Forensic Audit
and
Automated Oversight

Federal Audit Executive Council
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U.S. Department of Commerce OIG
Overview

• Forensic Audit and Automated Oversight
• Data Mining
• Techniques
• Equipment and Software
• Forensic Approach
Forensic Audit and Automated Oversight

- Definition of Forensic Audit
  - Audit that specifically looks for financial misconduct, abusive or wasteful activity.
  - Close coordination with investigators
  - More than Computer Assisted Audit Techniques (CAATs)

- Forensic audit is growing in the Federal government
  - GAO’s Forensic Audit and Special Investigations (FSI)
  - DoDIG Data Mining

- Federal outlays are $2 trillion annually
  - Approximately 11,000 OIG staff to provide oversight
  - OMB estimates improper payments for Federal government at $72B (4%)

- GAGAS requires tests for fraud in audit work
- 100% review using automated business rules versus statistical sampling
  - There is a place for both

- Automated Oversight
  - Continuous monitoring
  - Quick response
FY2008 Improper Payment Estimates

- Medicaid (M-S): $18.6
- Medicare Fee-for-Service: $12.1
- Medicare Advantage: $10.4
- Supplemental Security Income Program (M): $6.8
- Unemployment Insurance (S): $4.6
- Old-Age, Survivors, and Disability Insurance: $3.9
- Food Stamp Program (M-S): $2.0
- Temporary Assistance for Needy Families (M-S): $1.7
- National School Lunch Program (M-S): $1.7
- Other: $1.4
Data Versus Information

An Endless Maze of Data... but No Information
What is Data Mining?

• Refers to the use of machine learning and statistical analysis for the purpose of finding patterns in data sets.
  – If You Know Exactly What You Are Looking for, Use Structured Query Language (SQL).
  – If You Know Only Vaguely What You Are Looking for, Turn to Data Mining.

• Most often used (up until recently) in marketing and customer analysis
Different Levels of Knowledge

- **Data**
  - Facts, numbers
  - ACL, IDEA

- **Information**
  - Summary Reports
  - ACL, IDEA

- **Knowledge**
  - Descriptive Analytics
  - SAS, SPSS, ACL, IDEA

- **Wisdom**
  - Predictive Analytics
  - Clementine
  - Intelligent Miner
  - Enterprise Miner
Data Analysis Software - Fosters Creativity

• Can perform the tests wanted, instead of being limited to what technical staff can, or will, provide
• Not limited to just predetermined data formats and/or relationships
• Can create relationships, check calculations and perform comparisons
• Can examine all records, not just a sample
• Useful for identifying misappropriation of assets and fraudulent financial reporting
• Allows limitless number of analytical relationships to be assessed
  – within large databases
  – comparing large databases
• Identifies anomalies
Common Data Analysis Tests and Techniques

- **Join**
- **Summarization**
- Corrupt data (conversion)
- Blank fields (noteworthy if field is mandatory)
- Invalid dates
- Bounds testing
- Completeness
- Uniqueness
- Invalid codes
- Unreliable computed fields
- Illogical field relationships
- Trend analysis
- Duplicates
Frequency Distribution

Normal Distribution

Anomalous Activity
Normal Activity
Anomalous Activity
Comparing Data Files
(Three-Bucket Theory)

Vendors Not Paid Yet

Vendors Paid and In Vendor Table

Vendors Paid but not In Vendor Table

Vendor Table

Disbursing Transactions
Hardware and Software Applications

• Hardware
  – SQL servers
  – Mainframe (QMF)
  – Docking stations
  – Terminal server

• Software Applications
  – Data mining and predictive analytics, e.g., Clementine
  – Data interrogation – e.g., ACL, IDEA, MS Access, Excel
  – Statistical analysis – e.g., SPSS and SAS
  – Link analysis – I2
  – Lexis-Nexis
  – Data conversion utilities (Monarch)
  – Internet, open-source research
  – Access to system query tools
Forensic Audit Approach

- Audit objectives and audit universe
- Work with investigations
- Structured brainstorming
  - Consider SME conference
  - Identify indicators of potential fraud and ways to find in data
  - Process to identify financial risks
- Map out the end-to-end process
  - Identify systems and key processes
  - Identify key controls
- Identify and obtain transaction-level data
  - Record layout
  - 1000 record dump
  - ACL, IDEA, and Monarch can read virtually any data format
    - Flat files, Delimited files, Dbase files, MS Access, Report files, ….
    - No file size limits
- Build targeted business rules and run against data
- Examine anomalies
End-to-End Payment Universe
Forensic Audit Approach

Personnel Systems
Accounting Systems
Contracting Systems
People Pay Entitlement Systems
Commercial Pay Entitlement Systems
Central Contractor Registry
Disbursing Systems
Federal Reserve System
Commercial Bank

Data Analysis

$$ Treasury Check
Growing a Forensic Audit Capability

• Developing an organization-wide capability
  – All audit staff should have basic skill with ACL, IDEA, Access
  – Forensic audit units perform more sophisticated analyses

• Phased development
  – Staffing – system savvy, critical thinking, analytical, business process knowledge
  – Hardware and software
  – Training….then immediate application to work
  – Standard audit programs should include data analysis steps
  – Include data analysis measures in staff performance plans

• Reporting Forensic Audit Results
  – Tables
  – Process flows….30,000 feet
  – Forensic techniques used in audit can help improve process…recommend them

- **Purpose**
  - Develop an automated oversight capability to identify anomalies in purchase card data that may indicate fraud or abuse
  - Joint effort of all Defense audit and investigation organizations

- **Transaction Universe**
  - 12 million purchase card transactions ($6.5B)
  - 200,000 cardholders and 40,000 authorizing officials

- **Data mining Results**
  - Developed 46 fraud indicators from SME conferences
  - 6.5 million transactions (1+ indicator)
  - 13,393 transactions (combinations of indicators)
    - 2066 cardholders and 1604 approving officials in 752 locations
  - 8243 transactions (researched by auditors)
  - 1250 questioned transactions (some level of misuse)

- **Outcomes**
  - 175 cases with adverse action and 75 investigations opened
  - Capability to embed data mining indicators in credit card company systems to promote continuous monitoring
Top Performing Combinations

- 97% Adult Internet sites, Weekend/Holidays
- 67% Purchases from 1 vendor, CH=AO
- 57% Adult Internet sites
- 57% Internet transactions, 3rd party billing
- 53% Interesting vendors, many transactions
- 43% Even dollars, near limit, same vendor, vendor business w/few CHs
Examples of Misuse and Abuse

• Splitting procurements
• Purchasing goods or services which, although for a valid governmental purpose, are prohibited on a purchase card
• Purchasing items for which there is no government need
• Engaging in fraudulent activity
• Invoices were being certified without being reviewed.
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Record: 1 of 4
Way Ahead

• Set up working group to see where the OIG community is with forensic audit and automated oversight
• Offer assistance to OIGs on development and expansion of capabilities