Acceptance Testing For Users

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KC Consulting

The Software Quality Institute

Acknowledgements

- ***Quality Software Project Management*** **by:**
  - **Robert T. Futrell**
  - **Donald F. Shafer**
  - **Linda I. Shafer**

- **Software Project Management Program**
  - **University of Texas At Austin, College of Engineering Center for Lifelong Engineering Education,**

    Software Quality Institute

My Background

- Native New Yorker - born and raised in the Mohawk and Schoharie Valley area
- Bachelor of Science Degree in Management Information Systems from University of South Florida
- Certified Project Management Professional (PMP) through the Project Management Institute (PMI)
- Certified Software Project Manager (SWPM) through the University of Texas College of Engineering, Software Quality Institute
- SWPM Instructor and Mentor at University of Texas

  Hook 'em Horns!
- Almost 20 years experience as an employee and consultant in Texas State Government projects

Today's Agenda

- Introduction to Software Quality
- Requirements and Test Criteria
- Test Strategy and Planning
- Test Execution
- Acceptance and Beyond

Importance of Software Quality

Why do we need to manage projects toward good software quality?

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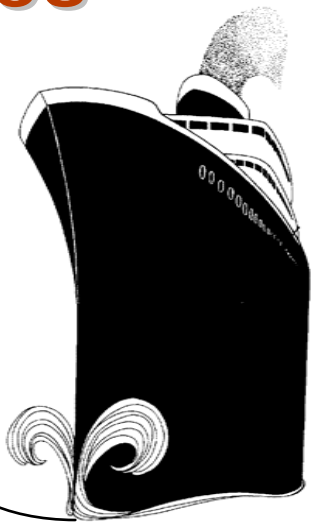
Some Reasons for Project Trouble

- Poor Planning – Unrealistic Costs / Schedule
- Ill Defined Charter Or Contract
- Unstable Problem Definition
- Poor Communications
- Poor Requirements Understanding
- Inexperienced Project Management
- Unrealistic Expectations
- Ineffective / Non-existent Change Control
- Political Pressure
- Shortage Of Skilled People
- . . .

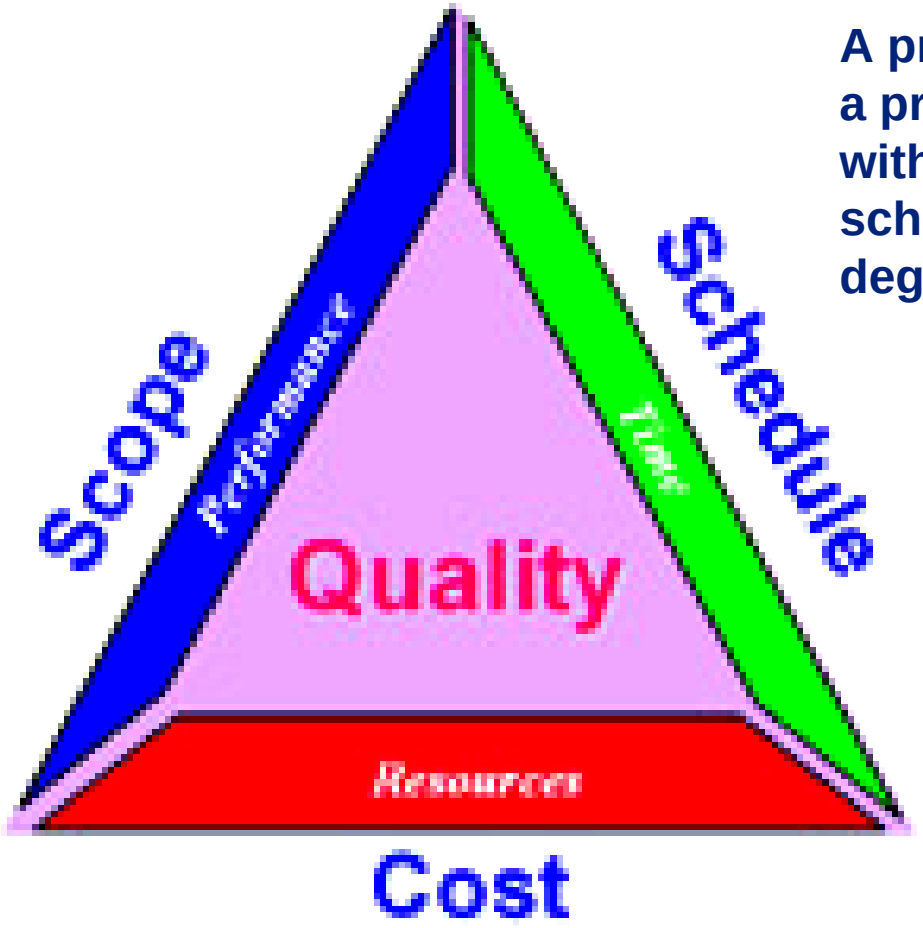
The Real Quality Cost Issues



- Customer Or Problem Reports
- Lawsuits
- QA & Test Department Costs

- Excessive Turnover
- Poor Teamwork
- Lack Of Planning
- Lack Of Business Understanding
- Poor Problem Handling
- Stress Due To Constant Overtime
- Lost Opportunities
- Lack Of Good Practices & Standards
- Ineffective Project Performance
- Poor / Ineffective Customer Relations

The Triple Constraint



A project strives to deliver a product of a given scope, within a given cost and schedule, with a certain degree of quality

"We want it Fast, Good and Cheap!"

Quality is *built in* into a software product through the implementation of software engineering methodologies and software process improvements

Fundamental Teachings on Quality

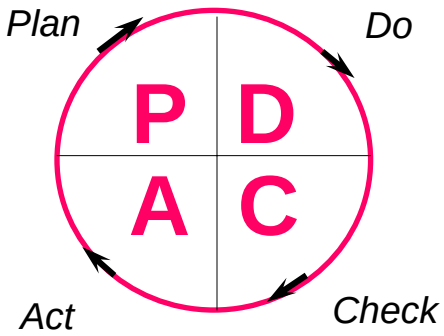
- **The GURUs of Quality**
  - **Walter Shewhart**
  - **Joseph Juran**
  - **Phillip Crosby**

- **Quality Programs**
  - **TQM**
  - **Business Process Reengineering**
  - **Software Quality Assurance**
  - **Capability Maturity Model**
  - **Six Sigma**

Walter Shewhart

- **"Father of statistical quality control" - Created statistical methods for quality control in 1930's while at Bell Labs**
- **Today we call the whole set SPC (Statistical Process Control)**
- **Invented the Plan-Do-Check-Act cycle of process improvement**
- **Divided process variability into:**
  - **common causes (normal)**
  - **special causes (abnormal)**

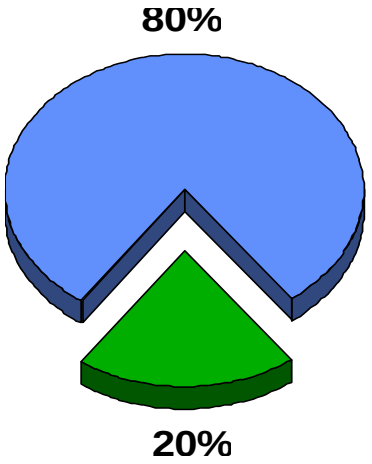
Walter Shewhart Biography at:
http://www.asq.org/about/history/shewhart.html

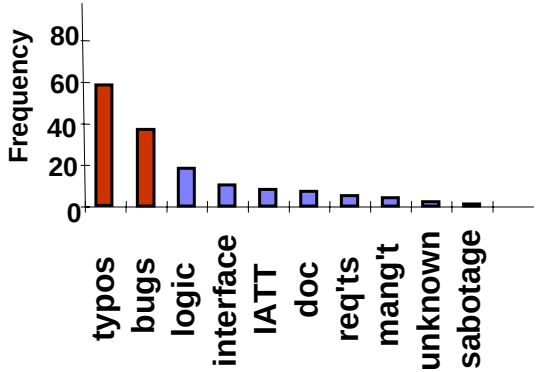


Joseph Juran's Contributions

- **Known for bringing the Pareto Principle into use, coining the terms "trivial many" and "vital few"**

- **Also known as the "80/20" Rule**
  - the vital few weak elements of a product account for cost of the errors
  - formalized into Pareto charts (ordered histograms) separate the vital few from the trivial many.





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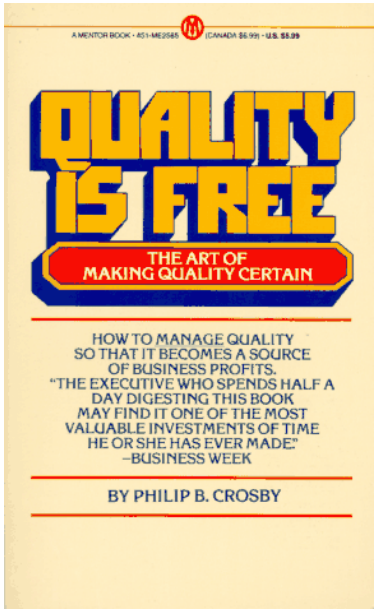
Joseph Juran's Contributions

- **On Quality:**
  - **Said quality was "fitness for use", not just "conformance to specifications"**
- **Promoted:**
  - **upper management leadership in quality improvement**
  - **quality training for all**
  - **structured annual improvement plans**
  - **teams examine defects, form theories, test theories, install remedial action**
  - **some defects are worker-controllable, some are management-controllable; the latter are often the harder ones to fix**

Philip Crosby's Contributions

- **Leader of Total Quality Management (TQM)**
- **Quality Director at ITT**
- **Authored "Quality is Free" 1979**
  - drew lots of attention to poor quality in U.S. products



Philip Crosby's Four Absolutes

1. **Quality means conformance to requirements**
2. **Quality comes from prevention - based on training, discipline, example, leadership**
3. **Quality performance standard is Zero Defects - don't tolerate "acceptable quality levels" - "Do It Right the First Time" (DIRTFT)**
4. **Quality measurement is the Price of Nonconformance**
   - **manufacturing companies spend about 25% doing things wrong**
   - **service companies spend about 40% on wasteful actions**

Reference: Philip Crosby, *The Eternally Successful Organization*, 1988

Quality Focus

Total Quality Management Concepts applied to Software Project Process Management

- **Sort out the many Quality Mgmt labels**
- **Apply key ideas from:**
  - **Walter Shewhart**
  - **W. Edwards Deming**
  - **Joseph Juran**
  - **Phil Crosby**
- **Use Assessments of Quality**
  - **ISO9000**
  - **SEI CMM (CMMI)**
  - **MBNQA (Malcolm Baldrige)**

Quality Labels - What do they mean?

- **TQM - Total Quality Management**
- **BPR - Business Process Reengineering**
- **FURPSI - Functionality, Usability, Reliability, Performance, Supportability, Integrateability**
- **CQI - Continuous Quality Improvement**
- **CPI - Continuous Process Improvement**
- **TCS - Total Customer Satisfaction**
- **QMS - Quality Management System**
- **Hoshin - Japanese term for strategic quality plan (literally, policy deployment)**

More Quality Labels– What do they mean?

- VoC - Voice of the Customer
- QFD - Quality Function Deployment
- SPC - Statistical Process Control
- SEI - Software Engineering Institute
- MBNQA - Malcolm Baldrige National Quality Award
- ISO - International Organization for Standardization
- CAT, ET, QIT, PIT, PPT - Corrective Action Team, Effectiveness Team, Quality Improvement Team, Process Improvement Team, Process Perfection Team
- Six Sigma- DMAIC = Define, Measure, Analyze, Improve and Control

What is TQM?

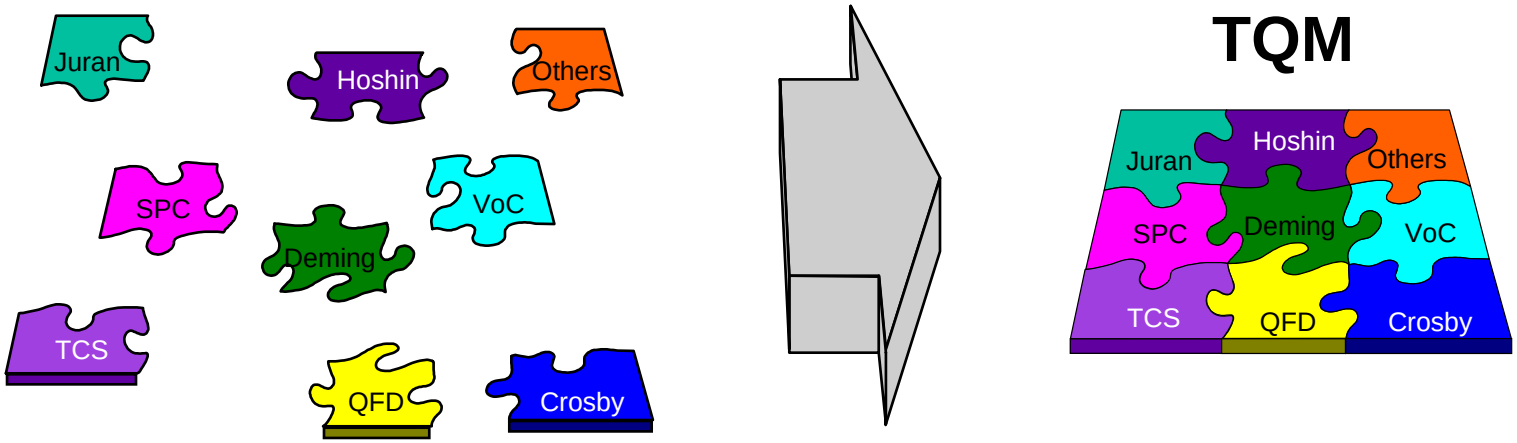
Total Quality Management

- **Organization-wide continuous process improvement**
  - **to meet and exceed customer needs (delighted customers)**
  - **at lower costs, with higher revenue**
  - **with employee empowerment**
  - **focused on processes and systems**
  - **using management by fact**
  - **enabled by continual training and learning**
  - **assessing progress to goals that evolve with a plan**

What is TQM?

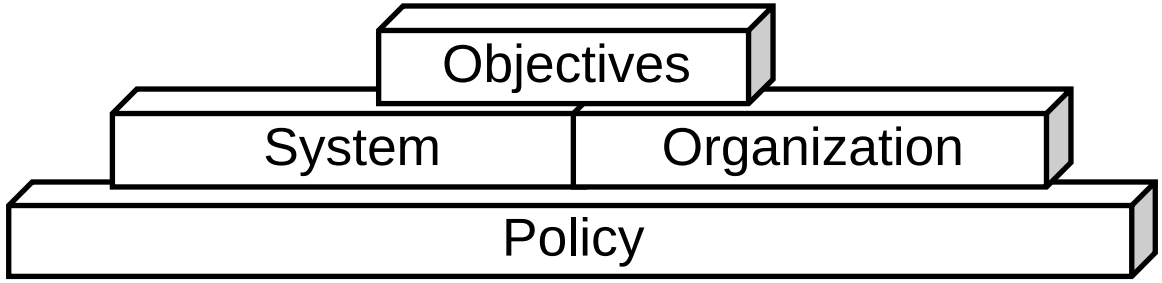
Total Quality Management

- **MUCH more than a "program of the month," an *integration* of the work of many gurus (Deming, Juran, Crosby, ...)**
- **Total Quality Mindset**



Software Quality Framework for TQM

Building quality products is nurtured by a solid framework that supports quality efforts for all employees



- ***Policy*** clearly expresses organization commitment
- ***Objectives*** are current measurable improvements identified by the organization (corporation, group, ...)
- ***System*** is the collection of processes and procedures used to achieve the objectives
- ***Organization*** is a team of experts who coach, teach, evaluate, and check the quality activities of the teams in the whole organization

What is BPR? *Business Process Re-engineering*

- **The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in performance (cost, quality, capital, service, speed)**
  - **Fundamental -** first determine what must be done, then how; ignore the current approach
  - **Radical -** disregard current procedures; get to the root of things
  - **Processes -** entire collection of activities that transform inputs into outputs of value to the customer
  - **Dramatic -** aimed at major, not tuning, improvements

Reference: Michael Hammer, James Champy: *Business Process Reengineering*, 1993

What is Six Sigma?

- Developed by Motorola
- Sigma often used as a scale to measure goodness
- Process improvement program aimed at reducing defects
- Levels of abilities within organizations
  - Yellow Belts - trained
  - Green Belts – implementors that retain regular job responsibilities
  - Experts or Black Belts – Experts that focus on implementation full time
  - Master Black Belts – Organizational Coaches

Source:
http://www.motorola.com/motorolauniversity.jsp

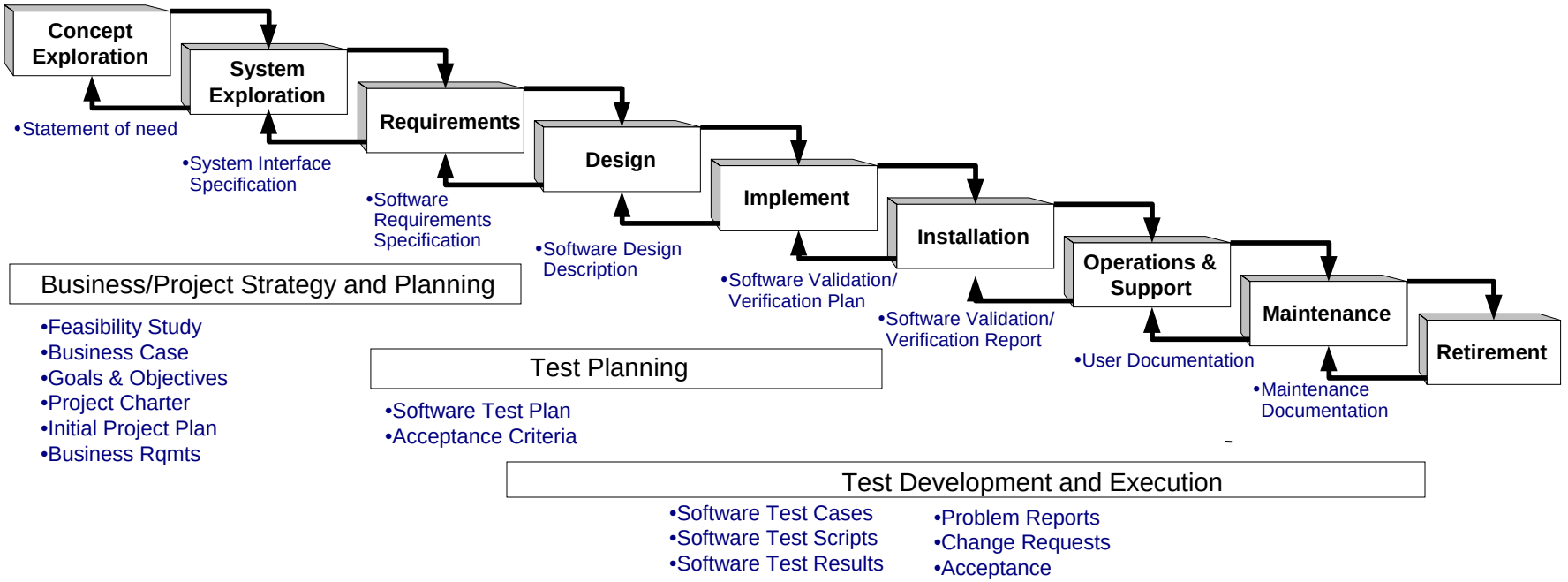
Conceptualize the business... then the software

- **Customers optimize the benefits of software by first developing a business vision that includes:**
  - **People and organization**
  - **Process and procedures**
  - **Environment and climate**
  - **New and emerging technologies**
  - **Changing attitudes and politics**
  - **Economy and funding**
- **What is the strategic vision for the business?**
- **How can the strategic vision be realized through change and supported by software?**

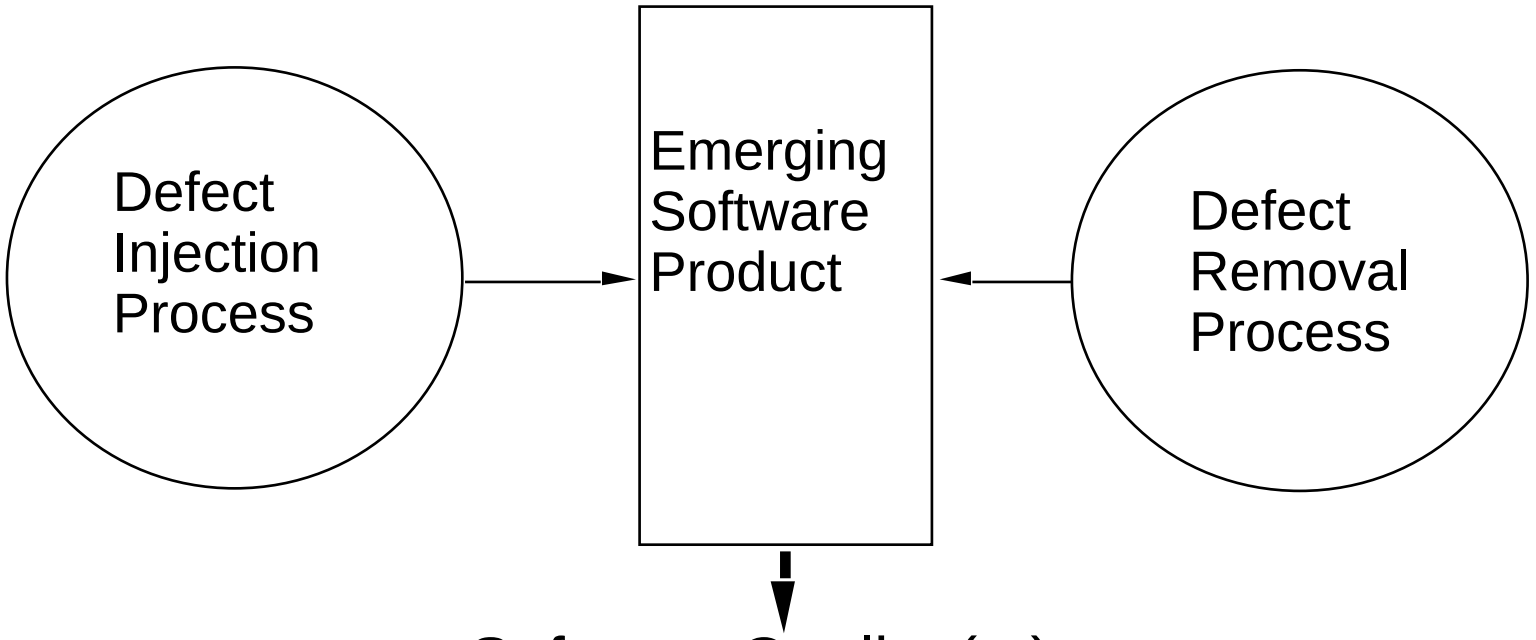
Software Quality Assurance – Throughout the Development Life Cycle

- **Validation**
  - **Are we doing the right things?**
    - **Is what's being created that which is required?**
    - **Will it support our vision?**
- **Verification**
  - **Are we doing the things right?**
    - **Does the implementation provide accurate results ?**
    - **Does the implementation do what was specified?**
    - **Does the implementation work as documented?**

Understanding The Software Development Life Cycle



Software Quality - A Tug of War



Software Quality (*t*) =
defects injected (*t*) - # of defects removed (*t*)

what should your quality target at delivery be ?

The Role of Users in Improving Quality Outcomes

- What you want vs. what you get – don't be surprised!
- Participation throughout the software development process
- Users and developers share responsibility for
  - Requirements elicitation and management
  - Prototyping feedback
  - Static testing (reviews)
  - Dynamic testing (system and acceptance testing)

Managing Requirements are Key

- Understand your needs and avoid being overly prescriptive in the early stages
- Make sure your requirements **are** requirements – do your part to control scope
- Develop scenarios, storyboards, work flows to help developers understand the business context / need
- Assist developers in writing Use Cases, Requirements Specifications
- Work with developers and management to prioritize requirements
- Develop test criteria along with requirements
- Trace requirements through to acceptance testing

Prototyping

- Conceptual representations of the software
  - Paper-based
  - User-interface based
- Prototypes are tools - not a complete system
- Interactive process between users and developers
- Improves understanding of requirements – reduces misunderstandings
- Provides critical view of the software to users – look and feel
- Increases user satisfaction

Static Testing with Reviews

- Does not require execution on a computer
- Validation of software development products before the code is written
- Allows the detection and removal of errors and identifies omissions early in the development process
- Provides an opportunity for learning and a basis for making improvements
- Users should be involved in some reviews
  - Most importantly – Requirements and Test Plan reviews
  - Other reviews on Planning documents and user documentation.

Dynamic Testing

- Requires execution on a computer
- Developers perform dynamic tests early in the stages of code development
- Users perform dynamic testing in the latter stages of the code development
  - System Test (sometimes)
  - Acceptance Test
- Goal is to uncover and fix as many errors as possible within the bounds of diminishing returns
- Cannot 'Test in Quality' but can confirm the 'Built-in Quality'

Acceptance along the way

- **Acceptance testing**
  - **Determines whether the software is satisfactory and meets the business needs**
  - **Is typically the last step in software development**
  - **Major misunderstandings / mistakes discovered during acceptance testing are the most difficult and expensive to correct**
- **Early input and involvement of users in validating software development artifacts and deliverables reduces the likelihood of 'surprises' during Acceptance Testing**

Next ...

Requirements

The critical success factors for a software product!