Internal Audit Innovation – Analytics, Automated Testing Tools & Continuous Auditing

IIA Dallas Chapter - October 27, 2017
Agenda – Internal Audit Innovation

1. Audit Innovation
   i. Computer Assisted Auditing Tools and Techniques (CAATTs)
   ii. Automated Testing Solutions
   iii. Continuous Auditing

2. Robotics Deep Dive

3. Art of the Possible

4. Close
Learning Objectives

Attendees will learn:

1. How to add value to their organization through audit innovation
2. Practical examples of how innovative auditing techniques are being used today
3. Ideas for future advancements in audit innovation
1. Audit Innovation
Computer Assisted Auditing Tools and Techniques (CAATTs) transformed audits by testing complete populations, providing enhanced audit assurance and opening up new testing techniques – AML Scenario Testing Example

<table>
<thead>
<tr>
<th>CAATTs</th>
<th>Impact</th>
<th>Recognized Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 INDEPENDENT assurance of scenarios</td>
<td></td>
<td>✓ Penetration across the audit universe</td>
</tr>
<tr>
<td>2 Reperformed entire scenario BEGINNING to END</td>
<td>Traditional • 40 Sample Customers Tested • 40 Hrs Time per Samples • 1 Year Total Testing Effort (10 years for full population)</td>
<td>✓ Greater assurance provided through testing of large populations</td>
</tr>
<tr>
<td>3 100% of the population</td>
<td>Analytics • 199,865 Records Tested • 36ms Time per Record • 2 Hours Total Testing Effort</td>
<td>✓ Create repeatable, fact based findings</td>
</tr>
<tr>
<td>4 Reconciled alerts to monitoring system and identified EXCEPTIONS</td>
<td></td>
<td>✓ Provided analytics training to auditors</td>
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<tr>
<td></td>
<td></td>
<td>✓ Implemented a quality review of analytics developed</td>
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Automated Testing Solutions

Audit Innovation Solutions allow for an expanded analytics footprint and utilization of enhanced testing procedures

### Automated Testing Solutions
- **Audit Innovation**
  - Bespoke analytics developed for an audit
- **Automated Testing Solutions**
  - Packaged analytics with defined inputs, queries, and deliverables
- **Digital Auditing**
  - Web based solution execution which enables global on-demand testing

### Entitlement Testing – Illustrative Example
- **Traditional**
  - 100’s of individual data requests
  - 5-10 Days on data approval & access
  - 10 Days to examine selected entitlements
  - 1-2 Entitlement tests
  - Manual testing limited in scope
- **Analytics**
  - 1 time data feed (weekly)
  - 0 min spent on data acquisition
  - Instant analytics execution
  - 19 standard tests
  - 100% of population

### Recognized Benefits
- Consistent use of control tests
- Greater assurance provided through testing of large populations
- Self-Service and on-demand testing
- Platform allows for centralized inventory of solutions

Self-Service Solutions available on the Web

Off-Line Solutions

Full suite of Solutions available spanning the different lines of business
# Continuous Auditing

Continuous Auditing provides increased audit assurance through the recurring and frequent testing of selected key controls between audit cycles, increasing audit coverage through the testing of large transaction populations.

## Use of Analytics Solutions
- Consistency in control testing across IA
- Efficiencies through the use of repeatable control tests

## Policy
- Guidance incorporated from regulator publications
- Updated the audit methodology and operational procedures

## Implementation
- Converted a set of control tests previously performed during Business Monitoring to Continuous Auditing
- Audit teams continue to identify testing opportunities specific to their business needs across each business/function/geography

## Illustrative Example

<table>
<thead>
<tr>
<th>Traditional</th>
<th>Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Samples Tested</td>
<td>41 Million Records tested</td>
</tr>
<tr>
<td>60 Min Time per Record (4,680 years for full population)</td>
<td>15 ms Time per Record</td>
</tr>
<tr>
<td>Cycled audit frequency</td>
<td>Monthly testing</td>
</tr>
<tr>
<td>0 Exceptions Identified</td>
<td>20 Exceptions Identified</td>
</tr>
</tbody>
</table>

## Recognized Benefits
- Testing of key controls between audit cycles
- Leverage audit automation (e.g., analytics solutions, robotics) to provide testing consistency and efficiency
- Greater assurance provided through testing of large populations
- Embedded Continuous Auditing in IA Methodology
- Multi-year commitment to establish a sustainable Continuous Auditing process
2. Robotics Deep Dive
Overview of Robotic Process Automation (RPA)

1. Programmable device that can perform tasks and interact with its environment, without the aid of human interaction.

2. Implementation without altering existing tech infrastructure.

3. Alternative for outsourcing.

Types:
- Automation
- Machine Learning
- Cognitive / AI

Attributes:
- Linear task
- Orchestration of activities
- Non-standard
- Contextual
- Inference
- Predictive
- Self Learning
- Self Healing

Scripting of scripts:
- Understand different process
- Convert images to text
- Understand and learns
- Predicts future behaviors

Process Dynamic:
- Understand different process
- Convert images to text
- Understand and learns
- Predicts future behaviors

Systems Self Aware:
- Virtual Assistants
- Auto Feedback

Implement. approach:
- Read email
- Copy paste
- Enter data
- Send confirmation
- Understand different process
- Convert images to text
- Understand and learns
- Predicts future behaviors

Vendor:
- Automation Anywhere
- blueprism
- WorkFusion
- UiPath
- IVsoft
- IBM Watson

#DrivePositiveChange
Value for Internal Audit

Save time by automating repetitive, mundane tasks

Focus on more value-added activities

Reduce error rates

Spend more time on stakeholder engagement

Provide enhanced assurance
Criteria for RPA

Ask yourself the following questions:

1. Do team members frequently copy information from one system to another system or to templates?
2. Do you obtain data from multiple source systems?
3. Do you spend a lot of time in performing simple, repetitive steps?
4. Can objective rules be applied to the steps in your process?
5. Are calculations involved in your process?
6. Are the same updates required in multiple systems?
7. Are you generating multiple similar reports manually?

If the answers to these questions are YES, then your process is a good candidate for RPA.
As part of the Branch Network audit testing the auditors need to test specific controls around the account opening process which varies dependent on the type of account. As the new account listings by branch and account type are not accessible via the data warehouse the team currently access a manual reporting tool to identify this information. The report is pulled by day by branch for each banker. By performing this data pull with robotics not only is there an efficiency in time, but complete scope periods can be pulled to test complete populations.

**Use Case Key Outcomes**

<table>
<thead>
<tr>
<th>Human</th>
<th>Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditor define and generates population via manual reporting and pastes into MS Excel.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Automated Processing</th>
<th>Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot differentiates account types focusing on specific populations based on supervised rules.</td>
<td></td>
</tr>
<tr>
<td>Robot decides which branches to pull from web results.</td>
<td></td>
</tr>
<tr>
<td>Searches for account details on website reports and web scrapes.</td>
<td></td>
</tr>
<tr>
<td>Returns results to template in MS Excel.</td>
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</tbody>
</table>

On average, Robots performed the task in 1 Minute compared to 15 Minutes (Task completed by Human).

Robots were 99% accurate, as Humans had a higher chance of copy/paste error.

Successful integration of RPA as a digital workforce across traditional applications.

If Bot is scaled creates significant efficiencies.

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3. The Art of the Possible
The Future

Through creating closer ties with academia and industry, promoting innovation, and employing new technology, Internal Audit can thrive off of the strong foundation already created.
The Art of the Possible – Current Advanced Analytics

Generating new insights, greater assurance and disrupting traditional audit techniques

Benefits of Insight Driven Audits
- Enhanced Assurance
- Predictive Capabilities
- Increased Productivity

Audit of the Future
- Advanced Analytics
- Integrated Solutions
- Natural Language Processing
- Alerting & Insights
- Machine Learning
- Augmented Intelligence

#DrivePositiveChange
The Art of the Possible – Integrated Solutions

- Advanced Analytics
- Augmented Intelligence
- Machine Learning
- Natural Language Processing
- Alerting & Insights
- Integrated Solutions

Moving from siloed solutions and data to an integrated platform

Benefits of Integrated Solutions:
- Hidden Patterns
- Complex Knowledge Framework
- Identify Opportunities

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The Art of the Possible – Alerting & Insights

Audit of the Future

Advanced Analytics

Integrated Solutions

Alerting & Insights

Augmented Intelligence

Machine Learning

Natural Language Processing

Potential Capabilities

Knowledge at a moments notice at the auditor’s fingertips

Email & SMS Alerts

Signaling Outliers

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The Art of the Possible – Natural Language Processing

Potential Capabilities
- Information Extraction
- Sentiment Analysis
- Information Retrieval

Using thematic analysis to identify emerging risks

Audit of the Future

Advanced Analytics

Integrated Solutions

Alerting & Insights

Natural Language Processing

Machine Learning

Augmented Intelligence
The Art of the Possible – Machine Learning

Potential Capabilities
- Analysis of past and present data sources to make algorithmic predictions
- Capture Manual Work
- Historical Analysis
- Learning Capabilities

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Amplifies the Auditor’s subject matter expertise and the Stakeholder’s experience.

Potential Platforms:
- Google Analytics
- Studio
- MicroStrategy

#DrivePositiveChange
Citi Internal Audit’s culture of continuous improvement and investment in innovation helps us #DrivePositiveChange and strengthen our audit assurance. Here are some of the key drivers of success in Innovation:

i. **People** - We have the right people, with strong data analytics skills, in the right locations working together as “One IA” and “One Citi” to drive positive change across the organization.

ii. **Innovation** - Innovation is a key priority to further improve the efficiency and effectiveness of our assurance processes while enabling us to optimize the utilization of our resources.

iii. **Learning & Development** - We continue to invest in our people through industry qualifications, Audit Analytics Academy, and we contribute to industry-wide thought leadership through our participation at key events.

iv. **#DrivePositiveChange** - Sharing audit analytics with 1st and 2nd lines of defense positively impacts Citi’s control environment.