

SOFTWARE QUALITY AS A DIFFERENTIATOR

A Presentation

by

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OVERVIEW

- ✘ Software Quality
- ✘ Cost of Quality
- ✘ Quality as Differentiator
- ✘ Quality Maturity Levels
- ✘ Software Quality Assurance
- ✘ Detection vs. Prevention
- ✘ Validation
- ✘ Verification
- ✘ Prevention

SOFTWARE QUALITY

✘ What is Software Quality

- + Absence of Bugs
- + Fitness to Use
- + Meeting Customer Requirements
- + Meeting Desired (Implicitly or Explicitly Stated) Requirements
- + Customer Satisfaction



COST OF POOR QUALITY

- ✘ Loss of Prestige
- ✘ Loss of Time
- ✘ Loss of Business
- ✘ Loss of Money
- ✘ Loss of Lives

QUALITY AS DIFFERENTIATOR

✘ Three stages of New Industries/Products

+ Stage 1

- ✘ Limited companies/producers
- ✘ Customers have little choice
- ✘ Price is determined by demand



+ Stage 2

- ✘ Number of companies increases
- ✘ Customers have more choices
- ✘ Price is determined by supply



+ Stage 3

- ✘ Number of companies increases further
- ✘ Customers have even more choices
- ✘ Price is determined by quality

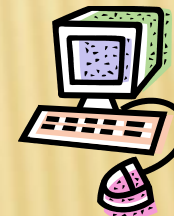


QUALITY MATURITY LEVELS (QML)

QML	Description
0	No investment in quality, individual skills determine quality
1	Minor investment in quality, validation (testing) for quality
2	More investment in quality, employing verification techniques
3	Focus on prevention , process definitions for quality control
4	Quality-centric organization, quality assurance and improvements

QML - PRODUCING CLAY POTS

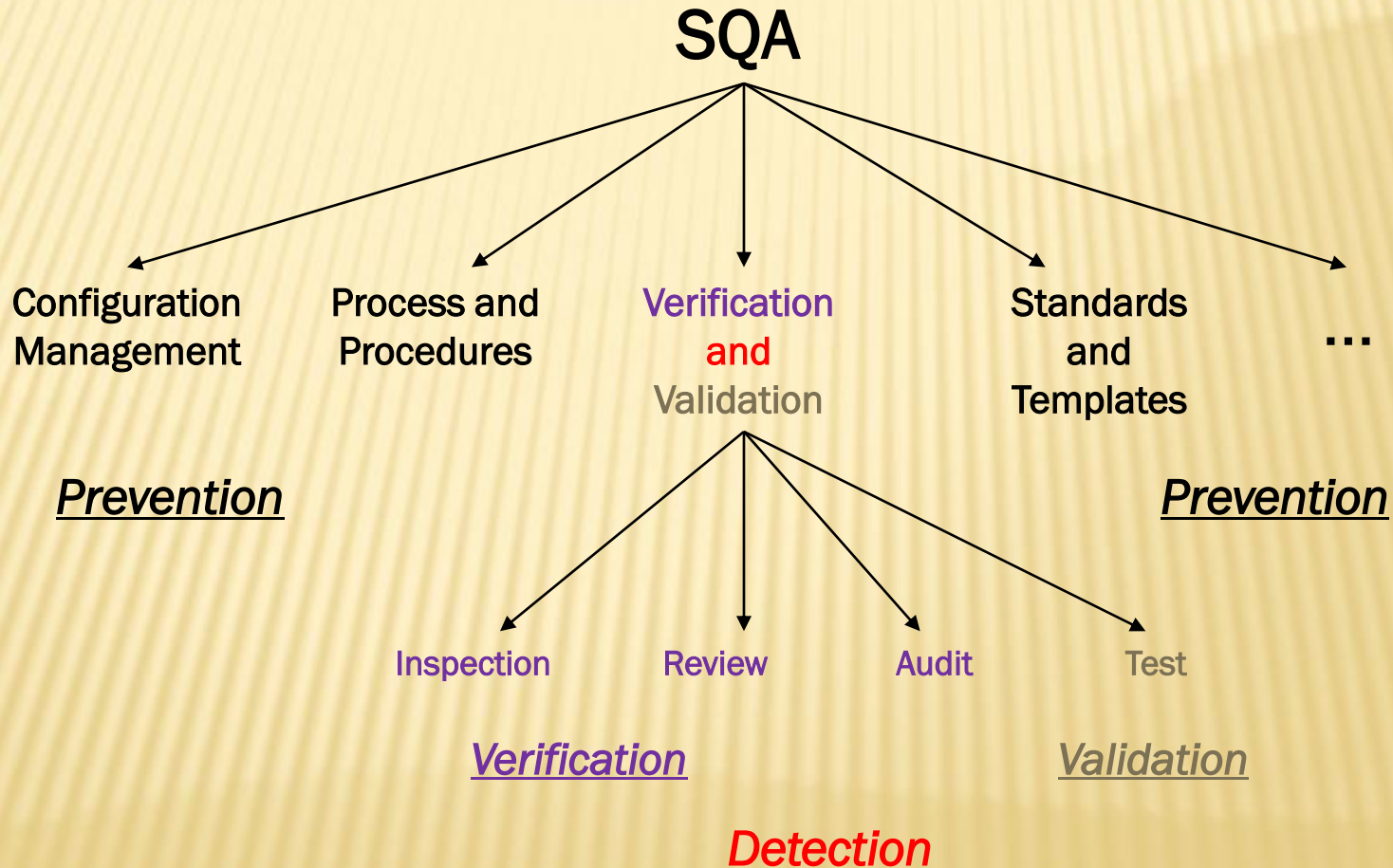
QML	Product
0	Sell clay pots as produced
1	Use a hammer to test the pots, throw away the ones that break – Validation
2	Verify that the right mixture, temperature and time of heating and cooling cycles are used – Verification
3	Use tools to control the mixture, temperature and time of heating and cooling cycles - Prevention
4	Buy materials from qualified suppliers, calibrate tools used regularly, take measurements and Continually Improve



ROAD TO QUALITY

- ✘ Detect Defects – Validation
 - + Test the end product to find defects
 - + Ensure that the right product is built
- ✘ Detect Defects – Verification
 - + Evaluate the intermediate products to find defects
 - + Ensure that the product is built right
- ✘ Prevent Defects
 - + Eliminate the source of defects
- ✘ Continuously Improve
 - + Improve processes and procedures using defect metrics

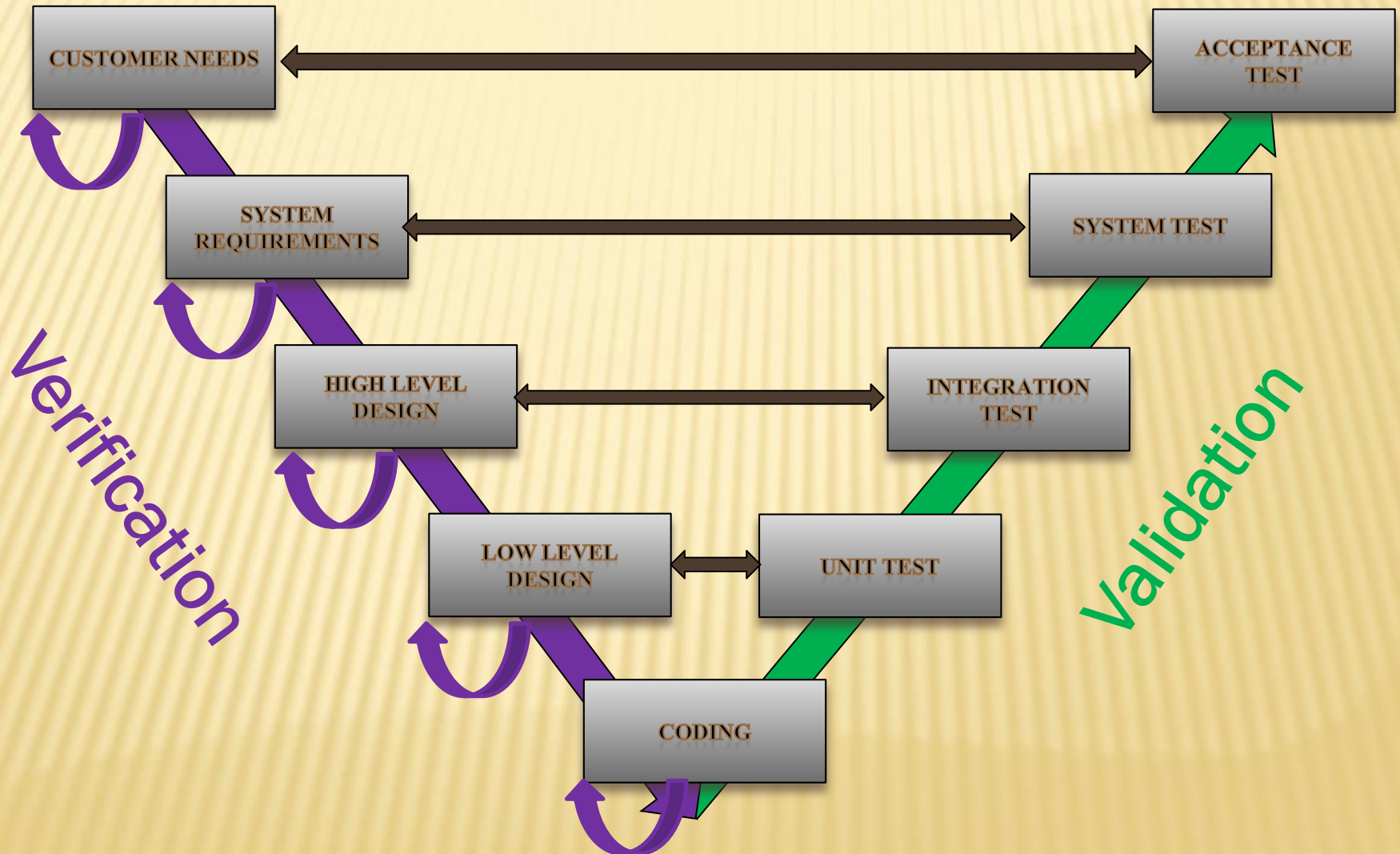
SOFTWARE QUALITY ASSURANCE



DETECTION VS. PREVENTION

- ✘ V&V focus on detection only.
 - + Inspections, Audits, Reviews, Walkthroughs (Static)
 - + Unit, Integration, System, and Acceptance Testing (Mostly Dynamic)
- ✘ QA focuses not only on detection but prevention of faults (a.k.a. defects, failures, errors, etc.) as well.
 - + Establish a suitable development environment
 - + Define processes and procedures to be followed
 - + Define how the effectiveness of the processes and procedures are to be measured and improved
 - + etc.

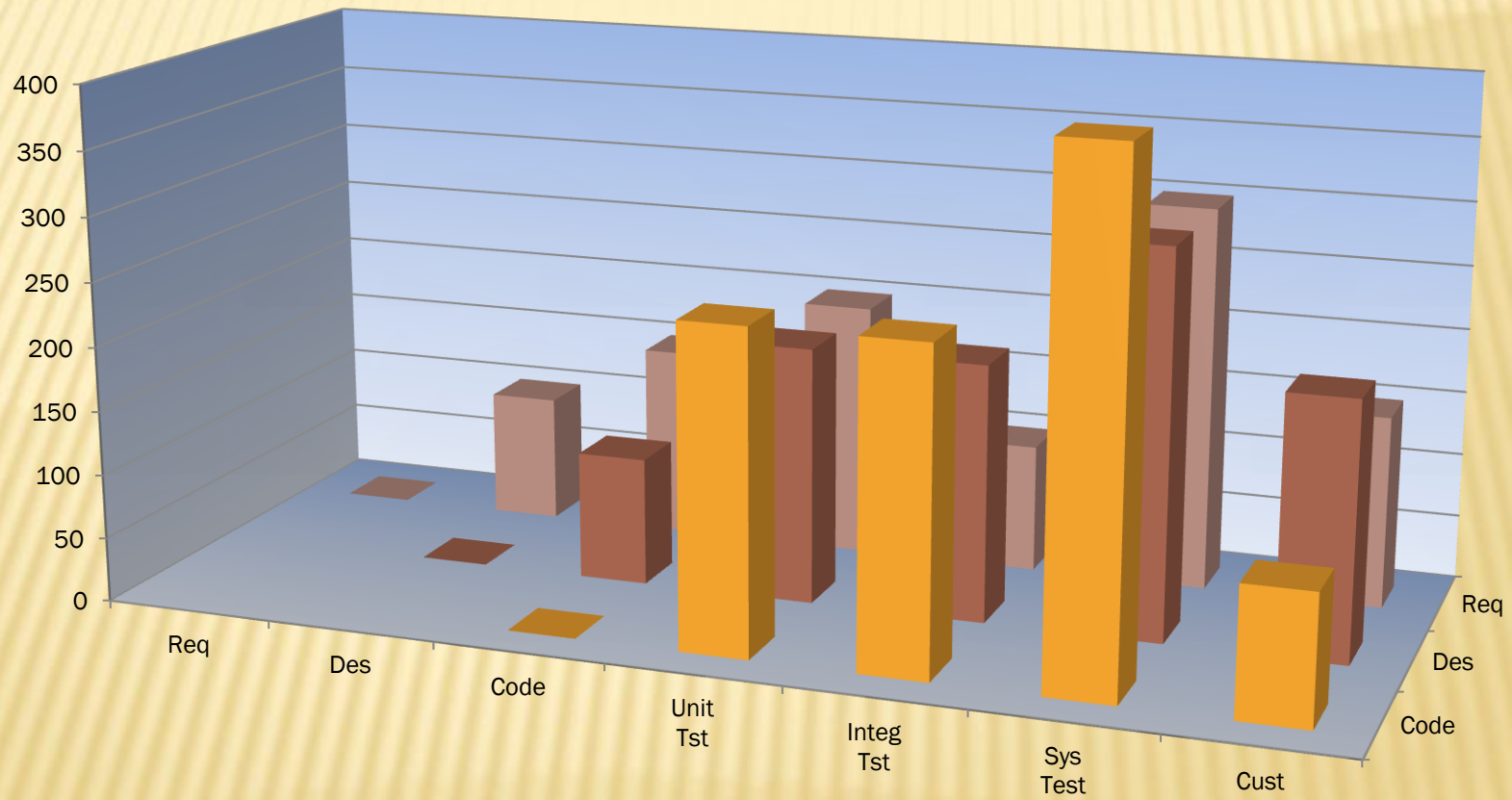
V - MODEL



VALIDATION

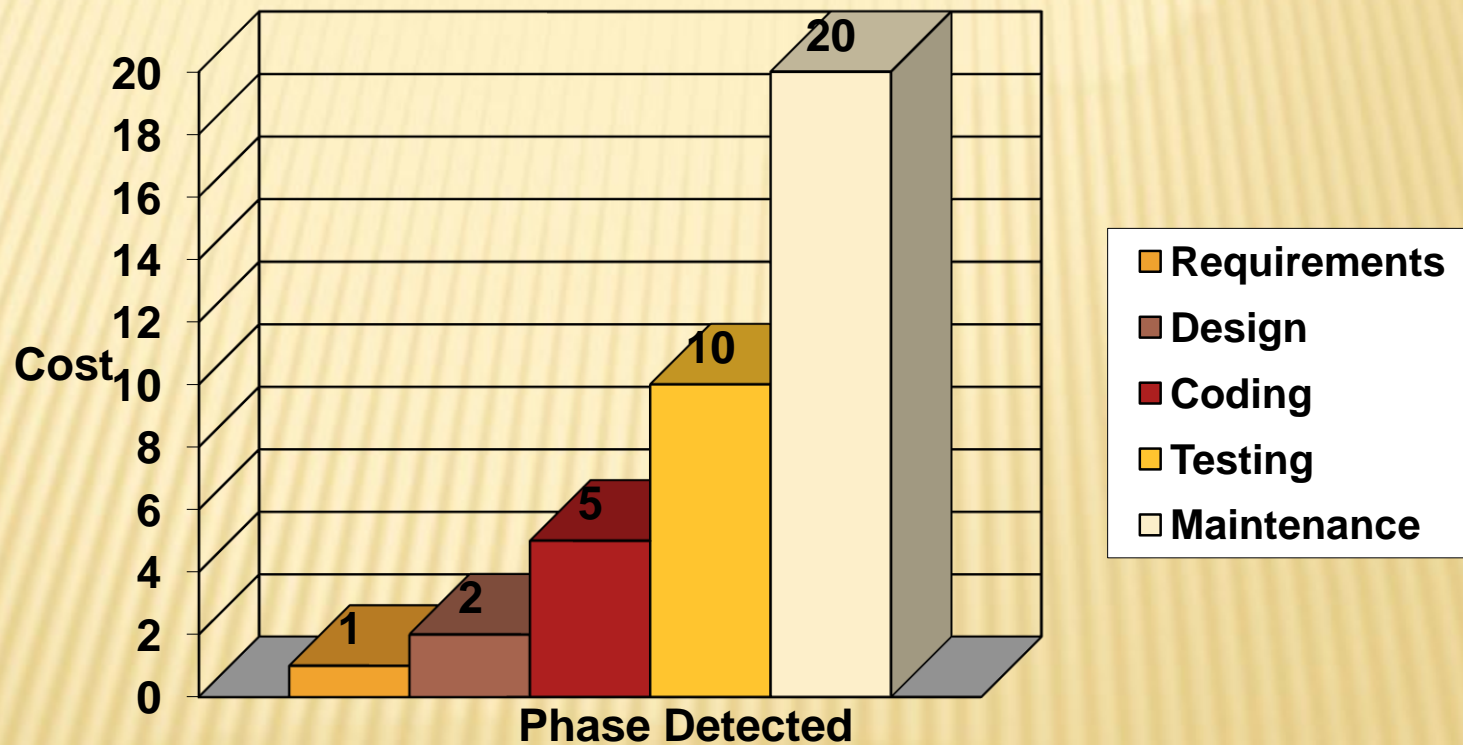
- ✘ Unit Testing
 - + Testing a module wrt a low level design specification
- ✘ Integration Testing
 - + Testing modules together wrt a high level design specification
- ✘ System Testing
 - + Testing the system wrt a system specification

VALIDATION



COST OF QUALITY – FIXING DEFECTS

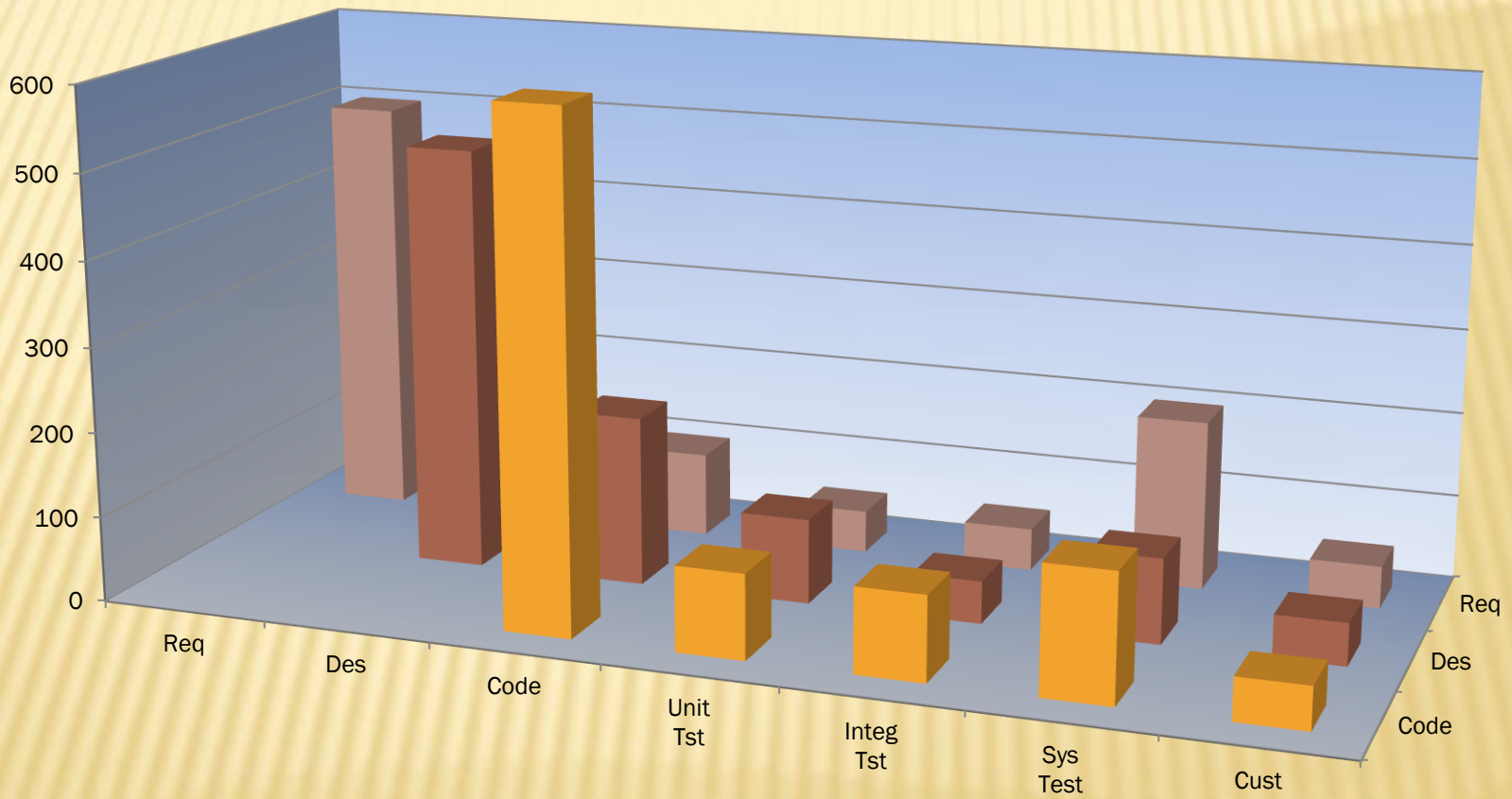
Cost of Fixing a Requirements Defect



VERIFICATION

- ✘ Walkthrough
 - + Present material for feedback
- ✘ Reviews
 - + Evaluate documents (requirements, design, code, ...) and mark defects
- ✘ Inspection
 - + Evaluate documents, mark and discuss defects, collect metrics
- ✘ Audits
 - + Independent evaluation of processes, architecture, technology, methodology, ...

VERIFICATION

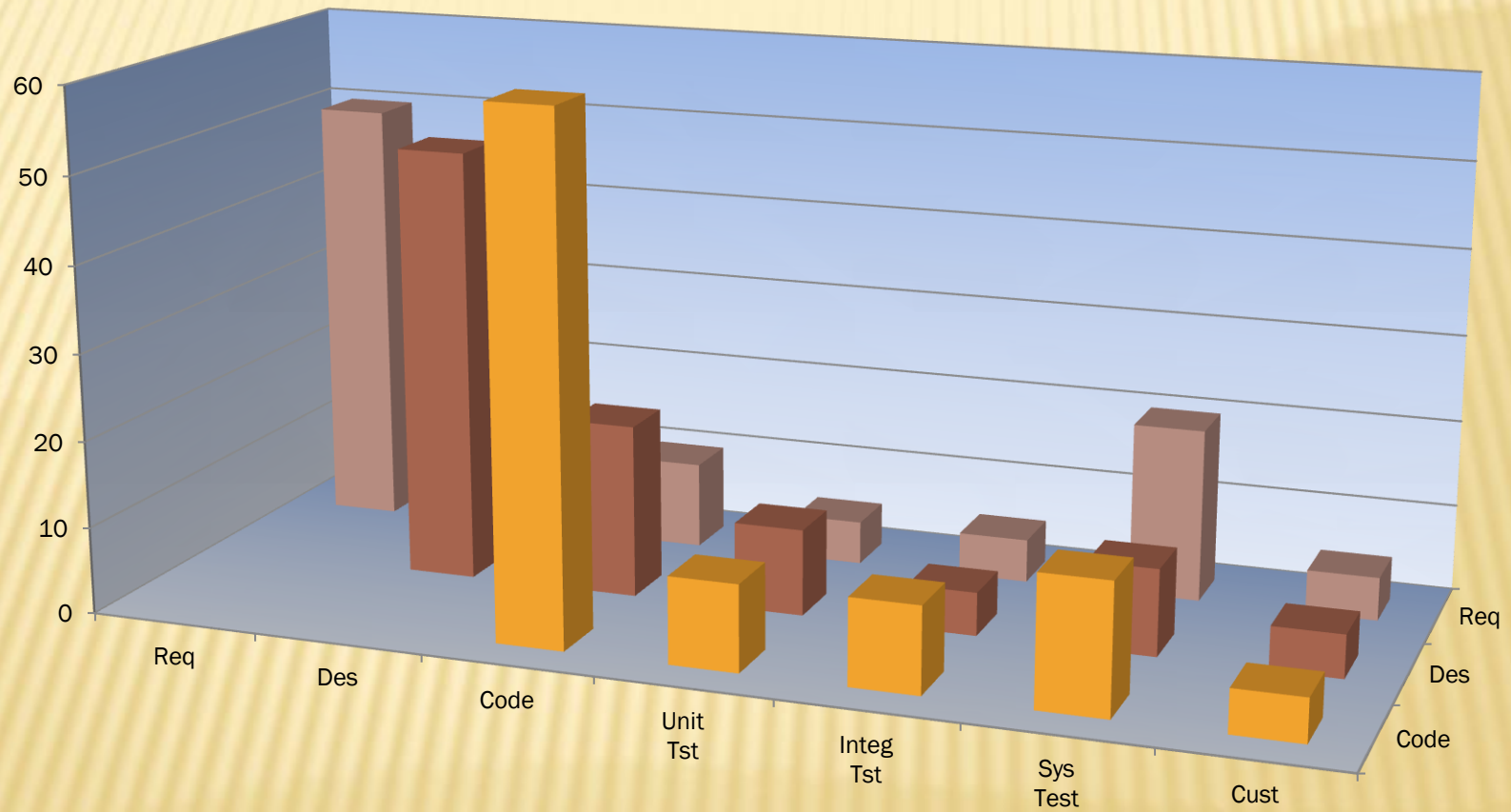


PREVENTION

Eliminating the source of defects

- ✘ Process Definition
- ✘ Metrics and Process Improvement
- ✘ Training
- ✘ Standards and Templates
- ✘ Configuration Management
- ✘ Standard Development Environment - Tools

PREVENTION



CLOSING REMARKS

- ✘ Quality is demanded by the consumer
- ✘ Quality is a major differentiator besides price and functionality
- ✘ Defect Detection presents immediate payback at a higher cost
- ✘ Defect Prevention requires initial investment, but the payoff is higher in the long-run
- ✘ Both Prevention and Detection techniques are a must for high quality products