

*Defect Containment*  
*How much can you really save?*



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1

*Defect Containment*  
*How much can you really save?*

**Are you analyzing the right  
data from your projects?**

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2

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***How much can you really save?***

- There are hundreds of project statistics that could be collected and then analyzed at the end of a project.
- The challenge is to know what to analyze
- The challenge is to know how to analyze it.
- Benefits must be quantified for senior management.
- Staff must understand why the organization needs this ‘stuff’.

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***How much can you really save?***

## **Presentation Contents**

- Total Cost of Quality
- Defect Containment
- \$ Savings from Walkthroughs
- Key Function Point Statistics
- Conclusions

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# Total Cost of Quality

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- What is Software Quality?
  - Product that is free of defects
  - Product meets all of the User Requirements
  - Product that is fit for use
  - Product that the Customer finds friendly, very easy to use, problem free, all at an affordable cost

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6

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- Total Cost of Quality - What is it?
  - Overall cost to build quality into a product
  - Doesn't necessarily guarantee quality
  - Costs in this area are often traded off to reduce overall project cost (e.g. less testing)
  - The goal is to minimize total cost of quality while maximizing product quality

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***How much can you really save?***

- Total Cost of Quality
  - Prevention Costs
    - Expenditures to ensure job is done correctly the first time
  - Appraisal Costs
    - Expenditures to ensure the product is built to specifications and also meets the Business needs
  - Repair Costs
    - Expenditures to fix and retest defects

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***How much can you really save?***

- Total Cost of Quality
  - Prevention Costs include:
    - Development of processes
    - Acquisition of tools to prevent, manage, monitor, or measure rework
    - Development of Standards and Best Practices
    - Training on Standards, Best Practices, Tools, and Processes
    - Process measurement, analysis, and refinement

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- Total Cost of Quality
  - Appraisal Costs include:
    - Walkthroughs and Reviews
    - Test Planning
    - Test environment setup and management
    - All Testing (Unit, Integration, System, Acceptance) and validation of test results
    - Monitoring processes for compliance
    - Project Manager's time to manage QA/QC
    - Audit Activities

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### *How much can you really save?*

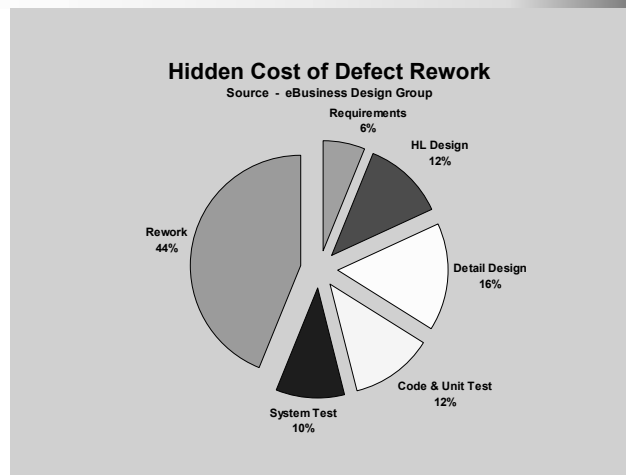
- Total Cost of Quality
  - Repair Costs include:
    - Documenting and managing defects to a proper conclusion
    - Reworking the affected areas
    - Testing and validating rework results
    - Any other cost associated with fixing the defect
      - staff overtime
      - restoring databases from backup

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11

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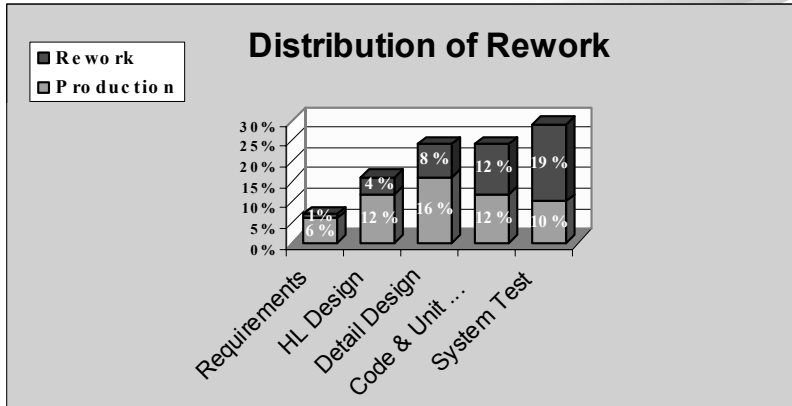


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12

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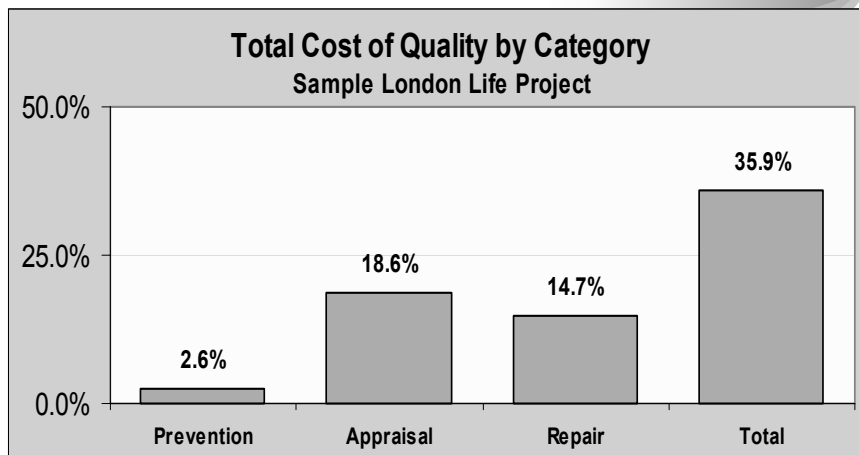


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13

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14

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- Total Cost of Quality - The Utopian Situation

No prevention

No walkthroughs

No test planning or testing

No rework

+

End product exceeds Customer Expectations

=

Zero Total Cost of Quality

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***How much can you really save?***

# Defect Containment



## ***Defect Containment***

### ***How much can you really save?***

- What is a Defect?
  - Any activity that involves rework/revisit (e.g.)
    - Missed Requirement or unnecessary feature
    - Design does not match the requirements
    - Answering questions on unclear requirements, specs, documentation, and procedures etc.
    - Coding mismatch with design; Design/Coding error
    - Standards violation
    - Environmental error or Test data error
    - Hardware or Software problems/incompatibilities
    - Errors or omissions in training material

## ***Defect Containment***

### ***How much can you really save?***

- What are the benefits of proper defect tracking?
  - Defects don't end up in the final product
  - Defect trends can predict product readiness
  - Provides a base of cross-project data for analysis
  - Defect analysis can pinpoint problem areas
  - Provides a focus on defects leading to increased awareness by project team members and mgmt
  - Provides information to senior management on project and product quality - support for initiatives

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***How much can you really save?***

- Defect Containment
  - Defects are not always found in the phase where they originate - many are found in later phases
  - The wider the gap between where defects originate and where they are found, the higher the cost to fix that defect
- Project Goals
  - Get it right the first time, failing that
  - Contain defects in their originating phase

***Defect Containment***  
***How much can you really save?***

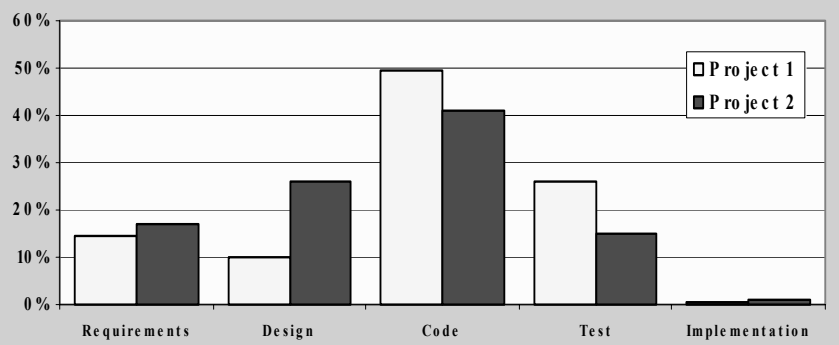
- Defects are Tracked by Project Phases
  - Requirements
  - Design
  - Coding (includes unit test planning & execution)
  - Testing (Integration, System, and Acceptance)
  - Implementation
  - Warranty
  - Production

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Where do Defects Originate?  
(What Phase?)

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Source of Defects - % by Phase

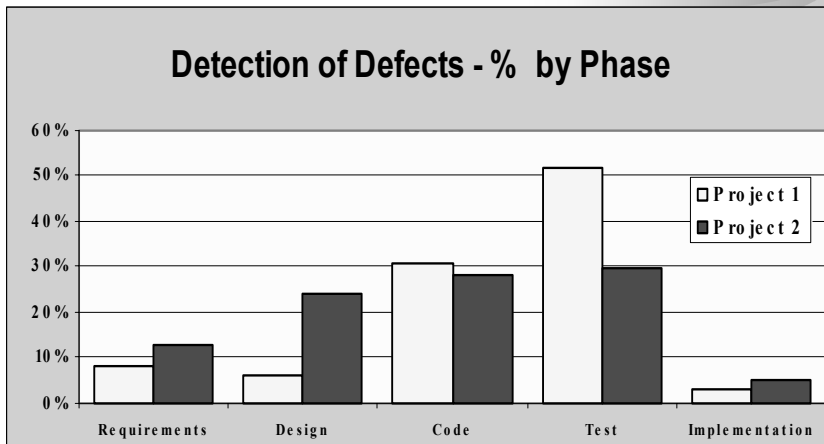


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Where are the Defects Found ?  
(What Phase?)

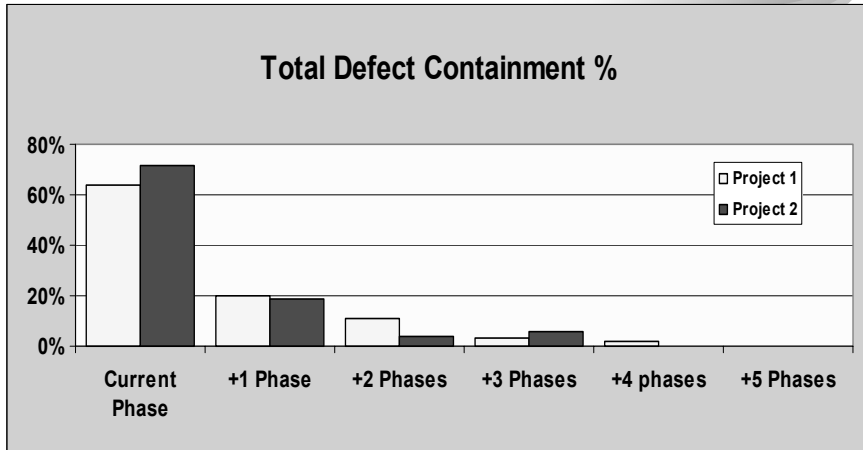
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Detection of Defects - % by Phase



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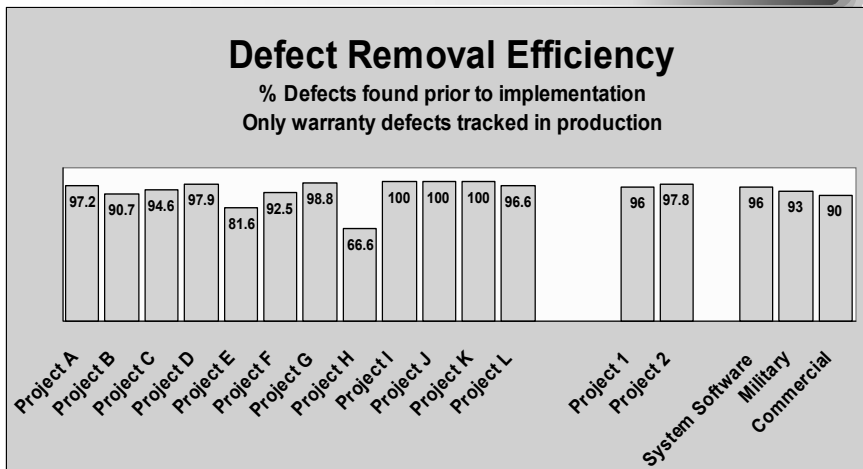


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25

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26

## *Defect Containment*

### *How much can you really save?*

- Cost assumptions to fix a defect (using \$50 per hour).
  - Defect found in current phase - \$200
  - Defect found in next phase - \$ 950 (4.75X)
  - Defect found 2 phases later - \$ 1700 (8.5X)
  - Defect found 3 phases later - \$ 2050 (10.25X)
  - Defect found 4 phases later - \$ 2400 (12X)
  - Defect found 5+ phases later - \$ 2800 (14X)

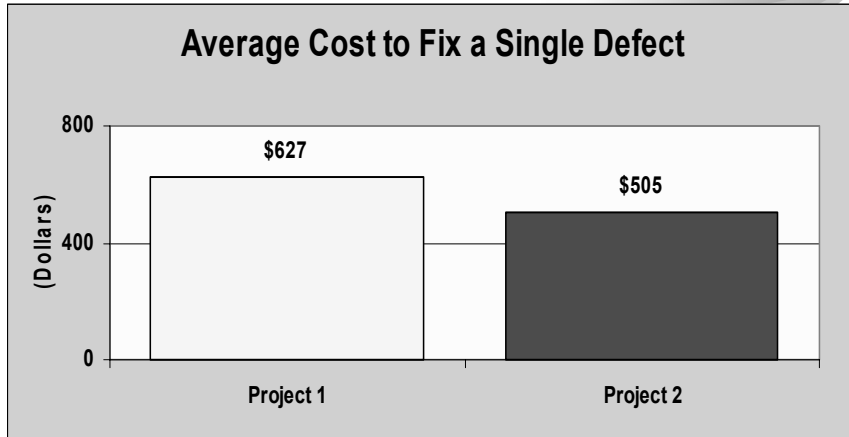
## *Defect Containment*

### *How much can you really save?*

- Example
  - Design defect found in design (i.e. same phase)
    - Designer changes design & validates - 4 hrs = **\$200**
  - Same defect found after coding phase (i.e. next phase)
    - Designer changes design & validates - 4 hrs = \$200
    - Developer analyzes code changes - 4 hrs = \$200
    - Developer changes code, checks, recompile - 4 hrs = \$200
    - Developer retests - 4 hrs = \$200
    - Developer validates Results - 3 hrs = \$150
    - **Total = \$950** (or 4.75 times)

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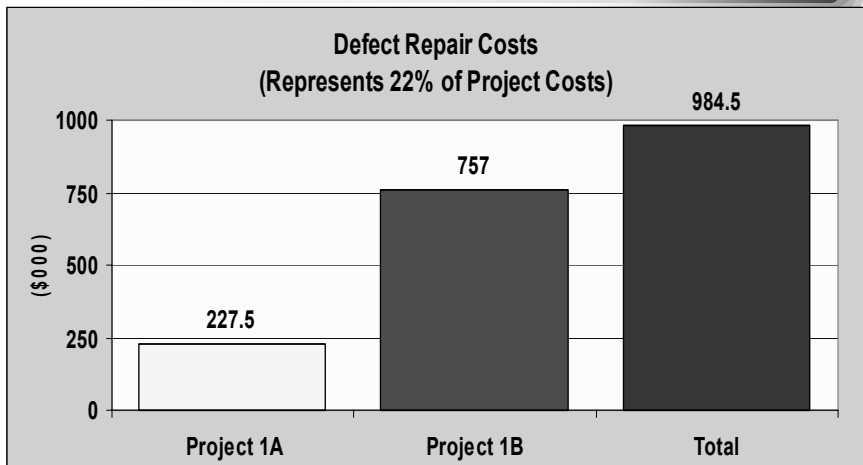


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29

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30

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**\$ Savings from  
Walkthroughs**

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31

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- Walkthrough Costs and Benefits
  - On average each Walkthrough takes 1 hour preparation time + 1 hour meeting time
    - **Costs for 5 people @\$50 per hour = \$500**
  - A defect found during a W/T costs \$200 to fix
  - Average cost to fix a defect found in a later phase = \$1980
  - Benefits therefore of finding and fixing a W/T defect is: **\$1980 - \$200 = \$1780**

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32



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- Additional Benefits
  - Defects not found during a W/T are also often missed during testing ---> they turn up in production.
  - Improved Business perception
    - better quality at a lower cost
  - Later stage defects place a strain on schedules & costs. This can result in undesirable fixes.
  - Effective W/Ts can reduce the retesting effort allowing for \$ to flow through to added function.

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# Key Function Point Statistics

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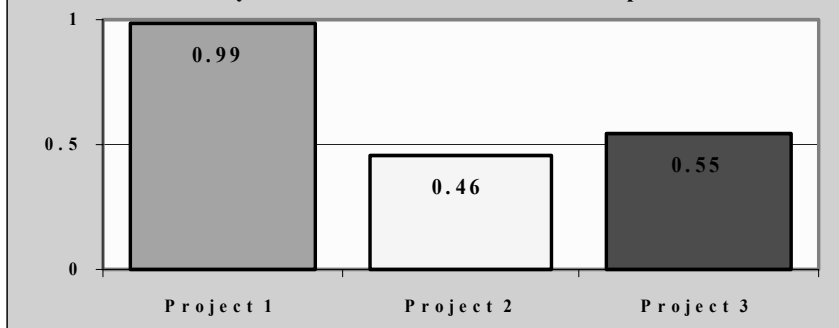
**What are Function Points?**

- Function points are a measure of the size of applications and the projects that build them.
- The size is measured from a functional, or user, point of view.
- It is independent of the computer language, development methodology, technology or capability of the project team used to develop the application

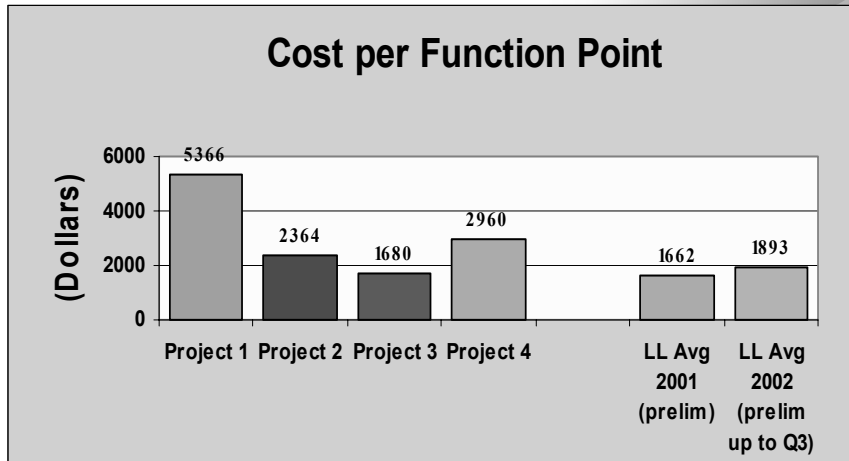
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**Defects Per Function Point**

Industry varies from .9 to 1.75 - Capers Jones



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37

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How is London Life Organized to collect and analyze this information?

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38

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- Project Teams
  - I.S. - Development; all testing (except acceptance)
  - Business - Acceptance Testing
  - QA - Processes including Defect Tracking and Analysis
- Walkthroughs for all major project deliverables
- Capture all defects in all project phases
  - Walkthroughs
  - System and acceptance testing
  - Warranty (production)

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39

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# Conclusions

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- **Conclusions**
  - Understand what data you need to collect and how you are going to collect it.
  - Understand how you are going to use the data
    - Focus on reduction of rework costs?
    - Communicate to senior managers?
    - Compare results across projects?
  - Since extra effort is needed on a project; explain and gain support for the processes:
    - Management, Project Leaders, Project Team Members
  - Be consistent across projects

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**Demo and Questions?**