AML and Data Analytics

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AML and Data Analytics

The AML Process

The AML Process

- MONEY LAUNDERING IS A FINANCIAL TRANSACTION SCHEME to conceal or attempt to conceal the identity of proceeds illegally obtained so that the proceeds appear to come from legitimate sources.
- IMF estimation: money laundering amounts to 2-5% of global GDP (www.farf-gafi.org/faq/moneylaundering) – 800 Billion to 2 Trillion dollars
- Money laundering disguises the illegal origin and legitimizes the funds so they can be openly used.
- Three main stages: placement, layering, and integration

Placement: The riskiest phase

- Direct connection to money source
- Most legislation is developed to prevent/detect this stage
- Large amounts of cash are chunked or disguised to escape detection/alerts
  - “smurfing”/structuring: splitting larger amounts so as to avoid detection (below 10K)
  - Physically move money
  - Exchanging to alternative currencies
  - Purchasing gems, bitcoins, money orders, cashiers checks

Layering: the most complex stage

- Where the origin of the money is being made difficult to trace.
- A number of transactions or layers need to be put between the original sources of the funds before they are brought back into the legal economy.
- Funds might be moved to foreign countries that usually have strong bank secrecy laws, moved into accounts in the name of others who are nominees, or moved to accounts held by offshore corporations where the beneficial ownership is hidden and the funds can be withdrawn and redeposited to a number of other accounts.
- Other layering tools and techniques include:
  - Bank secrecy laws
  - Offshore banks
  - Tax havens
  - Shell corporations
  - Trade-based laundering
  - Digital currencies

Integration: Re-Introduction phase

- In the integration stage, the money enters back into the legitimate economy where it appears to have come from legal and normal transactions.
- Difficult to detect, unless there is a PAPER TRAIL
- Depending on the layering stage, the return may appear to come from a sale of assets such as real estate.
  - False loans from off-shore companies
  - False inheritances
  - False gambling winnings
  - Credit cards issued by off-shore banks
  - Salary from false business
  - Importing/exporting/distribution
  - Co-Mingling of funds with legitimate businesses (high cash based businesses)

An AML scheme cannot be successful unless the paper trail is eliminated or made very complex!

Example:

Alberto Barrera ran a rather sophisticated structuring operation that involved bank accounts in cities all over the United States. Barrera and his accomplices would fly to different U.S. cities, traveling to various banks and purchasing cashier's checks and money orders in amounts less than $10,000 (to avoid U.S. federal reporting requirements). They would then travel to banks in other cities, where they would deposit some of the purchased checks and money orders into accounts controlled by Barrera. Once the money was converted or deposited, it was transferred to banks in other countries.

Money Laundering Methods

- Using a Front Business to Launder Funds
  - Seemingly legitimate business
  - Comings and goings will not stand out
  - Provides cover for delivery and transportation related to AML activities
  - Expenses from illegal activity can be concealed
- Overstating Revenues and Expenses
- Depositing, but NOT RECORDING, revenue

Money Laundering Methods: Luxury Antiques

Luxury Antiques is a chain of antique stores with several locations within and around a major metropolitan center. It is locally owned. The bulk of its activity is in the sale of antique figurines. Luxury Antiques sells an average of 200 pieces per month.

Customers are encouraged to pay in cash and, when they do so, are usually pleased when they receive a "special discount" (which can be as high as 25 percent) off of the "official invoice price." The invoice the customer receives shows the full price rather than the discounted price. If a customer questions this practice, the store owner explains it is done for "competitive reasons."

Over the course of a year, Luxury Antiques sells 2,400 total figurines for an average "official invoice price" of $4,000. This yields $9,600,000 of recorded revenues. Actual cash received from customers falls short of that figure by 20 percent, for a total of $7,680,000. The difference—$1,920,000—is now available for laundering purposes. To take advantage of this situation, the owner simply deposits cash receipts of $1,920,000 from his illicit sources as legitimate business income. The result is that $1,920,000 has been successfully laundered.

Money Laundering Methods: Luxury Antiques

Another way for Luxury Antiques to overstate reported revenues is to create fictitious sales with all the normal paperwork. If 50 fictitious sales are created each month at the average "official price" of $4,000, an additional $2,400,000 of laundered receipts are produced each year. The result is that $2,400,000 of illicit funds can be disguised as legitimate business income. (Note that this method involves potentially more risk than the first because it involves completely fabricating all the elements of a sale rather than merely modifying one part of a normal sale.)

Money Laundering Methods

- Overstating Expenses to make payoffs, buy illegal goods, other illegal investments
  - Padding expense accounts
  - Payments for supplies never received
  - Fees to suspicious consultants
  - Salaries for non-existent employees
  - Basically:
    - Fictitious employees
    - Fictitious fees or vendors
    - Inflated invoices

Money Laundering Methods: Luxury Antiques

Luxury Antiques has six salespeople and two assistant sales managers on the payroll. All eight employees are fictitious. Their pay, as well as sales commissions paid to the fictitious sales managers, represents an annual expense inflation of $500,000. Luxury Antiques' owner does not have to pay taxes on this $500,000 and can take that amount of cash out of the business and put it into his own pocket.

Money Laundering Methods: Luxury Antiques

EXAMPLE

Luxury Antiques has lawyers and consultants on "retainer" for a total of $600,000 per year. They perform little or no business work, but they do submit invoices for fees on expensive stationery and with suitably vague descriptions of their activities. Once again, the money paid out is not taxed and can be put to illicit purposes.

Money Laundering Methods: Luxury Antiques

EXAMPLE

Luxury Antiques makes purchases from a supplier, who agrees to inflate invoices by 25 percent. The supplier then gives back four-fifths of the inflated amount, keeping the other one-fifth. On $500,000 of actual purchases per year, Luxury Antiques reports expenses of $625,000—an inflation of $125,000.

Money Laundering Methods: Luxury Antiques

EXAMPLE

A Luxury Antiques supplier, Import Associates, which provides 40 percent of the antiques sold by Luxury Antiques, sells figurines to Luxury Antiques in lots consisting of 150 to 200 pieces. The individual prices and the exact number of figurines in each lot are vaguely described in these "wholesale" bills of sale. As a result of its long association with Import, Luxury Antiques is able to arrange for the invoices to be inflated by an average of 30 percent. This gains Luxury Antiques about $580,000 per year in inflated expenses (assuming 960 figurines at an average real cost of $2,000 = $1,920,000). By inflating the invoice by 30 percent, the invoice price will reflect a price of about $2,500,000, the difference representing laundered expenses.

Money Laundering Methods

- Depositing, but not recording, revenue (cash)
  - “Loan proceeds”
  - “Sale of property”
  - “Capital investments”
- Check documentation!

EXAMPLE

Each month, an extra $360,000 is deposited into Luxury Antiques’ bank account. To offset the entry, sales are credited for the laundered cash by either being fictitious or marked up.

Money Laundering Methods

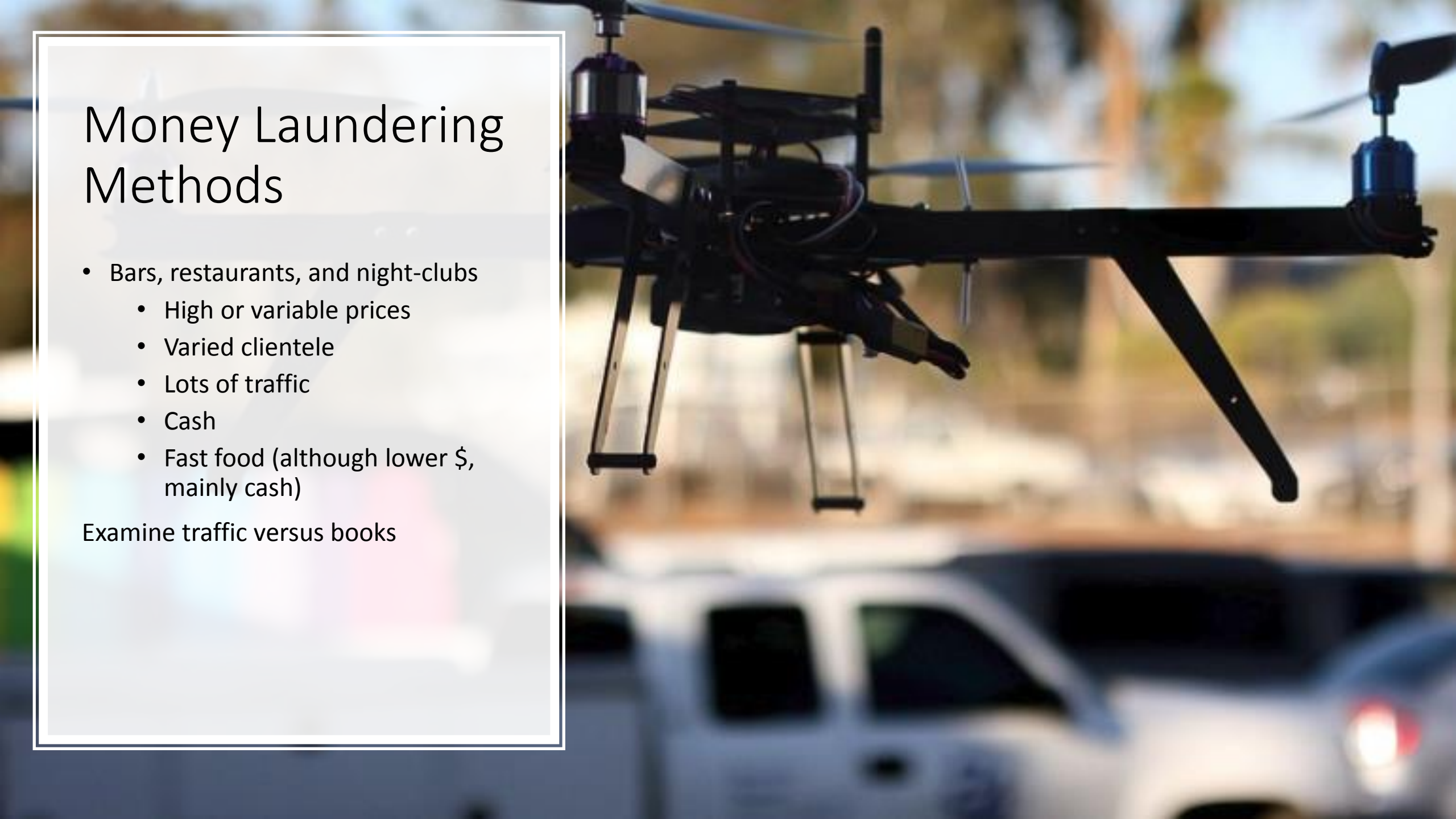
Characteristics of Favorite Businesses for Hiding or Laundering Money

- Revenue:
  - Revenue base is difficult to measure
  - Cash transactions
  - Variable amounts
- Expense:
  - Variable and tough to measure
- History:
  - Ethnic ties
  - Supplier/customer ties

Money Laundering Methods

- Bars, restaurants, and night-clubs
  - High or variable prices
  - Varied clientele
  - Lots of traffic
  - Cash
  - Fast food (although lower $, mainly cash)

Examine traffic versus books



Money Laundering Methods

- Vending Machine Operations
  - Highly variable
  - Hard to measure volume of cash receipts amd expenses
- Wholesale Distribution
  - Diverse product line
  - Falsified invoices
  - Fake Vendors
  - Fake Customers
  - Expenses easy to inflate

The Real Estate Industry

- Present a broad range of options
- Multiple parties, layering is possible
  - Obscure funding source
    - Loan-back schemes
    - Back-to-loan schemes
    - Shell entities
    - Appraisal Fraud
    - Monetary Instruments
    - Mortgage schemes
  - Obscure identity of owner

But, documentation!

ATMs

- Inexpensive
- Privately owned
- Easy to load
- ATM debits the cardholder and credits the ATM owner
- No requirement to check background of ATM owner
- No mandatory reporting procedures
- No rules for maintaining ATM sales records

Pre-paid Items

- Goods and services that are paid for in advance
  - Open, closed, semi-open
- Gift cards
- Pre-paid debit cards
- Payroll cards
- Prepaid mobile phones
- Mass transit cards
- Gaming and lottery cards

Mobile Banking

- Using an account associated with a mobile account…Samsung pay
  - Incomplete regulations
  - Transactions overseas hard to trace
  - Can move funds anywhere
  - Phone account owner can be anonymous

Digital Currencies and Virtual Assets

Online payment service which accepts funds in a variety of ways to transfer funds to and from individuals/businesses

Exist and are traded in a digital format

- Growing in number
- Loosely regulated
- Most transactions considered final
- International person-to-person
- No required customer identification, just the random “address”
- Poor record-keeping
- Unlimited volume
- Transactions almost instant

- Liberty Reserve (May 2013): $6 billion AML assets since 2000

Another example:

The Seoul Metropolitan Police uncovered a money laundering ring that moved $38 million from South Korea to China during the course of 18 months. The group purchased in-game gold of an online video game "farmed" by low-cost laborers in China, and then sold it to exchangers in South Korea. The criminals placed the money into accounts opened under fake or stolen identities, and then disguised wire transfers to a Hong Kong–based paper company as product purchases. To avoid detection, group members used technology to spoof their IP address and make it look like they were operating out of an Internet café in South Korea.

Banks and MSBs (Money Services Businesses)

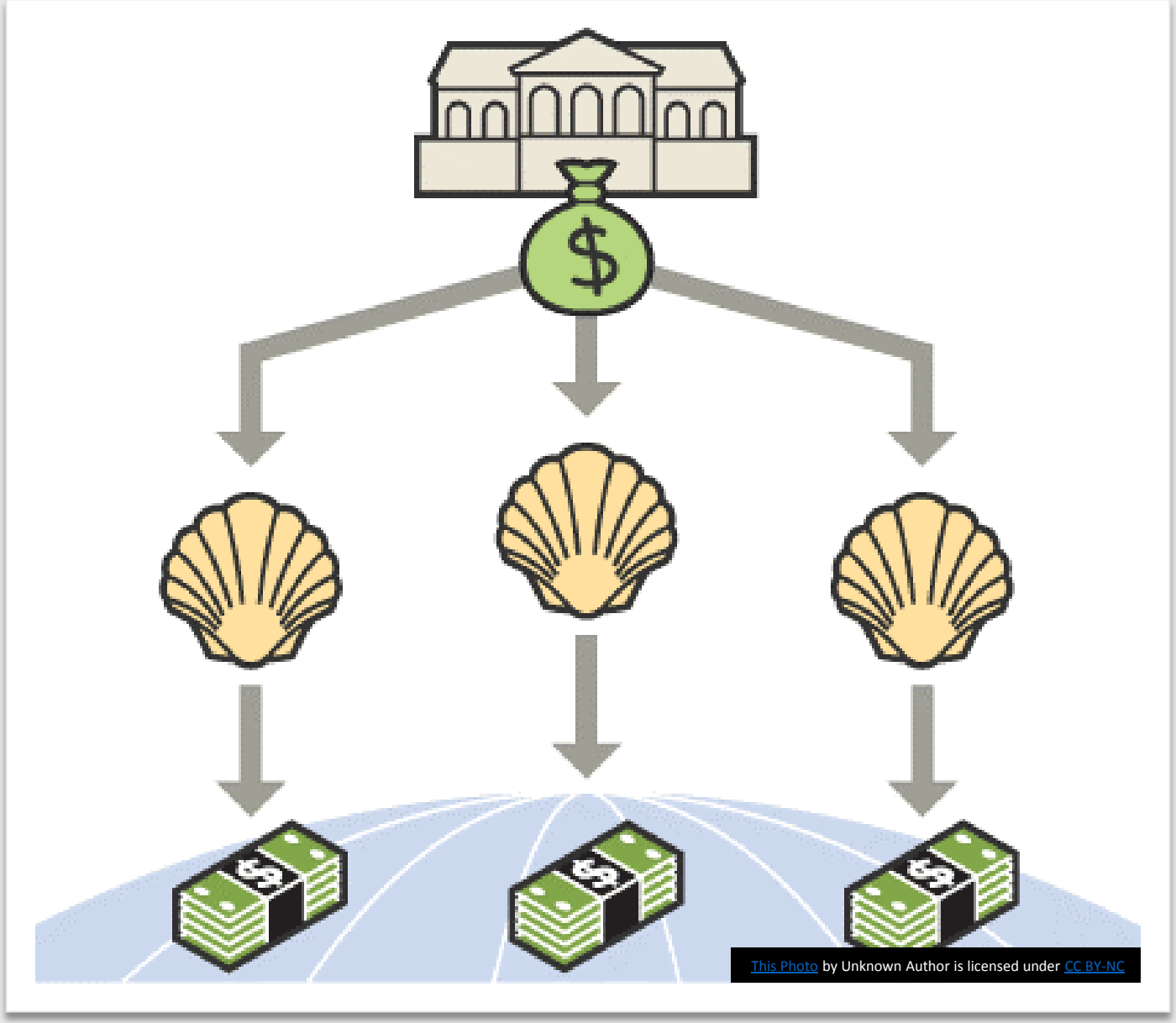
- Banks:
  - Employee collusion
  - In-effective policies and controls
  - In some jurisdictions, may be a front
- MSBs:
  - Currency exchangers
  - Check Cashers
  - Issuers or redeemers of money orders, etc
  - Money transmitters
  - Prepaid access providers and sellers
    - Loose regulations
    - Lax ID requirements

Casinos!!!

- High volume and cash intensive
- Provides a broad range of financial services
- Chips for AML:
  - Hold for a while, then cash in
  - Use chips as cash to purchase drugs
  - Use chips to gamble, generate legit winnings

Shell Companies

- Hide ownership
- Mask financial details
- Conceal assets



Charities and Non-profits: gifts to disguise illicit assets

In 2012, an orthodox rabbi from New York was sentenced to four years in prison for his involvement in a widespread money laundering and corruption scheme. The case was part of the FBI's "Bid Rig III" crackdown that involved the arrests of more than 40 people, including politicians and other religious leaders. The rabbi ran a collection of community charities known as gmachs. *An undercover informant approached the rabbi and sought his assistance in laundering money through the charities. The rabbi deposited check donations of almost $1 million into accounts owned by the charities. He then used an underground financial network that operated between the United States and Israel to convert the funds into cash. After taking a 10 percent commission, he physically delivered the cash to the undercover informant.*

AML and Data Analytics

Data Analytics

Data Analytics: What does it actually mean?

- ***Data Analytics*** - A process of inspecting, cleaning, transforming, and modelling data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making.
- ***Data Mining*** is a particular data analysis technique that focuses on modelling and knowledge discovery for predictive rather than purely descriptive purposes.
- ***Business Intelligence*** - *Co*vers data analysis that relies heavily on aggregation (summarization) , focusing on business information.
- ***Predictive Analytics*** focuses on application of statistical or structural models for predictive forecasting or classification.
- ***Text Analytics*** - Applies statistical, linguistic, and structural techniques to extract and classify information from textual sources, a species of unstructured data.

Application and Relevance To AML Prevention and Detection

Data analysis technology enables auditors and fraud examiners to:

- Analyze business data to test the effectiveness of internal controls
- Identify transactions that may indicate fraudulent AML activity

Data analysis also provides an effective way to fight against AML.

- Provides the ability to test 100% of the records or any size sample
  - Enables investigations professionals to focus investigation actions on those transactions that are suspicious or are identified as areas of weaknesses

Data analysis technology also enables organizations to:

- Conduct ad hoc analysis based on a report of wrongdoing or to perform repeatable automated procedures, for continuous auditing and monitoring
- Provide insight into the integrity of financial and business operations through transactional analysis.

Improves the ability to better assess and manage AML risk.

Basic Data Analytical Process – Planning To Post Analysis Reporting

The standard process of analytics consists of the following phases / processes:

- *Determine Scope & Requirements*
  - Understand the purpose of the analysis, define the objectives & profile potential fraud schemes
- *Identify & Extract Information Sources*
  - Identify the relevant data sets, extract the data in a useable format (consider legal ramifications of data integrity if conducting and investigation and consider computer forensics) & verify the data as accurate after extraction
- *Data Extraction & Preparation*
  - Cleanse the data sets, de-duplication of data if relevant, reformat as required (maintaining records of all changes made to the data set), transform the data into the require sets for import into test tools.
- *Testing & Interpretation*
  - Determine testing regime to be applied, conduct standard and unique tests as per the objectives, record results (Note: Most commercial tools generate and audit log for this purpose)
  - Interpret the results of the data tests and identify potential issues, weaknesses or suspicious transactions and activities
- *Post Analysis Phase*
  - Prepare data testing report (if a consulting, investigation analysis or audit)
    - Determine required preventative tests to be applied on a schedule for fraud and corruption prevention activities as part of an overall data analysis program

ACFE Data Analysis Process

Planning Phase

- Understand the data
- Define examination objectives
- Build a profile of potential frauds
- Determine whether prediction exists

Preparation Phase

- Identify relevant data
- Obtain, verify, cleanse, and normalize the data

Testing and Interpretation

- Analyze the data!

Post-Analysis Phase

- Response to findings
- Monitor the data

Data Sources and Extractions

- Big Data: data of high volume, high velocity, and high variety that requires new and different forms of processing to enable enhanced decision making, insight discovery, and process optimization
- Continuous information source
- Qualitative Data
  - PDF documents
  - Twitter/Blog feeds
  - Audio and Video files
  - Emails, texts, corporate minutes
  - Mainframe and laptop software and logs
  - GPS data
  - Phone call meta-data
  - Receipts
  - Interview recordings/logs

Planning Phase

- Understand the Data
  - Availability
  - Structure
  - Dictionary
  - Links
- Define Examination Objectives and Scope
  - Purpose of exam and structure/size/resources/thresholds/limits
- Build a Profile of Potential Frauds
  - Also profile potential NON-FRAUD instances
- Determine Whether Prediction Exists: BASIS OF FRAUD EXAMINATION!
  - Totality of circumstances would lead a professionally trained and reasonable person to conclude that fraud might be occurring

Preparation Phase

- Identify relevant data
- Obtain the data
- Verify the data:
  - Control totals
  - Correct periods
  - Gaps/missing fields
  - Reasonableness tests
- Cleanse/Normalize Data

Testing and Interpretation Phase

- Analyze the data
  - Geo-location
  - Business unit
  - Time period
  - Dollar value
  - By Unique Identifier(s)
- Issues:
  - The Role of Concealment
  - Addressing False Positives
    - Data validity/integrity issues?
    - Data merging difficulties
    - Legitimate data that falls outside the norm

Post-Analysis Phase

- Respond to Analysis Findings
- Monitor the Data
- Spectrum of Analysis:
  - Ad-hoc testing
  - Repetitive testing
  - Continuous testing

Data Mining

- Searches and explores data for previously undiscovered instances
- Can be used preventatively and for detection
- Pattern analysis, trend ratios, matches, hidden connections
  - Employee/vendor
  - Duplicate bank accounts
  - Abnormal transaction days/times/amounts
  - Round numbers
  - Missing numbers
  - Benford’s Analysis

Five Advantages of Using Data Analysis Software

1) allows examiner to centralize an investigation

2) assures completion and accuracy

3) bases predictions about the probability of a fraudulent situation on reliable statistical information

4) allows searches of entire data files for red flags of possible fraud

5) assists in the development of reference files for ongoing fraud detection and investigation work

Core Data Analysis Functions in Software Packages

- Sorting
- Record Selection
- Joining Files
- Multi-file processing
- Correlation Analysis
- Trend Analysis
- Time Series
- Verifying multiples of a number
- Compliance verification
- Duplicate searches
- Expressions and Equations
- Graphing
- Filter and Display criteria
- Fuzzy logic matching
- Gap tests
- Pivot tables
- Regression Analysis
- Sort and index
- Statistical analysis
- Stratification
- Date functions
- Benford’s Law analysis

Sorting

Arrange the data in a meaningful order for analysis

Sample Customer Sales Data

Date	Customer	Invoice	Amount
3/12/20X6	V45892	J54534	$10,000
4/8/20X6	V45892	J54535	$10,000
5/7/20X6	V78293	J70384	$15,698
2/8/20X6	V90132	J37234	$85,365
12/15/20X5	V10345	J12853	$47,952
1/8/20X6	V78343	J26487	$52,978

Data Sorted by Invoice Number

Date	Customer	Invoice	Amount
12/15/20X5	V10345	J12853	$47,952
1/8/20X6	V78343	J26487	$52,978
2/8/20X6	V90132	J37234	$85,365
3/12/20X6	V45892	J54534	$10,000
4/8/20X6	V45892	J54535	$10,000
5/7/20X6	V78293	J70384	$15,698

Data Sorted by Amount

Date	Customer	Invoice	Amount
3/12/20X6	V45892	J54534	$10,000
4/8/20X6	V45892	J54535	$10,000
5/7/20X6	V78293	J70384	$15,698
12/15/20X5	V10345	J12853	$47,952
1/8/20X6	V78343	J26487	$52,978
2/8/20X6	V90132	J37234	$85,365

Record Selection

- Select specific records for analysis
- For example: NYC Office of the Mayor employees with OT pay in 2016

PAY_BASIS	REGULAR_HOURS	REGULAR_GROSS_PAID	OT_HOURS	TOTAL_OT_PAI
per Annum	1,355.00	27,540.90	50.25	1,012
per Annum	1,826.28	46,779.24	109.00	2,391
per Annum	760.00	14,898.94	89.25	1,694
per Annum	1,123.00	22,469.86	96.50	1,565
per Annum	1,830.00	45,463.16	3.50	88
per Annum	1,830.00	46,285.89	15.00	352
per Annum	1,830.00	33,692.76	9.00	209
per Annum	1,830.00	54,647.32	96.75	3,507
per Annum	1,830.00	64,690.62	18.75	670
per Annum	1,830.00	54,450.51	41.00	1,232
per Annum	1,826.60	81,509.38	4.75	213
per Annum	1,100.67	21,981.72	26.75	525
per Annum	1,830.00	40,565.28	168.00	3,756
per Annum	1,830.00	44,539.55	48.50	1,380
per Annum	1,830.00	54,687.13	83.00	2,969
per Annum	1,827.15	39,350.97	63.75	1,418

Joining Files

- Connects fields from two sorted input files into a third file.
- Frequently used to match invoice data with A/R files, using common identifier

File 1

Customer	Account	Balance	Last Invoice
Jerry's Cleaners	555221	$12,500	12/30/X6
Quality Garments	555658	$9,283	11/15/X5
Beverly's Tailoring	554891	$27,588	01/15/X6

File 2

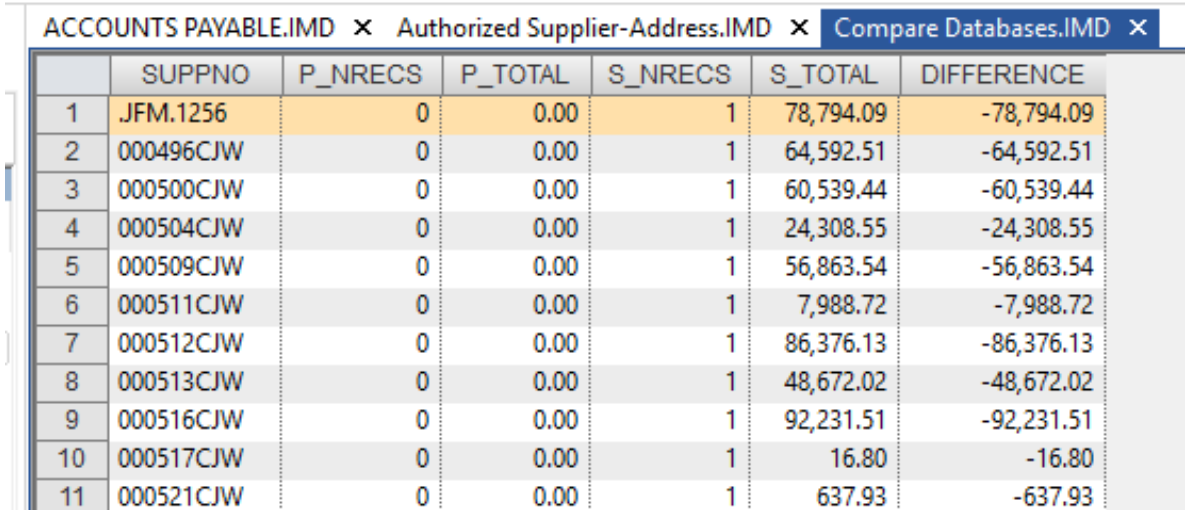
Customer	Account	Balance	Last Invoice
Quality Garments	555658	$9,283	11/15/X5
McCloud's Fabrics	556897	$10,888	09/24/X6
Beverly's Tailoring	554891	$27,588	01/15/X6

The *JOINED* Exception File

Customer	Account	Balance	Last Invoice
McCloud's Fabrics	556897	$10,888	09/24/X6
Jerry's Cleaners	555221	$12,500	12/30/X6

Multi-file processing

- Allows the user to relate several files by defining their relationship without the use of join. For example, relate an outstanding invoice master file to A/R file using an account number. Can relate invoice numbers as well.



ACCOUNTS PAYABLE.IMD × Authorized Supplier-Address.IMD × Compare Databases.IMD ×

	SUPPNO	P_NRECS	P_TOTAL	S_NRECS	S_TOTAL	DIFFERENCE
1	JFM.1256	0	0.00	1	78,794.09	-78,794.09
2	000496CJW	0	0.00	1	64,592.51	-64,592.51
3	000500CJW	0	0.00	1	60,539.44	-60,539.44
4	000504CJW	0	0.00	1	24,308.55	-24,308.55
5	000509CJW	0	0.00	1	56,863.54	-56,863.54
6	000511CJW	0	0.00	1	7,988.72	-7,988.72
7	000512CJW	0	0.00	1	86,376.13	-86,376.13
8	000513CJW	0	0.00	1	48,672.02	-48,672.02
9	000516CJW	0	0.00	1	92,231.51	-92,231.51
10	000517CJW	0	0.00	1	16.80	-16.80
11	000521CJW	0	0.00	1	637.93	-637.93

Correlation Analysis

- Relationships in raw data
- Examine correlations in data for deviations from expected relationships

Independent Variable	Dependent Variable
Number of days traveling	Hotel cost
Number of documents printed	Reams of paper used
Number of houses built	Paint used

- Pair-wise relationship between two sets of data; each *x* has a unique *y*
- The strength of this relationship is measured by the correlation co-efficient
- In excel, the CORREL(array1,array2) function returns this coefficient
- IDEA example

Trend Analysis

- Calculates the values of data over time and forecasts values into the future based on the assumption that the expected behavior will continue
- Beneficial for fraud examiners to benchmark future behaviors of accounts, persons, transactions types
- Seasonal data should be examined with Time Series Analysis
- Based on linear regression using the method of least squares
- Quantifies the trend of the data – which department shows a supplies expense that exceeds past trends?
- IDEA Trend Analysis demo

Time Series Analysis

- Calculates the trend of data over time with a seasonal component
- Decomposition Method of Time Series Analysis is the most useful for FINANCIAL data
- Testing based on seasonality – higher values at year end?
- IDEA example

Verifying Multiples of a Number

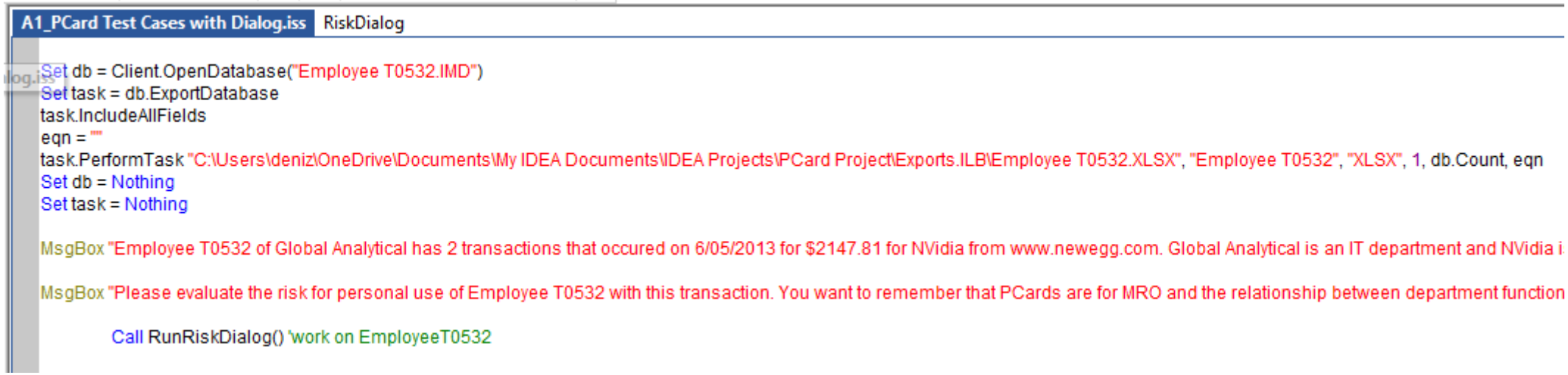
- Are numbers consistent with the regular or expected rate? Or, are transactions under or above the limit? Or, do they lie just below the limit?
  - IDEA limits tests/IDEA stratifications

Data_PCard_Transactions-Sheet1.I... ✕ Over 2000.IMD ✕

	TRANSACTION_NUMBER	ACC_EMPLOYEE_ID	DAILY_TRANSACTION_LIMIT ▲	ITEM_TOTAL_DOLLAR	TRANSACTION_TOTAL	ACC_
1	14	T1022	2,000.00	2,862.19	2,862.19	INCID
2	267	T9938	2,000.00	2,499.87	2,499.87	INCID
3	268	T9938	2,000.00	2,499.87	2,499.87	INCID
4	269	T9938	2,000.00	2,499.87	2,499.87	INCID
5	270	T9938	2,000.00	2,499.87	2,499.87	INCID
6	271	T9938	2,000.00	3,289.99	3,289.99	INCID
7	272	T9938	2,000.00	4,187.22	4,187.22	INCID
8	273	T9938	2,000.00	2,166.99	2,166.99	INCID
9	274	T9938	2,000.00	2,098.87	2,098.87	INCID
10	276	T9947	2,000.00	2,087.69	2,087.69	INCID
11	277	T9947	2,000.00	2,087.69	2,087.69	INCID
12	278	T9947	2,000.00	2,087.69	2,087.69	INCID
13	279	T9947	2,000.00	2,087.69	2,087.69	INCID
14	280	T9947	2,000.00	2,087.69	2,087.69	INCID

Compliance Verification

- Are controls/rules being observed?
- Feature/attribute/limits tests
- Can be scripted as apps (Excel, IDEA, ACL) to run upon command or automatically as part of a monitoring system



Duplicate Searches

- Identify duplicate values in specified fields
- Single file or joined files
- Addresses, identifiers, days, amount

Sample-Employees.IMD ✕ Sample-Suppliers.IMD ✕ **Duplicate Addresses.IMD** ✕

	BRANCH	COUNTRY	FIRST_NAME	NAME	SALARY	CURRENCY	ADDRESS	CITY
1	3	China	Zhang	Chu	360000	CHY	1469 Huaihai Zhonglu	Shanghai
2	3	China	Liu	He	190000	CHY	1469 Huaihai Zhonglu	Shanghai
3	1	U.S.A.	Alice	Saunders	19567	USD	215 N. Main Street	Houston
4	1	U.S.A.	Anna	Phillips	62000	USD	215 N. Main Street	Knoxdale
5	3	China	Yzhi	Le	600000	CHY	313 Mid-Changjiang Road	Hefei
6	3	China	Wu	Niu	240000	CHY	313 Mid-Changjiang Road	Heifei
7	2	Germany	Lea	Wagner	54000	EUR	Im Mühlenbruch 6	Georgsmarienhütte
8	2	Germany	Leon	Newmann	37028	EUR	Im Mühlenbruch 6	Dueren

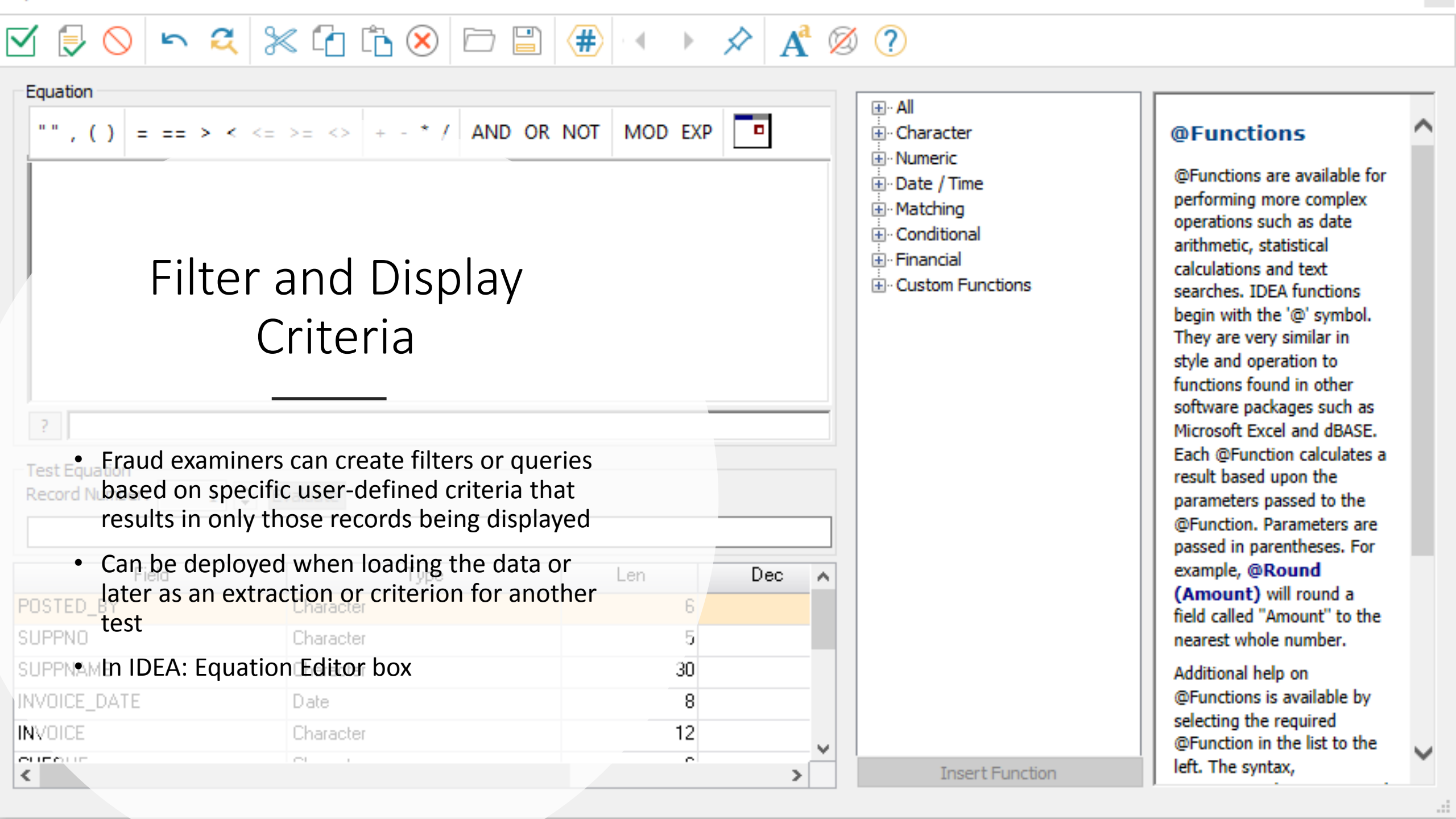
Expressions and Equations

- Fraud examiners can build expressions and equations based on their knowledge and expectations of the data
- Also used with compliance testing

	File Name		Criteria
1	Pay date on Sunday		@Dow(PAY_DATE) = 1
2			

ple-Suppliers.IMD ✕ Duplicate Addresses.IMD ✕ Sample-Payments.IMD ✕ Pay date on Sunday.IMD ✕

SUPPNAME	INVOICE_DATE	INVOICE	CHEQUE	PAY_DATE	PURCH_ORDE	AUTH	AI
BURKHARDT	1/1/2015	FR-963 32	A52659	2/1/2015	100084300	HMV	
CCEB INC	12/24/2015	PPN98787	B52172	2/22/2015	100089500	V.S.T	
LOCKSMITH SERVICES LTD	12/24/2015	PPN98804	B52226	3/8/2015	100094900	H.M.V.	
FREESTYLE INC.	12/24/2014	2001/102.63	B52121	2/8/2015	100080600	V.S.T	3
MACKENZIE PETROLEUM LTD.	12/25/2014	9999-97-213	B52122	2/8/2015	100080700	WJT	5
MULTI-LINGUAL TEK INC.	1/4/2015	316/4/QPZ/1	B52123	2/8/2015	100081400	H.M.V.	8
RIO HORA INC	12/31/2014	000500CJW	B52124	2/8/2015	100089600	HMV	6
MAURICE MYNAH	12/24/2015	26G	C51008	3/15/2015	100096000	BC	1



Filter and Display Criteria

- Fraud examiners can create filters or queries based on specific user-defined criteria that results in only those records being displayed
- Can be deployed when loading the data or later as an extraction or criterion for another test
- In IDEA: Equation Editor box

Fuzzy Logic Matching

- Matching very similar attributes that might escape normal matching algorithms
- For example: First Street, First St, and 1st Street
- Very useful when the perpetrator has taken steps to mask steps
- May produce an increased number of false positives

Sample-Employees.IMD | Sample-Suppliers.IMD | Duplicate Addresses.IMD | Sample-Payments.IMD | Pay date on Sunday.IMD | **Fuzzy Vendors.IMD**

	GROUP_ID	GROUP_NAME	SIMILARITY_DEGREE	RECORD_NUM	SUPPLIER_ADDR	SUPPNO	SUPPNAME	COUNTRY
1	1	TWO MILE HILL ROAD	1.0000	1	TWO MILE HILL ROAD	10229	A J FORSYTH & CO LTD	NIGERIA
2	1	TWO MILE HILL ROAD	1.0000	7	TWO MILE HILL ROAD	11810	DKNY INC.	BARBADOS
3	2	9 BOULEVARD SAN JUAN BOSCO	1.0000	64	9 BOULEVARD SAN JUAN BOSCO	32002	GATUVIA JOYERIA	HONDURAS
4	2	9 BOULEVARD SAN JUAN BOSCO	0.9630	67	99 BOULEVARD SAN JUAN BOSCO	32687	GUCCHI	HONDURAS

Gap Tests

- Identifies items missing in expected sequences or series (check and invoice numbers)
- Finds sequences where none are expected to exist (employee government ID numbers, SSNs)

	From: CHEQUE	To: CHEQUE	
−	**A52656**	**A52656**	**1**
	A52656		
		Total number of items detected	1
		Total number of gaps detected	1

17	SOUB	99999	O KAY YAHS	1/6/2015	871456BUZ	A52653	1/29/2015	100081900	WJT	37,418.72
18	MIA	99999	MILES LONG	1/13/2015	GR132 97	A52654	1/29/2015	100080400	HMV	26,340.30
19	MIA	99999	CARY S MATIC	1/3/2015	5745M[illegible]C	A52655	1/30/2015	100081800	HMV	17,304.80
20	MIA	92211	RICARDO BAL	1/8/2015	BC 4[illegible]701 W	A52657	1/31/2015	100083700	H.M.V.	11,001.66
21	SOUB	20535	BURKHARDT	1/4/2015	CS - 563 -97	[illegible]	1/31/2015	100084500	H.M.V.	20,431.80
22	CW	20535	BURKHARDT	1/1/2015	FR-963 32	A52659	2/1/2015	100084300	HMV	8,579.04

Pivot Tables

- Interactive data summarization tool found in Excel and also in IDEA
- It is used to sort, count, total, or give the average of specified data
- Assists in providing the “big picture”

Sum of Amount	Country				
Salesperson	CAN	MEX	UK	USA	Grand Total
Carson	$978	$24,613			$25,591
Grant	$7,842		$1,248		$9,090
Hughes	$6,777	$1,203			$7,980
Jamison		$8,596		$5,634	$14,230
Jarrison		$9,785	$4,576	$7,854	$22,215
Miller		$452	$552	$9,809	$10,813
Parsons	$9,846		$2,458		$12,304
Grand Total	**$25,443**	**$44,649**	**$8,834**	**$23,297**	**$102,223**

Regression Analysis

- Statistical method that uses a series of records to create a model relationship between a dependent variable and one or more independent variables
- Ex: Regression could be used to determine the number of widgets manufactured based on materials and labor numbers
- Periods where sales of widgets are higher or lower than expected would require analysis

Sort and Index

- Arranges the data in a manner that assists analysis – ascending, descending
- Depending on the field type, could be alphabetically or numerically

Sample-Sales Representatives.IMD

	SALESREP_NO	SALESREP_FIRST	SALESREP_LAST	COMMISSION	SALARY
1	103	JEAN	BINOCHE	15	34000
2	113	YUDONG	CHENG	15	34000
3	105	BOB	COLES	10	31000
4	115	RENALDO	DICAPRIO	15	22000
5	116	MARIA	ESCAYOLA	15	34000
6	102	NANCY	FRISHKORN	15	45000

Sample-Sales Representatives.IMD

	SALESREP_NO	SALESREP_FIRST	SALESREP_LAST	COMMISSION	SALARY
1	112	YULY	LEE	15	12000
2	109	KLAUS	SCHULZE	15	15000
3	115	RENALDO	DICAPRIO	15	22000
4	119	CLARA	TORO	15	24000
5	101	MARK	SMITH	15	25000
6	110	MIKYUNG	HA	25	26000
7	106	GEORGES	REAGAN	15	28000

Sample-Sales Representatives.IMD | Sample-Payments.IMD | Sample-Bank Transactions.IMD

Field Type

Numeric
Date
Time

Numeric Fields

AMOUNT

Statistical Analysis/Descriptive Statistics

- Calculating statistics such as averages, mins and maxes and absolute values
- IDEA Field Statistics

Numeric Statistics	AMOUNT
Net Value	8,498,776.44
Absolute Value	13,533,999.08
# of Records	1,166
# of Zero Items	4
Positive Value	11,016,387.76
Negative Value	-2,517,611.32
# of Positive Records	765
# of Negative Records	397
# of Data Errors	0
# of Valid Values	1,166
Average Value	7,288.83
Minimum Value	-12,476.98
Maximum Value	3,899,925.00
Record # of Min	573
Record # of Max	219
Sample Std Dev	154,550.16
Sample Variance	23,885,751,096.45
Pop Std Dev	154,483.87

Stratification

- Breaks the data down into intervals or strata
- Very useful for limits testing!

Invoice Amount	Count	Percent of Total	Total Amount
Less than $1,000	87	10.5%	$ 66,078.24
$1,001–$5,000	196	23.6%	$ 782,089.00
$5,001–$10,000	359	43.2%	$ 2,515,940.21
$10,001–$20,000	102	12.3%	$ 1,427,527.74
$20,001–$50,000	68	8.2%	$ 2,022,600.16
Over $50,000	19	2.3%	$ 1,298,874.96
Total:	**831**	**100%**	**$ 8,113,110.31**

Amounts Outstanding

nvoice umber	Customer Name	Amount Receivable	Amount Owed	1–30 Days	31–60 Days	61–90 Days	90–120 Days	120+ Days
6987	McClintock Fabrics	$1,250	$250		$250			
5365	ABC Incorporated	$5,250	$650	$650				
8942	Riley's Pest Control	$1,000	$200			$200		
5410	Bob's Lawn Service	$250	$50			$50		
9463	Clean 4 You	$750	$300					$300
7156	XYZ Corporation	$6,250	$1,000				$1,000	

Date Functions

Aging analysis:

Benford's Test

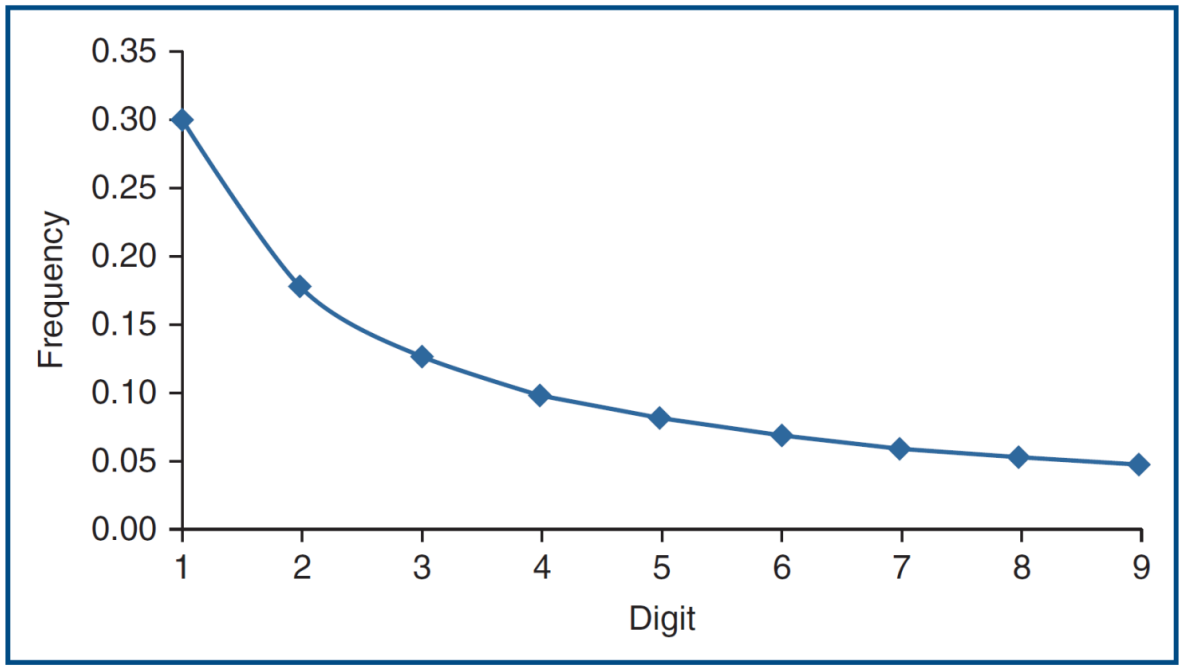
- Founded on counterintuitive observation that individual digits of multidigit numbers are not random, but follow a pattern
  - Describes expected frequencies of digits in numbers
  - UNTAMPERED NATURALLY OCCURING NUMBERS!
- Posits that distribution of first digits is positively skewed, or more heavily weighted toward smaller numbers
- Number series must follow a geometric sequence
  - Each successive number calculated as a fixed percentage increase over previous number
- Applications
  - Net income
  - Earnings per share
  - Income tax
  - Fraud detection

Benford's Test: expected Digital Frequencies

Digit	First	Second	Third	Fourth
0		.11968	.10178	.10018
1	.30103	.11389	.10138	.10014
2	.17609	.10882	.10097	.10010
3	.12494	.10433	.10057	.10006
4	.09691	.10031	.10018	.10002
5	.07918	.09668	.09979	.09998
6	.06695	.09337	.09940	.09994
7	.05799	.09035	.09902	.09990
8	.05115	.08757	.09864	.09986
9	.04576	.08500	.09827	.09982

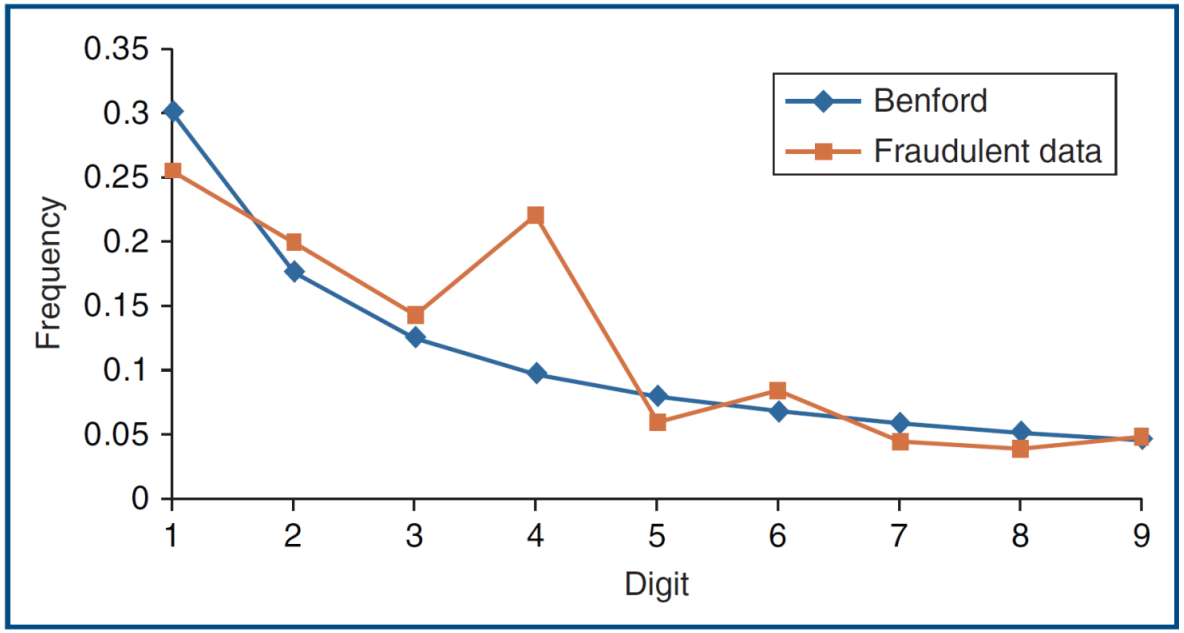
First Digit Test

- Compares the first-digit profile of a data set to Benford's first digit profile



First-Two-Digits Test

- Compares the first two digits of a data set with Benford's profile for the first two digits (purchases at $300 threshold)



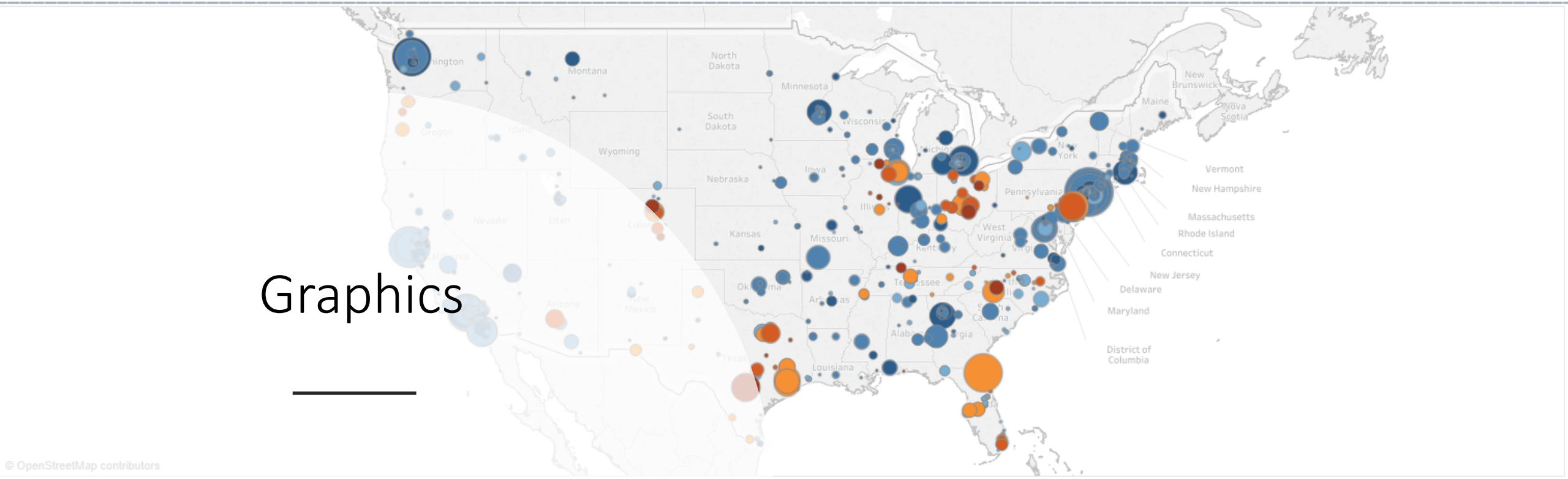
Last-Two-Digits Test

- Compares the last two digits of a data set with Benford's profile for the last two digits

Points regarding Benford's Tests

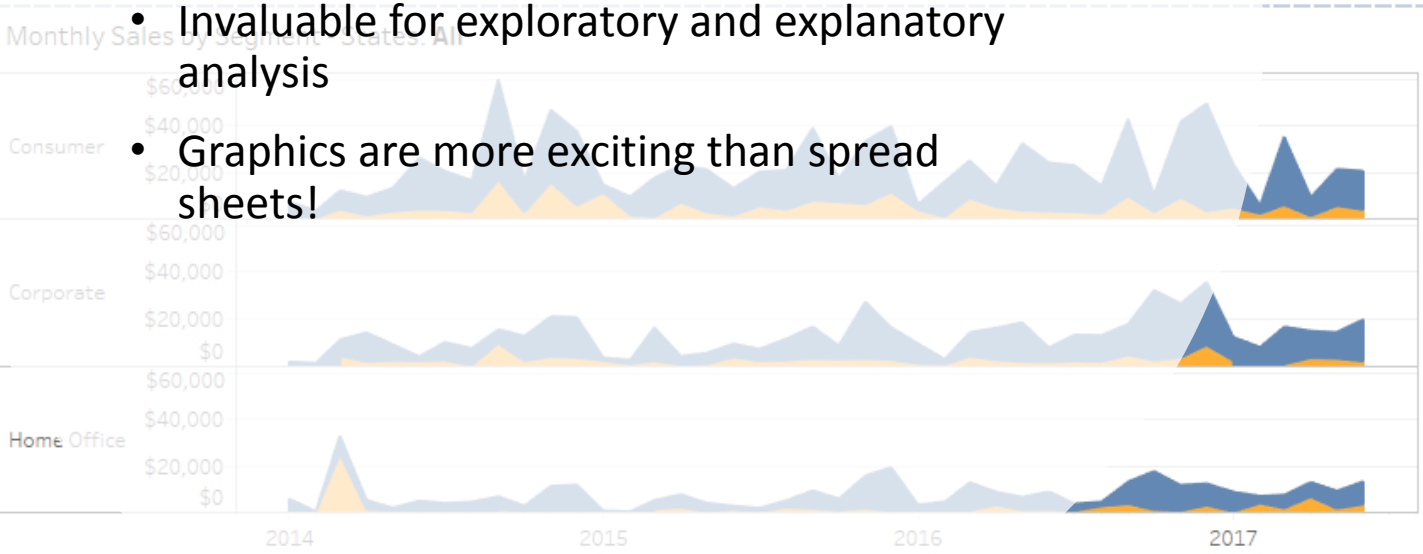
- Data should describe the sizes of similar events ($ of purchases)
- No built in Mins or Maxes in the data
- Only positive data should be analyzed
- Numbers should occur naturally, not be assigned
- Smaller amounts occurring more frequently
- Handy for identifying shell company schemes (AML or non-AML)
- Fictitious sales/checks/transactions
- Bid-splitting and other schemes involving limits (identifies concentrations)

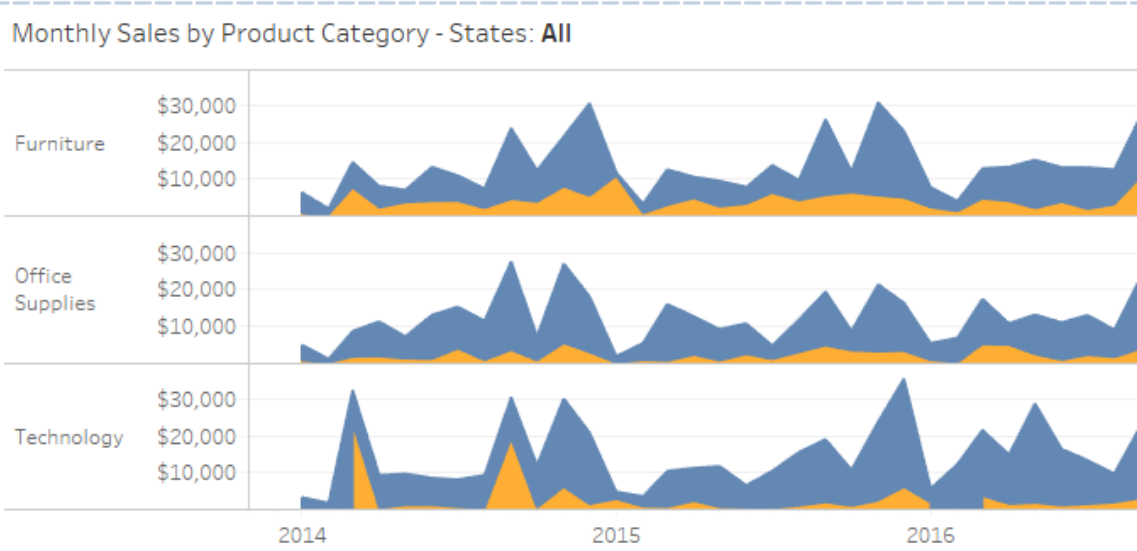
Sales	Profit	Profit Ratio	Profit per Order	Sales per Customer	Avg. Discount
$1,820,895	$231,963	12.7%	$59.04	$2,313.72	15.71%



Graphics

- Invaluable for exploratory and explanatory analysis
- Graphics are more exciting than spread sheets!






MOVIE
CLIP
HD

Examples of AML data analysis queries

- Benford's Law tests can be used to highlight abnormal duplications. These duplications may be the result of making up expense numbers to offset illicit funds recorded in revenue to avoid paying tax on the excess revenues.
  - The duplications may also be in the made-up revenue recorded in the sales register.
  - The first two digits test, the last two digits test, and the numbers duplication test of Benford's Law can be utilized.
- The relative size factor test can flag transactions in sales or expenses that are out of line for each customer or vendor.
- The same-same-same test and the same-same-different test can output specific duplications within selected fields, and those duplications with a selected difference field.
- The even amounts test/round numbers: payments paid in exactly even thousands or hundreds of thousands.

Examples of AML data analysis queries

- Extract and review cash transactions from the payment register.
- Extract from sales or accounts receivable files high amounts paid with cash.
- Compare bank deposits with sales by joining electronic bank statement records with accounts receivable credits.
- Summarize sales from source categories for each year, join, and chart to determine unusual increases in revenue.
- Extract from the asset register significant additions and disposals and review.
- Test if transactions were at fair market value.
- Extract from the asset register items that are not normally associated with the nature of the business, such as works of art, precious metals, and so on.
- Extract from the liabilities loan accounts and review for unusual arrangements.
- Extract high-interest payments made and review.

Examples of AML data analysis queries

- Extract related-party transactions from purchase and sales.
- Extract from the customer master file new additions and join to sales and summarize
- Extract from the vendor master file new additions and join to purchases and summarize
- Summarize sales by unit item. Summarize costs of goods sold by unit item and join to the summarized sales file. Calculate the gross margin and extract those with unusually high margins.
- Summarize sales by unit item and by customer and extract those customers who were charged significantly more than normal. The Z-score test would be appropriate here.
- Extract transactions with offshore entities.
- Create a list or file containing countries that are considered high risk for money laundering and extract transactions with those countries.

Cash manipulation and AML

- Misappropriation of incoming cash and cash equivalents
  - Check washing: using chemicals to erase data from checks such as the payee name, the date, and the check amount

  For AML:
  - Altering amount of check received
  - Altering amount of expenses to offset enhanced revenue

Cash Manipulation

- Case study: “Sample – Detailed Sales”, “Sample – Detailed Previous Year”, 2015 and 2014 respectively, in the sample project
  - **Append** an 11th field called MONTH: @Month(INV_DATE), to isolate month in each dataset
  - **Summarize** Sales Representative field and total on the sales before taxes
  - Set **view vertically** to display files side-by-side
  - Combine both files using **JOIN** feature, create a new joined file called “2014_2015 by sales rep”
  - **Visualize** your results. Visualize the number of sales records per sales rep for the two years.
  - **Pivot Table:** for 2015, create pivot tables by sales rep, on month and then on month/custno.

Customer and Billing Schemes

- Submission of a false or an altered invoice
- Payables fraud (to shelter income):
  - Fake vendors (collusion required for goods, less so for services)
  - Altering and/or double paying non-complicit vendor's statements
  - Making personal purchases with company funds (ie procurement cards etc)
- Dummy or shell companies:
  - Post office box
  - No phone number
  - Duplication of employee data: addresses, names, phone numbers, bank accounts

Billing Schemes

- Case Study: using OK data set
  - Please **extract 10,000 records** from the dataset
  - Create a **NEW PROJECT** in IDEA: OK Vendor Payments_2015
  - **Upload** your 10,000 row excel file into this project, please name the dataset “State Vendor Payments”
  - Open the file and perform **field statistics**
  - Payment amount and transaction type are most interesting
    - B—The voucher type for all the records is JRNL with PAYMENT_AMOUNT as zero; it seems that these are journal entries
    - C—Contains both positive and negative amounts in the PAYMENT_AMOUNT field
    - H—Contains negative amounts and are noted as Regular Voucher
    - P—Paid amounts
    - R—Refunds
    - W—Negative amounts

Billing Schemes

- Case Study, cont.:
- **Extract** all records that are paid to new file name: “Payments trans type P”, by using the equation: TRANSACTION_TYPE=“P”
- Using this new paid file, perform **Benford’s Tests** (pg 138) on the payment amounts.
  - Benford’s **First Digit** test
  - Create a 3D bar chart of the **first two digit** tests
  - Create a 3D bar chart of the **last two digit** tests
- Using the same paid dataset, **extract** a new file called “Even Thousand Amounts” using this equation (pg 141):

(PYMNT_AMT % 1000) = 0 .AND. PYMNT_AMT <> 0

Check-Tampering Schemes

- The sheer volume of business payments still made by check today will maintain this as the preferred method of payment.
- The traditional check-tampering fraud schemes will continue to exist as long as check payments exist.
- Electronic-payment systems open the door to new types of fraud that must be guarded against.
- Many organizations use both traditional checks and electronic transfer payments.
- It is not unusual that an organization would use electronic direct deposits for their payroll and checks as payments for everything else.
- It is also not unusual for a business to use a hybrid system for receiving payments.

Check Tampering: The Payee

- Checks can be made out in favor of the fraudster, an accomplice, shell company, or even cash. They can also be made out to legitimate vendors to pay for personal items. Checks made payable to the fraudster, while easy to cash, are also easier to detect.
- If checks are already prepared, the payee name can be altered and replaced with the fraudster's name. Amounts can be also changed. Modification of the existing name by adding additional letters to the end of the payee line or setting up shell companies with similar names of legitimate vendors facilitate the conversion of checks to be cashed.
- If the fraudster has access to the payments system in updating or changing vendor names, this can be done just prior to a check being issued and then changed back afterward.
- Addresses may also be changed at the same time to divert the check to the fraudster or an accomplice.
- If the check is made out to a third party, then the fraudster would have to forge the endorsement also. Having matching identification may be an issue for the fraudster.

Case Study: Check Tampering

Open the Samples Project and use the Payments file for these tests.

1) Normalize the inconsistent data in the AUTH file by APPENDING another field – name this field AUTHORIZED with the equation of @Strip(AUTH).
2) Next, test for separation of duties. Perform a direct extraction, creating a new dataset called SEP_OF_DUTIES, with the equation:

   AUTHORIZED==POSTED_BY

3) Last, test for missing entries by creating a new dataset called BLANK_ENTRIES, with the equation:

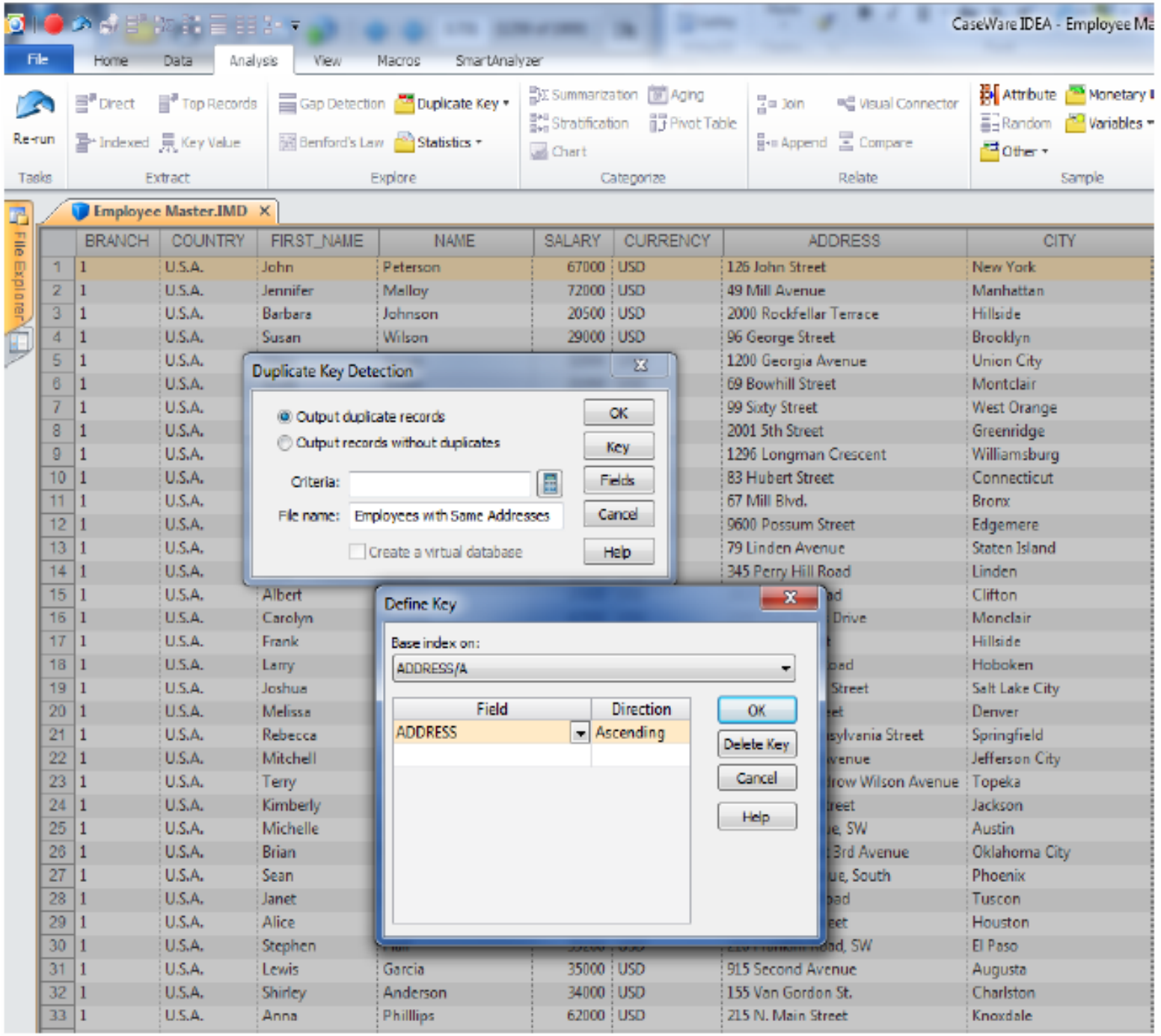
   AUTHORIZED = = “ ” .OR. POSTED_BY = = “ ”

Payroll Fraud and AML

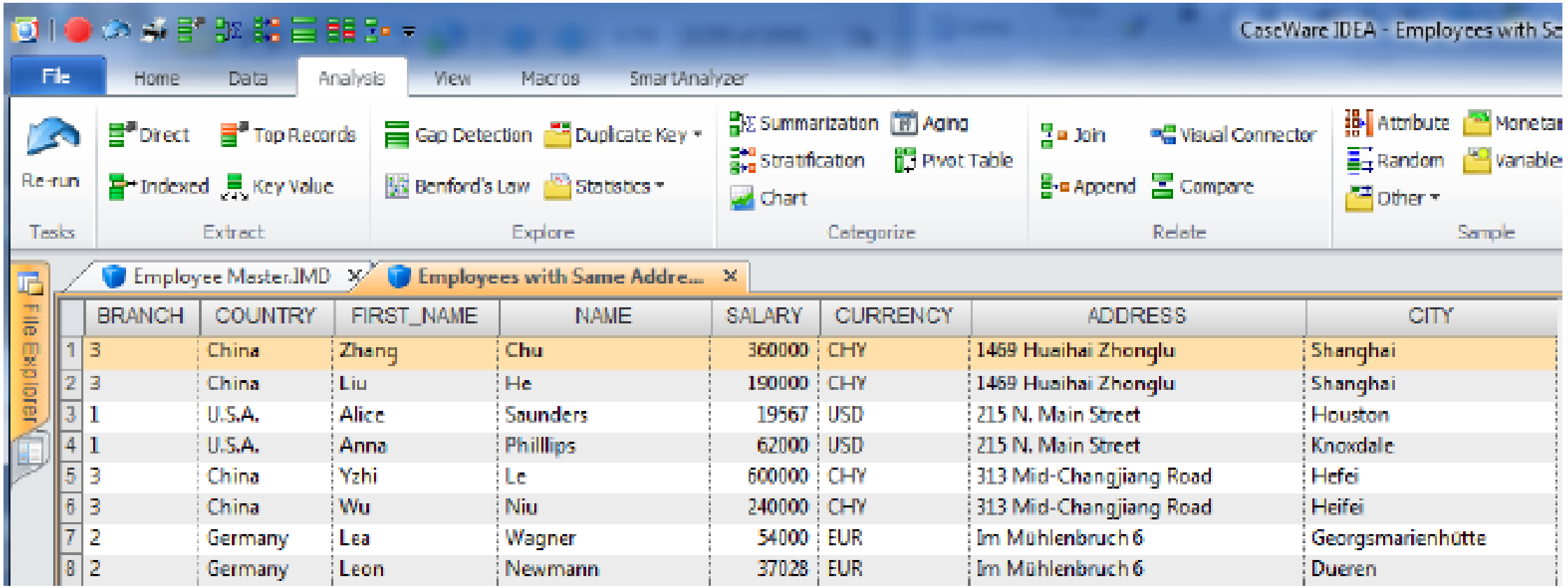
- Ghost Employees
- Falsified or Excess Overtime
- Fraud related to commissioned earnings

"Sure, I've got ghost employees, but they're as productive as my other employees."

Case Study: Payroll Fraud – test for employees with the same address

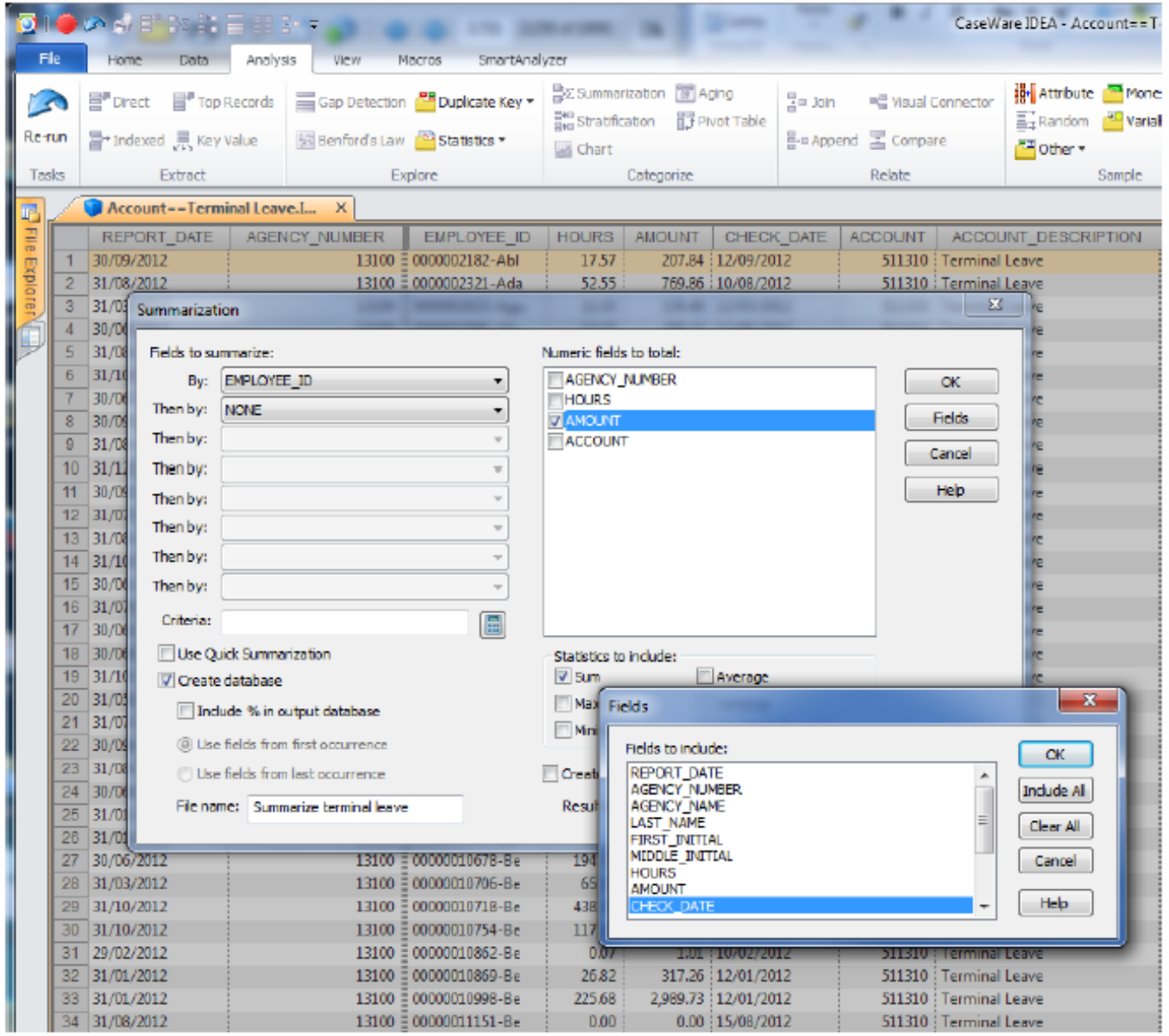


Result:

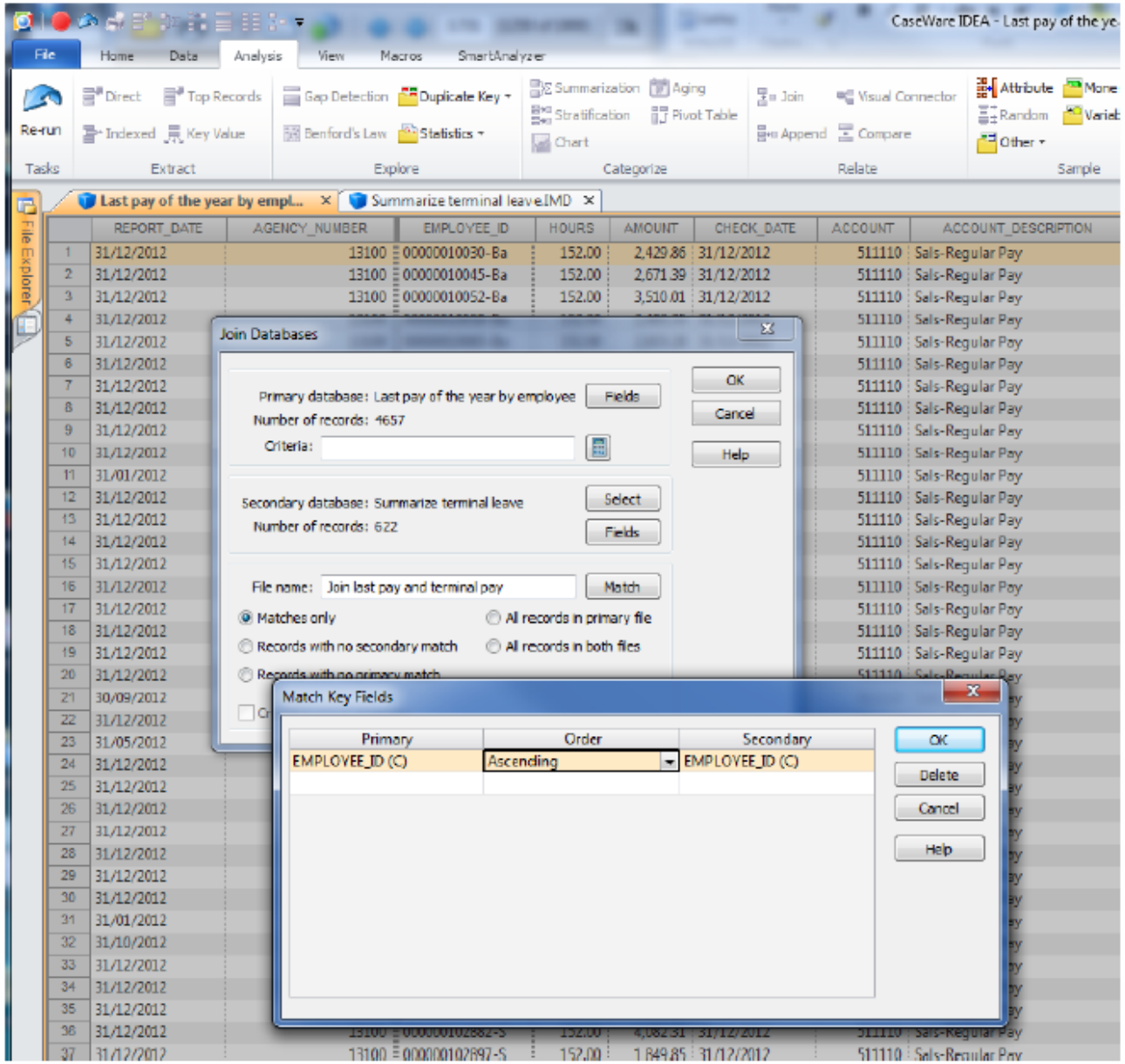


	BRANCH	COUNTRY	FIRST_NAME	NAME	SALARY	CURRENCY	ADDRESS	CITY
1	3	China	Zhang	Chu	360000	CHY	1469 Huaihai Zhonglu	Shanghai
2	3	China	Liu	He	190000	CHY	1469 Huaihai Zhonglu	Shanghai
3	1	U.S.A.	Alice	Saunders	19567	USD	215 N. Main Street	Houston
4	1	U.S.A.	Anna	Phillips	62000	USD	215 N. Main Street	Knoxdale
5	3	China	Yzhi	Le	600000	CHY	313 Mid-Changjiang Road	Hefei
6	3	China	Wu	Niu	240000	CHY	313 Mid-Changjiang Road	Heifei
7	2	Germany	Lea	Wagner	54000	EUR	Im Mühlenbruch 6	Georgsmarienhütte
8	2	Germany	Leon	Newmann	37028	EUR	Im Mühlenbruch 6	Dueren

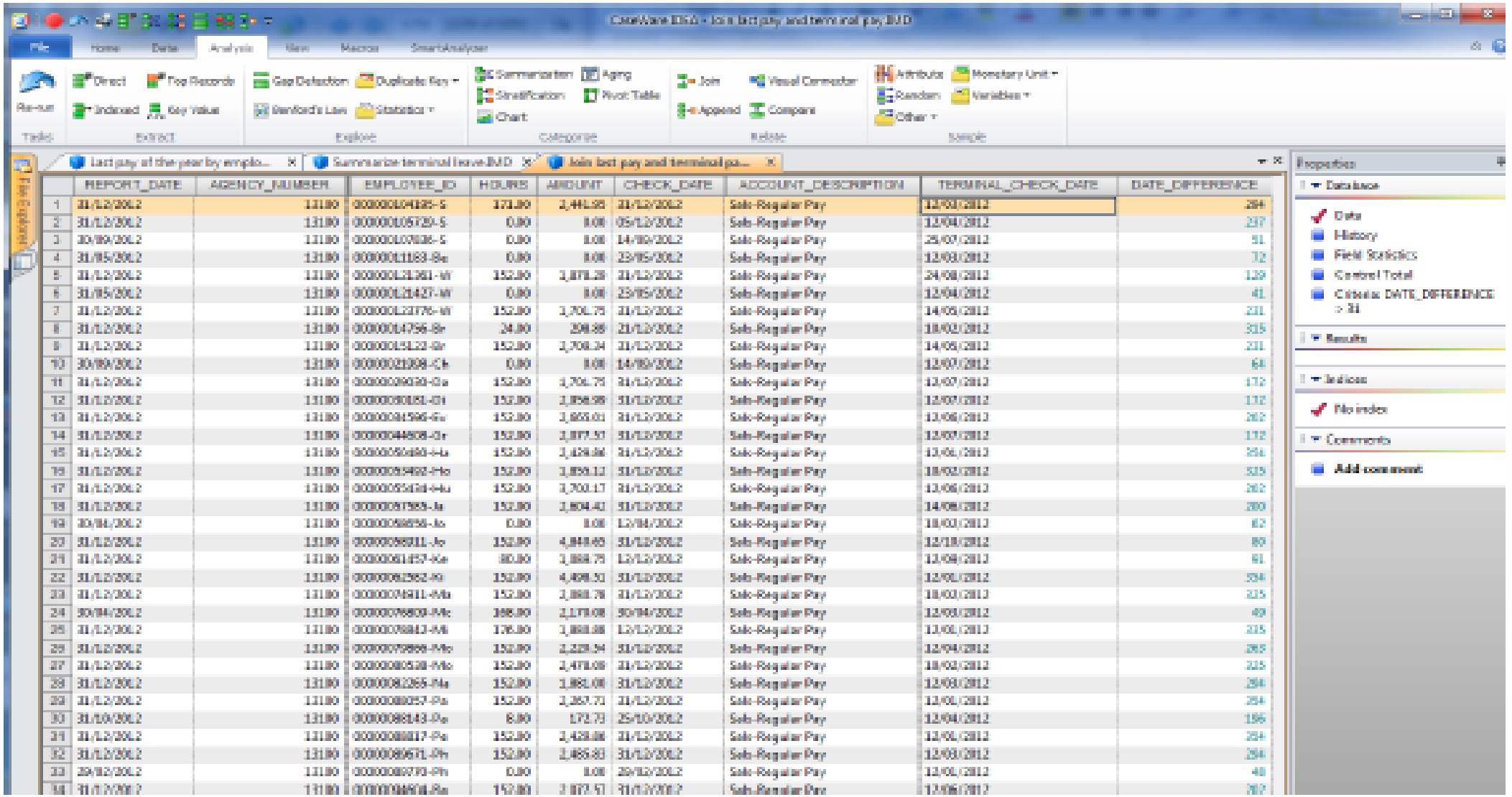
Test for payments made after termination dates



Test for payments made after termination dates



RESULT: Test for payments made after termination dates



Expense Reimbursement Schemes and AML

Travel and Entertainment expenses

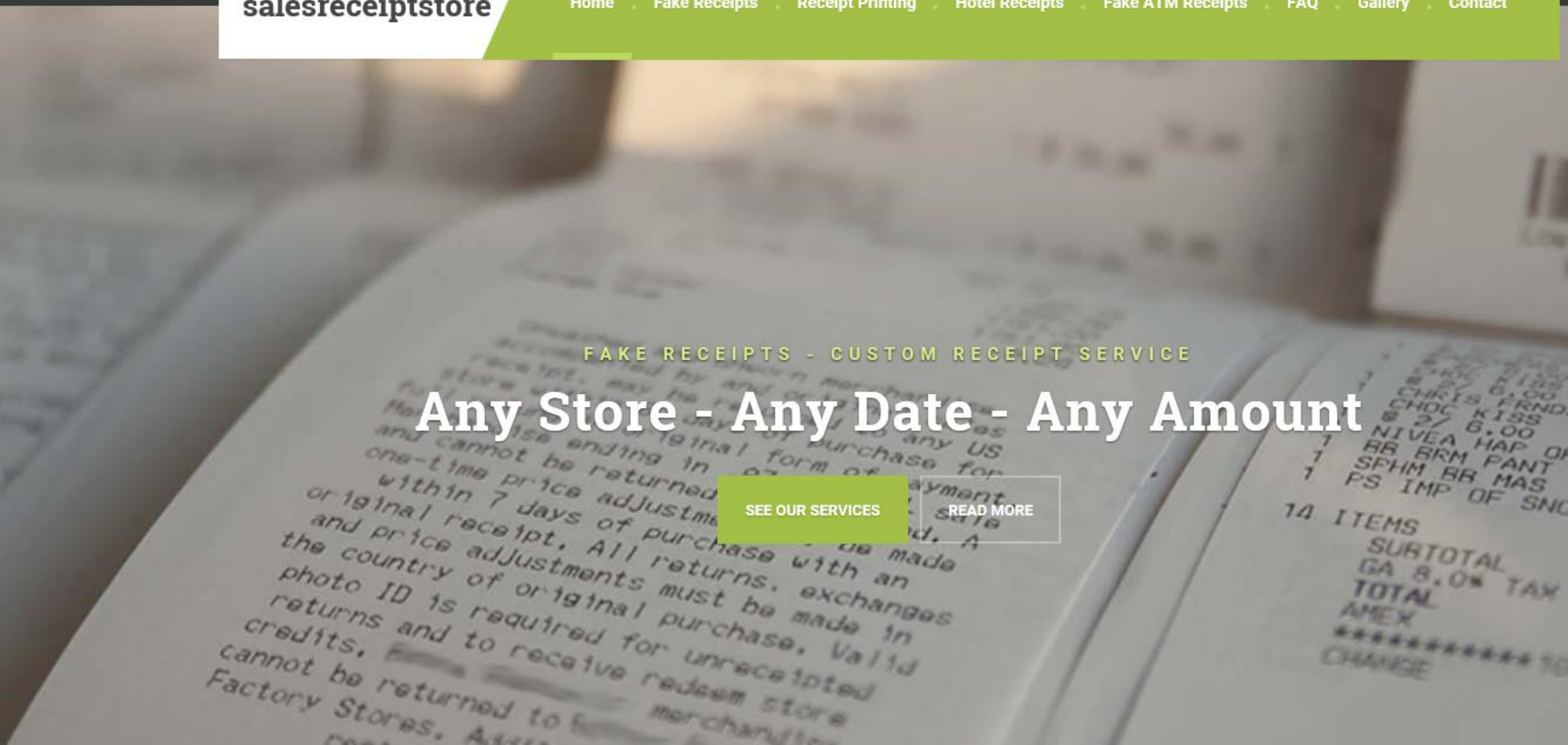
Procurement Cards

Improper Expense claims include:

- Personal items
- Expenses that never materialized or were subsequently canceled
- Fake or Altered Receipts

Fraudulent Expense reimbursements:

- Overstated Expense Reimbursements
- Mischaracterized Expense Reimbursements
- Multiple Reimbursements
- Fictitious Expense Reimbursements



FAKE RECEIPTS - CUSTOM RECEIPT SERVICE

Any Store - Any Date - Any Amount

SEE OUR SERVICES

READ MORE

Falsified Travel Expenses and AML

Load the provided excel travel expenses file into IDEA as a managed project called Employee Travel Expenses_Ch 11

Days Traveled Test: Create a field called DATE_DIFF with the equation:

@Age(END_DATE, START_DATE)

Same Day Traveled with Accommodation Charges:

DATE_DIFF = = 0 .AND. ACCOMMODATION > 0

Same Day Traveled with Flight Charges:

DATE_DIFF = = 0 .AND. AIR_FARE > 0

Same Day traveled with both fight and accommodation changes:

DATE_DIFF = 0 .AND. AIR_FARE > 0 .AND. ACCOMMODATION > 0

Travel Expenses –

Traveled with Flight but No Accommodation Charges:

DATE_DIFF > 0 .AND. AIR_FARE > 0 .AND. ACCOMMODATION = 0

SAME-SAME-SAME (Duplicate Tests)

Using the main Travel Expenses data set, test for duplicates on START_DATE and for EMPLOYEE_NO.

Using the main Travel Expenses data set, test for duplicates on EMPLOYEE_NO and AIR_FARE, where AIR_FARE is greater than 0.

Likewise, test for duplicates on EMPLOYEE_NO and ACCOMMODATION, where ACCOMMODATION > 0.

Extraction bases on Audit Unit: Please extract the following, creating a new data set called Ass.Dep.Min.:

POSITION = = “Assistant Deputy Minister”. Please display the result in a graphic format that you feel is most appropriate.

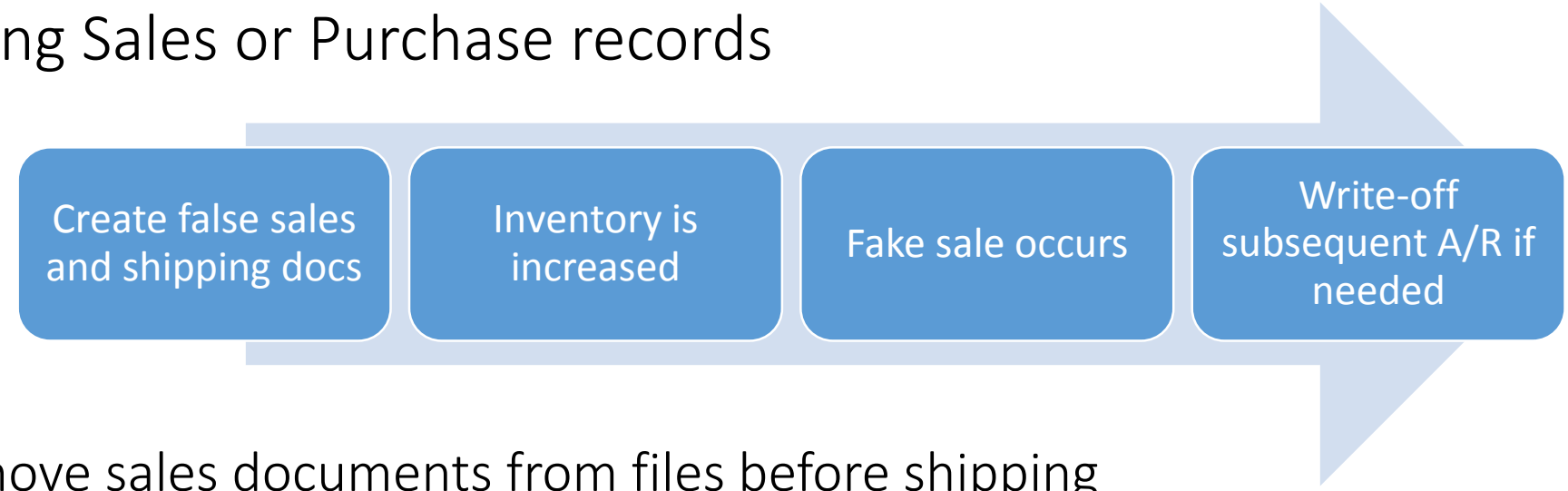
Types of Non-Cash Misappropriations

- ✓ Misuse and Abuse
- ✓ Unconcealed Misappropriations
  - ✓ In plain view
  - ✓ Suspicion only
  - ✓ Poor management/employee relationships
  - ✓ No whistleblowing process
  - ✓ Perpetrator hold management position
  - ✓ Lack of desire to get involved
- ✓ Transfer of Assets
- ✓ Proprietary Information

"For the right price, I could find a way to make bribes deductible."

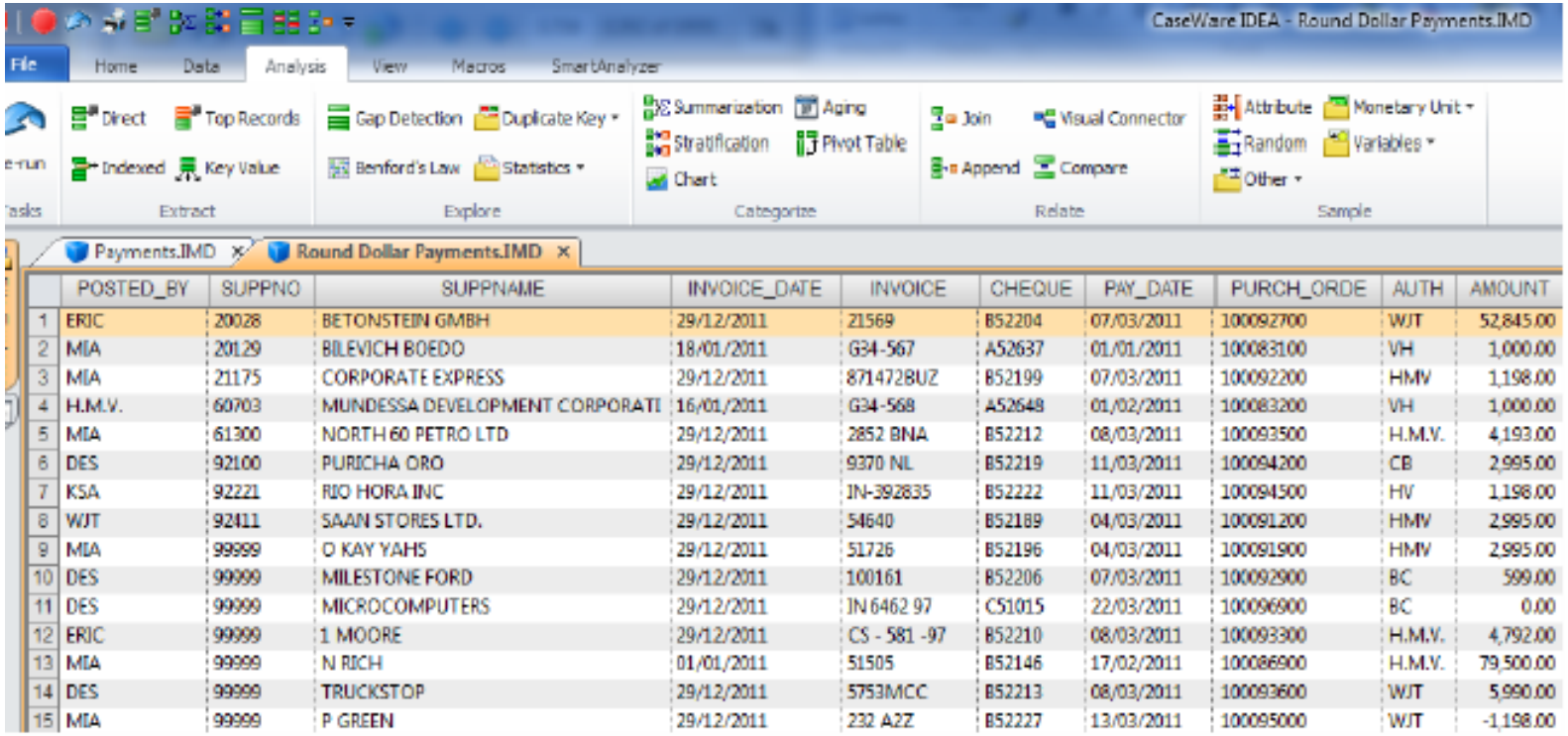
Concealment of Non-Cash Misappropriations for AML

- Falsifying Sales or Purchase records



- Remove sales documents from files before shipping
- Overstate COGS and ship to an accomplice for billing adjustments
- Charging small sales to a customer with a large A/R balance
- Charging a larger sale into smaller chunks spread across several customers
- Discount/write-off the false sale to bad debt

Example: Round Dollar Payments



	POSTED_BY	SUPPNO	SUPPNAME	INVOICE_DATE	INVOICE	CHEQUE	PAY_DATE	PURCH_ORDE	AUTH	AMOUNT
1	ERIC	20028	BETONSTEIN GMBH	29/12/2011	21569	B52204	07/03/2011	100092700	WJT	52,845.00
2	MIA	20129	BILEVICH BOEDO	18/01/2011	G34-567	A52637	01/01/2011	100083100	VH	1,000.00
3	MIA	21175	CORPORATE EXPRESS	29/12/2011	8714728UZ	B52199	07/03/2011	100092200	HMV	1,198.00
4	H.M.V.	60703	MUNDESSA DEVELOPMENT CORPORATI	16/01/2011	G34-568	A52648	01/02/2011	100083200	VH	1,000.00
5	MIA	61300	NORTH 60 PETRO LTD	29/12/2011	2852 BNA	B52212	08/03/2011	100093500	H.M.V.	4,193.00
6	DES	92100	PURICHA ORO	29/12/2011	9370 NL	B52219	11/03/2011	100094200	CB	2,995.00
7	KSA	92221	RIO HORA INC	29/12/2011	IN-392835	B52222	11/03/2011	100094500	HV	1,198.00
8	WJT	92411	SAAN STORES LTD.	29/12/2011	54640	B52189	04/03/2011	100091200	HMV	2,995.00
9	MIA	99999	O KAY YAHS	29/12/2011	51726	B52196	04/03/2011	100091900	HMV	2,995.00
10	DES	99999	MILESTONE FORD	29/12/2011	100161	B52206	07/03/2011	100092900	BC	599.00
11	DES	99999	MICROCOMPUTERS	29/12/2011	IN 6462 97	CS1015	22/03/2011	100096900	BC	0.00
12	ERIC	99999	1 MOORE	29/12/2011	CS - 581 -97	B52210	08/03/2011	100093300	H.M.V.	4,792.00
13	MIA	99999	N RICH	01/01/2011	51505	B52146	17/02/2011	100086900	H.M.V.	79,500.00
14	DES	99999	TRUCKSTOP	29/12/2011	5753MCC	B52213	08/03/2011	100093600	WJT	5,990.00
15	MIA	99999	P GREEN	29/12/2011	232 A2Z	B52227	13/03/2011	100095000	WJT	-1,198.00

Data Analytics

Data Files

Ensure data validity

Consider data format and structure

Compare the cost and benefit of potential analysis

Consider the spectrum of distinct levels of aggregation at which fraud monitoring is required

BEGIN WITH THE END IN MIND (will this algorithm hold up under intense scrutiny of a court case???)

"Surely there's an easier way of moving files?"

Other Analytics for AML Schemes

- Social media/web-scraping
- Summarize per employee/vendor for links
- Analyze all bid/purchase data for reasonableness
- Match bid data to originals
- Look at successful bid trends
- Run duplicate tests for addresses, etc.

Concealments: Look at fields such as “Consulting fees”, and “legal fees”

Look for personal relationships, family connections – more qualitative examination/investigation

CONCLUSION: Controls, right-to-audit, identify red-flag transactions

Textual Analytics

- Social media Posts
- Instant Messages
- Videos
- Voice/audio files
- User Documents
- Mobile software apps
- News feeds
- Sales and marketing materials
- Presentations!

Enhanced Text Mining:

- Weighted fraud indicators
- Emotive tone
- Unethical behavior
- Entity Extraction
- Text link Analysis
- Social Network Analysis
- Fraud Triangle Analytics

Suggested Fraud Keywords for AML

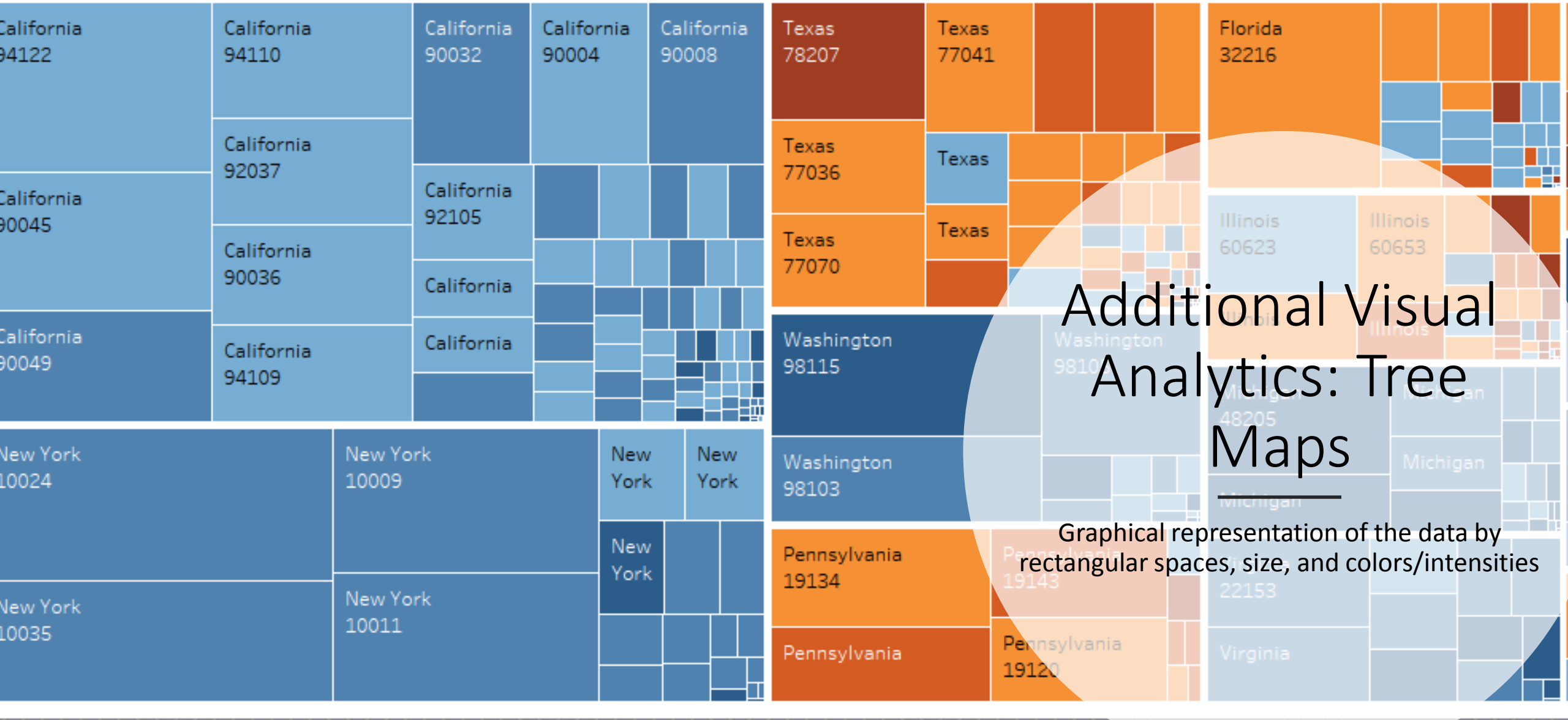
***Pressure*:** deadline, quota, trouble, short, excessive, overage, problem, alert, concern, limits

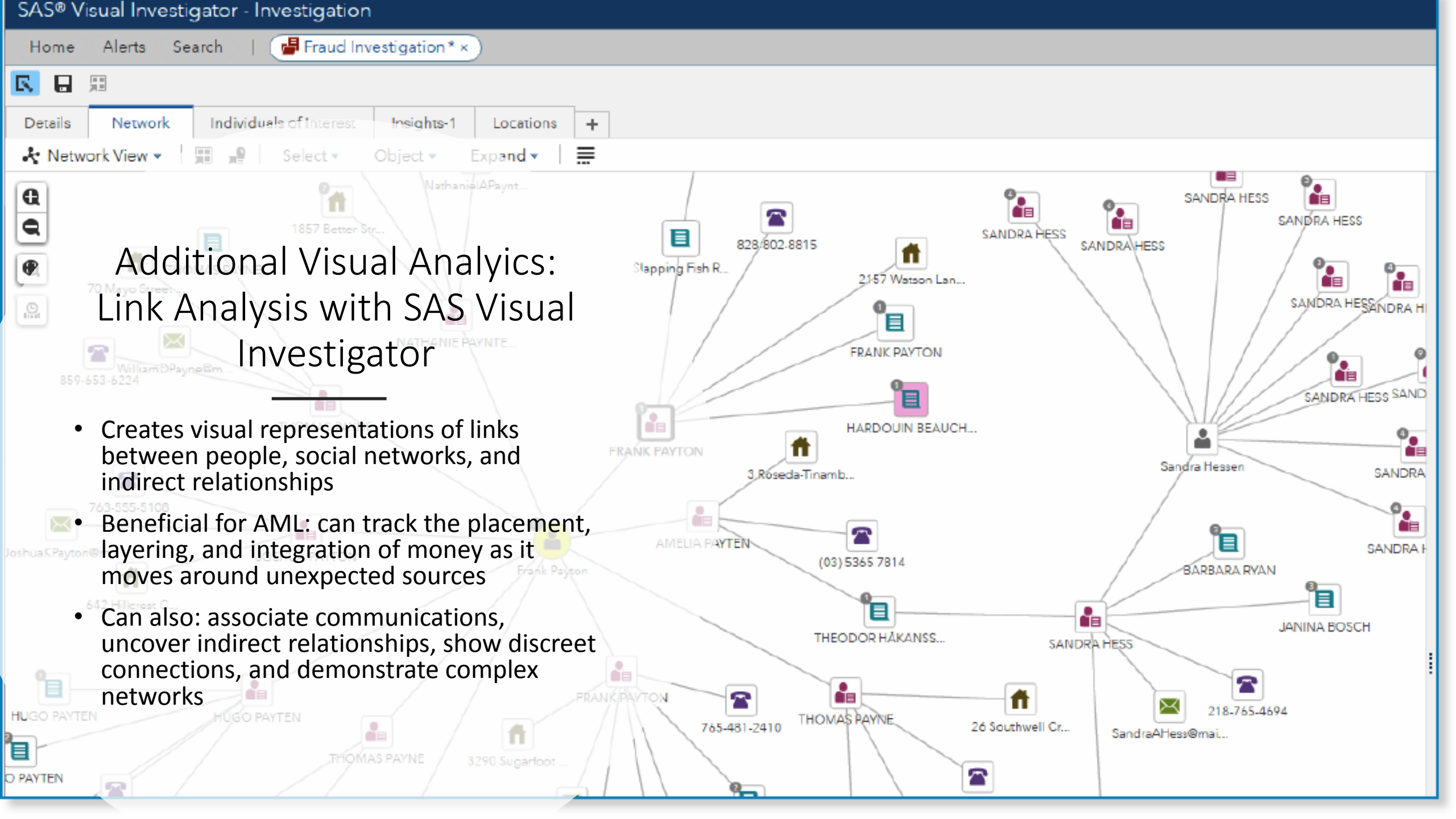
Opportunity: Override, inflate, revenue inflation, expense padding, adjust, reserves, new vendors, consulting fee, legal expense, incentive payment, donation, goodwill payment

Rationalization: reasonable, deserve, temporary

xecutive Overview - Profitability (All)

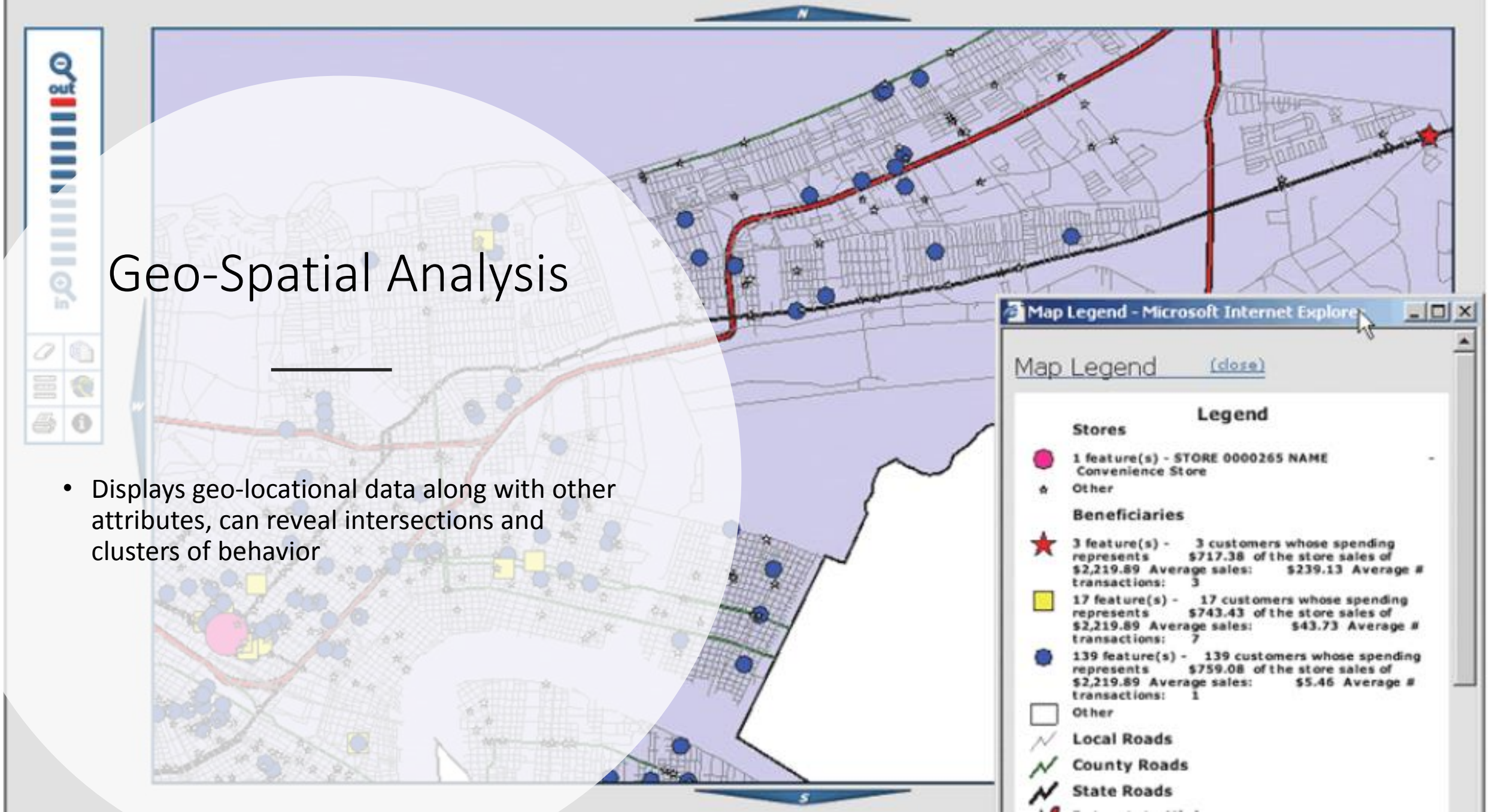
Sales	Profit	Profit Ratio	Profit per Order
$1,820,895	$231,963	12.7%	$59.04




SAS® Visual Investigator - Investigation
Home
Alerts
Search
Fraud Investigation*
Details
Network
Individuals of Interest
Insights-1
Locations
Network View
Select
Object
Expand
Additional Visual Analytics: Link Analysis with SAS Visual Investigator
Creates visual representations of links between people, social networks, and indirect relationships
Beneficial for AML: can track the placement, layering, and integration of money as it moves around unexpected sources
Can also: associate communications, uncover indirect relationships, show discreet connections, and demonstrate complex networks
828-802-8815
2157 Watson Lan...
FRANK PAYTON
HARDOUIN BEAUCH...
3 Roseda-Tinamb...
SANDRA HESS
Sandra Hessen
BARBARA RYAN
JANINA BOSCH
(03) 5365 7814
THEODOR HÅKANSS...
765-481-2410
THOMAS PAYNE
26 Southwell Cr...
218-765-4694
SandraAHess@mai...

Geo-Spatial Analysis

- Displays geo-locational data along with other attributes, can reveal intersections and clusters of behavior

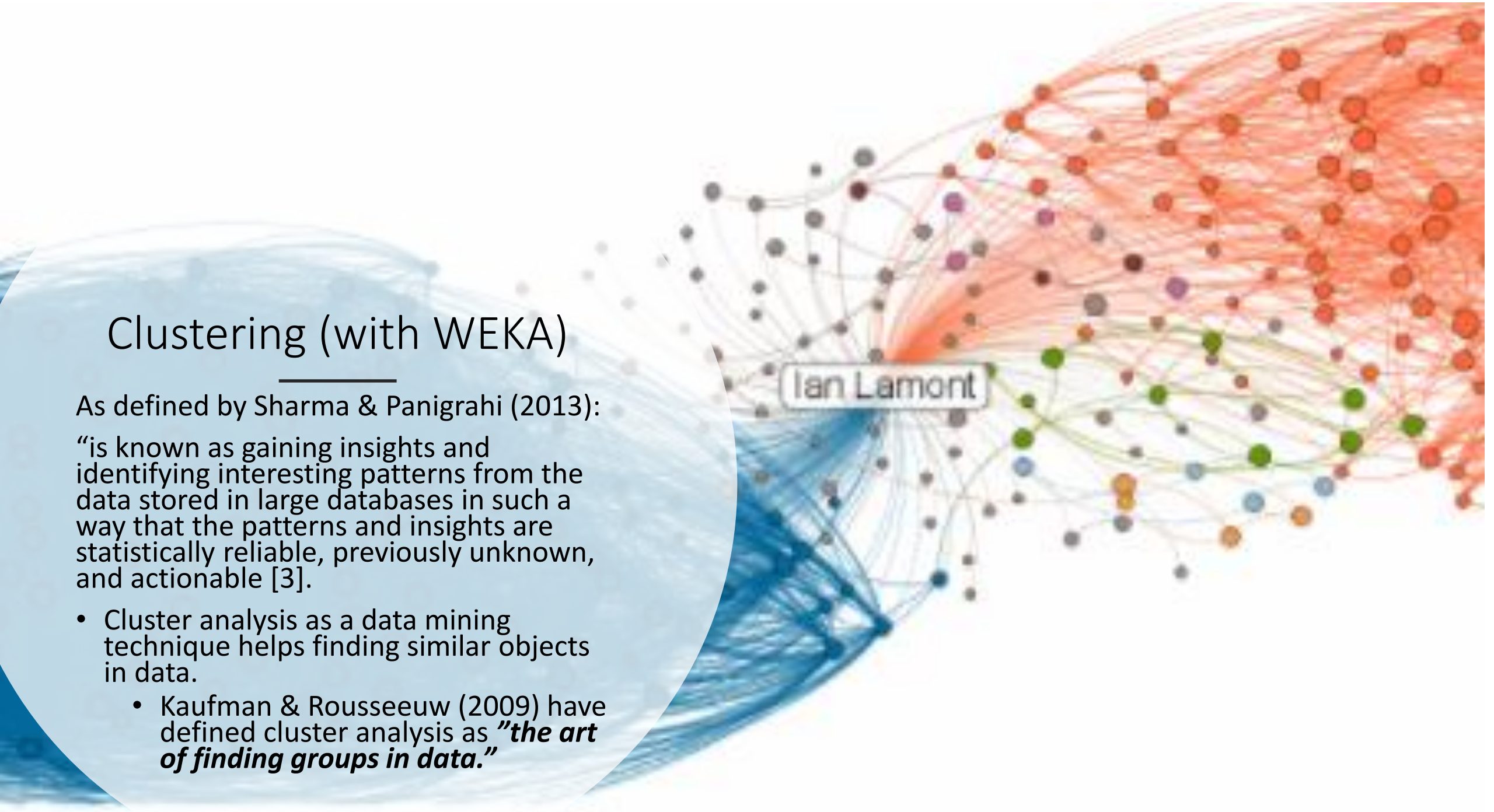


Clustering (with WEKA)

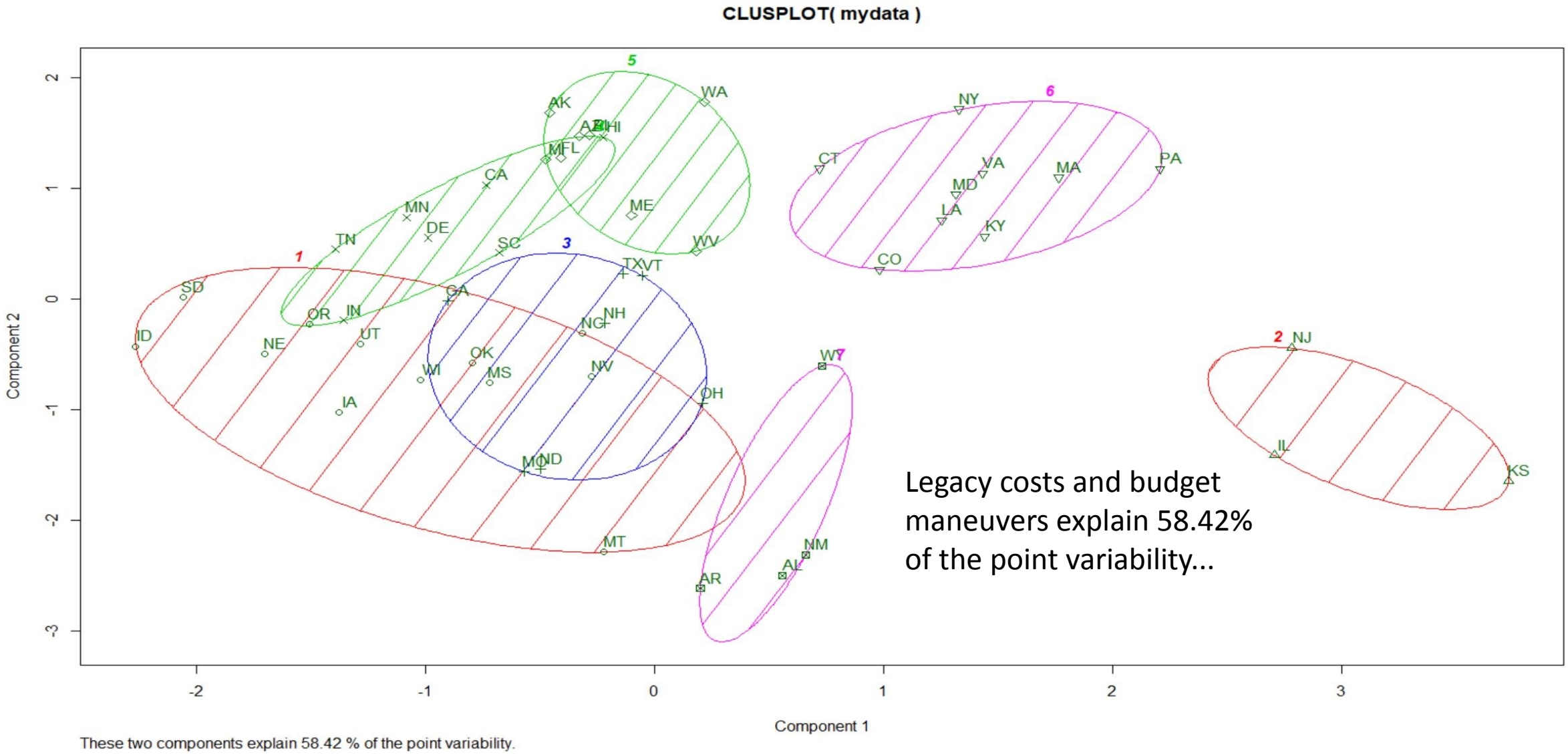
As defined by Sharma & Panigrahi (2013):

“is known as gaining insights and identifying interesting patterns from the data stored in large databases in such a way that the patterns and insights are statistically reliable, previously unknown, and actionable [3].

- Cluster analysis as a data mining technique helps finding similar objects in data.
  - Kaufman & Rousseeuw (2009) have defined cluster analysis as ***”the art of finding groups in data.”***



“Birds of a Feather Flock Together”



Legacy costs and budget maneuvers explain 58.42% of the point variability...

Artificial Intelligence and AML

- Artificial intelligence (AI) allows IT systems to imitate the cognitive ability of human – “problem solving”, “reasoning”, “planning” and “learning”
- AI enabled systems possess inbuilt intelligence to sift through, aggregate, blend, and identify patterns and relationships that are buried within mountains of data - a large number and types of data sources.
  - Customer onboarding
  - Link analysis
  - Customer segmentation
  - Screening
  - Risk management
  - Transaction monitoring
  - Alert investigation, reporting and case management
- HSBC is partnering with Ayasdi, FinCEN has been using its own AI system FAIS

Blockchain and AML

- Bitcoin as digital currency is highly suspect, not on official books

“It essentially provides users with a digital public record of Bitcoin transactions (the digital currency through which these transactions are conducted) that have been executed by a particular entity. It is inherently difficult for hackers to manipulate”

- Blockchain – semi-private? Peers? Impossible to change values without consensus….plus changes are recorded

Evaluating Data Analysis Software

- Data import/export capabilities
- Data visualization
- Suite of tools?
- Tailoring:
  - Performance
  - Functionality
  - Usability
  - Support for additions

Possible data Mining and Analysis Software

Excel	IDEA/CaseWare	ACL	ActiveData for Excel	Thompson Reuters
Tableau	Python	R	WEKA	Oversight
	SAS	Oracle	IBM Watson and IBM Blockchain	

Thank You!
Questions?
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973-655-7689