Data Analytics
Why Internal Audit Needs Analytics
Study Links Earnings Manipulation to Success in Corporate Accounting

WASHINGTON, D.C. (AUGUST 10, 2015)
BY MICHAEL COHN

Willingness to manipulate earnings helps individuals succeed in corporate accounting, according to a new academic study.

Source: Accounting Today, August 2015
CFES estimate the typical organization loses 5% of annual revenues to fraud.
$6.3 billion in total losses

23% of cases caused losses of $1 million or more

$150,000 median loss per case

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BKD Big Data & Analytics
**Figure 45: Frequency of Schemes 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>Services (Professional)</th>
<th>Religious, Charitable, or Social Services</th>
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<tr>
<td>Cases</td>
<td>388</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>70</td>
<td>88</td>
<td>62</td>
<td>80</td>
<td>52</td>
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<td>Billing</td>
<td>9.6%</td>
<td>25.3%</td>
<td>32.8%</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>29.7%</td>
<td>22.9%</td>
<td>22.1%</td>
<td>12.9%</td>
<td>26.7%</td>
<td>25.0%</td>
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<tr>
<td>Cash Larceny</td>
<td>11.1%</td>
<td>7.9%</td>
<td>5.2%</td>
<td>9.7%</td>
<td>13.6%</td>
<td>12.5%</td>
<td>8.1%</td>
<td>4.7%</td>
<td>4.1%</td>
<td>5.4%</td>
<td>15.7%</td>
<td>4.4%</td>
<td>1.6%</td>
<td>13.3%</td>
<td>9.6%</td>
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<tr>
<td>Cash on Hand</td>
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<td>10.5%</td>
<td>8.3%</td>
<td>11.1%</td>
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<td>11.5%</td>
<td>7.0%</td>
<td>4.7%</td>
<td>9.5%</td>
<td>8.1%</td>
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<td>Check Tampering</td>
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<td>18.6%</td>
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<td>Corruption</td>
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<td>39.4%</td>
<td>44.4%</td>
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<td>31.8%</td>
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<td>38.6%</td>
<td>44.6%</td>
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<td>81.5%</td>
<td>41.9%</td>
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<td>15.7%</td>
<td>22.9%</td>
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<td>15.9%</td>
<td>8.7%</td>
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<td>Financial Statement Fraud</td>
<td>12.0%</td>
<td>7.9%</td>
<td>10.9%</td>
<td>13.2%</td>
<td>5.3%</td>
<td>5.8%</td>
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<tr>
<td>Non-Cash</td>
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<td>18.9%</td>
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<td>29.4%</td>
<td>38.7%</td>
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<td>Payroll</td>
<td>3.8%</td>
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<tr>
<td>Register Disbursements</td>
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<td>5.7%</td>
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<td>8.7%</td>
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<td>2.9%</td>
<td>3.2%</td>
<td>1.7%</td>
<td>1.9%</td>
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<tr>
<td>Skimming</td>
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<td>8.1%</td>
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<td>21.4%</td>
<td>11.8%</td>
<td>6.5%</td>
<td>18.3%</td>
<td>19.2%</td>
</tr>
</tbody>
</table>
Victim organizations that lacked anti-fraud controls suffered greater median losses---in fact twice as much.

- **Proactive Data Monitoring/Analysis**: $92,000 in control vs. $200,000 not in control.
- **Management Review**: $100,000 in control vs. $200,000 not in control.
- **Hotline**: $100,000 in control vs. $200,000 not in control.

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Our Focus is the Problem
The Initial Key Challenge
...analysis methods designed to extract useful information for answering strategic questions...

The Solution is Analytics
Most useful areas to start
Common Schemes

• Shell companies
• Expense reimbursements
• Personal purchases on P-card
• Check tampering
• Circular cash flows (“Roundtrip”)
• Bribes and kickbacks
• Inflated / duplicate invoices

Example Analytics

✓ Vendor-Employee attribute matching
✓ Time-series analysis of activity
  (Spikes, valleys, acceleration, etc.)
✓ Frequently rounded invoices
✓ Amounts “just under” thresholds
✓ Mail drop or PO addresses
✓ Departures from “normal” baselines
✓ Holiday/weekend activity
✓ Account setup employee same as only processor
✓ Invoice date on or after payment date
Common Schemes
• Circular cash flows
• Bill and hold schemes
• Payment lapping
• Fraudulent write-offs/discounts
• “Refreshing” receivables
• Fictitious sales
• Bonus & incentive fraud
• Debiting old/fake accounts
• Pocketing discounts for early payment

Example Analytics
✓ Sales with no corresponding CGS
✓ Customer-Employee attribute matching
✓ Use of dormant/old accounts
✓ Write-offs and discounts by processor
✓ Correlation with vendor activity
✓ Bad debts trending (acceleration)
✓ Customers with no attributes
✓ Sales held until beginning of incentive period
### Common Schemes
- Ghost employees
- Terminated employees
- Timecard manipulation
- Off-cycle paychecks (extra)
- Overtime manipulation
- Misclassified employees

### Example Analytics
- Analysis of adjustment notes
- Payments after termination date
- No sick/vacation time
- Obscure employee attributes or none
- Timecard activity “just before/after”
- Shared direct deposit information
**Common Schemes**

- Corruption ("Buddy networks")
- Conflicts of Interest
- Big rigging
- Inventory theft
- Bribes/kickbacks in construction

**Example Analytics**

- ✓ Plot bid rotation by date
- ✓ Plot contract $ value by vendor
- ✓ Comparison of rates across vendors
- ✓ Verify dates bids received
- ✓ Compare contractor to invoice payee

**Others**
Fraud analytics examples
<table>
<thead>
<tr>
<th>Loan Customer</th>
<th>Address</th>
<th>Phone</th>
<th>TaxPayer ID</th>
<th>Amount</th>
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<tbody>
<tr>
<td>P&amp;Q Distributing, Inc.</td>
<td>PO Box 247, Hannibal, MO</td>
<td>660-555-1200</td>
<td>24-3784029</td>
<td>$100,000</td>
</tr>
<tr>
<td>P&amp;Q Distributing, Inc.</td>
<td>PO Box 247, Hannibal, MO</td>
<td>660-555-1200</td>
<td>24-3784029</td>
<td>$10,000</td>
</tr>
<tr>
<td>P&amp;Q Builders, Inc.</td>
<td>PO Box 145, Hannibal, MO</td>
<td>660-396-1889</td>
<td>24-3784029</td>
<td>$200,000</td>
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<td>P&amp;Q Builders, Inc.</td>
<td>PO Box 145, Hannibal, MO</td>
<td>660-396-1889</td>
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<td>P&amp;Q Builders, Inc.</td>
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<td>660-396-1889</td>
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<td>$600,000</td>
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<tr>
<td>Terry (President, CEO)</td>
<td>PO Box 145, Hannibal, MO</td>
<td>660-396-1889</td>
<td>500-17-8762</td>
<td>$352,800</td>
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<td>Terry (President, CEO)</td>
<td>PO Box 145, Hannibal, MO</td>
<td>660-396-1889</td>
<td>500-17-8762</td>
<td>$100,000</td>
</tr>
</tbody>
</table>
Enhancing your data

<table>
<thead>
<tr>
<th>Vendor Name</th>
<th>Vendor Address</th>
<th>Authorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntec</td>
<td>1221 East Kearney Street, Springfield, MO</td>
<td>DLC</td>
</tr>
</tbody>
</table>

Internet search returns no evidence of company, nor does Secretary of State website.

“Devon Clark” set up vendor and is only processor.

Cross Reference Against:
- Postal contractors database
- Correctional facilities database
- High-risk ZIP codes
- Unexpected / unusual addresses

The UPS Store
1221 East Kearney Street, Springfield, MO
<table>
<thead>
<tr>
<th>Vendor Name</th>
<th>Vendor Address</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntec</td>
<td>1221 East Kearney Street, Springfield, MO</td>
<td>37.320289</td>
<td>-98.538360</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employee Name</th>
<th>Employee Address</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
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<tbody>
<tr>
<td>Devon L. Clark</td>
<td>312 East Warwick Street, Springfield, MO</td>
<td>37.320552</td>
<td>-98.536550</td>
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</table>

Straight Line Distance = 965 Feet

GPS Visualizer

Enhancing your data
Patterns in Retail

Sales Voids / Refunds

Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
Word of Caution
Data Visualization
**Data Visualization**

**Acceleration Patterns:**
Vendors exhibiting a pattern of increased activity over multiple consecutive periods.

**Valley Patterns:**
Vendors exhibiting a pattern of activity characterized by long periods of inactivity between periods of activity.

**Spike Patterns:**
Vendors exhibiting a pattern of activity characterized by unusually high payments in a single period.
Patterns (Acceleration)

Vendor: JLM Plumbing    Authorized: Janice L. McPhearson
Expenses
<table>
<thead>
<tr>
<th>VENID_AP</th>
<th>VENNAME_AP</th>
<th>INVNUM</th>
<th>INVAMT</th>
<th>INVDATE</th>
<th>CHKNUM</th>
<th>CHKAMT</th>
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<td>10632</td>
<td>JSS</td>
<td>10013384</td>
<td>$2,000.00</td>
<td>31-Dec-07</td>
<td>13586</td>
<td>$500.00</td>
<td>17-Jan-08</td>
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<tr>
<td>10632</td>
<td>JSS</td>
<td>10013384</td>
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<td>31-Dec-07</td>
<td>13805</td>
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<td>11090</td>
<td>Weeks Data Systems</td>
<td>10071</td>
<td>$1,800.00</td>
<td>31-Jan-08</td>
<td>13939</td>
<td>$1,800.00</td>
<td>21-Feb-08</td>
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<td>11090</td>
<td>Weeks Data Systems</td>
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<td>31-Jan-08</td>
<td>38232</td>
<td>$1,800.00</td>
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<tr>
<td>1380</td>
<td>Sherry Barry</td>
<td>07062008</td>
<td>$2,550.00</td>
<td>06-Jul-08</td>
<td>15243</td>
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<td>16900</td>
<td>Basin Industries, Inc.</td>
<td>J408711</td>
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<td>16900</td>
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<td>$15,340.00</td>
<td>02-Apr-09</td>
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### Fun with Names

1. **Acronym / Initials**
   - Janice Linda McPhearson
   - JLM
   - JLM Plumbing

2. **Anagrams**
   - David Cash → Chad Davis
   - Dennis Carroll → Darren Collins
   - Robert Mullican → Unami, LLC

3. **Fictitious Names**
   - Mick E. Mows
e
   - Princess Ariel
   - George Ruth
   - Cheatum, Inc.

4. **Others**
   - Substitution
   - Insertion or Omission
   - Transposition
   - Numb3r
   - Subst1tut10n
Bid Rigging
Cash Receipts Theft
Vendor (A)
  Vinny’s Salvage,
  501 East 5th,
  Saint Louis, MO
  (Total Payments = $250,000)

Employee (B)
  Ronald Townsend, CFO
  4300 Oak Street,
  Saint Louis, MO

Conflicts of Interest
Employee in procurement or other key position, embezzled for 12 months before getting caught.

18-24 months before...
• Email indicates dispute with spouse, hints of financial pressures
• Internet history – research debt relief, payday loan locations, debt consolidation, credit cards, and gambling
• Social media reveals living beyond means
• Incoming phone calls indicate debt collections
Future Data for Internal Auditors
Expanding the Risk “Detection Horizon”
Where to Start
Do you need one of these? Nope...
Success Requires a Shift in Mindset
Guide to Achieving Your Strategic Objectives
Steps to Building a Program

1. Ask strategic question
2. Define your objectives
3. Obtain the data
4. Develop, apply procedures
5. Analyze results
6. Manage results
In Plain English...

- Pick an area to start with
- Understand common schemes and their red flags
- What data is related to the area?
- Pick beginning red flag(s)
- Develop and test the analytic
- Incorporate the analytic routinely
- Consider automation, grouping common procedures
Creativity is Critical
Think Simplicity First
Know your Technologies
Assess What You Have

Tools

- Standard Analysis (Excel, Access)
- Data Analytics (ACL, IDEA, SQL, Arbutus)
- Data Visualization (Tableau, etc.)
- Artificial Intelligence (Machine Learning, Social Media, Sentiment)
Get Your Team Involved
An analytic that doesn’t achieve it’s goal is not a failure. It is an opportunity to design and implement a better analytic.
Resources

Upcoming Training Events

- **JUL 17** Investigating Conflicts of Interest
  Philadelphia, PA

- **JUL 19** Uncovering Fraud with Financial and Ratio Analysis
  Philadelphia, PA

- **JUL 27** Protecting Against Data Breaches and Cyberfraud
  Vancouver, BC

- **AUG 2** Conducting Internal Investigations
  Minneapolis, MN

- **AUG 12** Financial Statement Fraud
  Sydney, Australia
DETECTION OF FRAUD SCHEMES

*Impact of Hotlines*

![Bar Chart showing the impact of hotlines in fraud detection.](chart.png)
Organizations with hotlines catch fraud:
- 50% more quickly
- Median loss 50% less
DETECTION OF FRAUD SCHEMES

Source of Tips

Employee 51.5%
Customer 17.8%
Anonymous 14.0%
Other 12.6%
Vendor 9.9%
Shareholder/Owner 2.7%
Competitor 1.6%
Maintaining Proper Focus
“The signal is the truth. The noise is what distracts us from the truth.”

Nate Silver
Five Thirty-Eight
Challenges to Overcome
Success requires making analytics part of your culture, not an additional task to be completed.
Thank You

Lanny Morrow, EnCE, CTFI | Senior Data Scientist | BKD, LLP

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P: 816.701.0225