

31ST ANNUAL  
PACIFIC NW SOFTWARE  
QUALITY  
CONFERENCE  
OCTOBER 14-16, 2013

THE MANY FACES OF QUALITY



# A Risk-Based Testing (RBT) Approach for the Masses

Bruce Kovalsky, Capgemini

PNSQC 2013  
Portland, OR  
October 15, 2013

People matter, results count.

# The Problem

- You are called to assist a client project for 2 weeks
- They have ~550 tests and ~3900 test instances to run, which will take an estimated 18 weeks to execute
- The integration testing period is only 7 weeks long
  
- What to do?
  
- *Use Risk Based Testing analysis to help determine which tests are the highest risk to focus on*

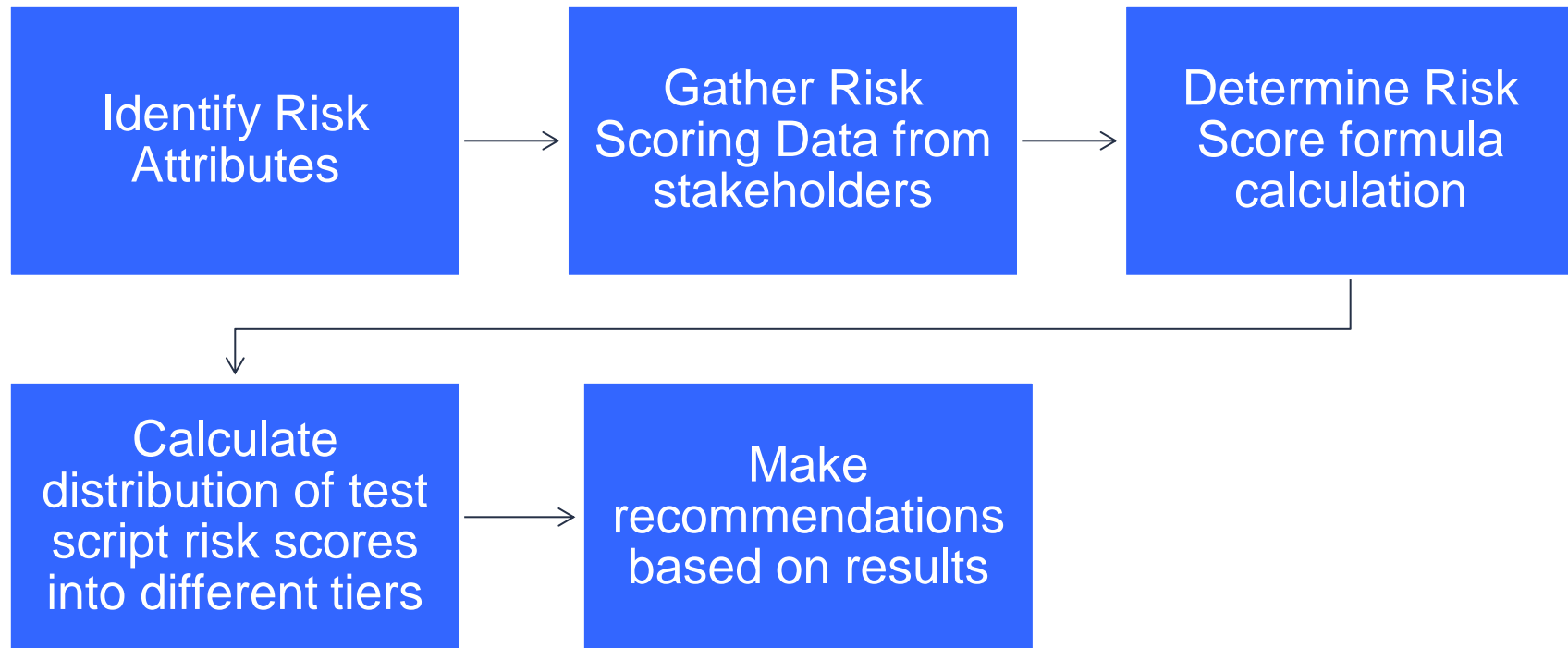
# Risk Based Testing (RBT) Defined

- Wikipedia defines Risk-Based Testing (RBT) as
  - “a type of software testing that prioritizes the tests of features and functions based on the risk of their failure - a function of their importance and likelihood or impact of failure”
- For purposes of this presentation, risk related to testing can be identified as:
  - “Probability that an undetected software defect from a test case will have a negative impact on the user”

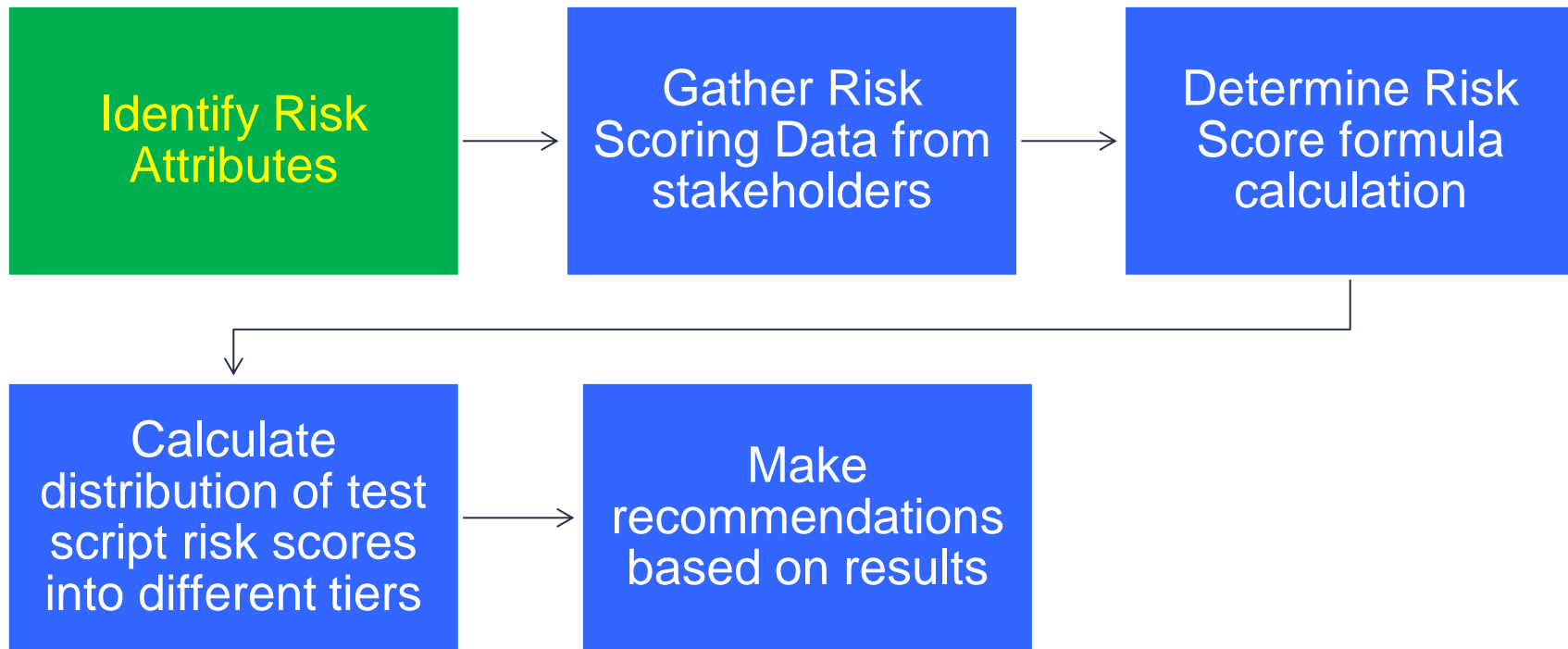
# Testing and the Importance of Risk

- Testing teams have a finite amount of time (usually time-boxed) to run their tests
- Need a strategy of how to address testing risk
  - Determine what type of risks are important to your organization
  - Should test for the biggest risks first, and more often
- Management could ask your test organization:  
**What is the minimum amount of testing effort we should invest in order to maximize risk reduction?**
- No matter what the reason - use an organized approach to Risk Based Testing to make quantitative risk decisions

# Risk Based Testing Approach steps



# Step 1 – Identify Risk Attributes



# Identify Risk Attributes

- Identify the risk-based scoring attributes used to create a “Risk Score” for each test
- Risk Score will be a formula of individual attribute scores, weighted appropriately
- Examples of risk attributes types:
  - Business
  - Technical
  - External Factors
  - E-Business / Failure-Mode Related
- Choose a mixture across multiple dimensions
- Use a simple 1 to 3 scoring scale for each attribute
  - 1 = Low
  - 2 = Medium
  - 3 = High

# Scoring and choosing Risk Attributes

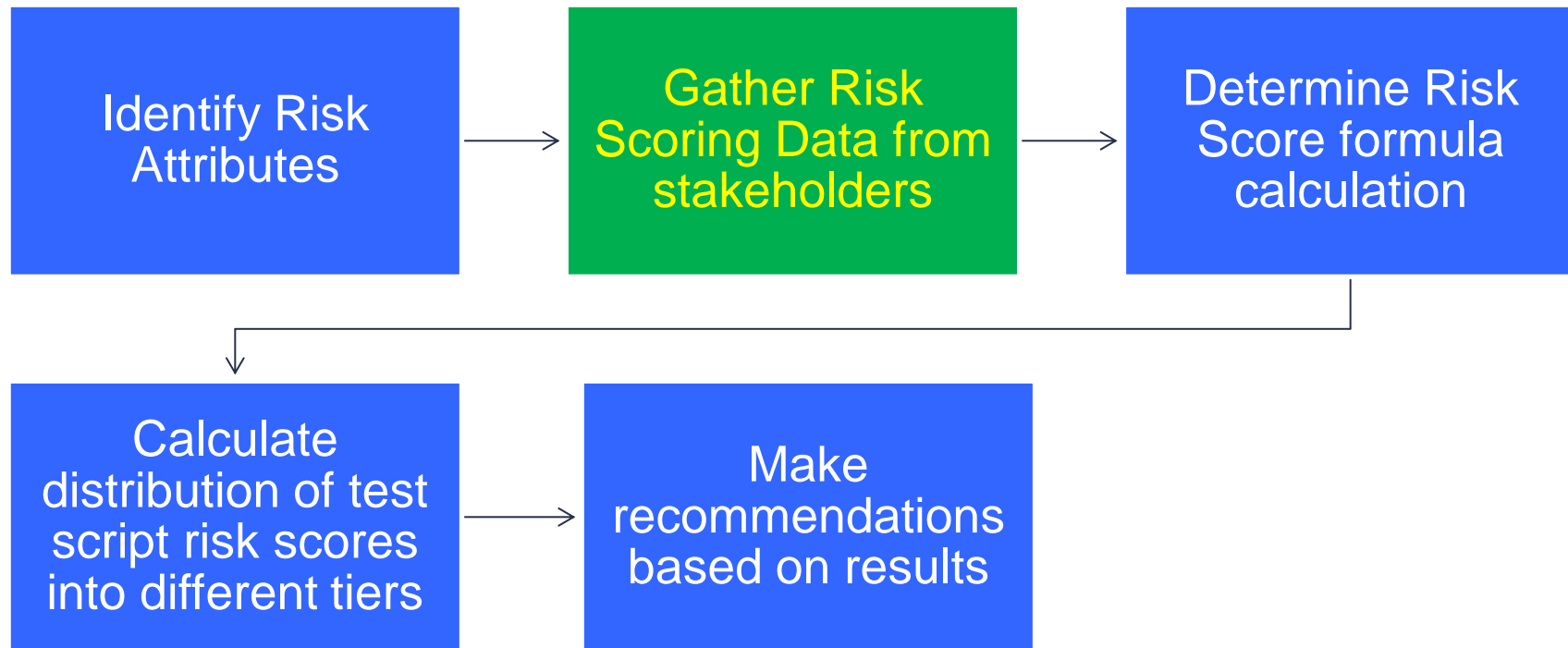
- Show the criteria used to guide scoring by stakeholders

Business Impact Levels		Business Frequency Levels	
Rates the business impact of test failure		Rates the frequency of test usage from a business perspective	
3 - High	<p>Test impacts that mean failure of the test will have a high impact to the Business. Examples:</p> <ul style="list-style-type: none"> <li>• System crash or lock-up would severely impact the user</li> <li>• Usage cannot continue effectively and there is no workaround</li> <li>• Inaccurate, missing or corrupt data could be used or applied that cannot be corrected</li> <li>• Incurs financial or manufacturing costs, or scheduling related issues</li> <li>• Non-conformance to product standards (business rules, manufacturing standards)</li> </ul>	3 - High	Very often (daily or many times per day)
2 - Medium	<p>Test impacts that mean failure of the test will have a moderate impact to the Business. Examples:</p> <ul style="list-style-type: none"> <li>• Inaccurate, missing or corrupt data could be used or applied that can be corrected</li> <li>• Usage can continue with some workaround but it is difficult or inconvenient</li> <li>• Moderate impact to system usability</li> </ul>	2 - Medium	Moderate frequency
1 - Low	<p>Test impacts that mean failure of the test will have a minor impact to the Business. Examples:</p> <ul style="list-style-type: none"> <li>• Standard SAP transactions and processing</li> <li>• Minor usability issues</li> <li>• Workarounds exist or are readily available</li> </ul>	1 - Low	Infrequently (monthly or less)

- Choose risk attributes across multiple categories
  - Business (Business Impact , Business Frequency)
  - Technical (Technical Complexity, Technical Impact)



## Step 2 - Gather Risk Scoring Data from stakeholders



# Gather Risk Scoring Data from Stakeholders

- Ask the appropriate stakeholders to score each attribute you defined for each test
  - Business users/testers, Developers, Management, etc.
- Give them a guideline to score attributes across a Normal Distribution (20/60/20)
- Before:

Folder	Test ID	Test Name	Technology Scorer	Technology Impact Score	Technology Probability Score
BPM	1590	048 Assign Resources to Task & Initiate Workflow	Sunil Gupta		
BPM	1690	048 Worflow and Execution Report	Sunil Gupta		
BPM	1656	048- Manager Dashboard	Sunil Gupta		
BPM	1654	048- Partial Assignment of Resource to Task	Sunil Gupta		
BPM	1850	133 Assign Resources to Projects using COE Workflow- Pool Development	Sunil Gupta		
BPM	1847	133 Assign Resources to Projects using COE Workflow-Special Projects	Sunil Gupta		
BPM	1944	148 Change Resources and Dates Post Workflow Initiation	Sunil Gupta		
BRF.	3921	01 BRF Test Finishings- HS, DC, BR, EM	Sunil Gupta		
BRF.	3913	02 BRF Test Finsihings- SS, Thermo, Flocking, Letterpress	Sunil Gupta		
BRF.	3914	03 BRF Test Finishings - Laser Cut, Stitching, Epoxy, Microbeads, Misc.	Sunil Gupta		

# Gather Risk Scoring Data from Stakeholders

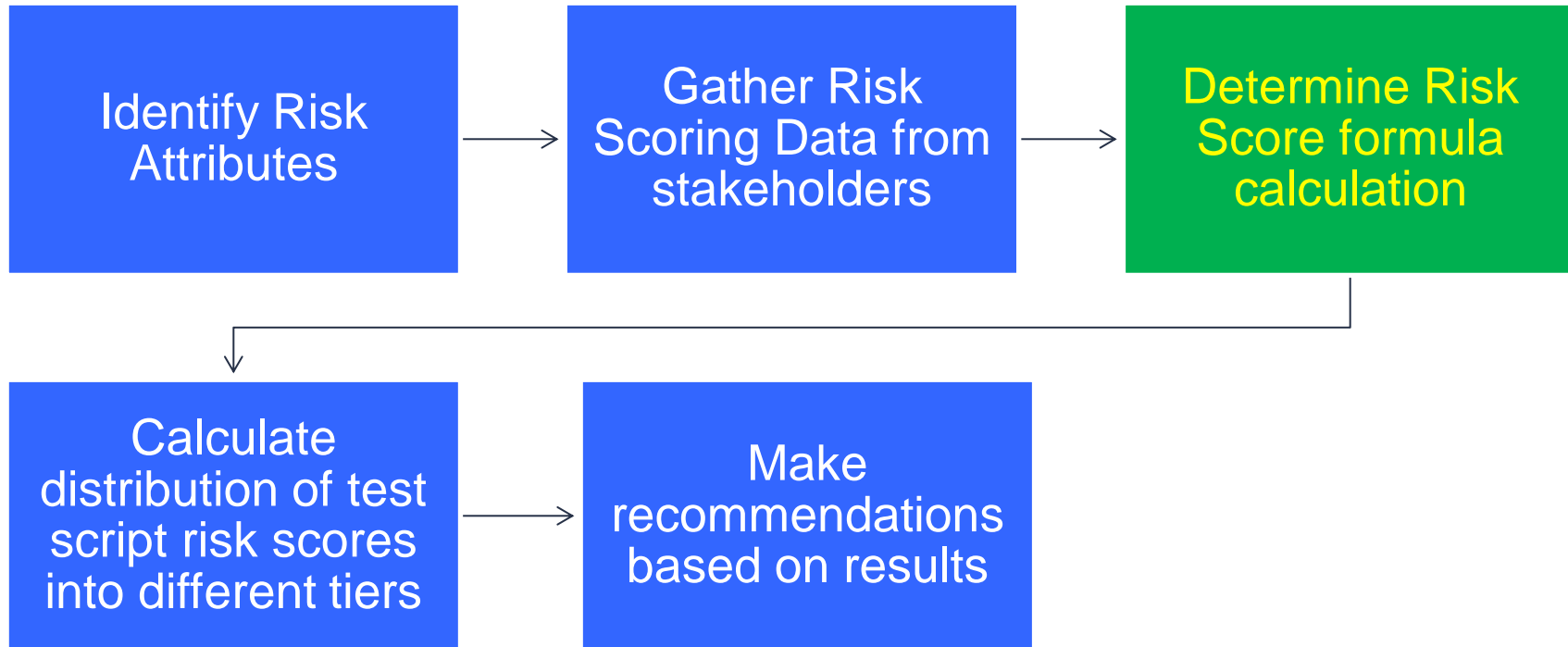
- **POLL:** What's best method to ask attribute scorers to score data: Together or Independently?
  - Answer: *Independently*
- Send spreadsheets to each scorer for the tests they will be scoring, independent of others

■ After:

Folder	Test ID	Test Name	Technology Scorer	Technology Impact Score	Technology Probability Score
BPM	1590	048 Assign Resources to Task & Initiate Workflow	Sunil Gupta	2	2
BPM	1690	048 Worflow and Execution Report	Sunil Gupta	3	1
BPM	1656	048- Manager Dashboard	Sunil Gupta	3	1
BPM	1654	048- Partial Assignment of Resource to Task	Sunil Gupta	2	1
BPM	1850	133 Assign Resources to Projects using COE Workflow- Pool Development	Sunil Gupta	3	3
BPM	1847	133 Assign Resources to Projects using COE Workflow-Special Projects	Sunil Gupta	3	3
BPM	1944	148 Change Resources and Dates Post Workflow Initiation	Sunil Gupta	2	2
BRF.	3921	01 BRF Test Finishings- HS, DC, BR, EM	Sunil Gupta	1	1
BRF.	3913	02 BRF Test Finsihings- SS, Thermo, Flocking, Letterpress	Sunil Gupta	1	2
BRF.	3914	03 BRF Test Finishings - Laser Cut, Stitching, Epoxy, Microbeads, Misc.	Sunil Gupta	2	3



## Step 3 - Determine Risk Score formula calculation



# Determine Risk Score formula calculation

- Initial “raw” scoring data by stakeholders has now been collected for each attribute, for all tests
- Determine the appropriate formula to be used to calculate your Risk Score

Bus. Impact Score	Bus. Freq. Score	Tech. Impact Score	Tech. Prob. Score	Combined Sum	Test Script Priority	Risk Multiplier	Risk Score
-------------------	------------------	--------------------	-------------------	--------------	----------------------	-----------------	------------

← Scores for the four attributes chosen , scored 1 to 3 ->

Sum of attributes based on a weighted formula	Reverse lookup based on the Combined Sum	Multiplier which scales risk scores	
---	--	-------------------------------------	--

(Combined Sum + Test Script Priority) X Risk Multiplier



# Determine Risk Score formula calculation

- You can use many different approaches to calculate the Risk Score formula:
  - **Evenly weight the attributes**  
= (Business Impact + Business Frequency)/2 + (Technology Impact + Technology Probability)/2
  - **Make one attribute override / bias the other attributes**  
=IF (Business Impact=3, <Highest Score>, SUM (Combined Sum + Test Script Priority) \* (Risk Multiplier))
  - **Weight one (or more) attributes higher than others**  
= ((1.5\*Business Impact) + Business Frequency)/2 + (Technology Impact + Technology Probability)/2
- Each method of formula weighting will present a different Risk Score distribution
- Experiment with different formulas to find your optimal distribution
- Example - last formula resulted in 9 possible Risk Scores (6, 6.5, 7, 7.5, 14, 15, 21, 22, 28)

# Observe how raw score data distributes across attributes

- Create tables to show how each attribute was scored individually
- Observe the raw data of how the Risk Scores were derived

	Business Impact Score	%	Business Frequency Score	%	Technology Impact Score	%	Technology Probability Score	%
3-High	257	48%	183	34%	72	13%	57	11%
2-Med	200	37%	214	40%	253	47%	224	41%
1-Low	84	16%	144	27%	216	40%	260	48%
	541		541		541		541	

- If numbers don't match an optimal curve, may want to ask stakeholders to re-score tests

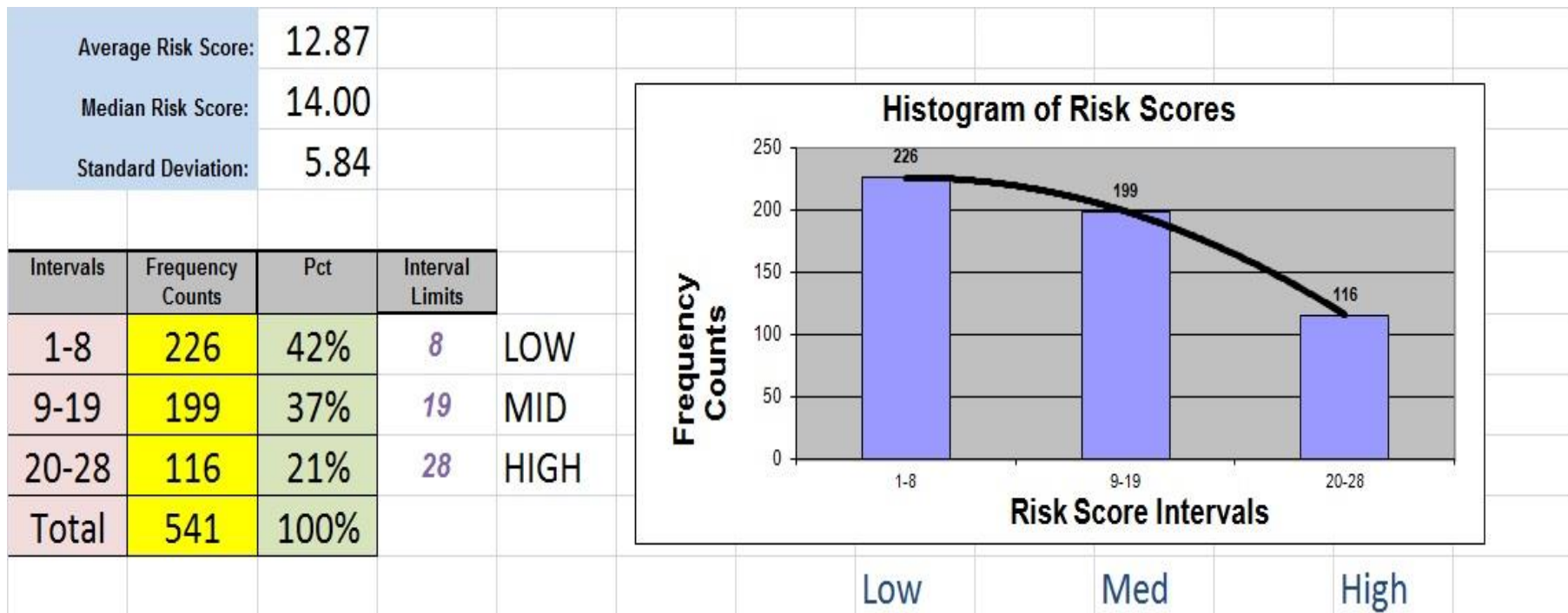
# Step 4 - Calculate distribution of test script risk scores into different tiers





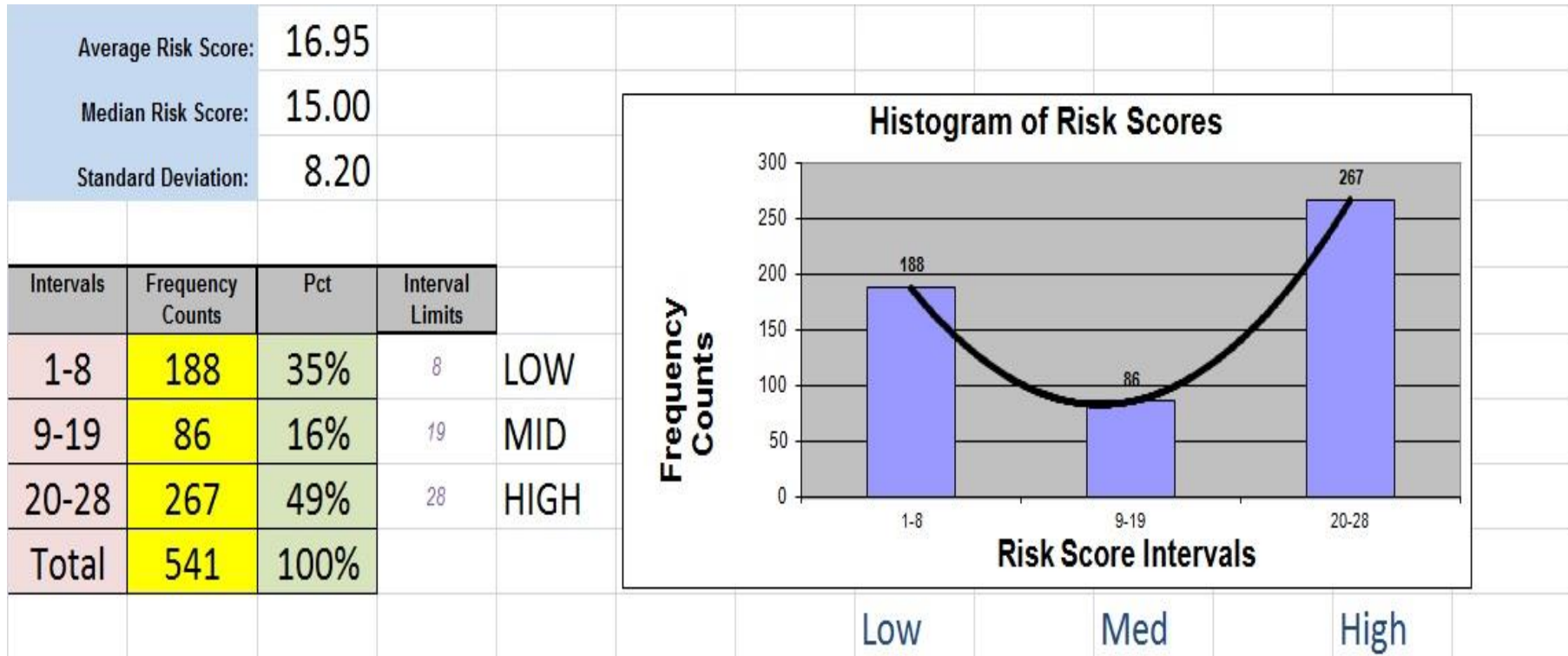
# Calculate distribution of test script risk scores into different tiers

- Tier distribution can be set by changing the interval limits that the risk scores are distributed over
- Use the Excel FREQUENCY function to roll up risk scores into intervals
- Using an Equal Attribute Weighting formula:



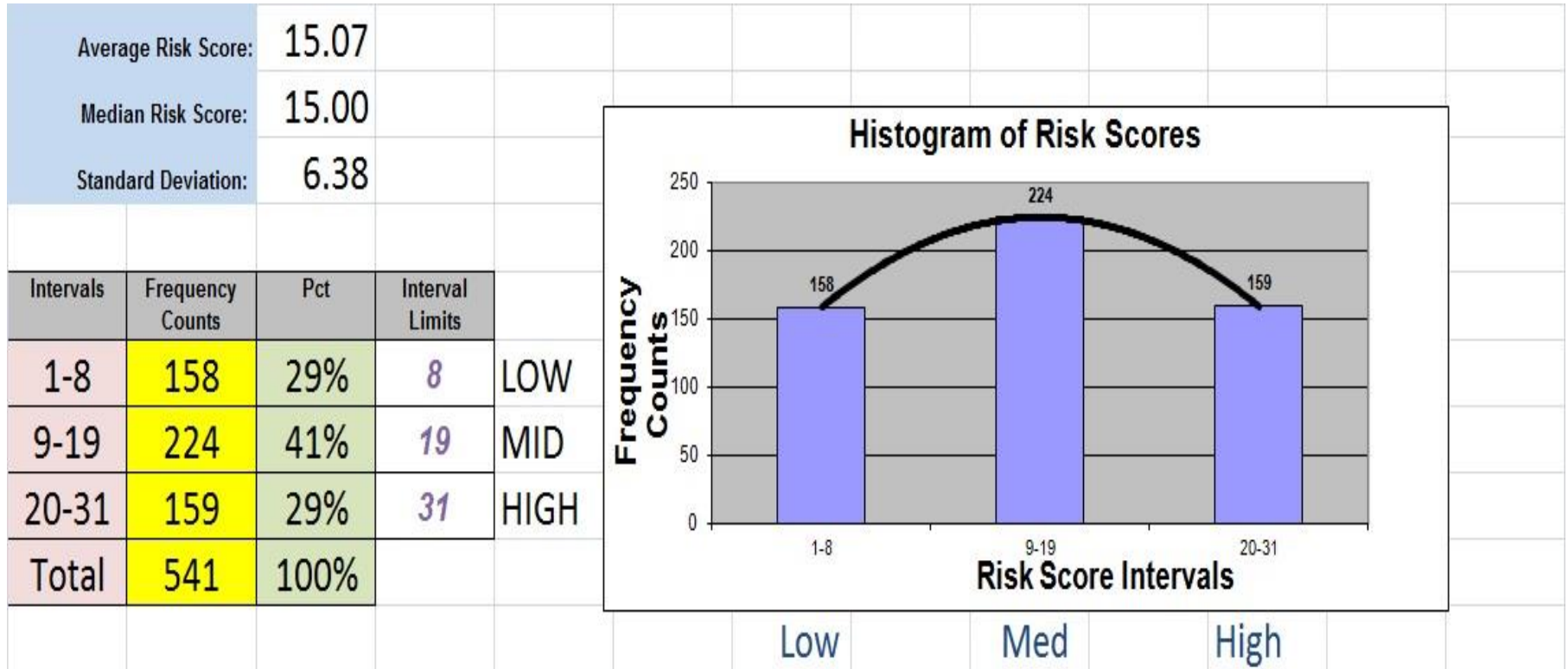
# Modifying risk formula changes to a different tier distribution

- Try different risk score weighting methods
- Using a Single Attribute Override formula:

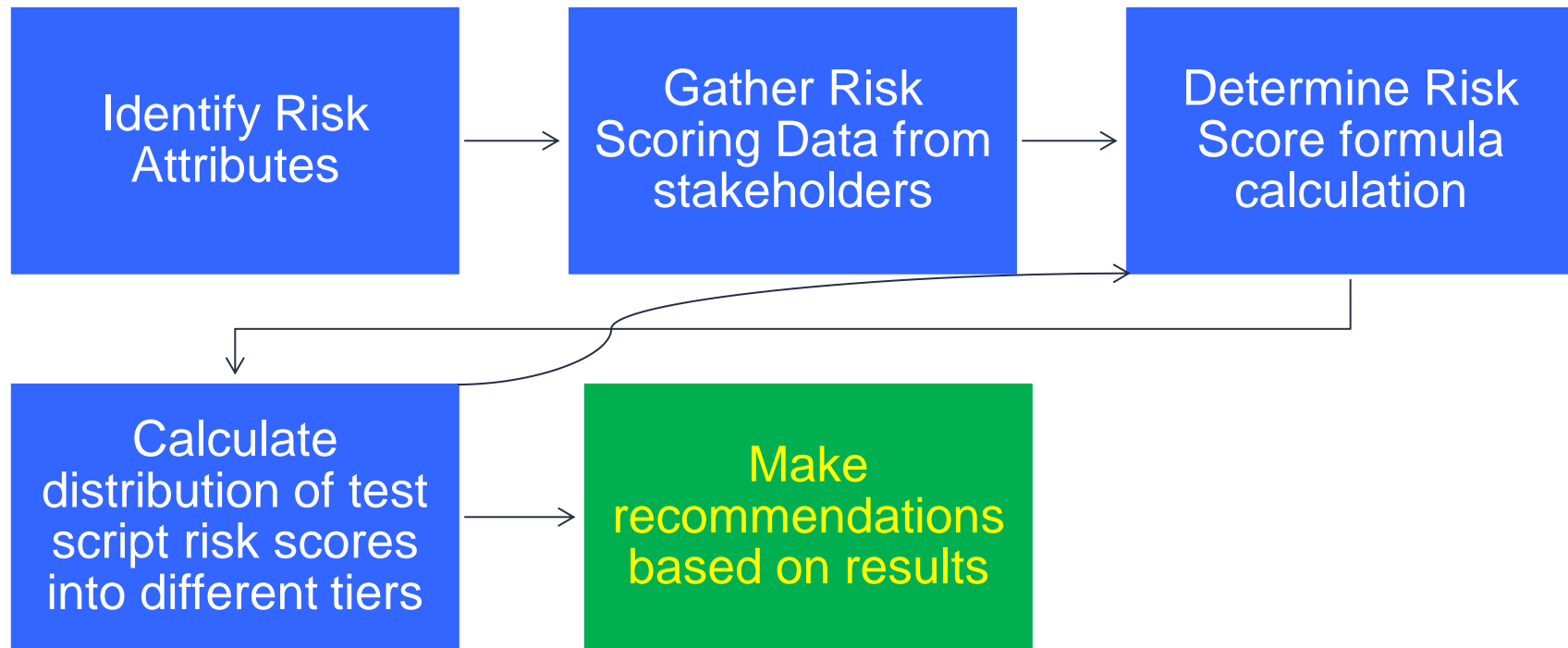


# Modifying risk formula changes to a different tier distribution

- Continue to try different risk score weighting methods
- Using a Business Impact Weighted 1.5 formula:



## Step 5 - Make recommendations based on results



# Make recommendations based on results

- Finalize the Risk Score formula and get an optimal Tier Distribution
- Focus your testing on High Risk tests / Minimize effort on Low Risk tests

Intervals	Frequency Counts	Pct	Interval Limits	
1-8	158	29%	8	LOW
9-19	224	41%	19	MID
19-31	159	29%	31	HIGH
Total	541	100%		

Minimize effort and focus on these Low Risk tests

Focus and prioritize these High Risk tests

# Applying Risk Based Test (RBT) Scoring at the Test Set level

- Many organizations have Test Sets that contain multiple Test Cases
- Can create a Pivot Table (Test Set vs. Risk Tier) to analyze risk at Test Set level
- Review the Test Set RBT Tier counts in the Pivot table spreadsheet
  - *Presence or mix of High Tier tests should be executed earlier and run more often*

S2.C018-P S2 Disp New 1 - No Reference  
 S2.C021-P S2 Disp New 2 - CDB Reference  
 S2.C024-P S2 Disp New 3 - Consumer Validation Part 1  
 S2.C027-P S2 Disp Label Change  
 S2.C030-P S2 Disp Product Line Change  
 S2.C033-P S2 Disp Reprint  
 S2.C036-P S2 Disp Evolve/Change

3	12	30
13	12	14
6	5	5
8	2	9
8	4	7
10	5	11
10	5	14

- *Predominately Low Tier and Medium Tier tests should be moved to end and executed less often*

S3.B006-M TS3 Portfolio Item Request  
 S3.B008-P TS4 Portfolio Projects  
 S3.C003-P S3 MAWB  
 S3.C006-P S3 PLL Upload  
 S3.C009-P S3 PPM Budget Strategies  
 S3.C012-P S3 Team Selection

2	1	
	3	
1		
	2	
2	1	
	1	

# Sample RBT Excel Spreadsheets

- Sample RBT spreadsheets are available for PNSQC attendees to download and use here:
- [https://drive.google.com/folderview?id=0B25L\\_rQ45uL3c1lvQnQzWmZiYnc&usp=sharing](https://drive.google.com/folderview?id=0B25L_rQ45uL3c1lvQnQzWmZiYnc&usp=sharing)
- **Review/Demo of RBT spreadsheets**
- **Questions?**