

Guidance Note on Computer Assisted Audit Techniques (CAATs)*

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Introduction

1. The overall objectives and scope of an audit do not change when an audit is conducted in a computer information systems (CIS) environment. The application of auditing procedures may, however, require the auditor to consider techniques known as Computer Assisted Audit Techniques (CAATs) that use the computer as an audit tool for enhancing the effectiveness and efficiency of audit procedures. CAATs are computer programs and data that the auditor uses as part of the audit procedures to process data of audit significance, contained in an entity's information systems.
2. The purpose of this Guidance Note is to provide guidance in the use of CAATs. This Guidance Note describes computer assisted audit techniques including computer tools, collectively referred to as CAATs. This Guidance Note applies to all uses of CAATs when a computer of any type or size is involved whether that computer is operated by the entity or by a third party.

Description of Computer Assisted Audit Techniques (CAATs)

3. Computer Assisted Audit Techniques (CAATs) are important tools for the auditor in performing audits. CAATs may be used in performing various auditing procedures, including the following:
 - ◆ tests of details of transactions and balances, for example, the use of audit software for recalculating interest or the extraction of invoices over a certain value from computer records;
 - ◆ analytical procedures, for example, identifying inconsistencies or significant fluctuations;
 - ◆ tests of general controls, for example, testing the set-up or configuration of the operating system or access procedures to the program libraries or by using code comparison software to check that the version of the program in use is the version approved by management ;
 - ◆ sampling programs to extract data for audit testing;
 - ◆ tests of application controls, for example, testing the functioning of a programmed control; and
 - ◆ reperforming calculations performed by the entity's accounting systems.
4. CAATs allow the auditor to give access to data without dependence on the client, test the reliability of client software, and perform audit tests more

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efficiently. CAATs are computer programs and data that the auditor uses as part of the audit procedures to process data of audit significance contained in an entity's information systems. CAATs may consist of package programs, purpose-written programs, utility programs or system management program. Regardless of the origin of the programs, the auditor substantiates their appropriateness and validity for audit purposes before using them. A brief description of the programs commonly used is given below.

- ◆ *Package Programs* are generalized computer programs designed to perform data processing functions, such as reading data, selecting and analyzing information, performing calculations, creating data files and reporting in a format specified by the auditor.
- ◆ *Purpose-Written Programs* perform audit tasks in specific circumstances. These programs may be developed by the auditor, the entity being audited or an outside programmer hired by the auditor. In some cases, the auditor may use an entity's existing programs in their original or modified state because it may be more efficient than developing independent programs.
- ◆ *Utility Programs* are used by an entity to perform common data processing functions, such as sorting, creating and printing files. These programs are generally not designed for audit purposes, and therefore may not contain features such as automatic record counts or control totals.
- ◆ *System Management Programs* are enhanced productivity tools that are typically part of a sophisticated operating systems environment, for example, data retrieval software or code comparison software. As with utility programs these tools are not specifically designed for auditing use and their use requires additional care.

Details of some of the techniques used are mentioned in the Appendix.

Considerations in the Use of CAATs

5. When planning an audit, the auditor may consider an appropriate combination of manual and computer assisted audit techniques. In determining whether to use CAATs, the factors to consider include:

- ◆ the IT knowledge, expertise and experience of the audit team;
- ◆ the availability of CAATs and suitable computer facilities and data;
- ◆ the impracticability of manual tests;
- ◆ effectiveness and efficiency; and
- ◆ time constraints.

Before using CAATs the auditor considers the controls incorporated in the design of the entity's computer systems to which CAAT would be applied in order to determine whether, and if so, how, CAATs should be used.

IT Knowledge, Expertise and Experience of the Audit Team

6. Standard on Auditing (SA) 401, "Auditing in a Computer Information Systems Environment" deals with the level of skill and competence the audit team needs to conduct an audit in a CIS environment. It provides guidance when an auditor delegates work to assistants with CIS skills or when the auditor uses work performed by other auditors or experts with such skills. Specifically, the audit team should have sufficient knowledge to plan, execute and use the results of the particular CAAT adopted. The level of knowledge required depends on "availability of CAATs" and "suitable computer facilities".

Availability of CAATs and Suitable Computer Facilities

7. The auditor considers the availability of CAATs, suitable computer facilities and the necessary computer-based information systems and data. The auditor may plan to use other computer facilities when the use of CAATs on an entity's computer is uneconomical or impractical, for example, because of an incompatibility between the auditor's package program and entity's computer. Additionally, the auditor may elect to use their own facilities, such as PCs or laptops.

8. The cooperation of the entity's personnel may be required to provide processing facilities at a convenient time, to assist with activities such as loading and running of CAAT on the entity's system, and to provide copies of data files in the format required by the auditor.

Impracticability of Manual Tests

9. Some audit procedures may not be possible to perform manually because they rely on complex processing (for example, advanced statistical analysis) or involve amounts of data that would overwhelm any manual procedure. In addition, many computer information systems perform tasks for which no hard copy evidence is available and, therefore, it may be impracticable for the auditor to perform tests manually. The lack of hard copy evidence may occur at different stages in the business cycle.

- ◆ Source information may be initiated electronically, such as by voice activation, electronic data imaging, or point of sale electronic funds transfer. In addition, some transactions, such as discounts and interest

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calculations, may be generated directly by computer programs with no specific authorization of individual transactions.

- ◆ A system may not produce a visible audit trail providing assurance as to the completeness and accuracy of transactions processed. For example, a computer program might match delivery notes and suppliers' invoices.
- ◆ In addition, programmed controlled procedures, such as checking customer credit limits, may provide hard copy evidence only on an exception basis.
- ◆ A system may not produce hard copy reports. In addition, a printed report may contain only summary totals while computer files retain the supporting details.

Effectiveness and Efficiency

10. The effectiveness and efficiency of auditing procedures may be improved by using CAATs to obtain and evaluate audit evidence. CAATs are often an efficient means of testing a large number of transactions or controls over large populations by:

- ◆ analyzing and selecting samples from a large volume of transactions;
- ◆ applying analytical procedures; and
- ◆ performing substantive procedures.

11. Matters relating to efficiency that an auditor might consider include:

- ◆ the time taken to plan, design, execute and evaluate CAAT;
- ◆ technical review and assistance hours;
- ◆ designing and printing of forms (for example, confirmations); and
- ◆ availability of computer resources

12. In evaluating the effectiveness and efficiency of CAAT, the auditor considers the continuing use of CAAT application. The initial planning, design and development of CAAT will usually benefit audits in subsequent periods.

Time Constraints

13. Certain data, such as transaction details, are often kept for a short time and may not be available in machine-readable form by the time auditor wants them. Thus, the auditor will need to make arrangements for the

retention of data required, or may need to alter the timing of the work that requires such data.

14. Where the time available to perform an audit is limited, the auditor may plan to use CAAT because its use will meet the auditor's time requirement better than other possible procedures.

Using CAATs

15. The major steps to be undertaken by the auditor in the application of CAAT are to:

- (a) set the objective of CAAT application;
- (b) determine the content and accessibility of the entity's files;
- (c) identify the specific files or databases to be examined;
- (d) understand the relationship between the data tables where a database is to be examined;
- (e) define the specific tests or procedures and related transactions and balances affected;
- (f) define the output requirements;
- (g) arrange with the user and IT departments, if appropriate, for copies of the relevant files or database tables to be made at the appropriate cut off date and time;
- (h) identify the personnel who may participate in the design and application of CAAT;
- (i) refine the estimates of costs and benefits;
- (j) ensure that the use of CAAT is properly controlled;
- (k) arrange the administrative activities, including the necessary skills and computer facilities;
- (l) reconcile data to be used for CAAT with the accounting and other records;
- (m) execute CAAT application;
- (n) evaluate the results;
- (o) document CAATs to be used including objectives, high level flowcharts and run instructions; and
- (p) assess the effect of changes to the programs/system on the use of CAAT.

Testing CAAT

16. The auditor should obtain reasonable assurance of the integrity, reliability, usefulness, and security of CAAT through appropriate planning, design, testing, processing and review of documentation. This should be done before reliance is placed upon CAAT. The nature, timing and extent of testing is dependent on the commercial availability and stability of CAAT.

Controlling CAAT Application

17. The specific procedures necessary to control the use of CAAT depend on the particular application. In establishing control, the auditor considers the need to:

- (a) approve specifications and conduct a review of the work to be performed by CAAT;
- (b) review the entity's general controls that may contribute to the integrity of CAAT, for example, controls over program changes and access to computer files. When such controls cannot be relied on to ensure the integrity of CAAT, the auditor may consider processing CAAT application at another suitable computer facility; and
- (c) ensure appropriate integration of the output by the auditor into the audit process.

18. Procedures carried out by the auditor to control CAATs applications may include:

- (a) participating in the design and testing of CAAT;
- (b) checking, if applicable, the coding of the program to ensure that it conforms with the detailed program specifications;
- (c) asking the entity's staff to review the operating system instructions to ensure that the software will run in the entity's computer installation;
- (d) running the audit software on small test files before running it on the main data files;
- (e) checking whether the correct files were used, for example, by checking external evidence, such as control totals maintained by the user, and that those files were complete;
- (f) obtaining evidence that the audit software functioned as planned, for example, by reviewing output and control information; and
- (g) establishing appropriate security measures to safeguard the integrity and confidentiality of the data.

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When the auditor intends to perform audit procedures concurrently with online processing, the auditor reviews those procedures with appropriate client personnel and obtains approval before conducting the tests to help avoid the inadvertent corruption of client records.

19. To ensure appropriate control procedures, the presence of the auditor is not necessarily required at the computer facility during the running of CAAT. It may, however, provide practical advantages, such as being able to control distribution of the output and ensuring the timely correction of errors, for example, if the wrong input file were to be used.

20. Audit procedures to control test data applications may include:

- ◆ controlling the sequence of submissions of test data where it spans several processing cycles;
- ◆ performing test runs containing small amounts of test data before submitting the main audit test data;
- ◆ predicting the results of the test data and comparing it with the actual test data output, for the individual transactions and in total;
- ◆ confirming that the current version of the programs was used to process the test data; and
- ◆ testing whether the programs used to process the test data were the programs the entity used throughout the applicable audit period.

21. When using CAAT, the auditor may require the cooperation of entity staff with extensive knowledge of the computer installation. In such circumstances, the auditor considers whether the staff improperly influenced the results of CAAT.

22. Audit procedures to control the use of audit-enabling software may include:

- ◆ verifying the completeness, accuracy and availability of the relevant data, for example, historical data may be required to build a financial model;
- ◆ reviewing the reasonableness of assumptions used in the application of the tool set, particularly, when using modeling software;
- ◆ verifying availability of resources skilled in the use and control of the selected tools; and
- ◆ confirming the appropriateness of the tool set to the audit objective, for example, the use of industry specific systems may be necessary for the design of audit programs for unique business cycles.

Documentation

23. The various stages of application of CAATs should be sufficiently documented to provide adequate audit evidence.

24. The audit working papers should contain sufficient documentation to describe CAAT application, including the details set out in the sections below:

(a) Planning

- ◆ CAAT objectives;
- ◆ CAAT to be used;
- ◆ Controls to be exercised; and
- ◆ Staffing, timing and cost.

(b) Execution

- ◆ CAAT preparation and testing procedures and controls;
- ◆ Details of the tests performed by CAAT;
- ◆ Details of inputs (e.g., data used, file layouts), processing (e.g., CAATs high-level flowcharts, logic) and outputs (e.g., log files, reports);
- ◆ Listing of relevant parameters or source code; and
- ◆ Relevant technical information about the entity's accounting system, such as file layouts.

(c) Audit Evidence

- ◆ Output provided;
- ◆ Description of the audit work performed on the output;
- ◆ Audit findings; and
- ◆ Audit conclusions;

(d) Other

- ◆ Recommendations to the entity management; and

In addition, it may be useful to document suggestions for using CAAT in future years.

Arrangements with the Entity

25. The auditor may make arrangements for the retention of the data files, such as detailed transaction files, covering the appropriate audit time frame.

26. In order to minimize the effect on the organisation's production environment, access to the organisation's information system facilities, programs/systems and data should be arranged well in advance of the needed time period

27. The auditor should also consider the effect of these changes on the integrity and usefulness of CAAT, as well as the integrity of the programs/system and data used by the auditor.

Using CAATs in Small Entities

28. Although the general principles outlined in this Guidance Note apply in small entity IT environments, the following points need special consideration:

- (a) The level of general controls may be such that the auditor will place less reliance on the system of internal control. This will result in greater emphasis on tests of details of transactions and balances and analytical review procedures, which may increase the effectiveness of certain CAATs, particularly, audit software.
- (b) Where smaller volumes of data are processed, manual methods may be more cost effective.
- (c) A small entity may not be able to provide adequate technical assistance to the auditor, making the use of CAATs impracticable.
- (d) Certain audit package programs may not operate on small computers, thus restricting the auditor's choice of CAATs. The entity's data files may, however, be copied and processed on another suitable computer.

Appendix

Examples of Computer Assisted Audit Techniques

Techniques	Description	Advantages	Disadvantages
Audit Automation	<ul style="list-style-type: none"> ◆ Expert Systems ◆ Tools to evaluate a client's risk management procedures ◆ Electronic working papers, which provide for the direct extraction of data from clients computer records ◆ Corporate and financial modeling programs for use as predictive audit test 	<ul style="list-style-type: none"> ◆ These techniques are more useful when auditors are using laptops which can be directly linked with the entity's system. 	<ul style="list-style-type: none"> ◆ Not applicable in the case of mainframe computers.
Audit Software	<ul style="list-style-type: none"> ◆ Software used by the auditor to read data on client's files, to provide information for the audit and/or to re-perform procedures carried out by the client's programs. 	<ul style="list-style-type: none"> ◆ Performs a wide variety of audit tasks ◆ Long term economies ◆ Reads actual records ◆ Capable of dealing with large volumes of transactions 	<ul style="list-style-type: none"> ◆ Requires a reasonable degree of skill to use ◆ Initial set up costs can be high ◆ Adaptation often needed from machine to machine
Core Image Comparison	<p>Software used by the auditor to compare the executable version of a program with a secure master copy</p>	<ul style="list-style-type: none"> ◆ Provides a high degree of comfort concerning the executable version of the program ◆ Particularly useful where only executable versions are distributed 	<ul style="list-style-type: none"> ◆ Requires a high degree of skill to set up and to interpret the results. ◆ Where programs have been recompiled the comparison may be invalidated as the program records everything as a difference ◆ Printouts are hard to interpret and the actual changes made are difficult to establish

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			<ul style="list-style-type: none"> ◆ Availability restricted to certain machine types
Database Analysers	Software used by the auditor to examine the rights associated with terminals and the ability of users to access information on a database	<ul style="list-style-type: none"> ◆ Provides detailed information concerning the operation of the database ◆ Enhances the auditor's understanding of the database management system 	<ul style="list-style-type: none"> ◆ Requires a high degree of skill to set up and to interpret the results ◆ Restricted availability both as regards machine types and database management systems ◆ Specific and limited audit applicability
Embedded Code	Software used by the auditor to examine transactions passing through the system by placing his own program in the suite of programs used for processing.	<ul style="list-style-type: none"> ◆ Performs a wide variety of audit tasks ◆ Examines each transaction as it passes through the system ◆ Operates continuously ◆ Capable of identifying unusual transactions passing through the system. 	<ul style="list-style-type: none"> ◆ There is a processing overhead involved because of the extra programs ◆ Definition of what constitutes an unusual transaction needs to be very precise ◆ Precautions need to be taken over the output from the programs to ensure is security ◆ Precautions need to be taken to ensure that the program cannot be suppressed or tampered with ◆ Requires some degree of skill to use and to interpret the results
Log Analysers	Software used by the auditor to read and analyse records of machine activity	<ul style="list-style-type: none"> ◆ Provides detailed information on machine usage. ◆ Long term economies ◆ Effective when testing integrity controls 	<ul style="list-style-type: none"> ◆ Requires a high degree of skill to use and to interpret the results ◆ Limited availability as regards machine types ◆ High volume of records restricts extent of test
Mapping	Software used by the auditor to list unused program instructions	<ul style="list-style-type: none"> ◆ Identifies program code which may be there for fraudulent reasons. 	<ul style="list-style-type: none"> ◆ Very specific objective ◆ Requires a high degree of skill to use and to interpret the results ◆ Adaptation needed from machine to machine.

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Modelling	A variety of software, usually associated with a microcomputer, enabling the auditor to carry out analytical reviews of client's results, to alter conditions so as to identify amounts for provisions or claims, or to project results and compare actual results with those expected	<ul style="list-style-type: none"> ◆ Can be a very powerful analytical tool ◆ Can enable the auditor to examine provisions on a number of different bases ◆ Very flexible in use ◆ Can provide the auditor with useful information on trends and patterns 	<ul style="list-style-type: none"> ◆ A high volume of data may need to be entered initially ◆ Results require careful interpretation
On-line Testing	Techniques whereby the auditor arranges or manipulates data either real or fictitious, in order to see that a specific program or screen edit test is doing its work	<ul style="list-style-type: none"> ◆ Very widely applicable ◆ Easy to use ◆ Can be targetted for specific functions carried out by programs 	<ul style="list-style-type: none"> ◆ Each use satisfies only one particular objective ◆ Care must be taken to ensure that "live" data does not impact actual results
Program Code Analysis	An examination by the auditor of the source code of a particular program with a view to following the logic of the program so as to satisfy himself that it will perform according to his understanding	<ul style="list-style-type: none"> ◆ Gives a reasonable degree of comfort about the program logic ◆ The auditor can examine every function of the program code 	<ul style="list-style-type: none"> ◆ The auditor must understand the program language ◆ The auditor needs to check that the source code represents the version in the source library, and that this version equates to the executable version
Program Library Analysers	Software used by the auditor to examine dates of changes made to the executable library and the use of utilities to amend programs	<ul style="list-style-type: none"> ◆ Provides the auditor with useful information concerning the program library ◆ Identifies abnormal changes to the library ◆ Useful when testing program security 	<ul style="list-style-type: none"> ◆ Requires a high degree of skill to use and to interpret the results ◆ Availability restricted to certain machine types ◆ Only relevant when testing integrity controls
Snapshots	Software used by the auditor to take a "picture" of a file of data or a transaction	<ul style="list-style-type: none"> ◆ Permits the auditor to examine processing at a specific point in 	<ul style="list-style-type: none"> ◆ Can be expensive to set up

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	passing through the system at a particular point in time	time to carry out tests, or to confirm the way a particular aspect of the system operates	
Source Comparison	Software used by the auditor to compare the source version of a program with a secure master copy	<ul style="list-style-type: none"> ◆ Compares source code line by line and identifies all differences ◆ Useful when testing integrity controls or particularly important program procedures 	<ul style="list-style-type: none"> ◆ Other procedures are necessary to ensure that the executable version reflects the source code examined ◆ Requires some degree of skill to use and to interpret the results ◆ Availability restricted to certain machine types
Test Data - "Live", "Dead", Integrated Test Facility or Base Case System Evaluation	<p>Fictitious data applied against the client's programs either whilst they are running or in an entirely separate operation.</p> <p>The results of processing the fictitious data are compared with the expected results based on the auditor's understanding of the programs involved</p>	<ul style="list-style-type: none"> ◆ Performs a wide variety of tasks ◆ Gives considerable comfort about the operation of programs ◆ Can be precisely targeted for specific procedures within programs ◆ Long term economies 	<ul style="list-style-type: none"> ◆ "Dead" test data requires additional work for the auditor to satisfy himself the right programs were used ◆ Care must be taken to ensure that "live" data does not impact actual results ◆ Technique can be expensive to set up and cumbersome to use ◆ Adequate for detection of major error but less likely to detect deep-seated fraud
Tracing	Software used by the auditor to identify which instructions were used in a program and in what order	<ul style="list-style-type: none"> ◆ Helps to analyse the way in which a program operates 	<ul style="list-style-type: none"> ◆ There may be less costly ways to achieve the same objectives, although not in the same detail ◆ Requires a high degree of skill to use and to interpret the results ◆ Adaptation needed from machine to machine