Data Analysis, An Integrated Approach

ISACA Charlotte Chapter
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Agenda

1 - Intro, background, etc.
2 - Present day audit shop challenges
3 - Benefits of data analysis
4 - Data Analysis, An Integrated Approach
5 - Continuous Auditing, Continuous Monitoring
6 - Data Flows, a walk through
7 - A recent survey
WFAS- Consumer Lending DAS*/Tech Team

*DAS = Data Analysis Support
Consumer Lending DAS/Tech coverage

Lines Of Businesses we support

**Consumer Lending – Home Lending**
- Wells Fargo Home Mortgage
- Wells Fargo Home Equity

**Consumer Credit Solutions - CCS**
- Credit Card
- Auto Finance/Commercial Auto
- Dealer Services
- Educational Finance Services
- Personal Lines and Loans/Credit Management
- Retail Services
- Rewards and Enhancement Services
What is Data Analysis/Analytics?

ISACA definition—
“Data analytics (DA) involves processes and activities designed to obtain and evaluate data to extract useful information.”
In other words...

- SOR, web, report, etc.

[systemic process]

- statistical and/or logical techniques

-data

- verify process effectiveness
- improve business efficiencies
- influence business decisions

[-Describe -Illustrate -Condense -Recap -Evaluate]

-key risk, fraud, errors or misuse
Present day audit shop challenges
Challenges faced by Internal Auditors

- **Regulatory Compliance and Controls:**
  - evaluation and identification of issues and processes
  - resources
  - Priorities and sustainability- new regs; SOX, Dodd-Frank, Reg A-Z, etc.
  - financial reporting risks

- **Internal Audit Value and Independence:**
  - high expectations (the new norm is...?...)
  - growing internal controls issues
  - confusion around the role of internal auditing responsibility (the fine line... objectivity and independence)

- **Fraud:**
  - detection and control
  - fraud management responsibility
  - increased incidence and cost of fraud
Challenges faced by Internal Auditors

- **Availability of Skilled Resources:**
  - lack of competency and appropriate skill sets
  - shortage of auditors
  - staff retention
  - lack of understanding of risks and controls

- **Technology:**
  - appropriate solutions to support compliance
  - information security
  - competing information technology priorities
  - outsourcing
Benefits of Data Analysis
Why Data Analysis is important today

- The traditional audit approach involves performing a walk-through, identifying control objectives, assessing and testing controls by doing some sort of **sampling**

- Use of data analytics changes this landscape fundamentally.
  - Possible for organizations to look at **every transaction and every balance**, and to apply a whole range of tests to that data
  - Allows a greater **degree of assurance** about the effectiveness of the controls
  - **Does not necessarily make audits more efficient** because more coverage can mean more time investigating potential issues
  - Audit plans/testing scope can be more risk-based

- Identify **Emerging Risks** (proactive risk monitoring)
Why Data Analysis is important today

Automated testing and continuous audit procedures change the audit process significantly since a ‘real time’ testing is possible.

Results can be used in ongoing call programs with the business. The use of results of Continuous Auditing techniques provide visibility into whether risk is increasing in specific areas and warrants additional audit focus.

- **Efficiency** in data access/acquistion;
  - Enables auditors to access and query data, hence *reducing reliance* on IT personnel to run data extracts
  - Delivers higher degree of **confidence** in accuracy and completeness of audit work

- Reduces **audit risk**
  - By honing the risk assessment and stratifying the audit population

- Identify potential **Fraud risks** (Benford’s law)
Data Analysis, An Integrated Approach
Data Analysis Team – integrated all the way

- DAS is at least considered on all Consumer Lending audits and emerging risk projects and is actively involved 90% of the time
- DAS resources work with the audit team in every phase of the audit
- Even after an audit is over, DAS continue to work on follow-up items
  - Help identify additional opportunities for Continuous Auditing
  - Develop an automated process for generating and reporting results
  - Testing of Corrective Action / Issue Validation
- The DAS team trains selected auditors to use ACL and perform some of their own analysis (Data Analysis Consultants)
- DAS is a visible member of the audit team by participating in walkthroughs and meetings with the Business Partner
- Data Analysis topics are presented in audit team meetings
- Organize and execute DAS Business Monitoring Program (BMP) calls with LOBs
Consumer Lending- Data Analysis Consultants (DAC)

- About 25 team members currently enrolled in this program
- Champion the use of data analysis and ensure DAC coverage on scheduled audits. **Participation is key**
- Provide insight on possible data analysis opportunities in the planning and brainstorming meetings
- Be proficient enough in ACL to execute analysis in the planning and fieldwork stages of the audit
- Document data analysis testing using the DAS documentation standards
- DAC teams meet periodically to discuss ways to increase efficiency and effectiveness of audit testing through data analysis
Consumer Lending DAS Process - Overview

**DAS Process Phases**

- DAS Kick Off Meeting
- Initial Population Lists
- DAS Brainstorming Sessions
- Testing
- Documentation and Exit Meeting

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**Audit Process Phases**

- Planning
- Testing
- Wrap up/Reporting

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Phases Run parallel
Consumer Lending DAS Process

DAS will monitor the audit plan and contact the AIC to set up data kickoff meeting approximately 4 weeks prior to planning.

The SAM, AIC, DAS resource and DAC (if known) should be invited to this meeting and the following items should be covered:

- DAS testing completed in previous audit.
- Application systems used by the business.
- Business and IT contacts for the applications noted.
- Test period for the audit.
As soon as possible after the DAS Kick-Off meeting, the initial population extracts should be provided to the audit team for use in planning.

The initial population extract will contain standard fields and DAS’ best guess as to what information could be useful. Additional data fields can be requested and added later. The population is turned over to the audit team or DAC in an ACL project for them to use and “play with” during the planning process. DAS and the audit team work together to validate the initial population to ensure it is complete.
Consumer Lending DAS Process

Once the Business Analysis (BA) and Risk Assessment (RA) have been completed, a DAS brainstorming meeting(s) are scheduled. Again, the SAM, AIC and DAS team members along with the DAC should be invited. The following should be covered in this meeting:

- Any new developments since the DAS kick-off meeting.
- Determine involvement of the DAC.
- Review of the Business Analysis and Risk Assessment for additional DAS opportunities.
- Finalize the initial list of data analysis tests.

*Creativity is really a big thing here!*
Data analysis testing should begin as soon as possible after the brainstorming meeting. The DAS resource(s), DAC, AIC and audit team should be in regular contact through the end of planning and during fieldwork. The following should be considered:

- Invite the DAS and DAC resources to the weekly update meetings with the business partner.
- The DAS and DAC resources should keep data analysis testing documentation up-to-date as the work is being completed. Waiting until the end of the audit to document takes more time and is more likely to result in errors.
Consumer Lending DAS Process

Once the data analysis work has been completed, the work should be documented and a DAS exit meeting should be scheduled.

- Documentation is completed in accordance with Wells Fargo DA documentation standards.
- A DA exit meeting is held with the AIC to:
  - Discuss any remaining documentation
  - Review the number of DAS hours used in relation to planned hours
  - Discuss any improvements or opportunities for next time
Consumer Lending DAS Process

- DAS Kick Off Meeting
- Initial Population Lists
- DAS Brainstorming Session
- Testing
- Documentation and Exit Meeting

Communication
Work we’ve been doing...
Recent flavor of work in DAS teams

- **Basel**
  - Data Integrity testing in Basel space involves 100% testing of loan attributes, GL reconciliations, ETL testing, Control Point, submission file testing, etc.

- **Emerging Risk Projects**
  - Validating the completeness and accuracy of data populations being generated by the business. Challenges include:
    - Complexity of code reviews
    - Artifacts not available
    - Access to systems/data repositories
    - No real SMEs within LOB

- **Assurance audits**
  - DAS actively involved in over 90% of all Consumer Lending audits

- **DAS BMP calls**
  - Quarterly meetings with owners of key data repositories

- **DAS Quality Assurance Reviews**
  - Internal review process to ensure consistency in execution and documentation
Population validation- Examples of gaps

- Incomplete documentation and LOBs not addressing gaps we identify during our reviews
- Unclear identification of the actual count of accounts affected/queried
- Missing code (SQL, SAS, Mainframe JCLs, etc.) that was used to pull data from SOR/data repositories
- Missing evidence of code execution (screen prints, log files, etc.) that will show how many records were impacted/obtained
- Time period differences in data extractions covered across various Retail LOBs with no/limited explanations why it was so
- A complete flow of the record count should be documented i.e. traceability
- Lack of descriptive content to enable the reviewer to come to the same conclusions
Population validation - Examples of benefits

- **Build relationships** between WFAS and LOBs/Ops Risk/Compliance/Legal/Technology teams
- **Provide guidance** but keep into consideration our principles - independence, objectivity, and confidentiality
- Help LOB partners see what they could be inadvertently excluding
- Help LOBs start **streamlining** their data validation **processes** across the board
- **Challenging** the LOBs on what and how they do things
- **Preparing** WFAS (DAS & business audit teams) for similar/more projects in the future i.e. in-house expertise
- All the above leads to **gaining credibility**
Continuous Auditing, Continuous Monitoring
Continuous Audit Definition

**Continuous auditing** is analytical testing of key indicators to provide information on trends or evidence of control effectiveness. *...method used to perform control and risk assessments automatically on a more frequent basis.*

Results in timely notification of gaps and weaknesses to allow immediate follow-up and remediation.
Why Continuous Auditing?

- It is one of the many tools used within the internal audit profession to provide reasonable assurance that the control structure surrounding the operational environment is:
  - Suitably designed
  - Established
  - Operating as intended

*Continuous Audit is not concluding on the total control environment for the process selected but only for the selected controls being reviewed.

- Continuous auditing programs (CAPs) can reduce the need for conducting on site fieldwork and can help determine where to focus our detailed testing.

- Establishing a CAP will allow for more real time monitoring of risks and the development of a dynamic audit plan.

- Additional benefit to the organization is that instances of error and fraud are typically significantly reduced and operational efficiency is increased.
A typical Continuous Auditing process has the following Phases:

**Foundation**
- Selection of the target area
- Outlining testing objectives
- Frequency of testing
- Testing technique

**Approach**
- Scope
- Volumes
- Sampling
- Criteria and attributes
- Technology

**Execution**
- Performance
- Exception identification
- Summarizing results

**Reporting**
- Report on the results

Changes
## Differentiating Continuous Auditing from Continuous Monitoring

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Continuous Auditing</th>
<th>Continuous Monitoring</th>
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</thead>
<tbody>
<tr>
<td>Responsibility</td>
<td>Internal audit</td>
<td>Business unit management</td>
</tr>
<tr>
<td>Definition</td>
<td>Methodology used by auditors to perform control validation on a recurring basis</td>
<td>Management process that assists in meeting its fiduciary responsibilities</td>
</tr>
<tr>
<td>Focus</td>
<td>Process that tests selected transactions or key control points based on a predetermined criteria. Part of the assurance process of internal audit responsibilities</td>
<td>Process that verifies acceptable performance based on department or industry standards. Part of the ownership responsibilities of management</td>
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Continuous Auditing: Myth vs Truth

- **Myth**: Continuous auditing has to be automated.
- **Truth**: Continuous auditing can be either automated or manual. Automation is definitely not a requirement.

- **Myth**: Continuous auditing requires internal audit to be in the business unit too often, and it will cause a disruption.
- **Truth**: Continuous auditing, when implemented correctly, will be less intrusive than a regular audit.

- **Myth**: Continuous auditing is too time consuming and difficult to implement.
- **Truth**: Continuous auditing is not difficult to implement if the objectives of how the methodology is to be used are clear and communicated to the audit/LOB team.
Benefits of Continuous Auditing

1) Internal Audit
   - Increase auditor business unit knowledge and exposure
   - Proactive identification of trends and root cause focus
   - Establish and foster business management relationships
   - Enhance audit product offerings
   - Manage audit workload more effectively and efficiently

2) Audit Committee
   - Expansion of risk and audit coverage
   - Standardization of audit results

3) Management
   - Validate compliance with existing policies and procedures
   - Provide potential methodology for self-assessment

4) External Partners
   - Potential reduction in external work performed
   - Advanced reliance on internal audit work
Continuous Auditing

The Consumer Lending DAS team has determined the best approach is to leverage metrics and reporting already being generated by the business rather.

- Procedures for obtaining/reviewing:
  - Select key metric(s) (part of audit or isolated metric validation)
  - Identify critical data point(s)
  - Independently validate the data point by going back to the data source
  - Document the process/effort
  - Communicate results to audit team

- Advantages/gains:
  - DAS gets access (which can be painful on it’s own)
  - DAS learns a lot along the way
  - Saves time by not reinventing the wheel i.e. use existing reports/metrics
  - Reports used in BMP calls and to drive audit coverage
Data Flow, a walk through
Present day complexity of data flows

Customer Application → Input Systems → Application Systems → System Of Record → Data Warehouse

Control points

Report System → Compilation Process → Secondary Process → Primary Process → Data Mart
Checksum data interface control

ISACA definition “A mathematical value that is assigned to a file and used to “test” the file at a later date to verify that the data contained in the file has not been maliciously changed.”

Checksum can be part of:
- The file name
- Info embedded into the header
- Sent separately

Checksum is generally used for critical file transmissions.
Examples of Data Interface/Exchange Controls

Duplicate file data interface control
Receiving system should be able to detect files or track what has already been loaded and whether the ‘new’ file should be uploaded entirely or only the ‘new’ record sets

Checking the:
• Date and time stamps of receiving system’s tables
• Business rules that can validate if the file has been loaded or not
Examples of Data Interface/Exchange Controls

Duplicate records

- Should NOT exist – no body likes this
- Undesirable consequences
- Data level enforcement (keys)
- Checks/control(s) to avoid overwrite the existing record
Examples of Data Interface/Exchange Controls

Aggregation of data file interface control
It involves:
- placing the overall count of rows,
- the sum of numeric fields, etc.
- in the header OR footer of the interface file.

The receiving system should reconcile the aggregate of values in the transaction level records and match it with the pre-aggregated value in the header/footer.
Examples of Data Interface/Exchange Controls

Database to database control

Database to database checks are typically run post the interface files using various methods of Data monitoring, automated OR manual reports reconciliation.

A detective control.
Examples of Data Interface/Exchange Controls

Time sensitive / cut-off controls

Certain files have to be uploaded before another business cycle OR process starts.
Typically this is linked to bringing systems online post batch processing, OR any other
time bound process.

Time cut-off controls allow the interface files to be uploaded during a certain time slots.

E.g. Credit card statement printing
1. Spending data to be uploaded by 1AM
2. Statement generation program runs at 2AM
3. Statement printing starts at 7AM
Examples of Data Interface/Exchange Controls

Data upload validation controls for data exchange

File upload should be accompanied by the validation rules, to ensure that the correct data gets uploaded into the system.

At the time of upload it should check, if the file has valid:

- customer codes
- supplier codes
- product codes
- Dates
- etc.
Examples of Data Interface/Exchange Controls

Audit controls at file and record level for data interface

Without this no one will know on how the upload process happened, what was successful, rejected, and may miss out on duplicate file getting uploaded.

With audit data, one can investigate the rejects and is also able to explain the outcome of the processing following the upload.

Records that evidence...

- Which file was received when
- When it was uploaded
- Was it rejected OR accepted
- Was it partly uploaded
- Which records were rejected and why
Test of one or full population for end-to-end testing?

This is driven by a number of reasons:

- Size of data interfaces
- Size of records/files
- Complexity of controls
- Complexity of lineage/transformation at various ‘hops’

If fully automation of:

- loading of source data,
- interfaces,
- data processing programs,
- report/output creation programs,
then test of one can be done.

Test of one can be a huge Time Saver, but be careful how you evaluate taking this approach.
Data Analysis Problems

- The same data is found in many different systems. e.g. number of different systems holding customer data grew from $X$ to $Y$ in just a couple of years, due to mergers and buying new software for different purposes.

- The same concept is defined differently. a similar concept, e.g., delinquency, may be defined very differently in different systems, and it may literally take years to agree on a common definition (due, past-due, way over due, <30, 30-60, 60+)

- Data change over time. historical information is not kept, since it is not needed e.g. the vendor management system just needs to know the current address of a vendor. However, for analysis purposes, the complete address history may be necessary.
Data Analysis Problems

- **Data is suited for operational systems.** data models and structures are aimed at specific applications like accounting, billing, etc., and do not support analysis across business functions, which is what is really needed

- **Data quality is bad.** often, operational data will contain issues like missing data, imprecise data, or varying data quality due to different use of the systems

- **Data is volatile.** in operational systems, data may be deleted when they are no longer needed for the particular business functions, e.g., expenses data could be deleted 3 months after the bill was paid. However, data may be needed much longer for analysis purposes
A recent survey
Survey

A recent survey from Lavastorm Analytics

Results published on CIO Insight on 10/21/2013

Title: Analytical Skills, Tools, and Attitudes Survey 2013

Lavastorm Analytics polled more than 425 people in the analytics community about whether their organization needs more analytic resources or skills and which skills are valued most and are most urgently needed.

Survey respondents included business analysts, technologists, data analytics professionals, managers, and C-level executives across a broad variety of industries.

Survey results

- **Useful Tool**
  - 83% of respondents say analytics is critical to their organizations, driving day-to-day decisions now more than past experiences, intuition and other factors.

- **Biggest Barriers for Analytics Initiatives**
  - Lack of skills, training and education: 19%, Lack of funding or resources: 18%, Inadequate executive support: 10%

- **Help Wanted**
  - Two-thirds of survey participants say their organization don't employ enough people with adequate skill sets to analyze and glean insight from data.

- **Biggest In-Demand Analytics Skills**
  - Statistics, math and quantitative capabilities: 48%, Analytics tool training: 40%, Critical thinking: 28%

- **Misallocated Minutes**
  - Data analytics professionals spend only one-fifth of their time on data analysis.
Survey results

- **Siloed Systems**
  - 36% of survey respondents say business and IT both have analytic resources and they function independently, as opposed to 26% who say both have these tools and work collaboratively.

- **What Accounts for Nearly One-Half of a Data-Analytics Professional’s Day**
  - Gathering requirements: 13%, Preparing and presenting reports: 10%, Meetings: 9%, Administrative activities: 7%, Infrastructure design and implementation: 5%, Testing and tuning processes: 4%

- **Roadblock**
  - 38% of survey respondents say insufficient self-service tools and reports prevents their access to data, and the same percentage say that IT data-governance policies do the same.

- **Missing Inventory**
  - 35% say IT doesn't even have the data in the data warehouse.

- **FYI**
  - 13% say their organization needs to have a better, increased awareness of the opportunities within analytics and big data.
Survey results

- In conclusion the top themes were:
  - According to the survey respondents, a lack of skills/training/education is the biggest factor holding back organizations from using analytics more
  - Skills most urgently needed in their organizations are statistics, math or other quantitative skills; analytic tool training; and critical thinking
  - Lack of funding or resources, however, also has a significant impact on adoption of analytics to drive day-to-day decisions
  - Lesser factors also include inadequate support from executives and data that is not integrated
One few more things...

- Consider making data analysis part of your audits – it will add a tonne of value! ... key component in future of auditing!
- How can I break the process control, increase risk
- Think BIG, start small, huge gains – low hanging fruit first
- Be creativity
- Document as auditors usually do
References/ Credits

- ISACA website
- IIA’s website
- Google
Q/A and Thank You

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