



Audit Data Analytics & Business Intelligence

NAW Billion Dollar CFO Roundtable
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Thought Leadership

- q Rutgers AICPA Data Analytics Research Initiative
- q Audit Data Analytics Guide Task Force
- q PCAOB Data and Technology Task Force

The Future of Audit Is Nearly Here

The pace of change is accelerating, drivers include:

- Analytics
 - **Predictive analytics**
 - **Audit data analytics**
 - **Visualization**
- Automation
 - Robotic Process Automation
 - **Artificial intelligence**
- Advances in preparer systems
 - Blockchain
 - **Internal audit**

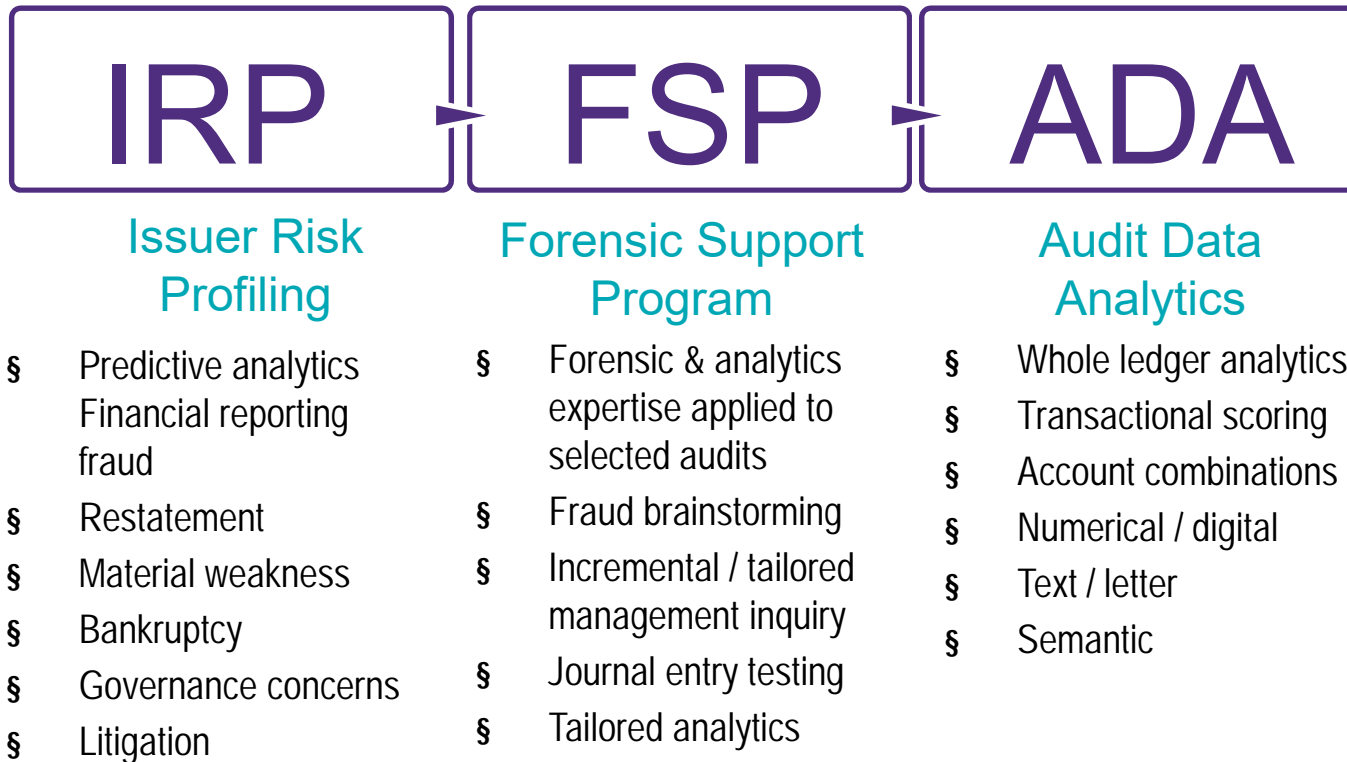




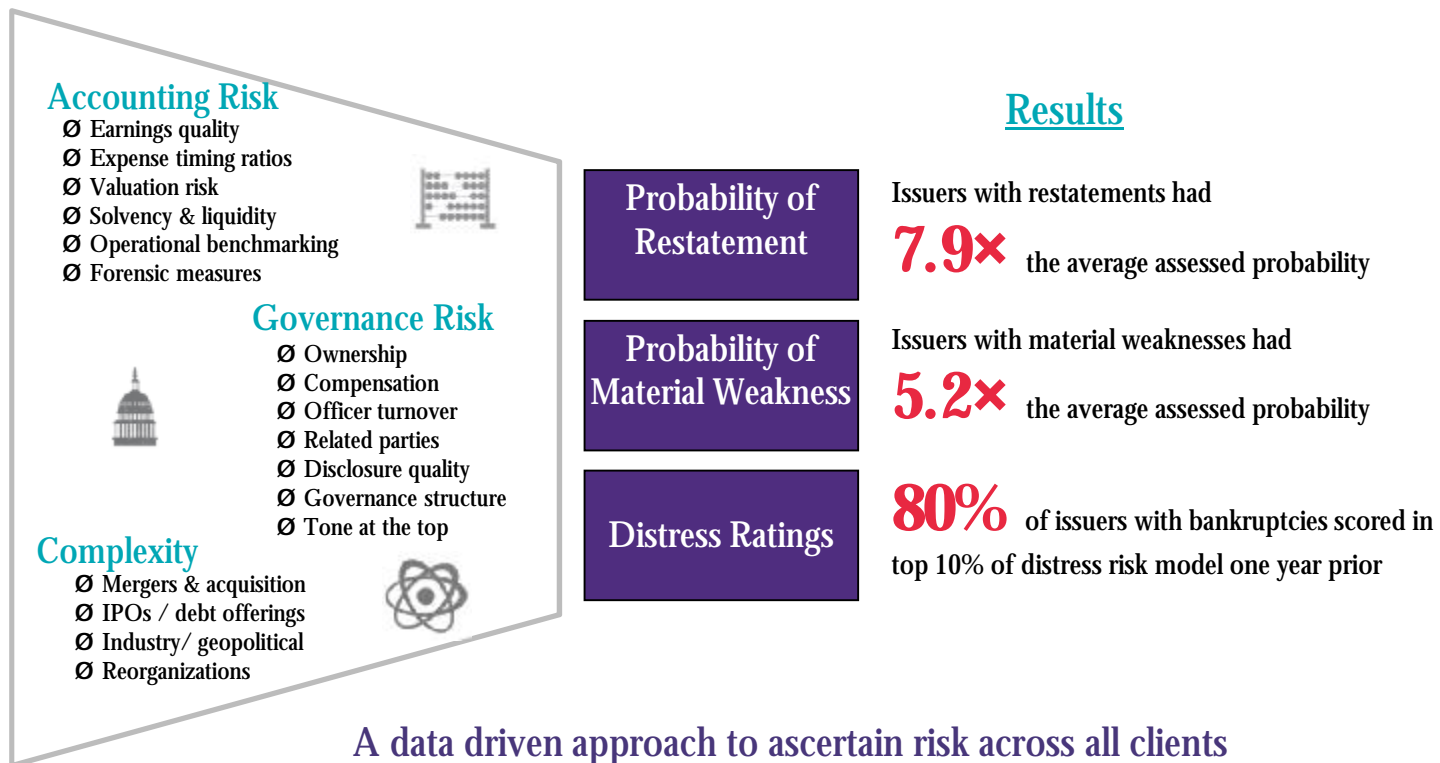
Predictive Analytics



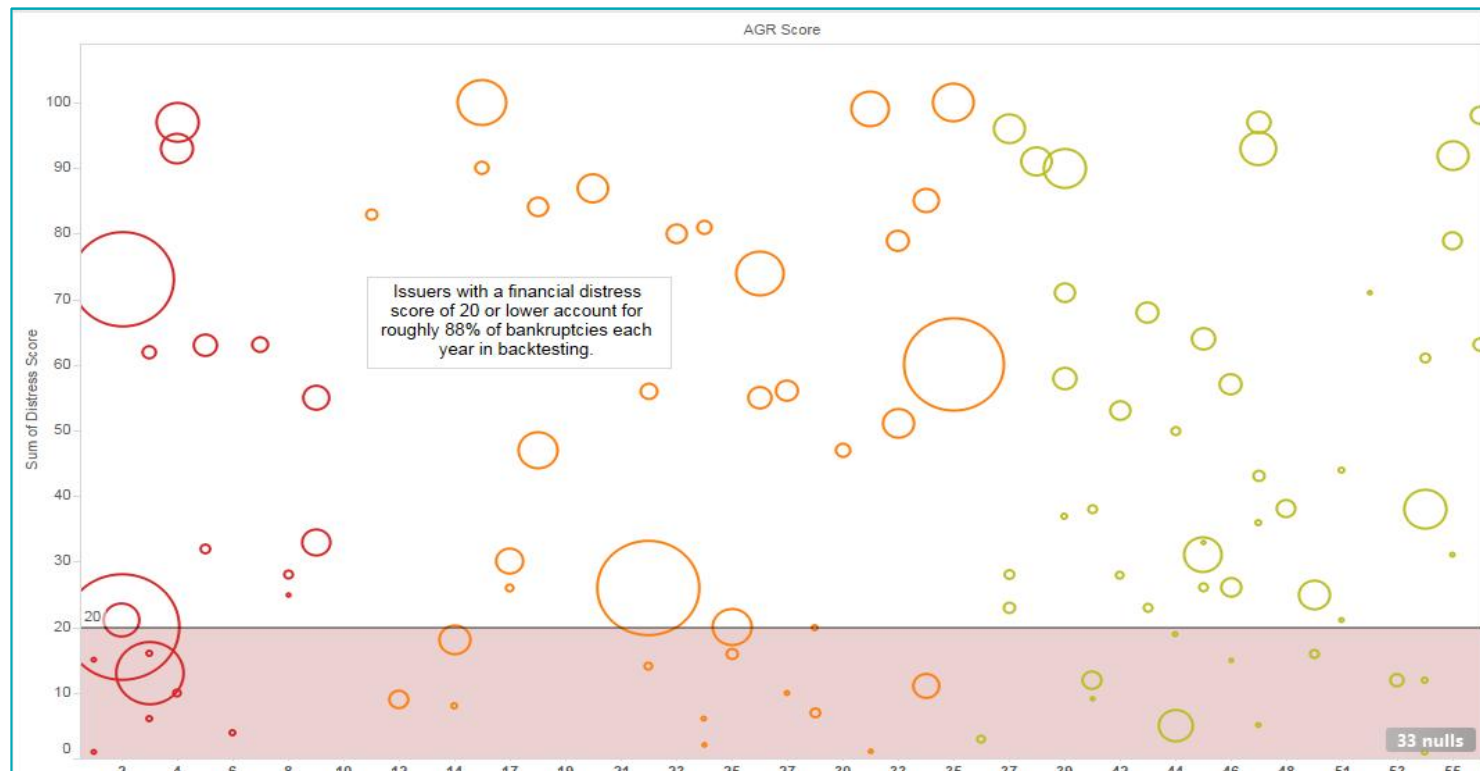
Analytics Programs



Issuer Risk Profiling

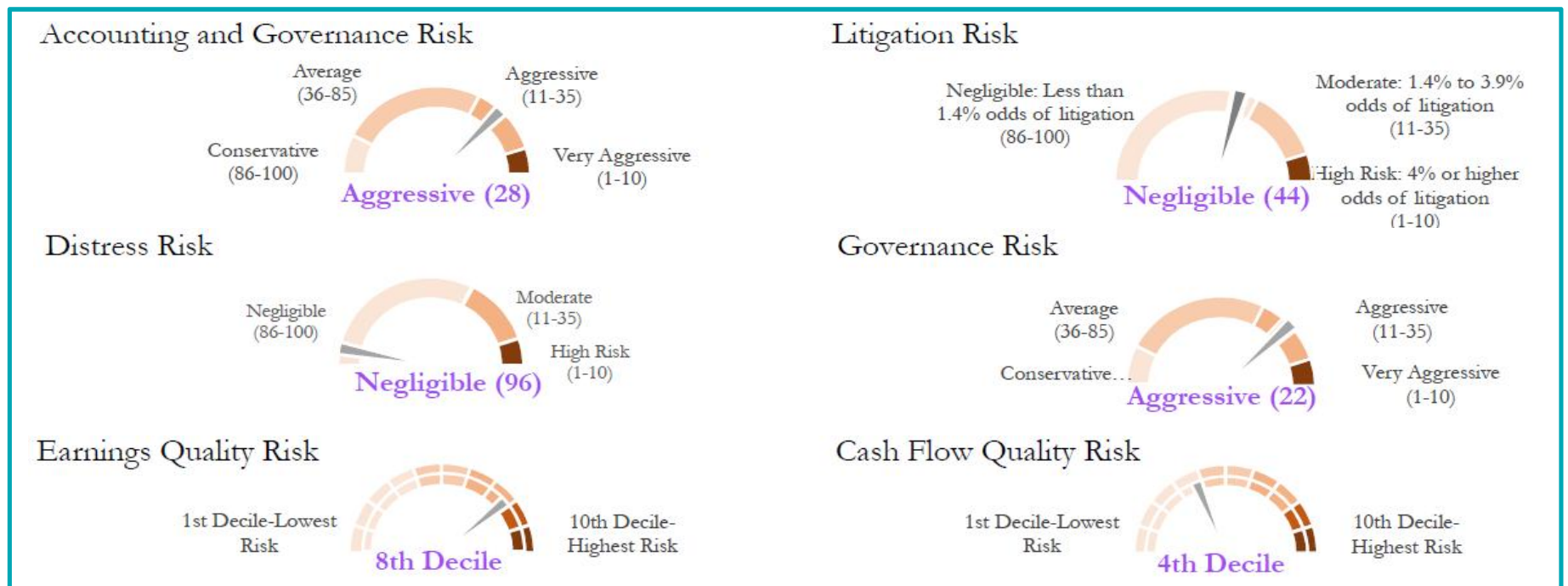


Using Visualization to Quickly Digest Risk Layers



Risk Mitigation

- ✓ Consider profiling factors – what could go wrong and how can that manifest
- ✓ Continued focus on audit quality, mitigating risk

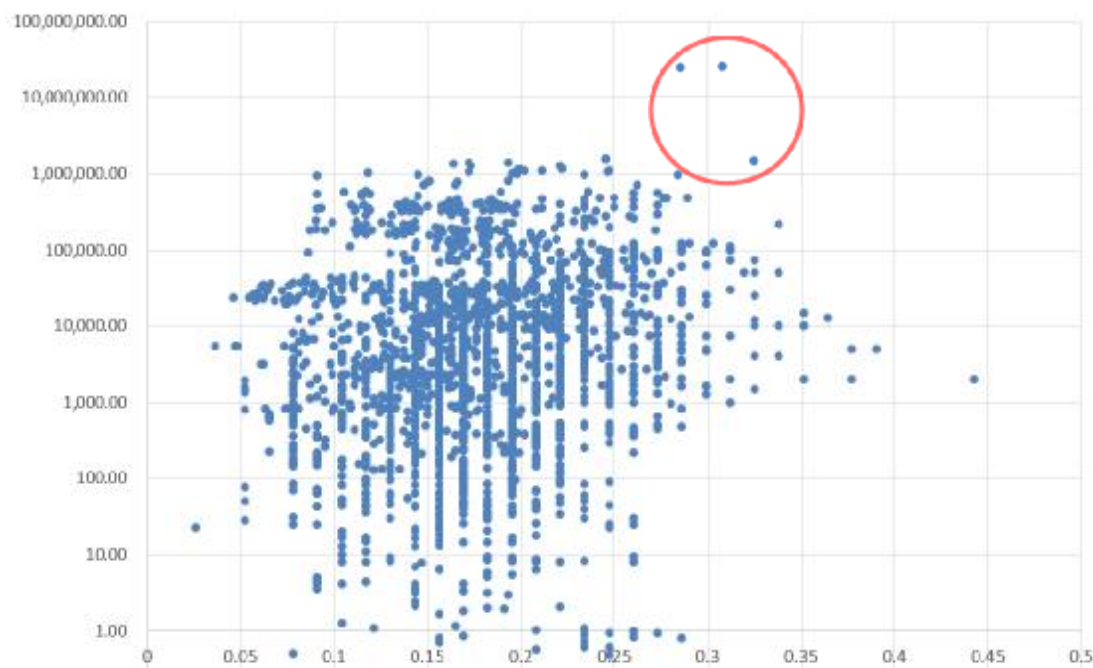




Audit Data Analytics

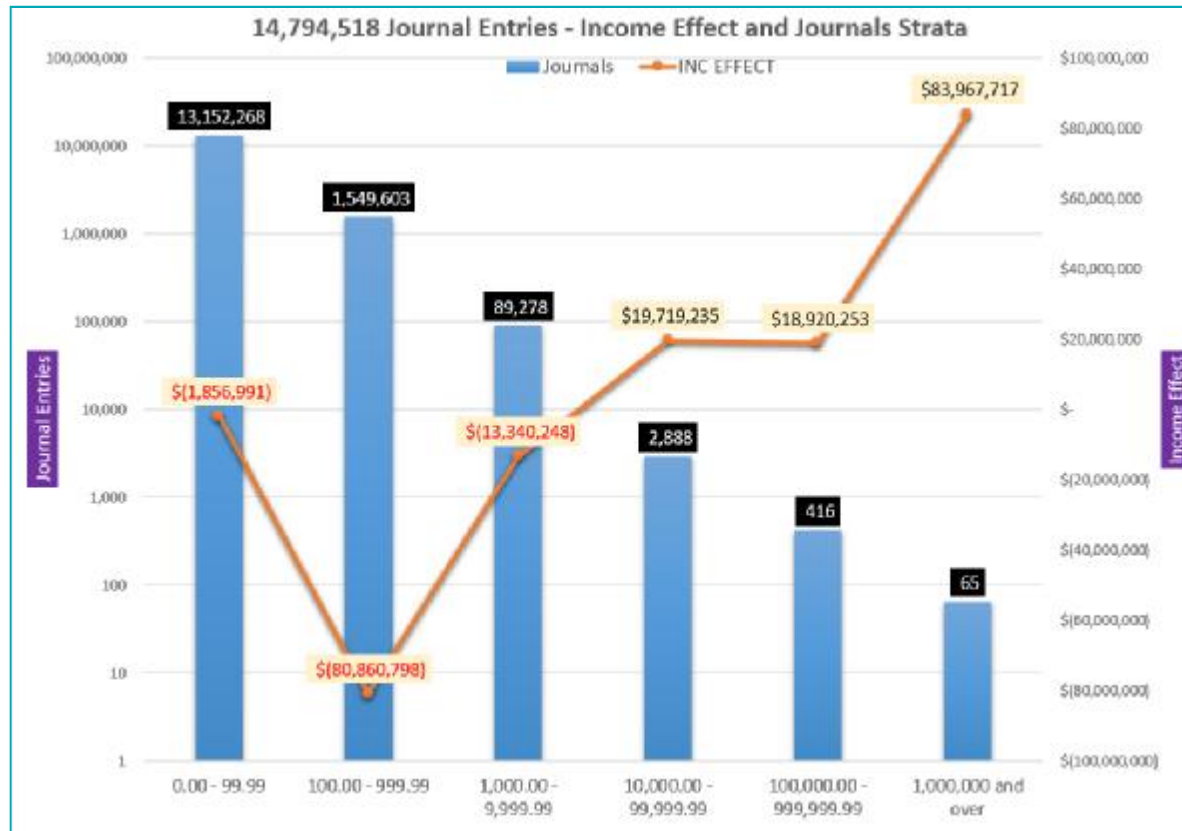


Transactional Scoring with Income Effect



Top Entries	SCORE_RATIO	INC_STMT_IMPACT	BAL_SHEET_IMPACT	Description	Posting_Date
1	0.338	(216,678.08)	216,678.08	To balance to subledger	12/31/2016

Stratification



Millions of journal entries can be compressed into a single view.

In this case, 15 of the 65 largest journal entries make up 94% of the net income effect

Each of these items can be further explored by location, segment, and entry process/employee.

Account Combinations

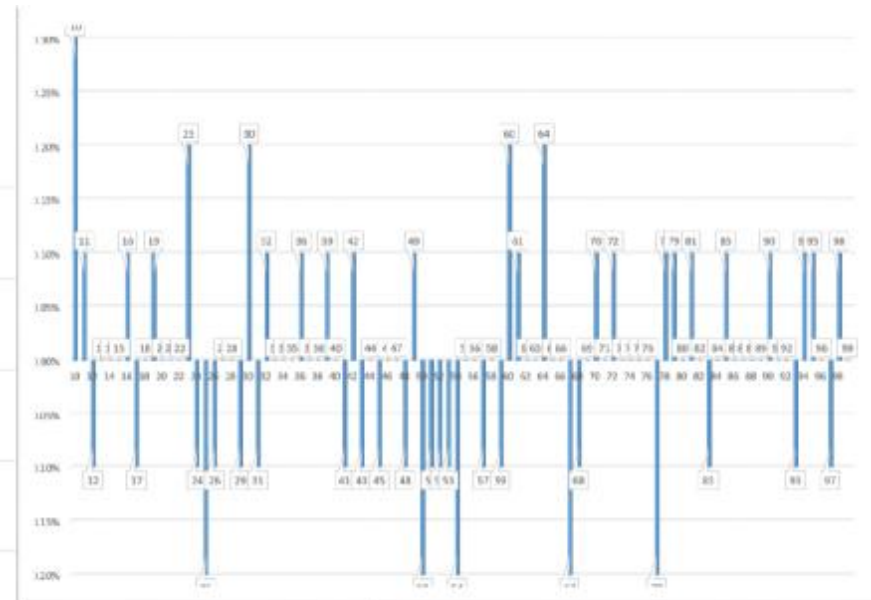
The top 20 combinations account for 86% of JE line items

	Journal Lines	% of Total
Total Journal Entry Lines	1,558,112	100%
Zero Income Stmt. Line Items	136,930	9%
Top 20 Account Combinations	1,338,811	86%
Remaining 322 Account Combinations	82,371	5%

The top combination accounts for 60% of J/E line items

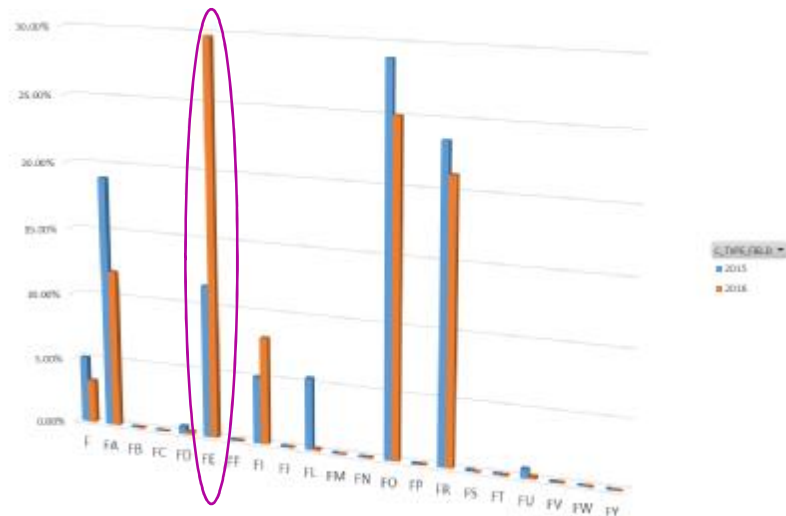
TOTAL_JE_TRANS	GL_AccountDr1	GL_AccountCr1
927,956	Inventory	COGS

Digital Analysis



Textual Analysis

“The Benford’s Law of Words”



Word usage in ledger

- Same words tend to occur year over year
- Changes may indicate some change in the client that could affect risk assessment

Sum of WORD_OCCURRENCES			
Column Labels			
Row Labels	2015	2016	Change
FEE	3,024	2,237	(787)
FEES	25,528	25,596	68
FEESDAN		6	6
FEESDISCNT		24,684	24,684
FEESDISCOUNT		33,294	33,294
Grand Total	28,552	85,817	57,265



Visualization



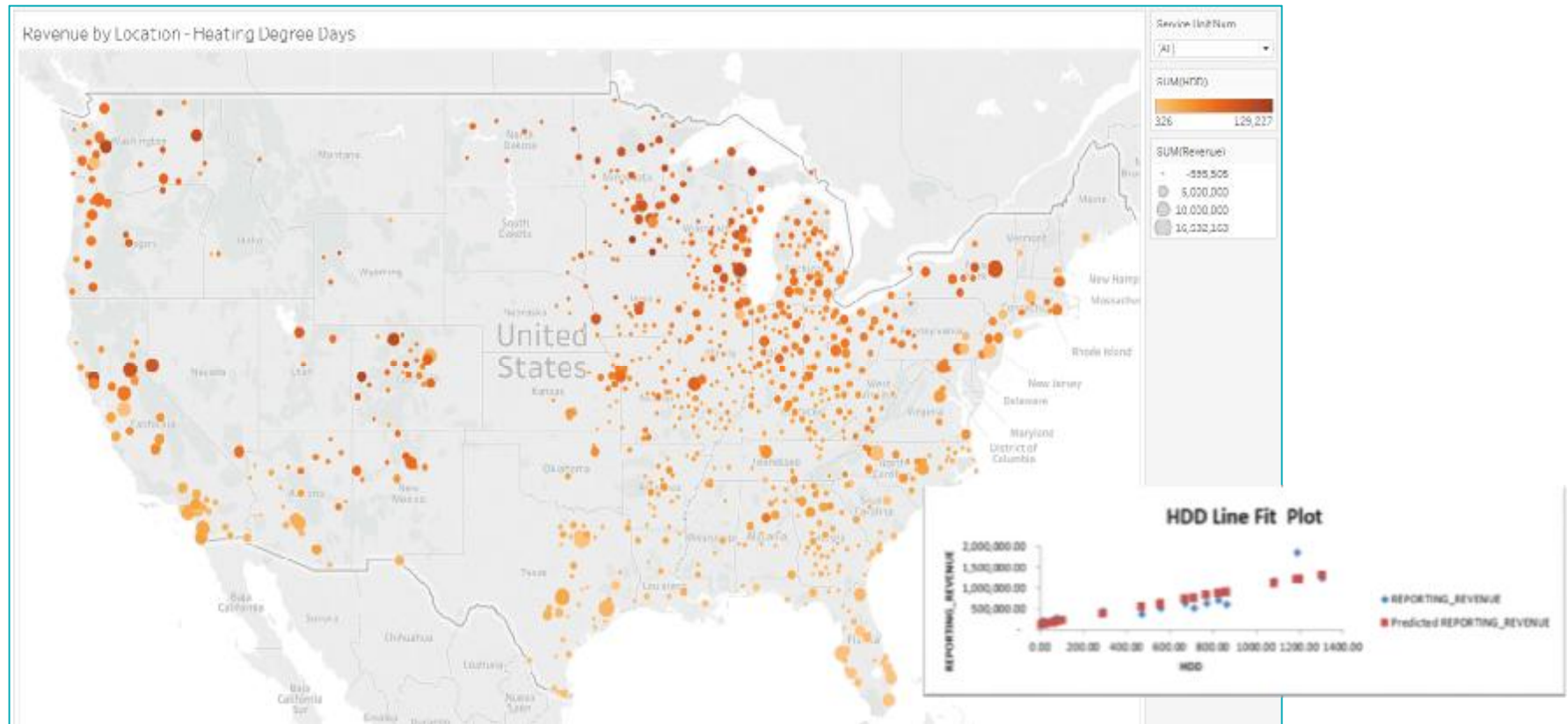
Trending Revenue

- ü Store sales were expected to decrease year over year
- ü One store closed
- ü One store had 2.3% increase overall (*but that tells only part of the story*)

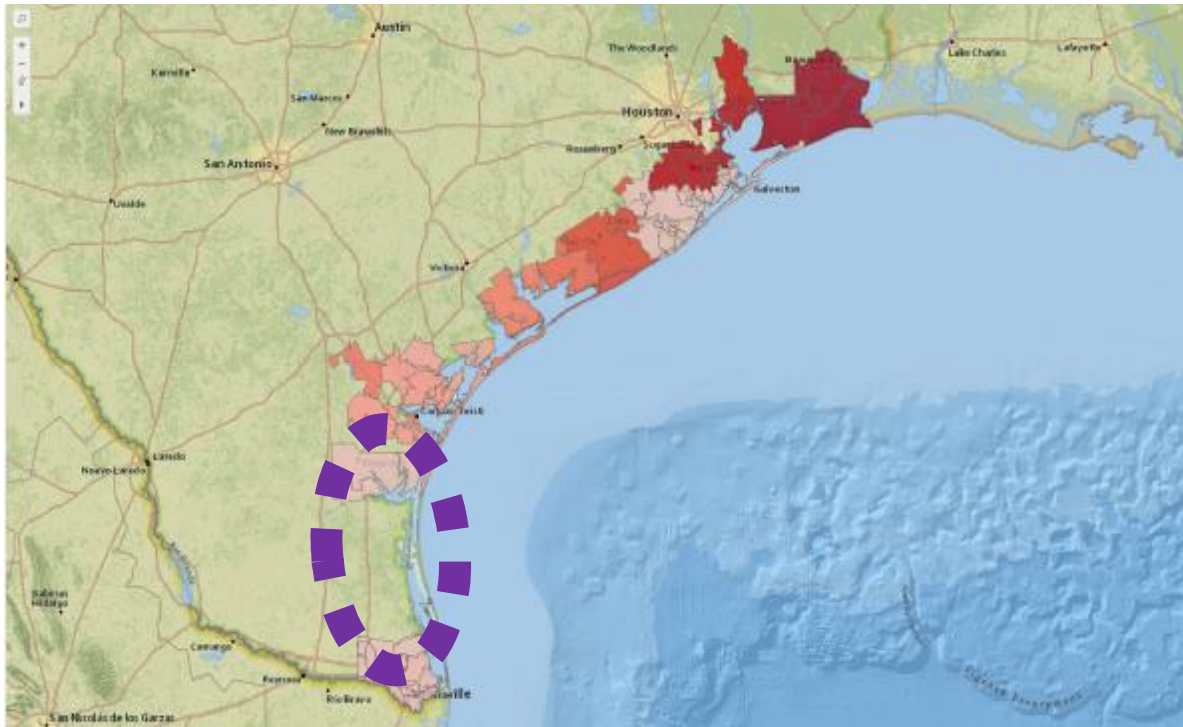
Sales By Month and Store



Gas Distribution Industry: Heating Degree Days



Visualization Technology + Non-Financial Data



Financial Data

- § Wind damage claims
- § Policy holder data

External Data

- § Hurricane path
- § Flood information

Visualizations

- § Geo-mapping services
- § Interactive visualizations



Robotic Process Automation



Robotic Process Automation (RPA)

RPA involves “**training**” digital robots to execute processes, using same steps, business rules and systems that a person does today.

Characteristics

- Any process – works at GUI level
- No change to process – automates current process
- No change to systems – no data level (API) interfaces required
- Faster and lower cost to deploy and maintain – day/weeks v. months/years

Requirements

- Structured digital data – as found in most applications and systems
- Business rules – clear, mature



Typical RPA Candidates by Function

Procure to Pay	Order to Cash	Record to Report
Avg. RPA Potential: 40% - 70%	Avg. RPA Potential: 50% - 70%	Avg. RPA Potential: 50% - 65%
Invoice Processing <ul style="list-style-type: none"> ● Receipt/processing and electronic inputs ● Verification and approval actions, escalations and monitoring ● Account downloads from ledger to AP system for reconciliations ● Invoice Match – Exceptions ● Check preparation, handling activities Discrepancy Resolution <ul style="list-style-type: none"> ● Identification of discrepancies (i.e., price/quantity differences, short pay, missing or invalid PO nos.) ● Follow-up aged discrepant items ● Error corrections as received either from systems, audit or sites Supplier Management <ul style="list-style-type: none"> ● Supplier Master Data Management ● Item Master / Content Management ● Payment execution 	Order Management <ul style="list-style-type: none"> ● Quote Generation ● Customer Profitability Analysis ● Order Entry Errors ● Customer Service Frequent Responses Credit Management <ul style="list-style-type: none"> ● Customer segmentation ● Customer credit management ● Payment Trend v. Credit Monitoring Customer Billing <ul style="list-style-type: none"> ● Unbilled management and Billing Triggers ● Bill calculation and verification ● Customized billings ● Credit memo processing Cash Applications <ul style="list-style-type: none"> ● Cash posting ● AR reconciliation ● Unallocated and unapplied cash ● Short payments 	General Ledger Accounting <ul style="list-style-type: none"> ● Automated GL transaction feeds ● Manual journal entry processing ● GL reconciliation and analysis ● GL Reporting ● Period End Close Intercompany Accounting <ul style="list-style-type: none"> ● Manual data entry activities ● Reconciliations Reporting <ul style="list-style-type: none"> ● Download data/format in Excel/auto distribute ● Record report receipt ● Auto report follow ups Tax <ul style="list-style-type: none"> ● Sales and Use Tax Reconciliation ● Sales and Use Tax Forms ● Tax Master Data Annual Monitoring/Renewal Processing

Average RPA Potential - % of manual processes that can be automated using RPA

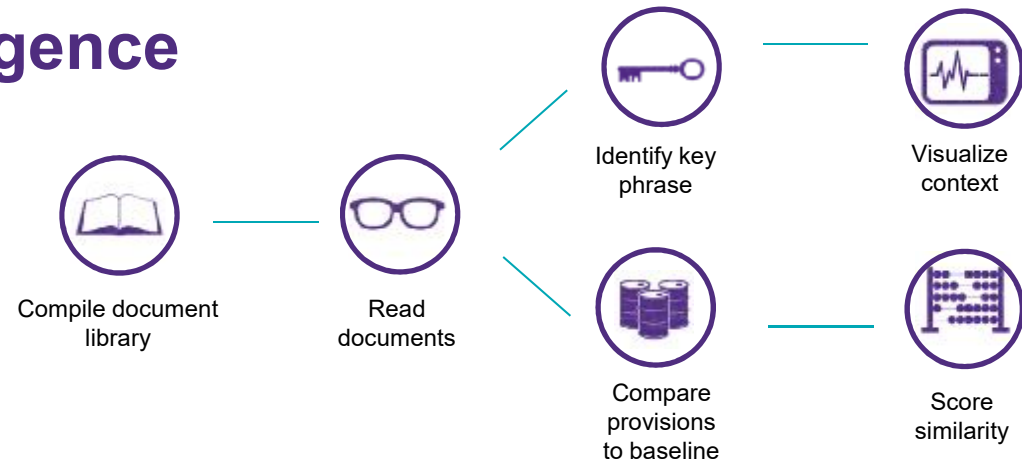


Artificial Intelligence

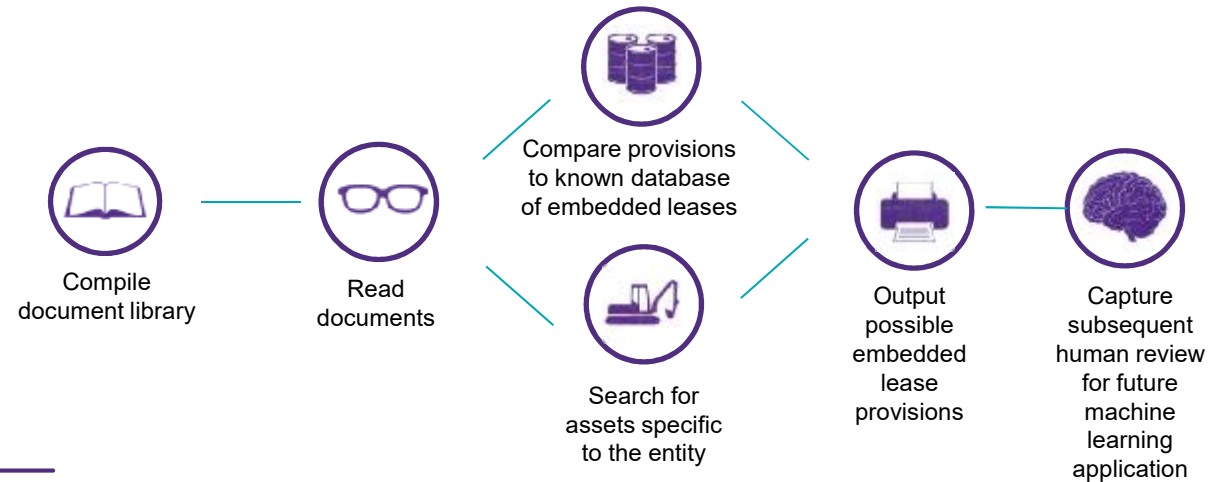


Artificial Intelligence

Text Analytics Tool:



Embedded Lease Search:



Linguistic Analysis

Executive



General Knowledge
(Deceptive CEOs use More)

General Knowledge
(Deceptive CFOs use More)

Impersonal Pronouns
(Deceptive CFOs use More)

Extreme Negative
(Deceptive CFOs use More)

Certain linguistic cues in earnings calls have been found to be correlated with restatements.

This is one example of how artificial intelligence can be used to support auditor inquiry relevant to the risks associated with the financial statements and larger business environment.



Blockchain



Blockchain Opportunities

Blockchain, also known as **distributed ledger technology**, has the potential to drive significant change:

- **Continuous** monitoring/auditing
- **Eliminate** audit sampling
- **Customized** attestation reports
- **Simplified** corporate processes and controls



Blockchain and Audit Assertions

Table 3.1: Using distributed ledgers to test audit assertions

	AUDIT ASSERTION	DESCRIPTION	POTENTIAL FOR DIRECT BENEFIT FROM DISTRIBUTED LEDGERS (INDICATIVE VIEW)*
1	Completeness	All transactions are recorded in the financial statements	√√
2	Occurrence	The transactions in the financial statements actually happened	√√√
3	Valuation	Items in the financial statements have been included at appropriate amounts	√
4	Classification and understandability	Financial information is correctly categorised and disclosures are clearly communicated	√
5	Accuracy	Data is recorded at the correct amounts, which are verifiable in source documents	√√
6	Rights and obligations	Correctly establishing right to use or dispose of assets as well as obligations to pay off liabilities	√
7	Cut-off	Recording of transactions for the correct accounting period	√√√

* More √ indicates greater potential for direct benefit. Excludes indirect benefit where DL might improve data quality in general terms which creates knock-on benefits

Source: <http://www.accaglobal.com/us/en/technical-activities/technical-resources-search/2017/april/divided-we-fall-distributed-we-stand.html>



Internal Audit



A Shift in Internal Audit's Approach and Value

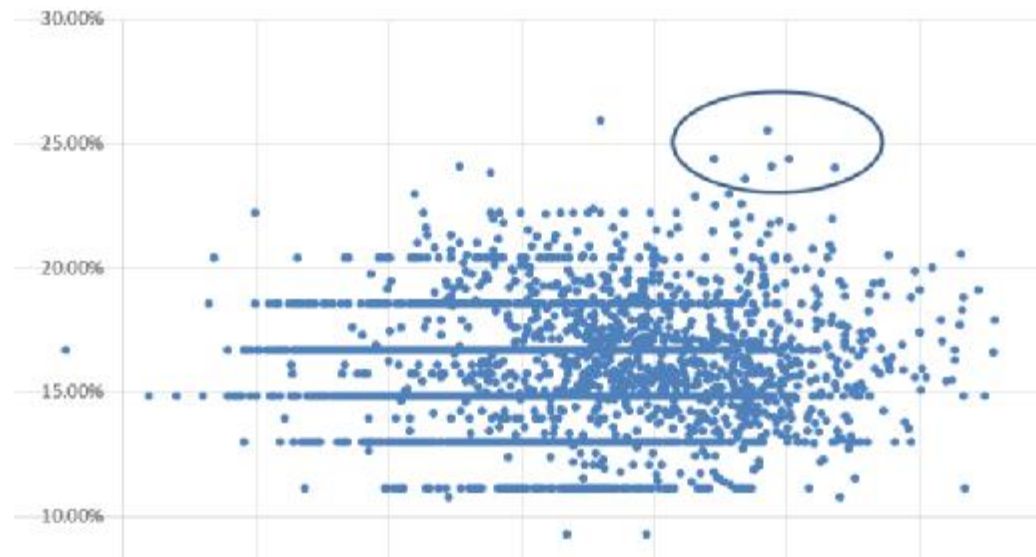
Projects of NOW and NEXT

Compliance Auditor

Trusted Partner and Value Driver

Operator	Human: manually complete checklist	Machine with human: data and analysis driven
Scope	Sample: thoroughly evaluate small portions of data	Entire population of data: thoroughly analyze all data
Focus	Compliance using historical data	Risk-based assurance using trends and predictions
Time & value	Slow & stagnant	Fast, efficient & insightful
Advisory role	None	Drive value through focus on business outcomes and improvements
Orientation	Reactive: quarterly cadence	Proactive: persistent data monitoring, control testing
Technology	Limited reliance	Heavy reliance
Outcome	Pass / Fail	Risk based actionable recommendations
Client Sentiment	Check the box: "Get them out of here"	Eager and excited: "Stay and help us mature this function"

Vendor Risk Ranking



ü Two vendors in the top 5 scored vendors with over \$10K

IVendor_No	IVendor_Name	vStreet_Address	vCity	vState	vZIP	IPald_Amou	SCORE_RATI
822001	8227 Main Street, LLC	PO Box 548	Owings Mills	MD	21117	28,814.43	24.31%
823001	8231 Main Street, LLC	PO Box 548	Owings Mills	MD	21117	49,490.99	23.52%

Accounts Payable Analytics

Enable 100% testing coverage & focus resources on the highest risk

- Grant Thornton proprietary risk scoring based on high risk trends and characteristics for vendors, invoices, checks, payments, and user activity.

Examples



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Analytic Tests

Examples

Perform vendor master analysis:

- Vendor risk scoring
- Duplicate vendors
- Vendors with a potential match to employees
- Vendor trends, outliers and unusual characteristics

Perform invoice analysis:

- Invoice risk scoring
- Duplicate invoices
- Payment date vs. invoice due date
- Invoice trends, outliers and unusual characteristics

Perform disbursement analysis:

- Payment risk scoring
- Check risk scoring
- Total payments to unauthorized / restricted vendors
- Duplicates invoices and payments
- Payments posted on weekends / holidays
- Transactions and trends summarized by user

Control Test Automation

Automate routine processes across a variety of systems, allow for controls testing across 100% of the population and reap time savings.

Manual Compliance Assessment

Before
2 hours per control

	Pass / Fail
Control 1	Pass
Control 2	Pass
Control 3	Pass
Control 4	Fail
Control 5	Pass

Partial Assurance

Before Adjustments to Control (user access control):

- User access for SAP sampled at 25 users per quarter, catching potential access issues every three months
- Excessive time spent testing – 2 hours per control per year.

Time savings of 75%+ per control

Automated control monitoring using advance analytics – efficient value protection

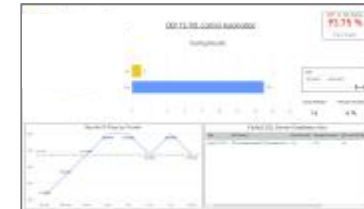
Efficiency

Sample based control testing - basic risk management

Value Protection

Automated Compliance Monitoring

After
<10 minutes per control



Value Protection

After Adjustments User Access Controls:

- SAP user access tested at 100%, in real time
- Testing performed in seconds or minutes
- *Organization responds to user access problems in real time – as opposed to quarterly*

Questions?

Lumen: Enlightened Financial Audits

Lumen is an advanced analytics approach that drives superior independent audits. We use predictive modeling and whole ledger analytics to bring all of your company's financial data into clear focus. By transforming the way we see your statements, Lumen enables a new level of data-driven decision-making.

[Connect with our Lumen team](#)

