Integrating Data Analytics into Internal Audit

IIA Beach Cities Meeting

May 19, 2011

Ernst & Young

Quality In Everything We Do

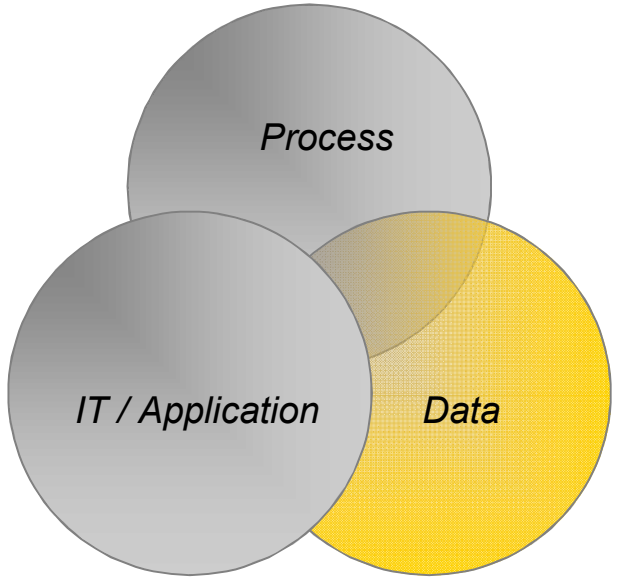
Agenda

- Introductions
- Background
- Industry Perspective
- Benefits of Integrating Data Analytics into Internal Audit
- Challenges in Integrating Data Analytics into Internal Audit
- Examples / Case Studies
- Tools Of The Trade
- Q & A

Background

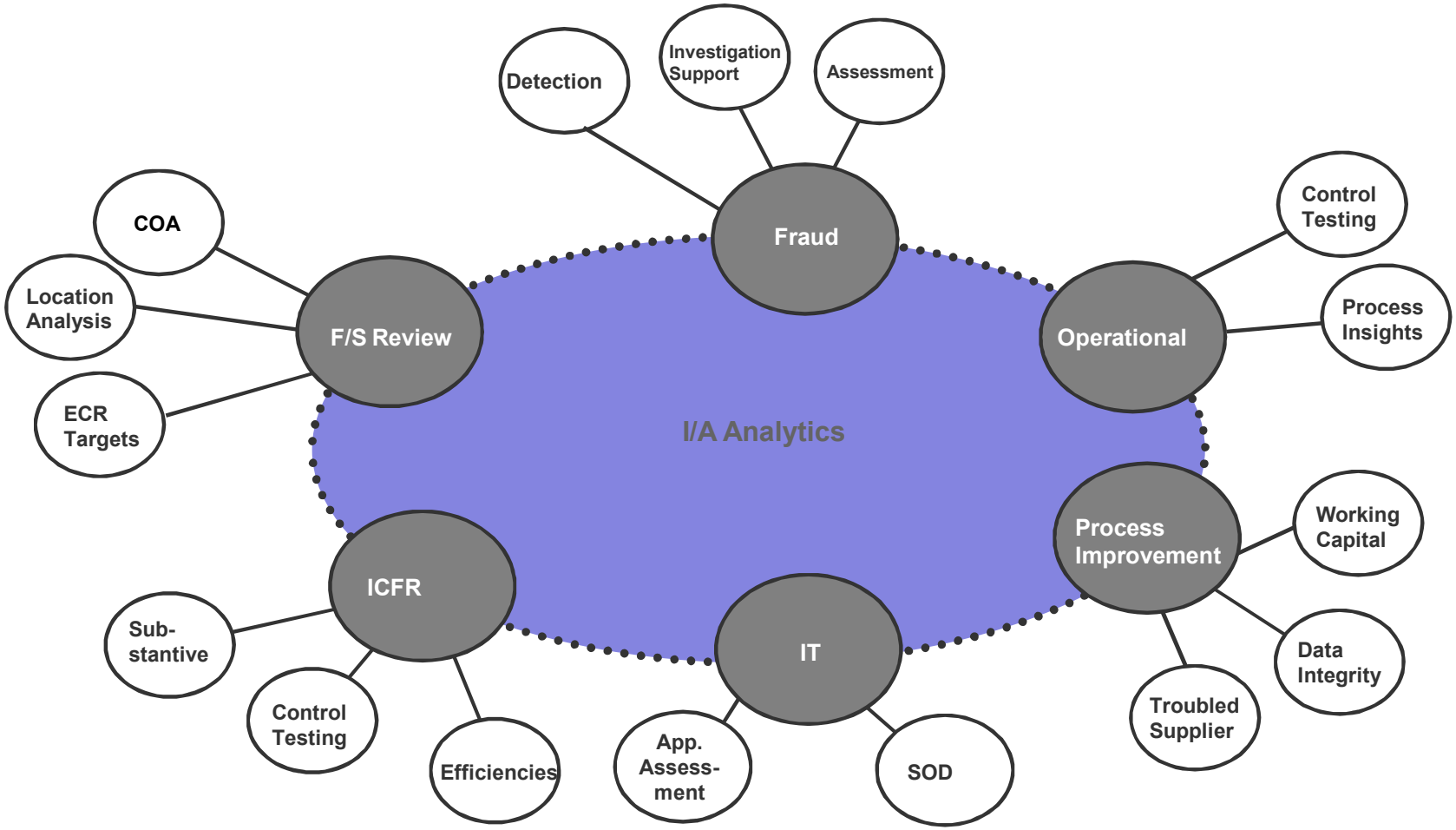
Data analytics is a critical component of Internal Audit

Data analytics is an often overlooked, but an extremely valuable component to an internal audit program. Analytics provides insight into process anomalies, trends and risk indicators through the extraction and analysis of transactional or unstructured data. It allows auditors to efficiently analyze complete populations and draw fact-based conclusions toward the achievement of audit objectives, while concurrently gaining valuable insights into business operations.



Integration of analytics into Internal Audit

Analytics can be applied to many areas of the Internal Audit function. The following chart illustrates how we have integrated analytics into other companies' internal audit programs.

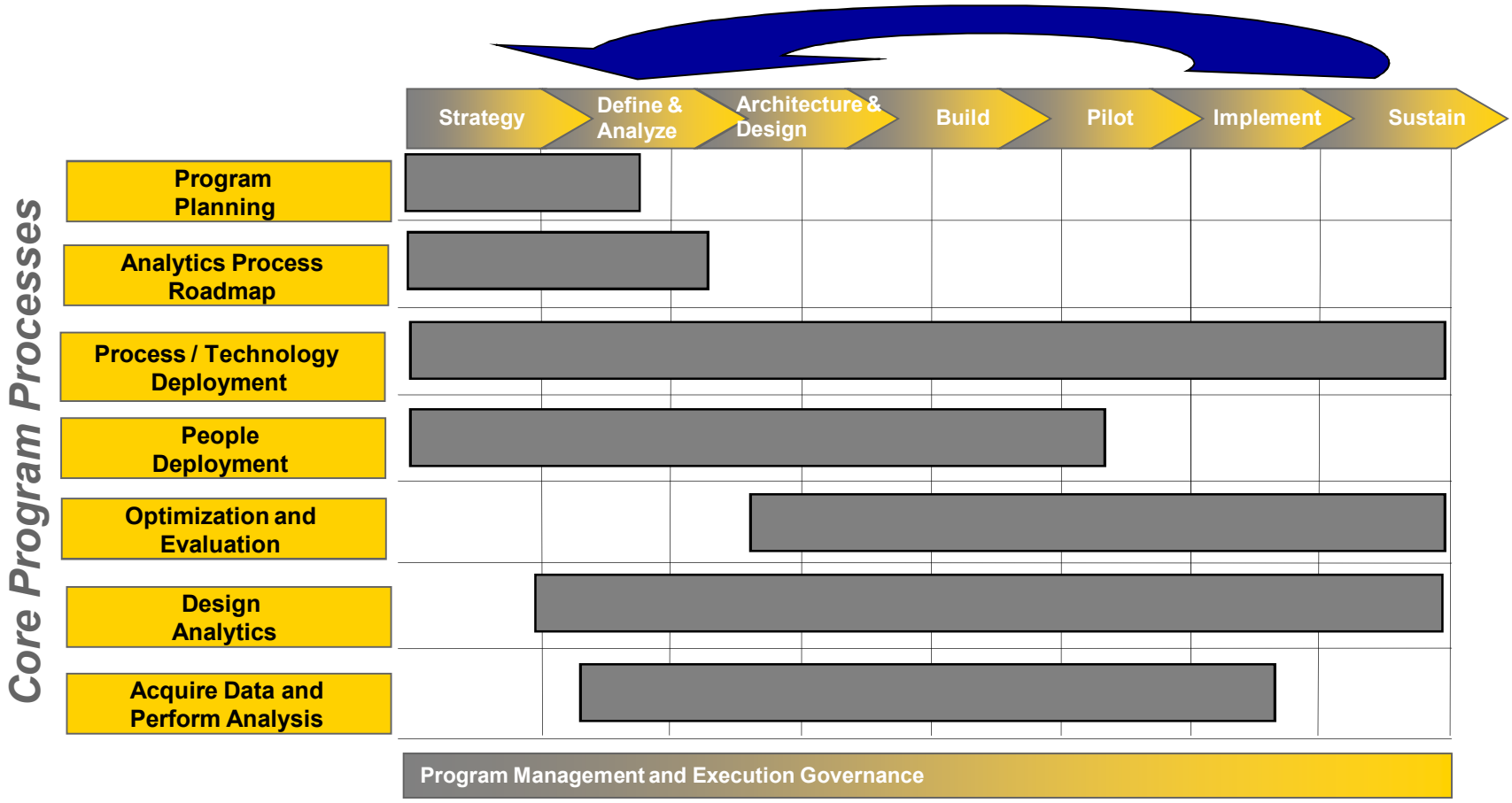


Internal Audit analytics strategy

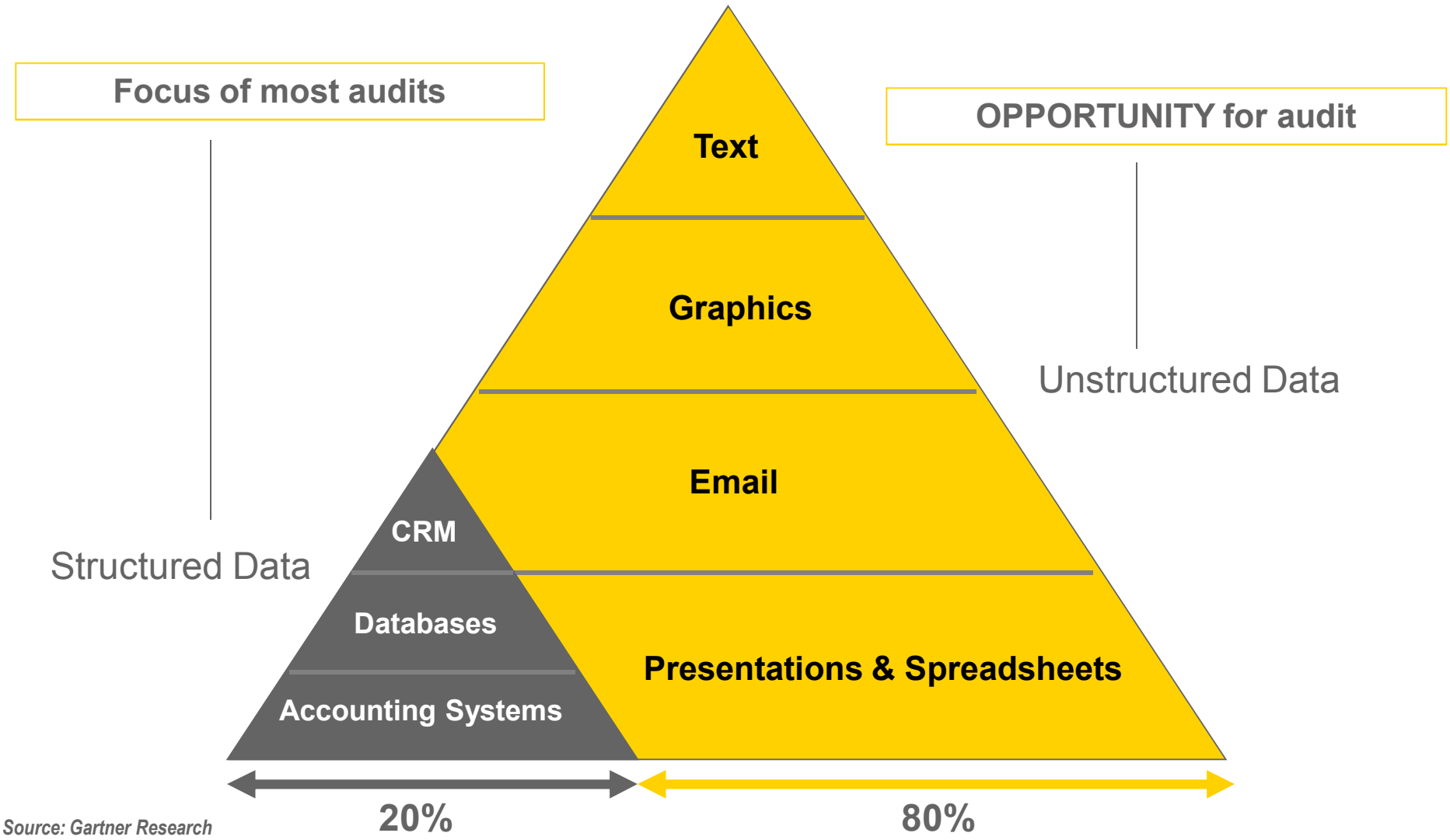
An overall Internal Audit Analytics strategy is supported by multiple operational components. It's important that all components are considered when developing and implementing an analytics program.

Internal Audit analytics enablement roadmap

The roadmap below provides a high level outline of the core processes and phases that would need to be considered during an Analytics Enablement program launch



Data sources in today's organization



Source: Gartner Research

Industry Perspective

Industry issues facing the Internal Audit function

"Making compliance repeatable, sustainable, and cost-effective must become the priority for ongoing investment. Continuous monitoring and automated testing is maturing in approach and applicability to be considered for evaluation now rather than later."

John Haggerty, AMR Research Alert

- High cost of controls, compliance activities and management / internal audit assessment, including process and assessment inefficiencies
- Audit committee concerns over effectiveness of internal audit function and their ability to respond to the evolving risk in the organization
- Limited realization on 404 and technology investments
- Instances of exposures to fraud
- Financial restatements and material weaknesses
- Engaging early on large business issues

Industry adoption of analytics into the Internal Audit function

EY International Internal Audit Survey

83% of respondents indicated their internal audit functions did not utilize data analytics.	66% of the respondents indicated that 40% or less of their internal audit staff is proficient in the use of data analytics.	Only 8% of respondents indicated that data analytics are leveraged on all audits.	Respondents indicated that data analytics are primarily used in audit execution of projects, inclusion in fraud detection programs and in planning individual audit projects.
Significant growth area	**Competency gap**	**Early program maturity**	**Expanding functionality**

- "The key to an efficient internal audit department is to use automated tools and embrace best practice in internal audit"
  - ***Siemens Financial Services, Inc. (Jason Gross – VP of Internal Audit)***
- "What has been lacking is timely, context-based analytics that can provide audit teams with a continuous view of risk and control issues while at the same time providing audit evidence to support an auditor's risk assessment and findings."
  - ***GRC and BPM solutions at IDC (Kathleen Wilhide - Research Director)***
- "To put it simply, distributing standalone software and arranging for training cannot achieve the maximum benefits"
  - ***ACL (John Verver – VP of Product Strategy)***

Internal Audit functions continue to struggle with integrating analytics effectively

Maturity Challenges

- Lack of Implementation Strategy
- Data Acquisition
- Training & Competency Development
- Staff Continuity

Most Fortune 500 IA functions

Optimizing
Managed
Defined
Repeatable
Basic

Level 1 | Level 2 | Level 3 | Level 4 | Level 5

Level 1	Level 2	Level 3	Level 4	Level 5
▸ No formal DA approach, procedures or methodology ▸ DA performed occasionally at best ▸ Tools are not readily available ▸ Dependant on the skills of limited number of SMR's	▸ DA is recognized a s a value-add to the audit ▸ DA is not yet institutionalized ▸ Relies on a central group or an individual to understand issues and implement DA procedures as appropriate ▸ Tools area available, however not applied consistently or correctly	▸ Enforced DA policy support by a defined methodology ▸ The use of DA is monitored by IA management ▸ The quality and impact of DA results are evaluated ▸ Understanding of the business relevance ▸ Tools are used to create data analysis models	▸ DA methodology is institutionalized ▸ Management involved in on-going DA efforts ▸ Mgt understanding of business issues and root cause ▸ Re-performance of DA procedures ▸ Advanced tools used e.g. visual analysis and modeling	▸ Practices evolved in level 1 through 4 are used to continually improve DA processes, procedures and results ▸ Continuous control monitoring tools

Benefits of Integrating Data Analytics into Internal Audit

New directions for Internal Audit

- Trends show that IA departments are focused on gaining efficiency throughout their audits as well as proactively (predictively) finding and addressing organizational risks.
- Internal Audit's function is not simply to audit established controls, but also monitor an organization's risk profile and drive identification of new areas to improve risk management.
- Traditional methods are being replaced with ongoing reviews of entire populations to perform control and risk assessments.
- Analytics can assist all phases of the audit process, from planning and risk assessment to specific control testing.
- Increased focus on transforming Internal Audit into a revenue generating function and not just a cost center.

The Internal Audit function is transforming to …

Provide increased value

Helping Internal Audit move from compliance officer to strategic business advisor…

Audit Committee and management expectations

Internal audit

Business issues, risks, initiatives and key objectives

Strategic and value advisor

Serve as a subject-matter resource to business management supporting strategic initiatives, issues and key objectives of the organization.

Business insights

In addition to core competency, provides high-quality, relevant business insights as an integral part of the process. Business insight is not a by-product, but an explicit outcome.

Core competency

Reinforce and monitor control environment and compliance

Focused on evaluating the design and the effectiveness of internal controls in those areas outlined in their charter or mandate. Also includes focusing on compliance with key regulations and policies.

… requires a move beyond core competencies toward skills that elevate its impact.

Applying analytics across the audit process

Audit activity	Example opportunities to use data analytics
Risk assessment	► Identify risk assessment priorities by using information gathered from trend analysis, financial ratios and comparisons ► Assist with determining scope of audit plan activities (by size/relevance)
Audit planning	► Provide a preliminary "scan" of relevant audit information to drive project scope, sampling and fieldwork procedures
Fieldwork procedures	► Support testing of controls in an efficient and comprehensive manner ► Identify anomalies, trends and potential fraud indicators ► Supplement sample testing approaches with full-coverage data analytics
Reporting	► Provide quantifiable, fact-based information for reportable issues and exceptions ► Supplement reporting with statistical and graphical information gathered during the audit
Monitoring and trending	► Automate the ongoing monitoring of the control environment to a sustainable effort through timely exception notification and review ► Analyze trends in the company's risk profile and identify opportunities for improvement

Example analytics audit targets and the potential benefits

#	Audit Area per Internal Audit Plan	Improve Audit Efficiency	Enhance Financial Integrity	Promote Governance, Risk and Compliance	Contribute to Operational Excellence	Improve Cash Flows
1	Purchase to Pay					
2	Order to Cash					
3	Treasury					
4	Inventory Management					
5	Payroll and Benefits					
6	Fixed Assets					
7	Financial Close					

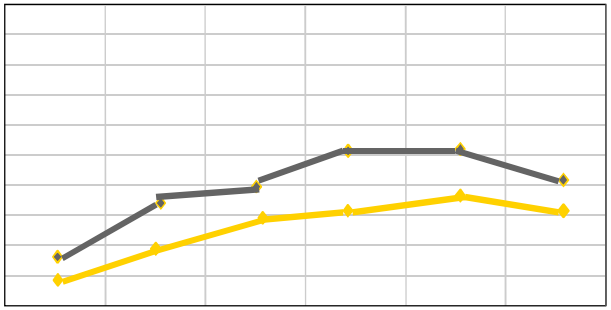
 Higher Potential

 Moderate Potential

 Low Potential

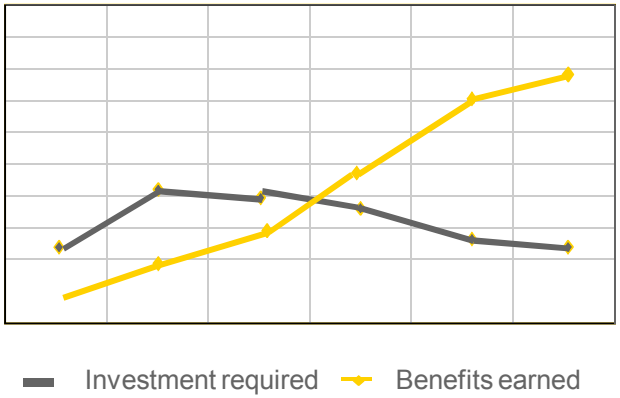
Analytics provide higher long-term benefits

Traditional method



- Typically Labor-intensive manual collection / evaluation
- Limited samples / relatively infrequent tests
- Narrow time period / stressful remediation
- Test procedures are limited in scope
- Capability / benefit tends to lessen with complexity and as the organization evolves

Data analytics

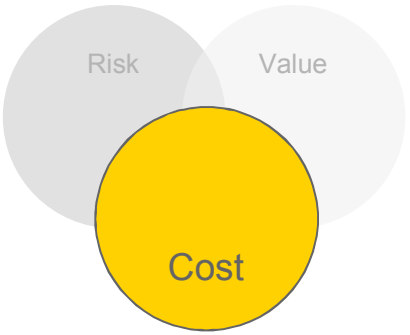


- Increased insight
- Typically automated collection / evaluation
- High sample sizes / decreased false positives
- Frees up resources to focus on other high-risk areas
- Frequent, faster and more accurate analysis
- Decrease in opportunity for human error
- Incremental and more extensive testing is practical
- Capability / benefit tends to increase with complexity and as the organization evolves

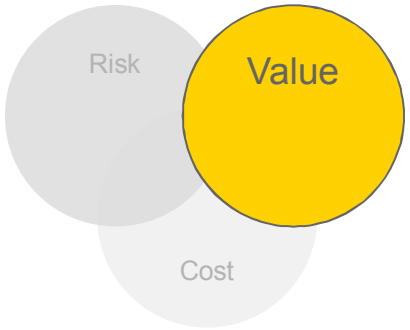
Relatively higher initial costs for analytics can yield significantly more long-term benefit.

Analytics enhance the overall Internal Audit value proposition

- Improved risk assessment
- Better deployment of resources to highest risk areas
- Test 100% of transactions for many controls
- Use of data analysis for sample selection in cases where testing 100% of transactions is not possible
- Expedite fraud detection and prevention procedures
- Initial steps in the implementation of a CCM process



- Reduced time spent on lower risk and less complex areas
- Reduced travel expenses
- Minimized disruption to the business during the execution of internal audit reviews
- After initial investment in the program, potential to reduce fees in subsequent years



- Ability to reallocate budget to more value added activities
- Leverage data analytics for internal and external benchmarking
- Quantification and root cause analysis of issues noted
- Ability to generate more relevant background information for audit reports
- Support audit objectives while gaining insight into business operations
- Shift the mentality of the IA team from compliance to business insight and strategy

Challenges in Integrating Data Analytics into Internal Audit

Integrating analytics into Internal Audit requires change

- Most internal audit functions have not materially changed over the past 10 to 15 years
- Risk assessment and audit planning processes have not evolved with the needs of the business
  - Traditional risk assessments focus on “risk factors” and “coverage”
    - Last time audited
    - Previous audit rating
    - Change in environment such as IT systems, staff, etc.
    - Revenue and assets
  - Critical areas are often omitted due to lack of competencies
    - Strategy
    - External and industry trends
    - Taxes
    - Treasury (derivatives and hedging)
    - Complex accounting
- Internal audit functions looking to provide increased benefits within their organizations should:
  - Make the initiation and management of change a core competency
  - Better leverage analytics across the engagement activities
  - Focus on higher-risk areas; employ more efficient resource deployment models
  - Leverage a consistent ROA model (return on auditors)

For more IA functions, mastering change will be the first step.

Key barriers to integrating data analytics into Internal Audit

It is essential that every analytics program is designed, planned and staffed to overcome the following barriers from the start.

- Difficulty scoping and developing procedures – Do we have the right people? How do we begin?
- Inefficient data collection process – Are we getting the right data in an efficient and timely manner?
- Difficulty interpreting and filtering findings – What is our data telling us?
- Unclear return on investment – Did the data analytics program yield the expected benefits?

Examples / Case Studies

Case Study #1

Payroll - Fraud detection case study

Audit Scenario

- A major life insurer suspected fraudulent payroll activity. Insurer wanted to assess the payroll information to identify suspicious activity and develop process measures which could be used on a periodic basis as input to business and audit management reports and dashboards.
- The objective was to develop payroll and employee master data analytics initially analyzing the prior two years. Then, implement a periodic retest and reporting process for the following:
  - Employee identification number of deceased individuals
  - Employees missing key data points (address, ID, etc.)
  - Stratification of payments to employees after termination
  - Employees paid not on the EMP master file
  - Employees with no or minimal deductions
  - Employees hired on irregular days (weekends and holidays)

Results

- Reduced potential exposure to fraud risk
- Reduced erroneous payments and increased cash recovery
  - Identified bonus payments incorrectly made to terminated employees
  - Eliminated duplicate employees resulting in US$100,000 of payroll over-payments
- Identified process improvement opportunities to reduce fraudulent entries (i.e., ghost employees, payments to terminated employees, etc.)
- Increased management confidence and control through the development of ongoing monitoring reports and management dashboards, including suspicious activities

Case Study #2

Accounts Payable - Process insights case study

Audit Scenario

- Ernst & Young was requested to provide internal audit assistance in providing data analysis testing procedures to facilitate purchasing audits at 15 “in-scope” business units and a centralized accounts payable audit for a $7B medical diagnostics company.
- The objectives of the data analysis testing procedures were to expand the audit coverage by testing full populations and to reduce audit costs by automating manual efforts and reducing the time required in the field. In addition, the procedures aggregate findings in a single view to identify opportunities to enhance the process.

Results

- **Pricing consistency** – Identified an opportunity to save $3.4M if prices per product were consistent across all business units.
- **Missed discounts** – Identified over 5k invoices with 10-day or 15-day discount terms that had been paid after the discount period, resulting in $1.3M in lost savings.
- **Payments issued to employees set up as vendors** – Identified 346 payments that had been issued to vendors with addresses matching an employee’s.
- **Requisitions created and approved by same person** – There were 5 requisitions created and approved by the same person totaling $114K of unauthorized spend.
- As a result of the findings, analytical testing now occurs on a periodic basis for both coverage and audit planning purposes

Case Study #3

Procurement Card – Process insights case study

Audit Scenario

- Internal Audit was required to conduct a Procurement card audit at a $2BN packaging and consumer products company
- The objectives of the audit were to identify process and control weaknesses within the P-Card process, identify cash recovery opportunities, and provide insight into major trends and classifications of spending.

Results

- **Out of policy/Questionable use** – Identified 1000+ 'high risk/out of policy' P-Card transactions with a total value exceeding $500K. Analyzed transaction patterns to isolate 'high risk' spending to a filtered population of 20 cardholders.
- **Transactions after termination** – Identified 3,353 transactions totaling $3.6M made by terminated cardholders.
- **Opportunity for improvement in policy compliance/prevention** of high risk transactions and creation of a set of KPIs to monitor the efficiency of the P-Card process on an ongoing basis.

Case Study #4

Travel and Expense – Process insights case study

Audit Scenario

- Internal Audit was required to conduct a Travel and Expense audit at one business segment.
- Traditional Approach - statistical or judgmental sample of 25 individual. Evaluate compliance with company travel policy, adequate authorization for travel and reasonableness of expenses
- Analytical Approach **-** Analyze the T&E submission of all 60,000 employees for a 12-month period, Benchmark results against available industry T&E data, Re-performance audit after 6 months to evaluate impact of audit remediation

Results

- ***Impact of not using preferred Travel Partners*** - $2.3M
  - $2M in higher per night Hotel costs – 50% employees using hotels outside the network
  - $185K in rental car costs
  - Lost $125K in Earned Value Discounts.
- ***Use of Online Booking Tool*** - Used by 10% of employees, If increased to 50%, could save the company $2.5M

Case Study #5

Unstructured data analysis case study

Audit Scenario

- A global oil and gas company had large volumes of unstructured data (sales presentations, contracts, competitive advantage material etc) stored on a shared drive. Client was concerned about "what" high-risk data was on the drive, "when" the data was created, and "who" had access to the data
- The objective was to perform a business risk assessment to determine what high risk business units use the shared drive and identify the types of high-risk documents stored there. High-risk documents and access controls were analyzed to determine the "who", "what" and "when" around the data to gain a deeper understanding of the chain of communication.

Results

- Identified areas of high-risk information within this shared drive that did not have the appropriate level of controls to protect the sensitive information and other inefficiencies.
  - Storage inefficiency- 20% of documents were duplicates (1/2 Word or Excel)
  - Unauthorized applications - 36% of the space taken
  - Records retention - Documents outside retention policy
  - Privacy - Credit card, SS#, bank account information
  - Intellectual property - 25% key word hits on "sensitive" terms

Other example Internal Audit data analytics

Access monitoring analytics

- Segregation of duties assessment
- Key configuration changes

Financial statement computer assisted audit techniques

- Journal entry analytics
- Accounts receivable analytics

Contract audit analytics

- Royalty payment recalculations (incorrect sales figures, royalty rates)
- Invoicing inaccuracies (overpayments, duplicate transactions)

Other example Internal Audit data analytics (cont.)

Payment stream analytics (AP, T&E, Procurement Cards)

- Duplicate payments
- Data irregularities and unusual transactions
- Purchasing control violations (split PO's, expenditures above policy limits)

Master file analytics (Vendor, Customer, Employee)

- Missing or unusual information
- Duplicate records
- Conflicts of interest

Unstructured data analytics (i.e., email and text based files)

- Recurring content themes and relationship communication patterns
- Contextually valid references to key words or phrases

Tools Of The Trade

Selected typical analytic tools

- **ACL –** Audit Command Language
- **MS Access / MS Excel**
- **MS SQL Server**
- **IDEA**
- **Tableau –** Visual analysis and reporting solution
- **Monarch –** Data acquisition tool
- **Informatica –** Data conversion tool
- **Trillium –** Data quality / profiling tool
- **Cognos –** Business intelligence software

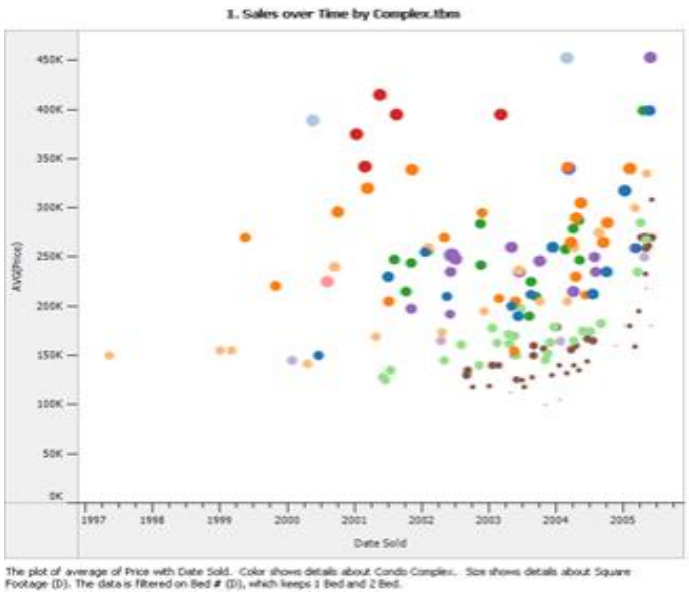
Ernst & Young does not endorse any of these vendors or products listed above.

Data visualization analysis

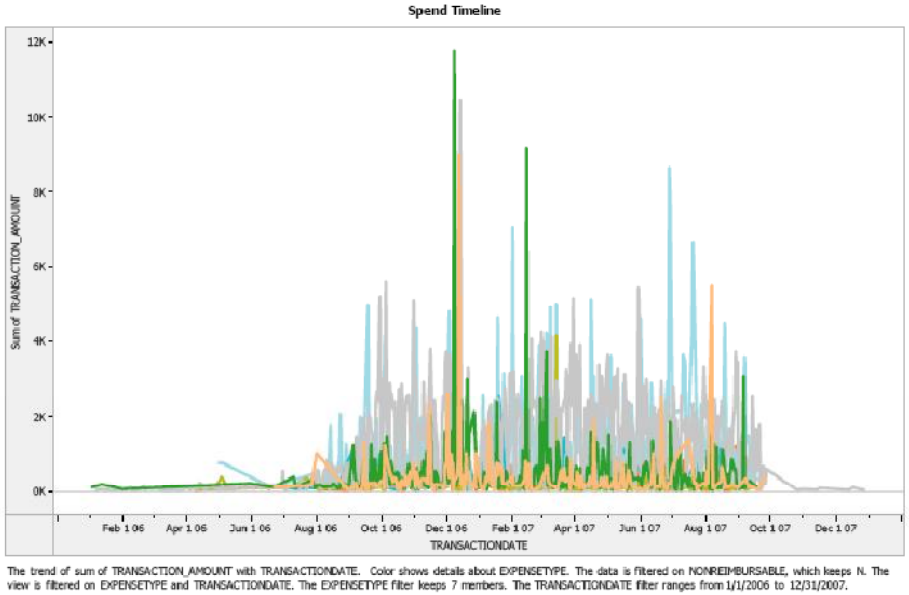
Tableau

Tableau is a visual analysis and reporting solution that allows the exploration and analysis of databases and spreadsheets with simple drag-and-drop operations.

Broader than just depiction, data visualization methods and tools provide the means to better understand the data and to derive insights in an intuitive manner by using visual cues to explore and understand complex information.



The plot of average of Price with Date Sold. Color shows details about Condo Complex. Size shows details about Square Footage (D). The data is filtered on Bed # (D), which keeps 1 Bed and 2 Bed.



The trend of sum of TRANSACTION_AMOUNT with TRANSACTIONDATE. Color shows details about EXPENSETYPE. The data is filtered on NONREIMBURSABLE, which keeps N. The view is filtered on EXPENSETYPE and TRANSACTIONDATE. The EXPENSETYPE filter keeps 7 members. The TRANSACTIONDATE filter ranges from 1/1/2006 to 12/31/2007.

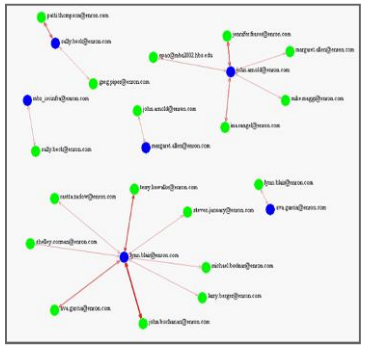
Capabilities

- See and understand
- Pivot and refine
- Search and extract
- Browse and explore
- Query and summarize
- Publish and present

Text / unstructured data analysis

GEFrey, McAfee

WHO

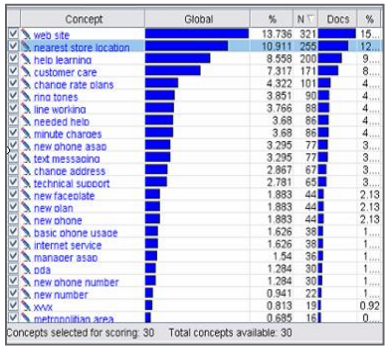


Social Networking

"Who is talking to whom?…

- Access Controls
- People-to-people analysis
- Entity-to-entity analysis
- Map communication lines to organization chart

WHAT

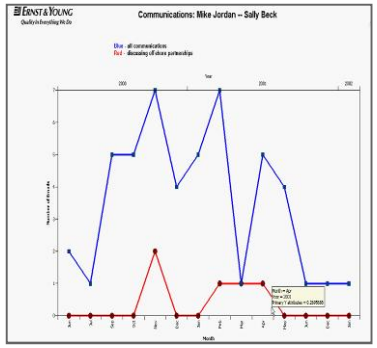


Concept Clustering and Frequency

…about what?…

- Top words mentioned
- Sensitive code words
- Key noun concepts
- Top or unusual dollar amounts
- Social Security numbers in data
- Credit card numbers in data

WHEN

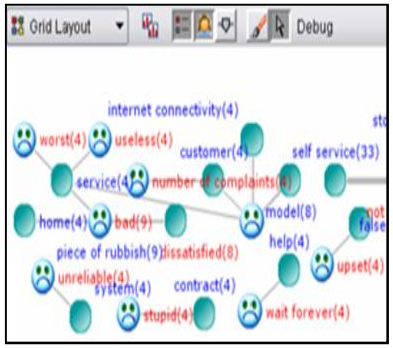


Communication Volume Over Time

…over which time period?…

- When are key communications occurring
- Communication spikes around key business events

WHY



Sentiment Analysis for Person and Concept

…how do they feel?"

- Positive vs. negative sentiment
- Top 10 negative journal entry comments and why
- Top 10 most angry emails and why
- Top 10 most concerned emails and why
- Customer survey comment analysis
- Employee survey comment analysis

Text / unstructured data analysis (cont.)

Example geographic view

Thank you!

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