

Data Analytics and Continuous Controls Monitoring

(Including Practical Case Studies)



The Institute of Chartered Accountants of India
(Set up by an Act of Parliament)
New Delhi

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(Including Practical Case Studies)

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Internal Audit Standards Board
The Institute of Chartered Accountants of India
(Set up by an Act of Parliament)
New Delhi

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Foreword

Information Technology is revolutionizing the nature and scope of worldwide communications, changing business processes, and erasing the traditional boundaries of the organization, internally between departments and externally with suppliers and customers. The resulting intra-enterprise coordination as well as inter-enterprise integration with external business partners through supply chain management and customer relationship management systems demonstrates the power of IT as both a driver and enabler of management processes and strategies. The developments in Information Technology are not only changing the way business are being conducted, but also increasing the associated risks and changing the requirement of proper controls.

Internal auditors must recognize and leverage the powerful capabilities of computers and technology in collecting, generating, and evaluating information for managerial decision making related to strategy, risk management and controls, and, more broadly, for effective organizational governance. The purpose is to enhance audit effectiveness, which should improve corporate governance by increasing the monitoring, accountability, and accuracy of the organisation's transactions and financial reporting.

I am pleased that the Internal Audit Standards Board of ICAI is issuing this publication on "*Data Analytics and Continuous Controls Monitoring*" to educate members with current data analysis tools, computer-assisted audit techniques and continuous auditing and monitoring methods. I congratulate CA. Rajkumar S. Adukia, Chairman, Internal Audit Standards Board and other members of the Board on issuance of this publication.

I am confident that this publication would help the members to implement technology enabled auditing and render their duties in an effective manner.

August 8, 2012
New Delhi

CA. Jaydeep Narendra Shah
President, ICAI

Preface

Information Technology fundamentally changes the way in which organizations operate internally and interconnect with external organizations redefining the boundaries for cooperation. Internal auditors can play a pivotal role in helping organizations leverage IT to meet the increased demand for improved governance by evaluating current risks and controls as well as define and assess the monitoring systems. Internal auditors can also help develop an information system to provide the board with mandated financial information, industry insights, risk and controls analysis, and the integrity of the financial reporting system. While IT brings great opportunities to the organization, it also brings great risk. The interconnectivity of the e-commerce environment increases the scope and magnitude of risks faced by the organization.

Data analysis can help auditors meet their auditing objectives and would thereby helps to comply with auditing standards, support enterprise risk management system, uncover fraud and money laundering, recover costs, improve compliance with regulations and would also provide better insight into business operations and performance. Considering this, the Internal Audit Standards Board is issuing "Data Analytics and Continuous Controls Monitoring". This Guide has been divided into various chapters covering data analytics for business decision making, computer aided audit tools, stages in the use of general audit software, benefits derived by using general audit software, general audit software applications across business functions and industries, fraud detection using general audit software, documentation of process of use of general audit software, etc. This guide also provides guidance on challenges while implementing data analytics, application of CAATs to bank audits, continuing auditing with IDEA, etc. This guide also contains practical case studies for using MS Excel for CAAT, Data Analysis and MIS reporting.

At this juncture, I am grateful to CA. Deepjee A. Singhal, CA. Manish Pipallia for sharing their experiences and knowledge with us and preparing the draft of the publication for the benefit of the members and also to CA. Rishabh Pugalia for preparing chapter on "Case Studies – using MS Excel for CAAT. Data Analysis and MIS Reporting" for inclusion in this Guide.

I wish to thank CA. Jaydeep N. Shah, President and CA. Subodh Kumar Agrawal, Vice President for their continuous support and encouragement to the initiatives of the Board. I must also thank my colleagues from the Council at the Internal Audit Standards Board, viz., , CA. Rajendra Kumar P., Vice-Chairman, IASB, CA. Amarjit Chopra, CA. Shiwaji B. Zaware, CA. Ravi Holani, CA. Anuj Goyal, CA. Nilesh Vikamsey, CA. Atul C. Bheda, CA. Charanjot Singh Nanda, CA. Pankaj Tyagee, CA. G. Ramaswamy, CA. J. Venkateswarlu, CA. Abhijit Bandyopadhyay, CA. S. Santhanakrishnan, Shri Prithvi Haldea, Smt. Usha Narayanan, Shri Gautam Guha, Shri Manoj Kumar and Shri Sidharth Birla for their vision and support. I also wish to place on record my gratitude for the co-opted members on the Board viz., CA. Porus Doctor, CA. Masani Hormuzd Bhadur, CA. Ghia Tarun Jamnadas, CA. Deepjee A Singhal, CA. Nitin Alshi, CA. Narendra Aneja and CA. Guru Prasad M and special Invitee, CA. Sumit Behl for their invaluable guidance as also their dedication and support to the various initiatives of the Board.

I firmly believe that this publication would serve as basic guide for the members and other readers interested in the subject.

August 9, 2012
Mumbai

CA. Rajkumar S. Adukia
Chairman
Internal Audit Standards Board

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Introduction

Data Analytics

1. Although internal auditors have been doing analysis for more than 25 years, it has only recently started to become standard practice. By nature, most accountants and auditors are inclined to stick with what has worked in the past, rather than reach outside their comfort zones for an alternative that could help them accomplish more. They should self-introspect, "Could They analyse data electronically in 15 minutes where traditional methods would take 15 hours, and certainly improve the quality of reports as a result."

At the end of the day, if the internal auditor want to make better decisions and take the right actions, they have to use analytics. Putting analytics to work is about improving performance in key business domains using data and analysis. For too long, managers have relied on their intuition or their "golden gut" to make decisions.

2. On the audit front, auditors both financial and internal have been performing data analysis for more than 25 years. Data Analysis using Computer Assisted Audit Techniques (CAATs) have started to gain centre-stage in the 'Now Economy'. All organisations are impacted by IT in various forms. It is nearly impossible to conduct an effective audit without the aid of technology tools. Current audit standards already require consideration of the use of data analysis for good reason. The use of data analysis allows auditors to view high-level organizational operations and drill down into the data. It is important for the Chief Audit Executive (CAE) and his staff to realize that the use of data analysis technology is not limited to the scope and activities associated with IT audit alone. The use of technology-based audit techniques in general, and data analysis technology, in particular, is far more widespread.

Continuous Controls Monitoring

3. Continuous Controls Monitoring applications are a framework to achieve acceptable levels of risk in an organization by monitoring and addressing internal control weaknesses. The application manages risks and controls from an enterprise level by examining the details of transactions and data files.

Data Analytics and Continuous Control Monitoring

Most organizations spend significant time and effort in streamlining their internal controls to meet regulatory requirements, such as COSO III, Sarbanes-Oxley, Basel II, and ISO 9000. By implementing Continuous Controls Monitoring applications, these efforts can be automated and made repeatable.

4. Organizations can move away from periodically examining the state of controls to knowing when a control has failed or is about to fail. Continuous Controls Monitoring applications monitor transactions and data within business processes to detect exceptions based on business rules and parameters. Once detected, relevant business users and departmental heads can be alerted through triggers using a variety of contact options, such as email and text messaging. All alerts and reports are managed within a comprehensive workflow solution.

Chapter 1

Data Analytics for Business Decision Making

Introduction

1.1 All the analytics in the world won't help unless we use them to make and execute better decisions. Entrepreneurs who realize this will ride the wave for times to come. Analytics and fact-based decisions establish trends for the ages to come. Other decision approaches will ebb and flow, but the progress towards fact-based techniques are here to stay permanently. The writing is on the wall for us all to see – “We are becoming rational, analytical and data-driven in a far wider range of activity than we ever have been before”.

Better information systems facilitate better decisions. The first fifty odd years of the digital age were spent largely in capture of data. Now that entities are beginning to master analytics, they can better justify the utilization of the captured data sets.

1.2 Fact-based decisions employ objective data and analysis as the primary guides to decision making. The goal of these guides is to get at the most objective answer through a rational and fair-minded process, one that is not colored by conventional wisdom or personal biases. Whenever feasible, fact-based decision makers rely on the scientific method – with hypothesis and testing – and rigorous quantitative analysis. They eschew deliberations that are primarily based on intuition, gut feeling, hearsay, or faith, although each of these may be helpful in framing or assessing a fact-based decision.

Business Side of Analytics

1.3 Analytics can yield significant benefits to business. Following are some of the reasons to jump onto the analytical bandwagon right away:

(i) Better Strategic Decisions

If you're trying to conclude on buying or merging with another company, entering a new market or winning over a different customer type, you will benefit from analytical decision making. Strategic decisions need good

intuition, but analytics will certainly help you make sense of the impact of imponderables on growth and profit.

(ii) Improved Tactical and Operational Decisions

Decisions on production, pricing, market segment and selling are decisions that recur frequently and are based on operations that creates tonnes of data. The systematic collection and analysis of data can yield tangible and cognizable savings per transaction and super profits over a dramatic time scale.

(iii) Enhanced Ability to Take on Problems Head-on

If your supply chain has more inventory than you would expect for the quarter, analytics can help with a solution. Hence, if something is going wrong, then gathering and analysing data on the underlying causes of the problems is the best way to get to its source. Analytics work the numbers and demystify the cause, let alone treat the symptoms.

(iv) Streamlined Business Processes

Embedding analytics into the underlying business processes is just good business. Processes are a structured way to think about how work gets done. Analytics are a structured way to think about the decisions within those processes.

(v) Decisions at the Speed of Analytics and Consistent Results

Analytics take time to develop at first instance. Once developed and set up, you can scale it and run it any number of times in shorts spans of time. By using analytic optimizers created by your experts, you can sure? decisions will be made correctly and consistently across the board.

(vi) Anticipate Varying Trends and Market Conditions

Monitoring the outside business environment and its force-factors can provide a compelling early warning alert mechanism of shifting economic and market dynamics. Analytics bring opportunities to the fore and help predict changing customer tastes, loyalties and spending tendencies. Assumptions made under various analytical scenarios can be tested for their relevance and applicability on an on-going basis.

(vii) Sharper Business Results

It's a known fact that entities which ride the analytic wave make better financial fortunes than their industry peers.

Traits of Analytical Leaders for Evolved Decision Making

1.4 Analytical leaders must demonstrate the following traits abundantly:

(i) Develop their People Skills

Analytical leaders must learn to develop a fine blend of the technical nuances and subtle people skills like sympathy and empathy.

(ii) Be a Catalyst for More Data and Greater Analytics

Individuals who plan to hone leadership skills in analytics must set a tone for data and analysis amongst all their teams. Sloppy logic and uninformed intuition must make way for hard-data analysis and related conclusions.

(iii) Lead from the Front

Good analytical leaders set an example by crunching data in their own decisions.

(iv) Sign-up for Results

Seasoned analysts commit themselves to achieving a specific result in the part of the organization they serve or control.

(v) Train

Budding analysts gently guide, orient and sensitize protégés into the analytical way of work.

(vi) Set Strategy and Expected Results

Analytical Leaders at the helm of affairs know that analytics and fact-based decisions do not happen in a vacuum. Defining metrics will itself drive the organization in a more sustained analytical direction and motivate employees to begin tools usage and decision making thereof.

(vii) Look for Leverage

Strong analytical leaders know where to apply leverage and where a small improvement in a process driven by analytics can make a big difference in top line and bottom line figures.

(viii) Patient and Perseverant

Analytical leaders have to work doggedly and persistently for the long haul because changes that apply analytics to decision making, business processes, information systems, culture and strategy hardly happen overnight.

(ix) Create an Analytical Ecosystem

Expert analysts build an ecosystem of employees, vendors, partners who work towards providing talent, advice, resources, tools and solutions to common problems.

(x) Know Limit

Mature analytical leaders blend analytics with intuition and never lose sight of the big business picture. They focus on the soft issues in business models and customer values and let their intuition take over as and when required.

Introspection for Decision Makers on Use of Data Analytics

1.5 Following are important points for introspection for decision makers on use of data analytics:

- Assessing where you are, i.e., what are your analytical capabilities, strengths and weaknesses.
- Recognizing where to go next i.e., what strengths can you capitalize on, and what gaps should you try to close.
- Setting reasonable ambitions, i.e., what can you hope to accomplish and when.
- Monitoring progress, i.e., how fast and how far are you traveling on the journey to capitalize on analytics.
- Consensus with executive leadership and everyone else with an interest in succeeding with analytics – how can each decision maker come to mutual understanding about capabilities and commitments to a plan of analytic action.

Conclusion

1.6 Traditional basis of competitive advantage like, geographical proximities or protective regulation have been eroded by the sweeping

effects of globalization. This leaves three key differentiators as the basis for competition – efficient and effective implementations, intelligent decision making and the skill to cull-out every ounce of value from business processes – all of which can be gained through the mature use of analytics.

The time has come for auditors to:

- Use data more intelligently to deduce critical business analytical insights.
- Build a framework of data, people and technology to administer analytics.
- Groom analytical users and leaders.
- Set and monitor SMART targets for analytical pursuits.

Sources:

1. *Analytics at Work – Smarter Decisions Better Results* – Davenport, Harris and Morison.
2. *Competing on Analytics – The New Science of Winning* – Davenport and Harris.
3. *Research papers on CAATs – IDEA Data Analysis Software* – www.caseware-idea.com.

Chapter 2

Computer Aided Audit Tools (CAATs)

2.1 Data analysis as used by auditors is the process of identifying, gathering, validating, analysing and interpreting various forms of data within an organization to further the purpose and missions of auditing.

Computer Assisted Audit Techniques (CAATs) are computer programs that the auditor uses as part of the audit to process data of audit significance to improve the effectiveness and efficiency of the audit process.

2.2 The matrix below identifies the six key questions that data analytics can address in any organization:

	Past	Present	Future
Information	What happened? (Reporting)	What is happening now? (Alerts)	What will happen? (Extrapolation)
Insight	How and why did it happen? (Modelling, experimental design)	What's the next best action? (Recommendation)	What's the best/worst that can happen? (Prediction, optimization, simulation)

Much of your “business-intelligence” activities are in the top row. Moving from purely information-oriented questions to those involving insights is likely to give you a much better understanding of the dynamics of audit in any business operation.

Where can CAATs Apply

2.3 Analytics can help to transform just about any part of your business or organization. Many organizations start where they make money, in customer relationships. They use analytics to segment their customers and

identify their best ones. They analyse data to understand customer behaviours, predict their customers' wants and needs, and offer fitting products and promotions. They price products for maximum profitability at levels that they know their customers will pay. Finally, they identify the customers at greatest risk of attrition, and intervene to try to keep them.

Not surprisingly, analytics can also be applied to the most numerical of business areas like, finance and accounting. Instead of just putting financial metrics on scorecards, leading firms are using CAATs to determine which factors truly drive financial performance. In this era of instability, financial and other firms are using CAATs to monitor and reduce risk.

When Application of CAATs are not Practical

2.4 There are times when being analytical just doesn't fit the situation. Some of these situations are:

- (i) ***When there's No Time.*** Some decisions must be made before data can be gathered systematically. One of the best examples is the decision Gary Klein addresses in his book *Sources of Power*. When a fire-fighter is in a burning building, trying to decide whether the floor is about to collapse, he has to "gather data" rapidly by observing his surroundings. He's unlikely to perform a logistic regression analysis using CAATs.
- (ii) ***When there's No Precedent.*** If something has never been done before, it's hard to get data about it. The obvious analytical response in such a situation is to perform a small-scale randomized test on the idea and see if it works.
- (iii) ***When History Is Misleading.*** Even when ample precedents exist, as the fine print on the stockbroker ads warns, "past performance is not necessarily indicative of future results." Rather than abandoning statistical techniques in CAATs altogether, auditors should try to identify those unusual times when the past is not a good guide to the present.
- (iv) ***When The Decision Maker Has Considerable Experience.*** Sometimes a decision maker has made a particular decision often enough to have internalized the process of gathering and analysing data. If you're an experienced home appraiser, for example, you can estimate what a home on the market is worth without feeding data into an algorithm.
- (v) ***When The Variables Can't Be Measured.*** Some decisions are difficult to make analytically because the key variables in the analysis are hard to measure with rigor.

Type of CAATs

2.5 CAATs may consist of packaged, purpose written utility programs or system management programs. Different technologies fall under this concept, including database interrogation tools (generic standard query language-based tools) and audit-specific packages.

Table below identifies the different type of CAATs with a brief on their purpose:

<i>CAATs Caption</i>	<i>Purpose</i>
General Audit Softwares	Special programs developed for data extraction and analysis, entailing, sorting, grouping, filtering, joining, sampling, irregularity testing, arithmetical computation and more.
Stress Testing Tools	Tools that can be specially deployed for volume and stress testing of user traffic response through newly implemented application programs.
Integrated Test Facility	Program that simulates transactions that can be used to test processing logic, computations and controls actually programmed within software applications.
Enterprise Risk Management (ERM) Tools	Tools when integrated with the company ERM activities assists in risk identification, scoring, treatment and mitigation.
Audit Administration Programs	Special purpose tools which assist the auditor in planning, programming, administration, working paper management and reporting.

This chapter will largely present General Audit Softwares.

General Audit Softwares – Attributes of Data Analysis Software for Audit

2.6 Data analysis technology for internal audit's use needs to have the features and functionality that auditors require to do their job effectively. Not only should it deal with the data access challenges, but it also needs to support the way in which auditors work and the types of analytics that are appropriate to the audit task on hand.

Computer Aided Audit Tools (CAATs)

Following are some of the key attributes of General Audit Softwares:

- Able to analyse entire data populations covering the scope of the audit engagement.
- Makes data imports easy to accomplish and preserves data integrity.
- Allows for accessing, joining, relating and comparing data from multiple sources.
- Provides commands and functions that support the scope and type of analysis needed in audit procedures.
- Generates an audit trail of analysis conducted that is maintained to facilitate peer review and the context of the audit findings.
- Supports centralized access, processing and management of data analysis.
- Requires minimum IT support for data access or analysis to ensure auditor independence.
- Provides the ability to automate audit tasks to increase audit efficiency, repeatability and support for continuous auditing.

2.7 Use of General Audit Software's for data analysis tasks can be grouped into following three types:

Ad Hoc	Repetitive	Continuous
Explorative and investigative in nature.	Periodic analysis of processes from multiple data sources.	'Always on' – scripted auditing and monitoring of key processes.
Seeking documented conclusions and recommendations.	Seeking to improve the efficiency, consistency and quality of audits.	Seeking timely notification of trends, patterns and exceptions. Supporting risk assessment and enabling audit efficiency.
Specific analytic queries – performed at a point in time – for the purpose of	Managed analytics – created by specialists – and deployed from a	Continual execution of automated audit tests to identify errors,

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generating audit report findings.	centralized, secure environment, accessible to all appropriate staff.	anomalies, patterns and exceptions as they occur.
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2.8 Leading internal audit activities have a lot in common when looking for data analysis tools. They look for data analysis tools (i.e., software) that are easy to learn and can realistically be used by the entire audit staff, not just a select few. The software must measurably improve audit techniques and shorten audit cycles right out of the box.

2.9 Chief Audit Executives (CAE's) may employ the comprehensive ranking card (below) while evaluating suitable General Audit Software for his/her engagements:

Need: 0=Needless: 1=Nice to Have: 2=Desirable: 4=Mandatory		Need
Internal Audit Strategic Objectives		
1	Software is easy to learn and use	
2	Competitive advantage	
3	Minimize reliance on IT professionals	
4	Improve work accountability, responsibility and supervision	
5	Enforces production program change controls	
6	Reliability: bug free, speed, work like a professional	
7	Portability: runs on a laptop	
8	Scalable: grow from desktop to server without learning new software	
9	Data integrity and security: client data is protected from auditor change	
10	Collaborative features	
11	Supports development of automated and continuous programs	
12	Compatible with electronic work papers	
13	Improves documentation of audit work completed.	
Provider and Implementer Support		
14	Global presence	
15	Years in business	

Computer Aided Audit Tools (CAATs)

Need: 0=Needless: 1=Nice to Have: 2=Desirable: 4=Mandatory		Need
16	Multiple languages	
17	Help desk available	
18	Ease of doing business: knowledgeable in auditing needs	
19	Regular software upgrades	
20	Training readily available	
21	User group program for networking with other users of the Tool	
22	Knowledgeable consultants independent of the provider available	
23	Getting started programs available	
Technical Features and Functionality		
24	Import all file types used by the organization	
25	Handles large file record sizes	
26	Handles large data volumes	
27	Ease in validating and reconciling data import	
28	Modify imported data field properties	
29	Support search for text, numbers and time.	
30	Project visual chart or mapping of data actions performed	
31	File join/ merge/ compare	
32	File append	
33	Visual Connector	
34	Sorts, indexing, filtering and fuzzy logic	
35	Summarization	
36	Extraction	
37	Pivot Table	
38	Stratification	
39	Gap Detection	
40	Aging	
41	Compare data to predicted data – Benford's Law	
42	Advanced statistical analysis: correlation, trend analysis, time series	

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Need: 0=Needless: 1=Nice to Have: 2=Desirable: 4=Mandatory		Need
43	Sampling	
44	Statistical analysis	
45	Export to typical office applications	
46	Create custom reports and graphics	
47	Create simple and complex calculated fields	
48	Data cleansing solutions – character and functions available	
Cost		
49	Software purchase	
50	Implementation costs – scripting and components	
51	Upgrade fees	
52	Annual help desk support	

Source - *Global Technology Audit Guide (GTAG) 3: Continuous Auditing: Implications for Assurance, Monitoring and Risk Assessment* released by the Institute of Internal Auditors (IIA)

Chapter 3

Academic and Regulatory Drivers to the Use of CAATs

3.1 Academic pronouncements issued by international Audit and Accounting regulators in the last decade have played an important role in promoting CAATs worldwide. Of these pronouncements the guidelines issued by the following regulators are significant:

- The Institute of Chartered Accountants of India
- The Institute of Internal Auditors, Delhi
- The Information Systems Audit and Control Association.

The Institute of Chartered Accountants of India

3.2 Recognising the developments in the field of technology and its impact on the auditing profession in India, Auditing and Assurance Standards Board had issued Standard on Auditing (SA) 401, "Audit in Computer Information System Environment". The Guidance Note on Computer Assisted Audit Techniques comes as a follow up to that AAS. The Guidance Note deals extensively, with the concept of CAATs and related pertinent issues such what CAATs are, where they may be used, considerations in use of CAATs, how to use CAATs, testing of CAATs, controlling application of CAATs, documentation required when using CAATs, use of CAATs in small entities, etc. The Guidance Note also contains a comprehensive appendix containing examples of CAATs, their description and comparable advantages and disadvantages of each of these CAATs.

Further, the date Standard on Auditing (SA) 315 and SA 330 come into effect, this Standard on Auditing shall stand withdrawn. The SA 315 and SA 330 are effective for audits of Financial Statement beginning on or after April 1, 2008.

The Institute of Internal Auditors, Delhi

3.3 The Global Technology Audit Guide (GTAG) 16 on 'Data Analysis Technologies' released by the Institute of Internal Auditors in August, 2011 is a significant and landmark International Professional Practices Framework (IPPF) - Practice Guide on use of CAATs.

The GTAG 16 cites related Standards/Guidance:

(i) Standard 2300: Performing the Engagement

Internal auditors must identify, analyse, evaluate and document sufficient information to achieve the engagement's objectives.

(ii) Standard 2310: Identifying Information

Internal auditors must identify sufficient, reliable, relevant and useful information to achieve engagement's objectives.

(iii) Standard 2320: Analysis and Evaluation

Internal auditors must base conclusions and engagement results on appropriate analyses and evaluations.

(iv) Practice Advisory 2320-1: Analytical Procedures

Internal auditors may use analytical procedures to obtain audit evidence. Analytical procedures involve studying and comparing relationships among both financial and non-financial information. The application of analytical procedures is based on the premise that, in the absence of known conditions to the contrary, relationships among information may reasonably be expected to exist and continue.

The Information Systems Audit and Control Association

3.4 The Information Systems Audit and Control Association released IT Audit and Assurance Guideline G3 – 'Use of Computer Assisted Audit Techniques (CAATs)' on 1st December 1998 which was subsequently revised on 1st March 2008. It lays down that "As entities increase the use of information systems to record, transact and process data, the need for the IS Auditor to utilise IS tools to adequately assess risk becomes an integral part of audit coverage. The use of computer-assisted audit techniques (CAATs) serves as an important tool for the IA auditor to evaluate the control environment in an efficient and effective manner."

Chapter 4

Stages in the Use of General Audit Softwares

4.1 Data analysis can be used throughout a typical audit cycle. While individual audit cycle definitions and steps may vary, the following breakdown provides some of the ways data analysis can be employed during various stages in an audit cycle.

Planning

4.2 Data analysis can be greatly effective in identifying data-driven indicators of risk or emerging risk in an organization. This can help audit define and create an audit plan that focuses on the areas of highest concern. The audit activity should consider prioritizing the use of data analysis for risk assessment during the audit planning stage, where the data is available, and where this approach is applicable.

Data analysis technology can be effectively employed to identify indicators of risk in a variety of processes. Consider the following examples:

- Revenue by location, division or product line.
- Revenue backlogs by value and age.
- Personnel changes in key positions (legal, finance, research and development).
- Volume of manual journal entries or credit notes.
- Aging accounts receivable balances or inventory levels.
- Vendor management (number of vendors, volume of transactions).
- Procurement card vs. purchase order procurement.
- Average days for customer payment.
- Industry code of supplier on credit card purchases.

Preparation

4.3 Data access and preparation can be a challenging step within the

audit process. Requests to IT departments can take weeks and the resulting data can often be incomplete or incorrect, making for an inefficient process. By using data analysis technology during the audit preparation phase, many of these delays can be avoided. Auditors skilled in the use of data analysis can source the data required for the audit engagement, do data integrity and validity checks, and prepare test routines for staff auditors to use once the audit commences. This will provide audit teams with streamlined access to reliable data sets or even automated access to multiple data sources to allow for quick and efficient analysis of data. Data should be housed in a centralized repository allowing the audit team to analyse data sets according to their authorization and need for access.

Testing

4.4 A great deal of audit testing uses organizational data to some extent, often to a significant extent. Due to ever increasing amounts of data, some auditors have relied on techniques, such as, sampling or spot checks. These techniques may be ineffective at uncovering anomalies and indicators of failed or inefficient internal controls. To improve effectiveness in the search for errors and unusual transactions, audit teams can use data analysis technology to analyse entire data populations. Once initial analysis is done, efforts can be focussed on areas where exceptions were found, making more efficient use of audit resources. The ability to automate repetitive tests by using analytic scripts increases overall departmental efficiency and allows for greater insight into high risk areas. Results and scripts should be stored in a central repository allowing audit team members to review findings and access and re-deploy analytical procedures.

Review

4.5 The analytic routines and the results they generate should be included in the audit review. This helps to ensure that conclusions drawn from using data analysis can be relied on and that any mistakes in the query are identified and corrected or that conclusions that were drawn from those results are not erroneous.

Chapter 5

Benefits Derived by Using General Audit Softwares

5.1 Data Analysis can help auditors meet their auditing objectives. By analysing data within key organizational processes, internal audit is able to detect changes or vulnerabilities in organizational processes and potential weaknesses that could expose the organization to undue or unplanned risk. This helps identify emerging risk and target audit resources to effectively safeguard the organization from excessive risk and improve overall performance. This also enables audit to identify changes in organizational processes and ensure that it is auditing today's risks – not yesterday's.

By analysing data from a variety of sources against control parameters, business rules and policies, audit can provide fact-based assessments of how well automated controls are operating. Data analysis technology also can be used to determine if semi-automated or manual controls are being followed by seeking indicators in the data. By analysing 100 percent of relevant transactions and comparing data from diverse sources, audit can identify instances of fraud, error, inefficiencies and / or non-compliance.

5.2 A number of significant benefits accrue from the use of General Audit Softwares for data analysis. Some of them are:

- Meet Current Audit Standards
- Supports the enterprise risk management system
- Uncover Fraud and Money Laundering
- Recover Costs
- Improves compliance with controls, business policies and regulation
- Facilitate Enterprise wide Continuous Auditing and Monitoring initiatives
- Enables insight into business operations and performance
- Improves auditor confidence and reduces audit costs
- Documents and retains learning

Data Analytics and Continuous Control Monitoring

- Enables faster reaction
- Improves governance, performance and accountability
- Responds to scrutiny from regulators
- Reduces compliance-related costs with Sarbanes Oxley and others regulations
- Improves financial reporting reliability
- Provides an essential component of the COSO model
- Generates support and documentation for CFO/CEO certification and auditors.

Chapter 6

Common General Audit Software Applications across Business Functions and Industries

6.1 General Audit Software applications can be used for intelligent analysis of electronic data from key business processes like, Purchase to Pay, Order to Cash, Payroll, Inventory and IT Security.

Purchase to Pay

6.2 Purchase to pay serves as a vital business cycle in any organization with valuable data analytical insights from a compliance, fraud and MIS point of view. The checklist below has been presented as a sample case study for reader creative visualization.

Procurement		
Area	Control	Data Analysis
Purchasing	Application will not allow a duplicate payment to be processed	Obtain purchase order data. Validate that no duplicate payments (same vendor/ same account) were processed.
	Purchase orders (POs) older than three months will not be processed.	Obtain a list of all POs processed. Determine if POs older than three months were processed.
	The person who creates the PO can't release/ approve the same PO.	Obtain a list of all POs created (by originator) Obtain a list of all POs released or approved. Determine, if any, inappropriate segregation of duties (SOD) existed.
Receiving	All goods received (GR) are validated against PO.	Obtain a list of all GR and POs placed. Validate that quantities are the

Data Analytics and Continuous Control Monitoring

		same.
Invoicing	PO should be created before supplier invoice is received.	Compare PO dates against invoice dates and make sure that there are no POs dated after invoice dates.
	Amount on PO should agree with amount on invoice.	Compare the PO amount against the invoice amount. Validate there are no differences.
Payment	Application should not allow duplicate payments.	Obtain a list of payments that have been made to vendors in the last 12 months. Determine if duplicate payments have been made, for example: <ul style="list-style-type: none">• Same vendor ID and amount but different invoice number.• Same vendor ID and invoice number but different amounts.• Different vendor ID with same bank account numbers.
Value adding services to organizational users	N/A	<ul style="list-style-type: none">• Total Spend.• Vendor wise spend.• Budget vs. actual• Age analysis.• Top vendors, products, locations

Order to Cash

6.3 The following audit tests are suggested when auditing an Accounts Receivable system. However, the exact tests carried out for a particular client will depend upon the system used and the data available. Common tests include:

(i) Mechanical Accuracy and Valuation

- Total the file. It often pays to separate debits and credits.
- Revalue foreign debts, if applicable.
- Check transaction totals to the balance on each account.

(ii) Analysis

- Profile debtors using **Stratification** to see the number of large debts and what proportion of value is in the larger items.
- Produce an aging debt analysis. Consider how to deal with unallocated cash and credit notes. IDEA, by default, ages these on their date rather than allocating against the oldest item or any other treatment. It is often worthwhile to split the file into invoices, unallocated cash, and so on using multiple extractions, and then to age the individual files.

(iii) Exception Tests - Existence and Valuation

- Identify old items (i.e., greater than three months old).
- Identify large balances either in their own right or compared to turnover.
- Select accounts for which no movements have been recorded in a set time.
- Report credit balances.
- Identify unmatched cash or credits.
- Compare balances with credit limits and report exceptions (i.e., accounts with balances in excess of their credit limits or accounts with no credit limits, etc.).
- Test for items with invoice dates or numbers outside the expected range.
- Identify partial payments of debts.
- Identify invalid transaction types.
- Identify customer addresses that are "care of" or flagged not to be sent out.

(iv) Gaps and Duplicates

- Test for duplicate invoices (both invoice number and customer/value).
- Use duplicate exception testing for less obvious input errors, such as the same vendor ID assigned to two different vendor names, the same vendor name assigned to two different vendor IDs, payment of the same invoice number and amount to two different vendors, and so on.

(v) Matching and Comparison Tests

- Compare the balance on an account with its turnover.
- Match the sales transactions to the customer master information to identify sales to new or unauthorized customers, and those with exceeded credit limits.
- Compare to Accounts Payable for possible contra accounts.

(vi) Sampling

Select samples (random or specific) for functional testing and confirmation (and produce confirmation letters).

Payroll

6.4 Payroll auditing is an excellent application of IDEA. The main objective is validity and accuracy by testing existence of employee and correctness of pay. There are many regulations and taxes associated with payroll and compliance with these can be checked easily. Privacy concerns may limit your testing.

(i) Analysis

- Summarize and stratify salaries by department/grade, etc.
- Profile employee ages/years of service to assist in forward planning.
- Analyze costs for special pay, overtime, premiums, etc.
- Summarize payroll distribution for reconciliation to general ledger.
- Summarize and compare costs for special pay, overtime, premium, etc.

(ii) Calculations

- Total gross pay, net pay, deductions and any other value fields.
- Check calculation of gross pay.
- Check calculation of net pay.

(iii) Exception Tests

- Extract all payroll checks where the gross amount exceeds set amount.

(iv) Reasonableness Checks

- Tax rates
- Pay/grade comparison
- Hours worked
- Overtime claimed
- Sickness taken
- Holiday taken
- Date of birth (under 18, over 60 years of age)
- Identify bonuses and other allowances
- Report activity on records for new or terminated employees
- Find changes in key payroll data, such as, gross pay, hourly rates, salary amounts, exemptions, etc.
- Identify and records with missing information (National Insurance number/Social Security number, tax code, employee number etc.).

(v) Gaps and Duplicates

- Duplicate employees (Social Insurance, National Insurance, Social Security numbers, Employee numbers, addresses) on payroll file
- Duplicate bank account details
- Duplicate names and date of birth.

(vi) Matching and Comparing

- Comparison of payroll file at two dates to determine recorded starters

and leavers, (hires and terminations) and changes in pay, etc., are as expected.

- Join payroll transactions file, to payroll master to determine if there are "ghost" employees on the payroll.
- Compare time-card entries and pay to payroll and indicate variances.
- Compare vendor addresses/ phone numbers and employee addresses/ phone numbers to identify conflict-of-interest (e.g., postcodes, phone numbers).

(vii) Sampling

- Most sampling options apply.

Inventory

6.5 The following tests are suggested when analyzing an inventory system. However, the exact tests carried out for a particular client will depend upon the system used and the data available.

Common tests include:

(i) Mechanical Accuracy and Valuation

- Total the file, providing sub-totals of the categories of inventory.
- Re-perform any calculations involved in arriving at the final stock quantities and values.
- Re-perform material and labour cost calculations on assembled items.

(ii) Analysis

- Age inventory by date of receipt.
- Compute the number of months each inventory item is held based on either sales or purchases. Produce a summary of this information.
- Stratify balances by value bands.
- Analyze gross profit.
- Analyze price adjustment transactions.

(iii) Exception Tests - Existence and Valuation

- Identify and total inventory held in excess of maximum and minimum inventory levels.
- Identify and total obsolete or damaged inventory (identified as such in the database).
- Identify balances in excess of a reasonable usage period that are probably obsolete.
- Identify items past their shelf life (if a sell by date or bought date is present on the system).
- Identify any items with excessive or negligible selling or cost prices.
- Identify differences arising from physical stock counts.
- Test for movements with dates or reference numbers not in the correct period (cut-off).
- Identify balances that include unusual items (i.e., adjustments).
- Identify work in progress that has been open for an unreasonable period.
- Identify inventory acquired from group companies.

(iv) Gaps and Duplicates

- Test for missing inventory ticket numbers.
- Test for missing transaction numbers.
- Identify duplicate inventory items.

(v) Matching and Comparison Tests

- Compare files at two dates to identify new or deleted inventory lines or to identify significant fluctuations in cost or selling price.
- Compare cost and selling price and identify items where cost exceeds net realizable value.
- Compare holdings and inventory turnover per product between stores.

Computer Security

6.6 General Audit Softwares gives any user the power to sift through Windows network security event logs to extract the entries that may have a security impact. Functions within the tool can be used to identify deviations from corporate policy, security breaches and inappropriate usage.

(i) System Logs

When auditing system logs, you may wish to:

- List:
 - Accesses outside standard office hours or during holiday/sick leave
 - All users with their normal computers
 - All computers with their normal users
 - Users on unusual computers.
- Identify users, particularly those with supervisory rights who are logged in for long period of time.
- Analyze by user - identify those with higher use than might reasonably be expected.
- Summarize by network address to identify.
- Summarize charges by user to determine resource utilization.
- Analyze utilization by period, such as, daily, weekly, and monthly, to show historical trends.

(ii) File Lists

When performing auditing tests in regards to computer security, you may wish to:

- List duplicate names (both software for multiple copies and data where there is a risk of accidental deletion).
- Identify old files.
- Analyze by directory.
- Analyze file sizes by owner.
- Identify last access dates for old files.

- Analyze file type (by file name extension).
- Identify all files without an owner, such as where user accounts have been removed from the system.
- Test for .com, .exe or .bat files in areas where there should not be programs, DOS/Windows systems.

(iii) Access Rights

In regards to access rights, you might decide to audit:

- Lists of:
 - Accounts with passwords not set or not required for access
 - Group memberships.
- Accounts with:
 - Short access passwords (less than the recommended six characters)
 - No activity in the last six months
 - Access to key directories
 - Supervisor status
 - Equivalence to users with high level access, such as supervisory equivalence.
- Aging of password changes.

(iv) E-mail Logs

E-mail logs generally contain information such as, the sender and recipient address, subject title, date and time of transmission, size of file, service provider, etc. Ensure the organization has a published policy related to employee use of e-mail before undertaking any of these tests. Common tests include:

- Total length of time spent on e-mails (receiving and responding) by organization as a whole, by individuals, by month
- Analyze internal and external e-mails
- Summarize by service providers
- Summarize numbers of e-mails by employee, sort in order
- Isolate, summarize and examine personal e-mails

- Stratify by time and examine any unusual activity e.g., lunchtime, weekends, bank holidays
- Stratify by size of files
- Analyze file attachments, by size, by type
- Analyze incoming e-mails, identify common domain addresses
- Calculate length of time individuals spent on e-mail in given time period, sort in order
- Match with list of employees and extract any e-mails that are sent by invalid employees
- Analyze any dormant accounts
- Identify non-work related e-mails by searching for specific words in the subject title e.g., weekend Auditing E-mail Logs,

(v) Firewalls

Many organizations implement a range of controls, including installing sophisticated firewalls to eliminate the risk of unauthorized access to their networks, especially via the Internet.

Firewall logs record all incoming and outgoing transmissions on a network and it is not unusual to record hundreds of thousands of activities in a single day. IDEA can be used to analyse the logs, identifying trends and exceptional items to follow up.

Firewalls generally contain information such as, the source and destination IP address, date and time of admission, action by the firewall on receipt of the transmission, the service type and the service port accessed.

Common tests include:

- A summary of the type of service being requested or being used
- Identifying the most common IP addresses attempting access to the network
- A summary of actions upon connection, i.e. control, accept or drop
- Analysing trends to determine the most common access times and identifying requests at unusual times
- Extract all dropped transmissions
- Identify potential attacks by looking for a pre-defined sequence of port scans e.g., SATAN, ISS attacks or searches for ports which can be used.

6.7 General Audit Software applications can be used for transaction testing, compliance review, fraud investigation, MIS reporting, advanced statistical forecasting and correlation, large database reconciliation of electronic data from different industry verticals.

Some of the illustrative usage scenarios are mentioned below:

(i) Manufacturing

- Detection of duplicate vendor bill booking and payment.
- Identification of ghost employees in a payroll file.
- Monitoring duplicate round sum journal entries booked on public holidays.
- Related party transaction scrutiny.
- Overtime reconciliation between payroll and departmental data.

(ii) Banking

- Capturing high value transactions on newly opened retail liability accounts.
- Presenting on retail assets having inconsistent credit score grading/classification.
- Monitoring trading on government security investments which are in the 'Held to Maturity' category.
- Tracking accounts opened with Prohibited party list.

(iii) Insurance

- Detecting healthcare fraud – same procedure, same third party administrator, same hospital different procedure cost.
- Capturing repetitive motor claims without related premium increase.
- Displaying insurance undertaken of stolen vehicles.
- Capturing close proximity life insurance claims.

(iv) Retail

- Computing inconsistent discounts offered towards the same retail selling scheme.
- Operational throughput analysis of cashier performance.
- MIS report generation of 'Top Schemes', 'Top Brands', and 'Top Cross-Selling Products'.
- Unauthorized system access of departed employee accounts and/or ghost accounts.

Chapter 7

Fraud Detection Using General Audit Softwares – Case Studies

Introduction

7.1 Today the genre of frauds and fraudsters are growing at an unbridled rate given availability of abundant complex data from legacy systems, ERP's and bespoke applications. This provides the Auditors, Fraud Investigators, Fraud Risk Management Experts and Business Process Owners the opportunity to mine and thereby generate intelligent patterns, trends and red-flag alerts from raw data. Companies need to incorporate a culture spanning related process and technology of making the best of Data Analytics in their Fraud Risk Management framework.

Evolution of Audit Automation Tools has been remarkable. The advent of new enabling technologies and the surge in corporate scandals has combined to increase the supply, the demand, and the development of enabling technologies for a new system of continuous assurance and measurement. Fraud analytic monitoring based assurance will change the objectives, timing, processes, tools and outcomes of the fraud investigation process definitively.

Given below are practical case-studies on the use of CAATs for detecting red flags, patterns, anomalies and alarming trends across industry verticals like 'Healthcare', 'Retail', 'Utilities', 'Banking' and 'Technical Plant Study's'.

Healthcare

Index of Case Studies

7.2 Index of Case Studies are as follows:

- Excessive Procedure Billing Of Same Diagnosis, Same Procedures.
- Identify excessive number of procedures per day or place of service per day / per patient.
- Identification of diagnosis and treatment that was clearly inconsistent with patient age and/ or gender.

Case Studies Explained

7.3 Excessive Procedure Billing of Same Diagnosis, Same Procedures

(i) Objective

To identify instances of excessive medical procedure billing for the same diagnosis and medical procedure.

(ii) Method

In this exercise, the Healthcare Claims transaction file was linked with the master file on the basis of the Diagnosis Code.

A computed numeric field was added to arrive at instances where excessive procedural charges had been claimed by the insured, in comparison to the current master charge list.

Cases were extracted where the difference exceeded 15% (Hypothetical acceptable variance norm across hospitals).

(iii) Functionality Covered

The exercise used the following GAS functionalities:

- Join files

The Healthcare Claims transaction file is opened and chosen as the active database. This file is the primary database. The master file for procedure rates is chosen as the secondary file.

The two files are linked together based on the similar field Diagnosis Code. The field is named differently in both the primary and secondary file as Diagnosis Code and Diagnosis Reference Code respectively. The link is still possible as both the fields are character in nature.

The option ALL RECORDS IN PRIMARY FILE is used as the joining command.

- Append a computed numeric field

Existing field values cannot be altered in the joined database hence preserving the data integrity of the whole database. However, a computed field of numeric nature is added to the resultant joined database. This computed field will contain the values based on the linked diagnosis code from the master file.

- Use the equation editor to write the criteria in the computed numeric field

A command is entered through the Equation Editor to arrive at the difference in medical procedure charges as per the transaction file and masters captured from the master file.

The command can be checked for syntax and validated for field nomenclature and construction.

- Data extraction to filter out the exceptions

Data extraction involves filtration of transactions from the joined file which meets the filtration command criteria. The values in the computed numeric field above are filtered for non-zero cases.

Zero values indicate billing of medical procedure charges as per the master table of charges. Non-zero cases represent deviations from the master table of medical procedure rates. Non-zero cases were trapped through the Data Extraction – Equation Editor Facility using the command “Audit Charge <> 0”. Here “<>” refers to NOT EQUAL TO.

Normally billings should proceed as per the master table of rates. However, options are available within the Med-Plus Software for overriding the master charges and applying manual charges on a case to case basis. These manual overrides were specifically investigated for its particulars.

7.4 Identify Excessive Number of Procedures Per Day or Place of Service Per Day / Per Patient

(i) Objective

To identify instances of excessive number of medical procedures conducted per day or place per patient.

(li) Method

In this exercise, the Healthcare Claims transaction file was used as the basis for the red flag check. A duplicate check was run on the Insured Name, Policy Number, and Hospitalization Date to identify possible duplicate claims for excessive medical procedures for the same insured patient. This test was further corroborated by a summarization/ consolidation of claims based on the insured name and policy number to generate multiple claim instances in excess of one hospitalization/ medical procedure.

Cases were identified where multiple medical procedures had been conducted on the same insured at the same hospital. The cases were referred by the Team to the expert medical officer who clearly identified the claims as unrelated and fictitious. For example, a cornea transplant of the eye was followed by a hernia operation which was medically absurd.

(lii) Functionality Covered

The exercise used the following GAS functionalities:

- Duplicate detection

In the duplicate test, exact vertical matches are detected within specific field or fields designated. The transactions file was used as the basis for the test. The insured name, policy number, and hospitalization date were selected as the key fields on the basis of which duplicates were to be detected.

In the GAS, an auto key field indexing was performed on the insured name, policy number, and hospitalization date to fasten the process of duplicate key detection. The duplicate test revealed a list of vertical matches which were to be investigated.

- Summarization

The GAS had a popular transaction consolidation function called summarization. The advantage of this function was that multi-field summarization was possible with generation of valuable insightful statistics like, MIN, MAX, AVG, VAR, DEVIATION and more. This superior functionality was accompanied by generation of multi-chart and multi-graph utilities in user friendly color rich formats which could be ported across office applications.

Summarization/ consolidation of claims was performed based on the insured name and policy number to generate a report of multiple claim instances in excess of one hospitalization / medical procedure. Here the key statistic used was COUNT rather than SUM. Just like in the first stage duplicate test, summarization was also preceded by an auto index facility on the key objective fields to increase the throughput of results.

- Data extraction to filter out the exceptions

Data extraction involves filtration of transactions from the joined file which meets the filtration command criteria.

Multiple claim instances in excess of one hospitalization/ medical procedure were trapped through the Data Extraction – Equation Editor Facility using the command “Count > 1”.

These vital cases and potential red-flag indicators were immediately taken up for scrutiny with the Chief Medical Officer at the concerned hospital. Patient health history reports were also studied to provide allowance for multi-health issues and failures on the same day warranting multi-medical procedures.

7.5 Identification of Diagnosis and Treatment that was Clearly Inconsistent with Patient Age and/ or Gender

(i) Objective

To identify diagnosis and treatment that was clearly inconsistent with the patient/ insured age and gender.

(ii) Method

The team set up value bands from the Claim Transaction file. The value bands were set up for 0-20000, 20001-50000, 50001-100000, 100001-200000, and more. The high value bands were designated as "A Class High Risk". "A Class High Risk" band corresponded to 10, 00,000 to 20,00,000. All the claims in this category were culled into a separate dump within the GAS.

All the claims in the A Class category were examined through the search function for the insured details like, age, gender, past medical history. Specific instances were observed with the assistance of the ace team medical expert wherein open heart surgeries were conducted for minors even though the medical history suggested otherwise. In one critical high value instance the insured (a male) had claimed large amounts for complex medical procedures normally conducted on elderly women.

(iii) Functionality Covered

The exercise used the following GAS functionalities -

- Stratified random sampling

In Stratified Random Sampling credence is given to distribution of individual transaction values between low, medium and high.

Judgment on the interpretation of low, medium and high rests with the GAS user based on consultation with the Medical Expert and past Industry experience of the team members.

The team set up intervals from the Claim Transaction file. The intervals were set up for 0-20000, 20001-50000, 50001-100000, 100001-200000, and more. The high value bands were designated as "A Class High Risk". "A Class High Risk" band corresponded to 10, 00,000 to 20, 00,000. All the claims in this

category were culled into a separate dump within the GAS using the random number table within the GAS.

The random number table generates a list of random numbers from the “A Class High Risk” interval based on its internal algorithms and generates a separate file of such instances.

- Data search

Data Search is an advanced tool within the GAS which can undertake simple, complex, structured, unstructured, fuzzy, single word or multi word searches quite similar to a web portal search engine.

Here with the aid of the medical expert specific key strings and character occurrences were trapped. Suspicious transactions were studied in depth along with the patient case paper file.

Specific instances like, open heart surgeries were conducted for minors even though the medical history suggested otherwise. In one critical high value instance the insured (a male) had claimed large amounts for complex medical procedures normally conducted on elderly women.

Retail

Index of Case Studies

7.6 Index of Case Studies are as follows:

- Reconciliation of Net Sales with Cash Takings, and Card Receipts.
- Inconsistent scheme discount rates offered by Cashier's to different customers against the same Scheme ID.
- Identifying the most efficient Cashier across all the Malls – Operational Throughput.
- Detecting transactions Out of Office hours.

Case Studies Explained

7.7 Point of Sale Systems from the Retail Industry – Malls

Point of Sale Applications deployed in Malls, generate comprehensive Sales Reports. These Reports may be conveniently saved in MS-Excel Data formats. This is an alternate to File Print options.

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These Sales Reports contain fields, like:

- Date of Sale
- Time of Sale
- Transaction Number
- Cashier Name
- Cashier ID
- Product Sold
- Quantity
- Rate
- Gross Value
- Taxes
- Scheme Discounts
- Net Value
- Scheme ID
- Scheme Details
- Collections in Cash
- Collections by Card
- Dues.

(i) Data Import

These MS-Excel Data Files once saved on the workstation containing the GAS or on the Local Area Network in a shared audit data folder can be accessed through the GAS's Import Assistant – Excel component. The process of import is simple and easy to apply, since Excel file Record Definitions are readily recognized by the GAS.

(ii) Data Analysis

- (a) Reconciliation of Net Sales with Cash Takings, and Card Receipts.

The fields of reference relevant to the objective being tested are:

- Net Sales
- Cash Collected
- Card Receipts

The process of interrogation in GAS followed is:

- Import the Sales Report for a given period through GAS's Import Assistant – MS Excel.
- Navigate to the Field Statistics in the Database Toolbar.
- View the numeric control totals for the Net Sales, Cash Collected and Card Receipts fields respectively.
- Normally the Net Sales should be arithmetically balanced by Cash Collections and Card receipts.
- In the case under review we notice a high percentage on Unpaid Bills almost 25% of the period's Net Sales.
- An overview of the Unpaid Bill cases through a Field Summarization reveals that the Due amounts are significantly concentrated on Cashier A and Cashier D.

These cases may be specially looked into by interrogating the concerned Cashier's, to ascertain their motive.

(b) Inconsistent scheme discount rates offered by Cashier's to different customers against the same Scheme ID.

The fields of reference relevant to the objective being tested are:

- Cashier ID
- Scheme ID
- Scheme Discounts
- Gross Value

The process of interrogation in GAS followed is:

- Navigating to Data in the Menu Tool Bar and selecting Field Manipulation.
- In Field Manipulation, appending a computed Virtual Numeric Field Discount % with the Criteria (Scheme Discounts*100 / Gross Value), rounded off to the nearest integer.
- Navigating to Analysis in the Menu Tool Bar and selecting Duplicate Key Exclusion.
- In Duplicate Key Exclusion, we identify different Discount % values for the same Scheme ID.

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- We get a list of cases where varying Discount % have been applied for the same Scheme ID.
- Some cases are extremely glaring, with the Discount % being as high as 45% where the Scheme ID warrants a Discount % of 15% only.

These cases may be specially looked into by interrogating the concerned Cashier, to ascertain his motive.

(c) Identifying the most efficient Cashier across all the Malls – Operational Throughput

The fields of reference relevant to the objective being tested are:

- Cashier ID
- Cashier Name
- Start Time
- End Time
- Quantity

The process of interrogation in GAS followed is:

- Create a new computed numeric field in the imported Sales File with the difference between the Start Time and the End Time using the criteria '@agetime(End Time, Start Time)'. This new field will give us the time taken by each cashier in seconds to scan, bag and bill all the items against that transaction.
- Create another computed numeric field with the criteria 'Difference in Time/ Quantity' to arrive at the Time taken to scan each item.
- Now perform a Field Summarization on the Cashier ID and Cashier Name with regard to the numeric field containing the Time taken to scan each unit.
- In the Field Summarization also include additional statistics like, Count and Average along with Min and Max. These statistics will give us the number of scans by a single Cashier in a given period, the minimum time for scan, the maximum time for scan and the average time to scan.
- In the Summarization result, sort the Time to Scan (Average) on a Descending basis.

- The Cashier with the best scan rate appears right on top.

The Management of the Mall Chain can select the Top 10 Cashier's from the above exercise and place them at the front desks on crucial days like, weekends or public holidays. This test is a concrete measure of customer service.

(d) Detecting transactions Out of Office hours

The fields of reference relevant to the objective being tested are:

- Start Time
- End Time
- Cashier ID
- Cashier Name
- Net Sales

The process of interrogation in GAS followed is:

- Perform a Data Extraction on the imported Sales File.
- Build criteria using the function .NOT. @betweenagetime(Start Time, "10:00:00", "22:00:00") .OR.. .NOT. @betweenagetime(End Time, "10:00:00", "22:00:00").
- This criteria will isolate all transactions out of the normal Mall working hours of 10 AM to 10 PM. Here we trap both Start Time and End Time.
- The Direct Extraction function within GAS is very popular on large databases say upwards of 1 Crore Transactions. The function first sorts the entire database and then runs the equation through the sorted database. Hence the results arrive faster than running an ordinary command on an unsorted database.

The case reveals around 50 transactions out of 1 Lac transactions where the Start Time and End Time are after office Hours at 10:30 PM. An explanation from the Mall In charge reveals that these transactions were all pertaining to Public Holidays, when schemes were launched and working hours were extended by two hours with local administration permission.

(e) Demand Study of New Products introduced into Pilot Mall Outlets across India

Malls introduce certain new products into Pilot outlets to study the Customer Behavioural patterns, spending patterns, loyalty to existing products rather than new substitutes and more.

In this interesting Business Case Study the following fields are considered:

- Transaction Number
- Product Number
- Quantity
- Net Sales

The process of interrogation in IDEA is as follows:

- The Transaction Number contains a combination of the Mall Outlet ID, the financial year and the transaction ticket number. The first 3 digits of the Transaction number represent the Mall Outlet ID.
- We append a new computed character field with the aim of getting the Mall Outlet ID into this field. This is performed through a criteria/equation @left (Transaction ID, 3). This function removes the first 3 digits from the Transaction Number and places the same in a separate computed field.
- A Field Summarization is performed on the imported Sales file on Mall Outlet ID and Product Number /Code with respect to Quantity and Net Sales.
- In the Summarization result, a direct extraction is performed on the Pilot Product Malls through the Equation @ list(Mall Outlet ID, "003", "005"...).
- A Top Records Extraction is performed with the Key field being the Mall Outlet ID, and the top 5 products in each of the 10 pilot malls are identified.

A detailed review of the final result broadly confirms the Management's expectation. All the new products have fared well in the 10 pilot malls save one product which has not been preferred over its long lasting existing competitor. This exercise has armed the Management with factual historical data from a truly representative sample of Mall Outlets. Now the Management is in a position to slowly and surely roll out the most liked products to the remaining Mall outlets over the next month.

Utilities – Electricity Companies

Index of Case Studies

7.8 Index of Case Studies are as follows:

- Recalculation of Revenue Heads.
- Verification of Subsidies provided by the State Government to defray the levy of Full Energy Charges to the Final Customer.
- Monitoring of Faulty Meters
- Duplicate Tests on Billing Information.

Case Studies Explained

(i) Recalculation of Revenue Heads–

Electricity Companies levy a host of charges to both household and industry customers. These charges vary from fixed processing cycle charges like, Meter Rent to variable charges like, Energy Charges. Many times the Company buys power from state private players to meet the power deficit. Charges levied by the private player to the electricity company are passed on to the final consumer. These Additional Supply Charges or Fuel Escalation Charges vary on an average from month-to-month.

The objective, description, rational and authority to raise these charges are stated in a Power Tariff Manual which is issued in the common interest of operators and customers for transparency. This manual always contains the formulae for the calculation of each charge very clearly. The user can get possession of this manual and identify the charges to be recalculated along with the formulae. Nowadays under the Right to Information Act, these Tariff Manuals are also available on the website of the Energy Major.

The user can then create a new computed numeric field (Virtual Numeric Field) within GAS and replicate the tariff manual formulae in the GAS's Equation Editor.

Illustration – $(\text{Units_Consumed} * 0.45) - \text{ASC}$

ASC – Additional Supply Charges stands for purchase of power from private players. The rate of 0.45 per unit as seen in the formulae above is announced by the State Electricity Regulatory Commission on a month-on-month basis. In this equation we are recalculating the ASC and arriving at possible differences between the recalculated ASC and the ASC levied by the billing system.

(ii) Verification of Subsidies Provided by the State Government to Defray the Levy of Full Energy Charges to the Final Customer.

In many States in India, the energy charges to be recovered by the Electricity Company are distributed between the final customer and the State itself. Here the State steps in and contributes to the Energy charges by way of a State Subsidy. The State Subsidy is invariably a percentage of the Net Billed Amount. The objective of the test is to ensure that the right amount is being recovered from the State by way of the Subsidy. The GAS user can accomplish this task easily by creating a new computed numeric field with the formulae:

$(\text{Net_Amt} * 0.40) - \text{Subsidy}$

Here we assume that the State supports the Energy Bill up to 40%.

Subsidies are normally provided to households and critical industry units. Hence the GAS user should obtain a listing of Customer Code Categories who are entitled to the Subsidy and those who have to bear the entire Energy Bill. With this information efforts can be made to identify incorrect Subsidies raised on the State for Customer Categories ineligible for the Subsidy. The User can make use of the Display or Extraction function in GAS to identify eligible and ineligible Customer Categories.

(iii) Monitoring of Faulty Meters

After power theft which ranges between 10%-30% in India, faulty meters are the next high-risk prone area for an Energy Major.

Billing Data Files invariably contain a field for Faulty Meters. If the meter is Faulty a flag 'Y' appears against the concerned Customer. If the meter is running, the flag 'N' appears in the respective field and cell. There is also an additional field available which states the date since when the meter has been faulty and the average units consumed. The average units consumed is updated based on the past usage and history of each user. This field is invariably manually updated by the Billing clerk. In the absence of automatic system generation of average units consumed, this area is ripe for mismanagement of revenues.

With the help of the GAS, the user can link the faulty meters, the average units consumed and the last consumption prior to the meter going faulty through the Visual Connector. The user can then create a new computed numeric field where the average units being billed fall short of the last active consumption reading by say 20% (norms can be decided on a case-to-case

basis depending on the Customer Class, Geographical Region and more). These cases can be taken up for review, discussion and scrutiny with the respective Regional Chief Electricity Engineers.

(iv) Duplicate Tests on Billing Information

The Billing file contains the Customer Number, Meter Number, Bill Number and Receipt Number where the Bill has been duly paid. As a part of the standard financial and revenue integrity testing, the user can employ the Duplicate Key test within GAS to look for possible duplicates in the combination of the following fields:

Customer Number

Meter Number

Bill Number and

Receipt Number

This test should normally reveal duplicates. The existence of duplicates could indicate an irregularity which needs to be investigated further or a Billing System application error.

Plant Technical Reviews

Index of Case Studies

7.9 Index of Case Studies are as follows:

- Plants experiencing frequent Breakdown Maintenance (BM)
- Plants experiencing Breakdown Maintenance (BM) immediately after Preventive Maintenance (PM) in the same month.
- Plants halted for Breakdown Maintenance (BM) beyond 24 hours.

Case Studies Explained

The Central Maintenance Cell (CMC) of a Manufacturing company was entrusted with breakdown maintenance and preventive maintenance for ten plant centres in the company. An electronic dump containing the following file layout was provided -

S No	Field Name	Field Type	Description
1	Plant Code	Character	
2	Plant Description	Character	
3	Maintenance Code	Character	"BM" for Breakdown

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			Maintenance and "PM" for Plant Maintenance
4	Description of Maintenance	Character	
5	Start Date	Date	DD/MM/YYYY
6	End Date	Date	DD/MM/YYYY
7	Start Time	Time	HH:MM:SS
8	End Time	Time	HH:MM:SS

(i) Plants experiencing frequent Breakdown Maintenance (BM)

Summarize the electronic dump on the Plant Code and Plant Description along with filtered criteria to extract all Maintenance Codes containing "BM". Performed this summarization to arrive at count of breakdown maintenance instances for each Plant centre. With the summarization file in place she finally performed a Top Records Filter to capture the 'Top 5' Plant Centres by highest frequency of breakdown maintenance. Armed with this information, the Head – CMC was able to investigate and diagnose the reasons for high breakdowns on specific Plant centres by looking at the age, usage, history of maintenance, nature of maintenance, plant output quality and allied details.

(ii) Plants experiencing Breakdown Maintenance (BM) immediately after Preventive Maintenance (PM) in the same month

Appended a new field to the electronic dump and captured the month of maintenance against each maintenance transaction activity. Perform a duplicate (exclusion) test on the Plant Code, Plant Description and Month with the field that must be different being Maintenance Code.

The resultant report provided a listing of plants being halted for "BM" immediately after "PM" in the same month. With the instances generated, the Head – CMC was able to investigate and diagnose the reasons for sudden breakdowns after preventive maintenance by studying the nature of preventive maintenance undertaken and the quality of maintenance spares used.

(iii) Plants halted for Breakdown Maintenance (BM) beyond 24 hours

Appended a new field to the electronic dump and captured the time taken to complete each maintenance activity by simply arriving at the difference between the 'Maintenance Start Time' and 'Maintenance End Time'.

Applied a filter to list Plants under 'BM' for more than 24 hours.

Finally converted the filtered report of 'Above 24 Hour BM cases' into a frequency distribution as below:

Stratum No	Stratum Details	Count	Maintenance Cost
1	24-48	5	50000
2	49-72	10	100000
3	73 & Above	3	250000

This frequency distribution allowed the Head – CMC to focus on pain areas in the Plant Maintenance process.

Benford's Law of Digital Analysis

Evolution of the Law and its Concept

7.10 Frank Benford was a physicist at GE Research Laboratories in the 1920s. He noted that the first parts of the log table books were more worn than the back parts. The first pages contain logs of numbers with low first digits. The first digit is the left-most digit in a number.

Frank Benford collected data from 20 lists of numbers totaling 20,229 observations. He found that the first digit of 1 occurred 31 percent of the time. Using integral calculus, he calculated the expected digit frequencies that are now known as "Benford's Law". It took Frank Benford six years to perform his analysis and develop his law of expected digit frequencies.

The Benford's Law task in IDEA can provide a valuable reasonableness test for large data sets. IDEA only tests items with numbers over 10.00. Number sets with less than 4-digits tend to have more skewed distributions and do not conform as well to Benford's Law. Positive and negative numbers are analyzed separately. This is because abnormal behavior patterns for positive numbers are very different from those for negative numbers.

Application to Data Mining

7.11 The application of Digital Analysis and the Benford Module is also permissible in the framework of Data Mining when certain distinctive facts in a data supply are measured against the personal expectations of the user and interpreted according to them. In this case it is not necessary for the data that is to be analysed, to create a Benford Set in a strict sense. In fact, it is permissible under these circumstances to analyse the numerical distribution of the leading digits of each data quantity and to interpret it independent of Benford's Law.

Assumptions of Benford's Law

Geometrical series

7.12 The mathematical pre-condition for the examination of a data supply based on Benford's Law is that the data supply is based on a geometrical series (thus, it is presented as a Benford Set). In reality this condition is rarely met. Experience shows however, that data must only partially meet this condition, i.e., the constant increase, percentage-wise of an element compared to the predecessor must only be met partially. Otherwise, this would mean that no number may occur twice which is quite improbable in the case of business data supplies. However, the pre-condition is that there is at least a "geometrical tendency".

Description of the same object

7.13 The data must describe the same phenomenon. Examples are:

- The population of cities
- The surface of lakes
- The height of mountains
- The market value of companies quoted on the NYSE
- The daily sales volume of companies quoted on the Stock Exchange
- The sales figures of companies.

Unlimited data space (non-existence of minima and maxima)

7.14 The data must not be limited by artificial minima or maxima. A limitation to exclusively positive numbers (excluding 0) is permissible as long as the figures to be analyzed do not move within a certain limited range. This applies, for example, to price data (e.g., the price of a case of beer will generally always range between 15 and 20 dollars) or fluctuations in temperature between night and day.

No systematic data structure

7.15 The data must not consist of numbers following a pre-defined system, such as account numbers, telephone numbers, and social security numbers. Such numbers show numerical patterns that refer to the intentions of the producer of the number system rather than to the actual object size, represented by the number (e.g., a telephone number starting with 9 does not mean that this person possesses a bigger telephone).

Statistical explanations for the Law

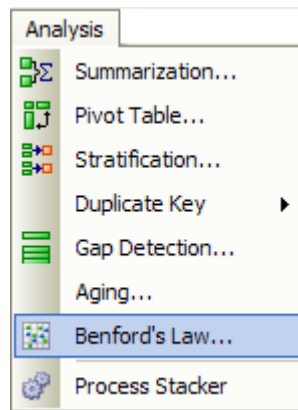
7.16 Basically, data complies best with Benford's Law if it meets the rules mentioned above, namely that the data consists of large numbers with up to 4 digits and the analysis is based on a sufficiently large data supply. A large data supply is necessary in order to come as close to the expected numerical frequencies as possible. For example, the expected frequency of the digit 9 in any data supply is 0.0457. If the data supply consists of only 100 numbers, the numbers which have a 9 as their first digit may be 5% of the data supply. Thus, in the case of a small data supply, there may be an over-proportional deviation from Benford's Law. In large data supplies, the numerical distribution is increasingly closer to the expected frequencies.

7.17 If the data supply has, or just roughly has, the characteristics mentioned above, it can be analyzed based on Benford's Law. However, the results of the Benford analyses are not interpretable on the basis of Benford's Law. As stated before, the expected frequencies according to Benford's Law often represent, in the practical use, nothing more than a type of benchmark for the observed frequencies. Since the observed frequencies will only be compared with the legality discovered by Benford, not interpreted accordingly, it is not necessary that all conditions mentioned above be met. In fact, the analysis results will help the internal auditor interpret the personal expectation of the user, without including the reference value according to Benford in the argumentation. If, for example, the personal expectation of the user is that the starting digit 4 must occur twice as often in the analyzed data than the starting digit 2, the results of the analyzed values must not be compared with the expected frequencies according to Benford but with the individual expectation of the user.

Case Study on Benford's Law within IDEA

7.18 Following are steps to run a Benford's Law analysis on any Accounts Payable database:

- (i) From the Analysis menu, select Benford's Law in IDEA Data Analysis Software.



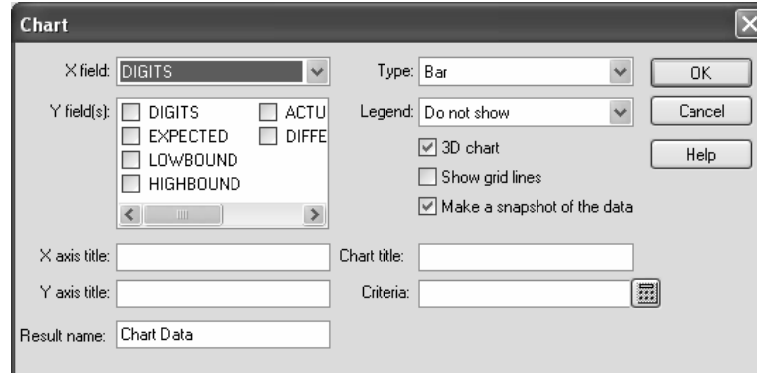
- (ii) In the Benford's Law dialog box, select **AMOUNT** as the field to be analysed. Accept all other default options as displayed in the image below.



Click OK to perform the analyses.

The **Benford First Digit** database becomes the active database. Other databases must be opened from the *File Explorer*.

(iii) To graph the data, select Chart Data from the Data menu.



In the Y field's box, select ACTUAL.

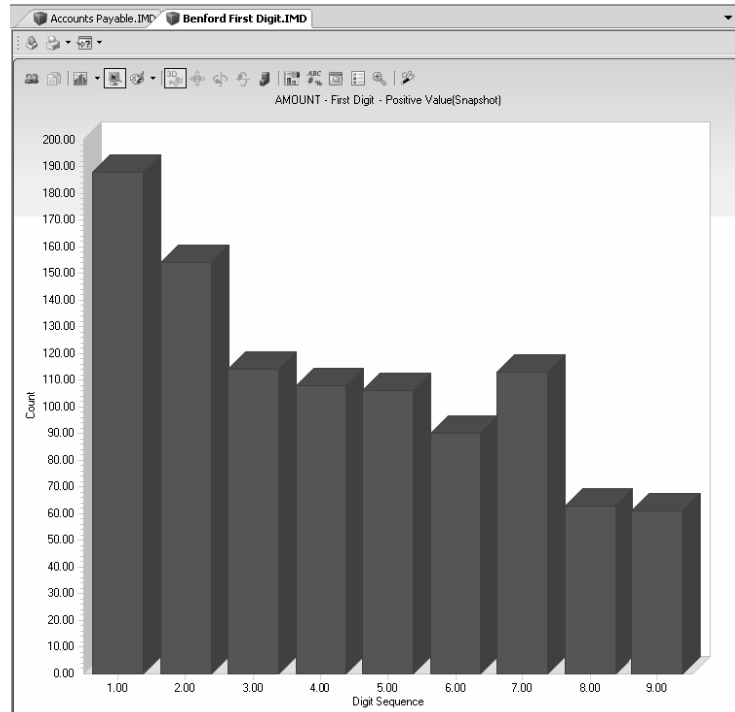
In the X axis title box, enter Digit Sequence.

In the Y axis title box, enter Count.

In the Chart title box, enter AMOUNT – First Digit – Positive Value.

Click OK.

The Chart Data Results output becomes active.



The first digit graph shows a spike in the digit 7 results.

Technical Notes

The **First Digit** test is the test of first digit proportions. The first digit of a number is the leftmost digit in the number. Zero can never be a first digit. This is a high level test. Analysts will not usually spot anything unusual unless it is blatant. This is a test of goodness-of-fit to see if the first digit actual proportions conform to Benford's Law. The **First Digit** test is an overall test of reasonableness. The upper and lower bounds are merely guidelines for the auditor. The **First Digit** graph could show a high level of conformity but the data set could still contain errors or biases.

(iv) Click the **Data** link in the *Properties Window* to return to the **Benford First Digit** database that was created as part of this analysis. The **DIFFERENCE** field shows the difference between the expected occurrences of the digits and the actual occurrences of the digits. When the **DIFFERENCE** field is indexed in ascending order, the digit 7 results show the largest negative difference (positive spike).

	DIGITS	EXPECTED	LOWBOUND	HIGHBOUND	ACTUAL	DIFFERENCE ▲
1	7	57.82	53.26	62.38	113	-55.18
2	5	78.94	73.61	84.27	106	-27.06
3	6	66.75	61.84	71.65	90	-23.25
4	9	45.62	41.57	49.67	61	-15.38
5	8	51.00	46.71	55.28	63	-12.00
6	4	96.62	90.72	102.52	108	-11.38
7	3	124.56	117.87	131.26	114	10.56
8	2	175.56	167.61	183.51	154	21.56
9	1	300.13	289.73	310.52	188	112.13

This result warrants further investigation as the CFO has indicated that any items in excess of Rs. 80,000.00 require additional approval. This spike could be indicating an abnormal level of items being processed just below the additional approval level – suspect skimming.

Chapter 8

Documentation of Process of Use of General Audit Softwares

8.1 Data identification and acquisition play a crucial role in the use of General Audit Softwares to facilitate the efficient and effective use of tools and pave the way to guaranteed results and returns from its use.

The stages in Data Identification and Acquisition are:

- Planning the deployment of the Tool
- Objective and Assurances
- Availability of data
- The flow of data in a system
- Identifying the file for interrogation
- Specifying the information required for use in the Tool
- Specifying the format of the data file
- File downloading and conversion
- The Standard requirements for data
- Modes of Data storage and transfer
- Help for Data Identification / Acquisition.

Regulatory Admissions

8.2 The Information Systems Audit and Control Association, U.S.A., has issued an IS Auditing Guideline on 'Use of Computer Assisted Audit Techniques (CAATs) Document G 3.

The excerpts of this Guideline on CAATs Planning Steps are as follows:

The major steps to be undertaken by the IS Auditor in preparing for the application of the selected CAATs is:

- Set the audit objectives of the CAATs.
- Determine the accessibility and availability of the organisation's IS facilities, programs/ system and data.

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- Define the procedures to be undertaken (e.g., statistical sampling, recalculation, confirmation, etc.)
- Define output requirements.
- Determine resource requirements, i.e., personnel, CAATs, processing environment (organisation's IS facilities or audit IS facilities).
- Obtain access to the organisation's IS facilities, programs/ system, and data, including file definitions.
- Document CAATs to be used, including objectives, high-level flowcharts and run instruction.

The documentation to be built up during the stages of Data Identification and Acquisition has been explained below.

Planning the Deployment of the Tool

8.3 The following are steps in planning

- The user needs to select the most appropriate file/ files for CAATs interrogations best suited to the objective on hand for testing.
- The user should make use of flowcharts of the client department's system to ascertain which files are being used. It is important to select data that is as close to the original data entry process as possible.
- The flow charts and file/ files selected should be documented and kept on record.
- Preferably the objectives along with the file/ files selected should be documented as below :

Illustration from a bank data analysis engagement

S No	Objective	File	Form	Fields	Source	Owner	Import Method
1	Identifying Current accounts where interest has been paid	CASA Interest Dump	Data Dump	Account No, Customer ID, Name, ROI, Product Code, Base Amt, Int Amt	Core Banking System	DBA	IDEA - ODBC

Objectives and Assurances

8.4 For any type of engagement it is necessary for the user to get to know the function and practices/ policies in place of the entity to be audited. This knowledge will help the user plan the engagement effectively. For example, in a Know Your Customer (KYC) Compliance Review – Duplicate Key Exclusion, Extraction, and Sampling plays a pivot role.

In order to achieve the stated objectives, a detailed knowledge of the system procedures needs to be made. These documents, policy notes, flow charts, need to be documented by the user as a part of his engagement evidence. In forensic reviews, the engagement evidence has to be irrefutable, exhaustive and unambiguous. IDEA has History. The History is the log of operations performed on a file within IDEA. The log cannot be deleted or altered but it can be printed.

Availability of Data

8.5 The user needs to have thorough knowledge of the operating system used by the entity being reviewed. He/ She needs to have a detailed knowledge of the application system being reviewed to identify the best possible data source and data format for each objective being reviewed.

User needs to engage in a meaningful discussion with the IT personnel of the entity. At times it makes sense to have an intermediary accompany the user. The intermediary could be chosen as a member having a good grasp of both audit and IT fundamentals like, an IT Auditor/ Functional Group Member/ Bank Reports Group Member. This meeting with the IT personnel needs to be undertaken formally with a clear written agenda and with space for the IT personnel response. Any format can be followed which is convenient to the user team so long as consistency of the approach document is always maintained.

The Flow of Data in the System

8.6 The user needs to obtain from the entity, Accounting Hand Books/ Process Manuals, Operational Process Flow Charts, etc., to have a clear understanding of details like, transaction files, master files affecting given lot of transactions. These flow charts need to be documented with the user and clear notes should be placed on the nature of data within the system. The approach document in terms of data identification, transfer, access and import from the auditee application System needs to be charted and buy-in should be obtained from the auditee, System Vendor, Database Administrator (DBA), User Wing and Top Management. This documentation will help the user in the current engagement as well as future cyclical engagements.

Identifying the File for Interrogation

8.7 The user must aim at selecting files which are closer to the raw data or initial input file. The study done by the user in the preceding stage will assist and facilitate in identification of such files. The user may choose to liaise with the Application Vendor or DBA to identify appropriate data files. This liaison may be done through email, written documents, in person, but never orally. When sending a request through email always insist on a read receipt acknowledgement. Combined requests will be preferred by the reader rather than piece meal request which can be annoying and time consuming. For example, the user must know when to use a detailed transaction file, or a summarized version of a file or a table directly from the database or a customer master files for instance.

Specifying the Information Required for the CAAT

8.8 Once the right file has been identified, it may contain information not required for the audit. At this stage it is prudent for the user to seek specific fields for his review. This has performance benefits for the user as the file import will get hastened with specific fields rather than all fields from the file. For example, a Data Table with 40 Million rows and 25 fields will take around x minutes for import within IDEA. The same table with 5-10 relevant fields will get done much faster. If the information to be sourced is not in the ideal format or key information is missing it may be necessary to liaise with the IT personnel to arrange some form of file manipulation such as an embedded audit module or a file manipulation program to produce the data in a more useful format. This request to IT has to be done in writing. For example, the Balancing Reports of Letter of Credit, Guarantees and Bills – customer wise, type wise, age wise are complex to generate within IDEA. These reports are ordinarily available in the Bank's Report Group Suite like, Business Objects. It is prudent to source the Balancing Reports from Business Objects in such a case.

File Download and Conversion

8.9 Once the data is readied the data may be placed on the User's PC, or it may be placed on a shared audit folder on the Local Area Network. If the data is not too large it can be sent through group office mail or even through secondary storage devices like, CDs, and Pen Drives. Data Transfer should always be accompanied by a virus scan at all times. The user upon receiving the data must sanitize the data i.e., clean the data to make it suitable to an IDEA Import compatible format. For example, MS-Excel files should be

cleaned – the first row should reflect the header row, there should be no blanks in the data grid, there should be no repeating header or footer rows in the data grid. Once the data is finally readied the user can deploy the best technique within the Tool for Data Import.

For example, MS-Excel for Excel Files from Business Objects/ SQL, Text for Comma Separated Value Files from Business Objects, Report Reader for Print Files from Crystal reports, ODBC for Data Tables from the ERP or Core Banking System Application Database and more.

8.10 The user may initiate further technical liaison in writing with the IT to improve the file layout – record layout for future. This usually occurs when the entity changes its Enterprise Resource Planning (ERP) or Core Banking System or migrates to a contemporary version of the application.

Who or What can help in Data Identification

8.11 The user needs to identify the right resource from the IT Section and Audit Section for the data analysis project. This identification can be done by seeking assistance from the Reports Group and the Heads of IT and Audit respectively. The criteria for selection like, knowledge of data, knowledge of file formats, cross sectional knowledge of functions, and more should be documented by the user. These criteria need to be provided to the DBA, IT Head and Audit Head while making the selection.

Specimen Format of a Data Indent – Bank Data Analysis Software Audit

8.12 The following is a specimen format for bank data analysis software audit:

To – Ms. ABC (DBA)

From – PQR (Audit Team Lead)

Date – 15th February, 2012

Subject – Data Request for review of 'Transactions on Newly Opened Current Saving Accounts (CASA)'

Pursuant to our recent meeting with respect to our planned audit of CASA, using IDEA Data Analysis Software, we would like to arrange for download of the attached data files and fields to the FTP Server set up for this purpose.

This review involves the audit of Transactions on Newly Opened Current Saving Accounts (CASA) in the following entities: Branch A, B, C and D. We understand your office can provide information for the following areas:

'Branch Transactions and Customer Account Masters'. Since this is an enterprise-wide review, we will be requesting similar data from Zonal Officers P, Q, R and S.

We request that each of the above entities be forwarded as separate files and that three files be created for each entity, to reflect all transactions captured by the systems for 1st April 2011 to 31st December, 2011.

To meet our planned review objectives and timing, the data must reflect all transactions captured by the system up to and including 31st December, 2011 and for Branches A, B, C and D.

To facilitate our CAAT analysis, the data should be given to us in the form of comma delimited text files and placed in "Data Analysis Audit" on Drive F.

Together with the data, please document the file record layouts, including the skip length, if applicable and record lengths. For each field, document the field name, field start position, field length, data type, and formats of numeric and date items. We also require documentation of Key control information, including the transaction cut-off date and time, the number of records in the file and control totals of numeric fields where applicable.

This represents our initial data request associated with this audit. We anticipate that it may be necessary for subsequent data requests, but we will endeavour to keep these requests to a minimum, in consideration of your time and resources.

We appreciate your assistance with data access, and look forward to working with you during the course of our audit. Kindly submit the requested electronic data no later than 20th February, 2012.

If you have any questions please do not hesitate to contact me on 123456789.

Specimen Format of a Data Analysis Software Working Paper

8.13 The following is a specimen format of a data analysis software working paper:

CAATs Working Paper Format (Client Name)

1. **Client and Location** – ABC Bank Ltd
2. **Review Period** – As on 01/03/2012

3. **Audit Area** – High Value Transactions on Newly Opened CASA Accounts
4. **Team Leader and Team Members** – PQR
5. **Audit Checklist Reference** – Bank Branch/Concurrent Audit/11-12/Branch Operations
6. **Audit Checklist Item Number** – 14
7. **Audit Objective (List in Detail)** – Transactions greater than 1 Lac on newly opened CASA accounts within 6 months of opening.
8. **Data Identified and Gathered** - Nature of Data – Branch Transactions and Customer Account Masters
Source of Data – Finacle – DBA Ms. ABC
Format of Data – Comma Text Delimited
Relevant Fields – CUST ID, ACCOUNT ID, TXN NO, TXN DATE, AC OPEN DATE, DEBIT, CREDIT, CUST NAME, ACCOUNT TYPE, TOTAL TXN VALUE, and PAN NO
9. **Input Reconciliation of Data Imported** – Record count and numeric total of field 'TOTAL TXN VALUE' reconciled between IDEA v8.5 and Comma Text Delimited file and found correct.
10. **Tests performed in IDEA** – Data – Extractions – Direct Extraction with criteria @age(@date(), AC OPEN DATE)>180 .AND. TOTAL TXN VALUE > 100000
11. **Results obtained** – YES. Exported to MS-Excel
12. **Conclusions and Recommendations** – Result file sent to Auditee Mr. Brown on 21.02.2012 by email on his email id brown@abcbank.com
13. **Auditee Feedback** – Feedback received on 23.02.2012 attesting to and accepting data analytical tool findings. Non-compliances accepted.
14. **Learning's** – 50 entries out of 5000 entries had blank AC OPEN DATE. This created false positives in the results obtained which were brought to our attention post use of IDEA Software. We have asked the auditee to populate the 50 blank cells with valid account opening dates from the account opening forms and resubmit for fresh data analysis by 24.02.2012.

Chapter 9

Challenges while Implementing Data Analytics

9.1 Embarking on an increased focus on data analysis using technology will likely have obstacles and challenges. The most common obstacles include underestimating the effort required to implement correctly, lack of Senior Management and Audit Committee support, lack of sufficient understanding of the data and what it means and the need to develop expertise to appropriately evaluate the exceptions and anomalies observed in the analysis. These and other obstacles are best addressed through a well thought out plan that commits sufficient resources and time.

9.2 A few recommendations to ensure that any implementation of a data analysis project is done with maximum benefit and least cost are:

- (i) Align your overall data analysis strategy with your risk assessment process, current audit plans and long terms audit goals and objectives.
- (ii) Manage your data analysis initiative like a program, focusing on your desired end-state of maturity.
- (iii) Develop a uniform set of analytic practices and procedures across assessment functions.
- (iv) Assign responsibility for data management, quality assurance and other key roles.
- (v) Document and/or comment scripted analytics to record the intent and context of the analysis being automated.
- (vi) Review and test analytics being used to ensure the results being generated are accurate and appropriate for the audit step being run.
- (vii) Establish a peer review of supervisory review process of analytics performed to safeguard against the reliance on results generated from using incorrect logic or formulas during analysis.
- (viii) Standardize procedures and tests in a central and secure repository.
- (ix) Safeguard source data from modification/ corruption – either through

Challenges while Implementing Data Analytics

- the type of technology being used to conduct the analysis or by analysing back-up data or mirrored data for audit purposes.
- (x) Address the potential impact of the analysis on production systems, either by scheduling analysis at off peak times or by using back-up or mirrored data.
 - (xi) Educate staff on how to interpret the results of the analysis performed.
 - (xii) Treat training as a continuous process, measured by on-going growth and continuous development of capabilities.
 - (xiii) Aim for constant improvement through leveraged use of data analysis software as analytics evolve over time.

Chapter 10

Application of CAATs to Bank Audit

Practical Case Studies on Audit of Term Deposits

Introduction

10.1 Term Deposits are deposits repayable after the expiry of a certain period. They are considered time liabilities of any bank. Term Deposits include fixed deposits, cumulative and recurring deposits, cash certificates, certificates of deposits, annuity deposits, deposits mobilized under various schemes, ordinary staff deposits, foreign currency non-resident deposit accounts, etc.

The internal auditor should satisfy himself that controls are in place and working as intended on acceptance of deposits, renewal of deposits, premature closure of deposits, maturity payment of deposits, and interest computation through the use of IDEA Data Analysis Software.

10.2 Banks also hold deposits designated in foreign currency e.g., foreign currency non-resident deposits. The auditor should examine whether internal instructions for reporting acceptance of such deposits to the RBI have been complied with. It should also be examined whether the bank has taken steps to ensure that it does not have to bear any loss arising out of exchange fluctuations between the date of acceptance of deposit and the date of its repayment.

10.3 Term Deposit Master Files normally contains the following fields:

- Term Deposit Account Number
- Deposit Certificate Number
- Deposit Line Number
- Currency Code
- Customer ID
- Customer Name
- Product Code
- Deposit Start Date

- Deposit Value Date
- Tenor
- Maturity Date
- Deposit Rate of Interest (ROI)
- Principal
- Maturity Value
- Deposit Closure Date
- Closure Rate of Interest
- Deposit Status.

Term Deposits Prematurely Closed, Interest Paid at Deposit Rate.

10.4 When term deposits are prematurely closed, interest on closure is normally paid at deposit rate for the period run less penal interest. The penal interest varies from Bank to Bank and Deposit to Deposit. This field is a computed field and normally not available at a native field within the database. The application system vendors should create such a field in the database which gets populated once a deposit is prematurely withdrawn or otherwise blank. This computed field is very critical to the process within IDEA.

A term deposit may be renewed more than once in which case a single term deposit account number will have multiple line entries and records which are represented by the Deposit Line Number in the database.

Depending on the scope of review, the IDEA user may consider all the renewals i.e. all the line items or just the last renewal using Top Records Extraction within IDEA.

The IDEA user extracts a list of cases where deposit closure date is before maturity date (i.e. premature closures) and closure Rate of Interest is equal to zero. This would mean that the bank has paid the deposit holder the deposit ROI rather than the premature closure ROI which is a clear violation of internal rules.

On arriving at a list of exceptions the IDEA user may perform a summarization of interest paid on closure for such violations so as to put a monetary value to the exception.

Term Deposits Closed within 15 days of Opening, Interest Paid

10.5 Where term deposits are prematurely closed before the maturity date and within 15 days of the account opening date, no interest should be paid on such deposits. Here the IDEA user creates a computed field within IDEA to reflect the differences in days between the Deposit Start Date and Deposit Closure Date. This test is conducted line item wise. Furthermore, an extraction is performed within IDEA using Top Records Extraction to cull out latest Term Deposit Accounts where Difference in Days, i.e., computed field is less than 15 and Closure Interest is not zero.

In one of the recent Reserve Bank inspections, the inspection team used IDEA to detect substantial interest payments to directors of the private sector bank even though their deposits had been prematurely closed within 15 days of opening. In fact in a very serious violation of rules, a single director had opened and closed deposits to the tune of 1 million within a single day and interest had been paid on such deposits.

Term Deposits Accepted for a Tenor Greater than 10 Years

10.6 In line with the RBI Guidelines, Banks are not allowed to issue Term Deposits for a term in excess of 10 years. The field "Tenor" in the Term Deposit Master file is maintained in months in this case.

The IDEA user is required to perform an extraction on the Term Deposit Master file with the criteria tenor is greater than 120 (i.e. 10 years * 12 Months).

At times the tenor is maintained in days in which case a complex equation like the one below will have to be written to cater to day approximations.

```
(@age(dat_maturity_date,dat_value_date_date) / 365 > 10 ) .AND.  
(@day(dat_maturity_date) <> @day(dat_value_date_date)) .AND.  
(@month(dat_maturity_date) <> @month(dat_value_date_date))
```

Normally, the banks systems are configured to prohibit this non-compliance through Core Banking System Internal Checks. Seldom will you encounter an exception on this control assertion.

Term Deposit Accounts Opened Subsequent to Value Date

10.7 Term Deposits when opened affect two date fields within the system – Deposit Start Date and Deposit Value Date. When a deposit-holder opens

a deposit for the first time his deposit start date and deposit value date will almost resemble the same date ordinarily. However if it is a renewal of a deposit (i.e. say maturity date of earlier deposit is 30.06.09 and renewal is done on 12.07.09 – within 15 days of earlier maturity date, then the start date of the new deposit will be 01.07.09 but the value date will be 12.07.09 – Interest will accrue on the renewed deposit from 01.07.09. On the other hand - say maturity date of earlier deposit is 10.06.09 and renewal is done on 12.07.09 – greater 15 days of earlier maturity date, then the start date of the new deposit will be 12.07.09 and the value date will also be 12.07.09 – Interest will accrue on the renewed deposit from 12.07.09.). From the above one may notice that the start date will always precede the value date or be equal to the value date but it should not be greater than the value date.

The auditor can test such control point failures by extracting deposit accounts where the value date is lesser than the start date.

Term Deposits where Maturity Proceeds Above Rs. 20,000 are Paid in Cash

10.8 Term Deposits where the maturity amount is greater than Rs. 20,000 must be settled through an account transfer or check or pay order but not through cash. This is a violation of the Income Tax Act and Rules and normally is a reportable finding in Bank Tax Audits.

The IDEA incumbent must proceed to identify term deposits where the deposit status is closed and closure amount paid is greater than Rs. 20,000/-

Armed with this information, the auditor needs to perform a look up on the Term Deposit Account Ledger through Account Number. Once the file is combined the user must identify general ledger codes in the TD Ledger which represent cash codes for the Bank.

Term Deposit maturity payments in cash over Rs. 20,000/- tantamount to an exception and a statutory compliance violation.

Identifying Irregular Recurring Deposits during the Review Period

10.9 Where a recurring deposit installment is not paid on time and when the number of delayed installment payments is more than 4 in a given period, this RD is treated as irregular. Where a recurring deposit installment is not paid on time and when the number of delayed installment payments is more than 4 in continuation for a given period, this RD is treated as discontinued.

The auditor adds a computed field to the RD INSTALLMENT TRANSACTION FILE where if the installment paid date is greater than the maturity date, installment line wise a flag (for e.g. "YES") is placed in the new computed field. If the payments are within the maturity date a flag "NO" is placed in the computed cell. This test can be performed through a @IF function within IDEA.

The auditor proceeds to sum up the count of "YES" flags in the file against each RD account for a given review period through IDEAs SUMMARIZATION function. If the count exceeds 4 the auditor extracts such RDs into a separate file called irregular RDs.

Missing Term Deposit Certificates

10.10 The auditor is bound to check serial control on Term Deposit Receipt generation. Special attention needs to be paid to Lost Receipts, Cancelled Receipts, Duplicate Receipts Generated and Issued and more since they affect the monetary interest of the Bank directly.

The Term Deposit Account Master file contains the Deposit Certificate Number.

The IDEA user can run a GAP DETECTION on the above file, on the Deposit Certificate Number field for OPEN Term Deposits only.

Missing certificate numbers need to be taken up for close scrutiny with the Physical Register for Term Deposit Maintenance.

For instance lost TD Receipts can only be secured / administered through a formal process of indemnity by the deposit holder on notarized stamp paper. Through the process of GAP DETECTION the auditor will get an inventory of missing receipts (some lost) where he could check record of the indemnity submissions at the Bank.

Practical Case Studies on Revenue Assurance

Introduction

10.11 Section 30 of the Banking Regulation Act, 1949 requires the auditor of a banking company to state whether the profit and loss account shows a true balance of profit and loss for the period covered by such account. Similar provisions exist in the Banking Companies (Acquisition and Transfer of Undertakings) Acts of 1970 and 1980 which are applicable in respect of nationalized banks.

10.12 The profit and loss account as set out in Form B of the Third Schedule to the Act has three broad heads: income, expenditure and appropriations. Interest/ discount on advances/bills and Interest on Deposits form a valuable component of Income. The auditor should, on a test basis, check the rates of interest etc. with sanctions and agreements and the calculation of interest. He should examine with the aid of CAATs whether:

- Interest has been charged on all performing accounts up to the date of the balance sheet. According to the guidelines for income recognition, asset classification etc., issued by the Reserve Bank of India, a bank cannot take to income unrealized interest on any non-performing advanced;
- Discount on bills outstanding on the date of the balance sheet has been properly apportioned between the current year and the following year;
- Interest on inter-branch balances has been eliminated in the consolidated profit and loss account of the bank; and
- any interest subsidy received (or receivable) from the Reserve Bank of India in respect of advances made at a concessional rates of interest is correctly computed.

10.13 The CAAT auditor may also co-relate the interest on advances/deposits with the amount of outstanding advances/deposits outstanding using advanced statistical functions like, Correlation.

The following items under Income category can be checked with the aid of CAATs:

- Commission on bills for collection.
- Commission/exchange on remittances and transfers.
- Commission on letters of credit and guarantees.
- Brokerage on securities.
- Earnings on exchange transactions.
- Earnings on sale of investments.
- Earnings on sale of Fixed Assets.

Practical Case Studies – Illustrations

Account Maintenance

10.14 The following are important aspects:

Risk - Non-recovery of Service Charges on non-maintenance of minimum balance in Saving and Current accounts.

Risk Description - Saving and Current accountholders need to mandatorily maintain a minimum quarterly balance in their accounts.

The minimum balance to be maintained depends upon the type of account (Saving General, Current etc.), type of customer (Individual, Staff, Pensioner, Corporate Salary Account etc.), cheque book issue status (issued, not issued) and type of branch (urban, rural etc.).

The minimum balance required to be maintained by each account holder is entered in the Core Banking System by the Branch under the field "minimum balance required" in the CASA Master. Since this activity is performed at the Branch level and not the Central IT level it may be subject to branch errors of commission.

Non-maintenance of the required minimum balance attracts a system levied service charge. Once again this service charge may be waived with due permission (in case of dormant accounts for instance) or possibly with certain mal-intentions at the account level by the Branch by applying a flag "N" in the field "SC MIN BAL FLAG" in the CASA Master.

The Bank Auditor must verify the accuracy of both the "minimum balance required" and "SC MIN BAL" to be maintained in the CASA Master.

Procedure within IDEA

10.15 The following procedure may be applied:

(i) Open the CASA Master within IDEA.

(ii) SAVING ACCOUNT WITH CHEQUE BOOK AND INCORRECT MIN BALANCE REQUIRED TO BE MAINTAINED - Perform Data - Direct Extraction on the CASA Master by applying the command -

`(@list(product code, "SB GEN") .AND. chequebook issued flag = "Y" .AND. @nomatch(customer type code, "STAFF", 'EX STAFF', "PENSIONER") .AND. minimum balance required <> 1000).`

This report will provide a list all Saving accounts (other than NRE), who are

not STAFF, EX-STAFF, PENSIONER, having a cheque book facility and where minimum balance required to be maintained in the account as per the system is other than Rs. 1000. Rs. 1000 is defined by the Bank Policy.

(iii) SAVING ACCOUNT WITHOUT CHEQUE BOOK AND INCORRECT MIN BALANCE REQUIRED TO BE MAINTAINED - Perform Data - Direct Extraction on the CASA Master by applying the command -

(@list(product code, "SB GEN") .AND. chequebook issued flag = "N" .AND. @nomatch(customer type code, "STAFF", 'EX STAFF', "PENSIONER") .AND. minimum balance required <> 500).

This report will provide a list all Saving accounts (other than NRE), who are not STAFF, EX-STAFF, PENSIONER, having no cheque book facility and where minimum balance required to be maintained in the account as per the system is other than Rs. 500. Rs. 500 is defined by the Bank Policy.

(iv) CURRENT ACCOUNT WITH CHEQUE BOOK AND INCORRECT MIN BALANCE REQUIRED TO BE MAINTAINED - Perform Data - Direct Extraction on the CASA Master by applying the command -

(@list(product code, "CURRENT") .AND. chequebook issued flag = "Y" .AND. minimum balance required <> 5000).

This report will provide a list all Current accounts, having a cheque book facility and where minimum balance required to be maintained in the account as per the system is other than Rs. 5000. Rs. 5000/- is defined by the Bank Policy.

CASA ACCOUNTS WHERE MINIMUM BALANCE SERVICE CHARGES NOT RECOVERED - Perform Data – Direct Extraction on the child files generated above at Step 1, 2, 3 and 4 by applying the command –

SC MIN BAL FLAG = "N"

This report will provide a list of all Saving and Current accounts where minimum balance required to be maintained is other than the policy and system is not applying service charges for non-maintenance of minimum balance.

Transaction Maintenance

10.16 The following are important aspects:

Risk - Non-recovery of Folio Charges on Saving accounts.

Risk Description - Folio charges are to be recovered in case of Saving accounts having withdrawals in excess of 50 numbers/lines per half year. The charges per withdrawal in excess of 50 may differ from Bank to Bank and type of Saving account.

Procedure within IDEA

10.17 The following are procedures that may be applied:

- (i) Open the CASA Ledger within IDEA.
- (ii) SAVING ACCOUNT WITH WITHDRAWALS FOR HALF YEAR - Perform Data - Direct Extraction on the CASA Ledger by applying the command -

(@isini("SAVING", product name) .AND. @list(tran code, 1001, 6101, 1006, 1013) .AND. @betweendate(tran date, "20080401", "20080930"))

This intermediate report will provide a list all withdrawals through cash (1001), cheque (6101), debit funds transfer (1006) for all Saving accounts for the half year transaction period April 2008 to September 2008.

- (iii) SAVING ACCOUNTS WITH CUMULATIVE WITHDRAWALS FOR HALF YEAR - Perform Analysis - Summarization on the above intermediate report. "Fields to Summarize" to be selected from drop down field list as "account number". This intermediate report will provide account wise summary of all withdrawals - cash, cheque, debit funds transfer for all SAVING accounts for the transaction period April 08 to September 08 along with the number of withdrawals (i.e. entries).

- (iv) COMPUTATION OF SERVICE CHARGES - Perform - Data - Field Manipulation - Append - Virtual Numeric field having name "Service Charges" to the intermediate report generated at Step 3 above. Enter the command **no_of_recs * 1** in the parameter. This new field will provide Service Charges (Folio Charges) to be recovered from the account holder towards excess withdrawals over 50 entries.

- (v) IDENTIFYING SAVING ACCOUNTS WITH WITHDRAWALS IN EXCESS OF 50 - Perform Data - Direct Extraction on the intermediate report generated at Step 4 above by applying the command -

(no_of_recs > 50)

This final report will provide all SAVINGS accounts where half yearly withdrawals are greater than 50 entries along with Service Charges to be recovered.

These cases can be checked physically with the Statement of Accounts for the relevant Saving accounts in the final report for recovery of folio charges and the accuracy of charges recovered.

Cheque Maintenance

10.18 The following are important aspects:

Risk - Non-recovery of Cheque Book Issue Charges on Saving accounts.

Risk Description - Cheque Book issue charges are to be recovered in case of Saving accounts having cheque leaves issued in excess of 60 numbers per year. The charges per cheque leaf issued in excess of 60 may differ from Bank to Bank and type of Saving account.

Procedure within IDEA

10.19 The following procedure may be applied:

- (i) Open the Cheque Report within IDEA.
- (ii) SAVING ACCOUNTS WITH CHEQUES ISSUED DURING ANY YEAR
- Perform Data - Direct Extraction on the Cheque Report by applying the command -
`(@isini("SAVING", product name) .AND. @betweendate(cheque issue date, "20080101", "20081231") .AND. cheque leaves > 60 .AND. .NOT. @isini("staff", product name))`

This intermediate report will provide a list all cheque leaves issued in excess of 60 leaves for SAVING NON STAFF accounts in the transaction period of January 2008 to December 2008.

- (iii) COMPUTATION OF CHEQUE ISSUE CHARGES - Perform - Data - Field Manipulation - Append - Virtual Numeric field having name "Cheque Issue Charges Savings" to the intermediate report generated at Step 2 above. Enter the command `(cheque leaves-60) * 2`. This new field will provide Cheque Issue Charges to be recovered from the account holder.

- (iv) CHEQUE BOOK ISSUE CHARGES RECOVERED DURING ANY YEAR - Perform Data - Direct Extraction on the CASA Ledger by applying the command -

`(tran desc = "SC For Cheque Book Issue" .AND. @isini("SAVING", product name))`

This intermediate report will provide a list of transactions on SAVING

accounts where service charges for cheque book delivery have been recovered.

(v) CHEQUE BOOK ISSUE CHARGES NOT RECOVERED DURING ANY YEAR – Perform - File - Join - select the intermediate report generated in Step 2 above as the Primary File. Select the intermediate report generated in Step 4 above as the Secondary File. Click on Match. Match the two files on matching key – “account number” in Primary file and “account number” in Secondary file. Use the Join condition “Records with no Secondary Match”.

This final report will provide a list of SAVING accounts where cheque leaves issued in any year are more than 60 (annual free cheque leaves entitlement) and cheque book issue charges have not been recovered.

10.20 The following are important aspects:

Risk - Non-recovery of Cheque Book Issue Charges on Current accounts.

Risk Description - Cheque Book issue charges are to be recovered in case of all cheques issued to Current account holders. The charges per cheque leaf issued may differ from Bank to Bank.

Procedure within IDEA

10.21 The following procedure may be applied:

- (i) Open the Cheque Report within IDEA.
- (ii) CURRENT ACCOUNTS WITH CHEQUES ISSUED DURING ANY YEAR - Perform Data - Direct Extraction on the Cheque Report by applying the command -

(@isini(“CURRENT”, product name) .AND. @betweendate(cheque issue date, “20080101”, “20081231”)

This intermediate report will provide a list all cheque leaves issued to CURRENT accounts in the transaction period of January 2008 to December 2008.

- (iii) COMPUTATION OF CHEQUE ISSUE CHARGES - Perform - Data - Field Manipulation - Append - Virtual Numeric field having name “Cheque Issue Charges Current” to the intermediate report generated at Step 2 above. Enter the command **(cheque leaves) * 2**. This new field will provide Cheque Issue Charges to be recovered from the account holder.

- (iv) CHEQUE BOOK ISSUE CHARGES RECOVERED DURING ANY YEAR - Perform Data - Direct Extraction on the CASA Ledger by applying the command -

(tran desc = "SC For Cheque Book Issue" .AND. @isini("CURRENT", product name))

This intermediate report will provide a list of transactions on CURRENT accounts where service charges for cheque book delivery have been recovered.

(v) CHEQUE BOOK ISSUE CHARGES NOT RECOVERED DURING ANY YEAR – Perform - File - Join - select the intermediate report generated in Step 2 above as the Primary File. Select the intermediate report generated in Step 4 above as the Secondary File. Click on Match. Match the two files on matching key – “account number” in Primary file and “account number” in Secondary file. Use the Join condition "Records with no Secondary Match".

This final report will provide a list of CURRENT accounts where cheque leaves are issued in any year and cheque book issue charges have not been recovered.

10.22 The following are important aspects:

Risk - Non-recovery of Stop Payment Charges on Cheques Stopped for Payment

Risk Description - Stop Payment charges are to be recovered in case of all cheques stopped for payment in Savings accounts. Stop Payment charges vary between Banks. Reserve Bank of India has instructed Commercial Banks in India to rationalize and maintain reasonableness to the levy of such charges.

Procedure within IDEA

10.23 The following procedure may be applied:

(i) Open the CASA Ledger within IDEA.

(ii) SAVING ACCOUNTS WITH CHEQUE STOP PAYMENT CHARGES - Perform Data - Direct Extraction on the CASA Ledger by applying the command -

(@isini("stop", tran desc) .AND. @isini("SAVING", product name) .AND. staff flag = "N" .AND. customer type name = "INDIVIDUAL")

This intermediate report will provide a list of all INDIVIDUAL SAVING NON STAFF accounts where the transaction narration contains the word 'STOP'. This report will display a list of all stop payment charges recovered from the customer through the CASA Ledger.

(iii) Open the Stop Cheque Report file within IDEA.

(iv) STOP PAYMENT INSTRUCTIONS ISSUED on SAVINGS ACCOUNTS - Perform Data - Direct Extraction on the Stop Cheque Report by applying the command -

```
(cheque status flag = "S" .AND. @isini("SAVING", product name)
.AND. staff flag = "N" .AND. @betweendate(stop date, "20080101",
"20081231"))
```

This intermediate report will provide a list of all cheque stop payment instructions issued on SAVINGS NON STAFF accounts in the transaction period of January 2008 to December 2008. This query can be modified to any annual review period.

(v) CHEQUE STOP CHARGES NOT RECOVERED DURING ANY YEAR – Perform - File - Join - select the intermediate report generated in Step 4 above as the Primary File. Select the intermediate report generated in Step 2 above as the Secondary File. Click on Match. Match the two files on matching key – “account number” in Primary file and “account number” in Secondary file. Use the Join condition “Records with no Secondary Match”.

This final report will provide a list of SAVING NON STAFF accounts where stop payment instructions are issued in any year and cheque stop payment charges have not been recovered.

This objective can be suitably modified to check stop payment charges for CURRENT, OVERDRAFT, and CASH CREDIT accounts too.

(vi) CHEQUE STOP CHARGES NOT CORRECTLY RECOVERED DURING ANY YEAR – Perform - File - Join - select the intermediate report generated in Step 4 above as the Primary File. Select the intermediate report generated in Step 2 above as the Secondary File. Click on Match. Match the two files on matching key – “account number” in Primary file and “account number” in Secondary file. Use the Join condition “Matches Only”.

This final report will provide a list of all SAVINGS NON STAFF accounts where stop payment instructions have been issued and stop charges have been recovered.

These cases need to be checked physically by the auditor for accuracy of recovery of stop charges.

Temporary Overdraft Interest Charges

10.24 Non recovery of interest on Temporary Overdrafts (TODs) granted to Saving Accounts.

Introduction

10.25 TODs are granted by the Bank to an account holder when the account holder is short of available balance to meet specific payments on his account. The TOD is granted under the assurance by the account holder that the temporary overdraft would be made good through incoming funds in transit. TODs can be System TODs or Adhoc TODs. An accountholder should normally not be granted multiple TODs until earlier TODs are regularized. TODs which are not regularized within the limit end date should be specially taken up for scrutiny. Consistent delay in regularizations on few accounts should be dealt with strictly through punitive action.

Method within IDEA

10.26 The following method is recommended:

- (i) Open CASA TOD Ledger within IDEA.
- (ii) SAVING ACCOUNT TOD INSTANCES GRANTED - Perform Data - Direct Extraction on the CASA TOD Ledger by applying the command -

(product name = "SAVING")

- (iii) Open CASA ledger within IDEA.
- (iv) INTEREST CHARGED on SAVING ACCOUNT TOD INSTANCES - Perform Data - Direct Extraction on the CASA Ledger by applying the command –

(tran code = 5002 .AND. product code = 101)

Tran code 5002 stands for INTEREST DEBITS and PRODUCT CODE 101 stands for SAVING GENERAL accounts.

- (v) ACCOUNT SUMMARY LIST OF SAVING TODs – Perform Analysis - Summarization on the intermediate report generated at Step 2. Select 'account number' as Fields to Summarize.

ACCOUNT SUMMARY LIST OF INTEREST CHARGED ON SAVING TODs - Perform Analysis - Summarization on the intermediate report generated at Step 4. Select 'account number' as Fields to Summarize.

INTEREST NOT CHARGED ON SAVINGS TODs GRANTED – Perform - File - Join - select the intermediate report generated in Step 5 above as the Primary File. Select the intermediate report generated in Step 6 above as the Secondary File. Click on Match. Match the two files on matching key –

"account number" in Primary file and "account number" in Secondary file. Use the Join condition "Records With No Secondary Match".

Practical Case Studies on Compliance Review

Introduction

10.27 The importance of internal control in banks cannot be over-emphasised. Bank deal primarily with cash and readily encashable documents. It is essential that they take every precaution to guard themselves against errors and frauds committed by their constituents or by its own employees.

The following are the main principles of internal control in a bank:

- (a) Every transaction should be checked and authorized by authorized persons before it actually takes place.
- (b) Every transaction should be entered in the books before the next transaction is authorized.
- (c) The routine procedure should be such as to prevent and detect errors and frauds in the normal course and before interests of the bank are adversely affected.
- (d) There should be a regular as well as surprise checks by inspectors and internal auditors who should constantly review the working of all departments.

10.28 The Statement on Standard Auditing Practices (SAP) 1, *Basic Principles Governing an Audit*¹, issued by the Institute of Chartered Accountants of India, states (paragraphs 19-20):

"The auditor should gain an understanding of the accounting system and related internal controls and should study and evaluate the operation of those internal controls upon which he wishes to rely in determining the nature, timing and extent of other audit procedures.

Where the auditor concludes that he can rely on certain internal controls, his substantive procedures would normally be less extensive than would otherwise be required and may also differ as to their nature and timing."

¹ Refer SA 200 (Revised), "Overall objectives of the Independent Auditor and the Conduct of an Audit in Accordance with Standards on Auditing".

Internal control evaluation is a key phase in Compliance Audits. In the case of audit of banks, it assumes even greater importance due to the enormous volume of transactions entered into by banks. Evaluation of the design and operation of internal control system enables the auditor of a bank to perform more effective audits. Therefore, the auditor of a bank should study and evaluate the design and operation of internal controls. This would assist him in determining the nature, timing and extent of substantive procedures in various mainstream bank areas, depending upon whether the internal controls are adequate and observed in practice.

CAATs facilitate the Internal Control evaluation through deployment of comprehensive analytical routines to detect control failures and missing controls.

Introduction of Current Accounts by an Accountholder other than Current

10.29 In the CASA Account Master file, identify introducer customer number/account number with product type through file join operations and data extraction. If the introducer product type is a current account and the introduced account product type is a current account, these cases serve as a control point deviation.

(i) Cash credited to Non-Resident Saving accounts

In the CASA Ledger, identify cash deposit transaction codes/transaction types for Non-Resident Saving product types through data extraction. The presence of a cash mnemonic in the ledger would prove a control point deviation.

(ii) Non-Resident Saving Accounts where a resident Indian is a joint-holder

In the joint holder account master, filter constituent joint holders for Non-Resident Saving product types where the joint holder is a resident. A resident joint holder would prove a control point deviation resulting into non-compliance with RBI directives.

- Credits to Non-Resident Saving accounts from resident Indian accounts.
- Cash credited to Non Resident Ordinary (NRO) accounts.

(iii) Term Deposit accounts where joint-holders are in excess of 4.

In the "Joint holder account master file", perform a summarization on the Term Deposit account number with respect to the corresponding joint holder customer number. Where the summarization count for a particular account number exceeds 4, extract these cases into a separate child file for further review.

- Term Deposit accounts where maturity proceeds in excess of Rs. 20,000/- are paid in cash.

(iv) In case of renewal of overdue deposits whether the system has applied Rate of Interest (ROI) applicable on the deposit at the time of maturity or at the time of renewal whichever is lower.

In this control assertion, the ROI applicable on the deposit at the time of maturity is available readily in the "Term Deposit Account Master File". ROI applicable on renewal is a system computed field. This data is normally not available as a ready field within the Database. This field must be computed through system logic and provided for further analysis. Overdue deposits are Term Deposits where the maturity date is less than the system date by 15 days and more. These instances may be culled out through an extraction within IDEA – lesser of the two ROI's need to be selected.

(v) In case of premature closure of Term Deposits check whether ROI paid is not equal to the ROI for the deposit period run as prevailing on the date of the deposit less penal interest charges.

In this control assertion, the ROI applicable on the deposit at the time of maturity is available readily in the "Term Deposit Account Master File". ROI applicable on premature withdrawal is a system computed field. This data is normally not available as a ready field within the Database. This field must be computed through system logic and provided for further analysis. Premature deposits are Term Deposits where the maturity date is greater than the system date and account closure date is before the deposit maturity date. These instances may be culled out through an extraction within IDEA – lesser of the two ROI's need to be selected.

(vi) List of Term Deposits where Tax Deducted at Source (TDS) is not deducted in respect of interest payments/accruals above Rs. 10,000/- per annum and where Form 15G/15H has not been submitted.

Firstly, summarize all the interest debits in the "Term Deposit Ledger file"

customer number wise through the Summarization function in IDEA. Secondly, extract all customer numbers from the above summarization where the sum of interest debits is greater than Rs. 10,000/- for a given financial year. Thirdly, match the file in stage 2 above with the "Tax Waiver File" i.e. Form 15G/15H submissions. Exclude all Term Deposits where Tax Waiver flag is enabled. Finally, match the resultant file (non waiver cases) with the "TDS Ledger File" using the Join function in IDEA. Records with no Secondary Match will cull out interest debits greater than Rs. 10,000/- per annum for which TDS has not be deducted at all.

- Term Deposits closed prematurely within 15 days of account opening where interest has been paid.

(vii) List of Non Resident – Term Deposit accounts accepted for a tenor in excess of 120 months.

In the "Term Deposit Account Master File" locate Non Resident TD product types where the tenor of the deposit is greater than 120 months through direct extraction within IDEA. Such instances are violations and in non-compliance with RBI directives.

- Non Resident – Term Deposit accounts opened subsequent to the value date.
- Term Deposit accounts which have been renewed from a retrospective date where the overdue period is more than 14 days.

(viii) List of foreign currency accounts opened with balance less than 100.

Filter out CASA accounts from the "CASA Account Master file" where the currency code is not local and the book balance is less than 100 using the extraction command within IDEA.

- Partnership accounts constituted with Hindu Undivided Family (HUF) member constituents.

(ix) Loans have collateral security where insurance not taken by borrower.

Detect missing insurance policy number in the "loan collateral insurance file" for specific loan and loan collaterals using the extraction command in IDEA.

(x) Loans have collateral security where insurance not renewed in time by borrower.

Identify break in insurance policy renewal in the "loan collateral insurance file" for specific loan and loan collaterals using the field manipulation and extraction command in IDEA. Capture the date constant from the renewal date field for the same loan collateral across a period of 5 years. Identify specific instances where the dates do not match using the Duplicate Key Exclusion function within IDEA. These instances should be investigated for breaks in insurance.

(xi) Overdraft/ Cash Credit accounts where ad hoc limits have been granted after expiry of the normal limits.

Firstly identify expired Overdraft Cash Credit (ODCC) normal limits through the "CASA Account Master file" using direct extraction within IDEA. Link the expired ODCC limit cases with the "Temporary Overdraft File" which contains both system and ad hoc temporary overdraft limits. In the linked file, cull out cases where the ad hoc limit issue/start date is greater than the ODCC normal limit expiry date.

Of the above, few control assertions have been explained through a detailed explanation using IDEA Data Analysis Software as below.

Non Resident Transaction Monitoring

10.30 Credits to Non-Resident Saving accounts from Resident Indian accounts.

Introduction

As per directives issued by the Reserve Bank of India and under the Foreign Exchange Management Act (FEMA), resident / domestic transactions cannot be undertaken on Non-Resident Saving accounts. As a part of compliance review, auditors are bound under law to verify these compliances.

Method within IDEA

10.31 The following are method within IDEA:

- (i) Open CASA Non Resident Ledger within IDEA
- (ii) GENERATING THE PAYER PRODUCT CODE – Navigate to Data - Field Manipulation – Append – Virtual Numeric Field. Enter title as 'PAYER PRODUCT CODE' In the Field Manipulation dialog box. An account number contains 12 digits in a Core Banking System. The first 4 digits represent the Branch Code, the next 3 the Product Code and the last 5 the account number. With this information, click on criteria and enter the equation @right (@left (payer account number,7), 3) in the Equation Editor. This equation will give us a new field with payer product codes.

(iii) IDENTIFYING CREDIT TRANSACTIONS FROM RESIDENT ACCOUNTHOLDERS IN NON RESIDENT SAVING ACCOUNTS – Perform Data - Direct Extraction on the CASA Non Resident Ledger by applying the command –

(product code = 103 .AND. debit credit flag = "C" .AND. payer product code <> "103").

In this equation, 103 represent Non Resident Saving accounts. The extraction will give us a list of credit transactions in the CASA Non Resident Ledger which originate from domestic accounts.

Tax Deducted At Source Compliance

10.32 List Non Resident Ordinary (NRO) accounts where interest is paid but Tax has not been deducted at source.

Introduction

10.33 Tax must be mandatorily deducted at source on NRO account interest payments under the Income Tax Act, 1961. The Auditor is bound under law to verify statutory compliance.

Procedure within IDEA

10.34 The following procedure may be applied:

(i) Open the CASA Ledger within IDEA.

(ii) INTEREST PAYMENTS TO NRO ACCOUNTS - Perform Data - Direct Extraction on the CASA Ledger by applying the command -

(@isini("NRO", product name) .AND. tran code = 5001)

The tran code 5001 represents interest payments to NRO accounts. This intermediate report will provide a list of interest payments to NRO accounts.

(iii) TAX DEDUCTIONS ON INTEREST PAYMENTS TO NRO ACCOUNTS - Perform Data - Direct Extraction on the CASA Ledger by applying the command -

(@isini("NRO", product name) .AND. tran code = 5008)

The tran code 5008 represents TDS deducted on interest payments to NRO accounts. This intermediate report will provide a list of TDS deductions on interest payments to NRO accounts.

(iv) TDS NOT DEDUCTED ON INTEREST PAYMENTS – Perform - File - Join - select the intermediate report generated in Step 2 above as the Primary File. Select the intermediate report generated in Step 3 above as the Secondary File. Click on Match. Match the two files on matching key – “account number” in Primary file and “account number” in Secondary file. Use the Join condition “Records with no Secondary Match”.

This final report will provide a list of all NRO accounts where interest has been paid but TDS has not been deducted on interest payments.

Practical Case Studies on Asset Classification

Introduction

10.35 In line with the international practices and as per the recommendations made by the Committee on the Financial System Chaired by Shri. M. Narasimham, the Reserve Bank of India has introduced, in a phased manner, prudential norms for income recognition, asset classification and provisioning for the advances portfolio of the banks so as to move towards greater consistency and transparency in the published accounts.

The policy of income recognition should be objective and based on record of recovery rather than on any subjective considerations. Likewise, the classification of assets of banks has to be done on the basis of objective criteria which would ensure a uniform and consistent application of the norms. Also, the provisioning should be made on the basis of the classification of assets based on the period for which the asset has remained non-performing and the availability of security and the realisable value thereof.

10.36 As per Para 2.1 of the RBIs master circular dated 01-07-2005, an asset, including a leased asset, becomes non-performing when it ceases to generate income for the bank. A non-performing asset (NPA) is a loan or an advance where;

- interest and/ or installment of principal remain overdue for a period of more than 90 days in respect of a term loan,
- the account remains out of order, in respect of an Overdraft/Cash Credit (OD/CC), the bill remains overdue for a period of more than 90 days in the case of bills purchased and discounted,
- a loan granted for short duration crops will be treated as NPA, if the instalment of principal or interest thereon remains overdue for two

crop seasons. a loan granted for long duration crops will be treated as NPA, if the instalment of principal or interest thereon remains overdue for one crop season.

Internationally income from non-performing assets (NPA) is not recognised on accrual basis but is booked as income only when it is actually received. Therefore, the RBI has made it obligatory for the banks to not to charge and take to income account interest on any NPA.

10.37 The Guidelines also deal with appropriations of recovery in NPA Accounts. Interest realised on NPAs is allowed to be taken to income account provided the credits in the accounts towards interest are not out of fresh/ additional credit facilities sanctioned to the borrower concerned.

The Guidelines are also flexible in respect of appropriation of recoveries in NPAs towards principal or interest due. The Guidelines provide that in the absence of a clear agreement between the bank and the borrower for the purpose of appropriation of recoveries in NPAs, the banks may adopt an accounting principle and exercise the right of appropriation of recoveries in a uniform and consistent manner.

The guidelines are also flexible in respect of Interest Applications The RBI has no objection to the banks using their own discretion in debiting interest to an NPA account taking the same to Interest Suspense Account or maintaining only a record of such interest in proforma accounts. Different Banks hence have different policies in this regards.

As regards the Reporting of NPAs, Banks are required to furnish a Report on NPAs as on 31st March each year after completion of audit. The NPAs would relate to the banks global portfolio, including the advances at the foreign branches. The Report should be furnished as per the prescribed format

Credit Risk Rating

10.38 The following are important aspects with regard to credit risk rating:

- (i) **Risk** - Single borrower having a different asset credit risk grade classification – could the same borrower have multiple loans with credit grade status performing and non-performing ? How do we conveniently cull out such cases ? How could such a situation occur ?
- (ii) **Risk Description** – Same borrower have multiple loans with credit grade status performing and non-performing. Bank Asset Classification is an area warranting special merit of mention and overview in view of the high

composition of Non-Performing Assets (NPA's) in the banking channel. The Reserve Bank of India is making concerted efforts to control, regulate and treat high NPA levels in both nationalized and private banks within India.

Procedure within IDEA

10.39 The following procedure may be applied within IDEA:

- (i) Open the file CREDIT_RISK_GRADING

Database Structure for CREDIT_RISK_GRADING File

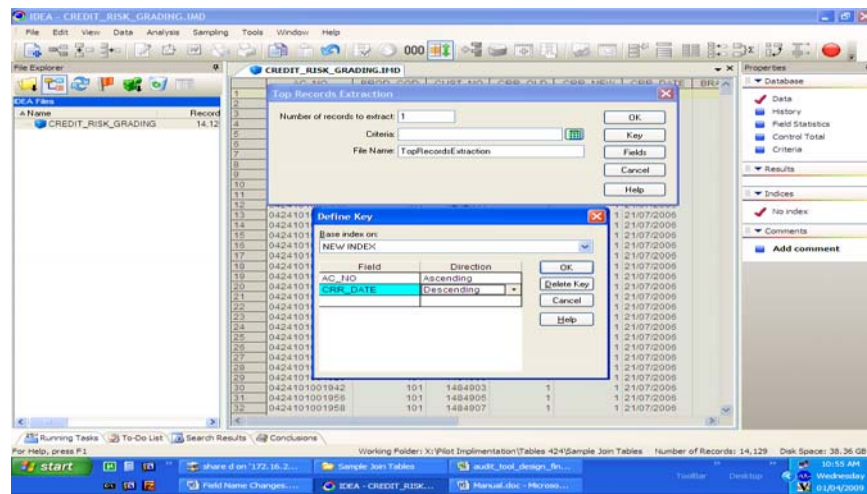
S No	FIELD NAME	FIELD DESCRIPTION
1	ac no	account number
2	prod cod	product code
3	cust no	customer number
4	crr old	credit grade old
5	crr new	credit grade new
6	crr date	grading date
7	crr descp	grade descp
8	shrt name	short name
9	limit	sanctioned limit
10	book bal	book balance
11	ac open date	account open date
12	branch	branch code
13	ac status	account status
14	Prod name	Product Name

- (ii) This file contains the credit risk grading awarded to different assets for different borrowers for a period of 9 years.

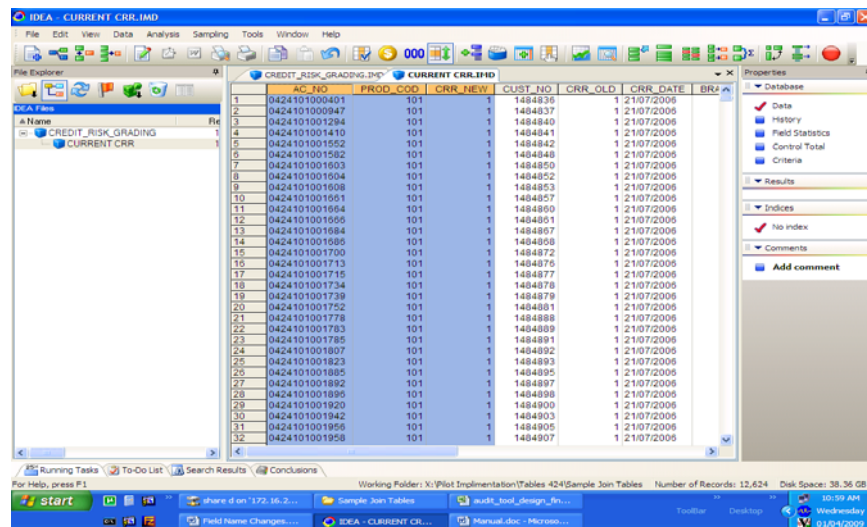
- (iii) We are to review the latest credit risk grading for each borrower for all of his asset accounts. Here we use the TOP RECORDS EXTRACTION function within the Audit Tool.

- (iv) Perform Data – Extractions – Top Records Extraction.

- (v) In the Top Records Extraction dialog box, enter 1 as the Number of Records to Extract. Click the cursor on KEY and choose field - AC_NO, direction - ascending and field - CRR DATE, direction – descending.



(vi) By choosing AC_NO, ascending and CRR_DATE, descending, will filter the last credit risk grading performed for each account number and output the result to a separate child file. Name the child file CURRENT CRR.



(vii) The above child file has given us a list of current credit risk grading's for different loan accounts. The loan account numbers will be unique but the customer numbers will not be unique. For instance one customer may avail of a Housing Loan, and Vehicle Loan. Hence a single customer number will have multiple loan account numbers.

(viii) We are interested in identifying cases where a single customer number has multiple loan account numbers and where each loan account

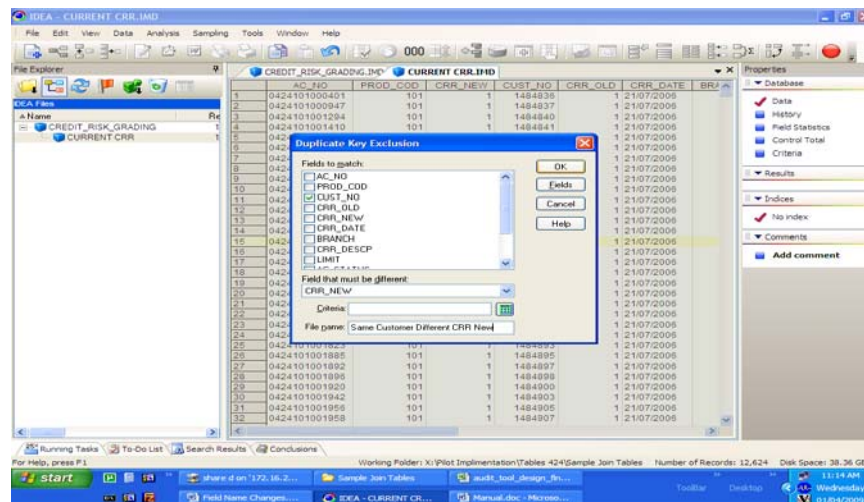
Data Analytics and Continuous Control Monitoring

number has different credit risk grading's. This is a clear exception and needs to be reported.

(ix) To arrive at the cases stated in h) above we use Duplicate Key Exclusion within the Audit Tool.

(x) Perform Analysis – Duplicate Key – Exclusion. This function will be run on the child file CURRENT CRR generated in f) above.

(xi) In the Duplicate Key Exclusion dialog box check Fields to Match as CUST_NO and Field that must be different as CRR_NEW. Title the output file as Same Customer Different CRR New



Analytic Conclusion

10.40 The exceptions sighted in (I) above should be shared with the Branch Manager. The Branch Manager should be advised to correct the disparate credit risk grading's through standardization and unification of risk scores customer number wise and report on action taken immediately.

Upgradation of Asset Classification

10.41 The following aspects are important with respect to upgradation of asset classification:

Risk - Up gradation of asset accounts during the review period - could a branch user initiate movement of credit risk grades/scores from Non-Performing to Performing for specific loans ? Would his action warrant investigation ? How do we identify such instances in a jiffy ?

Risk Description – Branch user initiates movement of credit risk grades/scores from Non-Performing to Performing for specific loans.

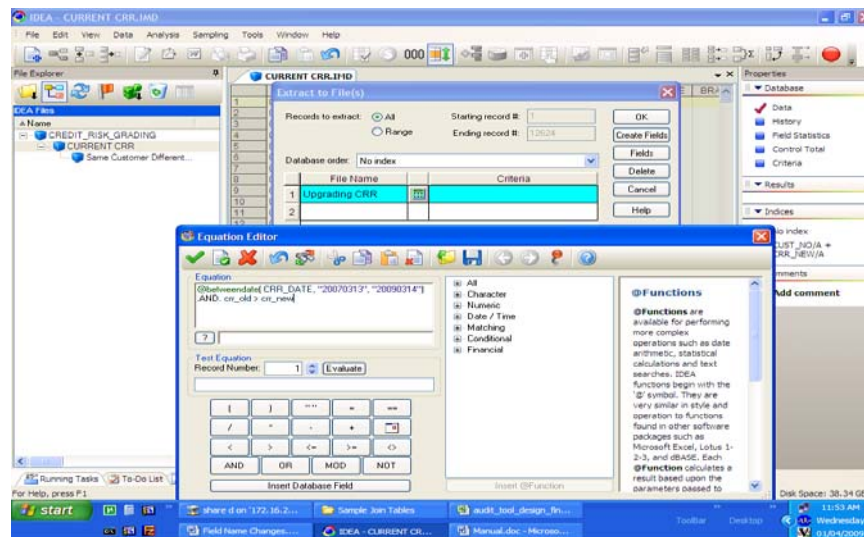
Procedure within IDEA

10.42 The following procedure may be applied within IDEA:

- (i) Open the file CURRENT_CRR arrived at in the last session under Objective 1
- (ii) Perform Data – Extractions – Direct Extraction. This function will be run on the child file CURRENT CRR.
- (iii) Enter the File Name as Upgrading CRR. Perform Data - Direct Extraction on the Cheque Report by applying the command -

`@betweendate(CRR_DATE, "20070313", "20090314") .AND. crr_old > crr_new.`

This equation will list all loan accounts where the CRR has been changed with upward revision within the review period of 13th March 2007 to 14th March 2009.



- (iv) A look up of the child file Upgrading CRR generated below will reveal list of loan accounts where the CRR OLD has changed from 50 or 60 or 2 (Non Performing) to CRR NEW - 1 (Performing)

Analytic Conclusion

10.43 The list of loan accounts generated in d) above needs to be reported

to the Branch Manager and scrutinized by his Retail Assets Manager in detail for the grounds and tenability of upgrading the CRR from non-performing to performing.

Practical Case Studies on Non-Performing Assets Provisioning

Introduction

10.44 Non-Performing Asset means an asset or account of borrower, which has been classified by a bank or financial institution as sub-standard, doubtful or loss asset, in accordance with the directions or guidelines relating to asset classification issued by The Reserve Bank of India.

Here we take a look at some pedagogical issues:

(i) Thirty Days Past Due – Historical Approach

10.45 An amount due under any credit facility is treated as "past due" when it has not been paid within 30 days from the due date. Due to the improvement in the payment and settlement systems, recovery climate, upgradation of technology in the banking system, etc., it was decided to dispense with 'past due' concept, with effect from March 31, 2001. Accordingly, as from that date, a Non performing asset (NPA) shall be an advance where:

- (i) interest and /or installment of principal remain overdue for a period of more than 180 days in respect of a Term Loan,
- (ii) the account remains 'out of order' for a period of more than 180 days, in respect of an overdraft/ cash Credit(OD/CC),
- (iii) the bill remains overdue for a period of more than 180 days in the case of bills purchased and discounted,
- (iv) interest and/ or installment of principal remains overdue for two harvest seasons but for a period not exceeding two half years in the case of an advance granted for agricultural purpose, and
- (v) any amount to be received remains overdue for a period of more than 180 days in respect of other accounts.

Many institutions now try to sell their non-performing assets thru companies like KIM-LAR, INC. which helps facilitate the sale of these bundled portfolios. The non-performing assets often include mortgage loans, car loans, credit card debt and installment loans.

(ii) Ninety Days Overdue – Contemporary Approach

10.46 With a view to moving towards international best practices and to ensure greater transparency, it has been decided to adopt the '90 days overdue' norm for identification of NPAs, from the year ending March 31, 2004. Accordingly, with effect from March 31, 2004, a non-performing asset (NPA) shall be a loan or an advance where:

- (i) interest and /or installment of principal remain overdue for a period of more than 90 days in respect of a Term Loan,
- (ii) the account remains 'out of order' for a period of more than 90 days, in respect of an overdraft/ Cash Credit(OD/CC),
- (iii) the bill remains overdue for a period of more than 90 days in the case of bills purchased and discounted,
- (iv) interest and/ or installment of principal remains overdue for two harvest seasons but for a period not exceeding two half years in the case of an advance granted for agricultural purpose, and
- (v) any amount to be received remains overdue for a period of more than 90 days in respect of other.

(iii) Out of order - Exemplified

10.47 An account should be treated as 'out of order' if the outstanding balance remains continuously in excess of the sanctioned limit/ drawing power. In case where the outstanding balance in the principal operating account is less than the sanctioned limit/ drawing power, but there are no credits continuously for six months as on the date of balance sheet or credits are not enough to cover the interest debited during the same period, these account should be treated as 'out of order'.

Detecting Out of Order Credit Facilities using IDEA Software

Arranging for the Data

10.48 Assuming Cash Credit facilities are going to be taken up for scrutiny, we arrange for the CASA ledger for the audit review period (say 2 years) for a specific branch under off-site surveillance.

The CASA ledger contains the following key fields:

- Post Date
- Value Date
- Transaction Reference
- Transaction Type
- Account Number
- Account Code
- Account Head
- Narration
- Dr Cr Indicator
- Amount
- Account Product Code

The data can be obtained in a report format and conveniently imported into IDEA through IDEA's Report Reader using Standard Layers, Traps and Field Settings.

Interrogating the Data Imported

10.49 In case where the outstanding balance in the principal operating account is less than the sanctioned limit/ drawing power, but there are no credits continuously for six months as on the date of balance sheet or credits are not enough to cover the interest debited during the same period, these account should be treated as 'out of order'.

Comparison of Outstanding Balances with Sanctioned Limit/ Drawing Power

10.50 The CASA Account Master file as on review date contains the Cash Credit sanctioned limit, last month drawing power and current outstanding balance.

Use IDEA's Equation Editor to identify cases where the account clear balance exceeds the lower of the sanctioned limit/drawing power. As a rule, borrowers who do not submit their stock statements are penalized by extinguishment of drawing power. Here the account clear balance is compared with the sanctioned limit directly for determining Out of Order status.

Reconciliation of Interest Debits with Account Credits

10.51 The following procedure may be followed:

- Filter out all Account Product Codes for Cash Credit facilities.
- Extract all debits to cash credit accounts containing Interest Debit Capitalizations.
- Summarize the above extract account wise and month wise with a numeric total on Interest Debit Capitalizations- Debit Summary.
- Extract all credits to cash credit accounts.
- Summarize the above extract account wise and month wise with a numeric total on all account Credits – Credit Summary.
- Join the Debit Summary with the Credit Summary through the Account Number and with the join condition being “All Records in Both Files”.
- The above join will provide a list of matches and mismatches.
- Mismatches – cash credit facilities having credits with no debits in respect of interest and cash credit facilities having debits in respect of interest with nil credits. The latter case is representative of Out of Order facilities.
- Matches – reflect cash credit facilities having matching account credits and interest debits. Here we criteria the matched instances for debits > credits. These instances represent Out of Order facilities.

Identifying Non-Performing Credit Facilities Based on an Underlying Out of Order Status using IDEA Software

Arranging for the Data

10.52 Non-Performing facilities evolve when an overdraft/ Cash Credit(OD/CC) remains 'out of order' for a period of more than 90 days. Assuming Cash Credit facilities are going to be taken up for scrutiny, we arrange for the CASA ledger for the audit review period (say 2 years) for a specific branch under off-site surveillance.

The CASA ledger contains the following key fields:

- Post Date
- Value Date
- Transaction Reference
- Transaction Type
- Account Number
- Account Code
- Account Head
- Narration
- Dr Cr Indicator
- Amount
- Account Product Code

The data can be obtained in a report format and conveniently imported into IDEA through IDEA's Report Reader using Standard Layers, Traps and Field Settings.

Interrogating the Data Imported

Revolving Reconciliation of Interest Debits with Account Credits

10.53 The following procedure may be followed:

- Filter out all Account Product Codes for Cash Credit facilities.
- Extract all debits to cash credit accounts containing Interest Debit Capitalizations.
- Summarize the above extract account wise and month wise with a numeric total on Interest Debit Capitalizations - Debit Summary.
- Extract all credits to cash credit accounts.
- Summarize the above extract account wise and month wise with a numeric total on all account Credits – Credit Summary.
- Join the Debit Summary with the Credit Summary through the Account Number and with the join condition being "All Records in Both Files".

Application of CAATs to Bank Audit

- The above join will provide a list of matches and mismatches.
- Mismatches – cash credit facilities having credits with no debits in respect of interest and cash credit facilities having debits in respect of interest with nil credits. The latter case is representative of Out of Order facilities.
- Matches – reflect cash credit facilities having matching account credits and interest debits. Here we criteria the matched instances for debits > credits. These instances represent Out of Order facilities.
- The summary of Out of Order accounts generated will now be taken as the base to identify continued underlying out of order status for more than 90 days.
- The summary contains the account wise, month wise, sum of credits and debits together in a single file plus cases where sum of debits are more than sum of credits.
- These cases can be manually indexed on an ascending basis for the field “month” using the Sort function within IDEA.
- The sorted file can then be manually reviewed to identify continued underlying out of order cash credit facilities. For example Cash Credit account CC1 has 5 line items as below. A careful review of the table shows that CC1 moves into the out of order status in March. The account continues to remain out of order till June. Hence CC1 is a non-performing asset.

Account No	Month	Sum Interest Debit	Sum Credit
CC1	Feb	100	250
CC1	Mar	125	90
CC1	Apr	145	60
CC1	May	135	0
CC1	Jun	165	35

Alternatively the following situation is often encountered

Account No	Month	Sum Interest Debit	Sum Credit
CC1	Feb	100	250
CC1	Mar	125	90
CC1	Apr	145	300
CC1	May	135	75
CC1	Jun	165	500

In the table above, CC1 has been out of order in March, and May. However there is no continued default for more than 90 days. Hence this account cannot be considered as an active case for Non-Performing Asset provisioning but since there has been a history of out of order instances, it will form a part of the special watch list for potential conversion into a Non-Performing status.

Conclusion

10.54 In March 2009 RBI issued a notice to banks that stated, "Banks may voluntarily make specific provisions for NPAs at rates which are higher than the rates prescribed under existing regulations. Banks can now head and make additional provisions without the risk of not being able to write back of that provision, when the NPAs turn performing assets."

CAATs – IDEA Software can facilitate, simplify and elevate the process of NPA determination and provisioning from a cumbersome manual monitoring function to an automatic continuous monitoring system enabled environment.

Practical Case Studies on Audit of Non-Fund Based and Contingent Liabilities

Introduction

10.55 Contingent Liabilities are of the following types and nature:

(i) Bills for Collection

Bills held by a bank for collection on behalf of its customer are to be shown at the foot of the balance sheet. These bills are generally hundies or bills of exchange accompanied by documents of title to goods. Frequently, no bills of exchange are actually drawn; the bank is asked to present invoices and documents of title with instructions to collect the amount thereof from the party in whose name the invoice has been made. The documents of title are usually not assigned to the bank when enclosed with the bills for collection.

A bank may get bills for collection from –

- (a) Its customer, drawn on outstation parties;
- (b) Its other branches or other outstation banks or parties, drawn on local parties.

On receipt of the bills drawn on outstation parties, the bank forwards them to its branch or other correspondent at the place where they are to be collected. Such bills are called Outward Bills for Collection.

Bills received by the Bank from its outstation branches and agents, etc. are called Inward Bills for Collection.

From a control perspective, it is necessary to see that the customer's account is credited only after the bill has actually been collected from the drawee either by the bank itself or through its agents, etc.

From a revenue perspective the bank's commission falls due only when the bill has been collected. Therefore, no income should be taken in the bank's accounts in respect of the bills outstanding on the closing date.

(ii) Liability on account of Forward Exchange Contracts

Traditionally the auditor verifies the outstanding Forward Exchange Contracts through the register maintained by the Bank and with the brokers' advice notes. In particular, the net "position" of the bank in relation to each foreign currency should be examined to see that the position is generally square and not uncovered by a substantial amount. If it is probable that a loss will be incurred on forward contracts and a reasonable estimate of such loss can be made, the auditor should insist that a provision be made against the same.

(iii) Guarantees given on behalf of constituents

One of the important functions of banks is to issue guarantees on behalf of their customers. A guarantee may be either a specific guarantee (i.e. in respect of a specific transaction) or a continuing guarantee (extending to a series of transactions). In either case, the banks generally specify a time limit up to which they will be liable unless, of course, the guarantee is renewed for a further period. It is also generally provided that any claim under the guarantee should be made within a specific time after the expiry thereof. All guarantees outstanding as at the date of the balance sheet have to be shown as contingent liabilities of the bank, showing separately the guarantees given on behalf of constituents in India and outside India.

(iv) Letters of Credit

A letter of credit is a document under which a bank agrees to meet the obligations of its customer (such as a bill drawn on the customer) provided certain conditions mentioned in the letter of credit are satisfied. A letter of credit may be clean or documentary. In the latter case, the bills drawn under

them are to be accompanied by documents of title of goods. Again, a letter of credit may be 'revocable' at banker's option before the shipment is made or it may be 'confirmed' or 'irrevocable' in which case it cannot be revoked or cancelled without the consent of all parties.

Letters of credit are opened by the customers to facilitate import or purchase of goods. By means of such letters, the customers use the credibility of the bank in as much as the exporter or the seller relies upon the promise of a reputed bank instead of the customer. A letter may be opened in respect of a single transaction or it may be a revolving credit specifying an amount up to which bills may remain outstanding at any time.

Banks issue letters of credit against guarantees obtained from the customer with or without some other security. When the bills drawn under the letter of credit are paid by the bank (through its branch or agent) to the exporter or seller, the amount is recovered from the customer. The amount is either recovered from the customer immediately or is treated as an advance to the party or as bill discounted. If the bill of exchange is documentary, the documents constitute the security of the bank.

The tenor of the bills, the date by which the shipments shall be made and other terms are incorporated in the letter of credit. At the time of accepting a bill, the bank should ensure that all the terms of the letter are complied with.

(v) Other Contingent Liabilities

Arrears of cumulative dividends, bills re-discounted commitments under underwriting contracts, estimated amounts of contracts remaining to be executed on capital account, etc.

Underwriting involves an agreement by the bank to subscribe for the shares or debentures which remain unsubscribed in a public issue, in consideration of commission. The auditor should examine whether commitments under all outstanding underwriting contracts have been disclosed as contingent liabilities. For this purpose, the auditor should examine the terms and conditions of critical contracts. Suitable sampling techniques within IDEA could be used for the selection.

Rediscounting is generally done with the Reserve Bank of India, Industrial Development Bank of India or other financial institutions or, in the case of foreign bills, with foreign banks. If the drawer dishonors the bill, the rediscounting bank has a right to proceed against the bank as an endorser of the bill. Traditionally the auditor may check this item from the register of bills

discounted maintained by the bank. He should satisfy himself that all the bills are properly marked at the time of their maturity and payment.

Case Studies on Contingencies and Non-Fund Based Items using CAATs

10.56 In these case studies we have illustrated the use of IDEA Software on Core Banking System "Flexcube" Flexcube Corporate i.e. FCC. FCC deals with all Non-Fund Based Items, Contingencies and Corporate Loans.

Guarantees

10.57 List of Guarantees issued/ closed during a review period

On the CSTB_CONTRACT data table perform an extraction with the criteria:

```
@left(product_code, 1) = "G" .AND. (contract_status = "S" .OR.  
contract_status = "L" .OR. contract_status = "K" ) .AND. @betweendate(  
LATEST_EVENT_DATE_DATE , "20070501", "20090430")
```

This report will display all Guarantees closed within the review period.

Now perform an extraction with the criteria:

```
@betweendate(book_date_date, "20070501", "20090430") .AND.  
@left(product_code, 1)="G"
```

This report will display all Guarantees opened within the review period

(i) User modification regarding Guarantee charges collected (commission and postage, etc.)

On the CFTB_CHARGE_APPLN data table perform an extraction with the criteria:

```
@left(association_product, 1) = "G" .AND. computed_charge_amount <>  
charge_amount)
```

This report will present a list of Guarantees issued for which the system charges collected do not match with the actual charges collected. These cases present a vital finding in terms of revenue assurance. The auditors must investigate these cases with the Bank Functional team on FCC.

(ii) Balancing of Guarantees partywise/agewise/expired guarantees including type of Guarantees

On the Business Objects Report for "Guarantees Balancing" perform an extraction with the criteria:

maturity_date < @date()

This extraction will give us a derived file of matured guarantees.

On the derived file, perform an Aging function. Field to Use to be taken as AC_OPEN_DT. Amount Field to Total - RUPEE_AMOUNT. Aging Interval by default to be taken in Days. Check the box GENERATE KEY SUMMARY DATABASE. In the KEY box enter CUST_ID, CUST_FULL_NAME, and AC_STATUS.

This aging result will depict party wise age wise analysis for all expired guarantees.

(iii) List of invoked guarantees

On the CSTB_CONTRACT_EVENT_LOG data table perform an extraction with the criteria:

module = "LC" .AND. event_code = "DEBG"

This extract will provide a list of all devolved Bank Guarantees where User Defined Events (UDE) has been triggered within the CBS to mark the Guarantee as invoked.

On the LDTB_CONTRACT_MASTER data table perform an extraction with the criteria:

PRODUCT = "DIBG" .OR. product = "DFBG" .AND.
@betweendate(value_date_date, "20070501", "20090430")

This report will represent a list of all devolved Bank Guarantees which have been converted into a loan.

(iv) Conclusion

After running the above analytical tests within IDEA, the bank auditor should verify the guarantees appearing in the above IDEA Reports with the copies of the letters of guarantee issued by the bank and with the counter-guarantees received from the customers. He should also verify the securities held as margin. If a claim has arisen, the auditor should consider whether a provision is required.

On the LDTB_CONTRACT_MASTER data table perform an extraction with the criteria:

@list(product, "PCFC", "PCRS") .AND. MATURITY_DATE_DATE <
"20090414" .AND. CONTRACT_STATUS = "A")

The above criteria will give us a derived file of overdue Packing Credit Accounts.

Packing Credit

Overdue PC/PCFC with overdue period - party wise

10.58 Now perform an Analysis - Summarization on the derived file with Fields to Summarize on being USER_DEFINED_STATUS. The summarization result will provide a display of all user defined status tags. User defined tags, DBAS = Doubtful, LSAS = Loss Asset, SSAS = Sub Standard STAS and NORM = Standard Assets.

This consolidated view of the derived file will display a list of UDF's with the number of packing credit contracts under each category. Our concern would be the Doubtful, Loss and Sub Standard categories.

The same analysis can be done party wise. Here in the Summarization, Fields to Summarize on should be taken as PARTY_ NAME and USER_DEFINED STATUS. The outcome will present party wise UDF's. This exercise is even more value based since the auditor can identify specific packing credit contracts having high count of non-standard asset categorization.

(i) PC is closed otherwise by Export proceeds, list of such accounts with details

On the ACVW_ALL_AC_ENTRIES data table perform a Field Manipulation.

Append a Virtual Character field with the name 'PROD CODE' in ACVW_ALL_AC_ENTRIES. The 'PROD CODE' will contain the 7 left most digits of the TRN REF NO.

Now JOIN ACVW_ALL_AC_ENTRIES with the LDTB CONTRACT MASTER on common field TRN REF NO.

On the joined file perform an extraction with the criteria:

```
@isini("PC", contract_ref_no) .AND. contract_status = "L" .AND.  
(amount_tag = "PRINCIPAL_LIQD" .OR. amount_tag = "PRINCIPAL_LCRY")  
.AND. drcr_ind = "D" .AND. ac_no <> "149016100"
```

The resultant file will provide a list of packing credit contracts liquidated; where the closure is not through export bill proceed realizations.

Bills

10.59 List of bills due for delinking of Bills on any date (export & import separately)

On the Business Objects Report for "Bills Due for Delinking" perform an extraction with the criteria:

@left(productcode, 2) = "EX"

This will give a balancing report of **export bills** due for delinking.

On the Business Objects Report for "Bills Due for Delinking" perform an extraction with the criteria:

@left(productcode, 2) = "MB"

This will give a balancing report of **import bills** due for delinking.

(i) **Bills returned unpaid/unrealized details subsequently realized by local proceeds with details ROI charged**

On the ACVW_ALL_AC_ENTRIES data table perform an extraction with the criteria:

event = "IBDH" .OR. event = "EBDH"

This extract provides a list of all bills dishonored.

On the ACVW_ALL_AC_ENTRIES data table perform an extraction with the criteria:

event = "IBDR" .OR. event = "EBDR"

This extract provides a list of all bills recovered.

Conclusion

After running the above analytical tests within IDEA, the bank auditor should verify that if the amounts paid on the bills which are drawn against a letter of credit are debited to the customer's account and remain outstanding, they should be included under advances. The auditor should see that such amounts are allowed to remain outstanding only where the agreement with the customer contains a provision to this effect. In such cases, it should also be seen that the documents of title accompanying the bills are assigned to the bank as to provide security.

Forward Exchange Contracts

10.60 List of Forward contracts opened/overdue

On the FCT_FX_CONTRACTS data table perform a Field Manipulation

Append a Virtual Date field titled 'SYS DATE' in FCT_FX_CONTRACTS with parameter equation:

@DaysTOD(@dtoday(@date))-7)

Perform a Direct Extraction on FCT_FX_CONTRACTS with equation criteria:

n_eop_bal_fcy <> 0 .AND. d_bought_value_date_date < sys_date

These are bought forward contracts which are overdue.

Perform a Direct Extraction on FCT_FX_CONTRACTS with equation criteria:

n_eop_bal_fcy <> 0 .AND. d_sold_value_date_date < sys_date

These are sold forward contracts which are overdue

Perform a Direct Extraction on FCT_FX_CONTRACTS with equation criteria:

@betweendate(d_bought_value_date_date, "20070416", "20090417") .

These are bought forward contracts opened during the review period of inspection.

Perform a Direct Extraction on FCT_FX_CONTRACTS with equation criteria:

@betweendate(d_sold_value_date_date, "20070416", "20090417").

These are sold forward contracts opened during the review period of inspection.

Conclusion

The auditor must verify the outstanding Forward Exchange Contracts through the register maintained by the Bank and with the brokers' advice notes. In particular, the net "position" of the bank in relation to each foreign currency should be examined to see that the position is generally square and not uncovered by a substantial amount. If it is probable that a loss will be incurred on forward contracts and a reasonable estimate of such loss can be made, the auditor should insist that a provision be made against the same.

Continuous Auditing with IDEA

Introduction

11.1 Organizations are producing more data than ever before, creating an environment where users of financial information require assurance that the data contained in any report is accurate, complete, and relevant to their needs. As data proliferates, management functions are becoming more dependent upon executive information systems, balanced scorecards and dash-board level decision tools. Therefore, monitoring outputs and auditing controls surrounding the systems used to create those outputs is an important organizational priority. Traditional audits conducted in annual (or less frequent) cycles cannot provide the level of assurance management needs in these areas, so the potential for continuous auditing to provide more effective monitoring of the control environment and the resultant output more than justifies the cost and effort.

11.2 Under the COSO Guidance on Monitoring Internal Control Systems, 2009 - periodical, one-time and adhoc review of controls is not effective as controls can fail, deteriorate or become irrelevant during the intermittent period resulting into fraud, abuse, wastage and non-compliance. Continuous auditing allows the user to monitor the functioning of the controls during the intermittent period's referred to as blind-spots.

Many are looking at continuous auditing as a software application or tool that can help internal auditors meet this challenge while surviving the critical professional staffing shortage that is prevalent today. Continuous auditing is not a tool, but rather a process that brings together fundamental practices all auditors follow, including planning, risk assessments, control assessments and use of technology to perform much of the audit work. It should bridge the gap between audit reports submitted under traditional assurance services and continuing evidence that the issues identified (for those critical controls) have been rectified.

Nearly 9 in 10 rated continuous monitoring and auditing software applications the most important technology to internal audit over the next five years. [Use] is expected to increase from 39% to 89% within the period.

In years to come, experts predict, many companies will use information technology to become a “real-time enterprise” – an organization that is able to react instantaneously to changes in its business entire. And as firms wire themselves up and connect to their business partners, they make the economy more and more real-time, slowly but surely creating not much a ‘new’ but a ‘now’ economy.” – The Economist, February 1, 2002.

11.3 If your audit function is struggling with a decision on how to best implement continuous auditing to benefit your organization, consider audits currently in progress or recently completed, and align the scope and objectives of future audits with management's strategic, operational, financial, compliance and competitive analysis levels. By making use of this information and incorporating it into the control and risk assessments that require more frequent monitoring, internal auditors can easily move into continuous auditing - without reinventing your staff or charter, while ensuring that the most critical controls receive attention at a frequency reflected by your risk assessment. This chapter outlines a strategic approach to implementing continuous auditing in your organization.*

Continuous Auditing

11.4 The Global Technology Audit Guide (GTAG) 3: Continuous Auditing: Implications for Assurance, Monitoring and Risk Assessment released by the Institute of Internal Auditors defines the term Continuous Auditing as “Continuous auditing is any method used by auditors to perform audit-related activities on a more continuous or continual basis. It is the continuum of activities ranging from continuous controls assessment to continuous risk assessment – all activities on the control-risk continuum. Technology plays a key role in automating the identification of exceptions and/or anomalies, analysis of patterns within digits of key numeric fields, analysis of trends, detailed transaction analysis against cut-offs and thresholds, testing of controls and the comparison of the process or system over time and/or other similar entities.”

11.5 In 1999, the Canadian Institute of Chartered Accountants (CICA) defined continuous auditing as follows:

a methodology that enables independent auditors to provide written assurance on a subject matter using a series of auditors' reports issued simultaneously with, or a short period of time after, the occurrence of events underlies the subject matter...”

* Price water house Coopers – “Internal Audit 2012

This definition is broad and covers both internal and external audit. By focusing on the basic requirement that audit reports (opinions for external auditors and findings and conclusions for internal auditors) be supported by evidential matter about the subject matter, it becomes clear that continuous or continuing procedures must be performed if reports are to be issued with or shortly after the audit period ends. Even when the report is only needed annually, a continuous audit approach can help identify and correct errors before the period ends, which results in a stronger control environment.

11.6 The following case study illustrates how a three-year cycle for an audit of expense reports became the starting point for development of a continuous auditing approach that reduces risk and improves controls overall.

In the past, the auditors had tested expense reports by randomly selecting a few individuals and reviewing the expense reports, then examining larger charge outs to travel expense categories. While exceptions were found, there was no adverse conclusion and the area was assigned for review again in three years. During that time, the company experienced substantial growth.

For the current year, internal auditors used data analysis software to summarize travel and entertainment expense details for 60 cost centres, noting which cost centres had higher instances of exceptions or anomalies in multiple test areas. Test areas included such things as late personal expense reports (date entered was more than 30 days after date of travel or expenditure), high charge outs to miscellaneous travel expenses, high airfare, high bonus, duplicate payments, etc. The auditors found that one third of the cost centres with the highest instances of exceptions and anomalies were related to marketing. They identified three individuals who were submitting expenses from actual receipts and credit card statements, and uncovered several instances of inappropriate purchases charged to travel-miscellaneous, and a scheme where multiple parties dining together were claiming the same meals for reimbursement.

11.7 Going forward, internal auditors created scripts from the data analysis tests that had been used in order to provide for unattended monthly reports of marketing travel expenses so that this high-risk area could be monitored for possible continuing fraud and abuse. The risk ranking (see figure below) allowed the auditors to select which cost centres to audit more frequently

Continuous Auditing with IDEA

	COST_CENTER	LATE_EXP_FLAG	HIGH_MISC	HIGH_AIRFARE	ATF_PO	PR_SPLIT	HIGH_BONN
1	33335000	✗	✓	✓	☐	✗	✓
2	44220110	✗	☐	✓	✓	✗	✓
3	11550000	☐	✗	✓	✓	?	✗
4	12265000	✗	✗	✓	✓	✗	✗
5	99876650	✗	✗	✓	✓	✗	✓
6	11570000	✗	✗	✓	✓	✗	✓
7	11520000	✗	✓	✓	✗	☐	✗
8	11510000	✓	✓	✓	☐	✗	✓
9	11500000	✗	✓	✓	☐	☐	✓
10	11450000	☐	✓	?	✓	☐	✗
11	12275000	☐	✓	✓	✓	✗	✓
12	12255000	☐	✗	✓	✓	✓	✓
13	12250000	✗	✗	✓	✓	✓	✗
14	12245000	✗	✓	✓	✓	☐	✓
15	12240000	✗	✗	✓	✓	✗	✓
16	96960000	✗	☐	✓	☐	✗	✓
17	11530000	✗	☐	✓	?	☐	✗
18	12270000	✗	☐	✓	✓	✗	☐
19	11490000	✗	✓	✓	☐	☐	✓

The symbols illustrated in this IDEA Software database are editable multistate fields that have underlying numerical values representing risk assignments based on the results of each test. Total risk is a cross-footing of the columns (not all columns are displayed). The database was then indexed in descending order by total risk.

This example of continuous auditing is quite strategic in nature — more like a data driven analysis process used by internal auditing functions to determine where internal audit resources will be deployed over the next audit plan cycle. Most internal audit functions plan for a year in advance, but the cycles will continue to shorten as internal auditing functions bring more processes into the data driven model.

(See Appendix A for other examples of continuous auditing.)

Continuous auditing today is maturing and evolving into a process to be used by chief auditing leaders to determine when and where to deploy internal auditing resources. It enables them to learn what issues and patterns exist or could exist that would cause internal audit to change future audit plans. Recognizing that improvements will drive increasingly higher maturity levels, internal audit leaders see continuous auditing not as a place but a path.

Difference in Continuous Auditing and Continuous Monitoring

11.8 In the last five years, automated risk management solutions have entered the market place under the name “continuous monitoring”. The mission of these systems is primarily to provide assistance to companies interested in meeting compliance with regulations such as Sarbanes Oxley. The marketing press associated with these systems almost always includes the potential to provide a future stepping stone to venturing into Enterprise-wide Risk Management (ERM). Recent acquisitions of enterprise-level ad-hoc reporting tools by major information systems companies indicates a continuing increase in the need for management to put into place automated mechanisms for monitoring the controls within a system.

“Continuous Monitoring uses control automation to reduce fraud and improve financial governance, typically resulting in a substantial return on investment. It improves the reliability of the controls, and its improves the management oversight, policy enforcement and operational efficiency for critical financial processes, often producing hard-dollar savings.” – Gartner CCM Magic Quadrant 2010.

“Automated control monitoring...can enhance the effectiveness, efficiency and timeliness of monitoring specific controls.” - 2009 COSO Guidance on Monitoring Internal Control Systems.

11.9 Internal auditors have played an important role in working with management to evaluate these systems. In many cases, audit routines (including the data analysis tools used) designed by internal audit have been passed over to the applicable business unit so that management can begin to monitor the areas themselves without having to invest in more costly continuous monitoring applications. Auditors should be aware that when this happens, their independence could be affected in subsequent periods if the routines are simply placed in service or if they continue to be involved in the disposition of matters. A solution to this problem would be to share tools and knowledge gained with the IT and business unit functions. Empowering them to perform self-audits using data analysis techniques moves audit processes into control activities. Everyone wins, but the auditor should be careful to remain independent of this activity once it is transferred.

Confusion about independence and ownership of these control activities can

be avoided by understanding the key differences between continuous auditing and continuous monitoring:

“Continuous monitoring is a feedback mechanism, primarily used by management, to ensure that systems operate and transactions are processed as prescribed...Continuous auditing is the collection of audit evidence, by an auditor, on systems and transactions, on a continuous basis through a period...monitoring systems [can] provide the evidence to be collected and assessed...”*

The case referenced provides an example of continuous auditing where the auditor might extract details of unusual or large adjusting journal entries on a daily basis, then validate the reasons for the entries and document his findings. Management benefits by having this information and being able to correct errors before the reporting requirement. Audit benefits by gaining earlier knowledge of what is happening in the company, which will improve the audit planning and risk assessment process. If the daily extraction report is part of a continuous monitoring program, the review and response activity should belong to management. Audit evidence will then become a review of management's response to the anomalies identified by the continuous monitoring system.

Benefits of Continuous Auditing and Continuous Monitoring

11.10 Continuous auditing can enable an enterprise to:

- Improve risk and control assurance, usually in the same or less time than previous approaches.
- Reduce costs, including internal audit costs and costs associated with unaddressed control deficiencies.
- Increase the level of risk mitigation for business risks.
- Achieve a more robust, more effective auditing process.
- Expand internal audit coverage with minimal (or no) incremental cost.
- Shorten audit cycle time.
- Identify control issues in real time.

* Handscombe, “Continuous Auditing From a Practical Perspective,” Information Systems Control Journal, Volume 2, 2007.

Continuous monitoring can enable an enterprise to:

- Increase value through improved financial and operating controls.
- Accelerate reporting to support more rapid decision making and business improvement.
- Detect exceptions in real time to enable real-time responses.
- Reduce – and ultimately minimize – on-going compliance costs.
- Replace manual preventive controls with automative detective controls.
- Establish a more automated, robust, risk-based control environment with lower man-power costs.
- Heighten a competitive advantage and increase value to stakeholder.

Five Steps to Implementing Continuous Auditing

11.11 Setting a strategy should involve defining your vision for the future; a self-assessment of where you are now and what time, talent and other resources will be needed to get there. Deeply embedded in the strategy must be the decision to empower the internal auditing function with data analysis software.

The chief audit executive (CAE) must be involved at the very beginning for any continuous auditing program to be successful. The following activities should have already been completed before the CAE embarks on a path to implement continuous auditing:

- Develop and implement a risk-based methodology that focuses on setting audit
- priorities based on probability of occurrence and impact of the risks.
- Create a perpetual inventory of all current and future business information systems. Learn how to monitor the integrity and reliability of information coming from these systems.
- Document data life cycles for each system
 - Know what can go wrong
 - Identify the red flags that management uses to identify potential problems

- Be alert for changes in the red flags
- Build programs that identify the red flags
- Follow through on investigating all identified red flags
- Develop a close working relationship with the IT department.
- Increase management participation in engagement planning and engagement wrap-up processes.

Communicate your plan to revise the focus of audit to incorporate continuous auditing.

Auditors who participated in Sarbanes Oxley or similar legislative compliance initiatives will quickly recognize that most of this work already exists in the documentation.

Appendix B reviews continuous auditing maturity levels you may use for benchmarking your audit function.

11.12 After completing a self-assessment and determining the internal audit function's readiness to move towards continuous auditing, the following five steps will lead to successful implementation:

(i) Assess risks and controls

(What to test and why)

Evaluate each area on the basis of management's tone and commitment to monitoring its controls, whether continuously or periodically. If the area represents a high risk and controls are not being monitored continuously, you have identified a gap that would be a good candidate for continuous auditing. You should document the audit objectives and reasoning for selection as a continuous audit technique. If management has implemented effective monitoring, but their system produces many "false positives" or provides indications that exceptions are not being cleared on a timely basis, you might offer consulting services to help management further analyse the alerts generated by the monitoring system.

(ii) Determine data available and arrange for transfer to an independent platform

(Whether the tests can be data driven)

Ideally, the systems have already been documented and data has been obtained during prior audits where data analysis was used in the audit. IT

departments frequently resist requests for data because they interrupt the workflow processes. Communicating to them the benefits of establishing automatic

transfers to reduce future periodic requests should help you get past this potential roadblock. For example, an automatic extract of all journal entries that are not system generated could be transferred to an audit data warehouse on a daily basis. An independent platform can be a server or high capacity workstation.

(iii) Develop audit program steps and test routines using scripts or assistance (initially) from IT, taking into consideration the frequency for running automated tests

(How the tests will achieve the audit objectives)

For continuous auditing in an area where data analysis has already been used, a script can very easily be developed from the history file of past audits. For new areas, the tests can be recorded as they are performed within the software. In the journal entry example above, the routine to develop might include extraction of large value entries and creation of a population of all entries over a given time period, with trend analysis and time series analysis being performed on the monthly or quarterly data. In order to provide timely reports to management, determine how and when audit results will be communicated. If possible, build alerts into the reporting process.

(iv) Apply a continuous improvement process to the tests

(How the results can be most effective)

For each test, you should analyse anomalies, and adjust parameters and criteria to eliminate false positive results. This will be an iterative process, and is the primary reason tools such as IDEA are more effective than out-of-the-box solutions. For example, a continuous auditing process initially used by a large energy company's internal audit department that was passed on to accounts payable became more and more sophisticated as the users learned from their system what conditions most often resulted in duplicate payments.

(v) Practice continuous planning

(How to build on successes)

Monitor the change processes within internal auditing to be sure continuous auditing activities stay on track and the maximum benefits are obtained.

Use successes in marketing internal auditing services to other areas. This and previous steps can be accomplished within the context of conducting this year's audit plan. As each planned audit is completed, it should be assessed for inclusion in your continuous auditing activities. Your internal auditors will benefit by learning more about each system or process they review, and their use of technology will continue to improve.

Conclusion

11.13 Today, management and internal audit find themselves working on the same problem but on opposite sides of the fence. If management controls and monitoring processes do not stop errors and fraud, then the auditing routines must. Going forward, management will be evaluated on sustainability of compliance and competitiveness. Internal audit will be evaluated based on the ability to tailor its activities to the areas of highest risk and opportunities to add the most value.*

As new ways of looking at the data from information systems are developed and perfected, the processes will be transferred to that function's leadership.

Continuous auditing will eventually lead to continuous reporting. In the Information Age, this is essential as investors and creditors also demand timely financial information for their decision making. Some companies have gone so far as to embed the analysis directly into the production system. In real-time mode, alerts are immediately generated to notify internal auditing and management that a transaction with certain characteristics has entered the production environment.

11.14 CAEs can achieve and maintain their status as strategic leaders amid the grind of management roll-call meetings, budget and planning activities, SOX and other regulatory compliance deadlines, and staffing and resource issues by implementing continuous auditing as the best path to enterprise wide risk management implementation.

Continuous Monitoring through CAATs enables decision making for business users, by empowering them with comprehensive relevant Enterprise Business Intelligence, across technology platforms. This is greatly accentuated by the understanding of the underlying business process by the business user.

With CAATs, users can jumpstart their Analytic journey, and enjoy improved

* Deloitte — optimizing the role of internal audit in the Sarbanes-Oxley Era (Second Edition, page 10).

margins, better customer retention, process efficiency and effectiveness thereby impacting the top-line and bottom-line performance of their business positively .

11.15 In culmination CAATs:

- Help accelerate your organisation's analytic maturity, taking you one step closer to achieving excellence.
- Create such business benefits by delivering enhanced usability speaking and thinking, anticipating the evolving needs of decision makers, and ensuring a faster adoption rate amongst users.
- Through simple screen guided analytics, empower every decision maker in every role in your organization and it takes the load off the IT Reports Group, by being easily extendable and maintainable.
- Reduce the latency, cost and project management challenges within reasonable tolerance levels associated with a traditional BI deployment, and enjoy unparalleled Speed to Benefits.
- Transform business intelligence from being a 'Decision Support System' to a 'Decision Making System'.

Appendix A Continuous Auditing in Practice

Many approaches to continuous auditing involve using audit specific data analysis tools such as IDEA Software to audit databases. Responses to a recent informal interview of internal auditors regarding the use of continuous auditing in their organizations resulted in the following examples already in operation:

- Continuous auditing can aid in the streamlining of audit efforts. For example, focusing on revenues and expenses depends on a key driver. Data from operations and finance are then combined to come up with ratios. These ratios are a) reviewed from month to month and b) cross-checked against price catalogues. Identified anomalies result in inquiries to the appropriate functions in operations and/or detailed tests.
- Monitoring of purchasing card usage provides early detection of errors and improper purchases.

For example, the internal auditor receives transaction data from the bank monthly, using data analysis techniques to identify potential misuse. When misuse is identified, the auditor can demonstrate to management through the data analysis that the risk of misuse is higher than expected.

- Human Resources data anomalies and payroll trends, patterns, relationships in hours and rupees can be monitored. Out of balance conditions between subsidiary ledgers and general ledger control account balances, along with the monitoring of key master file fields against company standards allow the monitoring of changes in business units included in financial statement consolidation.
- Continuous auditing can involve obtaining data outputs from critical processes several times per year, resulting in 'traffic light' overviews, substantiated with key operational and financial data, limited review work and interviews.
- Key indicators such as those related to financial and operational measures, and regression models (net revenue and earnings (usually EBITDA)) can be monitored. Quarterly, the information is downloaded into the profile; outliers are highlighted in RED based on formulas,

Data Analytics and Continuous Control Monitoring

and staff members follow-up on outliers with emails, with phone calls and review of other documentation used to resolve the outliers.

- Continuous auditing in lending might include having retail loans disbursed at the branch submitted to a central location within 2 days for checking completeness of documentation, adherence to policy and procedures and recovery of income.

Appendix B Continuous Auditing Maturity Levels

HIGH

Enterprise Risk Management

Build data analysis across the Enterprise – road to continuous ERM

Repetitive Continuous Audits

Improve data analysis in areas audit knows best. at impact & frequency of certain patterns.

What if - Fraud

Apply lessons learned to seek out gaps in monitoring. Assist in Fraud cases.

Risk Assessment

Using data to set audit resource priorities. CAAT's & Store Audits.

LOW

Data Challenged

May use and seek out reports and lists to improve audits. Primary tool is spreadsheets. May look for justification to improve data analysis skills and tools.

Priority – Sustainable Internal Audit Resources

Internal Audit function stabilizing and interested in best practices and continuous Improvement.

Chapter 12

Continuous Monitoring with Big Data Using Caseware Monitor

“Detect, correct and protect – immediate results for long- term peace-of-mind”

About

12.1 CaseWare™ Monitor is a sophisticated risk and controls monitoring solution that allows business, risk and control professionals as well as auditors to quickly and confidently monitor any automated system.

Our solution manages risks and controls across the enterprise by continuously monitoring business activities. This ensures that executives and other key decision makers are given the opportunity to maximize every possible advantage in monitoring risk and making better business decisions to boost profitability.

CaseWare™ Monitor can be applied to any business process, regardless of the underlying system or platform, across the entire organization.

Overview

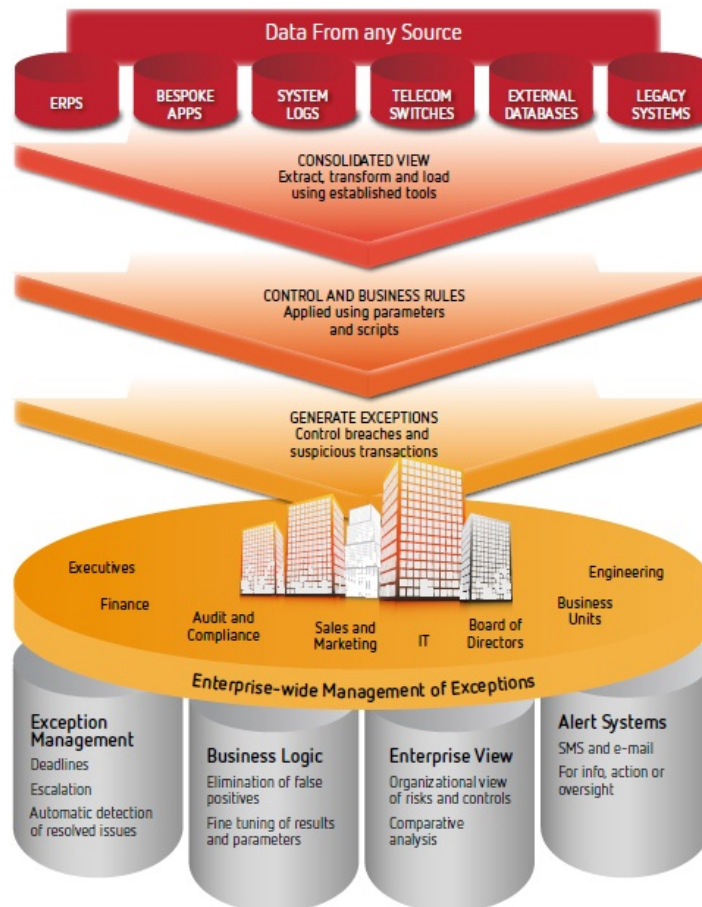
CaseWare™ Monitor Framework Concept

Enterprise-wide Controls Portal

12.2 The use of effective internal controls systems, when implemented properly, is good business, as it provides assurance that financial information is correct, businesses are operating efficiently and assets are safeguarded. Addressing breakdowns in internal controls in a timely and efficient manner allows businesses to improve their profitability.

Being able to determine the state of internal controls across the enterprise through a single portal is one key component of Monitor's value proposition. Controls at remote locations can be examined centrally, including actions being taken to mitigate risks. The solution is designed to meet the requirements of any business ranging from small businesses to Fortune 500 companies with diverse global operations across multiple languages.

12.3 CaseWare™ Monitor provides a single controls portal that enables all stakeholders within any organization to independently monitor controls across multiple businesses and systems. By providing a collaborative framework, our technologies detect breakdowns in internal controls and allow users to solve the underlying problems and prevent negative impacts on the company.



Source – Caseware Monitor framework from Caseware RCM Inc., Canada

Open Design, Universal Application

12.4 Consider a group of companies with global operations in telecommunications, manufacturing, banking and insurance. These are diverse businesses with their own controls and compliance needs, requiring a monitoring framework that is universally applicable.

CaseWare™ Monitor is perfectly suited to access and monitor data from telecom switches, ERPs, custom-made applications, and core banking and insurance applications. Regardless of the databases being used, the solution can monitor all these business processes and effectively improve compliance and controls.

12.5 While CaseWare™ Monitor has pre-built solutions for many business processes and industries; its open design allows customers to build customized controls using established scripting tools such as IDEA®, ACL™, Arbutus and SQL Scripts. With these scripting tools and the framework approach, customers can monitor any control in any business process. This approach allows the customer to focus on scripting the basic logic and having the framework handle everything else. For example, to monitor the creation of overtime claims in excess of the number of work hours in the period, the script writer can apply a simple logic of `OvertimeClaim > HoursInPeriod`.

The remaining stages of the process are handled by CaseWare™ Monitor including:

- when and how often the data is to be monitored.
- who is to be notified.
- how they are to be notified (e-mail, SMS, dashboards, etc.).
- the risk level associated with the control exception.
- who is responsible for resolving the issue and the turnaround time.
- who the exception is to be escalated to, if unresolved.

Solutions

12.6 CaseWare™ Monitor solutions are built around a continuous controls monitoring framework with predefined business rules. With a comprehensive suite of tests and the ability to monitor business processes regardless of the underlying data sources, platforms, or locations, CaseWare™ Monitor offers an effective solution to enable Continuous Controls Monitoring throughout the entire organization.

The Solutions offer:

- standardized rules for specific business processes.
- monitoring of ERPs such as Oracle™ and SAP™.
- faster and more efficient implementations.

Anti-Money Laundering

12.7 The focus of CaseWare™ Monitor AML is to assist institutions in meeting compliance requirements in an effective and efficient manner by automating regulatory reporting and monitoring financial transactions and customer information. The ability to assign responsibility for anomalies detected and maintain accurate records of all actions taken is key in allowing institutions to take all reasonable steps and exercise the necessary due diligence to avoid committing an offense.

Retail and Distribution

12.8 Effective loss prevention continues to be an essential activity for the Retail Industry. The constantly changing nature of retail shrinkage can only be contested through a greater understanding of the business activities within an organization's internal control environment.

In a recent KPMG Fraud Survey Report, inadequate oversight and lack of clarity regarding ownership of controls are cited as key factors leading to ineffective fraud prevention. Examples include individuals being temporarily assigned 'super' user rights but are not revoked at the correct time or exception reports going to stakeholders that cannot take action to remediate issues before they become material to the organization.

Through a single portal coupled with built-in workflow and notification, all stakeholders and key decision makers can independently monitor processes across varying businesses and systems. This collaborative framework helps users across multiple departments such as loss prevention, procurement, finance, operations, and audit, to detect and correct errors and abuses before they become detrimental.

Health Insurance Fraud

12.9 The health insurance industry suffers tremendous losses globally and the resulting impact is higher premiums. For example, in the U.S. alone health insurance fraud was estimated to cost \$68 billion. (National Health Care Anti-Fraud Association, 2008)

The methods being used by many health insurers lack the sophistication to stay ahead of the threat. CaseWare™ Monitor Health Insurance Fraud Monitoring employs a combination of business rules and predictive analytics to detect fraudulent claims. CaseWare™ Monitor integrates seamlessly requiring no changes to existing business systems in the organization. All

claims are examined against business rules in addition to advanced analytics to detect anomalies.

Every \$2 million invested in fighting health-care fraud returns \$17.3 million in recoveries, court-ordered judgments, plus bogus claims that weren't paid and other anti-fraud savings. (National Health Care Anti-Fraud Association, 2008)

Loan Portfolio

12.10 The focus of the solution is to automate the definition of governance, risk and controls within the financial institution's lending process. The financial institution is allowed to define the control environment from loan origination to servicing and portfolio management. Once completed, the monitoring framework examines all electronic activity to detect control breaches and alert the relevant persons automatically.

Order to Cash

12.11 CaseWare™ Monitor O2C enables all Order to Cash processes to be monitored, regardless of the underlying systems, data sources, platforms or locations. Results from these disparate sources are consolidated and presented in CaseWare™ Monitor O2C for use by any authorized users, regardless of location.

Continuous monitoring solutions provide an organization with an independent point of observation over its O2C business processes. It enables identification of control breaches, fraud and money leakage, while ensuring data quality and providing feedback on key performance metrics across the entire process.

An independent point of observation is important in continuous monitoring because solutions that are embedded tend to only provide insight into that system. CaseWare™ Monitor however enables all aspects of the O2C process to be monitored holistically and provides assurance that the interfaces between systems are working correctly.

Purchase to Payment

12.12 CaseWare™ Monitor for P2P suite of tests is comprehensive and covers the full lifecycle of P2P. The suite includes tests and reports for Segregation of Duties, Master Data Monitoring, Exception Reporting and Metrics & Performance Monitoring.

Using CaseWare™ Monitor, all facets of the P2P process, from Requisitioning through to Payment, can be monitored, providing insight into specific issues as well as the overall health of procurement controls. Notifications and workflow management are built into the CaseWare Monitor™ framework ensuring that issues receive proper attention and their resolution managed.

Payroll

12.13 According to the Association of Certified Fraud Examiners (ACFE), companies lose 7% of their annual revenues to occupational fraud. The focus of the CaseWare™ Monitor Payroll solution is to define and automate tests for the controls within the organization's payroll processes. CaseWare™ Monitor Payroll Solution is compatible with any source of data, including ERP and bespoke applications. By continuously monitoring the systems and applying a comprehensive resolution workflow, the audit and compliance process becomes independent and auditable.

A key feature of payroll controls monitoring in CaseWare™ Monitor is the ability to detect erroneous, suspicious and fraudulent activities before payments are made. This provides organizations with a valuable window of time to investigate exceptions to prevent losses due to error or fraud. This solution is deployed to all the relevant stakeholders, assigning them fraud mitigation tasks and ensuring that they are addressed in a timely manner.

Revenue Assurance for Utilities

12.14 Utility companies generally face mounting difficulties in safeguarding their revenues. In times of increasing data volume and complex systems, finding methods to detect revenue leakage and implementing an infrastructure to address it is challenging. With the CaseWare™ Monitor framework approach there are no "blind spots" because there is a virtual consolidation of the systems to create a single view of the business.

The focus of the solution is to automate the monitoring of the company's service and billing processes. Detecting anomalies and alerting the relevant persons will prevent and/or minimize revenue leakage. Most errors that result in revenue losses occur in advance of the actual loss. For example, a customer whose account is incorrectly rated will not result in a loss until billing is done but if detected early, the loss is preventable.

Segregation of Duties

12.15 The CaseWare™ Monitor SoD solution enables Segregation of Duties to be monitored holistically, ensuring that user authorities are properly compartmentalized regardless of the business application, and as a secondary benefit, provides assurance that interfaces between different systems and business operations are working correctly.

Key Benefits

12.16 The following are key benefits:

- early detection of SoD issues
- simple regulatory compliance reporting
- enhanced view of potential SoD violations
- reduction in the risk of fraud through SoD violations
- historical record of SoD exceptions and remediation
- common portal for Segregation of Duties across the enterprise
- greater transparency and effectiveness in the protection of information

Taxation

12.17 Our Tax Monitoring solution is compatible with any source of data, including ERP and bespoke applications. By continuously monitoring the systems and applying a comprehensive resolution workflow, the compliance process becomes independent and auditable. This solution is deployed to all the relevant stakeholders, assigning them issues to be dealt with and ensuring that they are addressed in a timely manner.

Continuous Auditing

12.18 CaseWare™ Monitor enables Continuous Auditing of the entire business regardless of underlying systems, data sources, platforms or locations. CaseWare™ Monitor analyzes 100% of the applicable data and presents a consolidated view of these disparate sources. Internal Audit (IA) is allowed to define the control environment by utilizing a monitoring framework, and alerts are sent once control breaches occur. The solution allows auditing to become more independent and repeatable. IA can now automate scripts to have more frequent testing of controls, and, with the

issue management workflow and distribution, can always know the status of internal controls.

Windows Security Logs

12.19 In most Windows environments, audit logs are underutilized. They are often examined only for investigation purposes and usually after an incident. However Windows logs, when properly configured and efficiently monitored, have tremendous value.

System logging generates vast amount of data from varying sources. As a result, the process of consolidating, inspecting and analyzing them may be tedious and inefficient. The challenges are compounded by inadequate configuration resulting in logs being full, overwritten, incomplete and useless.

Our solution focuses on automating analysis, reporting, alerts and issues management within the organization's Windows logging environment. The resulting logs are collated to a centralized CaseWare™ Monitor server for analysis and interrogation. Once completed, CaseWare™ Monitor utilizes a monitoring framework that examines all electronic activities to detect reportable events and alert the relevant individuals.

Features

12.20 CaseWare™ Monitor examines transactions and data within business processes to detect exceptions based on business rules and parameters. Once detected, CaseWare™ Monitor can alert the relevant users using a variety of contact options such as e-mails and text messaging. All alerts and reports are managed within a comprehensive workflow solution. The workflow is distributed across the enterprise to engage all stakeholders in achieving internal control and compliance objectives.

Issue Management Workflow

Detecting compliance and control breaches is only part of the core objective. The resolution of issues and the associated improvements in the control environment are critical to realizing the value of continuous monitoring. Anyone attempting to monitor business process controls manually can attest to the challenges.

CaseWare™ Monitor boasts impressive functionality to manage issues.

This includes:

- ability to automate the execution of tests via schedules
- selecting users/groups to be alerted for information purposes only

- setting up an escalation process
- controlling whether or not the assigned user can close the issue
- performing all of the above based on conditions

The conditional management of issues is a powerful feature that allows the customer to determine different treatment of exceptions based on predefined criteria. For example, all exceptions for Branch A get routed to Manager A and Branch B to Manager B, and so on. In another instance, exceptions above US\$50,000 get routed to the CFO's attention. Once results are assigned, users can:

- review/close
- reassign
- comment
- export reports to portable formats
- view history of activities

Exemptions

12.21 CaseWare™ Monitor allows for the exemption of specific records as a way of reducing false-positives. Applications that detect issues and allocate work must provide for the reduction of false-positives or the user may become overburdened. Specific records in a report can be exempted or a condition can be applied to exempt them. For example, inactive employees in a report on employees with missing demographics could be exempted by using the condition "Employee Status = INACTIVE".

Exemptions are reversible and can be viewed at any time. This functionality can also be used to extend the business rules used to generate reports without amending scripts.

Review Process

13.22 Issues can be reviewed by the user to whom they were assigned. He or she has the option to make comments on actions taken and may attach screenshots, spread sheets, and other documents, to evidence work done.

Reassigning the issue to another user allows the Manager or Supervisor to manually allocate work to others. All issues reassigned are kept on the assigner's dashboard until they are closed by the assignee.

Chapter 13

Conclusion

13.1 In today's economic environment many companies are striving to reduce costs. Together with new audit standards this provides audit departments with an opportunity to make use of data analysis and accentuate the credo "do more with less" a potential reality. Data analysis also can be an enabling technology that assists audit departments in fulfilling their responsibilities to evaluate and improve the governance, risk management, and control processes as part of the assurance function and seek to deliver timely value to the enterprise by distributing, tracking and escalating potential issues for better organizational insight and control.

In culmination the reader must introspect and act upon the following immediately:

- Understand why data analysis is significant to your organization.
- Know how to provide assurance more efficiently with the use of data analysis technology.
- Be familiar with the challenges and risks that you will face when implementing data analysis technology within your department.
- Know how to incorporate data analysis at your organization through adequate planning and appropriate resource structures.
- Recognize opportunities, trends and advantages of making use of data analysis technology.

Chapter 14

Case Studies – Using MS Excel for CAAT, Data Analysis and MIS Reporting

Case Study

14.1 The following are some case studies on using MS Excel for CAAT, Data Analysis and MIS Reporting:

Case Study 1: Compute 7 th of next month																																			
Application area: Computing due dates of statutory payments based on invoice dates. Used to check whether payment has been made on or before due date.																																			
Solution: =EOMONTH(start_date, months)																																			
Example:																																			
=EOMONTH(A7,0) with "0" as parameter helps compute end of Current Month [first picture]. Adding 7 after the end of this formula helps jump the resulting date 7 days ahead [second picture].																																			
<table border="1"> <thead> <tr> <th></th><th>A</th><th>B</th><th>C</th></tr> </thead> <tbody> <tr> <td>1</td><td>Invoice Date</td><td>End of Current Month</td><td>7th of Next Month</td></tr> <tr> <td>2</td><td>15-Jun-11</td><td>30-Jun-11</td><td></td></tr> <tr> <td>3</td><td>28-Jun-11</td><td>30-Jun-11</td><td></td></tr> <tr> <td>4</td><td>12-Sep-11</td><td>30-Sep-11</td><td></td></tr> <tr> <td>5</td><td>26-Dec-11</td><td>31-Dec-11</td><td></td></tr> <tr> <td>6</td><td>1-Jan-12</td><td>=EOMONTH(A6,0)</td><td></td></tr> <tr> <td>7</td><td></td><td>EOMONTH(start_date, months)</td><td></td></tr> </tbody> </table>					A	B	C	1	Invoice Date	End of Current Month	7th of Next Month	2	15-Jun-11	30-Jun-11		3	28-Jun-11	30-Jun-11		4	12-Sep-11	30-Sep-11		5	26-Dec-11	31-Dec-11		6	1-Jan-12	=EOMONTH(A6,0)		7		EOMONTH(start_date, months)	
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	A	B	C																																
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4	12-Sep-11	30-Sep-11	7-Oct-11																																
5	26-Dec-11	31-Dec-11	7-Jan-12																																
6	1-Jan-12	31-Jan-12	=EOMONTH(A6,0)+7																																
7			EOMONTH(start_date, months)																																

Case Study 2: Compute 90 days vs. 3.0 months from Invoice Date

Application area: Computing exact due dates for debtors, tender cut-off date, project deadline

Solution: =EDATE(start_date, months)

Example:

Adding "90" to the Invoice Date will compute due dates based on days. The resulting due date may be different from the due date based on 3.0 months calculation as shown in the second picture.

	A	B	C
1	Invoice Date	90 days from Invoice Date	3 months from Invoice Date
2	15-Jun-11	13-Sep-11	
3	28-Jun-11	26-Sep-11	
4	12-Sep-11	11-Dec-11	
5	26-Dec-11	25-Mar-12	
6	1-Jan-12	=A6+90	

	A	B	C
1	Invoice Date	90 days from Invoice Date	3 months from Invoice Date
2	15-Jun-11	13-Sep-11	15-Sep-11
3	28-Jun-11	26-Sep-11	28-Sep-11
4	12-Sep-11	11-Dec-11	12-Dec-11
5	26-Dec-11	25-Mar-12	26-Mar-12
6	1-Jan-12	31-Mar-12	=EDATE(A6,3)
7			EDATE(start_date, months)

Case Study 3: Compute Days from given list of Dates. E.g. Sunday, Monday etc.

Application area:

- Derive day (e.g. Saturday, Sunday) to analyse sales data (day-wise sales trend), locating ghost employees if their date-of-join falls on Sunday, ensuring deadline dates does not fall on a Sunday
- Representing dates in "dd/mm/yyyy" format as required while uploading dates during e-filing of VAT returns

Solution: =TEXT(value, format_text)

Example:

	A	B
1	Invoice Date	Day
2	15-Jun-11	Wednesday
3	28-Jun-11	Tuesday
4	12-Sep-11	Monday
5	26-Dec-11	Monday
6	1-Jan-12	=TEXT(A6,"dddd")
7		TEXT(value, format_text)

	A	B	C
1	Invoice Date	Day	DD/MM/YYYY format
2	15-Jun-11	Wednesday	15/06/2011
3	28-Jun-11	Tuesday	28/06/2011
4	12-Sep-11	Monday	12/09/2011
5	26-Dec-11	Monday	26/12/2011
6	1-Jan-12	Sunday	=TEXT(A6,"dd/mm/yyyy")
7			TEXT(value, format_text)

"format_text"	Resulting Output
Dddd	wednesday
Ddd	Wed

Case Studies – Using MS Excel for CAAT Data Analysis and MIS Reporting

Dd	15
mmmm	June
Mmm	Jun
Mm	6
Yyyy	2011
Yyy	2011
Yy	11
dd/mm/yyyy	15/07/2011 [

Case Study 4: Cleaning dates from ERP downloaded "DD.MM.YYYY" format in to Excel acceptable "MM/DD/YYYY" format

Application area: Pre-requisite step before applying date-based Sorting, Filtering and applying Date formulas such as =EDATE(), EOMONTH(), TEXT() etc.

Solution: Text-to-Columns

Example:

Applying date based formulas on dates stored in DD.MM.YYYY format will result in errors as Excel reads date in MM/DD/YYYY format. Sort, Filter, Pivot Table and other such techniques will not work correctly unless the date is corrected as per Excel Standards i.e. MM/DD/YYYY format.

	A	B
1	Invoice Date	Date Formula - NA
2	15.06.2011	#VALUE!
3	28.06.2011	#VALUE!
4	12.09.2011	#VALUE!
5	26.12.2011	#VALUE!
6	01.01.2012	=EOMONTH(A6,0)
7		EOMONTH(start_date, months)

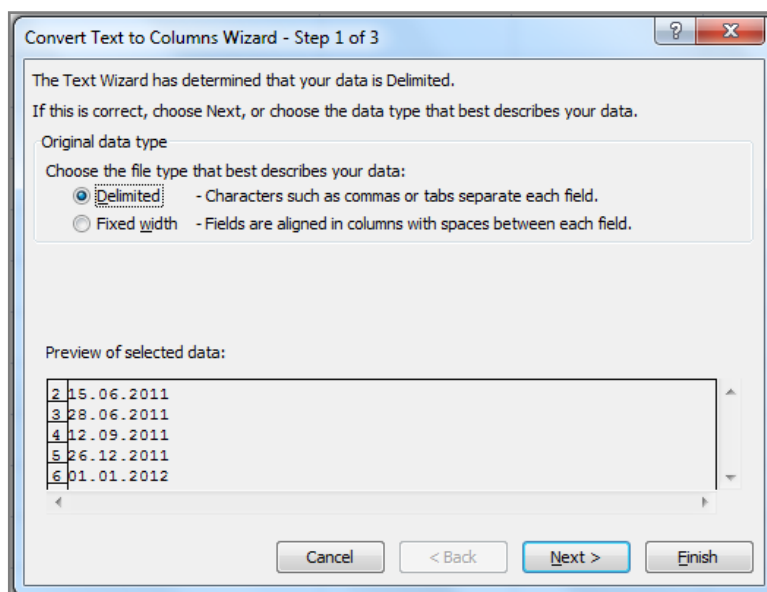
Step 1: Select affected dates

	A	B
1	Invoice Date	Date Formula - NA
2	15.06.2011	#VALUE!
3	28.06.2011	#VALUE!
4	12.09.2011	#VALUE!
5	26.12.2011	#VALUE!
6	01.01.2012	#VALUE!
7		

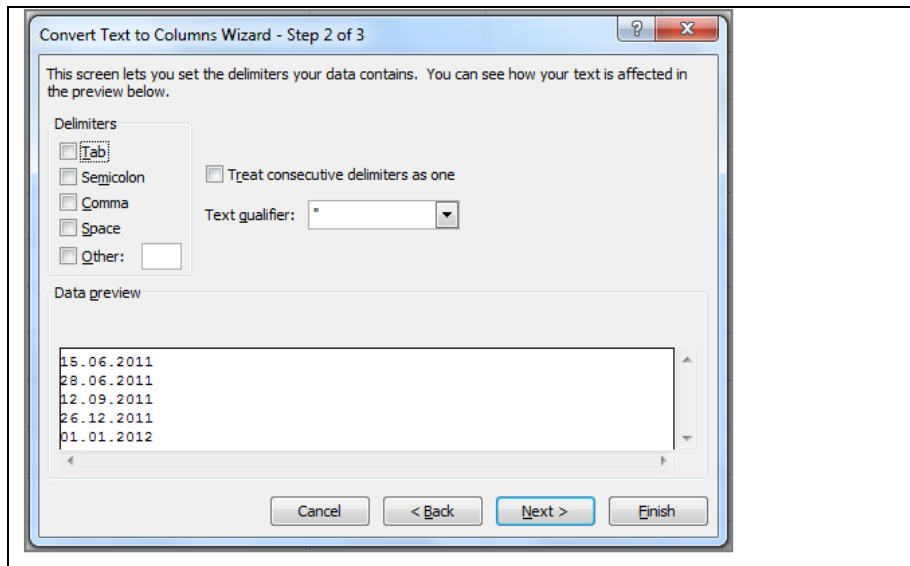
Step 2: DATA tab-> TEXT TO COLUMNS



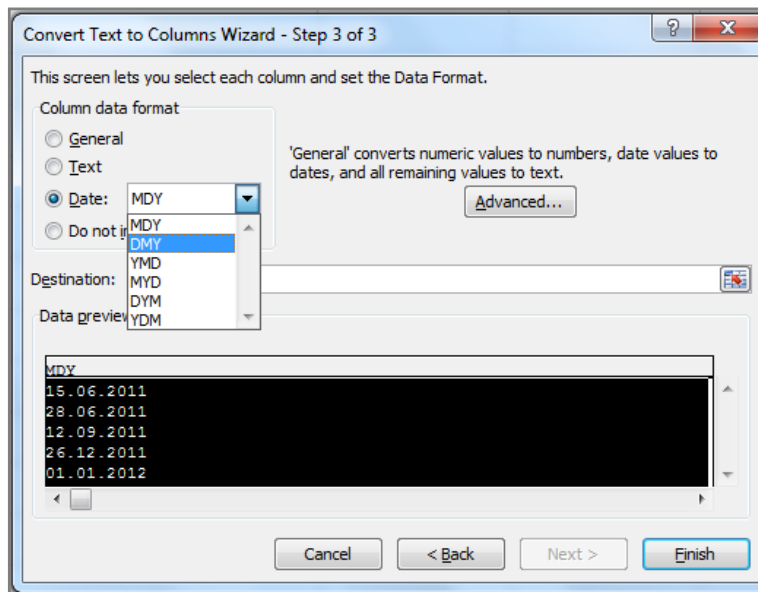
Step 3: TEXT TO COLUMNS (Step 1 of 3) -> Delimited



Step 4: TEXT TO COLUMNS (Step 2 of 3) -> Turn-off all checkboxes [e.g. Tab, Comma etc.]



Step 5: TEXT TO COLUMNS (Step 3 of 3) -> "Date" drop-down list -> DMY -> "Finish" button

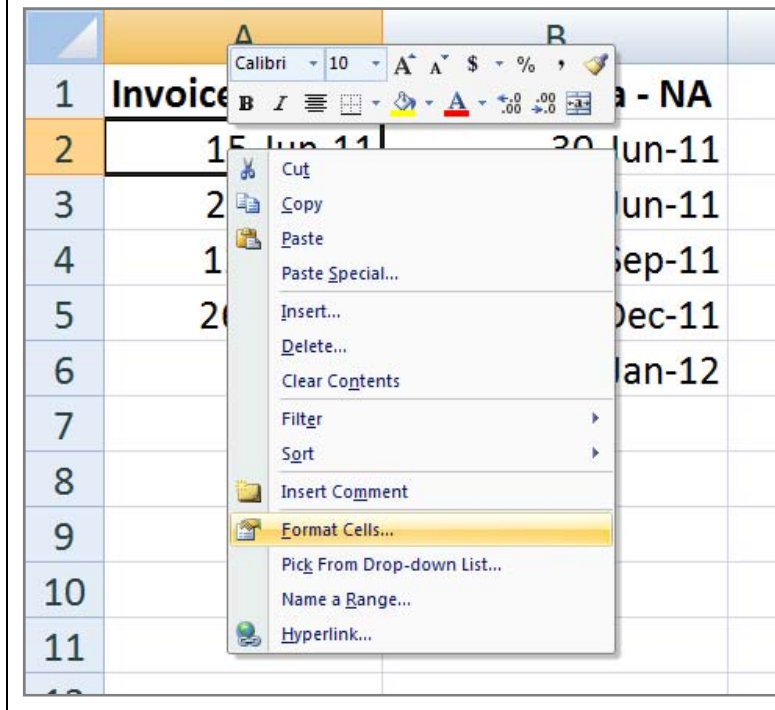


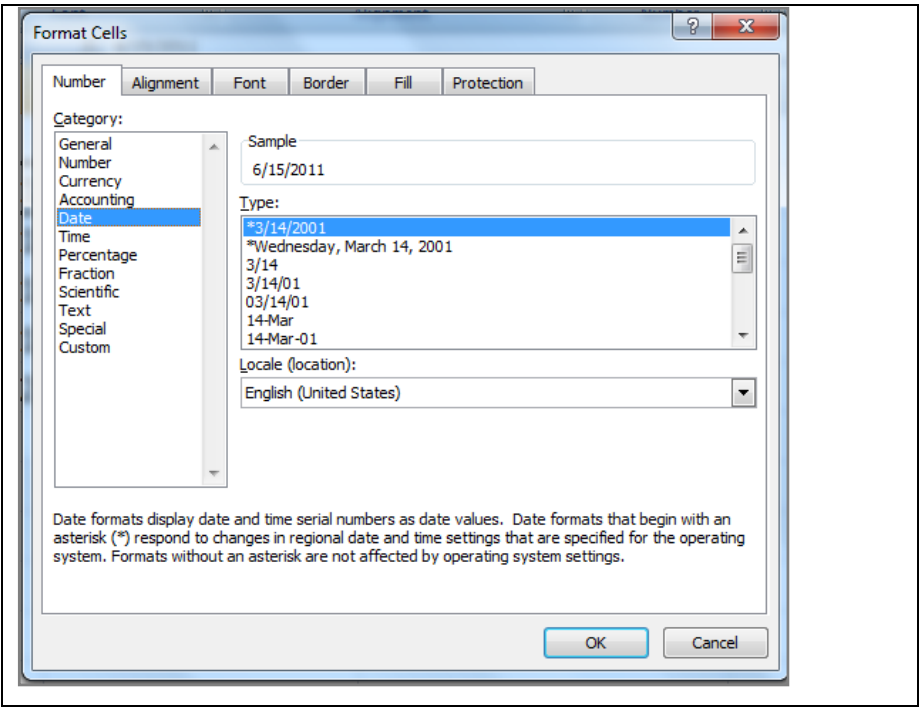
Step 6: Result: Internally, all dates turn into MM/DD/YYYY [refer cell A6]. Although, the skin (presentation) can be modified to DD-MMM-YY as shown in the subsequent step.

Case Studies – Using MS Excel for CAAT Data Analysis and MIS Reporting

	A	B
1	Invoice Date	Date Formula - NA
2	15-Jun-11	30-Jun-11
3	28-Jun-11	30-Jun-11
4	12-Sep-11	30-Sep-11
5	26-Dec-11	31-Dec-11
6	1/1/2012	31-Jan-12
7		

Step 7: Select cells -> Right-click -> "Format Cells" -> "Date" option -> Choose appropriate format for display-presentation of dates





Case Study 5: Adding Subtotal at the end of every Category of item

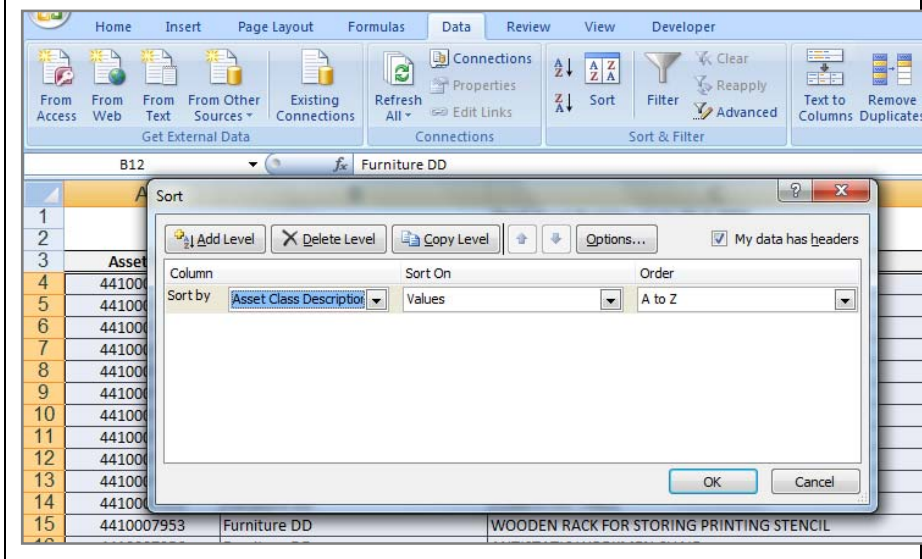
Application area: Documentation of Inventory items by Category, Fixed Asset items by Asset Class

Solution: SUBTOTAL

Example:

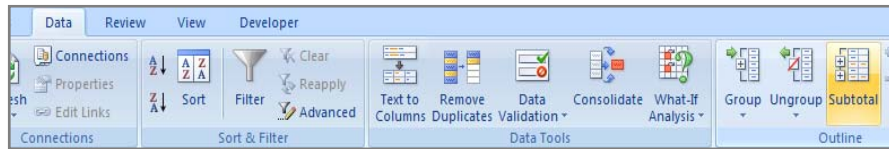
Fixed Asset Register as on 31-3-2004							
Asset No.	Asset Class Description	Asset description	Capex. date	Asset Class	Acquisition Value	Accumulated Depre	Corr.bk.val.
4410007082	Furniture DD	COMPUTER CHAIR	13.09.1995	69010	3,300.00	-3,300.00	0
4410007091	Furniture DD	ESD TOP STEEL ALMIRAH 50"X38"X19"	01.05.1995	69010	5,900.00	-5,900.00	0
4410007942	Furniture DD	STEEL ALMIRAH WITH SHELVES	01.04.1995	69010	5,900.00	-5,900.00	0
4410007944	Furniture DD	ESD WORK TABLE	04.11.1995	69010	22,100.00	-22,100.00	0
4410007945	Furniture DD	PCB COLLECTION TABLE (ESD) FOR SMT LINE	20.01.1996	69010	3,600.00	-3,600.00	0
4410007947	Furniture DD	NON- ANTISTATIC SHELVES	21.04.1996	69010	3,100.00	-3,100.00	0
4410007948	Furniture DD	ESD CHAIR	10.04.1996	69010	24,800.00	-24,800.00	0
4410007949	Furniture DD	Wooden Rack	25.04.1996	69010	27,400.00	-27,400.00	0
4410007950	Furniture DD	Wooden Rack	22.05.1996	69010	46,200.00	-46,200.00	0

Step 1: Sort the Data Set as per the Column (e.g. Asset Class Description) based on which the Subtotal is needed

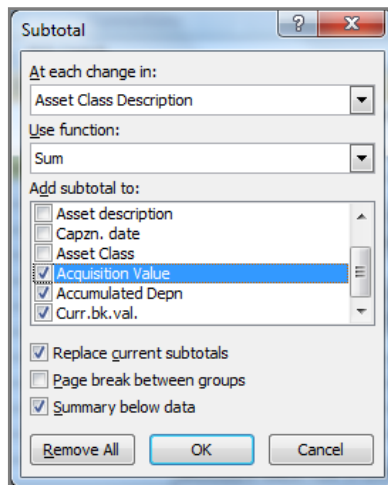


Data Analytics and Continuous Control Monitoring

Step 2: After Sorting, select the entire data set. Go to DATA tab -> SUBTOTAL



Step 3: "At each change in:" – Asset Class Description | "Use function:" – Sum | "Add Subtotal to:" – Acquisition Value, Acc. Depn., Current Bk. Val.



Step 4: The *Subtotal* adds an extra row with Subtotals at the end of every category of "Asset Class Description"

	A	B	C	D	E	F	G
1			Fixed Asset Register as on 31.3.2004				
2							
3							
4	Asset No.	Asset Class Description	Asset description	Capex. date	Asset Class	Acquisition Value	Accumulated Depn
1238	441000181	Factory Buildings	CBA - PHASE II - 4TH & FINAL BILL	24.07.1998	64200	13,887.26	-1,999.26
1239	441000182	Factory Buildings	CBA - PHASE III - 4TH & FINAL BILL	24.07.1998	64200	9,969.13	-809.13
1240	441001227	Factory Buildings	Mezzanine Floor in Aux.C Area(West Side)	13.08.1999	64200	2,55,175.00	-29,769.00
1241	441001290	Factory Buildings	Mezzanine Floor in Aux.C Area(East Side)	09.10.1999	64200	2,68,800.00	-30,240.00
1242	441001291	Factory Buildings	Mezzanine Floor between Compressor Room & PLIC	09.10.1999	64200	1,90,080.00	-21,864.00
1243	441001292	Factory Buildings	Mezzanine Floor in front of IGI	09.10.1999	64200	2,88,000.00	-32,400.00
1244	441001353	Factory Buildings	Mezzanine Floor in Plant Room	01.09.1999	64200	2,10,000.00	-24,060.00
1245	441001354	Factory Buildings	Mezzanine Floor in Road Center	11.08.1999	64200	1,97,550.00	-18,581.00
1246	4410013542	Factory Buildings	Enclosure for ICT	02.09.1999	64200	1,23,582.00	-14,167.00
1247	4410014287	Factory Buildings	Mezzanine floor in the compressor room	25.09.2000	64200	2,40,000.00	-21,500.00
1248	4410014318	Factory Buildings	Extension of Cable Room	15.02.2000	64200	70,000.00	-7,292.00
1249	4410014715	Factory Buildings	Wooden Partition between EWSD area & PN area	06.07.2000	64200	2,54,822.40	-29,890.40
1250	4410014752	Factory Buildings	Construction of Scrap Yard	04.07.2000	64200	1,75,992.00	-16,445.00
1251	4410015532	Factory Buildings	False Ceiling in Stores Area	06.09.2000	64200	1,77,590.00	-19,910.00
1252	4410016446	Factory Buildings	Material Keeping Shed	02.03.2001	64200	1,60,000.00	-11,563.00
1253	4410017239	Factory Buildings	Mezzanine Floor in the Stores Area	14.06.2001	64200	7,00,000.00	-89,583.00
1254	4410017918	Factory Buildings	Material Keeping Shed	20.07.2001	64200	77,500.00	-5,828.00
1255	4410018321	Factory Buildings	Mezzanine Floor in delivery centre	12.10.2001	64200	4,65,000.00	-29,062.00
1256		Factory Buildings Total				3,52,40,687.69	-78,58,975.69
1257	4410002714	Office Buildings	OFFICE & UTILITY BUILDING ON LEASEHOLD L	01.10.1996	64100	34,58,771.00	-10,41,719.00
1258	4410005079	Office Buildings	FALSE CEILING GRID SITATEX BOARD	06.05.1998	64100	7,630.00	-904.00
1259	4410014283	Office Buildings	Construction of social utility building	06.09.2000	64100	7,59,692.00	-54,445.00
1260	4410014293	Office Buildings	Extension of DOC centre	13.10.1999	64100	75,704.00	-6,813.00
1261	4410014293	Office Buildings	False ceiling work in the extn. of DOC centre	28.12.1999	64100	50,577.25	-4,385.25
1262		Office Buildings Total				63,52,374.25	-11,08,266.25
1263	4410004788	Leasehold Land	LEASEHOLD LAND	01.10.1996	64130	2,73,35,812.71	-14,64,886.71
1264		Leasehold Land Total				2,73,35,812.71	-14,64,886.71
1265		Grand Total				17,24,96,369.29	-7,17,48,001.80

Case Study 6: Cleaning database – Deleting the errors

Application area: Final Documentation & Reporting

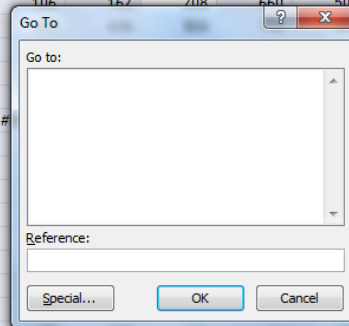
Solution: Go To (Special) – Formulas with errors

Example:

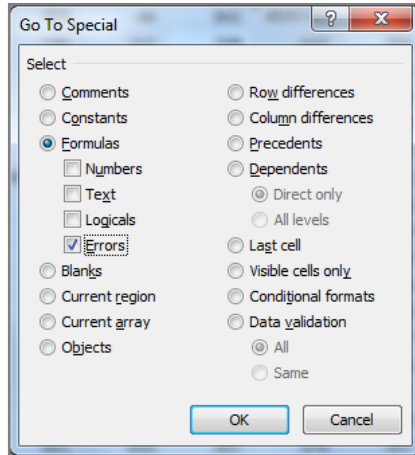
	A	B	C	D	E	F	G	H	I
		Q1 07	Q2 07	Q3 07	Q4 07	Q1 08	Q2 08	Q3 08	Q4 08
2	Andhra Pradesh	483	273	486	166	974	509	474	737
3	Arunachal Pradesh	557	315	271	526	462	86	837	930
4	Assam	99	738	634	412	292	459	823	288
5	Bihar	330	959	46	842	#DIV/0!	68	231	688
6	Chhattisgarh	852	106	162	208	660	506	523	140
7	Goa	#REF!	435	636	826	752	891	962	745
8	Gujarat	901	865	104	1	394	410	400	450
9	Haryana	607	218	995	297	38	609	773	245
10	Himachal Pradesh	747	299	559	840	718	35	99	
11	Jammu and Kashmir	456	#DIV/0!	179	281	963	783	364	709
12	Jharkhand	505	512	358	236	#DIV/0!	886	303	862
13	Karnataka	11	856	646	539	286	669	488	919
14	Kerala	690	448	862	850	874	655	189	598
15	Madhya Pradesh	21	182	645	133	464	184	791	503
16	Maharashtra	748	477	751	961	493	828	856	96
17	Manipur	79	196	104	32	491	237	430	253
18	Meghalaya	591	285	647	358	995	956	75	528
19	Mizoram	429	21	291	539	744	#DIV/0!	211	687
20	Nagaland	397	92	330	136	14	688	643	584

Step 1: Select data -> Press <Ctrl> <G> together to activate "Go To" box -> Choose "Special" button from the "Go To" box

	A	B	C	D	E	F	G	H	I
		Q1 07	Q2 07	Q3 07	Q4 07	Q1 08	Q2 08	Q3 08	Q4 08
2	Andhra Pradesh	483	273	486	166	974	509	474	737
3	Arunachal Pradesh	557	315	271	526	462	86	837	930
4	Assam	99	738	634	412	292	459	823	288
5	Bihar	330	959	46	842	#DIV/0!	68	231	688
6	Chhattisgarh	852	106	162	208	660	506	523	140
7	Goa	#REF!						962	745
8	Gujarat	901						400	450
9	Haryana	607						773	245
10	Himachal Pradesh	747						99	
11	Jammu and Kashmir	456						364	709
12	Jharkhand	505						303	862
13	Karnataka	11						488	919
14	Kerala	690						189	598
15	Madhya Pradesh	21						791	503
16	Maharashtra	748						856	96
17	Manipur	79						430	253
18	Meghalaya	591						75	528
19	Mizoram	429						211	687
20	Nagaland	397						643	584



Step 2: Choose "Formulas" with "Errors"



Step 3: The above mechanism helps select all the cells with errors simultaneously. Pressing <delete> key will help delete the errors in one go.

	A	B	C	D	E	F	G	H	I
1		Q1 07	Q2 07	Q3 07	Q4 07	Q1 08	Q2 08	Q3 08	Q4 08
2	Andhra Pradesh	483	273	486	166	974	509	474	737
3	Arunachal Pradesh	557	315	271	526	462	86	837	930
4	Assam	99	738	634	412	292	459	823	288
5	Bihar	330	959	46	842	#DIV/0!	68	231	688
6	Chhattisgarh	852	106	162	208	660	506	523	140
7	Goa	#REF!	435	636	826	752	891	962	745
8	Gujarat	901	865	104	1	394	410	400	450
9	Haryana	607	218	995	297	38	609	773	245
10	Himachal Pradesh	747	299	559	840	718	35	99	
11	Jammu and Kashmir	456	#DIV/0!	179	281	963	783	364	709
12	Jharkhand	505	512	358	236	#DIV/0!	886	303	862
13	Karnataka	11	856	646	539	286	669	488	919
14	Kerala	690	448	862	850	874	655	189	598
15	Madhya Pradesh	21	182	645	133	464	184	791	503
16	Maharashtra	748	477	751	961	493	828	856	96
17	Manipur	79	196	104	32	491	237	430	253
18	Meghalaya	591	285	647	358	995	956	75	528
19	Mizoram	429	21	291	539	744	#DIV/0!	211	687
20	Nagaland	397	92	330	136	14	688	643	584
21		828	451	655	451	574	987	781	654

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	A	B	C	D	E	F	G	H	I
1		Q1 07	Q2 07	Q3 07	Q4 07	Q1 08	Q2 08	Q3 08	Q4 08
2	Andhra Pradesh	483	273	486	166	974	509	474	737
3	Arunachal Pradesh	557	315	271	526	462	86	837	930
4	Assam	99	738	634	412	292	459	823	288
5	Bihar	330	959	46	842		68	231	688
6	Chhattisgarh	852	106	162	208	660	506	523	140
7	Goa		435	636	826	752	891	962	745
8	Gujarat	901	865	104	1	394	410	400	450
9	Haryana	607	218	995	297	38	609	773	245
10	Himachal Pradesh	747	299	559	840	718	35	99	
11	Jammu and Kashmir	456		179	281	963	783	364	709
12	Jharkhand	505	512	358	236		886	303	862
13	Karnataka	11	856	646	539	286	669	488	919
14	Kerala	690	448	862	850	874	655	189	598
15	Madhya Pradesh	21	182	645	133	464	184	791	503
16	Maharashtra	748	477	751	961	493	828	856	96
17	Manipur	79	196	104	32	491	237	430	253
18	Meghalaya	591	285	647	358	995	956	75	528
19	Mizoram	429	21	291	539	744		211	687
20	Nagaland	397	92	330	136	14	688	643	584

Case Study 7: Filling up Blank cells with appropriate date pieces to enable use of Filter & Pivot table

Application area: Preparing ERP downloaded raw data file (e.g. Vendor Master, Transaction files) for further analysis

Solution: Go To (Special) – Blanks

Example:

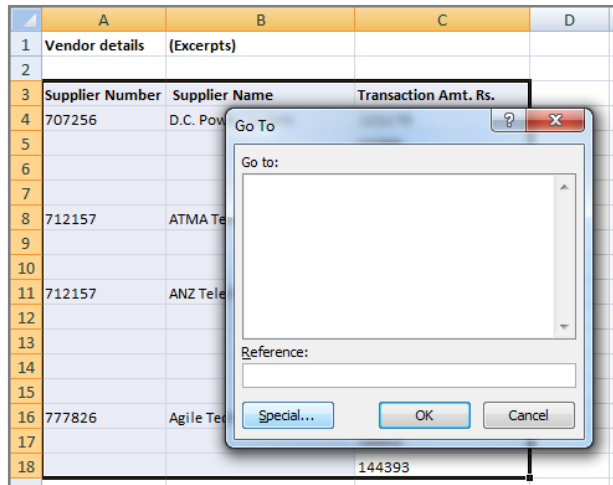
	A	B	C
1	Vendor details	(Excerpts)	
2			
3	Supplier Number	Supplier Name	Transaction Amt. Rs.
4	707256	D.C. Power System	125279
5			32090
6			136529
7			45305
8	712157	ATMA Tele Power Limited..	108411
9			171781
10			156918
11	712157	ANZ Tele Power Ltd	74676
12			110210
13			20866
14			48500
15			193193
16	777826	Agile Technologies	111433
17			56903
18			144393

Step 1: Choose affected range of columns/cells

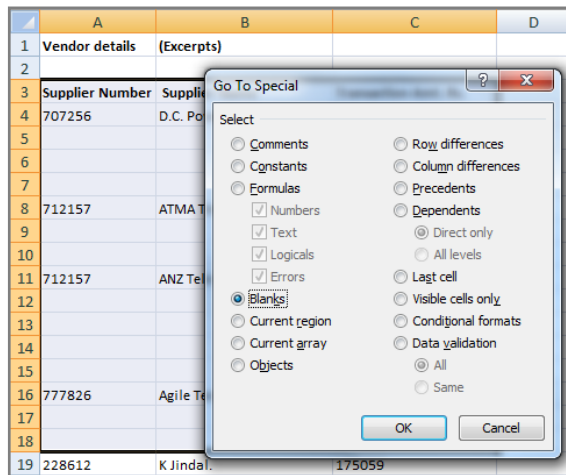
	A	B	C
1	Vendor details	(Excerpts)	
2			
3	Supplier Number	Supplier Name	Transaction Amt. Rs.
4	707256	D.C. Power System	125279
5			32090
6			136529
7			45305
8	712157	ATMA Tele Power Limited..	108411
9			171781
10			156918
11	712157	ANZ Tele Power Ltd	74676
12			110210
13			20866
14			48500
15			193193
16	777826	Agile Technologies	111433
17			56903
18			144393

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Step 2: Press <Ctrl> <G> together to activate “Go To” box -> Choose “Special” button from the “Go To” box



Step 3: Choose “Blanks”



Data Analytics and Continuous Control Monitoring

Step 4 Write formula in the first selected cell keeping the "Blank" range selected -> Press <Ctrl> <Enter> together to fill the formulas in the entire region of "Blank" range selected

	A	B	C
1	Vendor details	(Excerpts)	
2			
3	Supplier Number	Supplier Name	Transaction Amt. Rs.
4	707256	D.C. Power System	125279
5	=A4		32090
6			136529
7			45305
8	712157	ATMA Tele Power Limited..	108411
9			171781
10			156918
11	712157	ANZ Tele Power Ltd	74676
12			110210
13			20866
14			48500
15			193193
16	777826	Agile Technologies	111433
17			56903
18			144393

	A	B	C
1	Vendor details	(Excerpts)	
2			
3	Supplier Number	Supplier Name	Transaction Amt. Rs.
4	707256	D.C. Power System	125279
5	707256	D.C. Power System	32090
6	707256	D.C. Power System	136529
7	707256	D.C. Power System	45305
8	712157	ATMA Tele Power Limited..	108411
9	712157	ATMA Tele Power Limited..	171781
10	712157	ATMA Tele Power Limited..	156918
11	712157	ANZ Tele Power Ltd	74676
12	712157	ANZ Tele Power Ltd	110210
13	712157	ANZ Tele Power Ltd	20866
14	712157	ANZ Tele Power Ltd	48500
15	712157	ANZ Tele Power Ltd	193193
16	777826	Agile Technologies	111433
17	777826	Agile Technologies	56903
18	777826	Agile Technologies	144393

Case Study 8: Debtors Ageing

Application area: Preparing ERP downloaded raw data file (e.g. Vendor Master, Transaction files) for further analysis

Solution: VLOOKUP(lookup_value, table_array, col_index_num, range_lookup) with range_lookup as <True>

Example:

	A	B	C	D	E
1	Days Due for:	Ageing Bracket:		Reference Table-	
2	200				
3	23			Due for More than equal to	Age Bracket
4	43			0	0-30
5	189			31	31-60
6	96			61	61-90
7				91	91-180
8				181	>180
9					

Step 1: Write =VLOOKUP() and choose *lookup_value*

	A	B	C	D	E
1	Days Due for:	Ageing Bracket:		Reference Table-	
2	200	=VLOOKUP(A2			
3	23	VLOOKUP(lookup_value, table_array, col_index_num, (range_lookup))		Due for More than equal to	Age Bracket
4	43			0	0-30
5	189			31	31-60
6	96			61	61-90
7				91	91-180
8				181	>180
9					

Step 2: Choose *table_array* i.e. "reference table" on the right as shown, press <F4> to lock the range (\$)

	A	B	C	D	E
1	Days Due for:	Ageing Bracket:		Reference Table-	
2	200	=VLOOKUP(A2,D3:E8			
3	23	VLOOKUP(lookup_value, table_array, col_index_num, (range_lookup))		Due for More than equal to	Age Bracket
4	43			0	0-30
5	189			31	31-60
6	96			61	61-90
7				91	91-180
8				181	>180
9					

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	A	B	C	D	E
1	Days Due for:	Ageing Bracket:		Reference Table-	
2	200	=VLOOKUP(A2,\$D\$3:\$E\$8,			
3	23	VLOOKUP(lookup_value, table_array, col_index_num,	Factor More than equal to	Age Bracket	
4	43		0	0-30	
5	189		31	31-60	
6	96		61	61-90	
7			91	91-180	
8			181	>180	

Step 3: Choose *col_index_num* as 2 since "Age Bracket" values are in the second column of the "Reference table"

	A	B	C	D	E
1	Days Due for:	Ageing Bracket:		Reference Table-	
2	200	=VLOOKUP(A2,\$D\$3:\$E\$8,2,			
3	23	VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])	Factor More than equal to	Age Bracket	
4	43		0	0-30	
5	189		31	31-60	
6	96		61	61-90	
7			91	91-180	
8			181	>180	

Step 4: Choose *range_lookup* as <True> since the "Reference table" refers to a data in "greater than equal to" format in the first column and is sorted in ascending order

	A	B	C	D	E	F
1	Days Due for:	Ageing Bracket:		Reference Table-		
2	200	=VLOOKUP(A2,\$D\$3:\$E\$8,2,				
3	23	VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])	Factor More than equal to	Age Bracket		
4	43		0	0-30		
5	189		31	31-60		
6	96		61	61-90		
7			91	91-180		
8			181	>180		

	A	B	C	D	E
1	Days Due for:	Ageing Bracket:		Reference Table-	
2	200	=VLOOKUP(A2,\$D\$3:\$E\$8,2,TRUE)			
3	23	VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])	Factor More than equal to	Age Bracket	
4	43		0	0-30	
5	189		31	31-60	
6	96		61	61-90	
7			91	91-180	
8			181	>180	

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Step 5: Drag the formula so written to subsequent cells downwards to pull the “Ageing Bracket” value based on “Days due for”

	A	B	C	D	E
1	Days Due for:	Ageing Bracket:		Reference Table-	
2	200	>180			
3	23	0-30		Due for More than equal to	Age Bracket
4	43	31-60		0	0-30
5	189	>180		31	31-60
6	=VLOOKUP(A6,\$D\$3:\$E\$8,2,TRUE)			61	61-90
7	VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])			91	91-180
8				181	>180
9					

Case Study 9: Finding Instances of Duplicates

Application area: Finding how many times a particular Invoice No. / Voucher No. may have been duplicated

Solution: COUNTIFS(criteria_range1, criteria1, criteria_range2, criteria2 ...)

Example:

Step 1: Write =COUNTIFS() and choose *criteria_range1* as illustrated.

	A	B	C
1	Invoice No.	Count	
2	AK/G/00122	=COUNTIFS(A2:A9	
3	AK/G/00177	COUNTIFS(criteria_range1, criteria1, ...)	
4	AK/G/00122		
5	AK/G/00100		
6	AK/G/00155		
7	AK/G/00133		
8	AK/G/00133		
9	AK/G/00122		
10			

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Step 2: Press <F4> to lock the selected range (\$)

	A	B	C
1	Invoice No.	Count	
2	AK/G/00122	=COUNTIFS(\$A\$2:\$A\$9	
3	AK/G/00177	COUNTIFS(criteria_range1, criteria1, ...)	
4	AK/G/00122		
5	AK/G/00100		
6	AK/G/00155		
7	AK/G/00133		
8	AK/G/00133		
9	AK/G/00122		
10			

Step 3: Choose *criteria1* as the Invoice No.

	A	B	C	D
1	Invoice No.	Count		
2	AK/G/00122	=COUNTIFS(\$A\$2:\$A\$9,A2)		
3	AK/G/00177	COUNTIFS(criteria_range1, criteria1 , [criteria_range2, ...])		
4	AK/G/00122			
5	AK/G/00100			
6	AK/G/00155			
7	AK/G/00133			
8	AK/G/00133			
9	AK/G/00122			
10				

Step 4: Copy the formula and paste it subsequent cells as shown.

	A	B	
1	Invoice No.	Count	
2	AK/G/00122	3	
3	AK/G/00177	1	
4	AK/G/00122	3	
5	AK/G/00100	1	
6	AK/G/00155	1	
7	AK/G/00133	2	
8	AK/G/00133	2	
9	AK/G/00122	3	
10			

Case Study 10: Removing Duplicate Names to arrive at unique list

Application area: Preparing a list of vendor names, client names, product names

Solution: Remove Duplicates

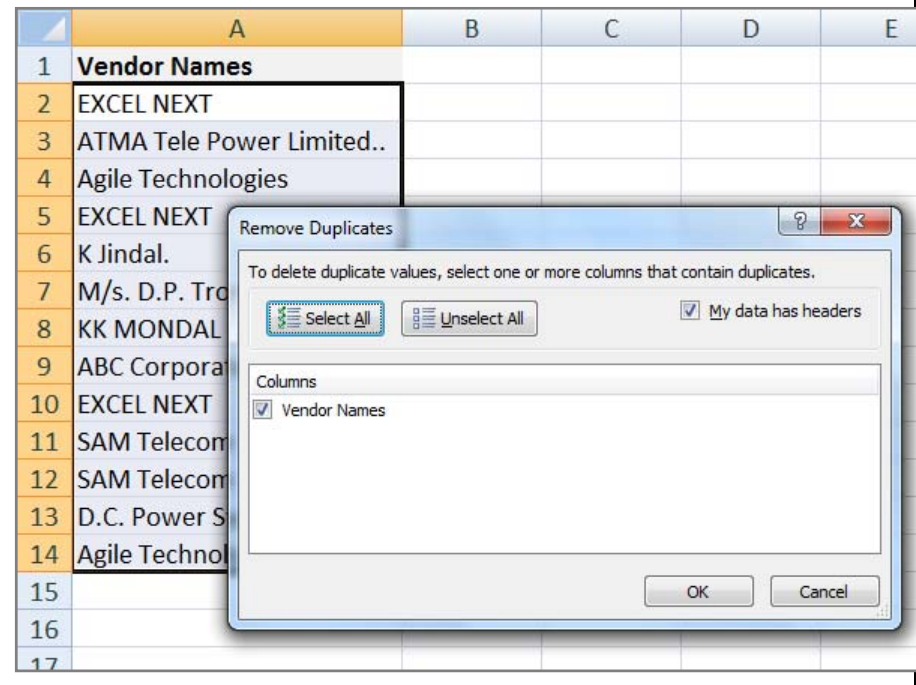
Example: Eliminating duplicate names will help us arrive at a list that has unique names

	A
1	Vendor Names
2	EXCEL NEXT
3	ATMA Tele Power Limited..
4	Agile Technologies
5	EXCEL NEXT
6	K Jindal.
7	M/s. D.P. Tron Pvt Ltd.
8	KK MONDAL
9	ABC Corporate
10	EXCEL NEXT
11	SAM Telecom
12	SAM Telecom
13	D.C. Power System
14	Agile Technologies

Step 1: After choosing the data set, DATA tab -> "Remove Duplicates"



Step 2: The resulting dialog box with "Vendor Names" ticked on should be continued with.



Step 3: "Remove Duplicates" keeps the first instance of the unique name and deletes the duplicates occurring thereafter.

	A	
1	Vendor Names	
2	EXCEL NEXT	
3	ATMA Tele Power Limited..	
4	Agile Technologies	
5	K Jindal.	
6	M/s. D.P. Tron Pvt Ltd.	
7	KK MONDAL	
8	ABC Corporate	
9	SAM Telecom	
10	D.C. Power System	
11		
12		
13		
14		
15		

Case Study 11: Pivot Table - I

Application area: Multi-dimensional Data Analysis on Columnar data sets.
E.g. Fixed Asset Register, Sales, Purchase, Goods Dispatch, Employee Master, Payroll

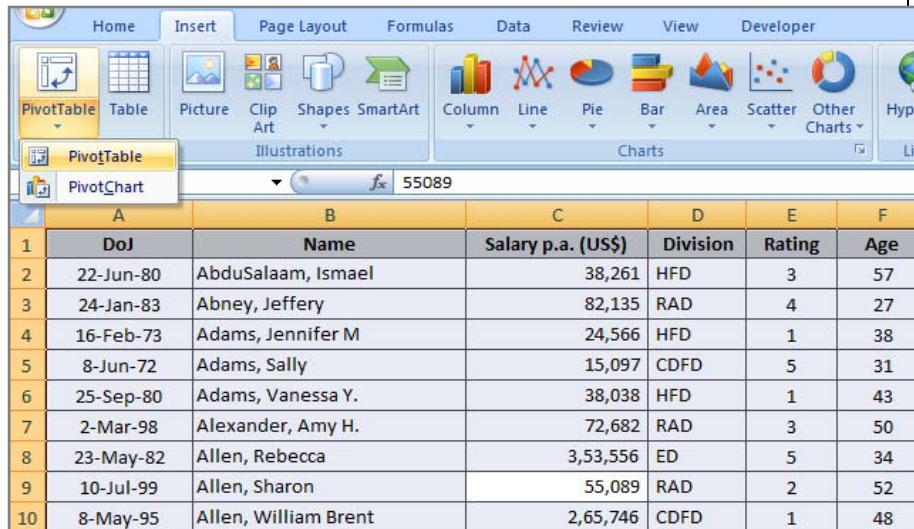
Solution: Pivot Table - Basic

Example: Given below is a snapshot of a data set of employees of a company with details of date of join, name, salary, department, performance rating and age.

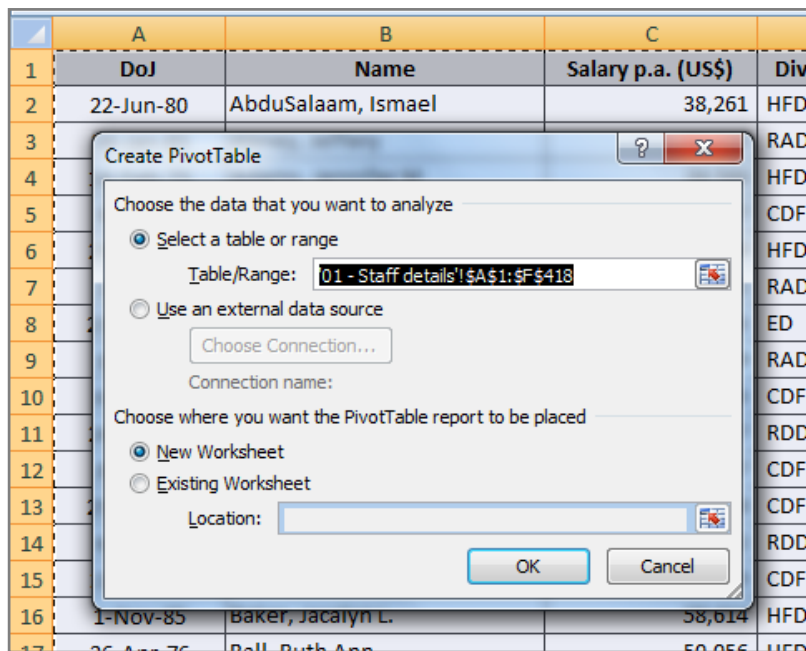
	A	B	C	D	E	F
1	DoJ	Name	Salary p.a. (US\$)	Division	Rating	Age
2	22-Jun-80	AbduSalaam, Ismael	38,261	HFD	3	57
3	24-Jan-83	Abney, Jeffery	82,135	RAD	4	27
4	16-Feb-73	Adams, Jennifer M	24,566	HFD	1	38
5	8-Jun-72	Adams, Sally	15,097	CDFD	5	31
6	25-Sep-80	Adams, Vanessa Y.	38,038	HFD	1	43
7	2-Mar-98	Alexander, Amy H.	72,682	RAD	3	50
8	23-May-82	Allen, Rebecca	3,53,556	ED	5	34
9	10-Jul-99	Allen, Sharon	55,089	RAD	2	52
10	8-May-95	Allen, William Brent	2,65,746	CDFD	1	48
11	24-Aug-77	Alligood, Cynthia	98,527	RDD	4	26
12	20-Jan-69	Andrews, Darryl	20,337	CDFD	1	32
13	25-Nov-87	Applegate, Mary Alice	18,158	CDFD	3	31
14	8-Aug-79	Ashcraft, Lynn F.	67,602	RDD	3	45
15	22-Jun-73	Avina III, Ross J.	1,61,229	CDFD	3	45
16	1-Nov-85	Baker, Jacalyn L.	58,614	HFD	3	52
17	26-Apr-76	Ball, Ruth Ann	50,056	HFD	1	28
18	12-Oct-83	Barber, Eva	1,21,317	RAD	3	53
19	28-Jan-87	Barden, Nicky E.	9,32,149	RAD	2	51

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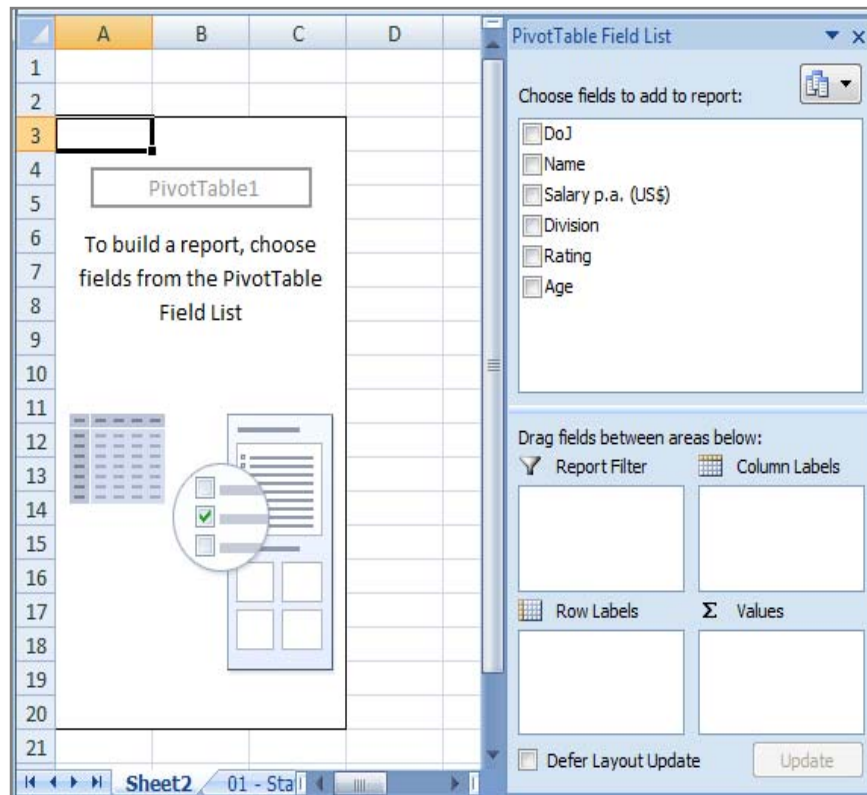
Step 1: Choose entire data set and then INSERT Tab -> "Pivot Table"



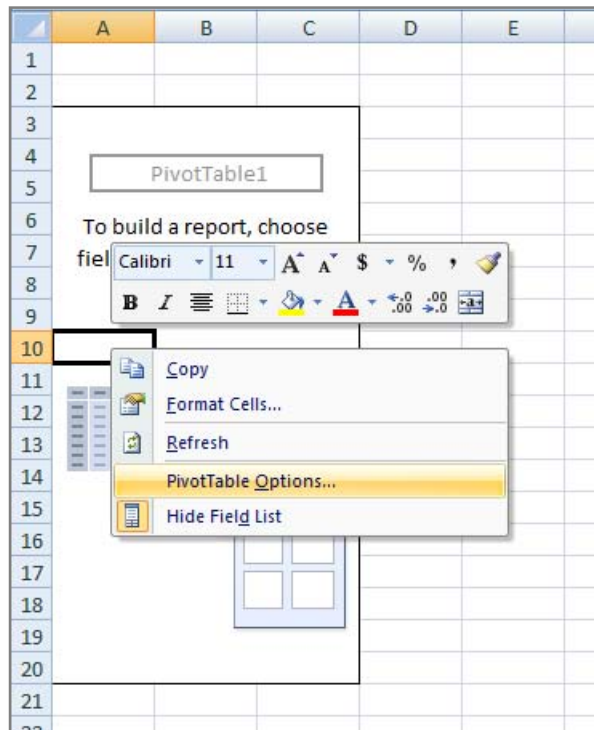
Step 2: "Create Pivot table" reconfirms selection of data range. Press OK.



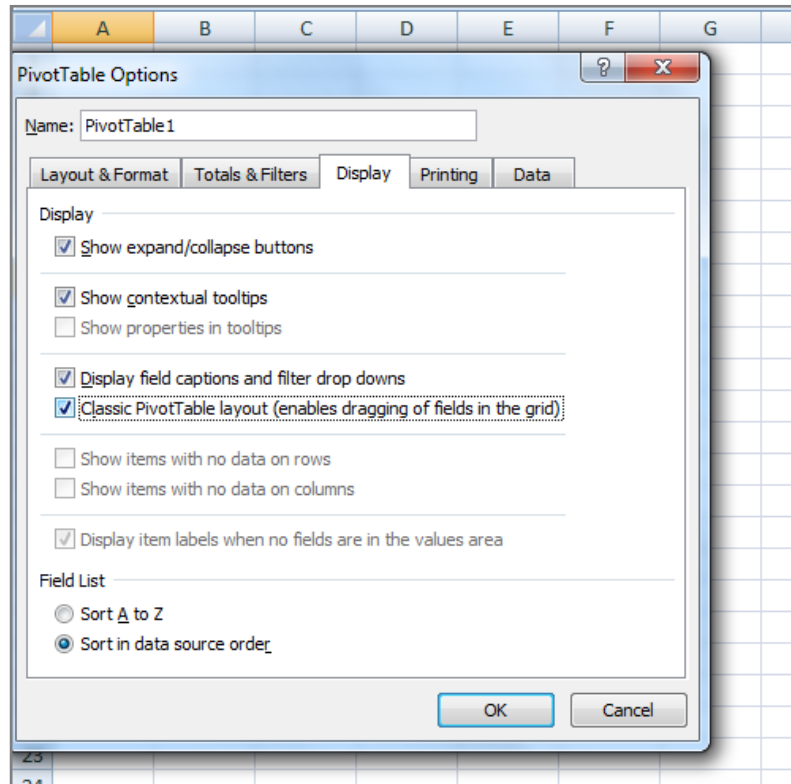
Step 3: A Pivot table shell template is created (left)



Step 4: Right-click on the report area and choose "Pivot Table options"

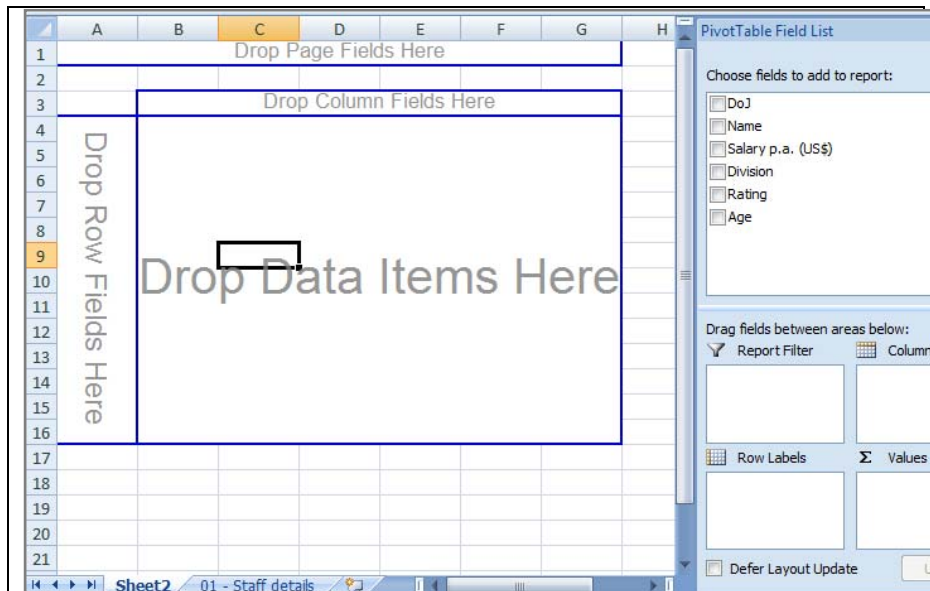


Step 5: Go to "Display" tab and activate the setting as mentioned – "*Classic Pivot Table Layout*"

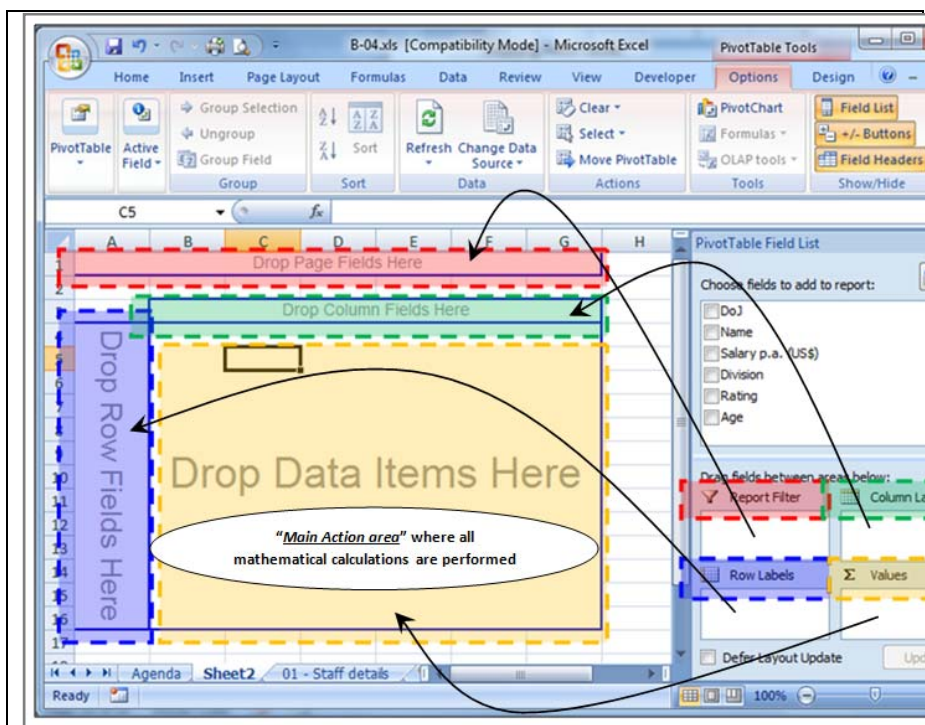


Explanation: "Row Fields", "Column Fields", "Page Fields" and "Data Items" (left) are template areas which exhibits area where the field lists (top right) will subsequently be dragged and dropped to form Pivot Table report.

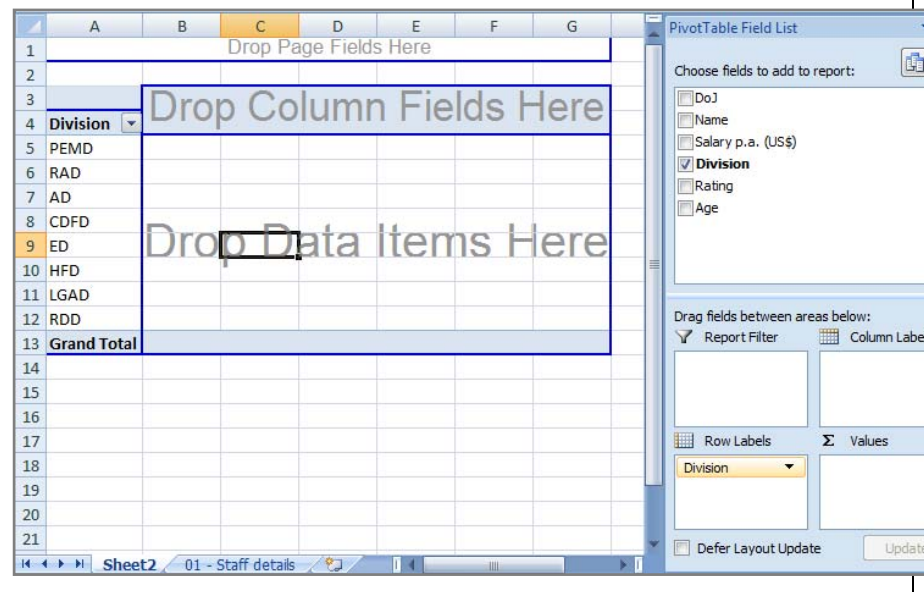
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Explanation: "Row Fields", "Column Fields", "Page Fields" and "Data Items" (left) are represented by "Row Labels", "Column labels", "Report Filter" and "Values" (bottom right), respectively. The "Data Items" or "values" area represents the region where all mathematical computations are performed – Sum, Count, Average etc.



Step 8: Select "Division" and drag/place it under "Row Fields" (left) or "Row Labels" (bottom-right)



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Step 9: Select “Salary” and drag/place it under “Data items” (left) or “Values” (bottom-right). Automatically, the “action area” will compute “Sum of Salary”

The screenshot displays an Excel worksheet with a PivotTable and the PivotTable Field List task pane on the right.

PivotTable Data:

Division	Total
PEMD	5334524
RAD	46944742
AD	8165899
CDFD	8008462
ED	4409016
HFD	17360720
LGAD	3373946
RDD	2114440
Grand Total	95711749

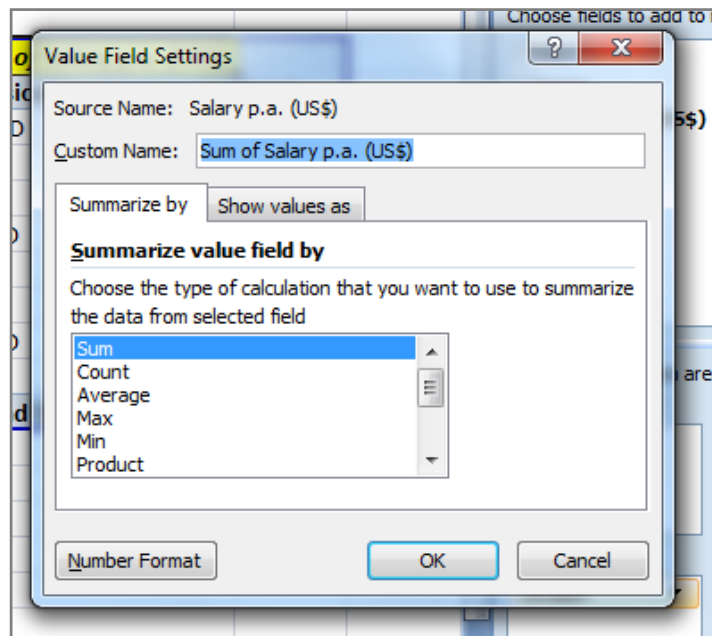
PivotTable Field List:

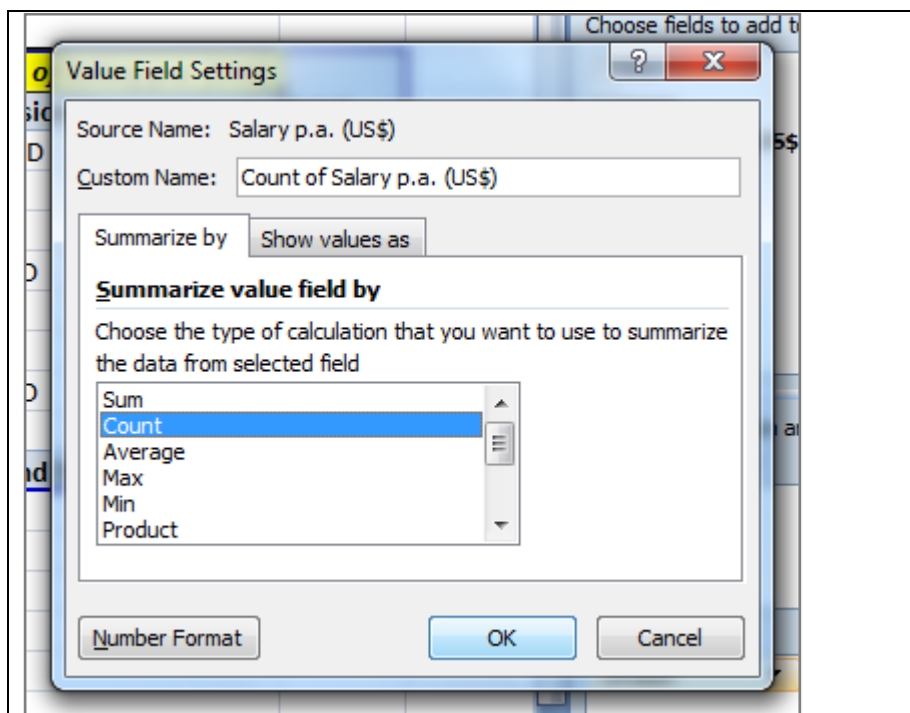
- Choose fields to add to report:**
 - ☐ DoJ
 - ☐ Name
 - ☒ **Salary p.a. (US\$)**
 - ☒ **Division**
 - ☐ Rating
 - ☐ Age
- Drag fields between areas below:**
 - Report Filter:** (Empty)
 - Column Labels:** (Empty)
 - Row Labels:** Division
 - Values:** Sum of Salary...
- ☐ Defer Layout Update
-

Step 10: To calculate “Head Count” or “Count” of “Salary”, double-click on the heading “Sum of Salary” as marked

	A	B
1	Drop Page Fields Here	
2		
3	Sum of Salary p.a. (US\$)	
4	Division	Total
5	PEMD	5334524
6	RAD	46944742
7	AD	8165899
8	CDFD	8008462
9	ED	4409016
10	HFD	17360720
11	LGAD	3373946
12	RDD	2114440
13	Grand Total	95711749

Step 11: As a result of the double-click, “Value Field Settings” box gets activated and from the “Summarize by” tab, one can choose “Count”

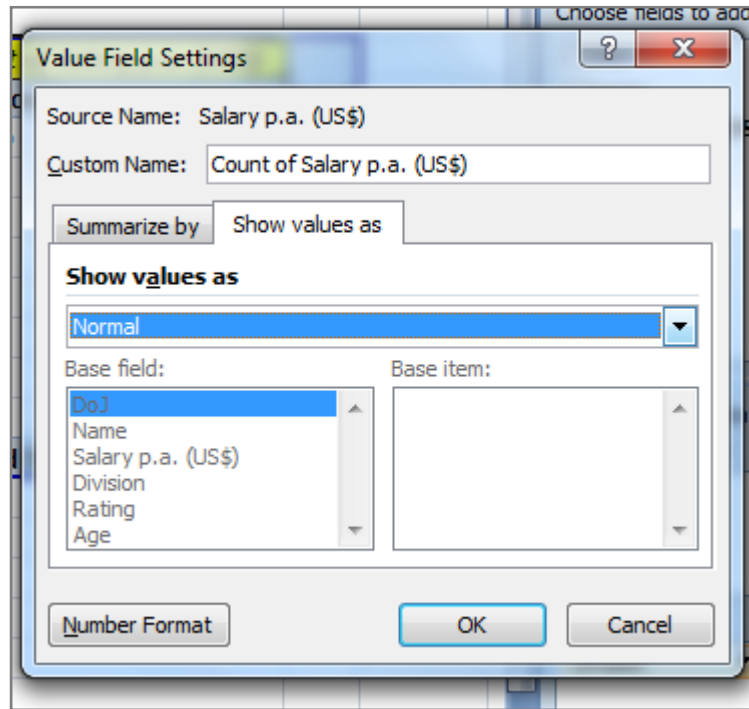


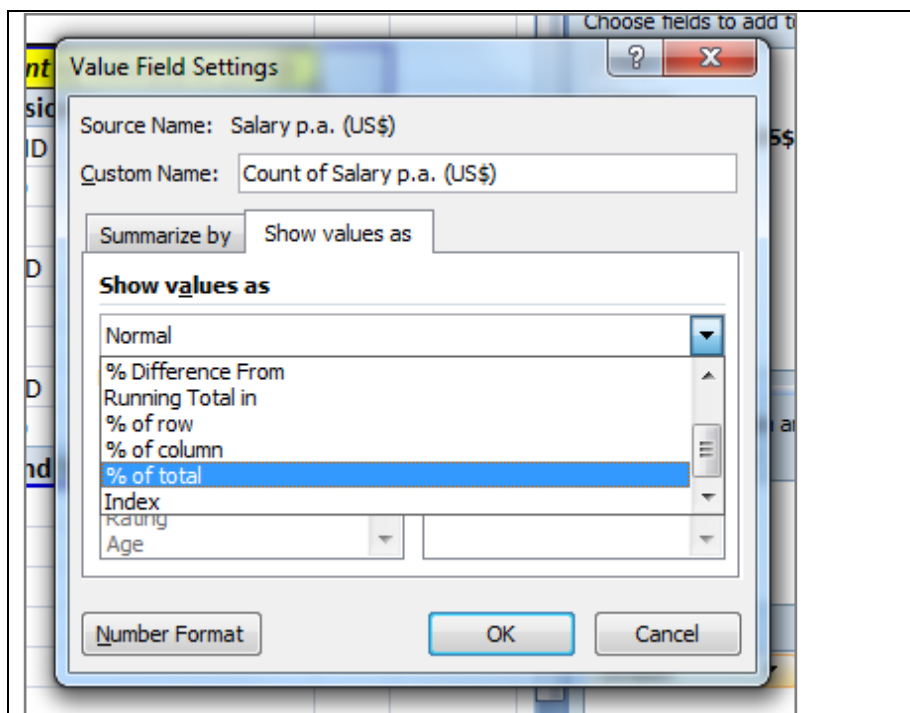


Explanation: Resulting output data suggests "Count of Salary" indicating a total of 417 employees

	A	B
1	Drop Page Fields Here	
2		
3	Count of Salary p.a. (US\$)	
4	Division	Total
5	PEMD	32
6	RAD	148
7	AD	41
8	CDFD	48
9	ED	17
10	HFD	112
11	LGAD	13
12	RDD	6
13	Grand Total	417
14		

Step 12: Based on the headcount (absolute numbers), if % is to be computed, double-click, "Value Field Settings" box and from the "Show Values as" tab, one can choose "% of Total"





Explanation: As a result, the total workforce headcount is displayed in % format

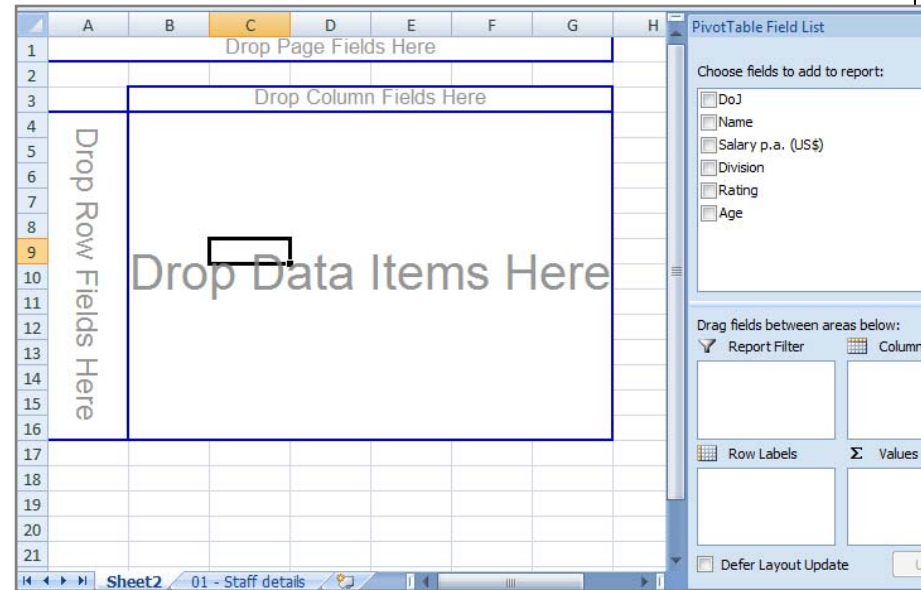
	A	B
1	Drop Page Fields Here	
2		
3	Count of Salary p.a. (US\$)	
4	Division	Total
5	PEMD	7.67%
6	RAD	35.49%
7	AD	9.83%
8	CDFD	11.51%
9	ED	4.08%
10	HFD	26.86%
11	LGAD	3.12%
12	RDD	1.44%
13	Grand Total	100.00%
14		

Case Study 12: Pivot Table – II

Application area: Creating Pools – Debtor Ageing, Salary Pools,

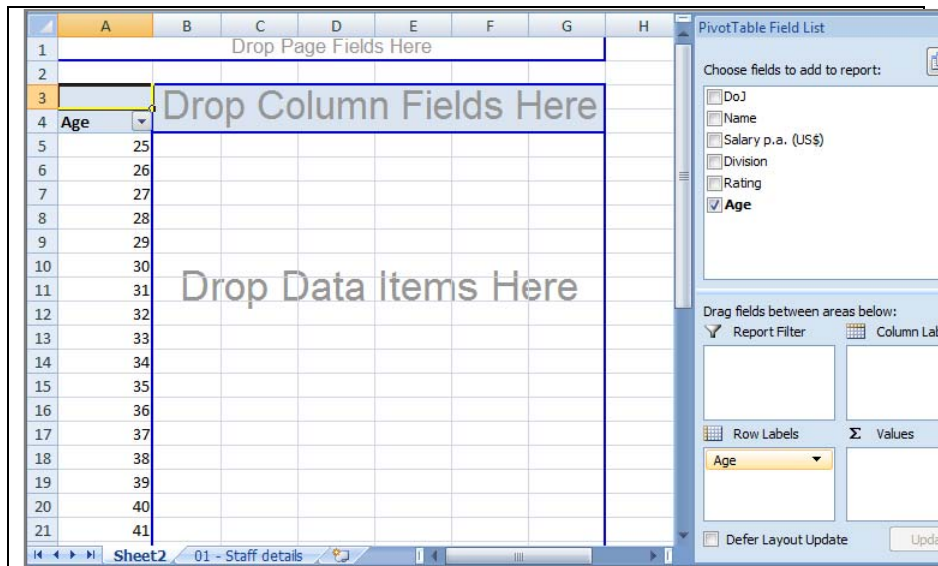
Solution: Pivot Table – Advanced (Grouping)

Example: Based on the previously generated Pivot Table report template.

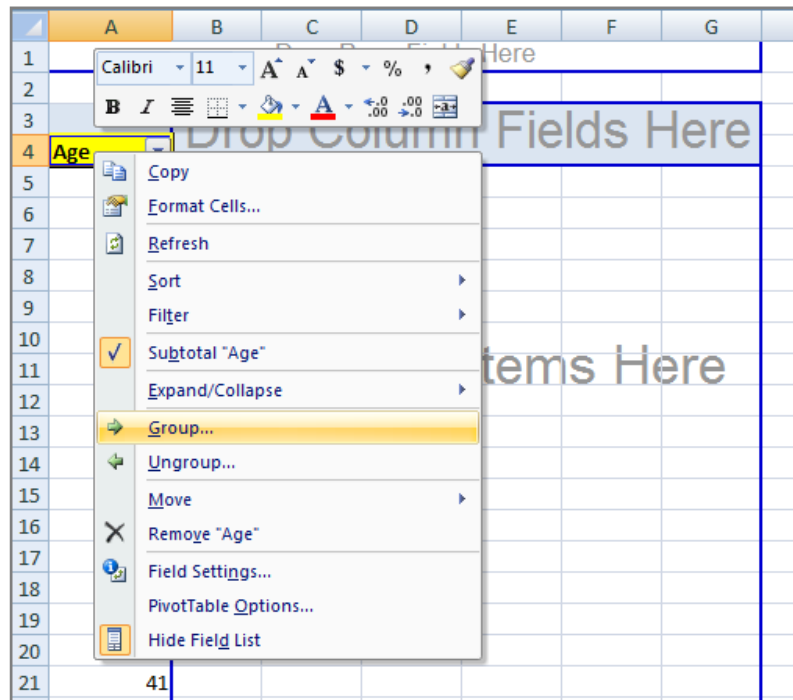


Step 1: Select and Drag "Age" from "Pivot Table Field List" (top-right) to "Row Labels" (bottom-right) to get the ages listed vertically as shown.

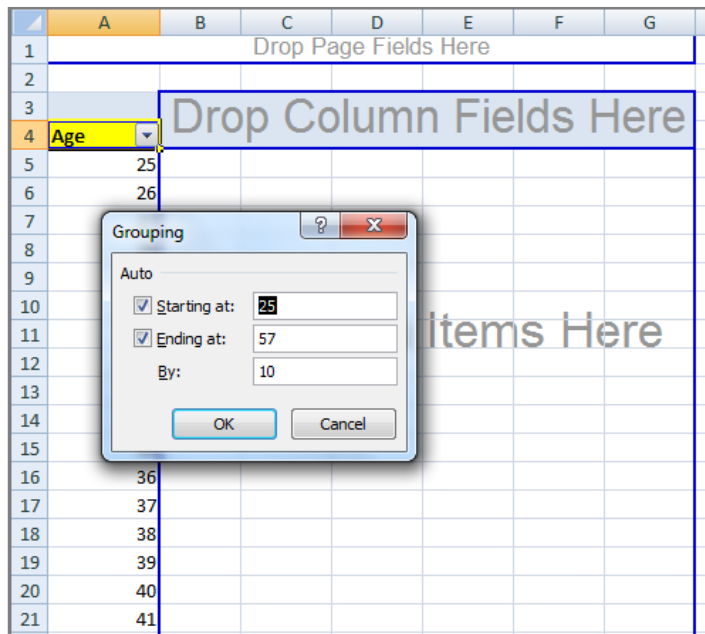
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Step 2: Right-click on the heading "Age" and choose "Group" from the resulting options box.



Step 3: Keeping the preferred Interval as "10", press OK.



Resulting Output:

	A	B	C	D	E	F	G
1	Drop Page Fields Here						
2							
3		Drop Column Fields Here					
4	Age						
5	25-34						
6	35-44						
7	45-54	Drop Data Items Here					
8	55-64						
9	Grand Total						
10							

Step 4: Keeping the preferred Interval as “10”, press OK.

The screenshot shows an Excel worksheet with a PivotTable. The PivotTable Fields task pane on the right is configured with 'Division' as the Report Filter and 'Age' as the Row Labels. The data source is '01 - Staff details'. The PivotTable is located in the range A4:J9.

Age	PEMD	RAD	AD	CDFD	ED	HFD	LGAD	RDD	Grand Total
25-34									
35-44									
45-54									
55-64									
Grand Total									

Step 5: Select and Drag “Division” from “Pivot Table Field List” (top-right) to “Column Labels” (bottom-right) to get division-wise age-bracket wise template report

	A	B	C	D	E
1	Drop Page Fields Here				
2					
3		Division			
4	Age	PEMD	RAD	AD	CDFD
5	25-34				
6	35-44				
7	45-54				
8	55-64				
9	Grand Total				

Step 4: Select and Drag “Name” from “Pivot Table Field List” (top-right) to “Values” (bottom-right) to get age-bracket division-wise headcount of employees

The screenshot shows an Excel PivotTable with the following data:

Count of Name	Division	PEMD	RAD	AD	CFD	ED	HFD	LGAD	RDD
25-34		9	45	6	15	6	34	6	
35-44		11	42	14	16	4	25	1	
45-54		11	48	19	12	6	41	3	
55-64		1	13	2	5	1	12	3	
Grand Total		32	148	41	48	17	112	13	

The PivotTable Field List on the right shows the following configuration:

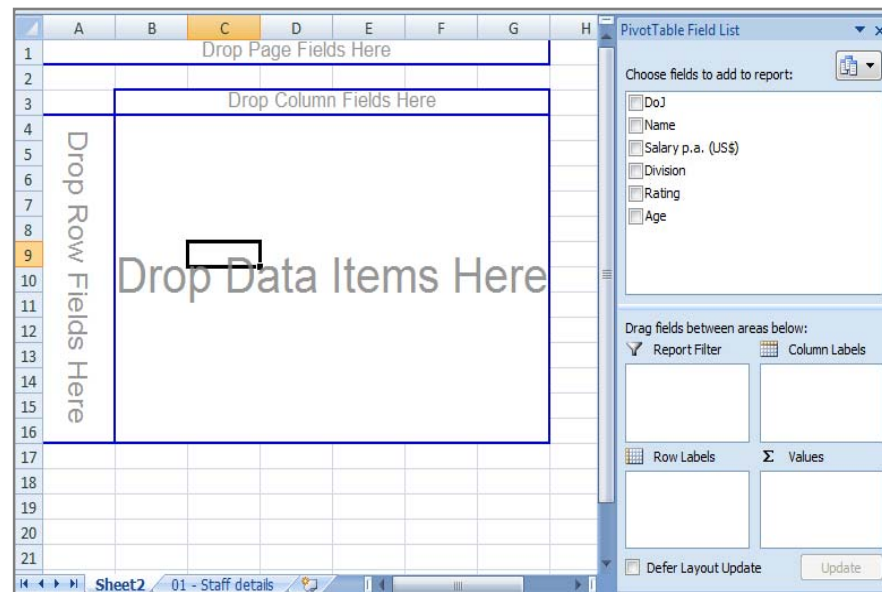
- Choose fields to add to report:**
 - ☒ Name
 - ☐ Salary p.a. (US\$)
 - ☒ Division
 - ☐ Rating
 - ☒ Age
- Drag fields between areas below:**
 - Report Filter:** (Empty)
 - Column Labels:** Division
 - Row Labels:** Age
 - Values:** Count of Name
- Defer Layout Update:** ☐ (unchecked)
- Update:** (button)

Case Study 13: Pivot Table - III

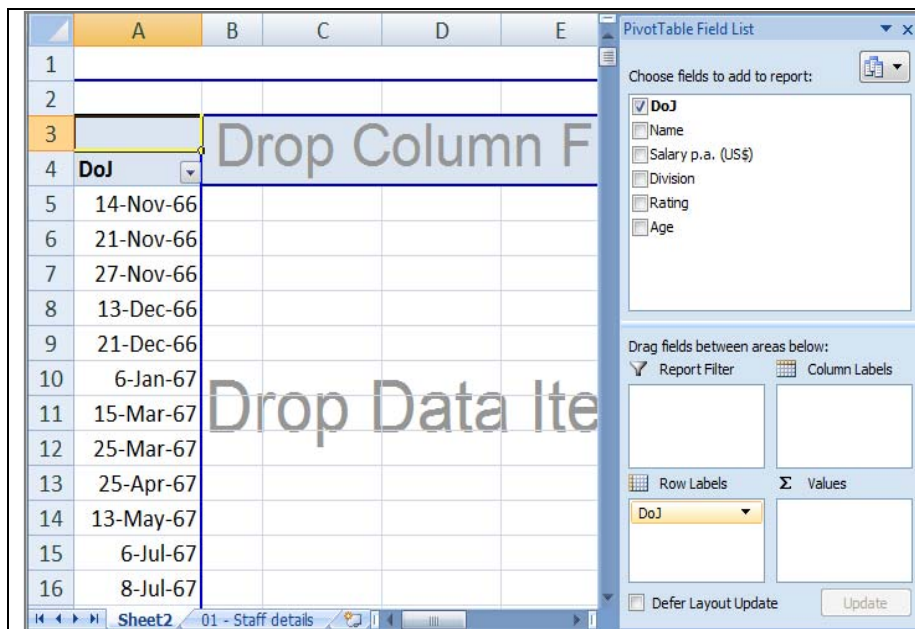
Application area: Creating date-wise reports for stock in hand, purchases, sales, transactions, date of joining, date of payment disbursements

Solution: Pivot Table – Grouping

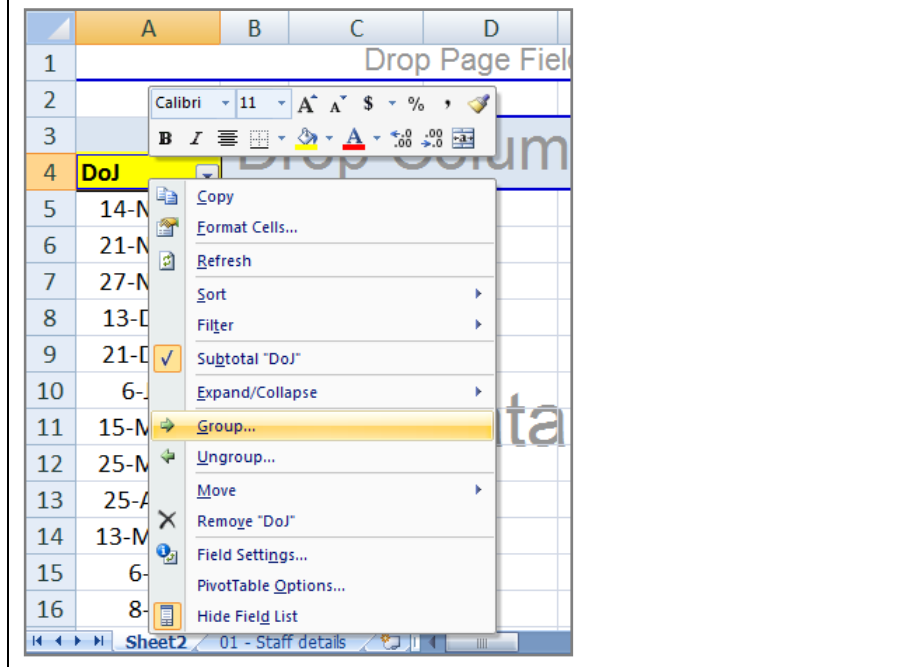
Example: Based on the previously generated Pivot Table report template.



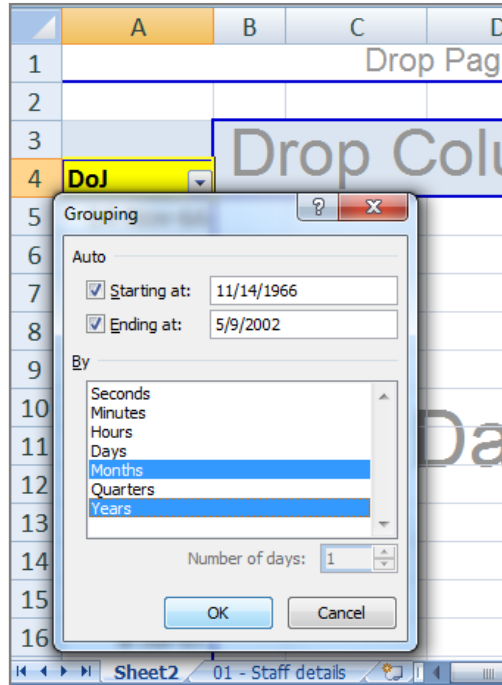
Step 1: Select and Drag "DoJ" from "Pivot Table Field List" (top-right) to "Row Labels" (bottom-right) to get the dates listed vertically as shown.



Step 2: Right-click on the heading "DoJ" and choose "Group" from the resulting options box.



Step 3: Choose “Months” and “Years” and press “OK” button.



Resulting Output:

	A	B	C	D	E
1					Drop Page Fields Here
2					
3					Drop Column
4	Years	DoJ			
5	1966	Nov			
6		Dec			
7	1967	Jan			
8		Mar			
9		Apr			
10		May			
11		Jul			Drop Data It
12		Aug			
13		Sep			
14		Dec			
15	1968	Feb			
16		Mar			
17		May			
18		Jun			
19		Sep			
20		Nov			
21	1969	Jan			

Step 4: Select and Drag "Name" from "Pivot Table Field List" (top-right) to "Values" (bottom-right) to get year-wise month-wise report on employee joining.

	A	B	C	D	E
1	Drop Page Fields Here				
2					
3	Count of Name				
4	Years	DoJ	Total		
5	1966	Nov	3		
6		Dec	2		
7	1967	Jan	1		
8		Mar	2		
9		Apr	1		
10		May	1		
11		Jul	4		
12		Aug	1		
13		Sep	1		
14		Dec	1		
15	1968	Feb	1		
16		Mar	1		
17		May	1		
18		Jun	2		

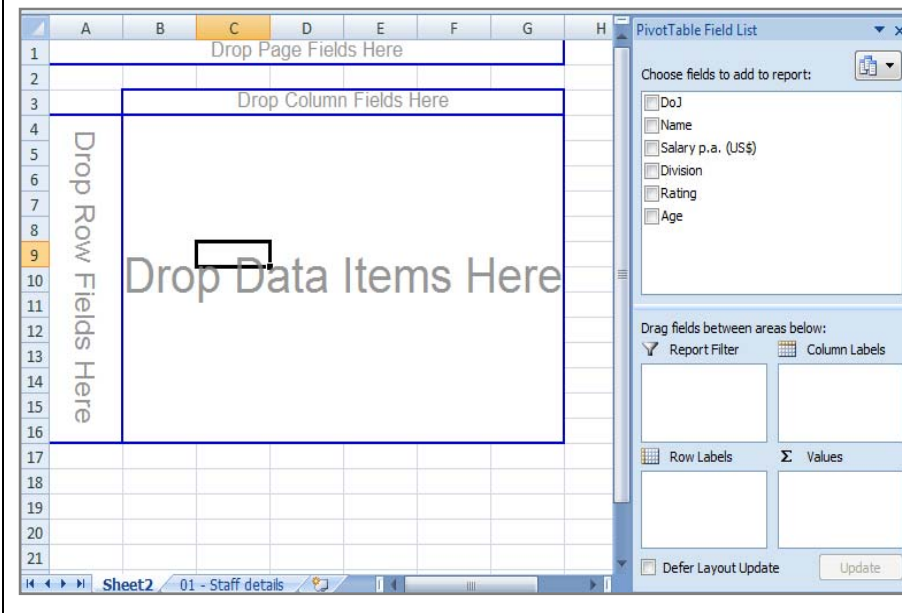
Note: This Dates - Grouping strategy shall only work if the date is as per Excel format. E.g. dates in DMY format - 22/7/2009 is not accepted as date by Excel (unless default "*Region & Language*" settings under "*Control Panel*" have been changed). To rectify the DMY format to Excel accepted MDY format, refer case study 4

Case Study 14: Pivot Table - IV

Application area: Creating Pools – Debtor Ageing, Salary Pools, Fixed Asset – High value vs. Low Value

Solution: Pivot Table – Advanced (Grouping)

Example: Based on the previously generated Pivot Table report template



Step 1: Select and Drag "Salary" from "Pivot Table Field List" (top-right) to "Row Labels" (bottom-right) to get Salaries listed vertically

The screenshot shows an Excel spreadsheet with a PivotTable. The PivotTable is located in the range A4:B18. The data is as follows:

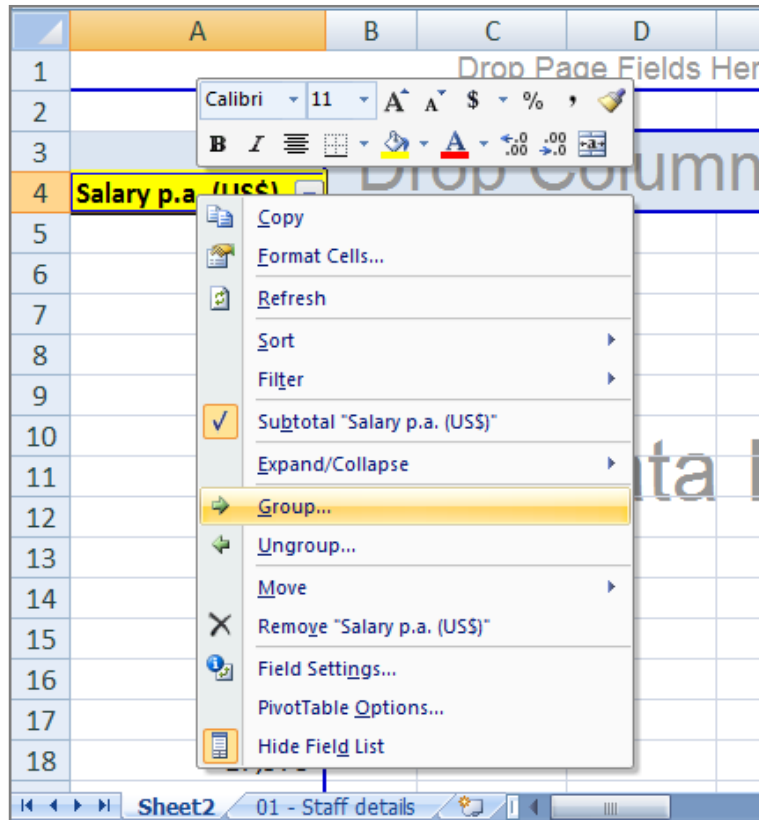
Salary p.a. (US\$)
10,898
11,043
11,991
12,365
13,486
13,547
14,907
15,097
15,176
16,012
17,201
17,224
17,684
17,975

The PivotTable Field List task pane is open on the right side of the screen. It shows the following fields:

- Choose fields to add to report:
 - ☐ DoJ
 - ☐ Name
 - ☒ Salary p.a. (US\$)
 - ☐ Division
 - ☐ Rating
 - ☐ Age
 - ☐ Years
- Drag fields between areas below:
 - Report Filter: (empty)
 - Column Labels: (empty)
 - Row Labels: Salary p.a. (...)
 - Values: (empty)
- Defer Layout Update: ☐
- Update: [button]

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Step 2: Right-click on the heading “Salary” and choose “Group” from the resulting options box.



Step 3: After changing the “Starting at” value to zero, and keeping the preferred Interval as “100,000”, press OK.

	A	B	C
1			Drop Page
2			
3			Drop Co
4	Salary p.a. (US\$)		
5	10,898		
6	11,043		
7	11,991		
8			
9			
10			
11			
12			
13			
14			
15			
16			

Grouping
 ?
✕

Auto

☐ Starting at:

☒ Ending at:

By:

Resulting Output:

	A	B	C	D
1				Drop Page Fields Here
2				
3				Drop Column
4	Salary p.a. (US\$)			
5	0-99999			
6	100000-199999			
7	200000-299999			
8	300000-399999			
9	400000-499999			
10	500000-599999			
11	600000-699999			
12	700000-799999			
13	800000-899999			
14	900000-999999			
15	Grand Total			

Step 4: Select and Drag "Name" from "Pivot Table Field List" (top-right) to "Values" (bottom-right) to get salary-bracket wise headcount of employees

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	A	B
1	Drop Page Fields Here	
2		
3	Count of Name	
4	Salary p.a. (US\$)	Total
5	0-99999	166
6	100000-199999	73
7	200000-299999	50
8	300000-399999	52
9	400000-499999	26
10	500000-599999	15
11	600000-699999	14
12	700000-799999	10
13	800000-899999	7
14	900000-999999	4
15	Grand Total	417
16		

Step 5: Select and Drag "Division" from "Pivot Table Field List" (top-right) to "Column Labels" (bottom-right) to get division-wise salary-bracket wise headcount of employees

	A	B	C	D	E	F	G	H	I
1									
2									
3	Count of Name	Division							
4	Salary p.a. (US\$)	PEMD	RAD	AD	CDFD	ED	HFD	LGAD	RDD
5	0-99999	15	39	19	16	5	66	4	2
6	100000-199999	7	22	6	19	3	13	2	1
7	200000-299999	3	23	3	5	3	10	3	
8	300000-399999	3	19	6	6	4	12	2	
9	400000-499999	2	11	4	1		7		1
10	500000-599999	2	7	2	1		1	1	1
11	600000-699999		11	1			2		
12	700000-799999		8			1	1		
13	800000-899999		5			1			1
14	900000-999999		3					1	
15	Grand Total	32	148	41	48	17	112	13	6

Note: Any numbers (invoice amount, salary, account balance etc.) or date based field can be grouped in Pivot Table if it is placed under "Row Fields" or "Column Fields"

Case Study 15: Developing Logical Statements ("IF")

Application area: Logical decision making, Data analysis

Solution: IF(logical_test, value_if_true, value_if_false)

=IF(, , )

Example: To find the list of suppliers whose amount due is less than Rs. 1.0 lac.

	A	B	C	
1	Supplier Name	Amt. Rs.	Less than Rs. 1.0 lac?	
2	D.C. Power System	1,25,000		
3	ATMA Tele Power Limited..	1,08,000		
4	ANZ Tele Power Ltd	75,000		
5	Agile Technologies	1,11,000		
6	K Jindal.	1,75,000		
7	Excel Next	5,000		
8				

Step 1: Insert "=IF(" formula. The starting parameter – "logical_test" refers to a user defined question whose answer can be in True or False (Yes or No).

	A	B	C	D
1	Supplier Name	Amt. Rs.	Less than Rs. 1.0 lac?	
2	D.C. Power System	1,25,000	=IF(B2<100000	
3	ATMA Tele Power Limited..	1,08,000	IF(logical_test, [value_if_true], [value_if_false])	
4	ANZ Tele Power Ltd	75,000		
5	Agile Technologies	1,11,000		
6	K Jindal.	1,75,000		
7	Excel Next	5,000		
8				

Step 2: The next parameter "value_if_true" refers to the message or action that shall be displayed or activated, respectively, if the question's answer is True/Yes. Any non-numeric message (e.g. Check, Yes, No etc.) should be enclosed in a pair of double quotes (" ").

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	A	B	C	D
1	Supplier Name	Amt. Rs.	Less than Rs. 1.0 lac?	
2	D.C. Power System	1,25,000	=IF(B2<100000,"Yes"	
3	ATMA Tele Power Limited..	1,08,000	IF(logical_test, [value if true], [value if false])	
4	ANZ Tele Power Ltd	75,000		
5	Agile Technologies	1,11,000		
6	K Jindal.	1,75,000		
7	Excel Next	5,000		
8				

Step 3: The next parameter "value_if_true" refers to the message or action that shall be displayed or activated, respectively, if the question's answer is False/No.

	A	B	C	D
1	Supplier Name	Amt. Rs.	Less than Rs. 1.0 lac?	
2	D.C. Power System	1,25,000	=IF(B2<100000,"Yes","No")	
3	ATMA Tele Power Limited..	1,08,000	IF(logical_test, [value if true], [value if false])	
4	ANZ Tele Power Ltd	75,000		
5	Agile Technologies	1,11,000		
6	K Jindal.	1,75,000		
7	Excel Next	5,000		
8				
9				

Resulting Output:

	A	B	C	D
1	Supplier Name	Amt. Rs.	Less than Rs. 1.0 lac?	
2	D.C. Power System	1,25,000	No	
3	ATMA Tele Power Limited..	1,08,000	No	
4	ANZ Tele Power Ltd	75,000	Yes	
5	Agile Technologies	1,11,000	No	
6	K Jindal.	1,75,000	No	
7	Excel Next	5,000	Yes	
8				
9				