

Automated Audit Testing for SAP Data— Benefit or Just Another Black Box?

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Automated audit testing has been discussed for many years. Buzzwords such as “continuous auditing” and “continuous monitoring” arose and have been talked and theorized about. In particular, internal auditors and public accountants who have to cope with increasing requirements in testing and compliance regulation are searching for more intelligent and integrated methods of automating testing. However, while evaluating IT tools and ways of standardizing audit routines, questions may arise regarding whether automation is really the future or whether there is the risk of creating a “black box”: a tool that makes auditors lose certainty and trust in the results due to the uncertainty about how the results were generated. False positives—results that turn out not to be real findings—may even support this reluctance.

This article discusses ways to standardize data extraction and audit routines. It is written based on SAP data, but this is exemplary for all complex enterprise resource planning (ERP) systems. Furthermore, the article discusses how to handle increasing amounts of data and how to avoid creating a black box.

OVERVIEW OF THE ISSUE

The methods of digital data analysis are getting more and more important in the globalized world. The reasons are obvious:

- External requirements such as legal or compliance aspects require more transparency (100 percent of transactions), preferably in real time (immediately).
- Business processes are implemented on highly integrated and complex ERP systems such as SAP.
- Globalization and technological progress lead to the generation of mass data in day-to-day business. Having to deal with large data sets and a growing variety of audit questions makes time the most essential resource for auditors.
- Data extraction and data analyzing tools are getting more powerful.

Large companies or conglomerates usually have ERP systems, such as SAP or Oracle Financials, in place—at least for their most important legal entities that cover the essential part of the transaction volume. However, instead of hosting a clutter of systems, most companies tend to harmonize their IT landscape and move toward a more standardized and integrated system. It is important to note that the databases of ERP systems are standardized up to a point. This means that the core table and field names of the data, which are necessary for standardized automation, are the same worldwide. Hence, audit routines can be predefined and are then generally applicable—worldwide, cross company and, at least within the core processes, independently of the business areas of an enterprise. Therefore, the vendor master data within nearly any release version of the SAP system can always be found in the vendor master-general section table—independent of any parameters such as company, system and location, as long as it is a standard SAP system. However, for other data that cannot be located that easily, a profound understanding of the data and the underlying business processes is inevitable.

Furthermore, not only auditors, but various departments are facing more and more internal and external requirements that occur due to compliance issues, legal aspects and tax regulations, for example. Abnormal transactions have to be detected and reported immediately; legal aspects and tax regulations require reporting to be published/reported in faster cycles. This shows that time and mature technology are crucial factors to enable enterprises to meet these requirements.

In a globalized and computerized world, particularly well-established business processes such as purchase-to-payment (P2P) and order-to-cash (O2C) are creating more and more data every day.



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Analyzing that mass of data requires more powerful audit tools. Server solutions and continuous controls monitoring (CCM) tools were developed to meet these increasing requirements. For years, it has been shown that using audit software for substantive testing to provide total assurance or clear pinpointing of errors and fraud greatly increases the credibility and value provided by the audit function.¹ However, despite the fact that the software is getting more powerful and keeps up with the business situation, internal audit is challenged by this development. In a situation in which, in theory, 100 percent of all relevant transactions can be tested and a catalog full of audit questions is to be run against the data, time is of essential importance. Additionally, legal and compliance requirements are creating the need for enterprises to be aware of all information these huge quantities of data may contain.

OVERVIEW OF THE SOLUTION

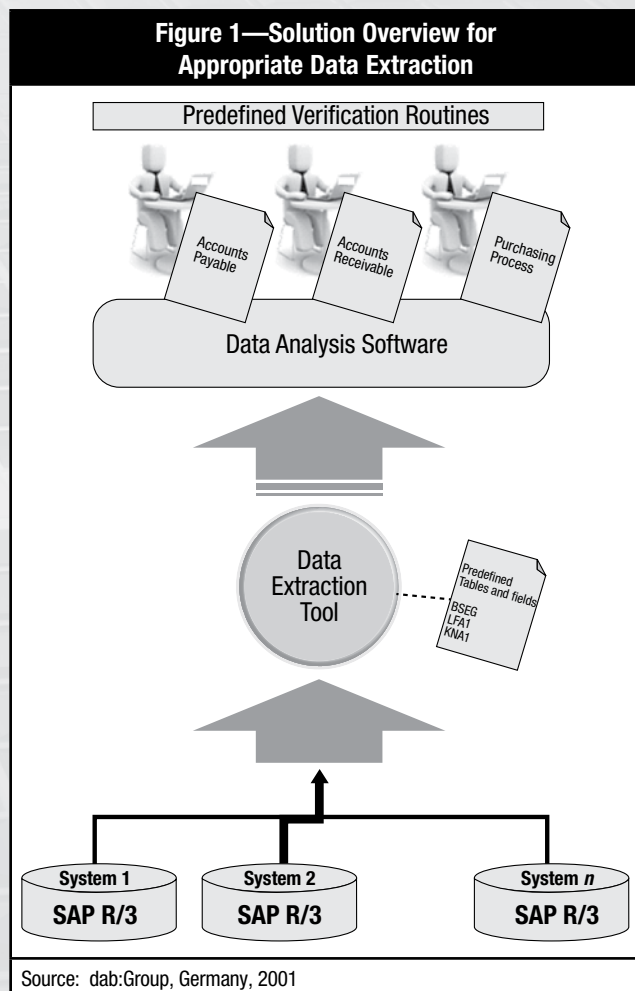
How does an enterprise cope with these challenges to facilitate and automate all required testing of 100 percent of a data population and meet the expectations of stakeholders regarding automated testing? Implementing an effective solution that will meet the demands needs to consider multiple issues including how to:

- Access the right data
- Analyze mass data without compromising the performance of productive systems
- Analyze data effectively and with a minimum number of false positives
- Avoid creating a black box

Basically, the solution consists of two main parts (see **figure 1**):

1. Extract the raw data from the database.
2. Analyze them on a separate machine with special auditing software by running predefined verification routines to cover the basic audit questions.

These two main aspects are explained in detail in the following subsections. The SAP system (or systems—larger enterprises usually have more than one) is visualized at the bottom of **figure 1**.



The relevant data that are in the SAP database need to be extracted from the system by a special data extraction tool. There are various data extraction tools available—the most

important points to consider will be discussed in the following section. The document depicted in **figure 1** represents a list of tables and fields that are necessary for a certain audit, so only the important data are extracted. Ideally, the extraction tool facilitates conversion of the extracted data into a format readable by the data analysis software used on the data. Therefore, no additional formatting or time-consuming import procedure has to be performed. Usually, there are several predefined tests implemented within the data analysis software that can be immediately performed on the data. They are standardized and cover the most important audit questions. Typical examples include searches for vendor master data duplicates, invoices not based on a purchase order (PO) and manual payments; analysis of one-time accounts; general ledger (GL) testing; and cash recovery aspects such as double-payments analysis.

Data Extraction

The approach to have data extracted from the system is subject to the assurance of the business continuity of the ERP system. If large and complex tests of the entire population of data were run directly on the SAP system (using reports, etc.), it would have considerable impact on system performance, which would impede business operations. When reports take too long to complete, they time out. Hence, having the data extracted to a separate machine, which can be a server or even just an auditor's laptop, is usually the better option. Instead of taking the risk of the issues mentioned, the separate computer can

do the heavy-duty part of the analysis without impacting the performance of the SAP system. The count and complexity of the tests executed do not matter. For example, executing five database-intensive reports on

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the SAP system would impact system performance five times. Downloading the data once and running 50 standardized, predefined audit routines will impact the system once during the download. Hence, “download once, analyze often” is the best practice in this situation. There are a few more things to consider when extracting data:

- **Transparency**—Most data extraction solutions need to have components installed on the SAP server. It is important that, whatever needs to be implemented, there is no complexity

and the instructions for implementation are clear and concise. The layout should be transparent enough to keep IT effort to a minimum. There should be minimal need for testing and evaluation of additional components in the system because the potential impact of data extraction on the ERP system needs to be carefully considered.

- **Read-only access**—On the client side, any user who needs access to the data must have the authorization only to read data. This is important because, during data extraction, data in the system must not be accidentally changed.
- **Reliability**—The reliability of the source and content of information is crucial—not only in traditional auditing, but also in computer-aided auditing techniques.² The reliability of the data is one of the most crucial aspects in data analysis. If the enterprise cannot rely on the extracted data, every subsequent step is useless. Without assurance regarding completeness, validity and accuracy, every interpretation of data is guesswork at best. For example, there are data extracted from a GL that originally contained 100 data sets, but only 96 data sets have been extracted. If the data are profiled, the range of entries is between 100,000 and 500,000, but one of the four missing data sets may indicate an entry with an amount of 800,000. This would make every query based on this information worthless, particularly with regard to materiality aspects. An audit issue regarding an amount of 200,000 would make up 40 percent in the first case and 25 percent in the second. Therefore, one of the important aspects when considering a data extraction tool is to have documentation of the data extraction process to be able to check for completeness, validity and accuracy later.
- **Independency and usability**—Data access is an important element for audits. If there is a delay of several weeks before data are delivered, a time problem may result that impacts the audit plan. The risk of receiving (accidentally or intentionally) manipulated data is another issue. Both of these points can be solved by equipping auditors (or a special team within the internal audit department) with data extraction tools for extracting the data on their own while considering the necessity of the adjustment in the system for read-only access. Easy-to-use tools with a graphical user interface (GUI) that allow a user-friendly practice, even for financial or operative auditors, are key to growing acceptance for data extraction solutions.

• **Mass data capability**—As outlined previously, the database in the SAP system can contain huge amounts of data. For audit purposes, the GL tables accounting document header and accounting document segment or the change log tables change document header/change document items, where millions of changes are recorded, are very important. The tables accounting document header and accounting document segment contain all the financial documents, and the change log tables record a variety of events such as the removal of payment blocks, vendor master data changes, credit limit updates and price changes in sales documents. For conglomerates, it is not unusual for these tables to reach a count of almost one billion records, resulting in file sizes of several hundred gigabytes of data. The extraction tool must be able to cope with these volumes of data without causing timeouts or overly impacting the SAP system.

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Data Analysis With Analyzing Tools and Predefined Tests

Designated data analysis software usually allows programming/scripting and coding to create user-defined tests. The scripting language, in combination with the globally standardized table and field names of an SAP installation, allows for standardizing audit

tests. This means that once the data have been extracted, these tests can be performed automatically and without manual effort.

The essentials of data analysis and testing include:

1. Interesting subject matters for auditing—how to gather audit evidence
2. The benefits of using predefined audit routines
3. The challenges that an audit department could face when running standard tests

Interesting Subject Matters

Since the most important business processes are usually mapped to the SAP system, a variety of audit subject matters can be analyzed. Defining and identifying the appropriate subject matter are crucial for both automating the process and reading the results. Subject matters that are fairly definable and measurable facilitate automated audit testing. Audit

questions depend on the focus of each audit, but also on the audit department in general. Some standard tests, grouped by topic, include:

- **Cash recovery aspects**—Double payments, discount losses, open items analyses
- **Fraud analyses**—Payments to vendors or banks located in a tax haven, payments to alternate payees, pattern analysis of business partners, bank account changes
- **Master data tests**—Customer or data duplicates, missing tax IDs, incorrect master data
- **Checks for identifying process weaknesses**—Manual payments or invoices not based on POs

Benefits

A standardized approach can have valuable benefits. In every audit, the basic questions can be answered almost at the push of a button, providing a lot of advantages, such as:

- Standardized, reliable algorithms based on years of auditor experience
- Auditor experience transferred to technical know-how
- Documented know-how in a structured form
- Opportunity to generate key performance indicators (KPIs)
- Support for creating the audit plan, obtaining transparency about audit items
- Obtaining reliable results quickly

The audit routines always use the same algorithm, so the results are comparable. On the other hand, when doing the testing manually, two auditors may be doing the same test correctly, but in a slightly different manner (e.g., one may include intercompany transactions while the other does not), so the results are not comparable. With standardized testing routines, they always are. The audit routines can also provide a basic set of KPIs that immediately give an overview of a certain topic—for example, all company codes. Therefore, the KPIs that are generated can be used for creating the audit plan, assigning the resources to audits of business units in which the risk may be higher than in others according to the indicators. Even audits that require travelling can now be prepared beforehand. Traditionally, auditors travel, sometimes to another country, to visit the legal entity; request the data from the IS department onsite; wait for the data; and import them manually into the auditing software. It can often be one or two weeks before the auditors are finally able to have a detailed look at the situation. Things can now be sped up considerably. The data can be downloaded in advance, the

planned audit steps can be performed and the results can be examined before even leaving corporate headquarters. This allows for in-depth interview preparation.

Challenges

Using predefined audit tests in combination with a data extraction tool offers a lot of advantages. As with any new approach, using predefined tests can also bring challenges, such as:

- Technical issues related to the data extraction tool
- False positives within the predefined audit routines
- User acceptance

Technical challenges exist, but they are usually not insurmountable. The data extraction software has to be installed on the SAP system and on the auditor's laptop or other client systems. Regarding the server components, the software has to go through the whole cycle of test systems and quality assurance systems before it can be used on the productive system. Moreover, the user profiles have to be adjusted for the users that are designated to perform the data extraction.

In the analysis of the data by the predefined audit routines, false positives are usually an issue. There is one simple rule: The more exact the company's policies and guidelines are, the fewer false positives are expected. For example, if the guideline for master data states only that the telephone numbers have to contain country codes, then the numbers 0049 999 111 22, +49 (0) 999 111-22 and +49 (999) 11122 will all be correct, but hard to test in a standardized way. If the format has to be +CC (PREDIAL) NUMBERWITHOUTBLANKS, only the third option is correct, and a test will be easy to implement with a restrictive algorithm that is unlikely to create a lot of false positives. Other examples include the analysis of invoices without POs. There are companies in which 100 percent of the nonintercompany invoices have to be based on POs. This is easy to test: Any nonintercompany invoice not referring to a PO is a violation. However, if there are 25 exceptions in the definition, it becomes a lot more difficult to test.

The huge number of results due to false positives is one of the challenges for growing user acceptance. However, most auditors without an IT background have a great degree of difficulty in integrating data analytic skills with their

professional knowledge in auditing. This limitation greatly impairs the auditor's ability to independently and continuously perform and understand data analytic semantics—and, even more, the results.³ In the future, auditors must develop a mix of capabilities, competencies and experience levels, with one of the most essential capabilities being the ability to conduct data analysis.⁴ Proper training and the perspective of the work becoming easier in the long run—leaving more time for

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testing new audit methods for shifting from a traditional internal audit to a risk-centric model—can help auditors alter their mindset to meet the requirements of the future.⁵ If the IT auditors are assigned to the automation of the process and the finance auditors are

designated to just use the results, an appropriate interaction and communication between both teams is necessary for avoiding the black box effect.

CONCLUSION

In automated auditing projects for companies and audit departments of any size, the following elements are key to success:

- Extracting the raw data
- Avoiding a black box by well-defined analysis, appropriate training and good communication
- Maintaining flexibility and avoiding a purely check-list audit
- Considering server-supporting analyzing solutions because they may be the future for mass data

Without a proper data extraction tool, setting up standardized and well-defined audit routines is almost impossible. Data of any size must be extracted from the systems, and they must always be in the same format so that audit routines can be based on these data structures.

For the audit department and the auditors, as users of the solutions, digital data analysis has to be a time-saving solution and a solution that creates results that the auditors trust. Clear, to-the-point documentation of the audit steps, in combination with training on each important topic (SAP tables and fields, business process aspects, software tools), is extremely important to avoid the black box effect.

Continuously integrating experiences into the process also helps to fine-tune the analysis and, therefore, may decrease the number of results. Having a team of people with a mixed and balanced distribution of business process and IT backgrounds also facilitates avoiding black box effects.

Moreover, the predefined routines and the results are elementary for the auditors' fieldwork. Their flexibility to bring their own creativity is crucial. Digital data analysis is not intended to be a fully automated report generator; it is a way to fully automate the preparation of the base for their actual work in a reliable, fast and transparent way.

The quantity of data nowadays is huge. Unquestionably, it will increase more and more through the years. Digital data analysis and dealing with data in a structured, logic and effective way is the future. The sooner the first steps are made, the more future-proof the profession of internal audit will become.

ENDNOTES

- ¹ Sayana, S. Anantha; "Using CAATs to Support IS Audit," *Information Systems Control Journal*, vol. 1, 2003
- ² See the International Accounting Standards Board (IASB) International Accounting Standard (IAS) 330 and ISACA's IT Audit and Assurance Standards, Guidelines, and Tools and Techniques, www.isaca.org/standards.
- ³ Li, Shing-Han; Shi-Ming Huang; Yueh-Chiao G.Lin; "Developing a Continuous Auditing Assistance System Based on Information Process Models," *Journal of Computer Information Systems*, fall 2007
- ⁴ PricewaterhouseCoopers LLP, "Internal Audit 2012: A Study Examining the Future of Internal Auditing and the Potential Decline of a Controls-centric Approach," USA, 2007
- ⁵ *Ibid.*