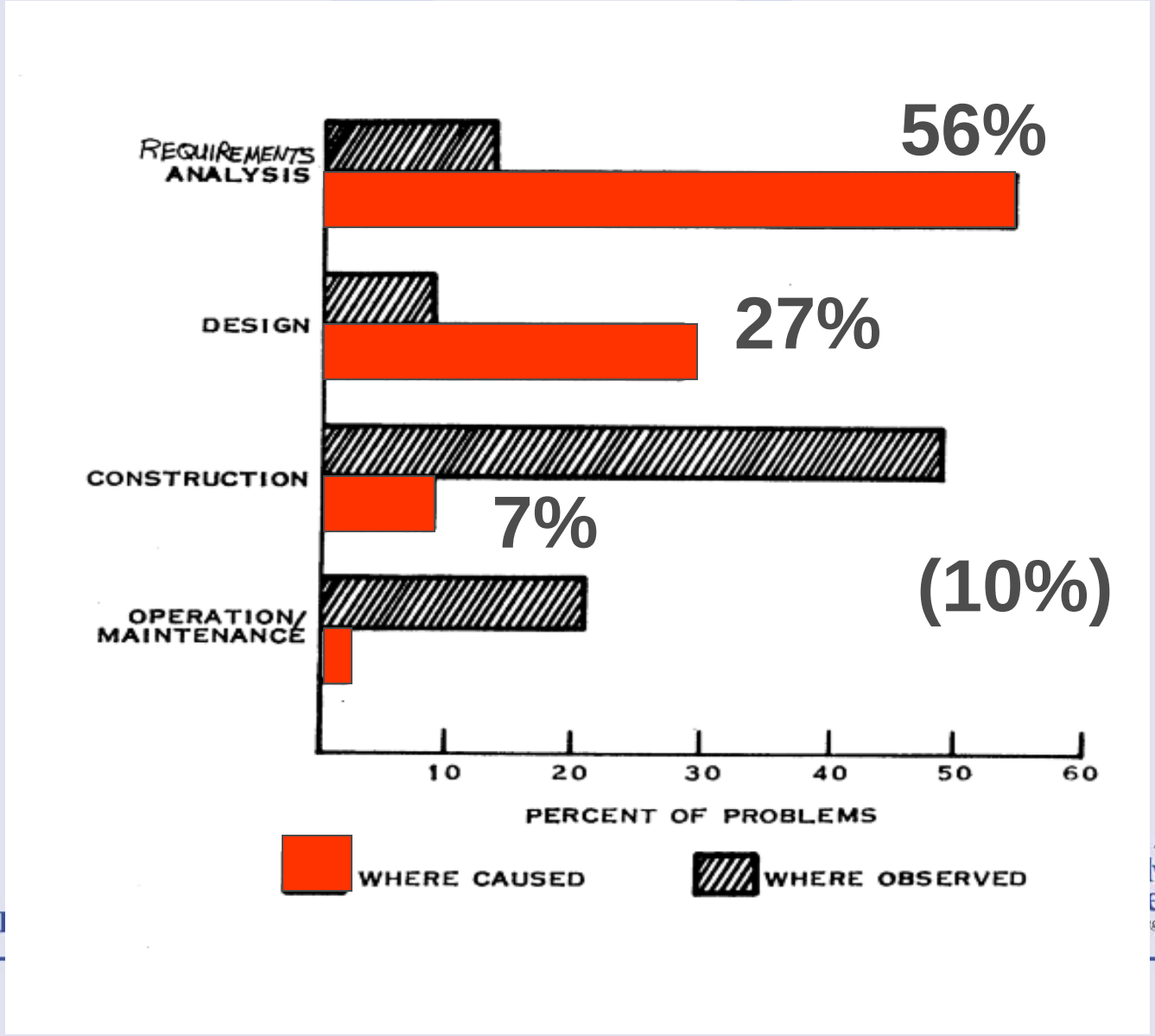
Software Engineering Economics

Barry Boehm

Prentice Hall, 1981



Where defects are caused and found



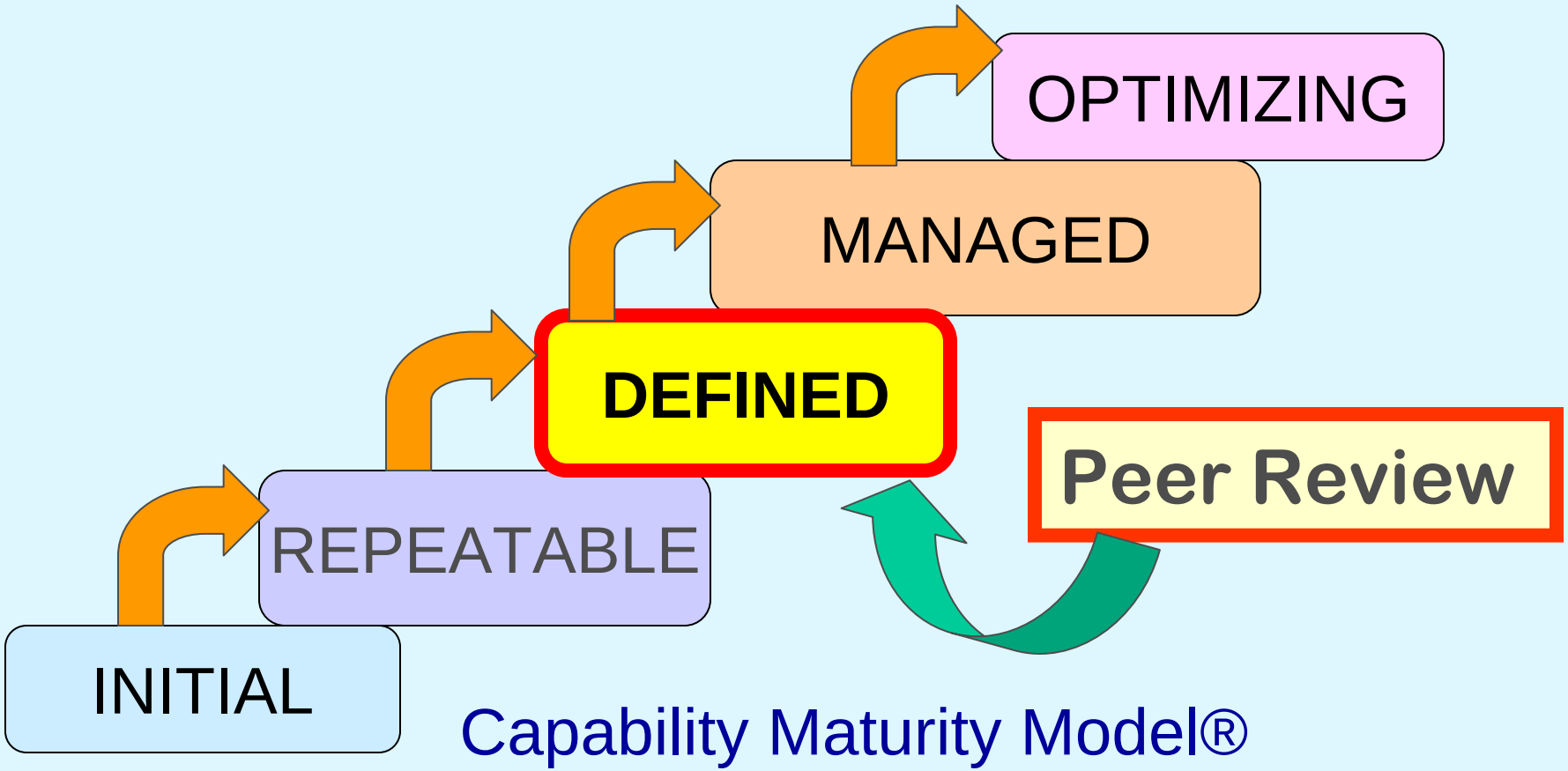
Defects: Caused, Found, Costs

Defects

Stage	Caused	Found	Costs
Requirements	56%	Few	$1
Design	27%	Few	$5
Code/Test	7%	Many	$50
Production	(10%)*	Some	$1,000

*Production and other sources

Inspections and Maturity



Capability Maturity Model®
CMMI

Inspections and Six Sigma

Motorola Inspection Results[1]

Motorola best practices include the following for defect prevention:

- Fagan Inspections
- Peer reviews
- Pre- and post-phase reviews
- Pre-kickoff meetings
- Post-mortems
- Weekly "lessons-learned" meetings

Motorola India Software Improvement Results

	1993	1995	Industry Average
Quality	5.1 σ	5.8 σ	4.3 σ
Cost of Quality	35%	17%	40%
Productivity KAELOC/mo	2.07	3.22	1.36

Motorola Government and Space Technology Group
In-Process metrics (not post-release)

	SEI Levels 1 – 3	SEI Levels 4 – 5
Quality	4.67 σ	5.00 σ
Defects/million LOC	752	228
Defect containment	65%	95%

1 Presented, 1996, QAI International Quality Software Conference

Structure of Formal Inspections

- Planning
- Overview
- Preparation
- Inspection
- Process Improvement
- Rework
- Follow up

The Law of Unreliability

Undetectable errors are

infinite in variety,

in contrast to detectable errors,

which are, by definition, limited!!

-- Tom Gilb

Testers Make Great Inspectors

- Analytic skills
- Critical mind set
- Pessimistic about product
- Optimistic about finding defects
- “BREAK IT!”
- “White Hat” Hackers

When should Testers be involved in Inspections?

- Requirements:
  - Are Requirements testable? Traceable?
  - Models
- Code
- Test Plans, Scripts, Cases
- User Acceptance Test Plan
- Other deliverables
- Standards

Static Testing

- Testers can perform Static Testing at any point:
  - Walkthroughs, Phase Reviews
  - Inspections, Peer Reviews
  - Audits
- Testers add value – Subject Matter Experts at finding defects

Remember

Over 80% of all defects are created before first line of code is written, generated, or outsourced!

Testers can help find defects early when they are cheaper to find and fix

Using inspection data

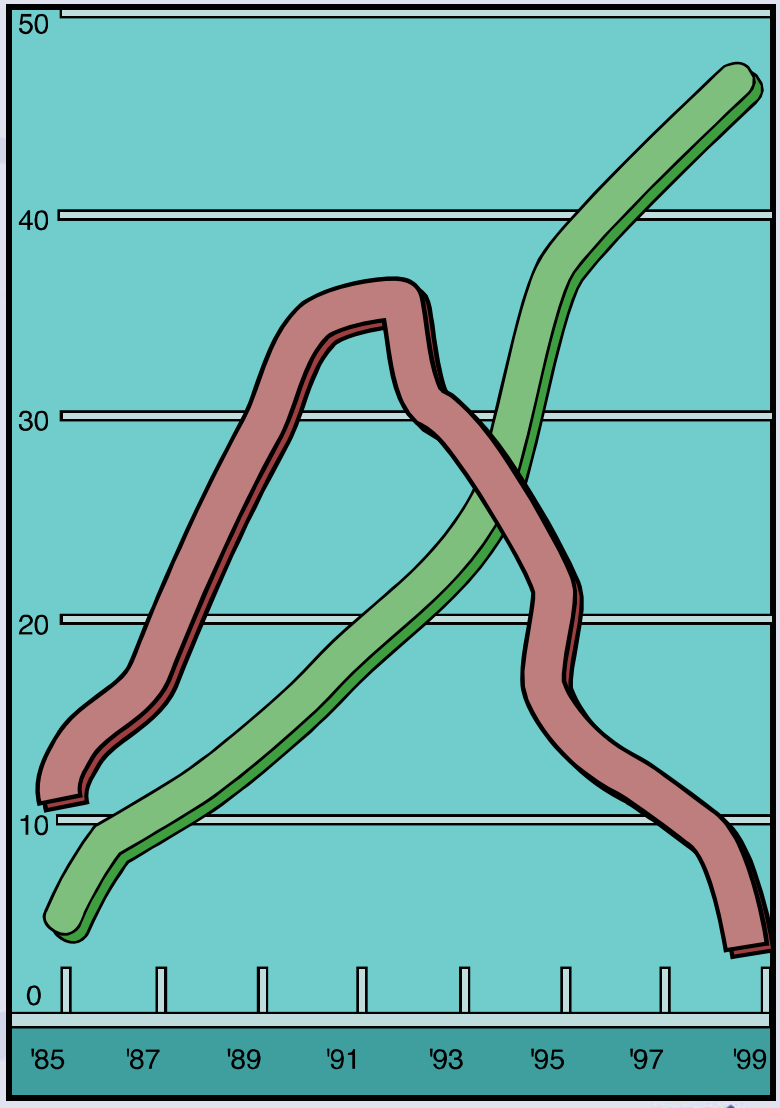
- Improvement of software (product)
- Improvement of processes
- Defect Studies
- Ongoing Measurement

Improvement of product

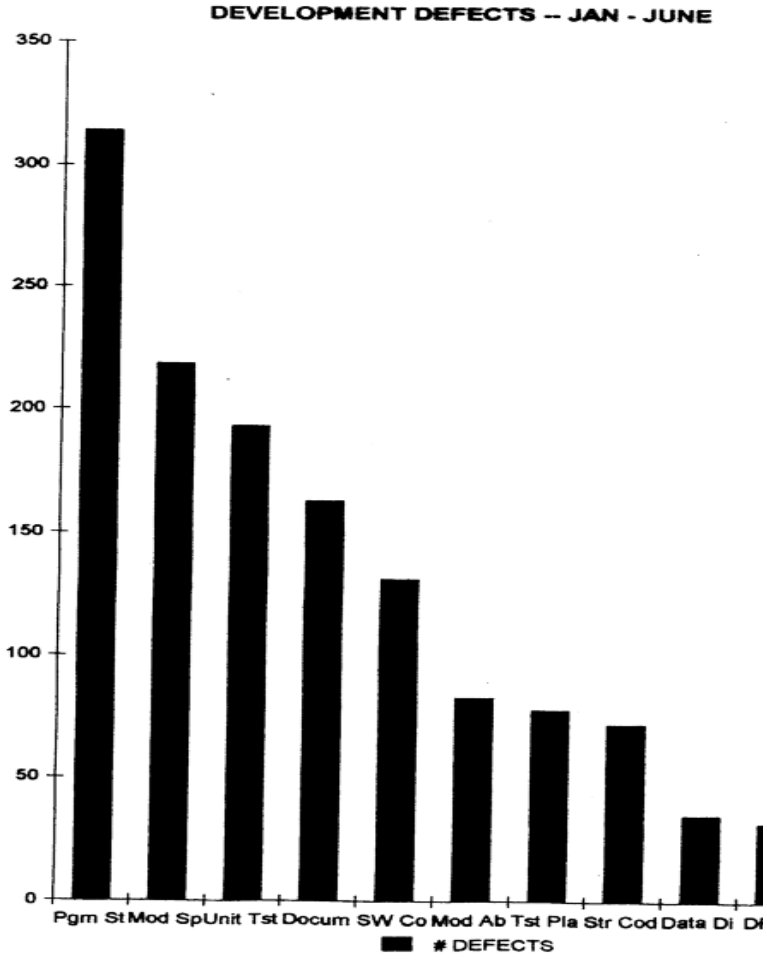
- Detected defects corrected
- Requirements defects not passed to design
- Design defects not passed to coding
- Coding defects not passed to testing
- Fewer defects in production

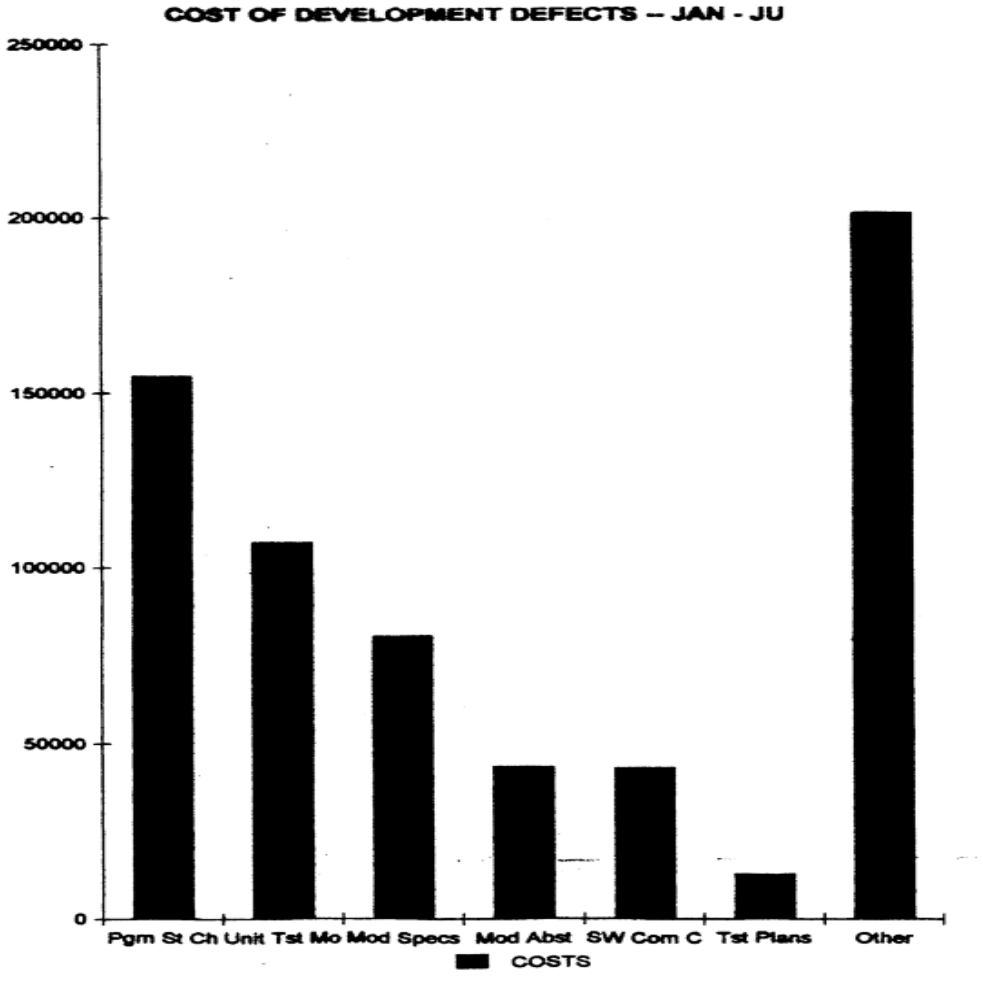
Defect Studies

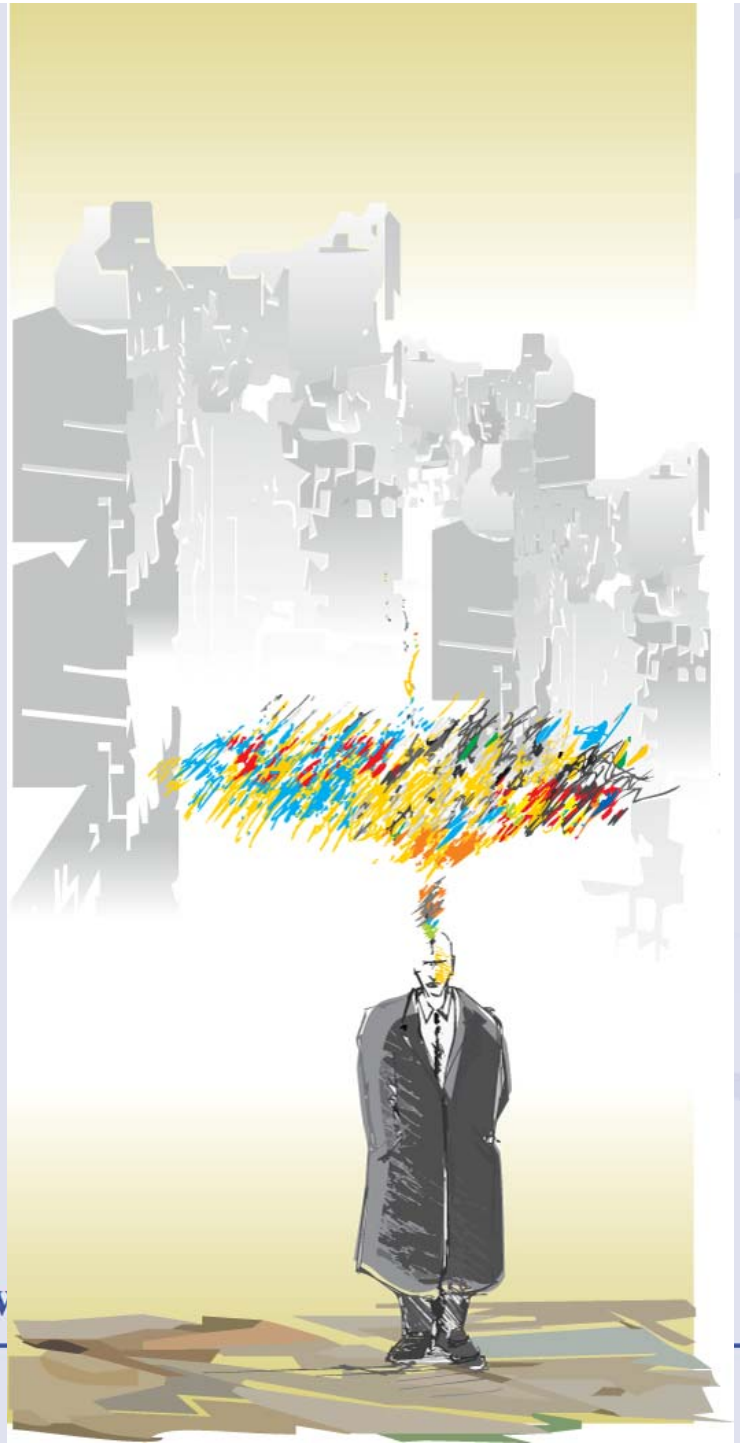
- Gather defects from many projects
- Classify by development stage
- Analyze clusters, trends
- Look for root causes
- Determine costs, frequency



Defect Data: Frequency and Costs







Data from Defect Studies

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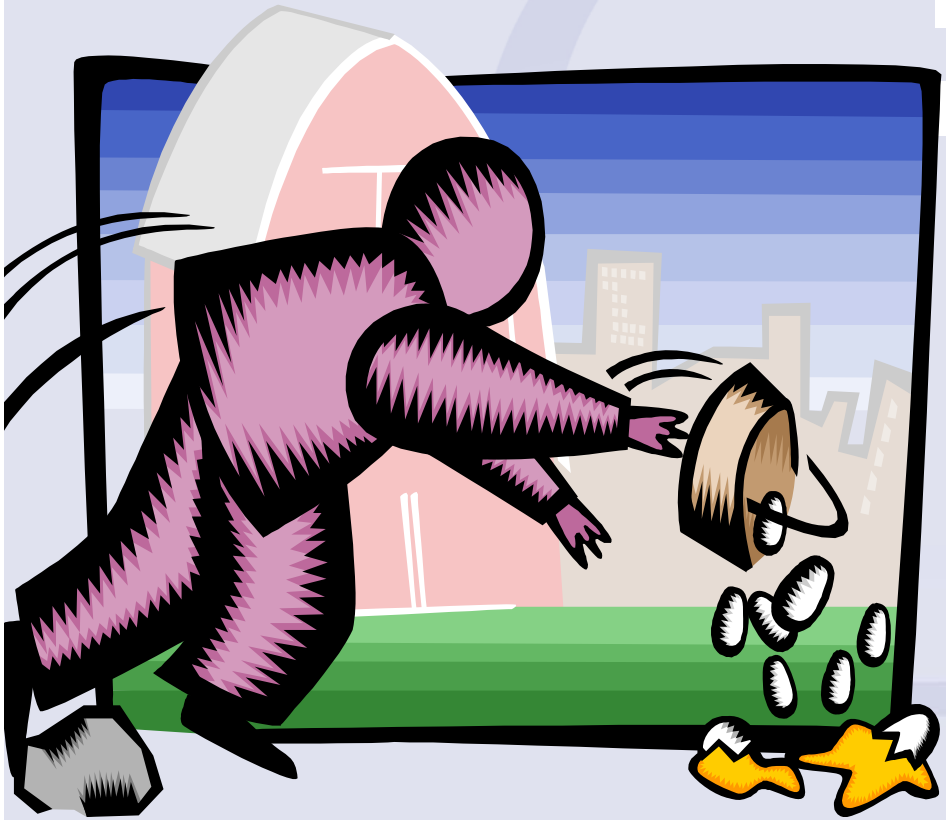
Testers involved in improvement

- Finding root causes
- Improving testing processes
  - Test planning, scripts, cases, data
  - Test tool selection
  - Requirements standards on testability
  - Models
  - User Acceptance Testing

Improvement of processes



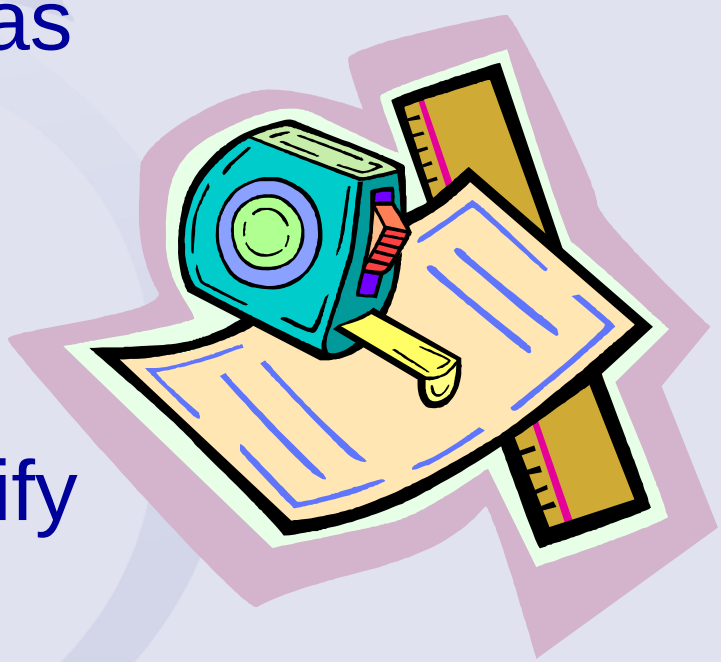
- Correct root causes
- Common causes are flawed:
  - Development process
  - Training process
  - Standards, policies, procedures
  - Management processes

Improvement of processes

- Drives improvement to new maturity and Sigma levels
- Reduces costs
  - Less rework
  - Less defect “leakage”
  - Use test tools more effectively
  - Shorter cycle time
- More satisfied customers
- Increased development capacity

Ongoing measurement

- Measurement established as legitimate, useful process
- Management by fact
- Demonstrate progress
- Plan, deploy, track and verify improved processes
- Increasingly sophisticated quality measures dominate
- Improved decision-making



15 X reduction in customer reported problems 2 X new feature content through increased productivity 41% increase, customer satisfaction	20% reduction, shipped Defect density 50% reduction, Cycle Time 2 X increased productivity 55% increased customer satisfaction Cost Avoidance: $46 million
25% increased productivity 82% Defects found by Inspection “0” Defects after 2 years in production 9% increased productivity over best 93% Defects found by Inspection “0” Defects in Acceptance Testing $958,390 NET savings, 324 Inspections	>65% efficiency, Defect removal by formal design Inspections >60% efficiency, Defect removal by formal Inspection vs. <50% efficiency using code walkthroughs Test efficiency: <20% Unit, <25% function, <35% Integration, <25% System, <50% Acceptance
Requirements Inspection = 40:1 reduction in development time Year 1: Inspections found 70% of defects, 50% eliminated by prevention Year 2: Inspection found 95% of defects, 70% eliminated by prevention 1st Inspection = 85% of defects found, Repeat = 15% found, Total = 100%	Inspections 3X more effective than testing $1600 savings/defect found prior to test $105 cost to find/fix, Inspections $1700 cost to find/fix in Testing $25,000 average Inspection savings 10 – 25% reduction, development time 90% reduction, corrective maintenance

The hidden power of Inspections

- Integrates
  - Quality Control
  - Quality Assurance
  - Quality Improvement
- Reduces dependence on dynamic testing alone
- Provides hard data to drive management by fact

ROI of Software Process Improvement: Metrics for Project Managers and Software Engineers

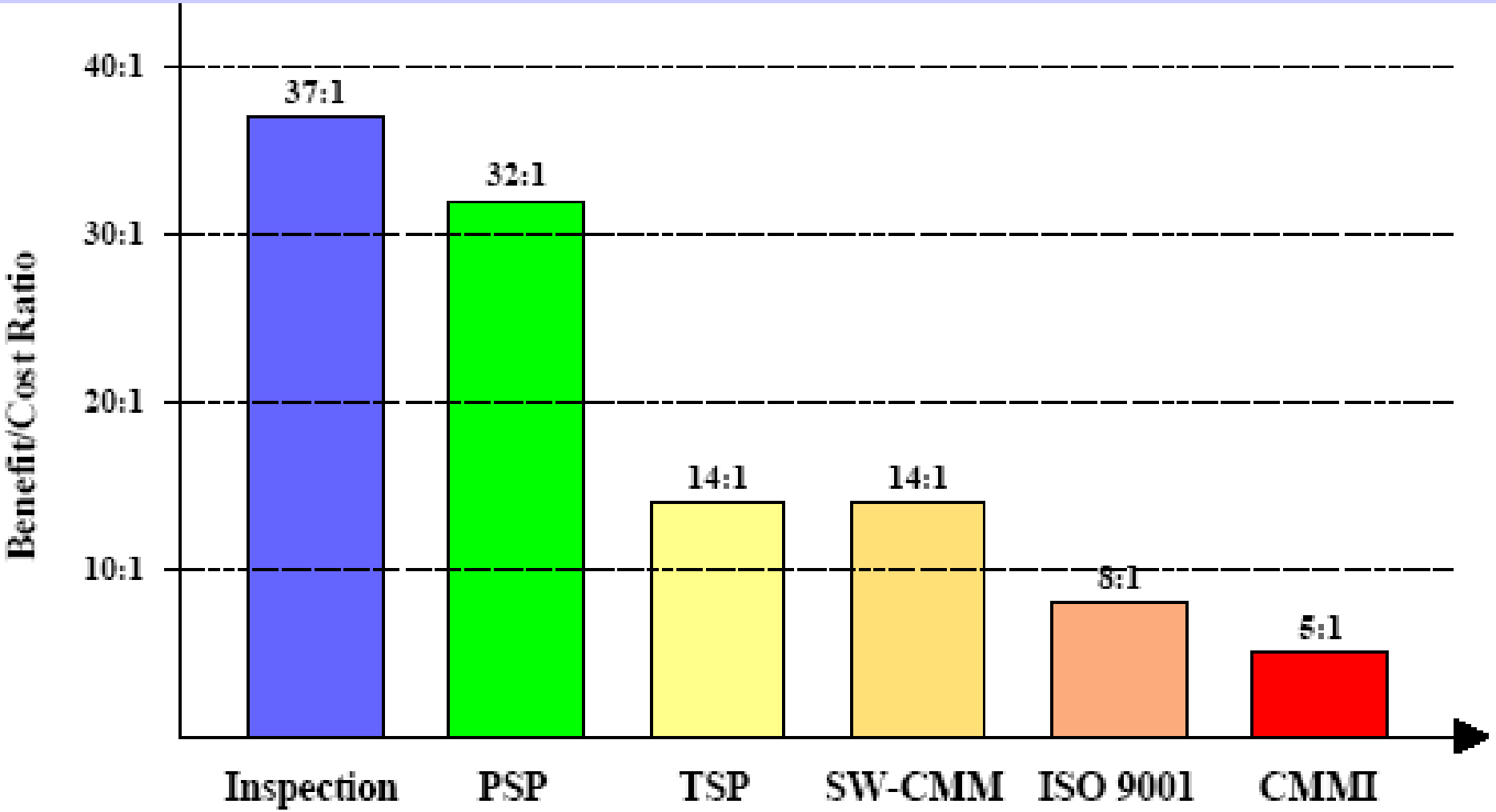
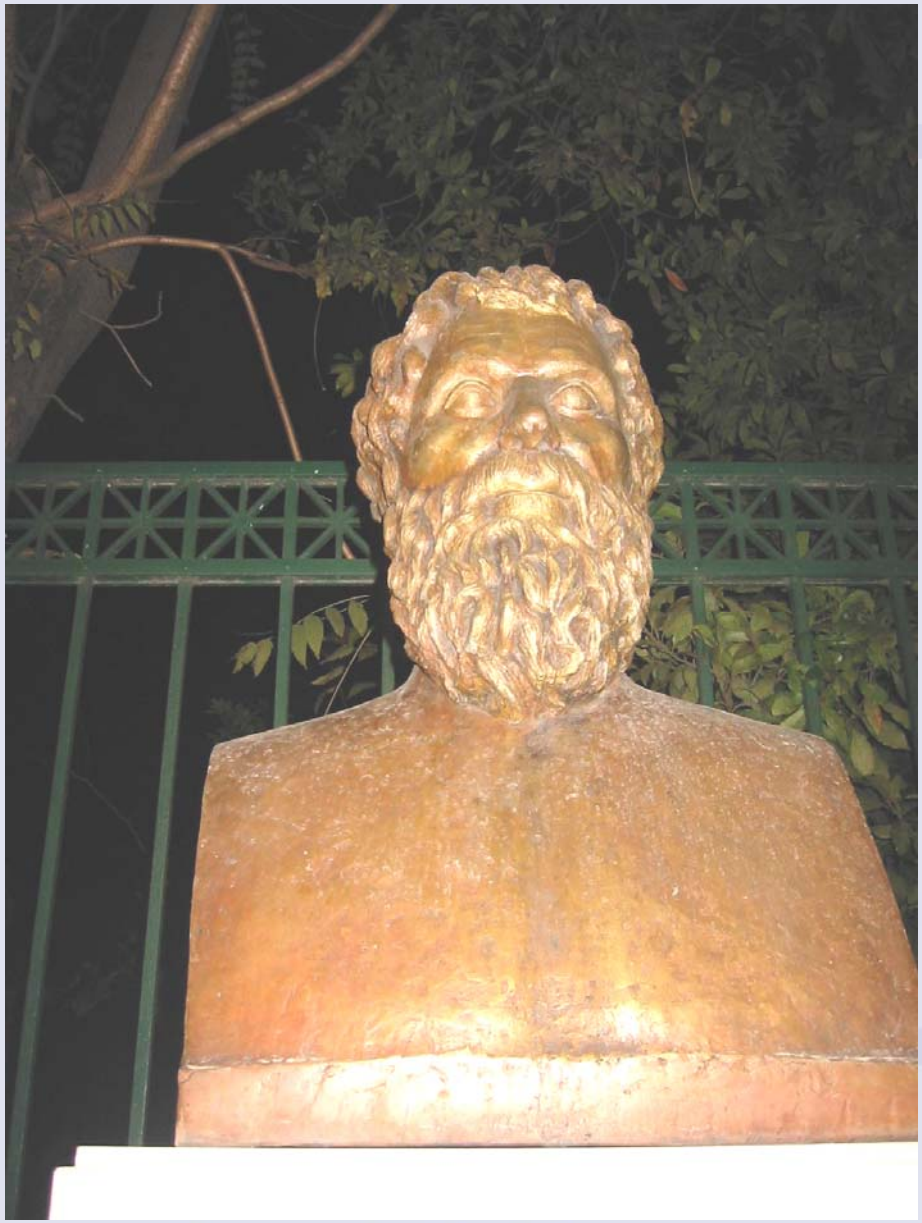


Figure 1: Examples for ROI

How to Estimate ROI for Inspections, PSP[sm], TSP[sm], SW-CMM®, ISO 9000, and CMMI[sm]
by David F. Rico

Resources

- *Software Inspection.* Tom Gilb and Dorothy Graham, Addison-Wesley, 1993
- ***www.result-planning.com*** or **www.gilb.com** – Tom Gilb's website
- ***www.mfagan.com*** – Michael Fagan's website, papers available
- *Peer Reviews in Software: A Practical Guide* by Karl E. Wiegers, 2002
- *High Quality Low Cost Software Inspections*, Ron Radice, Paradoxicon Publishing, 2002
- http://software.isixsigma.com/



Knowledge must come through Action

-- Sophocles

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