



***CAATs for Non-  
Financial Audits***

*An INTOSAI IT Audit  
Committee Project*



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*State Audit Institution  
Sultanate of Oman*

## **1. Introduction**

### **1.1 Background**

This project is a fall-out of the training modules on Computer Assisted Audit Techniques (CAATs) and Data Downloading of the INTOSAI IT Audit Courseware, developed by the INTOSAI Standing Committee on EDP Audit in 1997/1998 and updated in 2001.

It was felt that these products focussed mainly on the use of CAATs for financial audits. However, CAATs are being used increasingly, not just for attest audit of accounts and financial statements, but also for:

- Compliance audits, by verifying that the data representing the transactions is in compliance with applicable laws, rules and regulations;
- Performance and investigative audits, by identifying trends and areas of focus, as well as for generating forensic and VFM audit findings.

SAI-Oman therefore agreed to take up a project on “Use of CAATs for non-financial audits”. The focus of this project is on use of data analysis tools (rather than program validation tools) for non-financial audits.

### **1.2 Research Methodology and Organisation of Research Output**

The output of this research study consists of two parts:

- Part-A consists of generic guidance material on using CAATs for non-financial audits;
- Part-B consists of SAI-specific material – a write-up on the SAI’s approach to using CAATs for non-financial audits as well as illustrative case studies.

The first draft of the study, was presented at the 11<sup>th</sup> Meeting of the Committee at New Delhi in November 2002, included a draft for Part A and also contained material for Part-B from SAI-Oman as a rough template for contributions from SAIs. The members were requested to offer their comments for Part A and case studies for Part B.

Subsequently at the 12<sup>th</sup> Meeting of the Committee at Oslo in September 2003, a questionnaire on the use of CAATs for non-financial audits was circulated to Committee members, in order to elicit reactions from members in a structured fashion for Part-B; a copy of this questionnaire is enclosed as Annexe-1. 12 SAIs in addition to SAI Oman have given contributions, which have been incorporated in this document.

**Part - A**  
**Guidance on Using CAATs for Non-Financial Audits**

## A1. CAATs for Financial and Non-Financial Audits – The Continuum

This model highlights the difference between CAATs usage for Financial and Non-Financial Audits in the form of a continuum across different criteria.

<i>Type of Audit</i>	<i>IT Systems being reviewed</i>	<i>CAATs Objectives / Requirements Definition</i>	<i>Level of standardisation of CAAT tool</i>	<i>Emphasis</i>	<i>Skill Levels</i>	<i>Development Approach</i>
<b>Performance / Investigative Audits</b>	Core business systems Support systems	“Fuzzy”	Non-standardised	Audit Effectiveness	Complex mix of skills	Prototyping
<b>Compliance Audits</b>						
<b>Financial Audits</b>	Accounting systems	Relatively clear and specific	Standardised tools	Audit Efficiency	Relatively lower level of skills	Off-the shelf /“Waterfall”

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Issue	CAATs for Financial Audits	CAATs for Non-Financial Audits
<b>A1.1 IT systems being reviewed</b>	By and large, the focus is on computerised systems for financial accounting	The focus is on the IT systems for either <ul style="list-style-type: none"> <li>• the core business functions of the auditee organisation; or</li> <li>• support functions like procurement, inventory, payroll etc.</li> </ul>
<b>A1.2 CAATs Objectives / Requirements Definition</b>	Since these are concerned mainly with only one type of IT systems – accounting systems, the CAAT requirements are relatively well-defined, and in line with the objective of financial audit, viz. giving an opinion on the accounts.	It is relatively difficult to translate the audit objectives into a set of requirements for CAATs, primarily because the objectives of the systems are different for each audit. Objectives for performance audit tend to be more “fuzzy” than for compliance audits. Also, these are subject to substantial iterations as the audit progresses.
<b>A1.3 Level of Standardisation of CAAT tool</b>	Since the requirements are reasonably well-defined, the CAAT tool is highly standardised, even if it is complex. Also, the repetitive nature of CAAT use in such audits also acts as an incentive towards standardisation of the CAAT tool	In the absence of clearly defined requirements, the CAAT tool is less standardised, but needs to be more flexible. Since non-financial audits are generally not repeated often, standardisation is not a major requirement.
<b>A1.4 Emphasis</b>	The benefits derived from use of CAATs is on audit efficiency – better audit coverage, and savings in time and cost	The focus is less on audit efficiency and more on audit effectiveness – better audit planning, more complex audit interrogations, better analytical capabilities etc.

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<b>A1.5 Skill Requirements</b>	Once the CAAT tool has been developed and perfected, skill requirements, especially from the line auditor for using the CAAT tool, tend to be lower.	Because of the lack of clear requirements and standardisation of CAAT tools, the skill requirements for using CAATs tend to be more complex and higher in level.
<b>A1.6 Development Approach</b>	Because of the standardised requirements and high probability of repetitive use, CAATs for financial audits tend either to be off-the-shelf products or developed using the system development life cycle or “waterfall” approach	CAATs for non-financial audits tend to follow an iterative or prototyping process, with amendments or alterations as the audit progresses. In fact, one of the most common issues is the inclusion of new data elements after consideration of preliminary audit findings, which then necessitates further analysis.

## **A2. Decision on using CAATs for Non-Financial Audits <sup>1</sup>**

While the use of CAATs for non-financial audits can bring several benefits to the SAI, it is not always the best choice in all cases. Hence, it is recommended that a formal cost-benefit analysis be conducted for the use of CAATs for a specific audit. This analysis may often only be a qualitative assessment; nevertheless, it helps to set the tone for more realistic expectations of the benefits and costs involved.

The main cost is the cost of resources involved in setting up the CAAT; this covers the resources involved in:

- gaining an understanding of the IT system, and its relation to the business system;
- deciding the CAAT tool to be used and the mode of data access/transfer; and
- downloading the data, and conducting a download verification/reconciliation.

This cost is in the nature of a fixed cost, which is broadly independent of the volume and extent of data interrogation.

Some of the important factors, which weigh in favour of use of CAATs for non-financial audits, are as follows:

- How much additional value will CAATs provide ?
- Repetitive use of CAATs for future audits, ie. Are these audits likely to be repeated;
- High-priority nature of the audit, or audit areas identified as high risk;
- Status of computerisation of core business operations of the auditee organisation, possibly with real-time or online transaction processing;
- The corresponding non-computer based audit techniques are either impractical or involve high costs.

## **A3. Availability of Electronic Data**

A critical issue for using CAATs in non-financial audits is whether data will be readily available in an electronic format suitable for data analysis. In the case of financial audits, electronic data from accounting systems is generally available in

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<sup>1</sup> This section is drawn from the CAATs Module of the 2002 version of the INTOSAI IT Audit Training Courseware (Section 4.1 of the Student Notes).

some database or flat file format and the problems, if any, tend to be related to data downloading, rather than the availability of electronic data per se. However, while conducting non-financial audits, several other situations could be encountered:

- The data is not available in electronic format at all, or is stored in free text format as word-processed documents (which are almost in a non-analysable format as far as the CAATs auditor is concerned)
- Data is stored in semi-structured formats like electronic spreadsheets

The non-financial CAATs auditor's dream situation would be a case where the relevant business data is available in a data warehouse or mart together with tools for data mining or decision support (which could be effectively used by the auditor); however, this is often (indeed generally) not the case. The choices available to the CAATs auditor are then to:

- Try and migrate the electronic data into an "analysable format";
- Manually enter the data into an electronic format suitable for analysis;  
or
- Abandon the attempt to use CAATs.

In this scenario, the CAATs auditor has to conduct the best cost-benefit analysis that he possibly can:

- What is the cost and effort of manual data entry or migration vis-à-vis the potential for an audit finding? What is the extent of coverage in terms of period as well as level of detail?
- How critical is the area to the audit objectives? Is the audit a priority for the SAI? Are there serious audit concerns relating to this area, arising out of "warning flags"?
- Is it possible to do "paper audit"? How cost-effective would such audit be? How many transactions could be covered

In order to minimise the costs involved, a phased approach to data coverage is often appropriate. In this situation, the data entry or migration exercise covers only a limited period, or with limited scope. Based on the results of analysis of this limited data, a decision can be taken on whether to proceed with full-scale data entry or migration.

In addition to the data format, decisions also have to be taken as to the scope of data required. Often, at the start of the audit, there is a need for access to raw data as a basis for different types of analysis:

- The auditor may not always know as to what he wants and what further relationships can emerge during the processing and analysis of data

- More specific orders for tables/data can be placed at a later stage, when the auditor knows more about the activities and problems that he wants to study.

## **A4. CAAT Tools for Financial Audits**

While generalised audit software tools like IDEA and ACL, which are popular for financial audits, could be used even for non-financial audits, the CAAT tools for non-financial audits tend to be less structured and more flexible. The emphasis is less on data conversion or data downloading, and more on user flexibility:

- Desktop database tools like Microsoft Access, which permit the user to set up his own queries using either the GUI-based design interface or SQL (Structured Query Language) are appropriate for many, if not most, situations.
- Spreadsheets can be very convenient where the focus is on relatively complex calculations amongst a relatively small number of data elements.
- Where very large volumes of data are involved, it may be necessary to use more sophisticated decision support tools suited to data warehouses or data marts.

It must be noted that a change of choice of CAAT tool mid-way during data analysis is particularly expensive. If the data has been entered manually, this is made even more difficult. In a worst case scenario, a change of CAAT tool could necessitate re-entry of data.

## **A5. Issues with CAATs usage**

Some potential issues arising out of CAATs usage include the following:

<b>Free-form review</b>	Often the use of CAATs for performance audit support is a free-form, unstructured exercise. At least initially, the auditor “plays around” with the data (generally in raw format) to generate large numbers of hypotheses, out of which only a very small number would be taken up for detailed audit testing. Because of the unstructured nature of review, there is a possibility of the project time schedule going awry, which needs to be controlled by fixing “guillotines” for different phases of the review.
<b>Data Quality</b>	Data quality for performance or operational data, is likely to be more of an issue, than for financial data. The auditor may adopt a two-pronged approach: <ul style="list-style-type: none"> <li>• To the extent possible, correct and/or exclude invalid data</li> </ul>

	<ul style="list-style-type: none"><li>• Assess how much reliance is to be placed on the data, after correction/exclusion, and redesign his supplementary manual tests appropriately.</li></ul>
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## **A6. “Success” of CAATs usage**

The results of data analysis in non-financial audits could have three possible categories of outcomes:

- A potential audit finding and/or recommendation;
- A conclusion that there are no significant / material deficiencies or weaknesses worth reporting; or
- A situation where the auditor is unable to come up with any significant audit finding, nor is he able to conclude that there are no significant or material weaknesses.

It is this third category of outcomes where the auditor is unable to derive assurance one way or the other, which is so difficult to deal with. These situations, which for want of a better phrase could be classified as “CAATs failures”, are much more likely to arise in CAATs for non-financial audits, rather than in financial audits. However, it must be recognised that it is not possible for CAATs to be successful in all situations – what we should be looking for is a good “batting average”.

## **A7. Skill Requirements**

There are two broad sets of skill requirements for using CAATs, whether for financial or non-financial audits:

- Audit and “domain” skills
- IT and technical skills

However, unlike in the case of financial audits, the iterative nature of development and usage of CAATs for non-financial audits necessitates far closer “bonding” of audit and technical skills:

- The ideal case would be to have auditors, who are also skilled in using CAAT tools like MS Access for querying (it is generally more feasible to train auditors to use CAAT tools, than to train IT staff in audit !)
- Failing which, at the minimum, the audit team as a whole must possess the requisite audit and technical skills; part-time support from a technical support group is generally not as effective.
- The effectiveness of the audit team is considerably enhanced if the line auditor fully knows the potential as well as the limitations of the

CAAT tool (if not how to use the tool). A less important requirement is for the technical specialist, if he is separate from the line auditor, to be aware of the type of findings the line auditor is looking for.

**Part - B**  
**SAIs' Experiences in Using CAATs for Non-Financial Audits**

## **Overview**

Part-B of this study consists of SAI-specific material – a write-up on the SAI's approach to using CAATs for non-financial audits, as well as illustrative case studies.

The first draft of the study contained material for Part-B from SAI-Oman as a rough template for contributions from SAIs. Thereafter, a questionnaire on the use of CAATs for non-financial audits was circulated to Committee members, in order to elicit reactions from members in a structured fashion for Part-B.

Part 'B' now contains contributions from the following 13 SAIs:

1. Austria
2. Bhutan
3. China
4. Canada
5. Israel
6. India
7. Japan
8. Lithuania
9. Oman
10. Poland
11. Slovakia
12. Sweden
13. USA

## **SAI-Austria**

In the course of its performance / forensic audits, SAI-Austria downloads and conducts its own analysis of auditee data. As the SAI audits federal, state and municipal authorities, there is a variety of IT systems. The objective of the data analysis is to benchmark administrative processes, and evaluate best practices; also, data analysis is used by the SAI to segregate items of interest out of the total database e.g. 80%, 20%, 3 % or the top level items.

As regards the federal administration, usually, the Austrian SAI is allowed to access the host-based databases and is able to make queries specific to its needs. The databases queried cover budgeting, accounting, personnel administration and payroll. Generally, data is downloaded through file transfer, and Microsoft Excel is the tool used by the SAI to conduct data analysis. As regards state authorities, the SAI generally uses the auditees' IT systems, without being able to run its own queries.

As regards difficulties encountered in data analysis, the SAI has indicated that the design of the auditee databases is obviously driven by the administrative objectives of the auditee, but the objectives and requirements of the SAI generally differ from those of the auditee. Also, there is often a lack of specific data for the SAI to rate or benchmark auditee processes.

As regards the tools used by the SAI:

- MS Access and other tools are used for data extraction as well as creating the SAI's own database.
- Spreadsheets are used for statistical analysis and other calculations.
- SQL is used only with help from the auditees.
- In special circumstances, ACL and IDEA are used for data transfer, with support from external companies.

## **SAI-Bhutan**

SAI-Bhutan does not conduct its own analysis of auditee data in its performance/ forensic audits. IT in SAI, Bhutan is relatively new, and CAATs have never been used. Given the level of IT usage in various auditee entities, the SAI's assessment is that it is too early to use CAATS now. Other than in audit reporting, the SAI is thus not using IT in its performance and investigative audits.

In 1998, the SAI has created a separate IT unit, which manages the office LAN and the AIMS (Audit Information and Management System):

- All the audit reports are put in the AIMS. Computers are used for generating Audit Reports and the SAI is also in the process of introducing an Audit Master Report Template.
- The AIMS can also generate number of irregularities under a particular category e.g. excess payment, non-completion in time, misappropriation etc.
- Further, civil servants and corporate employees in Bhutan are required to obtain an Audit Clearance Certificate, before proposals for such employees relating to training, promotions and retirement benefits are processed. Unless the person clears all outstanding audit observations or recovers the amounts objected to by the SAI, he/she will not be issued an Audit Clearance Certificate. The AIMS will have all the adverse reports and audit observations against all the civil servants and corporate employees of government undertakings in Bhutan, and will thus facilitate speedy issue of Audit Clearance Certificates.

## **SAI-China**

SAI-China conducts its own analysis of operational data in certain audits, and they have trained their auditors in the use of SQL tools, simple desktop database management software and spreadsheet applications for such analysis. They do not use any generalised audit software, and they can only download the data with the assistance of auditees from online systems.

In one case, SAI-China conducted a performance audit of a computerised national municipal revenue collection system. This system was implemented in several locations through local area networks, with the data being finally transmitted to a central location. The auditors were able to obtain the data in several locations, which was then analysed. The objective of the analysis was to verify whether:

- the services had been correctly charged as per regulations.
- the revenues collected had been transferred as per requirements.
- the retained expenditure on such revenue collection been computed properly.

The results of SAI-China's evaluation were as follows:

- The SAI found certain discrepancies in the application of regulations for calculating the charges, and certain systemic loopholes which enabled short charging.
- It was found that certain exemptions on user charges had been given in contravention of regulations.
- There were delays in transfer of charges collected.
- In certain locations, there were deliberate errors in financial statements, leading to increase in operational expenses.

## SAI-Canada

SAI-Canada conducts its own analysis of auditee data in its performance / forensic audits. The objective of such data analysis is to validate the audit objectives, discover new evidence and collect supporting evidence; CAATs results are often very useful in support of audit conclusions. Some of the cases in which CAATs have been used by SAI-Canada are as follows:

- Social Insurance Number (SIN) validation.
- Old Age Security validation.
- Review of non-insured drug benefits for aboriginals, veterans and immigrants.

In the recent past, SAI-Canada has not relied on reports generated by the auditee’s systems. They have rather produced their own reports, using mainly IDEA. Some technical details relating to the SAI’s data analysis are summarised below:

File Download Formats	<ul style="list-style-type: none"> <li>• Flat text files – ASCII / ASCII Delimited / EBCDIC</li> <li>• Microsoft Access</li> <li>• Microsoft Excel</li> <li>• Dbase III and IV</li> </ul>
Software Environment of Auditee IT Systems	Various client/ server environments
Method of download	<ul style="list-style-type: none"> <li>• Direct</li> <li>• Extract / pre-defined extract</li> </ul>
Data analysis tools	<ul style="list-style-type: none"> <li>• IDEA (this is the main tool used by the SAI) – quick analysis for large files; capacity to rapidly process large files; production of special analysis and reports</li> <li>• MS Excel - analysis</li> <li>• MS Access &amp; other database tools - analysis; listing data</li> <li>• SQL and other programming languages – Listing data (self joining or nested joins)</li> </ul>

Some of the difficulties faced by SAI-Canada during data analysis are as follows:

- Data provided without meta data (underlying data structure not explained or defined)
- Incomplete or outdated master records
- Difficulties in reconciliation of data with subsidiary ledgers

## SAI-Israel

SAI-Israel downloads auditee data and conducts its own analysis of such data, in the course of its performance / forensic audits. Depending on the level of co-operation received from the auditee and the abilities and desires of the individual auditor, the SAI

- conducts its own data analysis, and/or
- receives reports generated by the auditee's IT systems

Some cases of analysis of auditee data by the SAI are:

- Compensation payments to victims of acts of hostility
- Employee hiring procedures

The SAI has also forwarded one case of reliance on reports generated by the auditee's IT systems:

- Continuing education bonuses for teaching staff

These cases are described in Annexe – 1.

As regards the tools used by SAI-Israel:

- Excel is the general tool used by most of the auditors
- IDEA is the main dedicated Audit software used by the SAI
- Access and SPSS are used by some auditors; Paradox for DOS used to be popular, but is now seldom used.
- SQL Server 2000 was recently acquired and is undergoing acceptance testing
- The SAI has acquired two data-mining tools – WizRule and WizWhy – to reveal rules, trends and exceptions in data sets.

The extent of usage of tools is as follows:

Tool	No of Users
MS Excel	More than 300
MS Access	20
SPSS	8
IDEA	20

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These tools are used for various purposes including sorting, extraction, summarisation, pivot tables, recalculation, reporting, charting, ageing, stratification, sampling, rule detection gap detection, statistics etc

**SAI Israel Annexe 1 – Cases of Data Analysis**

Report Title	Data Downloaded	Software Environment and Method of Download	Tools used	Objectives of audit analysis	Conclusions / Results in brief	Difficulties in understanding data
<p><b>Compensation Payments to Victims of Acts of Hostility</b></p> <p>National Insurance Institute</p> <p>(2003 Annual Report - 54B)</p>	<p>Identity details, Eligibility Criteria, Payment details</p> <p>(Finance &amp; Operational Data)</p>	<p>DB2 - NATURAL</p> <p>Application programs written in NATURAL were used to create ASCII data files which were downloaded to PC and imported using IDEA</p>	<p>SPSS, IDEA, PARADOX, EXCEL</p>	<p>To examine the handling of claims and to ascertain that only eligible people received proper payments</p>	<p>Some victims received double benefits (for drugs and for disabilities) when in fact they were only eligible for one or the other. Injuries were often recorded inaccurately and thus the victims did not receive the appropriate compensation. The computer application did not automatically update payment criteria from updated information available from the Population Registry.</p>	<p>Certain raw data had to undergo transformation during the import process. Profiles of common content were built in order to locate exceptions.; Exceptions between consecutive records were located using Excel. The IS Department aided the regular auditors in performing these tasks.</p>

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<b>Report Title</b>	<b>Data Downloaded</b>	<b>Software Environment and Method of Download</b>	<b>Tools used</b>	<b>Objectives of audit analysis</b>	<b>Conclusions / Results in brief</b>	<b>Difficulties in understanding data</b>
<p><b>Employee Hiring Procedures</b></p> <p>The EL-AL Airways Company</p> <p>(2003 Audit Report on Local Government, Associations and Institutions for Higher Learning)</p>	<p>Human Resources files on employees - personal and employment details; Family relationship files - parents, spouses, children</p> <p>(Operational Data)</p>	<p>ORACLE - COBOL</p> <p>ASCII data files were downloaded from the auditee's systems to PC and imported using Excel to our computer.</p>	<p>IDEA, EXCEL</p>	<p>To examine the hiring procedures of the company and to determine if all job applicants had a equal and fair chance of being hired</p>	<p>Audit revealed that 13% of employees were related to other employees. 40% of employees in the higher levels of management had relatives working at EI-AL. The audit concluded that family relationships played a role in the hiring process of new employees.</p>	<p>Family Relationship files were appended after undergoing data transformations to allow unification of the data. The Information Systems Department aided the regular auditors in performing these tasks.</p>
<p><b>Continuing Education Bonuses for Teaching Staff</b></p> <p>Ministry of Education</p> <p>(2003 – Annual Report 53B)</p>	<p>Reports generated by the client IT systems were used</p> <p>(Operational data, but with financial ramifications)</p>	<p>N/A</p>	<p>N/A</p>	<p>An assessment of the Authorization and Control Functions performed by the Continuing Education Department</p>	<p>A computer report was generated by the auditee listing the number of participation hours per year for each teacher that participated in continuing education courses for at least three times more than the teacher average (900 hours or more versus the 300 hour average for continuing education courses). An investigation of the teachers' files and</p>	<p>No</p>

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Report Title	Data Downloaded	Software Environment and Method of Download	Tools used	Objectives of audit analysis	Conclusions / Results in brief	Difficulties in understanding data
					<p>the course schedules showed that many of those teachers were enrolled in two or three courses that took place at the same time and thus ficticiously 'attended' at least one of the courses. This irregularity was carried out by teachers in order to receive continuing education bonuses faster.</p>	

## **SAI-India**

SAI-India downloads auditee data and conducts its own analysis, in the course of its performance / forensic audits. They have indicated that they generally do not face any difficulties in understanding electronic data from a business or technical perspective.

Three case studies of data analysis by the SAI are detailed in the Annexes

- Annexe 1- High Tension Billing System of a State (Provincial) Electricity Board in India;
- Annexe 2 - An e-Governance project in a State (Provincial ) Government;
- Annexe 3 - Estimation of Liability on account of retirement benefits for two Government companies.

As regards tools used for data analysis, SAI India has adopted the following Software as standard audit tools<sup>2</sup>:

- Access - database tools are used for capturing data for analysis.
- Excel, which is standard software in all offices.
- ANSI-SQL in SQL\* Plus environment (SQL skills are being imparted to the SAI's IT Audit staff; such tools are used for analysis of data in suitable cases)
- IDEA, which is the standard generalised audit software in the SAI. The SAI is giving training to all IT Audit personnel on IDEA.

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<sup>2</sup> Issue 8 of “intoIT” carries an article on Forensic Audit, which describes various cases where SAI-India has used the above tools.

## **SAI India Annexe 1 – High Tension Billing System of a State (Provincial) Electricity Board**

### **1. Introduction**

The State Electricity Board is responsible for the generation, transmission and distribution of electricity in a province. The consumers of power were mainly divided into the category of High Tension (HT) consumers and Low Tension (LT) consumers. The computerized HT Billing system was initially implemented in 1981 in COBOL/Unix Platform and after considering the sensitivity of the application and ever increasing need for changes, the above system was re-engineered using an RDBMS platform (Oracle/Developer 2000).

During the course of the IT Audit of the System, an analytical review of the data was conducted by running appropriately framed SQL Queries on the auditee's database.

### **2. Type of data downloaded**

Data pertaining to the billing details of H.T. consumers were stored in various tables. These tables contained fields such as consumer number, consumer type, date of connection, consumption, tariff applicable, date of issue of bills, amount receivable under various heads of charges, date of temporary/permanent disconnection, power factor, amount of rebates granted to H.T. consumers under various heads, last date of receipt of payment, arrears, data regarding audit trails such as updated by, updated on, updated from, etc.

### **3. Audit objectives and methodology**

In addition to data analysis from a performance audit perspective, the SAI also had the following additional audit objectives:

- Evaluation of the general IT controls that establish a framework for controlling the design, security and use of application software in the Board.
- Evaluation of IT application controls specific to the computerized H.T. Billing System, and the effectiveness of IT system in achieving organizational objectives.

The SAI developed SQL Queries based on

- the various policy, guidelines and circulars of the Board for tariff setting and
- tariff of Electricity Regularity Commission of the provincial Government relating to the H.T. Billing.

The SQL Queries so developed were run on the H.T. Billing System, and the reports generated were further analysed. Based on the results, audit identified key

deficiencies in controls, which either caused loss of revenue to the Board or directly impacted on the revenue earning capacity.

## **4. Conclusions**

### **4.1 Delay in issue of first bill to HT consumers**

As per the Board's rules, the first energy bill in respect of newly connected HT consumers was to be issued within one month from the date of connection. Audit scrutiny revealed that 1507 newly connected HT consumers were issued the first bill after delays ranging from 2 to 203 days from the date of new connection.

### **4.2 Excess time limit permitted to HT consumers for payment of bills**

As per the rules, the time limit for payment of bills for HT consumers was 15 days from the date of the bill (including the bill date). The analysis revealed that during 1999-2002, 231,941 HT consumers were permitted to pay their bill beyond the specified time limits, with excess days ranging from 1 to 4 days.

### **4.3 Waiver of minimum charges and other charges for Temporarily Disconnected HT consumers**

As per rules, minimum charges were required to be paid during the period between the dates of temporary disconnection to permanent disconnection. Further, permanent disconnections should be made six months after the temporary disconnection, for which the consumers had to be billed minimum charges. Audit scrutiny of data for the period 1998-2002 revealed that 39 HT consumers, who were temporarily disconnected, had not been charged minimum charges for six months from the date of temporary disconnection.

### **4.4 Bulk discount to HT consumers whose Additional Security Deposit are in arrears**

As per the rules relating to "Bulk Discount" on "Incentive and Disincentives", any industrial consumer (availing Time of Day (TOD) tariff and **having no arrears with the Electricity Board**) who exceeds one million units per month, will get a rebate of 1 *per cent* of his energy bill restricted to a maximum of 5 *per cent*.

Audit scrutiny revealed that 7 HT consumers, who had arrears of Additional Security Deposit (ASD) to the tune of Rs.35.3 million, were wrongly given bulk discount to the tune of Rs.27.4 million.

### **4.5 Incorrect calculation of Power Factor (PF) incentive resulting in loss of revenue of Rs. 52.0 million**

As per the rules, whenever the average PF was more than 0.95, the following incentives (calculated on the amount of the monthly energy bills) would be provided:

- 1 per cent for every 1 *per cent* improvement in the power factor above 0.95;
- 5 per cent for PF of 0.99;
- 7 per cent for PF of 1.00.

Audit observed that due to incorrect calculation method adopted while coding the parameters in the HT Billing system, excess incentive ranging from 0.053 *per cent* to 0.263 *per cent* amounting to Rs.52.0 million was given.

**4.6. Delay in issue of bills to HT consumers resulting in loss of interest of Rs. 7.4 million**

As per rules, the meter reading of HT consumers having contract demand up to 3 MVA and above 3 MVA should be recorded and energy bills based on such reading must be generated and issued to HT consumers on a monthly basis. Audit verification of HT consumers, whose current meter reading date exceeded the previous meter reading date by 31 days and who were billed after 31 days from the previous bill date, revealed that in respect of 12732 HT consumers, there was a delay in meter reading and consequent delay in issue of bills ranging from 1 to 106 days for the period 1999-2002. The above delay in issue of bills to the tune of Rs.7741.7 million resulted in loss of interest of Rs.7.4 million.

## **SAI India Annexe 2 - An e-Governance project in a State (Provincial) Government**

### **1. Introduction**

The Government in one of the States (Provinces) in India implemented an e-Governance project called 'e-Seva'. The salient features of e-Seva project were to

- (i) provide real time online transactional services like payment of electricity and telephone bills, booking of bus tickets, obtaining birth certificates, filing tax returns, etc., at any counter and at any centre;
- (ii) provide IT infrastructure and its maintenance for a period of 5 years by the operator (contractor firm), which was to be transferred at zero value to Government after 5 years;
- (iii) collect revenue relating to various departments/Public Sector Undertakings. through e-Seva;
- (iv) not to levy service charge on the citizen, with the transaction charges to be paid to the operator by Government.

During the IT Audit of the above project, data pertaining to the period of three months (January - March 2002) was chosen for substantial checking of data completeness, regularity and consistency, using IDEA.

### **2. Audit Methodology**

The transactional data was taken from data centre e-seva, and other Departments/Corporations concerned.

The software environment of the auditee IT systems was Oracle 9i AS on Solaris, Oracle 8i on Windows 2000 at data centre and Win 95 with Internet Explorer 5 at each of the e-seva centres. Data was downloaded using Oracle Export dump file. The tool used for data analysis was IDEA 2001.

### **3. Conclusions**

Audit scrutiny of transactions from January to March 2002 revealed the following deficiencies

- (i) The total number of transactions as well as total amount as per the reports generated in the system, did not tally with the figures in the reports generated by Audit.
- (ii) There were gaps in transaction numbers in respect of data generated at some of the eSeva centres. This indicated that the transactions were being deleted altogether. Since the programme permitted such deletion, it was a serious threat to the security of data and unauthorized deletion of

transactions without trace had wider ramifications and enhanced the risk of fraud.

- (iii) In as many as 9277 transactions involving Rs 6.843 million pertaining to electricity charges to one of the Corporations, the consumer's name was blank.
- (iv) Amounts did not tally in as many as 4251 transactions, and a difference of Rs 232,000 remained to be reconciled.
- (v) 24,176 transactions covering more than Rs. 180 million recorded in the e-Seva database were not recorded in the database of the Corporations concerned.

## SAI India Annexe 3 - Estimation of Liability on account of retirement benefits for two Government companies

### 1. Introduction

During the course of audit of annual accounts of two companies for the year 2001-02, it was observed by the SAI that many actuaries/companies made inappropriate assumptions resulting in substantial understatement of liability on account of retirement benefits in the financial statements. It was also observed that some of the companies were not providing correct data to the actuary/LIC (Life Insurance Corporation of India) based on which the liability was calculated. Hence the data was requisitioned in the electronic form and analyzed, to cross check these calculations.

### 2. Company-I

#### 2.1 Audit Objectives and Methodology

The basic objective behind the data analysis was to arrive at a rough estimate for gratuity liability and leave salary encashment liability and to check the validity of the data provided by the management to the Actuary and LIC of India.

The auditee IT application was a COBOL/C/Oracle based application running on a Windows platform. Data was provided twice by the Company, as below:

- Initially two dbase files, one for Executives and the other for Non-executives, were given.
- Subsequently, one excel file containing records for both Executives and Non-Executives was provided by the Company, after considering salary escalations.

The data was directly downloaded into IDEA 2001 using the Import Assistant. The initial data was downloaded as two IMD files, one for Company Executives and other for Non-Executives. The revised data was downloaded as a single IMD file.

#### 2.2 Audit Findings

According to the accounting policies of the Company, liability towards **leave encashment** as at the end of the year is provided for on the basis of the actuarial valuation. Furthermore, the premium towards **Gratuity-cum-Insurance Policy** is computed by the Life Insurance Corporation of India. Both the valuations are depended upon Manpower and Salary, amongst other factors. The liability towards leave encashment is also dependent upon the leave balances of the employees.

The liabilities, as calculated initially by the actuary and the LIC of India as on 31<sup>st</sup> of March 2002 were:

- a) Leave Salary: Rs. 190.3 million

- b) Premium towards Gratuity-cum-Insurance Policy: Rs. 75.8 million

On analyzing the imported data, several errors and discrepancies were noticed, and the management provided the SAI with the revised data in an EXCEL file.

Based on this revised data, the liability towards Leave encashment was revised by the actuary from Rs. 190.3 million to Rs. 388.3 million and the liability towards Gratuity was estimated by LIC at Rs. 389.8 million, and the financial statements were suitably revised.

### **3. Company-II**

#### **3.1 Audit Objectives and Methodology**

The basic objective behind the data analysis was to validate the data provided by the management to the actuary.

The auditee IT application was an MF COBOL/Oracle based application running on UNIX. Data was provided by the company in ASCII format, and directly downloaded into IDEA 2001 using the Import Assistant.

#### **3.2 Audit Findings**

The liabilities as calculated initially by the actuary as on 31<sup>st</sup> March 2002 were:

- a) Gratuity Liability: Rs. 418.1 million  
b) *Leave Encashment: Rs. 109.3 million.*

After the SAI pointed out that certain key assumptions regarding salary escalation were incorrect, the actuary revised his calculation of liabilities on 16<sup>th</sup> September 2002 as follows:

- a) Gratuity Liability: Rs. 465.6 million  
b) Leave Salary Encashment: Rs. 111.7 million

Immediately thereafter, the actuary gave a third valuation dated 19<sup>th</sup> September 2002 of liabilities as follows:

- a) Gratuity Liability: Rs. 535.0 million  
b) Leave Salary Encashment: Rs. 122 million

Two valuations at such short intervals raised doubts that wrong data may have been provided to the actuary by the Company. At this juncture, the data provided to the actuary was sought from the Company. As a result, **TWO** sets of data were provided to Audit. On importing both the data sets, it was observed that one data set had only 4803 records and the other had 5249 records, the same as in the first valuation. On further investigation of the data, it was realized that the **Second Valuation** of the Actuary was based on the data set containing 4803 records, which was as of September 2002 instead of 31<sup>st</sup> March 2002. Hence it did not contain the records of those who had retired after 31<sup>st</sup> March 2002.

The third valuation, although based on correct number of employees, still appeared to be on the lower side, as far as leave encashment was concerned. In the mean time, the actuary also cast doubts on the leave records provided to it. It was decided at this stage to examine the data through IDEA and also get the leave records checked manually. Initially a test check was done, but when errors were found to be in the vicinity of 90 %, it was decided to do a 100 % check of the leave records of 5249 employees.

Out of 5249 records, 4754 records were checked manually with manual records (the remaining 495 service books were not available) and discrepancies were found in 4365 records, i.e. 92% of the total records checked. The correct leave figures as noted by audit were exported to IDEA along with the original leave data as provided by the Company. It was observed that the average Earned Leave per employee increased from the original 79 days to 164 days. These facts were brought to the notice of the Management with the request that the leave records be corrected and the revised data be provided to the actuary and audit.

Based on the revised data of the Company, the liabilities were again calculated by the actuary (as on 31<sup>st</sup> March 2002). A comparison of the four actuarial valuations is given below (all figures in Millions of Rupees):

Particulars	<b>First</b> Valuation dated <b>10/05/2002</b>	Second Valuation dated <b>16/09/2002</b>	Third Valuation dated <b>19/09/2002</b>	<b>Final</b> Valuation dated <b>05/10/2002</b>	Difference between First & Final Valuations
Gratuity liability	418.1	465.6	535.0	522.0	103.9
Leave Salary encashment liability	109.3	111.7	122.0	219.8	110.5

Based on this revised actuarial valuation, the Annual Accounts of the Company for the year 2001-2002 were revised, increasing the losses by Rs. 214.4 million.

## **SAI-Japan**

SAI-Japan uses the reports generated by auditees' IT systems in its performance audits, and does not have the appropriate environment for acquiring auditee data through communication lines.

However, the SAI does not rely on the auditee reports, without conducting its own analysis. Since it is not cost effective for the SAI to conduct the analysis of all data available on the auditees' reports, the SAI ensures the correctness of these reports by examining and verifying sample data.

The SAI does not use general audit software packages, but uses DBMS software, spreadsheets and programming languages for analyzing audit data and numerical simulation.

### **Case - Management of hospitals by NTT East and NTT West**

The hospitals managed by NTT East and NTT West have contributed to local medical care, as well as medical examination and treatment of their employees. However, as the business environment for both companies has become difficult, it has become necessary for the hospitals to be operated without incurring a deficit. Although both companies have taken measures for improvements, the expenditure of these hospitals still exceed the revenues.

Consequently, both companies need to:

- continue to take various measures to increase the revenues and to reduce expenses of their hospitals.
- improve the systems for medical examinations and treatment through more accurate analysis of each department's revenues and expenditures.
- review plans for revenues and expenditures, in view of the changes in the environment for the management of hospitals.
- prepare and revise medium- and long-range plans for revenues and expenditures, and take comprehensive measures in accordance with these plans

In the course of this audit, the SAI collected and analyzed data generated by NTT East and NTT West. Analytical reviews were also performed to obtain the ratio of total expenditures to total revenues for each hospital, the ratio of labor costs to total expenses etc.

## **SAI-Lithuania**

In performance audits, SAI-Lithuania usually relies on reports generated by the auditees' IT systems for conducting analytical reviews of financial and operating data. Generally, MS Excel is used as the tool for data analysis. Examples where such data analysis were conducted, are as follows:

- In an audit of the Lithuanian State Medicines Control Agency, one objective was to compare data and check the homogeneity of commitments for healthcare institutions, across different regions as well as across different types of healthcare institutions.
- The SAI also conducted a recalculation of financial resources for school reform, based on financial and operating data.

## **SAI-Oman**

### **1. IT in the SAI**

In 1996, our approach to IT was re-oriented and a formal IT Strategy was drawn up in order to facilitate better control over audit and administrative activities and to provide better information support for field auditors. In support of this strategy:

- Long and short term plans and detailed policies and standards covering hardware and software acquisition, application software development, IT operations and IT security were developed
- A comprehensive but very economical upgradation of IT infrastructure was undertaken
- A suite of applications for both audit and administrative activities was developed in-house, with user-friendly browser interfaces
- Extensive training of local staff in computers – essentially office automation – was undertaken.

### **2. Business Case for Using CAATs**

In 2000, after putting into place a robust infrastructure for IT, we decided to concentrate on using CAATs for data analysis in non-financial audits. The main reasons for this approach were as follows:

- From an organisational point of view, compliance and performance audit rank higher in priority than attest audits.
- Expectations from the SAI were very high, in view of a significant expansion of the SAI's mandate. SAI was expected to provide management advice and recommendation, rather than fault-finding on individual transactions.
- Our “pilot” experiences with data analysis provided rich material for performance audit findings, which had the potential to add value to auditee organisations and were well appreciated.
- Performance audit of IT systems was not considered a priority area, keeping in mind other areas which had higher levels of audit concern. In addition, we did not have adequate competent staff to conduct such audits.
- Stand-alone IT control reviews were also not considered, since we found that the recipients of our reports were not be able to fully appreciate the risks of potential weaknesses, without providing concrete evidence through data analysis.

### 3. CAATs Approach

Our focus on use of CAATs for performance and forensic audits has been largely on free-form analytical review of operational and performance data. This broadly covers four aspects:

- Data cleansing – This involves identification of invalid and inconsistent data and correction / exclusion, reformatting / restructuring of data; adding additional fields to existing data etc.
- Data profiling – This involves creating summary profiles of data in different tables on different parameters – singly and jointly, along with statistical analysis, the objective being to identify potential areas of audit interest
- Hypotheses generation – This involves designing and running numerous SQL queries (often in hundreds) to identify exceptional or unusual trends. Typically, not more than 5% of the queries will result in scope for potential audit findings, requiring detailed audit testing.
- Hypotheses testing – The hypotheses filtered out through querying, are then subjected to detailed audit testing with reference to other records, which are often manually maintained. This is especially important in view of the possibility of discrepancy between manual and computer records / data.

### 4. Experiences in Using CAATs

Our experiences in using CAATs for non-financial audits are summarised in the following table:

Type of Audit	Data Availability & CAAT Tool	Area
Performance audits	Downloaded from auditee Tool: MS Access	(a) Procurement Data (b) Assessments by the Income Tax Authority
	Captured manually Tool: MS Excel	(a) Restatement of administered pricing based financial statements, using market prices (b) Validation of business forecasts (c) Alternative NPV models for loan and equity financing

	Captured manually Tool: MS Access (charts using MS Excel)	(a) Short-term and long-term investments of surplus cash (b) Timesheets for manpower services contracts (c) Analysis of chemical consumption
Compliance Audits	Downloaded from auditee Tool: MS Access	(a) Loans Database of Financial Institutions (Calculations of EMI, Compliance with Credit Authorisation Policies) (b) Validation of electricity billing and metering for a public utility
Forensic Audits	Captured manually Tool: MS Access	Investigation of payment vouchers and cheques to identify fictitious transactions and recipients
	Captured manually Tool: MS Excel	Valuation of share investments vis-à-vis market prices
	Downloaded from auditee Tool: MS Access	(a) Insider / circular trading in shares (b) “Accommodation” Letters of Credit (c) Sales, cash receipts and stock transfers in a supermarket to identify embezzlement of cash (d) Fraudulent billing of payphone calls in a telecom utility

Two illustrative case studies of our use of CAATs in non-financial audits are described below.

## **5. Case Study 1: Compliance with Credit Policies in a Housing Finance Institution**

This was a development finance institution owned by Government, providing subsidised housing finance to local citizens. The SAI took up the audit on a special request from the Government on suspicions of mismanagement and fraud.

The Government was providing subsidy for housing finance, and had therefore laid down procedures and policies from time to time for:

- Identification of eligible beneficiaries
- Loan entitlements
- Disbursal and repayment schedule

The line audit team requested assistance for use of CAATs for data analysis, and CAATs experts joined the audit team on a full-time basis. The decision for

deployment of CAATs was based on a formal business case, which was approved by senior management. In fact, based on this experience, a formal CAATs deployment policy was evolved by the SAI.

The organisation had computerised its credit function using a bespoke system developed on Oracle. It had imported legacy data from a flat-file system, but there were major issues of data integrity, which continued to plague the new system.

The SAI was able to connect to the Oracle database using ODBC, and downloaded the relevant tables into a Microsoft Access97 database on our PC. The SAI then ran our audit queries using SQL on the Access database.

The data analysis was hamstrung by lack of up-to-date system documentation. Fortunately, the auditee had good documentation on the initial systems design<sup>3</sup>, where record layouts and relationships (primary and foreign keys) formed the critical elements. However, this documentation was not updated, and therefore, the SAI's data analysis had to be preceded by efforts to bring the changes on board the systems design documents.

Our data analysis revealed the following systemic weaknesses

- The calculation of Equated Monthly Instalments (EMI) was gravely flawed, where instalments were reduced for no valid reason, leading to under-recovery of loans.
- The bank's lending policy had several stipulations as to the borrower's current age as well as age at the end of the repayment schedule, as well as maximum amount of loan, number of instalments etc. The SAI noticed a large number of instances of non-compliance.
- There were a large number of prospective borrowers in the queue for housing finance. Our analysis of the speed of the grant of loans showed wide variations in the time taken for different applicants to have their loans sanctioned – while some borrowers had their loans granted the same day as the application, the average waiting time was 3-4 years, while a few applicants had to wait for nearly 10 years.

The SAI stated that the above non-compliances could be on account of either policy violations and/or data deficiencies, as the auditee could not categorise individual non-compliances. We recommended a comprehensive clean-up of data, as well as corrective action on policy violations.

## **6. Case Study 2: Performance of a Chemical Injection System**

During the audit of a government-owned commercial entity, the SAI conducted a performance audit of a long-term contract for corrosion management of pipeline

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<sup>3</sup> In other audits, we could not get complete system documentation, whether current or out-of-date !

facilities. The primary objective of the contract was to optimise the rate of injection of corrosion inhibiting chemicals, while achieving the acceptable corrosion rates. There was a bonus / penalty system for short / excess chemical consumption. The contract was won by the successful contractor, on his promise to achieve a 15% reduction in chemical consumption from existing levels.

Since the audit team included CAATs experts, who were also proficient line auditors, the team was “self-sufficient” as regards CAATs. We noticed that while the contractor was submitting monthly reports, detailing the chemical deliveries at various tanks, and all adjustments to injection rates for each pipeline, there was no evidence of due consideration or analysis of the monthly reports by the auditee. Initially, we entered a part of this data in the form of an MS Excel spreadsheet. We realised that this tool was inadequate for our needs. We consequently created a Microsoft Access 2000 Database, where we re-entered details of :

- All pipeline facilities, and the contractual norms for chemical concentration
- Original injection rates and adjustments thereto over a five month period over 16 pipelines
- Details of fluid flow, which would affect the injection rates
- Chemical deliveries and tank level measurements over the same period.

We had to thus discard all the data entered in the MS Excel spreadsheets. After this experience, we took a policy decision that the line audit teams should seek the advice of the CAATs experts, before deciding to manually enter data.

Using this data, we were able to recompute the actual injection rates, based on fluid flow, deliveries and opening and closing tank levels. Our analysis revealed that:

- The promised reduction in chemical consumption was not being achieved
- Measurements systems for delivery as well as injection were flawed
- Monthly reports submitted by the contractor were unreliable
- The basis for payments to the contractor was unreliable.

Management broadly agreed with our findings, and agreed to take remedial action for (a) levy of penalty for non-optimisation of chemical consumption (b) improving measurement systems, and (c) quality check of all monthly reports, including past reports.

## **SAI-Poland**

### ***Introduction***

In the course of its performance audits, SAI-Poland does not download auditee data and conduct its own data analysis. Most, if not all of the electronic data made available to the SAI comes in the form of standard or customised reports understandable to the auditor. The position and standing of the SAI's auditor is high enough to have all the processing done before the report is delivered to him.

Recently, the SAI has been focussing more attention on IT costs and effectiveness. In an audit related to IT effectiveness, computers' usage has been reviewed in order to assure efficiency in IT budget distribution. Some of the standard reports generated by the system were difficult to understand, and specific assistance was sought from the auditee to correctly interpret the system generated reports.

### ***Tools Used***

#### **Spreadsheets**

The SAI frequently uses spreadsheets in performance and forensic audits. In most cases the auditor creates a spreadsheet on the spot to analyze the documentation provided by the auditee. The spreadsheet may then be part of the audit documentation either in electronic or printed form. The SAI also frequently requests the auditee to process selected data for the purpose of the audit

#### **SQL and other programming languages**

The SAI uses SQL for everyday database tasks. Among other programming languages, the main languages used for CAATs applications are MS Visual Basic (.net) and Java + JSP + XML.

#### **Generalized audit software packages**

The SAI uses ACL in specific cases of performance and forensic audit. ACL has been used in:

- traffic fines collection audit performed in one of the regions
- forensic audit related to medical prescriptions.

### ***Case 1 – Export Promotion Portals***

Recently a performance audit of export promotion portals has been conducted at the Ministry of Economy. One of the audit objectives was to ensure that the project management evaluates available resources on hand prior to making investment decisions. A number of registers needed to be queried in order to provide the basis for re-computation of IT assets evaluation. Also, servers activity reports needed to be generated to assess the hardware usage. The results of those queries were provided to the SAI auditors both in paper and in electronic format.

The analysis led the SAI to conclude that the analysis of IT resources prior to investment decision-making was vague and insufficient. Combined with other financial analysis, the SAI concluded that the prime motive for investment in hardware was the desire to spend the budget and not to fulfill a real need.

## ***Case 2 –Financial Grants***

During an audit of the Polish Agency for Industrial Development, an extensive survey of a database of financial grants provided by the Agency was required. Queries were generated by the Agency to meet the SAI's needs. Also, other specific electronic registers (including correspondence) needed to be consulted. The results of these queries were provided to the SAI's audit team for further analysis.

By cross-referencing the results, the SAI was able to generate several audit findings concerning the deficiencies of the registers in use (as well as the supporting regulations). The most important observations were related to problems in identification of parties who applied for the grant, and problems of identification of the negative decisions of the board etc. The delicate nature of many cases, where the decisions of the board were subjective, and the massive amount of the grants and its impact on the economy made the audit results very interesting and valuable from the SAI's perspective.

## ***Other Cases of Review of Financial and Operational Data***

In the SAI's reviews of social security and health system (eligibility, duplication etc.) the SAI generally uses samples provided by the auditee. For selected samples, the SAI reviews supporting documentation, checks eligibility, re-performs allowance calculation, and crosschecks against related registers etc.

Compliance review of administrative procedures is one of the SAI's most frequent tasks. While performing the review, the process of sampling the decisions of the organization under review is either performed by the organization or by the auditor. In the latter situation, the organization provides the data, mostly in printed form.

## **SAI-Sweden**

SAI- Sweden often uses data downloaded from the auditee systems for analysis, during performance audit. In addition, they also rely on standard reports generated by the auditee, which are used as a basis for formulating hypotheses and audit questions. For example, in a performance audit, the SAI used the auditee reports to compare the costs/ errand for items of work done by in a Government agency in different regions, and concluded that the differences were too big.

The main tools used by SAI-Sweden are Microsoft Excel for spreadsheets and Microsoft Access for DBMS. Microsoft Access is used less often and only when there large amounts of data or when several databases are to be merged.

As regards data quality, as a rule the SAI analyses / controls the quality of data they ask for and receive for use in the audit. This becomes a kind of audit within the audit, and the SAI finds it most important to know the exact quality of data upon which conclusions are drawn. The SAI faces problems regarding technical understanding of data with older databases, as it is difficult to now whether the concepts/ variables being used in the database have the same meaning as in newer databases. Also, one cannot be sure of data quality, because there is seldom anybody to ask and get clear/correct information from, in these cases.

### **Case Study - Arable Area Payments**

The Swedish National Audit Office conducted a performance audit of the EU's Arable area payments. This audit was intended to validate achievement of the following programme objectives:

- To assure a reasonable standard of living for the farmers;
- Increased Productivity; and
- Reasonable prices for the consumers

The validation of achievement of reasonable standard of living, which was based on income was conducted using extensive data analysis, on payments and income obtained from different databases. Much of the audit work was based on processing and matching data from different databases. Data was used from five different databases, which covered the various parameters, used in the audit. It was found more cost beneficial to purchase the data on the entire population and not conduct any sample analysis.

In conducting data analysis, data quality problems were encountered on two fronts:

- In data contained in a particular databases, definitional problems regarding the classification of data across different time periods.
- Matching of data elements across multiple databases.

Once these problems were sorted out, statistical analysis was largely used to draw appropriate conclusions, including correlation analysis, and Lorenz curves. The results of the data analysis were presented by extensive use of tables and graphs using spreadsheet software. This use of data analysis in audit was also presented in the January 2002 issued of IntoIT.

Based on the above analysis, the SAI concluded that the introduction of Arable Area Payments had a positive impact on the income of a small group of farmers – mainly the relatively small group of large producers. But for the majority of Swedish AAP recipients, available data did not support any substantial impact of AAPs on the standard of living, as measured by changes in the level of family income.

## **SAI-Slovakia**

The State Audit Office of Slovakia uses electronic data from its auditee for conducting performance audit. The tools used included Microsoft Access and Spreadsheets, and the SAO is planning to introduce generalized audit software like ACL and Idea shortly.

The SAO had conducted an audit of grants in a programme called SAPARD. This programme was administered nation-wide with the regional offices being connected to the national headquarters. Data analysis was used for highlighting the problems in processing applications for grants made under this programme.

## **SAI- United States of America**

GAO downloads operational and performance data (including financial, earned value, technical, reports, spreadsheets etc.) from the IT systems of the auditee for analysis during performance audits.

GAO uses several methods for data download:

- A data Management client tool called First Class, which is a client installed on the auditors' desktop
- Data provided on electronic media
- Data provided in report format

As regards analysis, GAO uses SAS and SPSS for most analysis, as also spreadsheets (Microsoft Excel), SQL and other programming languages and Generalised Audit Software Packages like ACL, IDEA etc. The spreadsheet models have been developed for providing estimates for funds' requirements and for estimating various parameters like efficiency etc.

Occasionally, database tools like MS Access are used

- to obtain access to auditee data, typically non-financial; this is used to confirm accuracy of records.
- To create data entry forms or to compile information for further qualitative review.

GAO also uses more specialised software such as MapInfo for GIS work, SUDAAN for certain types of statistical calculations. Other scripting tools are also used occasionally.

GAO frequently experiences problems in understanding data, particularly when a data dictionary is not available or when the metadata is incomplete or poorly documented. They frequently use auditee reports, but conduct a data reliability assessment to assure themselves of the accuracy and completeness of information

### **Case Study – Earned Value Management (EVM)**

The system of EVM has been adopted by various government agencies and departments in USA, including Department of Defence and National Aeronautical Space Agency (NASA), Federal Aviation agency (FAA) etc. This has been jointly developed along with these agencies as a standard method of measuring project performance. The government had adopted EVMS as a standard for certain specified types of project. This method has the following objectives:

- Relates time phased budgets to specific contract task

- Properly relates cost, schedule and technical performance and indicates progress
- Are valid, timely and auditable.

Using this method GAO is able to utilise the client data to accurately estimate the nature and type of variances, especially cost variance and schedule variance and reasons for such variance. They are able to focus on corrective action needed, as also the individuals responsible for such action. This provides a methodology for GAO to independently analyse the data from its auditee.

GAO uses EVM analysis for various audits. In one such case, GAO set out to assess the reliability of the FAA's life-cycle cost estimate of a program called STARS (Standard Terminal Automation Replacement System), determine the impact of STARS' estimated costs on FAA's future budgets and identify any alternatives to STARS. In order to accomplish these audit objectives, GAO analysed the data from the cost performance reports that the STARS' contractor had developed for FAA, using the EVM methodology.

## **Annexe - 1**

### **Revised Questionnaire for SAIs**

***Please send your responses at the earliest (preferably by e-mail), on or before December 2003 to the following address***

***State Audit Institution  
PO Box 727, Postal Code 113  
Muscat, OMAN  
Fax: 00 968 740264  
E-Mail: [sriram@sgsa.com](mailto:sriram@sgsa.com)***

1. In performance / forensic audits, do you download and conduct your own analysis of auditee data ?

Yes / No

2. If the answer to question 1 is **Yes**, please describe a few specific cases of such analysis. It would be preferable if these cases covered the auditee IT systems involving their core business functions. However, if data from such systems have not been audited, you may describe cases involving support IT systems like accounting, procurement, payroll etc.

Please cover the following issues in your description of cases :

- Type of data downloaded from core auditee IT systems
- Software Environment of Auditee IT System
- Method of download
- Tool(s) used for data analysis
- Objectives of audit analysis
- Conclusions / results in brief

3. During data analysis in performance / forensic audits, have you experienced situations where you have faced difficulty in understanding the electronic data either from a business or technical perspective? If yes, please give a brief description of such situations.

4. If you rely on the reports generated by the auditee's IT systems and do not conduct your own data analysis, please describe a few specific cases in your performance /forensic audits involving such reports, covering the following aspects:

- Objectives of audit analysis
- Conclusions / results in brief

5. In your performance or forensic audits, do you conduct analytical reviews of financial and/or operational data ? Please describe a few specific cases.

6. How does your SAI use the following IT tools in performance and forensic audits ?

- Access and other database tools
- Spreadsheets
- SQL and other programming languages
- Generalised Audit Software Packages like ACL, IDEA etc.

7. If you have not provided responses to the questions listed above, please describe how your SAI is using IT for its performance and investigative audits (other than for reporting) ?