Continuous Auditing in Big Data Computing Environments: Towards an Integrated Audit Approach by Using CAATTs

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Agenda

• Introduction

• Theoretical Background

• Research Approach

• Results

• Discussion

• Conclusion & Outlook
Introduction

Impact of the Big Data paradigm on Financial Audit: The Big Data Computing Environment (BDCE)

- Accounting Transactions
- Accounting Processes
- Financial Statements
- Accounting Information Systems (AIS)
  - Control Environment
- Computer-Assisted Audit Tools and Techniques (CAATTs)
- Transaction Level
- Process Auditing
- True and Fair View?

Audit

Enterprise

Assessment

Certification
Introduction

Impact of the Big Data paradigm on Financial Audit: The Big Data Computing Environment (BDCE)

- **Volume**: Complexity and Risk
- **Financial Statements**
- **Veracity**: Completeness and Accuracy, data privacy and information security
- **Variety**: increasing complexity and complicate the ex post traceability of data source
- **Velocity**: Limitations of manual, annual audit with historic data
- **Computer-Assisted Audit Tools and Techniques (CAATTs)**
- **True and Fair View?**

- **Audit**
- **Accounting Transactions**
- **Accounting**
- **Process Auditing**
Impact of the Big Data paradigm on Financial Audit: The Big Data Computing Environment (BDCE)
The overall goal:
Realization of Continuous Auditing (CA)

Scope of this paper:
Analysis of established types of CAATTs in terms to their support of the IT auditor to conduct a proper examination of financial statements in a BDCE
Theoretical Background: CAATTs

Computer-Assisted Audit Tools and Techniques (CAATTS) are “tools and techniques used to examine directly the internal logic of an application as well as the tools and techniques used to draw indirectly inferences upon an application's logic by examining the data processed by the application” (Hall, 2010)

<table>
<thead>
<tr>
<th>Types of CAATTs</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Test Data (TD)</td>
<td>Fictitious, auditor-prepared data, which will be processed by the audited systems. The evaluation bases on a comparison between the results of the test data and the auditor’s expectations. The processing within the audited systems is a “black box”.</td>
</tr>
<tr>
<td>Integrated Test Facility (ITF)</td>
<td>Processing of Test Data in separated areas or modules within the audited system. The results of the internal system controls are visible for the auditor.</td>
</tr>
<tr>
<td>Parallel Simulation (PS)</td>
<td>Auditor-developed application, which is completely separated from the client’s systems. The results of processing real data are compared with the results of the client’s systems.</td>
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<tr>
<td>Embedded Audit Module, System Control and Audit Review Files (EAM/ SCARF)</td>
<td>Auditor-developed module which is implemented within a client’s system. EAM evaluates real data by predefined criteria while it is processed. Results of EAM evaluations can be written into a SCARF, which is send to the auditors for further examination</td>
</tr>
<tr>
<td>Generalized Audit Software (GAS)</td>
<td>Auditor-developed and self-contained applications, which evaluate extracted real data and analyze them, regarding predefined criteria.</td>
</tr>
<tr>
<td>Snapshot Method (tagging and tracing)</td>
<td>Selection and marking of accounting transactions and monitoring their processing within the AIS. After every step, a snapshot is created and analyzed.</td>
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</tbody>
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Typology of CAATTs (Braun & Davis, 2003; Rittenberg et al., 2009)
Research Approach


Diffusion |
---|---
Analysis |
Evaluation |
Design |

Requirements Analysis (Kiesow et al. 2014)
Conceptual Architecture (Scope of this Paper)

Iterative Research Approach (Österle et al., 2011)
Assessment: Applicability of CAATTs for the Dimensions of Big Data based on literature and own considerations

<table>
<thead>
<tr>
<th>Types of CAATTs</th>
<th>Dimensions of Big Data</th>
<th>Overall Applicability</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Velocity</td>
</tr>
<tr>
<td>Test Data</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ITF</td>
<td>○</td>
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<tr>
<td>PS</td>
<td>○</td>
<td>○</td>
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<tr>
<td>EAM, SCARF</td>
<td>●</td>
<td>●</td>
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<tr>
<td>GAS</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Snapshot Method</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Legend: ○ = low, ○ = medium, ● = high
The combination of Embedded Audit Modules (EAM), Test Data, General Audit Software (GAS) enables basically the adoption of Big Data.

Audit Cockpit enables permanent monitoring of the control environment.
**Discussion: Informed Argument**

**Assessment according to the Typology of Audit (Marten et al., 2007)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Risk-oriented Audit</td>
</tr>
<tr>
<td>2</td>
<td>Direct Audit</td>
</tr>
<tr>
<td>3</td>
<td>System Audit, Goal-oriented Audit</td>
</tr>
<tr>
<td>4</td>
<td>Transaction Audit</td>
</tr>
<tr>
<td>5</td>
<td>Basic Population Audit</td>
</tr>
<tr>
<td>6</td>
<td>Progressive Audit and Retrograde Audit</td>
</tr>
<tr>
<td>7</td>
<td>Formal Audit</td>
</tr>
<tr>
<td>8</td>
<td>Computer-assisted Audit</td>
</tr>
<tr>
<td>9.1</td>
<td>Continuous Audit</td>
</tr>
<tr>
<td>9.2</td>
<td>On-site Audit and Off-site Audit</td>
</tr>
<tr>
<td>9.3</td>
<td>Announced Audit and Unannounced Audit</td>
</tr>
</tbody>
</table>
Discussion: Limitations

- Technical realization of the approach requires the implementation of manifold interfaces
- Reorganization of the processes
- Controls and data flows have to be carved out and analyzed
- Approach is not able to cover manual controls
- Reduction of system performance
- Code modifications
- Long-term solution, strategic planning/management decisions
Conclusion

- The design of appropriate audit solutions for BDCE is of increasing importance
- Continuous Auditing (CA) gains in importance due to the evolution of (A)IS
- CA has to be realized by computer-assisted audit tools and techniques (CAATTs)
- The tools and techniques to handle and use Big Data are already in place
- Audit Solution can build on the combination of different techniques
- Realization and Implementation is a recognized technical challenge and related with high costs

Outlook

- Prototyping
- Stronger Evaluation (in practical environment)
- Organizational requirements, internal controls, IT framework (e.g. COSO, COBIT)
Thank you for your attention.

Questions and Comments?

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