Improving Fraud Sampling Hit Rates with Analytics

2016 ACUA Annual Conference

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Richard B. Lanza, CPA, CFE, CGMA

- Assists clients daily in the use of analytic software
- Nearly 25 years of ACL, Excel and other software usage
- Has written and spoken on the use of audit data analytics for over two decades
- Received the outstanding achievement in business award by the Association of Certified Fraud Examiners for developing the publication *Proactively Detecting Fraud Using Computer Audit Reports* as a research project for the IIA
- Recently was a contributing author of:
  - Global Technology Audit Guide (GTAG #13) Fraud In An Automated World – Institute Of Internal Auditors.
  - Data Analytics – A Practical Approach - research whitepaper for the information system accountability control association.
  - Cost Recovery – Turning Your Accounts Payable Department Into A Profit Center – Wiley And Sons.
- In 2015, discovered a new textual analytic technique using letters called the Lanza Approach to Letter Analytics (LALA)™

Please see full bio at www.richlanza.com
Learning Objectives

1. Learn best practices of selecting a fraud-specific sample based on the highest mathematical likelihood and statistically exceptional sample units

2. Be able to score records based on various audit reports to improve your effectiveness and reduce false positives in your samples

3. Visualize sample results in a variety of graphs and charts to select samples with pictures

What We Learned About Sampling
And How to Refine the Approach to Detect Fraud
Popular Approaches
Control and Financial Statement Testing

**Police Translation - Random Patrol and Hope to Detect**

1. Attribute (Random, Fixed Interval, Stop and Go)
2. Statistical (Monetary/Dollar Unit)
3. Stratified (By Value)

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Software Input Fields/Variables

<table>
<thead>
<tr>
<th>Term</th>
<th>Record/Attribute</th>
<th>MUS / PPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Number of Records</td>
<td>Dollars in a Field</td>
</tr>
<tr>
<td>Confidence</td>
<td>Confidence %</td>
<td>Confidence %</td>
</tr>
<tr>
<td></td>
<td><em>Inverse is beta risk or risk of</em></td>
<td><em>Inverse is beta risk or risk of</em></td>
</tr>
<tr>
<td></td>
<td>assessing control risk too low</td>
<td>incorrect acceptance</td>
</tr>
<tr>
<td>Upper Error Limit</td>
<td>Upper Error Rate % Tolerable</td>
<td>Materiality/Tolerable Misstatement</td>
</tr>
<tr>
<td></td>
<td>Deviation Rate</td>
<td></td>
</tr>
<tr>
<td>Expected Total</td>
<td>Error Rate %</td>
<td>Error Value</td>
</tr>
<tr>
<td>Errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval</td>
<td>Record Interval</td>
<td>Dollar Interval</td>
</tr>
<tr>
<td>Tolerable Errors</td>
<td># of Errors</td>
<td>Maximum Tainting %</td>
</tr>
</tbody>
</table>
Sampling Risk

Risk that conclusions reached (i.e., the control works) by the auditor using a sample will differ from 100% testing of the population.

Automated Person Power

There are 159 million, million, million possible Enigma settings. All we had to do was try each one. But if we had 10 people checking one setting a minute for 24 hours every day and seven days every week, how many days do you think it would take to check each of the settings? Well, it’s not days; it’s years. It’s 20 million years. To stop an incoming attack, we would have to check 20 million years’ worth of settings in 20 minutes.

- *The Imitation Game movie*
But, Isn’t It About Finding the Deviations?

Audit Standards Are Moving Towards > Analytics & < Sampling

http://bit.ly/1K1FfhQ

http://bit.ly/20LwA7a

http://bit.ly/1VSoAxG
Surveillance is the quickest; lowers fraud impacts

![Graph showing median loss and median duration by detection method.]

**2016 Report to the Nations – Association of Certified Fraud Examiners**

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**PredPol**

http://www.predpol.com/

Predictive Modeling To Improve Police Detection

Santa Cruz experienced:

- 27% decrease in burglary
- 11% decrease in robbery
- 56% increase in arrests

“PredPol does not replace the experience and intuition of our great officers, but is rather an invaluable added tool that allows our police force to use their patrol time more efficiently and helps stop crime before it happens.” *Chief Mark Yokoyama*
PredPol
Working Smarter Using Algorithms Tested By Earthquake Software

- Crime strikes in the same dimensions
- People are needed to validate activity
- Focuses on a box of predicted crime
- Uses three prediction variables

Adjusting the Sample Approach
Improving the Chances of Identifying Fraud
How We Have Grown Accustomed to Reducing Sample Sizes

- Remove false positives and predict likelihood of fraud based on historical trends and results
- Reduce Expected Error Rate/Number
- Reduce Confidence or Increase Beta
- Increase Upper/Tolerable Error Limits

Automating Tests
Revenue Price Test Example

- **Manual test – Accurate price application**
  - Manual sample of 20 large sale or key customer account invoices to trace pricing back to an established contract.

- **Automated test – All sales**
  - Obtain the detailed invoice table and pricing table as of that timeframe
  - Understand the pricing table may be updated monthly or quarterly
  - Align invoice table’s unit price to the approved price per the listing for variances
  - Stratify variances and assess for materiality in volume and value
  - Select a sample (or review the entire listing) for all variances over 15%, if any
The Sampling Analytics “Problem”
Duplicate Payment Example

- Duplicate payment tests identify “suspicious” transactions
  - Usually about 1 in 5 of all transactions get a “red flag”
- Historically at least 0.02 – 0.03% of all transactions have real problems, such as a recoverable over-payment
  - Rates can be even lower for fraudulent transactions
  - 0.1% = 100 A/P fraud transactions to 100,000 annual transactions
- So, roughly 0.00025/0.2 = 0.00125 or 1 in 800 “suspicious items” reviewed identify fraud, on average
  - Imagine throwing a random dart at 800 balloons hoping to hit the right one!!!

Reducing False Positives

http://bit.ly/1Pdz3Df

- Blog article by speaker explains specifically explains how to:
  - Remove noise
  - Filter top predictors
  - Duplicate hit rates increased to 50% vs. less than 1%
Vendor Recovery Scoring
Top Problem Vendor Identification
How I Started “Scoring for Value”

1. Vendors on duplicate payment reports.
2. Duplicate transactions paid on different checks.
3. Duplicate with no debit amounts in the vendor account.
4. Vendors with a high proportion of round dollar payments.
5. Invoices that are exactly 10x, 100x, or 1000x larger than another invoice for that vendor.
6. Payments to any vendor that exceed the 12-month average payments to that vendor by a specified percentage (i.e., 200%) or 3x the standard deviation for that vendor.
7. Vendors with a high ratio (over 50%) of adjustments to invoices

Transactional Scoring
Score Each Transaction / Combine Scores

Sampling approach where the Examiner defines Risk mathematically by prioritizing reports and applying scores to transactions for summary and final selection
Scoring Beyond Transactional Data
Applying Scoring to Excel Sheets

- nRows – Number of rows
- nCols – Number of columns
- nCells – Number of used cells
- nBlanks – Number of blank cells
- nHidden – Number of hidden worksheets
- nUsed – Number of used worksheets
- nErrors – Number of formula errors
- nFormulas – Number of formulas
- nIfs – Number of IF() functions
- nNestedIfs – Number of Nested IF() functions
- nSumPlus – Number of formulas where there is a Sum() function + a value
- nSumMinus – Number of formulas where there is a Sum() function - a value
- nNamedRanges – Number of named ranges
- nLinks – Number of external links to other spreadsheets

Applying the Error / Fraud Score
Doing More Analysis to Narrow the Bull’s-eye Selection

1. Specific Reports – Reports based on history or new hypothesis to identify fraud
2. Trend Analysis – Multiple perspective review of data (digital, textual, size, type, etc.) over time and by the key transaction subsets.
3. Material Score Review
   Manual/automated review of material transaction values to sizable score ratios
4. Low Score Stat Sample
   Statistical, stratified, or random sample of lower scored transactions

Keep Looking at the Data, Test Samples, and Refine Logic
Step 1 – Calculating Predictors Through Specific Reports

Step 1. Specific Reports – A/P
The More Reports, the Merrier

✓ Purchase Requisition and Approval
  ✓ Approver and enterer segregation of duties test
  ✓ Purchase values are intently placed under approval limits
  ✓ PO to non-PO spend and 2-way vs. 3-way matching
  ✓ Purchase order pricing above average variance over time by item
  ✓ Cataloging vendors into different business lines
  ✓ Textual Analytics - Excel, Outlook, Word, and Text document analysis of buyers’ data

✓ Vendor Selection and Entry
  ✓ Sole vendors for a given category or too many
  ✓ Bad vendor data (blank or inaccurate address, TIN, duplicates, etc.)
    ✓ Obtain and match vendor masterfiles between periods (get it quarterly)
  ✓ Geomapping or Vlookup analysis of employee to vendor information
    ✓ Identify "bad" addresses or unusual locations for a business
  ✓ Vendor to invoice entry segregation of duties test
    ✓ Vendor entry and approval – the next step to improved control
1. Specific Reports – A/P (Continued)

- Receiving
  - Three way match testing
  - Adjustment analysis by enterer, date, stratification, and time of day

- Invoice Processing
  - Invoices by entry type (focus on manual vs. automated feeds with controls)
  - Duplicate invoices (and payments)
  - Incorrect invoice price to purchase order/contract pricing
  - Adjustment analysis by enterer, date, stratification, and time of day
  - Invoices right under an approval limit
  - Vendors with a higher proportion of credits to invoices
  - Bad invoice data (blank or inaccurate information)
    - Obtain and match invoices entered between periods (get it quarterly)
    - Look for odd invoice average lengths and round dollar amounts

Step 1. Specific Reports – AP (Continued)

- Payment Processing
  - Vendor paid to vendor on payment list in bank account and name
  - Gaps in check sequence
  - Numerous payments to the same vendor
  - Payments = 0
  - Days payable outstanding averages by vendor for each quarter
    - Stratify each quarter by DPO and compare in a Pivot
    - Invoices With Entry Dates After Payment Dates

- Accounting
  - Reconcile the subledger data to the general ledger accounting
  - Unrecorded liabilities
    - Invoices entered after with invoice dates prior to month end
  - Age the open invoice debits and credits
Why Not Make Some $$
Along The Way

- Accounts Payable
- Audit Fee Benchmarking
- Advertising Agency
- Document Fleet
- Freight
- Health Benefits
- Lease
- Order to Cash
- Proactive Fraud Detection
- Project Fraud
- Strategic Sourcing
- Telecom
- Travel and Entertainment
- Utilities

Cost Recovery Tests
More Specifically

A/P and G/L Review Factors
- Accounts that are sole sourced
- Accounts that have too many vendors
- Categories that map to the “recovery list”
- Assess to industry cost category benchmarks
- Top 100 vendors
- Trend analysis over time

Purchase Order / Price List
- Match to invoice payments to assess price differences
- Strategic sourcing vendor review
Step 1. Top Payroll Reports

- Duplicate employee payments
  - Payments to the same bank account and a different employee number
- Overtime trending by department and person (% of overtime to gross pay, average overtime by department)
- Match employee data from the human resource to the payroll system
- Look for inaccurate or incomplete employee data
- Identify duplicate hour employees by week

Step 1. Top Travel & Entertainment Reports

- Unmatched query of cardholders to an active employee masterfile
- Cards used in multiple states in the same day
- Cards processing in multiple currencies in the same day
- Identify cards that have not had activity in the last six months
- Cardholders that have more than one card (Duplicates on card holder)
- Extract any cash back credits processed through the card
- Extract declined card transactions and trend
- Person with multiple trips in the same week (count of business purpose can help in this test)
- Round valued items / Postings on holidays / Posting off hours
Step 1.
Top Travel & Entertainment Reports

- Duplicates on card number, amount, and transaction date
- Duplicates on merchant, amount, and transaction date
- Duplicates on merchant and amount
- Duplicates between accounts payable and T&E/Pcard data
- A multitude of transactions under the card purchase limit or MCC amount limit to identify split purchases on the card to purchase higher amount items using multiple charges.
- Postings to unusual/prohibited MCC codes
- Align the P-card to T&E system to ensure merchant and amounts line up for each transactions

Scripting the Tests
The Road to Continuous

  - Build something in Excel (or other simple tools) – Make sure it works
  - Then build something more repetitive using script coding tools
- Understand the first year will be rough
  - 30 unit samples will be replaced by 100% testing
  - This is the year of investment “clean up”
  - 2nd and 3rd year tests should be a blank report
- Move to a continuous audit and monitoring model
  - Focus on key risks to start with “friendly departments”
  - Have a results manager organize the remediation and follow up
Step 2 – Trending With the 5 Ws

Step 2. Using the 5W Questions
In Your Data Query and Mining Efforts

5. Why (Transactional Score, Value, Type)
4. Where (Geomapping)
3. When (Time, Week, Period End, Month)
2. What (Digital, Textual, Value Strata, Type)
1. Who (Authorized, Trend Above, Tool)
Step 2. Trend Analysis to Direct Scoring
Doing More Analysis to Narrow the Bull’s-eye

Getting Started:
Pivot to New Sheet
Getting Around The Pivot

- Right click on the amount fields (data part) to see field list and edit various Pivot Table options
- Select from the Top Ribbon Menu the Options and Design menus for Pivot Tables (Excel creates them when a Pivot Table is created) – best and easiest way to make changes

Grouping Date Ranges
### Excel Functions – Text Examples

**To Code Data for Improved Trending**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEFT()</strong></td>
<td>With a determined set of characters in a set string, the first character is returned from, the left of the cell</td>
</tr>
<tr>
<td><strong>LEN()</strong></td>
<td>Identifies the number of characters in a set and returns that as a number in the cell</td>
</tr>
<tr>
<td><strong>LOWER()</strong></td>
<td>Lower case letters substitute upper case letters (reverse for upper)</td>
</tr>
<tr>
<td><strong>UPPER()</strong></td>
<td>Lower case letters substitute upper case letters (reverse for upper)</td>
</tr>
<tr>
<td><strong>MID()</strong></td>
<td>Identifies characters in a set based on a start position and number of characters which is determined by the user</td>
</tr>
<tr>
<td><strong>PROPER()</strong></td>
<td>Capitalizes the first letter of each character and the remaining are lowercase</td>
</tr>
<tr>
<td><strong>RIGHT()</strong></td>
<td>Pulls the last set of characters from a set and the number of characters is set by the user</td>
</tr>
<tr>
<td><strong>TEXT()</strong></td>
<td>Returns the text version of a number with a specified number format (i.e., =TEXT(12345,&quot;0.00&quot;) will convert 12345 into a text version of 12345.00)</td>
</tr>
<tr>
<td><strong>TRIM()</strong></td>
<td>Keeps single spaces only between words and removes all other spaces</td>
</tr>
</tbody>
</table>

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### Additional Excel™ Text Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONCATENATE()</strong></td>
<td>Combines numerous strings to one stream (You can also use the and character to combine/merge/join fields)</td>
</tr>
<tr>
<td><strong>REPT()</strong></td>
<td>Repeats a character as many times as the user wants i.e., =REPT(&quot;J&quot;,10) will lead to &quot;JJJJJJJJJJ&quot;</td>
</tr>
<tr>
<td><strong>CHAR()</strong></td>
<td>Identifies a character with a number which is presented in the cell. This number then can be used to convert other CHAR to the number translate code from other sources (i.e., CHAR(127) is a nonprintable character and CHAR(9) is a tab)</td>
</tr>
<tr>
<td><strong>CLEAN()</strong></td>
<td>From a text string, it removes the nonprintable characters</td>
</tr>
</tbody>
</table>
**Excel™ Math Functions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VALUE()</strong></td>
<td>A number is given to identify a string now as a number</td>
</tr>
<tr>
<td><strong>ISNA()</strong></td>
<td>Returns true if the formula leads to a NA solution – This is normally combined with IF so =IF(ISNA(C3/D3),0,(D3/D3))</td>
</tr>
<tr>
<td><strong>AVERAGE()</strong></td>
<td>Is the mean of a range of cells set in the average function</td>
</tr>
<tr>
<td><strong>MEDIAN()</strong></td>
<td>Provides the middle number between the largest set value of numbers and the lowest value of numbers</td>
</tr>
<tr>
<td><strong>MAX()</strong></td>
<td>Provides the top value in a set of values</td>
</tr>
<tr>
<td><strong>MIN()</strong></td>
<td>Provides the lowest value in a set of values</td>
</tr>
<tr>
<td><strong>STDEV()</strong></td>
<td>Calculates the standard deviation for a range of numbers</td>
</tr>
</tbody>
</table>

**Additional Excel™ Math Functions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABS()</strong></td>
<td>Turns a negative or positive number into a positive number</td>
</tr>
<tr>
<td><strong>MOD()</strong></td>
<td>Determines whether a number is round to a divisor set by the user (i.e., divisor equals 1000 and all numbers where MOD() are =0 would be round to 1000)</td>
</tr>
<tr>
<td><strong>ROUND()</strong></td>
<td>Sets a number to a specified decimal place</td>
</tr>
<tr>
<td><strong>STANDARDIZE</strong></td>
<td>Calculates a Z score based on the score, the std. deviation, and the mean</td>
</tr>
<tr>
<td><strong>NORM.DIST</strong></td>
<td>Calculates a percentile based on the Z score</td>
</tr>
<tr>
<td><strong>COUNT()</strong></td>
<td>Counts the number of transactions. Also popular is CountIf()</td>
</tr>
</tbody>
</table>
### Date and Time Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE()</td>
<td>A date is created with a year, month, and day (i.e., 2015,10,7)</td>
</tr>
<tr>
<td>DAY()</td>
<td>By pointing to a specific field the function identifies the day</td>
</tr>
<tr>
<td>HOUR()</td>
<td>Identifies a hour in a time field which is set to military time (0:00-23:00 hrs.)</td>
</tr>
<tr>
<td>MINUTE()</td>
<td>Identifies the minutes in a time field which is set at 0-59</td>
</tr>
<tr>
<td>MONTH()</td>
<td>Identifies the month in a time field which is set as 1=January</td>
</tr>
<tr>
<td>NOW()</td>
<td>Sets to the actual current date and time</td>
</tr>
<tr>
<td>TODAY()</td>
<td>Sets to the actual date</td>
</tr>
</tbody>
</table>

### More Date and Time Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NETWORKS()</td>
<td>Identifies the ACTUAL Network days in a whole number from start to finish dates. (weekends and holidays are excluded unless specified)</td>
</tr>
<tr>
<td>SECOND()</td>
<td>Identifies seconds in a time field i.e., 0-59</td>
</tr>
<tr>
<td>WEEKDAY()</td>
<td>Identifies a day during a specified week in a specific timeframe. 1=Sunday</td>
</tr>
<tr>
<td>WEEKUM()</td>
<td>Identifies a specific week number in the calendar year</td>
</tr>
<tr>
<td>YEAR()</td>
<td>Identifies a year with a specific number i.e., 1900-9999</td>
</tr>
</tbody>
</table>
Stratify Your Data for Pivot Trending

Scatter Chart
Viewing Differences in Values/Volumes
Adding Labels to a Scatter


http://bit.ly/1GbzM1S - Macro for running the scatter

Validate Addresses with Power Map for Excel 2013
Step 2 – Digital and Textual Analytics

Setting Latitude and Longitude for Improved Scoring

Benford’s Law – The Basis of Digital Analysis

<table>
<thead>
<tr>
<th>Digit</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>.30103</td>
<td>.17609</td>
<td>.12498</td>
<td>.09691</td>
</tr>
<tr>
<td>1</td>
<td>.11968</td>
<td>.10982</td>
<td>.10433</td>
<td>.10031</td>
</tr>
<tr>
<td>2</td>
<td>.10878</td>
<td>.10097</td>
<td>.10057</td>
<td>.10018</td>
</tr>
<tr>
<td>3</td>
<td>.10004</td>
<td>.10002</td>
<td>.10000</td>
<td>.10000</td>
</tr>
<tr>
<td>4</td>
<td>.09668</td>
<td>.09979</td>
<td>.09999</td>
<td>.09999</td>
</tr>
<tr>
<td>5</td>
<td>.09991</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
</tr>
<tr>
<td>6</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
</tr>
<tr>
<td>7</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
</tr>
<tr>
<td>8</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
</tr>
<tr>
<td>9</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
<td>.09999</td>
</tr>
</tbody>
</table>


The table shows that the expected proportion of numbers with a first digit 1 is 0.17609 and the expected proportion of numbers with a first digit 2 is 0.10982.
Calculating Benford’s Digits in Excel

Benford’s Law: The Scored Approach
http://bit.ly/1iWV9gp
Data Types – Is It All Numbers?
From Structured to Unstructured and Beyond

<table>
<thead>
<tr>
<th>Structured Data</th>
<th>Unstructured Data</th>
<th>External Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting records</td>
<td>Documents (Excel, PDF, Word)</td>
<td>Geomap Service</td>
</tr>
<tr>
<td>Sub ledger details</td>
<td>Emails</td>
<td>OFAC, SAM.Gov Watch Lists</td>
</tr>
<tr>
<td>Monthly performance measures</td>
<td>Network Logs</td>
<td>IRS Tax ID Match</td>
</tr>
</tbody>
</table>

http://bit.ly/1gP3meq

EY Global Forensic Data Analytics Survey 2014

450 executives surveyed

- 72% of respondents believe that emerging big data technologies can play a key role in fraud
- Only 7% of respondents are aware of any specific big data / Only 2% are using them
- 12% utilize visualization / 26% apply key word searches
- 62% of respondents indicate that they need to improve management’s awareness of the benefits of analytics
90% of Data is Text Based
When Did You Last Audit Text?

It works fast to quickly gain a perspective of the business process data:
- Can work in real-time with the data while talking to the client – no prep needed...meaningful questions in seconds
- Look for deviations over a 3-year moving average to the current period

If digital analysis/Benford’s Law is latitude, letter analytics is longitude
- Text is far richer in business value and providing a picture than simple digit theory
- The unique word chart provides a more normalized view of activity while total word occurrences by letter provides a more dynamic chart
- The trends can be seen quickly to ask relevant questions and to highlight fraud

Why not use another approach, such as Benford’s Law, to look at ALL data?

Key Words/Phrase Survey Summary Results - 2014

Unique Responses
- 4,320 response phrases / 2,153 unique phrases
- Average of 17 phrases per response

Phrase Occurrences
- Unique phrases: 1,424 (66%)
- 2 to 4 occurrences: 574 (27%)
- 5 to 19 occurrences: 144 (7%)
- 20 and Over: 11 (1%)

Phrase Letter Length
- Average of 10, Max of 75 and Min of 2 letters

Per AuditNet® Key Words Survey
http://bit.ly/1XyMwch
Key Word / Textual Analytics
Fraud Triangle – Five Interesting Words

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Opportunity</th>
<th>Rationalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAVE BILLS TO PAY</td>
<td>CHANNEL STUFFING</td>
<td>DON’T KNOW WHAT ELSE TO DO</td>
</tr>
<tr>
<td>FROM PETER TO PAY PAUL</td>
<td>COOKIE JAR RESERVES</td>
<td>PIECE OF THE ACTION</td>
</tr>
<tr>
<td>MANAGE EARNING</td>
<td>FRAUDULENT SHAM</td>
<td>TREAT ME THIS WAY</td>
</tr>
<tr>
<td>TICKING TIME BOMB</td>
<td>QUID PRO QUO</td>
<td>WORRY ABOUT IT LATER</td>
</tr>
<tr>
<td>WALL STREET EXPECTATIONS</td>
<td>SECRET ACCOUNT</td>
<td>THEY’LL BE SORRY</td>
</tr>
</tbody>
</table>

Excel Macro
Red Flag Word Searches

**What You Need**
- Word Search Table
- Provided Excel Macro Add-in

**How You Do It**
- Open the Data File to Be Analyzed
- Copy a List of Words To Search With Into a New Excel Worksheet in the Data File
- Run the Excel Macro Add-in – which can be obtained at: [http://bit.ly/1LlnwOt](http://bit.ly/1LlnwOt)
C.O.C.A.
Dictionary Key Word List

See below and where to download the free 5,000 word list:

http://www.wordfrequency.info

Protiviti Reports on Internal Auditing
2006 to 2012 vs. 2013 to 2015 – Key Words

http://www.protiviti.com/IAsurvey
Making Wordles (www.worlde.net)

Creating the Wordle
www.wordle.net
Protiviti Reports on Internal Auditing
2006 to 2012 vs. 2013 to 2015
Lanza Approach to Letter Analytics (LALA)™

http://www.protiviti.com/IASurvey
A Benford’s Law For Letters and Words?

2) Practical Applications of LALA: http://bit.ly/1PF3GBY

Finalizing the Score Selection
By Coding Data and Also Coding for Likelihood
Using Vlookup to Combine Scores
Create a record number/relate sheets based on VLookup

<table>
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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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</tr>
</tbody>
</table>

Calculating Score Ratio
Productivity of Report Scores to Transactions

Each transaction has the chance of getting a 100% score

Combined Score
Scores for each report run, which is prioritized in value by report

One Transaction
To be scored for selection

If the transaction shows up on all of the “concerning” reports
Severity To Value

Vendors Over $50K To Score Ratio
New Functions To Learn
See the JEScoring Worksheet

Focus on 2 and 3 Std Deviations
Consider Sampling “Strata of Z”

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New Functions To Learn
To Produce Statistical Score Analysis

Average – Provides the mean
Stdev – Provides the standard deviation
Standardize - Z Score
Norm.Dist - Percentile per value
Percentile – Value for a percentile
Count – Counts the observations
Dashboards in Excel

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