Data Analytics at Xerox: A journey from idea to reality

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Mike Bowen, Audit Analytics CoE
Xerox Internal Audit Bios

Ken Metz – Chief Audit Executive
• CAE for Xerox since July 1, 2014
• 23 years experience including 3 years at Xerox
• Previous roles include Bausch & Lomb CAE and Asia Regional Controller; PricewaterhouseCoopers Senior Manager
• Certified Public Accountant (CPA), Certified Global Management Accountant (CGMA)
• BS Accounting & Finance from Clarkson University
• Based in Rochester, NY

Michael Bowen – Senior Manager, Audit CoE
• Over 22 years of IT experience at Xerox
• Previous Xerox roles include: Former leader of Business Intelligence & Analytics within the Global Customer Services Delivery Group and former leader of establishing Xerox’s machine connectivity technology
• Joined XIA in March 2016 and established Analytics CoE
• MBA in Information Management & Marketing and BS in Finance from State University of New York at Buffalo (UB)
• Based in Rochester, NY
Why Use Data Analytics?
Analytics helps organizations adapt to the shifting internal audit (IA) landscape

**Traditional IA**
- Typically labor intensive
- Limited samples
- Narrow time period or stressful remediation
- Test procedures are limited in scope
- Capabilities and benefits tend to lessen as internal audit needs become more complex

**Shifting IA landscape**
- There is greater emphasis on risk management, fraud prevention and corporate governance.
- Stakeholders are placing a greater emphasis on how IA can play a role in evaluating and mitigating risk.
- The role of IA is shifting from an independent assurance function to that of a real-time management advisor.
- Companies are moving toward using the IA function for comprehensive, top-down enterprise risk assessments.
- IA will need more effective resources, capabilities and expertise to contribute to the risk management needs of their organizations.

**IA leveraging analytics**
- Test 100% of transactions for many controls
- Use of data analysis for sample selection in cases where testing 100% of transactions is not possible
- Increased insights and root cause analyses
- Frees up resources (up to 20%) to focus on audits and insights not data collection
- Faster, automated data collection and evaluation
- Reduced travel expenses

**Investments in analytics can mitigate risk, reduce cost and add value to the business.**
A range of analytics techniques can be used, depending upon the questions to be answered.

### Questions driving analysis

- **What is the best outcome?**
- **What will happen next?**
- **What if those trends continue?**
- **Why is this happening?**
- **What actions are needed?**
- **Where exactly is the problem?**
- **How many, how often, where?**
- **What happened?**

### Techniques used

- **Standard Reports**
- **Ad hoc Reports**
- **Queries/Drill Downs**
- **Alerts**
- **Statistical Analysis**
- **Forecasting/extrapolation**
- **Predictive Modeling**
- **Prescriptive Analytics**
- **Predictive Analytics**
- **Descriptive Analytics**
- **Traditional Reporting and Analysis**

### Analytics maturity

- **Value**
- **Optimization**

### Analysis types

- **Descriptive Analytics**
  - Mining past data to report, visualize, and better understand WHAT has already happened; after the fact or in real-time.

- **Predictive Analytics**
  - Leverages past data to understand the relationships between data inputs and outputs to understand WHY something happened or to predict WHAT will happen in the future.

- **Prescriptive Analytics**
  - Determines WHICH decision or action will produce the most effective result against a specific set of objectives and constraints.
Analytics can be applied across the spectrum of internal audit processes

### Key activity examples

- **Risk assessment**
  - Risk identification
  - Review of material transactions
  - Significant account activity analysis
  - Segregation of duties
  - Embed analytics in existing client risk assessment process

- **Audit planning**
  - Specific risk identification
  - Develop audit plan
  - Research current available data & information
  - Coordinate lead time to execute

- **Audit execution**
  - Audit scoping
  - Process analytics
  - P2P, OTC, FSCP, Inventory, Fixed Assets, HR, T&E
  - Analytic testing of other significant processes
  - Customize data requests

- **Audit reporting**
  - Create visualizations (i.e., dashboards, scorecard)
  - Interpretation of results
  - “Special projects”

- **BU action plan**
  - KPI monitoring
  - KRI monitoring
  - Continuous auditing
  - Continuous monitoring

- **Monitoring**
  - Risk ranking
  - Visibility into highest risks
  - Identification of unknown risks
  - Identification of audits to incorporate analytics

### Key outputs

- **Typical initial focus**
  - Analytic test execution
  - Full population testing
  - Business insight
  - Identification of process defects

- **Leading practice**
  - Action plan recommendations
  - Repeatable analytics
  - Thresholds
  - Risk appetite

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**Typical secondary areas of focus**
How Did Xerox IA Really Start Using Data Analytics?
Step 1: Assess current state

- 2H 2014 - Analyzed team using Corporate Executive Board “25 Attributes of a World Class Audit Function” tool

- Identified key areas for improvement including the following linked to Data Analytics:
  - continuous monitoring,
  - fraud management, and
  - team’s ability to access and use key financial systems.
Step 2: Develop a plan

- Created a multiyear strategic plan to guide department to best in class. Refined plan each year.
  - 2014 – Cross train the organization
  - 2015 - Improved data analytics in multiple areas
  - 2016 - Establish Analytics Center of Enablement
  - 2017 - Analytics Center of Enablement is source for Company insights
  - 2018 - Analytics Center of Enablement is a profit center for company
  - 2018 - Executing continuous auditing approach
Step 3: Execution

• 1H 2015 – Internal Approach  
  – Team: Used internal team to enact change  
  – Tools: used low cost tools – Excel & Incisive  
  – Cost: Minimal  
  – Results: Minimal change in past practices  

• 2H 2015 - EY Approach  
  – Team: Partnered with EY (David Klur & Damaris Fynn)  
  – Tools: EY used SQL, Access and Tableau. XIA: Excel Power view  
  – Cost: Moderate to High  
  – Results: Created Risk Assessment tool, cash disbursement project, & T&E project
Step 3: Execution, Refine, Execution, …

- 1H 2016 – Dedicated Internal Resources
  - Team: Hired a dedicated Senior Manager of Data Analytics who partnered with IT group and EY experts
  - Tools: Invested in Tableau
  - Cost: Moderate
  - Results: Big change in capabilities and value delivered

Launched Analytics COE
What is the Long Term Vision?
Vision for Analytics COE

• 2018 - Analytics Center of Enablement is a profit center for company
  – Working in partnership with business and IT to identify projects
  – Running multiple projects led by internal audit that identify significant measurable value (profit improvement, cost reductions, fraud prevention, loss prevention, early warnings, etc.)
  – IA analytical tools are developed and given to business to use in the future

• 2018 - Executing continuous auditing approach
  – Business is running analytical tools developed by COE
  – IA is running Tools to audit continuously
  – Catching issues as close to real time as possible
Establishing an Analytics CoE
Xerox Internal Audit’s Roadmap
What Are Analytics?

Wikipedia:
Analytics is the discovery, interpretation, and communication of meaningful patterns in data. Analytics often favors data visualization to communicate insight.

Forrester:
Forrester defines the business intelligence (BI) market as a set of methodologies, processes, architectures, and technologies that leverage the output of information management processes for analysis, reporting, performance management, and information delivery.

Gartner:
Business analytics is comprised of solutions used to build analysis models and simulations to create scenarios, understand realities and predict future states. Business analytics includes data mining, predictive analytics, applied analytics and statistics, and is delivered as an application suitable for a business user.
What is a Center of Excellence Enablement?

Wikipedia:
A center of excellence (CoE) is a team, a shared facility or an entity that provides leadership, best practices, research, support and/or training for a focus area.

Forrester Research:
A formally appointed and documented body of knowledge and experience on a particular subject area with the goals of providing expertise, managing governance practices, and supporting projects associated with the subject area.

The Analytics CoE brings together people, process, and technology to support Internal audit processes with analytics.

A CoE doesn’t build dashboards, it enables!
A Few More Terms…

**Continuous Auditing:**
Continuous audits are usually technology-driven and designed to automate error checking and data verification in real time. A continuous audit driven system generates alarm triggers that provide advance notice about anomalies and errors detected by the system.
(Source: Investopedia)

**Data Warehouse:**
A large store of data accumulated from a wide range of sources within a company and used to guide management decisions.

**System of Record (SOR):**
An information storage system that is the authoritative data source for a given data element or piece of information.
(Source: Wikipedia)

**Sandbox:**
a virtual space in which new or untested software can be run securely. (Source: Google)

**ETL:**
ETL is short for extract, transform, load, three database functions that are combined into one tool to pull data out of one database and place it into another database. (Source: Webopedia)
CoE Concept

**Business Processes**
- Controls definitions
- Process re-engineering
- Analytics Resource Center
- Fraud, Waste, & Abuse Detection

**IT Platform**
- Integration with databases including: Accounts Receivable, Account Revenue System, Financial Reporting, Customer Service, & Tax
- Platform Technology: Tableau, Oracle, Microsoft SharePoint

**Audit Analytics**
- Fraud, Waste, & Abuse Detection

**Analytics Audits**
- Payroll
- Time and Expense
- Cash Disbursements
- Risk Assessment

*The CoE brings together audit process with business analytical needs, leveraging existing Xerox platform technologies*
Begin with a Charter!

Clarify objectives and establish boundaries early, before forming the team.

**Elements:**
- Executive Sponsor
- Mission / Goals
- Scope
- Costs & Benefits
- Team – Who’s on the bus?
- Stakeholders
- Approach
- Schedule
- Risks & Constraints

**Key:** Executive sponsor and stakeholders must sign-off **before starting** CoE work!
Build Your Team

Get the right people on the bus!

Skills Required
• Data & SQL
• Visualization
• Project Management

Recruiting
• Lead Time: Analysts are hard to find!
• Hire experience vs. grow
• “Intellectual Curiosity” and Tinkerers

Training
• Viz tool (eg. Tableau)
• Governance

Partnerships -- Get HELP!
• Internal IT departments
• External expertise (eg. Ernst & Young)

“Get the right people on the bus, the wrong people off the bus, and the right people in the right seats.”
- Jim Collins, Good to Great
## Current State Audit Process

<table>
<thead>
<tr>
<th>Pre-Audit Prep</th>
<th>Fieldwork</th>
<th>Audit Report Development &amp; Issuance</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Appropriately scoped</td>
<td>a. Effective execution</td>
<td>a. Create issue summaries as issues are identified</td>
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<tr>
<td>b. Clearly communicated to stakeholders</td>
<td>b. Lead an effective opening meeting – discuss scope and objectives and establish project protocols</td>
<td>b. Communicate issues to management immediately</td>
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<tr>
<td>c. Skill and resource levels appropriate</td>
<td>c. Arrange for an onsite introduction/tour</td>
<td>c. Validate issues</td>
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<tr>
<td>d. Create a project timeline</td>
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<tr>
<td></td>
<td></td>
<td>a. Summarize findings and recommendations</td>
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<tr>
<td></td>
<td></td>
<td>b. Draft report</td>
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<tr>
<td></td>
<td>6. Conduct Closing Meeting &amp; Issue Final Report</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Communicate key issues and findings</td>
</tr>
<tr>
<td></td>
<td>7. Quality Assurance, Metrics, &amp; Archiving</td>
<td>b. Determine action steps</td>
</tr>
<tr>
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<tr>
<td></td>
<td></td>
<td>a. Self-Review</td>
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<td>b. Senior Review</td>
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<tr>
<td></td>
<td></td>
<td>c. Manager/Oversight Review</td>
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<tr>
<td></td>
<td></td>
<td>d. Senior Manager and CAE Quality Assurance</td>
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<tr>
<td></td>
<td></td>
<td>e. Annual Internal Assessment</td>
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<tr>
<td></td>
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<td>f. External Assessments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>g. Destroy unnecessary documentation</td>
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<tr>
<td></td>
<td></td>
<td>h. Evaluate performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>i. Archive workpapers</td>
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<tr>
<td></td>
<td></td>
<td>j. Audit Observation follow-up</td>
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</tbody>
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### Key Documents
- Scope and Approach
- Audit Program
- Audit Workpapers
- XIA Internal Audit Checklist
- Internal Audit Report
- Internal Management Memo

See Xerox IA Methodology (Internal Audit Manual) for further explanation

Current state process has limited analytics engagement.
**Desired State Audit Process**

**Key Success Factor:** Early engagement of analytics. Analytics CoE engaged *as soon as possible* in the process!
### Analytics Business Model

<table>
<thead>
<tr>
<th>One Time Audit</th>
<th>Development</th>
<th>Production</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Term Strategic</strong></td>
<td>Oracle “Sandbox”</td>
<td>Oracle Production</td>
<td>Tableau</td>
</tr>
<tr>
<td>XIA CoE</td>
<td>Oracle “Sandbox”</td>
<td>None</td>
<td>Tableau</td>
</tr>
<tr>
<td>Quick Analysis</td>
<td>Laptop</td>
<td>None</td>
<td>Excel or Tableau</td>
</tr>
<tr>
<td>External Led</td>
<td>Local Database (Microsoft)</td>
<td>None</td>
<td>Tableau</td>
</tr>
</tbody>
</table>

**Flexibility:**
Support full spectrum of audits from single audit to continuous monitoring.
Centralization & Access

**Elements:**
- Central data repository
- Data playground or “sandbox”
- Analytics & Visualization tools (eg. Tableau Server)
- Auto-updates wherever possible
- Valuable “sandbox” results moved to central database for future use

Managing Complexity:
Back office data exists in hundreds of databases and multiple database technologies used over 40 years, and also in online repositories.
Why Tableau?

- Excellent visualization tool - in a class by itself
- Allows quick understanding of complex data sets
- Can leverage MS Excel PowerPivot results
- Integrates with SharePoint
- Tableau Server allows publication via web URL in minutes
- Mobile access to output.
- Intuitive

The “tool” is the 3’ putt. Needs determination is the 300-yard drive, and the data collection and organizing are the irons game!

Source: 2016 Gartner Group Magic Quadrant for Business Intelligence & Analytics Platforms
Start Small

Small teams of enthusiastic people
• “I want to make a difference!”
• “I wonder…”

Small Projects
• Single geography
• Small # of products or teams
• Grow via incremental bolt-ons
• Skunkworks

Rapidly Test & Iterate
• Improve algorithms
• Evolve visualizations

“A journey of a thousand miles must begin with a single step.”
- Lao Tzu
Continuous Monitoring

Concept is Not New!
• Identify results as close to time of occurrence
• Immediate corrective actions
• Faster cycle time to benefits

Enabling Factors
• Cheap hardware
• Massive data collection and availability
• High speed computation
• Availability of real-time data updates
• New analytical tools & alerts

Business Process Re-engineering
• Most critical aspect of continuous monitoring!
• How does the monitoring get inserted to the process?

IT Partnership
• Every continuous monitoring audit is an IT project
• Requirements, design, build, test, deploy
• 3 months to chase down the right data
• Privacy and data security laws & policies

“It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change.”
- Charles Darwin
Grow a Culture of Analytics

Blogs
• Marketing – Broad high-level communications
• “Did you know that…?”

White Papers
• Share procedures, specific solutions, tech discussions

Demonstrate Progress
• Stakeholder reviews
• Weekly CoE reviews

Forums
• Place to share ideas
• Official place to go to ask questions & get help
• Tableau provides monthly topic discussions for FREE

Central Repository
• Provide people a web page to find you
• Store for all CoE communications
• SharePoint

This is not an IT data architecture exercise. This is a business partnering and value-added exercise!

“Tools of Disruption!”
Measure Results

Track Everything!
Count of analytics delivered
Usage
Benefits
Cost vs. Benefit
Soft Benefits (Type II)
Before vs. After – What changed?
Statistics

“If you can't describe what you are doing as a process, you don't know what you're doing.”
- W. Edwards Deming
Audit Reporting

4. **Align policy guidelines and thresholds to T&E platform**

   Employees and their managers to have a strong understanding of the policy guidelines to ensure that expenses are handled properly. This puts pressure on approval controls.

   Management should assess capabilities to ensure the expense submission process is aligned to policy requirements. Management should also provide periodic training to employees and managers to ensure adequate knowledge.

**Agreed Management Action:**

The Operations Manager will engage with the project team to assess if Concur can be aligned to a greater extent.

Management will assess the practicality of providing periodic training to employees and managers to ensure adequate knowledge.

<table>
<thead>
<tr>
<th>Risk:</th>
<th>Lack of alignment between policy guidelines and expense processing may result in out of policy expenses being approved by managers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating:</td>
<td>Moderate</td>
</tr>
<tr>
<td>Responsibility:</td>
<td>Jane Doe, Manager</td>
</tr>
<tr>
<td>Target Date:</td>
<td>January 2017</td>
</tr>
<tr>
<td>ICFR Impact:</td>
<td>No</td>
</tr>
</tbody>
</table>

Traditional audit reports focused on the issues and recommendations with little space for analytics.

- Analytics were small and hard to read.
- Analytics did not tie easily to audit recommendations.
- Supporting analytics would often remain in spreadsheets, buried in work papers.
New templates allow for easier inclusion of analytics within audit reports to drive observations and recommendations.
Challenges

Data
- Many silos
- Different eras
- Subject matter experts
- Where to find data?

Culture
- “Cottage Industry” of solutions
- 25 years of MS Excel & Access
- Waterfall vs. agile
- What analytics?
- How to use insights?

Resources
- Funding
- Personnel
- Skills – Statistics, data, IT

Governance & Prioritization
- IT & Business org priorities
- Managing data growth and changes over time

“Not everything that can be counted counts, and not everything that counts can be counted.”
- Albert Einstein

Analytics will never tell you everything you want to know!
Keys for Success

Executive sponsor

Funding – embed in budget

Perseverance

Analytics expert on IA team

Linkage of analytics with finance / audit experts
Demo: Tableau

Perform a real-time analysis for our audit.

Recent T&E Audit

Perform 3 Tests
1. Expense reports submitted within 30 days
2. Corporate card not used for expense (when it should have been)
3. Receipts submitted for required expenses

Data privacy and security Disclaimer:
• Data is scrubbed to remove context
• Views will be scrubbed to remove context

During the audit, these analytics took as little time to create as they will now!

Key: Data needs to be available and organized!
Any Questions?