

# How to provide Better Test Coverage

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Software Quality Assurance Analyst

# High Stakes Testing:

- What does “High Stakes” mean?
  - Health Care example
  - Financial Institution example
- What do you do differently when you need a reputation for excellence and dedication to **maintain the highest level of quality** in all products and services.
  - You have to develop and refine processes to ensure the highest levels of testing.
- Differences between testing in a retail environment compared to high stakes companies.
  - Retail example

# *What if these were your Clients?*

**State Governments**

**Federal Government**

**Financial Services**

**Healthcare**

# The Answer

1. You would adhere to Project Management disciplines with a twist.
2. Redefine what cost means.
3. Fit within time constraints.
4. Be flexible.

# 1. *Testing Disciplines*

## **A way of managing**

- Focus on defining and implementing critical quality control. This includes processes, procedures, and metrics.
- Focus on continuous improvement.
- Management audits of processes and corrective action system.
- Integration of ISO 9000 thinking (international quality standard) into the business.

## 1. Testing Disciplines (cont.)

- Staff certified.
- Software Development approach being aligned with Software Engineering Institute's (SEI) Capability Maturity Model (CMM).
- Five-phased approach.
  - Project Initiation and Planning Phase
  - Project Design and Development Phase
  - Software Integration and Test Phase
  - Client Acceptance Phase
  - Product Implementation Phase

## 2. Redefine Costs: Key Concepts

1. You have to redefine what cost means.
  - Cost/Benefit Analysis
2. Don't assume:
  - You will never have 100% accuracy if you do.
3. Use tools that are readily available.
  - Why not?
  - Some are even free!
4. Mix it up:
  - Constantly move the work around to get fresh perspectives.

## 2. Redefine Costs (cont.)

- **Redefine Cost:** If you miss just one column of data and try to add up a child's score, the entire score would be wrong. Tell me what the cost is to a parent and child if their score pushes them to a lower level at the time of reporting or disallows the child from graduating.
- How do you measure the cost of that?
  - **\$\$ Cost to improve QA**
  - \$\$ potential costs from mistakes (COST AVOIDANCE)
    - = Positive impact to a company's bottom line

# Cost Metrics

- **It is easy to find data to support a cost/benefit analysis.**
  - **Average Labor rates can be found easily on the MN Unemployment website.**
  - **Work with your accountants and management.**
- **Example: Minneapolis-Saint Paul MN-WI MSA**
  - Employment Data from 2004, Fourth Quarter
  - Computer Specialists, All Other \$30.69/hr \$29.44/hr \$29.14/hr

# Cost Avoidance

What additional costs are out there?

– Litigation costs

[http://www.mealeys.com/stories\\_prod.html](http://www.mealeys.com/stories_prod.html)

*from* MEALEY'S **Product Liability & Risk**

**November 3, 2003**

**Product Liability Punitive Award Reduced; Plaintiff To Decide Whether It's Enough**

*from* MEALEY'S **Product Liability & Risk**

**October 17, 2003**

**XXXXXX Faces Class Action Over Allegedly Faulty Software**

## Cost Avoidance

What additional costs are out there?

- Lost contracts in the future
- Lower stock prices

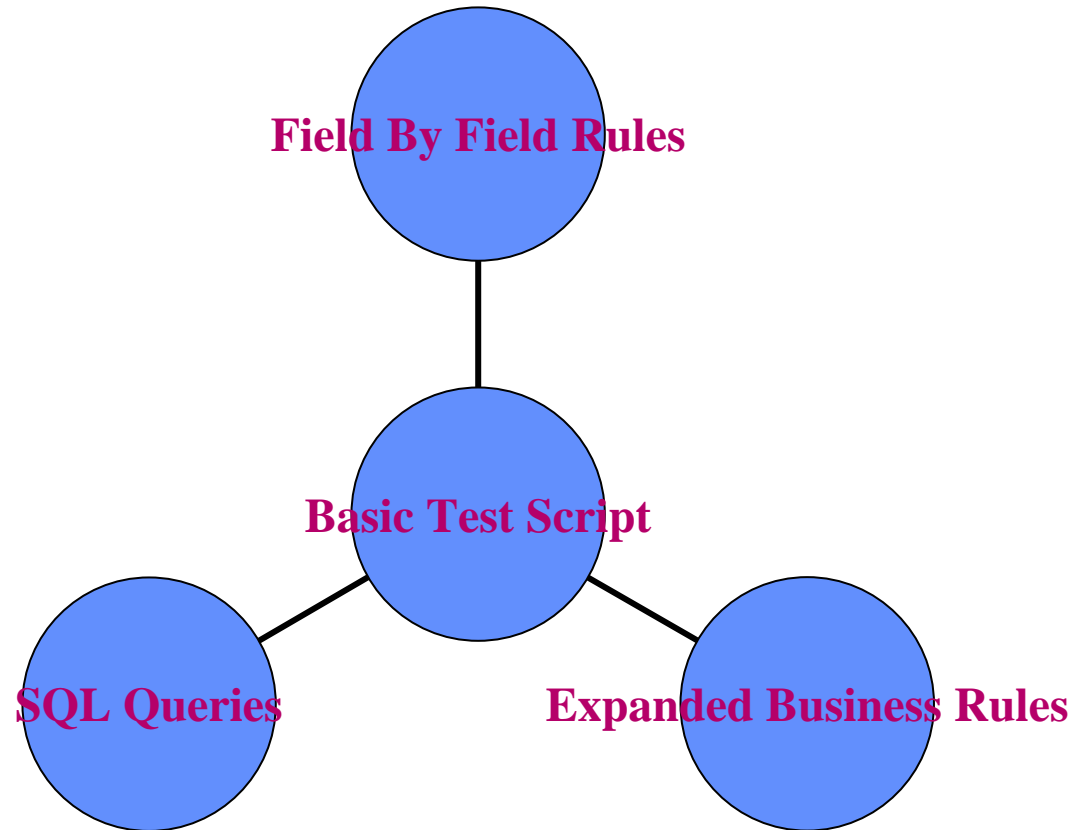
How to mitigate risk by redefining

- testing plans
- test scripts
- test execution

Quick review of a test script

[TSC TEMPLATE.xls](#)

# “Expanded Coverage” Test Script



### 3. Fit within Time Constraints

- **Don't Assume:** You have to put it in writing, understand, and extrapolate how to test everything. Just because someone says you can't get into something on a web site, doesn't mean you can't. It just means they didn't figure out how to do it. That's where structured testing methodologies really help out. The rules about boundary testing, volume testing (in a new sense), and security testing really pay off.

# Boundary Testing

- Don't test only one scenario within boundaries
- Must test all data – be inclusive not exclusive
- What else?
  - ***Test Input and Output Databases and Files***
  - Identify from where the contents of test data bases will come. Identify the data bases and files that will be created or updated as a result of testing.

# Volume Testing (Data Validation)

- Introduction to data validation testing coverage
  - Start with two files.
  - Compare the two files by using a software tool that encompasses some form of SQL language.
  - Calculate the difference between the same data in each file.
  - Make the results show up as Pass/Fail, Good/Bad, blank or the actual number.

# Security Testing

- ***Test System Security***
- Document the security needs for testing. Describe how modifications to existing security and new security features will be tested.
  - Setup a New User ID
    - Can anything go wrong with a new user ID?
  - Test every user ID
    - This really doesn't take that long.
    - Use tools or just create a Macro in Excel.
  - Test backdoor of the web `http:\` address
    - Save a link in your email, then try to click on it and see if you can get into the website without logging in.

# Reasonableness Testing

- Max/Min testing.
- Compare last year's numbers to this year.
  - Calculate the variation
- Find fields that are blank (is null/is not null).
- Look for big numbers. Look for small numbers.
- Verify record count.
- Scroll through file and just look at it.
- Verify length of data and parts of the data.

### 3. Fit within Time Constraints

- **Use Tools:** You can't expect testing professionals to spend months testing something that the stakeholders want in 2 weeks. You must find tools that are inexpensive and can be readily used by anyone because as you will see in concept #4, you really want to mix it up and use varying testing professionals to test.

# Tools

- Examples of tools
  - UltraEdit
    - Compares files quickly for regression testing.
  - Any SQL tool
    - Select
    - From
    - Where
    - Order By
  - Records & Playback tools
  - Automated Test Script documentation
    - [www.rwd.com](http://www.rwd.com)
- Try “Freeware”

# Tools

- Well known software testing tools.
  - Rational
  - Mercury
  - **Visual Studio 2005 edition for software testers**
    - Web Test Authoring and Debugging Techniques
    - <http://msdn.microsoft.com/library/en-us/dnvs05/html/WTAuthDebug.asp?frame=true>
- Other testing software available that is FREE or low cost. Here are a few examples.
  - [WebCorder](#) GUI web testing tool from Crimson Solutions, developed in VB. Designed for end users who are doing web based software testing, as a simple tool to record test scenarios, and play them back and generate log files. The user may also check for text or images on the screen or save screenshots.

## Tools

- [iOpus Internet Macros](#) - Macro recorder utility from iOpus Inc. automates repetitious aspects of web site testing. Records any combination of browsing, form filling, clicking, script testing and information gathering; assists user during the recording with visual feedback. Power users can manually edit a recorded macro. A command line interface allows for easy integration with other test software. Works by remote controlling the browser, thus automatically supports advanced features such as SSL, HTTP-Redirects and cookies. Can handle data input from text files, databases, or XML. Can extract web data and save as CSV file or process the data via a script. For Windows and MSIE.
  - \$499 or less (features list).
  - <http://www.iopus.com/iim/compare/>
  - IOpus software (the multiple demos and 1 video were very informative)
  - <http://www.iopus.com/iim/web-testing.htm?ref=padimie>

## Tools

- **QEngine WebTest Free or Professional Edition** - Platform independent web testing tools from AdventNet for Web Functionality testing and Web Performance testing of web applications developed using HTML, JSP, ASP, .NET, PHP, JavaScript/VBScript, e-commerce, etc. Developed using Java which facilitates portability and multiple platform support (Windows, Linux, and Solaris).
  - **FREE and \$495.00 professional versions available.**

## Tools

- **AppPerfect DevSuite** – Suite of testing, tuning, and monitoring products from AppPerfect Corp. that includes a web functional testing module. Records browser interaction by element instead of screen coordinates. Supports handling dynamic content created by JavaScript; supports ASP, JSP, HTML, cookies, SSL. For Windows and MSIE; integrates with a variety of IDE's.
  - FREE & \$495.00

### Tools Recap:

Companies are unique.

Different needs mean different tools.

Research and try them!

## 4. Be Flexible

- **Mix it up!** Testing professionals come in all shapes and sizes. Some are technical vs. business oriented. Some are experienced, while others are new. They all have different perspectives and thanks to that you can catch twice the number of defects in half the time.
- **Move Around!** Switch people around. Don't keep people on the same project forever.
- How Can you Do that?
  - Test scripts
  - Training and Mentoring
  - Disciplined Methodology

# Different type of testing people

## – Various testing personalities

- Picky Person – catches the little things.
- Eagle Eyes – notices the “big picture” & figures out when the business rules given are in question.
- Matrix Queen – likes to use a matrix to flush out all possibilities to test.
- Experienced person – just knows when something is wrong.
- New person – follows processes explicitly & likes to jump around and learn new stuff.

## – How to pair up teams to get effective test coverage.

- Write test scripts and test using opposites. (e.g. New person & Experienced person OR Picky Person & Eagle Eyes).

## – The “rule of 3”

- If 3 different people can’t find the bug, then you probably won’t find it in testing.

# Summary

- There are relatively simple changes to an organization that can increase their testing coverage closer to 100%.
- These are not costly.
- Justify the changes by presenting a new concept of cost to management.

# The End

- Biography
- Ms. Laura Hess-Ulman has eleven years of experience in the field of software quality assurance. This includes six years of hands-on experience in business system testing, two years implementing quality assurance methodologies, and three years managing a quality assurance group. She has helped one-company move quality levels from 50% to 90% on a consistent basis.
- In addition to the years of experience in quality assurance, Ms. Hess-Ulman has an extensive knowledge in the area of Project Management. She has managed many projects over her career and spent years researching and implementing best practices of project management at two companies.
- Ms. Hess-Ulman holds a Masters of Business Administration degree (emphasis on MIS) and a Bachelor of Arts degree in Accounting from Metropolitan State University in *St. Paul, Minnesota*. She is also a member of the Twin Cities Quality Assurance Association.