

Using the SAS® System as an Audit Support Tool

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Abstract

This paper presents a high-level overview concerning how the SAS System is used to support the auditing of governmental operations for the State of Texas. Instead of providing specific examples of analytical applications and procedures, the author's intention is to provide information regarding the context in which this work is performed, and of the important role that is played by the SAS System.

The Texas State Auditor's Office

Operating within the legislative branch, the State Auditor's Office (SAO) provides information about the operations of state agencies and universities to legislators, agency management, and the citizens of the State. The goal of the SAO is to actively assist government leaders to create and maintain strong accountability systems that ensure efficient, effective operation of state agencies and universities. The SAO performs work at the direction of the Legislative Audit Committee, a permanent standing joint committee of the State Legislature. The Legislative Audit Committee consists of the Lieutenant Governor, the Speaker of the House of Representatives, and the chairmen of the Senate Finance Committee, Senate State Affairs Committee, House Appropriations Committee and the House Ways and Means Committee. At the direction of the Legislative Audit Committee, the State Auditor would conduct an audit or investigation of any entity receiving funds from the state.

The SAO conducts financial audits, compliance audits, economy and efficiency audits, effectiveness audits, special audits, and investigations. Many State agencies, and other organizations, have internal auditors that conduct auditing activities that are similar to those at the SAO, but an important distinction is that the SAO does not "own" the data that are examined using the analytical procedures it uses. Since the data belong to someone else, we are not able to determine which data elements are collected, and we must spend a great amount of time extracting the data and converting them into something usable by our auditors.

The State of Texas has 211 agencies, boards, commissions, schools, and higher-education institutions. Many of these organizations have their own internal record-keeping systems, which they maintain on their own computing platforms. The SAO performs many of its auditing activities using the statewide accounting system, which also does not reside on a computer at the SAO. The data stored in an agency's internal system are kept in non-standard, agency-specific data files. Since most of the data reside on completely separate computing platforms, and since the data are stored in a variety of formats, then accessing the information cannot be accomplished by just "pointing and clicking." Moreover, many of the commonly used files from the statewide systems are very large. For example, an extract file containing information regarding state accounting transactions for only one year includes more than 41 million records, and has a record length of 1300 bytes

Computer Assisted Audit Techniques

In the field of auditing, methods by which computerized information is gathered for analysis as audit evidence are called Computer Assisted Audit Techniques, or CAATs. CAATs may be classified into the following groups:

- Electronic Working Papers,
- Information Retrieval and Analysis,
- Fraud Detection,
- Network Security,
- Electronic Commerce and Internet Security,
- Continuous Monitoring,
- Audit Reporting,

- Database of Audit History,
- Computer Based Training,
- Time Tracking.

Many of the software tools used for these tasks are directly accessible by auditors and their managers. Some of them are used only by a few auditors with specialized knowledge and experience in the area of information technology. And a few of them require the intervention of programmers and database experts. At the SAO, systems analysts on the Information Systems Audit Team, and on the Information Systems Team, are responsible for developing and implementing several CAATs to support our auditors and investigators.

Software Used by SAO Auditors

Auditors seem to have a special fondness for spreadsheet software (such as Microsoft Excel and Lotus 1-2-3), and generalized audit software packages (such as ACL and IDEA). These tools include functional capabilities that were designed specifically for use by accounting professionals, and they are readily accessible by them. SAO auditors use Excel, Microsoft Access, Microsoft Word, and ACL. SAO employees keep in touch with one another using GroupWise, and SAO auditors use PwC TeamMate as electronic work papers for documentation and management of the audit. When working away from the office, SAO employees use Citrix MetaFrame as a means of accessing frequently-used application software and files. For all SAO employees, keeping track of time spent working on individual projects and tasks is accomplished by means of an in-house-developed timesheet application.

From time to time, auditors also need to be able to perform certain statistical calculations, such as the computation of means, standard deviations, and confidence intervals, the generation of frequency distributions, the construction & interpretation of samples, and the testing of hypotheses. But non-statisticians regard extensive statistical software packages, which contain a baffling array of tools that an auditor would never use, as much less desirable than simplified statistical toolkits that were designed specifically for their use. SAO auditors use a statistical software package that was specially tailored for them in-house.

Okay, so what does this have to do with SAS? So far, the SAS System hasn't even been mentioned.

The Role of SAS in CAATs

At the SAO, SAS is the primary tool for information retrieval, data analysis, and fraud detection. SAS could be used for more tasks, of course, but it isn't. Information technology at the SAO is provided by different groups of programmers, each having different skill sets and different tool preferences. The systems-development-types use one set of tools, and the programmers who are responsible for generating ad hoc reports and data products use SAS. SAS is the tool of choice because of its ability to collect data from various sources and formats, to manipulate and store and analyze the data, and to easily generate a variety of reports and files. The SAO audit staff sometimes requires multiple years of data for their analysis. Therefore, the audit support staff is challenged with developing ways to extract the data from diverse external files. Limited computing resources and some SAS limitations (involving memory and workspace) add to the challenge.

At the SAO, SAS is used in both the mainframe and Windows environments. The audit support staff on the Information Systems Audit Team and the Information Systems Team use SAS on MVS mainframe platforms at the Texas Legislative Council, the State Comptroller's Office, and the Texas Education Agency. On those computers, we mostly use SAS in batch mode via TSO/ISPF. Unfortunately, none of these installations have licensed SAS' Integration Technologies, so we are presently unable to take advantage of the interoperability and information distribution that would be available using that SAS System component. Using DATA step programming, PROC SQL, and other SAS procedures, we extract various types of data from production database tables and extract data files. Often, we obtain data from various agencies on tape reels or cartridges, from which we retrieve the information using SAS. The data are extracted, combined, summarized, processed, and written out to flat files, and then they are downloaded via FTP to our PC/LAN environment, where the data files are imported into a data format which will be usable by the auditors (Excel, Access, or ACL). We also use SAS for Windows to do many

of the same kinds of things that we do on the mainframes, but using data that comes to us in a PC format. Systems analysts serving in the audit support teams need to be able to read a variety of file structures, and to be able to convert them into information that our auditors will find useful. ODBC is used to join many kinds of files. Sometimes our systems analysts construct samples for the auditors.

Whenever the audit plan calls for activities having similar objectives and scope, but to be carried out at different organizations, the systems analysts develop a methodology that will result in a standardized set of data products for each of the teams of auditors. Usually, the data pertain to accounts -- expenditures, revenues, encumbrances, budgets, vendor payments, fixed assets, inventory, claims, billings, costs, cash, payrolls, clients, suppliers, employees, or enrollments. Sometimes the scope of a data request is very specific and narrowly focused, and at other times the requests for queries or data analysis are more general. Since auditors generally want to perform their own analytical processing of the data, and using a software package other than SAS, requests for printed reports are less common than requests for special data files. Of course, the auditors would prefer to extract the data that they want themselves, and not have to rely upon the intervention of the systems analysts, but the complexity of the data sources frequently precludes this. A fairly large amount of time is spent providing consultation services to the auditors and to our management, helping them to understand the data that we provide.

SAS has been used at the SAO for comparing supposedly similar values appearing in different files, for identifying duplicate transactions in the same file, and for detecting gaps in document sequence numbers. We also use SAS to identify outliers, and to clarify trends, in the data. Using SAS, audit tools also have been created by the audit support programmers for identifying invalid social security numbers, for record matching of names and addresses using fuzzy logic, for detecting the presence of contrived numbers using Benford's Law, and for detecting the presence of an excessive quantity of rounded numbers.

Future Directions With SAS at the SAO

Systems analysts providing audit support continually look for new ways to use the SAS System to uncover errors and noncompliance. We attend and participate in SAS user conferences, and we monitor publications and online resources, looking for pertinent ideas. We are very interested in SAS Institute's future development of the SAS Enterprise Guide software. We envision an auditor-friendly interface that will provide transparent access to diverse kinds of data, and bring the power of the SAS System into the world in which auditors do their work. We are interested in using SAS in conjunction with non-SAS OLAP tools. And we are exploring the use of artificial neural networks and other data mining techniques, in the context of auditing.

Conclusion

The Texas State Auditor's Office uses elements of the SAS System to gather and analyze data as part of its auditing processes. All audit tools, including SAS, must fit into a complex and dynamic environment that includes many other resources. The teams of systems analysts which support our auditors use SAS as the primary tool for data extraction, data analysis, and fraud detection. The SAO continually seeks to make improvements in its audit tools and the way it uses them.

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