Auditing For Procurement Fraud

Florida Audit Forum
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Lance E. H. Schmidt, CPA, CFE, Principal
Learning Objectives

This course will cover types of procurement fraud, how procurement fraud is committed and ways to audit for procurement fraud.
Quick Poll

- How well is your team utilizing Computer Assisted Audit Techniques (CAAT)?
- What tools are being used for data analysis?

It is difficult to explain what data analysis is, but you know it when you see it.
The Evolution of Data Analysis

- Logical / Exception Analysis
- Artificial Intelligence
- Predictive Analysis
CBOK 2015 Practitioner Survey

- The use of monitoring and data analytics increased by 14% from 2006 to 2015
- Use of continuous/real-time auditing increased by 7% from 2006 to 2015
- Only 40 percent of Chief Audit Executives (CAEs) say their use of technology is “appropriate or extensive”
- 20% of CAEs say their departments rely primarily on manual testing
- 53% of audit departments use a tool for data mining or data analysis
- 80% of CEOs (Management) say data mining and analysis is strategically important to their organizations

Source: www.theiia.org/goto/CBOK
CBOK 2015 Practitioner Survey

80% of CEOs say data mining and analysis is strategically important to their organizations

53% of internal audit departments use a software tool for data mining or data analysis
Occupational Fraud and Abuse Classification System (Fraud Tree)

- Corruption
  - Conflicts of Interest
    - Purchasing Schemes
    - Sales Schemes
  - Bribery
    - Invoice Kickbacks
  - Illegal Gratuities
  - Economic Extortion
    - Bid Rigging

Source: Association of Certified Fraud Examiners
Occupational Fraud and Abuse Classification System (Fraud Tree)

Source: Association of Certified Fraud Examiners
Proactive Fraud Detection Cycle

Governance “Tone at the Top”

Controls Testing “Looking for Fraud”

Ongoing Monitoring

Event & Risk Assessment “Think Like a Fraudster”

Incident Response “Suspected Fraud”

Source: Audimation Services, Inc. (audimation.com)
Why ongoing monitoring is important?

The longer an occupational fraud scheme goes undetected, the greater losses tend to be.

The median duration of the frauds in our study was 18 months.

Nearly one-third of frauds lasted at least two years before they were detected.

A Look At the United States

Figure 8: Scheme Types by Region—United States

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Number of Cases</th>
<th>Percent of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billing</td>
<td>289</td>
<td>27.8%</td>
</tr>
<tr>
<td>Corruption</td>
<td>258</td>
<td>24.9%</td>
</tr>
<tr>
<td>Non-Cash</td>
<td>174</td>
<td>16.8%</td>
</tr>
<tr>
<td>Skimming</td>
<td>167</td>
<td>16.1%</td>
</tr>
<tr>
<td>Expense Reimbursements</td>
<td>164</td>
<td>15.8%</td>
</tr>
<tr>
<td>Check Tampering</td>
<td>154</td>
<td>14.8%</td>
</tr>
<tr>
<td>Payroll</td>
<td>131</td>
<td>12.6%</td>
</tr>
<tr>
<td>Cash on Hand</td>
<td>125</td>
<td>12.0%</td>
</tr>
<tr>
<td>Cash Larceny</td>
<td>102</td>
<td>9.8%</td>
</tr>
<tr>
<td>Financial Statement Fraud</td>
<td>93</td>
<td>9.0%</td>
</tr>
<tr>
<td>Register Disbursements</td>
<td>29</td>
<td>2.8%</td>
</tr>
</tbody>
</table>

Fraud Losses by Industry

Figure 43: Industry of Victim Organizations

Level of Government Frequency & Median Loss

Median Fraud Loss by Organization Size

Scheme Type by Size of Victim Organization

## Frequency of Scheme Based on Industry

<table>
<thead>
<tr>
<th>Industry/Scheme</th>
<th>Banking and Financial Services</th>
<th>Government and Public Administration</th>
<th>Manufacturing</th>
<th>Health Care</th>
<th>Education</th>
<th>Retail</th>
<th>Construction</th>
<th>Insurance</th>
<th>Oil and Gas</th>
<th>Technology</th>
<th>Services (Other)</th>
<th>Transportation and Warehousing</th>
<th>Telecommunications</th>
<th>Religious, Charitable, or Social Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>358</td>
<td>229</td>
<td>192</td>
<td>144</td>
<td>132</td>
<td>104</td>
<td>86</td>
<td>85</td>
<td>74</td>
<td>74</td>
<td>58</td>
<td>62</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>Billing</td>
<td>9.5%</td>
<td>25.3%</td>
<td>32.3%</td>
<td>31.3%</td>
<td>34.1%</td>
<td>15.4%</td>
<td>27.9%</td>
<td>17.6%</td>
<td>20.3%</td>
<td>23.7%</td>
<td>22.9%</td>
<td>22.1%</td>
<td>12.9%</td>
<td>25.7%</td>
</tr>
<tr>
<td>Cash Larceny</td>
<td>11.1%</td>
<td>7.9%</td>
<td>5.2%</td>
<td>9.7%</td>
<td>13.8%</td>
<td>12.5%</td>
<td>8.1%</td>
<td>4.7%</td>
<td>4.1%</td>
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<td>1.6%</td>
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<tr>
<td>Cash on Hand</td>
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<td>17.4%</td>
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<td>7.0%</td>
<td>4.7%</td>
<td>9.5%</td>
<td>8.1%</td>
<td>22.3%</td>
<td>5.9%</td>
<td>4.8%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Check Tampering</td>
<td>9.5%</td>
<td>8.2%</td>
<td>13.5%</td>
<td>14.6%</td>
<td>7.6%</td>
<td>9.8%</td>
<td>10.5%</td>
<td>17.6%</td>
<td>4.1%</td>
<td>5.4%</td>
<td>18.5%</td>
<td>10.3%</td>
<td>6.5%</td>
<td>31.7%</td>
</tr>
<tr>
<td>Corruption</td>
<td>37.5%</td>
<td>38.4%</td>
<td>28.1%</td>
<td>36.6%</td>
<td>31.8%</td>
<td>32.2%</td>
<td>36.0%</td>
<td>28.2%</td>
<td>19.6%</td>
<td>31.0%</td>
<td>28.6%</td>
<td>51.9%</td>
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<tr>
<td>Expense Reimbursements</td>
<td>5.4%</td>
<td>15.7%</td>
<td>22.9%</td>
<td>20.1%</td>
<td>15.9%</td>
<td>8.7%</td>
<td>20.9%</td>
<td>9.4%</td>
<td>10.8%</td>
<td>9.7%</td>
<td>13.7%</td>
<td>20.7%</td>
<td>12.9%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Financial Statement Fraud</td>
<td>12.0%</td>
<td>7.9%</td>
<td>10.3%</td>
<td>13.2%</td>
<td>5.3%</td>
<td>5.8%</td>
<td>17.4%</td>
<td>7.1%</td>
<td>6.0%</td>
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<td>17.1%</td>
<td>5.8%</td>
<td>9.7%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Non-Cash</td>
<td>10.5%</td>
<td>14.8%</td>
<td>30.2%</td>
<td>11.2%</td>
<td>17.4%</td>
<td>32.7%</td>
<td>22.1%</td>
<td>5.9%</td>
<td>17.6%</td>
<td>18.9%</td>
<td>23.9%</td>
<td>28.6%</td>
<td>30.7%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Payroll</td>
<td>3.3%</td>
<td>13.5%</td>
<td>11.5%</td>
<td>9.7%</td>
<td>7.6%</td>
<td>3.0%</td>
<td>6.3%</td>
<td>5.0%</td>
<td>8.1%</td>
<td>2.7%</td>
<td>11.4%</td>
<td>7.6%</td>
<td>3.2%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Register Dishonesty</td>
<td>2.7%</td>
<td>1.7%</td>
<td>5.7%</td>
<td>2.1%</td>
<td>1.5%</td>
<td>0.8%</td>
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<td>0.0%</td>
<td>1.4%</td>
<td>5.7%</td>
<td>2.0%</td>
<td>3.2%</td>
<td>1.7%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Skimming</td>
<td>6.5%</td>
<td>14.0%</td>
<td>8.3%</td>
<td>12.5%</td>
<td>25.0%</td>
<td>17.3%</td>
<td>15.1%</td>
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<td>8.1%</td>
<td>5.4%</td>
<td>21.4%</td>
<td>11.6%</td>
<td>6.5%</td>
<td>18.3%</td>
</tr>
</tbody>
</table>

### Frequency of Scheme Based on Department

<table>
<thead>
<tr>
<th>Department/Scheme</th>
<th>Accounting</th>
<th>Operations</th>
<th>Sales</th>
<th>Executive/Upper Management</th>
<th>Customer Service</th>
<th>Purchasing</th>
<th>Finance</th>
<th>Warehousing/Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>348</td>
<td>312</td>
<td>260</td>
<td>228</td>
<td>189</td>
<td>161</td>
<td>94</td>
<td>86</td>
</tr>
<tr>
<td>Billing</td>
<td>27.0%</td>
<td>21.5%</td>
<td>14.2%</td>
<td>36.8%</td>
<td>9.5%</td>
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<td>9.3%</td>
</tr>
<tr>
<td>Cash Larceny</td>
<td>14.9%</td>
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</tr>
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<td>Cash on Hand</td>
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<td>18.5%</td>
<td>13.0%</td>
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<td>5.8%</td>
</tr>
<tr>
<td>Check Tampering</td>
<td>30.5%</td>
<td>9.3%</td>
<td>2.7%</td>
<td>13.6%</td>
<td>7.4%</td>
<td>6.2%</td>
<td>24.5%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Corruption</td>
<td>21.6%</td>
<td>34.9%</td>
<td>34.6%</td>
<td>50.9%</td>
<td>25.4%</td>
<td>68.9%</td>
<td>37.2%</td>
<td>32.6%</td>
</tr>
<tr>
<td>Expense Reimbursements</td>
<td>15.8%</td>
<td>12.2%</td>
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<td>16.4%</td>
<td>18.6%</td>
<td>13.8%</td>
<td>57.0%</td>
</tr>
<tr>
<td>Payroll</td>
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<td>1.5%</td>
<td>10.1%</td>
<td>3.7%</td>
<td>5.0%</td>
<td>7.4%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Register Disbursements</td>
<td>3.2%</td>
<td>4.2%</td>
<td>5.0%</td>
<td>1.8%</td>
<td>3.2%</td>
<td>4.3%</td>
<td>3.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Skimming</td>
<td>17.5%</td>
<td>12.8%</td>
<td>11.9%</td>
<td>11.8%</td>
<td>16.9%</td>
<td>7.5%</td>
<td>12.8%</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

What does procurement fraud look like?

• Kickbacks and bribes
• Bid-rigging
• Billing fraud
• Conflicts of interest
• Change order abuse
• Shell company schemes
• Inflated or duplicate invoices
• Product substitution
• Split purchases
• Sole source abuse
• Unnecessary purchases

But wait, there’s more!
Kickbacks and Bribes

- Key Attributes:
  - Difficult to audit
  - Typically “off book”
  - Typically associated with larger contracts
  - Corruption fraud median loss - $200,000
  - Kickbacks may be non-cash
Kickbacks and Bribes

- Major Red Flags:
  - Unexplained change in employee lifestyle
  - All but one employee is happy with goods/service being provided
  - Significant pressure to keep a vendor or unnecessary involvement in the procurement process by an employee
  - Typically not the lowest bid/provider of the service
Kickbacks and Bribes

• Audit Tests:
  – Purchasing trends over time
  – Identifying Key Performance Indicators (KPIs) and comparing KPIs by vendor
  – Vendor satisfaction surveys – looking for anomalies in the data set
  – When appropriate, implement “Right to Audit” clauses in contracts (#1 defense is a good contract)
  – Identify new vendors and test for procurement
Kickbacks and Bribes

• Purchasing Trends:
  – Vendor purchases over a 3 year period
  – Vendor purchases by month over a 3 year period
  – Identifying new vendors, then testing for procurement those with the most vendor payments or vendors over a pre-defined procurement threshold
  – Great for data analysis

• KPI Analysis:
  – Average cost square foot of construction, mile of road, average rate per hour, etc.
  – Very manual process, often times metrics are not available
Bid Rigging

- Key Attributes:
  - Difficult to audit
  - Typically “off book”
  - Typically associated with larger contracts
  - Corruption fraud median loss - $200,000
  - Typically data analysis is not useful, labor intensive
Bid Rigging

- Major Red Flags:
  - Limited number of qualified bids
  - Same company has won a bid for a long period of time with no competition
  - Bids exceed internally developed cost estimates
  - Significant increase in prices year over year
  - Large discrepancies in bids
  - Most commonly discovered by a tip
Bid Rigging

Audit Tests:

- Identify new vendors and sample for procurement irregularities
- Review bids that significantly exceed cost estimates
- Cases where the ultimate winner of bid subsequently subcontracts with a different bidder (reviewing invoices and contracts for new vendors)
Change Order Abuse

• Key Attributes:
  – Difficult to audit
  – Typically “off book”
  – Typically associated with larger contracts
  – Typically data analysis is not useful, labor intensive
Change Order Abuse

• Major Red Flags:
  – Very low bids
  – Procurement method for a vendor is just below competitive bidding threshold
  – Vendors that exceed contracts amounts
  – Changes to scope after procurement
  – Significant increase in vendor spending year over year
  – Poor documentation of change orders
  – “After the fact” approval of change orders
Change Order Abuse

- Audit Tests:
  - Compare contract listing to purchases by vendor purchases
  - Compare procurement thresholds to vendor purchases
  - Obtain listing of bids and review for those just under pre-determined thresholds
  - Review multi-year contracts that may be more likely to go undetected
  - Select audit procurement bids related to departments with turnover in key fiscal positions
Conflicts of Interest

• Key Attributes:
  – Difficult to audit
  – Typically “off book”
  – Occasionally employee has a direct interest, but more commonly is a relative
  – Often tied to kickbacks
  – Elected officials and upper management will typically cause the largest fraud
Conflicts of Interest

• Major Red Flags:
  – Unusual favoritism of particular contractor or vendor
  – Employee has discussions about employment with current or prospective vendor
  – Close socialization with and acceptance of inappropriate gifts, travel or entertainment from a vendor
  – Fiscal or procurement has side businesses
Conflicts of Interest

• Audit Tests:
  – Employee and vendor address match using fuzzy logic or uniquely created fields to standardize the data
  – Keyword search of master vendor data file or general ledger
  – Sunbiz.org search for companies owned by key members of management
  – Sunbiz.org search for significant vendors, then comparison to
## Conflicts of Interest

**Summary:**
CLA imported the entire check register and the county wide employee listing into IDEA for analysis. CLA compared the street address + zip code of all employees and all vendors for matches. CLA reviewed the transactions highlighted on the first tab, including the check and the invoice for proper approval and invoice details and inquired of XXXXXXXX, payroll clerk, and XXXXXXXXXXXXX, AP Manager for accuracy and appropriateness, The below explanations were given by XXXXXX. CLA deemed these explanations to be reasonable,

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC HOMES LLC</td>
<td>ABC Homes and Linda Perkins – Linda has an apt #60 on her address. ABC Homes owns the apartment complex.</td>
</tr>
<tr>
<td>THE APT HOUSE</td>
<td>The APT House and John Davis – same as above. John rents an apt and The APT House is the apartment complex.</td>
</tr>
<tr>
<td>LEE JONES</td>
<td>Lee Jones – as a supplier received a private pay refund for a Nursing Home patient (typically family).</td>
</tr>
<tr>
<td>BOB HUNGRY</td>
<td>Bob Hungry – as a supplier received a private pay refund for a Nursing Home patient (typically family).</td>
</tr>
<tr>
<td>TED WILLIAMS</td>
<td>Ted Williams and Ned Williams – Ted received poll worker pay - relatives at same address.</td>
</tr>
<tr>
<td>ABC LAWN SERVICE INC</td>
<td>ABC Lawn Service Inc and John Doe – different apartment #’s at same street address.</td>
</tr>
</tbody>
</table>
Conflicts of Interest

Search for Corporations, Limited Liability Companies, Limited Partnerships, and Trademarks by Name

Entity Name: [ ]

Enter as: Last Name, First Name, Middle Initial. Partial names are acceptable.

Search Now
Procurement Method Errors

- Key Attributes:
  - Easy to audit with data analysis
  - Challenge with larger ERP systems is aggregating the data
  - Often times procurement data is not in the vendor module
  - Errors are as likely to happen has intentional fraud
  - Typically committed at the department level
  - Most systems do not provide preventive measures, typical audit measures are detective
  - More difficult if multiple forms of payments exist
  - Procurement officers only know what procurement officers know
Procurement Method Errors

• Major Red Flags:
  – Weak internal controls over procurement
  – No detective controls currently being utilized
  – Decentralized purchasing
  – Turnover in procurement officer/department
  – Turnover in fiscal managers
Procurement Method Errors

• Audit Tests:
  – Begin with meaningful planning meeting
  – Benford’s Law analysis is useful
    ◊ Single digit analysis for 1,000 to 10,000
    ◊ Two digit analysis and other analysis over 10,000 transactions
  – Summarize purchases by vendor
    ◊ Summarize review those purchases above/below procurement thresholds
    ◊ Be aware of “pyramid purchases”
  – Focus on sole source, emergency procurements, higher dollar amounts, new vendors
  – Split purchases test
Benford’s Law Analysis

• What place does Benford’s Law Analysis have for accountants and auditors?
• When do we utilize it?
• Do we over rely on automated tools to identify higher risk transactions?
• What is the typical “next step” after looking at Benford’s?
• Are we performing a Benford’s analysis to respond to a risk or to identify a risk? Or for a different purpose?
Benford’s Law Analysis

• Most useful to understand population, unless you have a specific risk identified
• Useful for any data set, not just procurement and journal entries
• High risk transactions identified by data analysis tools are not necessarily high risk
• Typical outcome is a deeper understanding of the data set
• Learn when to use Benford’s
Procurement Method Errors

Mean Absolute Deviation: 0.00260
Conclusion: Non-conformity

GROSS_AMOUNT
First Two Digits - Positive Values

- 10 Digit
- 25 Digit
- 50 Digit

Count vs Digit Sequence

Upper Bound  Lower Bound  Expected Count  Actual Count  Highly Suspicious  Suspicious
Procurement Method Errors

• Case Study in Risk Based Sampling:
  – Client uses a large ERP system
  – Some procurement data is in the same ERP, some data is maintained in a different system
  – AP department documents procurement method when known
  – Contract data is entered in a manual field (i.e. data is not structured and can be different each time)
  – No common identifiers between procurement data and AP data
  – No issues in the past with procurement, but had difficulty identifying higher risk procurements
  – Strong preventive internal controls, however, no detective controls
Procurement Method Errors

- Designed test to uncover “pyramid purchases”:
  - Summarized vendors with purchases over $25,000, but that did not have expenses charged to any one fund over $25,000
  - Obtained a list of 61 vendors that met the above criteria, totaling over $4 million in purchases
  - Of the list of 61 vendors, 6 vendors (10% variance rate) used unacceptable procurement methods.
  - Procurement method errors were primarily unintentional, however, did not comply with the procurement policy
Procurement Method Errors

• Skills needed to perform this test:
  – Team used IDEA and specifically the following features and formulas:
    ◊ Summarization
    ◊ Joined databases
    ◊ Pivot tables
    ◊ Filtering

• Relatively simple analysis helped us identify “higher risk” vendors for testing
Procurement Method Errors

• Case Study in P-Card Testing:
  – Obtained all purchases with all available information from p-card vendor
  – P-Card Vendor was Bank of America
  – Daily limits, monthly limited – fully automated controls
  – All procurement rules still apply
  – P-Card did not allow for IT purchases outside of the IT department
  – Concerned about terminated employees
  – Over 25,000 transactions and 900 users
Procurement Method Errors

• Results P-Card Testing:
  – Noted numerous transactions where the procurement method was not filled out
    ◊ Recommended this field become a required field
  – 73 terminated employees, 2 employees had activity after termination date
  – Performed word search on entire database and identified 2 instances of IT equipment being purchased that was not purchased by the IT department
  – Summarized purchases by vendor by P-Card, 5 instances of suspected split purchase fraud
Analyses to Understand Data
What comes first?

Risk / Question

Test / Analysis
Types of Analytics

Comprehensive and Insightful Analytics

Population

Grouping

People

Trending

Transaction
Types of Analytics

• Population analytics — Understand the entire population
  – Example test: Stratification by $10,000 increments

• Grouping analytics — Summarize transactions into meaningful groups
  – Example test: Summarization of manual journal entries by accounts

• People analytics — Garner insight into who benefits from and who is responsible for a transaction
  – Example test: Count and sum of journal entries by inputting user
Types of Analytics

• Trending Analytics — Show results through time.
  – Example test: Sum cash disbursements by month

• Transaction Analytics — Isolate transactions exhibiting particular traits.
  – Example test: Transactions occurring on a weekend
## Field Statistics - Numeric

<table>
<thead>
<tr>
<th>Numeric Statistics</th>
<th>DEBIT</th>
<th>CREDIT</th>
<th>NET_AMOUNT...</th>
<th>ABS_VAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Value</td>
<td>553,867,332.51</td>
<td>5,307,840.54</td>
<td>548,559,491.97</td>
<td>553,175,173.05</td>
</tr>
<tr>
<td>Absolute Value</td>
<td>553,867,332.51</td>
<td>5,307,840.54</td>
<td>559,175,173.05</td>
<td>559,175,173.05</td>
</tr>
<tr>
<td># of Records</td>
<td>36,282</td>
<td>36,282</td>
<td>36,282</td>
<td>36,282</td>
</tr>
<tr>
<td># of Zero Items</td>
<td>2,336</td>
<td>34,766</td>
<td>820</td>
<td>820</td>
</tr>
<tr>
<td>Positive Value</td>
<td>553,867,332.51</td>
<td>5,307,840.54</td>
<td>553,867,332.51</td>
<td>559,175,173.05</td>
</tr>
<tr>
<td>Negative Value</td>
<td>0.00</td>
<td>0.00</td>
<td>-5,307,840.54</td>
<td>0.00</td>
</tr>
<tr>
<td># of Positive Records</td>
<td>33,946</td>
<td>1,516</td>
<td>33,946</td>
<td>35,462</td>
</tr>
<tr>
<td># of Negative Records</td>
<td>0</td>
<td>0</td>
<td>1,516</td>
<td>0</td>
</tr>
<tr>
<td># of Data Errors</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td># of Valid Values</td>
<td>36,282</td>
<td>36,282</td>
<td>36,282</td>
<td>36,282</td>
</tr>
<tr>
<td>Average Value</td>
<td>15,265.62</td>
<td>146.29</td>
<td>15,119.33</td>
<td>15,411.92</td>
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<tr>
<td>Minimum Value</td>
<td>0.00</td>
<td>0.00</td>
<td>-565,000.00</td>
<td>0.00</td>
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<tr>
<td>Maximum Value</td>
<td>24,018,362.00</td>
<td>565,000.00</td>
<td>24,018,362.00</td>
<td>24,018,362.00</td>
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<tr>
<td>Record # of Min</td>
<td>54</td>
<td>1</td>
<td>26,191</td>
<td>878</td>
</tr>
<tr>
<td>Record # of Max</td>
<td>4,908</td>
<td>26,191</td>
<td>4,908</td>
<td>4,908</td>
</tr>
<tr>
<td>Sample Std Dev</td>
<td>254,036.45</td>
<td>4,151.58</td>
<td>254,079.16</td>
<td>254,061.58</td>
</tr>
<tr>
<td>Sample Variance</td>
<td>64,534,516,620.94</td>
<td>17,235,629.62</td>
<td>64,556,218,913.13</td>
<td>64,547,285,587.98</td>
</tr>
<tr>
<td>Pop Std Dev</td>
<td>254,032.95</td>
<td>4,151.52</td>
<td>254,075.66</td>
<td>254,058.08</td>
</tr>
<tr>
<td>Pop Variance</td>
<td>64,532,737,928.57</td>
<td>17,235,154.57</td>
<td>64,554,439,622.61</td>
<td>64,545,506,543.67</td>
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<tr>
<td>Pop Skewness</td>
<td>54.448766</td>
<td>89.146947</td>
<td>54.422595</td>
<td>54.431230</td>
</tr>
<tr>
<td>Pop Kurtosis</td>
<td>3,660.344793</td>
<td>10,490.437048</td>
<td>3,658.008335</td>
<td>3,658.770831</td>
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</tbody>
</table>
# Field Statistics - Date

<table>
<thead>
<tr>
<th>Date Statistics</th>
<th>GL_DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Valid Values</td>
<td>36,282</td>
</tr>
<tr>
<td># of Zero Items</td>
<td>0</td>
</tr>
<tr>
<td># of Records</td>
<td>36,282</td>
</tr>
<tr>
<td># of Data Errors</td>
<td>0</td>
</tr>
<tr>
<td>Earliest Date</td>
<td>10/1/2015</td>
</tr>
<tr>
<td>Latest Date</td>
<td>9/30/2016</td>
</tr>
<tr>
<td>Record # of Earliest</td>
<td>1</td>
</tr>
<tr>
<td>Record # of Latest</td>
<td>25466</td>
</tr>
<tr>
<td>Most Common Day</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Most Common Month</td>
<td>September</td>
</tr>
</tbody>
</table>

### Item Counts by Month

<table>
<thead>
<tr>
<th>Month</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>2811</td>
</tr>
<tr>
<td>February</td>
<td>3115</td>
</tr>
<tr>
<td>March</td>
<td>2950</td>
</tr>
<tr>
<td>April</td>
<td>3155</td>
</tr>
<tr>
<td>May</td>
<td>2614</td>
</tr>
<tr>
<td>June</td>
<td>3296</td>
</tr>
<tr>
<td>July</td>
<td>2571</td>
</tr>
<tr>
<td>August</td>
<td>3616</td>
</tr>
<tr>
<td>September</td>
<td>5694</td>
</tr>
<tr>
<td>October</td>
<td>965</td>
</tr>
<tr>
<td>November</td>
<td>2707</td>
</tr>
<tr>
<td>December</td>
<td>2788</td>
</tr>
</tbody>
</table>
### Stratification – Sum by Net DR/CR

<table>
<thead>
<tr>
<th>Stratum #</th>
<th>&gt;= L Limit</th>
<th>&lt; U Limit</th>
<th># Records</th>
<th>(%) # Records</th>
<th>NET_AMOUNT_DR_CR</th>
<th>(%) NET_AMOUNT_DR_CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.00</td>
<td>20,000.00</td>
<td>32,603</td>
<td>89.86</td>
<td>51,074,751.27</td>
<td>9.31</td>
</tr>
<tr>
<td>2</td>
<td>20,000.00</td>
<td>40,000.00</td>
<td>844</td>
<td>2.33</td>
<td>24,027,137.10</td>
<td>4.38</td>
</tr>
<tr>
<td>3</td>
<td>40,000.00</td>
<td>60,000.00</td>
<td>354</td>
<td>0.98</td>
<td>17,410,977.02</td>
<td>3.17</td>
</tr>
<tr>
<td>4</td>
<td>60,000.00</td>
<td>80,000.00</td>
<td>203</td>
<td>0.56</td>
<td>13,815,739.92</td>
<td>2.52</td>
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<tr>
<td>5</td>
<td>80,000.00</td>
<td>100,000.00</td>
<td>131</td>
<td>0.36</td>
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<td>2.15</td>
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<tr>
<td></td>
<td></td>
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<td>1,516</td>
<td>4.18</td>
<td>-5,307,840.54</td>
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<td>631</td>
<td>1.74</td>
<td>435,726,276.27</td>
<td>79.43</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Totals:</td>
<td>100.00</td>
<td>548,559,491.97</td>
<td>100.00</td>
</tr>
</tbody>
</table>
## Summarization by Fund

<table>
<thead>
<tr>
<th>CHILD_FUND_DESC</th>
<th>NO_OF_RECS</th>
<th>SUM</th>
<th>AVERAGE</th>
<th>VARIANCE</th>
<th>STD_DEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>9803</td>
<td>267,707,053.00</td>
<td>27,308.69</td>
<td>222,346,508,384.00</td>
<td>471,536.33</td>
</tr>
<tr>
<td>Equity</td>
<td>502</td>
<td>51,735,816.45</td>
<td>103,059.40</td>
<td>89,555,289,287.82</td>
<td>299,257.90</td>
</tr>
<tr>
<td>Index</td>
<td>937</td>
<td>32,910,533.36</td>
<td>35,123.30</td>
<td>11,544,798,159.23</td>
<td>107,446.72</td>
</tr>
<tr>
<td>Utilities</td>
<td>4656</td>
<td>22,213,750.61</td>
<td>4,770.99</td>
<td>330,855,138.50</td>
<td>18,189.42</td>
</tr>
<tr>
<td>Technology</td>
<td>629</td>
<td>19,766,605.14</td>
<td>31,425.45</td>
<td>10,686,675,256.13</td>
<td>103,376.38</td>
</tr>
<tr>
<td>Utilities</td>
<td>123</td>
<td>13,535,782.41</td>
<td>110,047.01</td>
<td>105,363,229,653.39</td>
<td>324,597.03</td>
</tr>
<tr>
<td>Non-Fund</td>
<td>92</td>
<td>13,327,728.51</td>
<td>144,866.61</td>
<td>87,195,898,183.35</td>
<td>295,289.52</td>
</tr>
<tr>
<td>Non-Fund</td>
<td>59</td>
<td>11,658,656.86</td>
<td>201,011.33</td>
<td>119,357,499,584.37</td>
<td>345,481.55</td>
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<tr>
<td>Non-Fund</td>
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<td>7,894,101.28</td>
<td>202,412.85</td>
<td>162,005,878,131.53</td>
<td>402,499.54</td>
</tr>
<tr>
<td>Foreign</td>
<td>138</td>
<td>7,546,711.50</td>
<td>54,686.32</td>
<td>14,333,143,592.15</td>
<td>119,721.11</td>
</tr>
<tr>
<td>Foreign</td>
<td>937</td>
<td>6,297,238.66</td>
<td>6,720.64</td>
<td>480,362,162.50</td>
<td>21,917.17</td>
</tr>
<tr>
<td>Non-Fund</td>
<td>605</td>
<td>5,441,695.94</td>
<td>8,994.54</td>
<td>2,479,226,908.15</td>
<td>49,792.44</td>
</tr>
<tr>
<td>Real</td>
<td>73</td>
<td>4,783,712.27</td>
<td>65,530.31</td>
<td>16,672,994,197.00</td>
<td>129,123.95</td>
</tr>
<tr>
<td>Real</td>
<td>4</td>
<td>4,132,725.00</td>
<td>1,033,181.25</td>
<td>776,438,487,135.42</td>
<td>881,157.47</td>
</tr>
<tr>
<td>Technology</td>
<td>1041</td>
<td>4,116,262.82</td>
<td>3,954.14</td>
<td>178,743,713.90</td>
<td>13,369.51</td>
</tr>
<tr>
<td>Technology</td>
<td>10</td>
<td>3,913,341.66</td>
<td>195,667.08</td>
<td>90,212,363,271.91</td>
<td>300,353.73</td>
</tr>
<tr>
<td>Technology</td>
<td>12</td>
<td>3,590,011.66</td>
<td>299,167.64</td>
<td>14,429,762,783.71</td>
<td>120,123.95</td>
</tr>
<tr>
<td>Non-Fund</td>
<td>4</td>
<td>3,437,195.63</td>
<td>859,298.91</td>
<td>1,712,586,674,080.44</td>
<td>1,308,658.35</td>
</tr>
<tr>
<td>Non-Fund</td>
<td>61</td>
<td>3,301,605.39</td>
<td>54,124.68</td>
<td>39,331,455,382.99</td>
<td>198,321.60</td>
</tr>
<tr>
<td>Non-Fund</td>
<td>4</td>
<td>3,274,225.00</td>
<td>818,556.25</td>
<td>783,502,125,989.58</td>
<td>885,156.55</td>
</tr>
<tr>
<td>Foreign</td>
<td>1354</td>
<td>3,269,272.99</td>
<td>2,414.53</td>
<td>104,855,203.03</td>
<td>10,239.88</td>
</tr>
<tr>
<td>Foreign</td>
<td>93</td>
<td>2,984,457.83</td>
<td>32,090.94</td>
<td>6,183,396,186.06</td>
<td>78,634.57</td>
</tr>
<tr>
<td>Corporate</td>
<td>4</td>
<td>2,754,675.00</td>
<td>688,668.75</td>
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<td>726,677.47</td>
</tr>
<tr>
<td>Corporate</td>
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<td>2,463,280.61</td>
<td>2,082.23</td>
<td>47,322,515.32</td>
<td>6,879.14</td>
</tr>
<tr>
<td>Technology</td>
<td>6</td>
<td>2,398,721.26</td>
<td>399,786.88</td>
<td>159,063,602,082.08</td>
<td>398,827.78</td>
</tr>
</tbody>
</table>
Primer on Data Analysis
Basic Data Analysis Methodology

- Identify objectives, understand client system, obtain desired skill set
- Discuss risks, understand control environment, get input from interested users, rank risks
- Achieve desired objective
- Document procedures and results
- Identify best practices and other useful information
- Communicate with department
- Data extraction
- Send request list to department (if necessary)
- Technical Analysis

- Corroborate results
- Identify anomalies
- Reassess risk
Data Integrity

Source of Data

Completeness

Data Flow

Data Normalization

Data Elements/Dictionary
Data Integrity – Best Practices

• Flowchart for larger ERP systems (evaluate all known tables and databases)
• Maintain a data dictionary for data elements
• Identify data elements that can be added to the ERP system to reduce time
• Completeness:

“Check twice, analyze once”
Access Data

- Commonly requested information types include, but are not limited to:
  - General Ledger Detail
  - Journal Entries
  - Accounts Receivable
  - Accounts Payable
  - Contribution Records
  - Cash Disbursements
  - Procurement Records
  - Payroll
  - Credit Cards
  - Travel and Entertainment Expenses
  - Subsidiary Ledgers (Various)

- Along with the above noted data sets, the following information is also needed to adequately interpret the data files:
  - Chart of Accounts
  - Data Dictionary
  - File Source Listing – indicating from which systems and locations the data was extracted

- Vendor Master File (A/P, A/R, Sales)
Common Data Types

• Data Elements:
  – **Character** – text data; this should be used for included data that is not, Numeric, Date, or Time. Also, if you are unsure whether a data field maintains the same structure throughout the entire database, character should be used as the “default” selection.
  – **Numeric** – numeric data; generally, the rule of thumb is that if you are going to use (or may use) the field as a part of a mathematical calculation, it should be defined as Numeric, the field should contain only numbers (and commas, parenthesis, periods).
  – **Date** – date data (a mask is required, such as “MM/DD/YYYY”); if the data field contains date information with a consistent mask throughout, it should be imported as a date.
  – **Time** – time data (a mask is required, such as “HH:MM:SS”); if the data field contains time information with a consistent mask throughout, it should be imported as a time.
Data Normalization

- More Efficient Analysis
- Better Relational Analysis
- More/Less Detailed Analysis
Common Data Normalization Fields

- Absolute Value
- Month
- Year
- Month Year/ Year Month
- Account Number Segmented
- Fund (parent and child fund)
- Fund Type and Fund Subtype
- Financial Statement Class
- Subsidiary Ledger Identifier
- Functional expense allocation
- Workday / Weekend
- Day of the week
- Days to posted
- Balance Sheet/Income Statement
- CFDA / CFSA Number and Description
- Shortened version of account number or vendor field
- Statistics by vendor/line item description
- Usernames / user title / user department
- Creating data from data

Data Normalization Now = Significant Time Savings Later
Questions?

Lance E. H. Schmidt, CPA, CFE
Principal
State and Local Government
Direct 863-680-5634
Lance.Schmidt@CLAconnect.com

Let us know how we can help!