Changing Data into Knowledge

dab:Whitepaper

SAP® Change Tables: How to reveal hidden information

Table of Contents

In the Depth of an SAP® System – Digital Data Analyses Based on SAP® Change Tables

Stefan Wenig

1 Introduction

Digital data analyzes are getting more and more in the spotlight. The quantity of data that is stored in the companies' IT-systems is growing steadily - just as steadily as the external (legal) and internal requirements (business excellence aspects) for audit departments are increasing. Also the software tools for data analysis and extraction, manual audits or even establishing continuous controls monitoring are becoming more and more powerful and therefore interesting for financial controls in general.

The following article will provide an insight into the usage of SAP® change tables for doing audits effectively and efficiently.

As it is about digital data analysis, special software is required and taken as given in this essay. By quoting real-life examples technical details will be illustrated.

2 Why “Change Tables”?

There is a lot of exciting information hidden in a SAP® system. One-time-accounts, Manual Payments, Invoices without PO, Discount Losses, Overdue Open Items, Duplicate Payments or violations of Segregation of Duties and so forth. These secrets are hidden in a variety of tables and it includes a deep knowledge of the table structure to discover or uncover them. Because of their size and complexity, the focus for data analysis was rarely on change tables up to now, although they can answer plenty of interesting questions.

They are amazing sources of information just because of their size and their content. As they are part of the logging function, a variety of aspects across different business processes is recorded.

For instance the following topics can be found in change tables:

- A vendor name which was changed from “Mr. John Doe” to “Big Company LLC” or vice versa
- Frequent bank account changes for certain vendors
- Unblocking a vendor, then adding a new PO item and blocking the vendor again afterwards
- Re-opening an already closed and deleted purchase order
- The change of a price for a material in a purchase order from 50.000 Euro to 49.999 Euro just below the existing authorization limit
- The removal of a posting text that pointed out a “special situation”
- The fact that the credit limit of a customer was raised 20 times within one year

These are just a few examples for cases, which are logged in the change tables.

Because of the wide range of aspects which are hidden in change tables, also the questions which can be answered by using these tables are various plus the concrete results you are looking for.

Usually the facts are to the point, as the changes are recorded very accurate by SAP® as following examples will show.

Like stated they were not used in the past to that extent they should be used for analysis. The obvious reason for that was and is the size of the tables, the pure number of change records clearly was a problem.
With efficiently working tools for data extraction that are available this table can be fully approached and analyzed now.

3 SAP® Change Tables in detail

This whitepaper will provide a more detailed look on SAP® Change Tables. Starting with the fundamentals followed by the data model in general we will examine the structure and most important content as well.

3.1 Fundamentals

First we have to identify the SAP tables where the change information is stored. We will use the term "Change Documents", so lets first talk about that expression.

A user could (and will in day-to-day work) change more than just one detail in one go – especially as the term "change" in this context means not only changed single field values, but also new ones, e.g a complete new vendor or a complete new address. If a vendor address changed, then the street, city and postal code are changed on one SAP© screen, in one go. Imagine this as printed out document it would look like the following:

Change document no. **0000100000,** created on **January 2, 2011** by user **JDOE**.
SAP® transaction code was **XK02** for vendor number **123456**

Change item no.	*Changed detail*	*New value*	*Old value*
0000100000-1	Street	Greenfield 12	Towncenter 44
0000100000-2	Postal Code	44412	91221
0000100000-3	City	Munich	New York

Figure 1: The Term "Change Document"

The data in the grey area are valid for each single change item, as it was made in one transaction. The change of the street is just like the replacement of the postal code and the city conducted by SAP® user JDOE on January 2, 2011 with SAP® transaction code XK02. Data that are valid for the whole document (grey section) are called *header data*, the details – there can just be one change, or up to many changes within one document – are called *item data*.

To avoid redundancies, SAP® in fact records the changes not only in one but a pair of tables. These two tables are called CDHDR (Change Document Header) and CDPOS (Change Document Items). Applied to our example above this means there is one entry in CDHDR containing change number, date, user, transaction code and vendor number. Additionally we will see for that example exactly three entries in item table CDPOS: One for each change detail with old and new values for street, postal code and city.

From a database point of view there is a one-to-many (1:n) relationship between CDHDR and CDPOS.

The following figures are based on data, which is displayed with the data analyzing software ACL™. Due to readability only data and not analysis software is displayed. Furthermore, not every field of the original table is displayed – the screenshots are limited to the most important fields for the examples in this article. The screenshot shows four different change documents, all entered by the same user on the 10th of November 1994 at around 3 p.m. using SAP transaction code FBL2.

Object class	Document change number	Object value	User name of the person responsible in change document	Creation date of the change document	Time changed	Transaction in which a change was made
BELEG	0000004455	090100001000000001994	HILLEBRAND	10.11.1994	151957	FBL2
BELEG	0000004472	090100001000000001994	HILLEBRAND	10.11.1994	152400	FBL2
BELEG	0000004456	090100001000000011994	HILLEBRAND	10.11.1994	152023	FBL2
BELEG	0000004473	090100001000000011994	HILLEBRAND	10.11.1994	152440	FBL2

Figure 2: CDHDR – Change Document Headers

The most important fields of the table CDHDR in the context of this article are *object class*, *document change number*, *object value*, the *user* who changed the document, *creation date* of the change document as well as *time* changed and the SAP® transaction which was used to conduct the change. The following table contains a short explanation including technical field names.

Technical Field Name	Designation	Description
OBJECTCLAS	Object class	The object class categorizes the type of object, which was changed.
CHANGENR	Document change number	Each change has a unique number assigned to which allows to identify the change.
OBJECTID	Object value	Contains the changed object (e.g. a vendor number, a document number…)
USERNAME	User name of the person responsible in the change document	User id of the person, who conducted the change in the SAP® system
UDATE	Creation date of the change document	The date on which the change was stored (conducted) in the system.
UTIME	Time changed	The exact point in time at which the change took place in the format hhmmss.
TCODE	Transaction in which a change was made	The SAP® transaction code which was used to conduct the change

Table 1: Excerpt of the Fields of CDHDR

The field list above is altogether quite self-explanatory, at least user name, SAP® transaction code as well as creation date and time where the change took place. Yet two of the fields may need an additional explanation. Those are the fields object class and object value.

The object class can be very helpful. As change tables store changes in general, the content they hold is created dynamically. They have to be able to record changes of the document date in accounting documents as well as changes of master data, which are different categories of data. The object class indicates to which category the change belongs to.

Thus the object class “BELEG” represents for instance all changes in accounting documents. If the vendor master data are changed, the related object class won’t be “BELEG”, but “KRED”. This way, the category of a change can be identified. There are numerous object classes – in this article only the two mentioned ones will be focused on. The object class values are standardized and not SAP® version or language dependent.

The second field is object value. The use of this field is also not complicated, though it might seem so at first glance.

The object value contains the concrete item of change. This might, depending on the type of change, for example be an accounting document number, a vendor or a customer number.
In figure 3 an accounting number is shown. There cannot be a for example a vendor number at this point and in this constellation, as the object class is “BELEG”, which is the category for financial documents and not for vendor master data.Thus the object class forms a logical constraint for the content of the object value (considered from a logical point of view, influencing the data accordingly).

After describing the structure of the change document header in CDHDR, we now examine the fields of the change document items in the line item table CDPOS.

Object class	Document change number	Table Name	Changed table record key	Field Name	New contents of changed field	Old contents of changed field
BELEG	0000004455	BKPF	09010000100000001994	AEDAT	19941110	00000000
BELEG	0000004455	BKPF	09010000100000001994	XBLNR	73567/94	
BELEG	0000004472	BKPF	09010000100000001994	XBLNR	11567/94	73567/94
BELEG	0000004472	BSEG	090100001000000001994002	ZUONR	11567/94	
BELEG	0000004456	BKPF	09010000100000011994	AEDAT	19941110	00000000
BELEG	0000004456	BKPF	09010000100000011994	XBLNR	73884/94	

Figure 3: CDPOS – Change Document Items

Its immediately clear that some of the fields are redundant, as for example the object class and the change document number. But there are also important fields in there we need for answering our audit questions. It is the table name and the field name of the content that was changed, plus the record key of the changed value. Last but not least, the old and new content of the field are stated.

Technical Field Name	Designation	Description
OBJECTCLAS	Object class	The object class categorizes the type of object, which was changed.
CHANGENR	Document change number	Each change has a unique number assigned to which allows to identify the change.
TABNAME	Table name	Changes are recorded in the whole SAP®. This field displays the concrete SAP® table, where a change takes place.
TABKEY	Changed table record key	
FNAME	Field name	The field contains the content, which was changed in the table (field „TABNAME“).
VALUE_NEW	New contents of changed field	New content of the field (the value, which replaces the previous one).
VALUE_OLD	Old contents of changed field	Old content of the field (the value, which was replaced).

Table 2: Excerpt of the Fields of CDPOS

In CDPOS, most fields again are quite self-explanatory. The object class and the document number are stored redundantly to CDHDR, as they serve as key fields for both tables. Old and new value contain the previous and the current value, depending from the change which was conducted. It will be a date, if a date field is changed or a number, if a numeric field was changed or as well a text, if a text field is changed.

The table name and field name information however is new and important and needs a more detailed explanation.

This again shows how important it is to know a standard set of SAP® tables and fields. With that know-how, you can focus on changes that are relevant for your current audit question. Knowing what you are interested in, then identifying the place where that information is stored (= the table and field name) and then using the change tables to identify all such cases.

Let us take a look at a standard financial posting in SAP®. Figure 4 shows a vendor invoice, displayed in the SAP Financials Module with the standard SAP transaction code FB03.

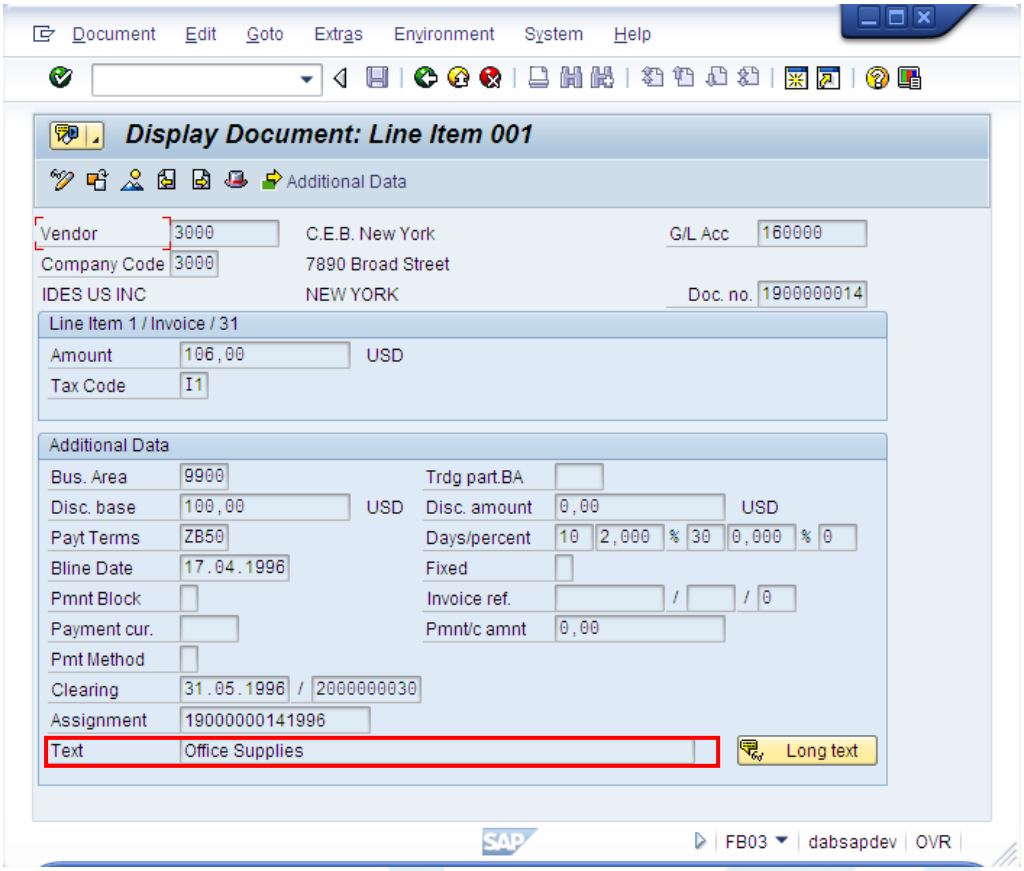


Figure 4: Screenshot – SAP® R/3 Financial Document containing posting item text

As shown above every posting contains posting text. We take this as area of interest to identify all financial documents where the posting text was changed at least one time.

To determine this we first use the SAP® built-in-methods (left-click in the field containing the posting text, then press F1, then hit button “Technical Information”) to identify the underlying table and field, shown in figure 5.

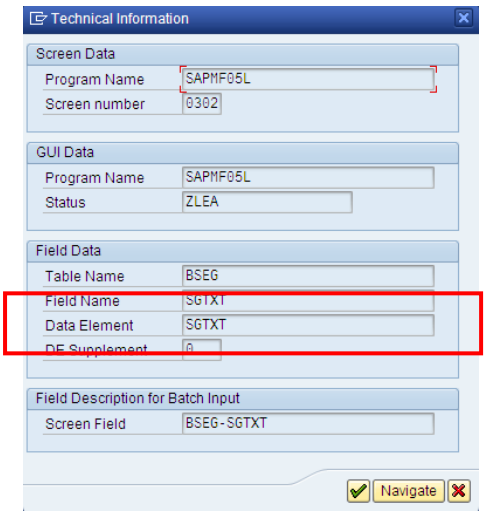
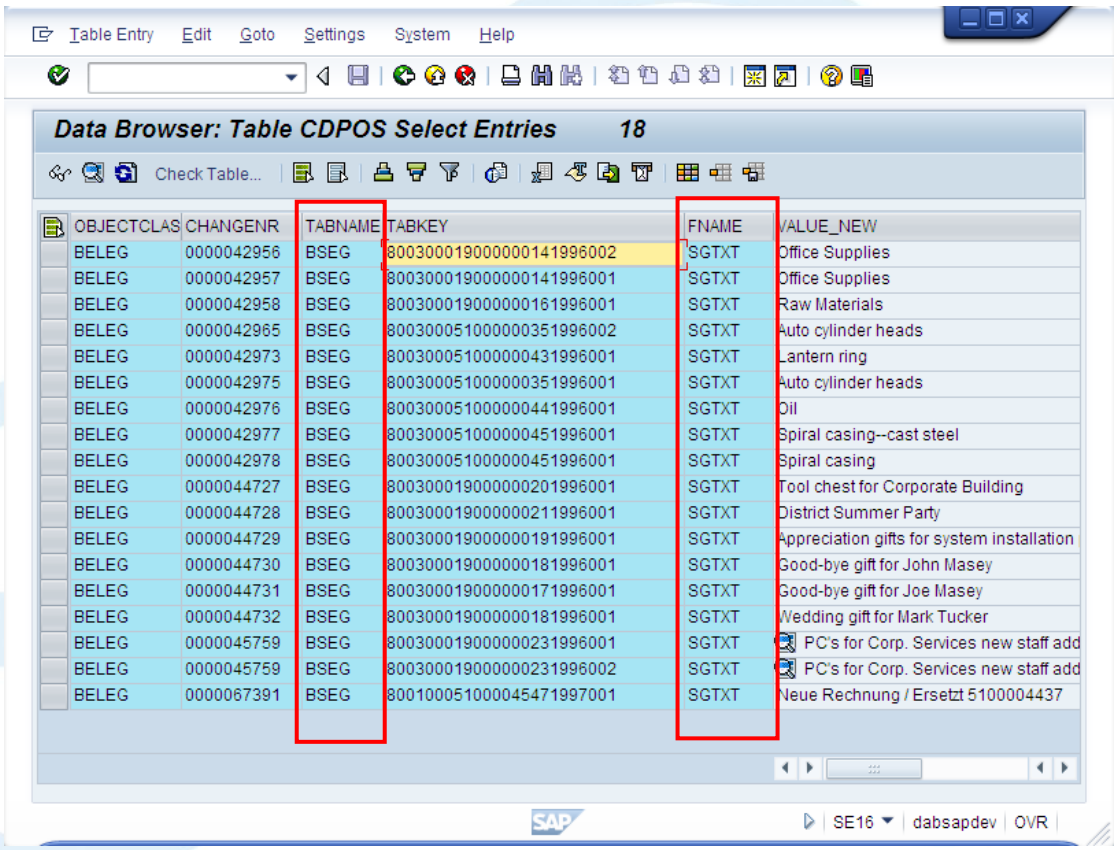


Figure 5: Screen – Finding out about table and field name in SAP® R/3

Using this information about table and field name we can have a look at our change tables to identify all postings where the text was changed at least once. This can be done by filtering table CDPOS for all records where TABNAME (Table Name) = “BSEG” AND FNAME (Field Name) = “SGTXT”. Doing this in SAP® lists the following change table entries (figure 6):



OBJECTCLAS	CHANGENR	TABNAME	TABKEY	FNAME	VALUE_NEW
BELEG	0000042956	BSEG	800300019000000141996002	SGTXT	Office Supplies
BELEG	0000042957	BSEG	800300019000000141996001	SGTXT	Office Supplies
BELEG	0000042958	BSEG	800300019000000161996001	SGTXT	Raw Materials
BELEG	0000042965	BSEG	800300051000000351996002	SGTXT	Auto cylinder heads
BELEG	0000042973	BSEG	800300051000000431996001	SGTXT	Lantern ring
BELEG	0000042975	BSEG	800300051000000351996001	SGTXT	Auto cylinder heads
BELEG	0000042976	BSEG	800300051000000441996001	SGTXT	Oil
BELEG	0000042977	BSEG	800300051000000451996001	SGTXT	Spiral casing--cast steel
BELEG	0000042978	BSEG	800300051000000451996001	SGTXT	Spiral casing
BELEG	0000044727	BSEG	800300019000000201996001	SGTXT	Tool chest for Corporate Building
BELEG	0000044728	BSEG	800300019000000211996001	SGTXT	District Summer Party
BELEG	0000044729	BSEG	800300019000000191996001	SGTXT	Appreciation gifts for system installation
BELEG	0000044730	BSEG	800300019000000181996001	SGTXT	Good-bye gift for John Masey
BELEG	0000044731	BSEG	800300019000000171996001	SGTXT	Good-bye gift for Joe Masey
BELEG	0000044732	BSEG	800300019000000181996001	SGTXT	Wedding gift for Mark Tucker
BELEG	0000045759	BSEG	800300019000000231996001	SGTXT	PC's for Corp. Services new staff add
BELEG	0000045759	BSEG	800300019000000231996002	SGTXT	PC's for Corp. Services new staff add
BELEG	0000067391	BSEG	800100051000045471997001	SGTXT	Neue Rechnung / Ersetzt 5100004437

Figure 6: Screen – Image of Table CDPOS in SAP® R/3

Again it is obvious how important the table name and field names are. It is the information about where the changed content originally is stored in and connects the entries of the change tables to the content of interest (vendor master data, financial documents, purchase orders) and its location within the database.

After looking at the fields TABNAME and FNAME in CDPOS, only one last field has to be examined – the “Changed table record key” (TABKEY). This contains the identifier of the concrete element which was changed, which is indicated by the object class as explained above. The changed table record key helps to link back to the original SAP® table in which the changes were performed. For vendor master data changes for example it contains the vendor number, for customer master data changes the customer number, the purchase order number for PO changes. In our example it consists of the document number information of the changed FI document.

3.2 Further examples

The in-depth look provides a detailed insight into the topic of SAP® Change Tables. Of course this is just the starting point for data analysis. From this level on, dozens of questions can be analyzed and answered using this technique.

Obviously a good analyze would not only list all records where changes appeared; it would also list the total number of changes per vendor, purchase order or financial document as well as trying to include the values if amounts are involved etc.

The following three examples should outline what aspects behind a simple question could be analyzed using the Change tables:

3.2.1 Vendor name changes

For all business processes, proper master data is an absolute must. When dealing with vendors the vendor master data (name, address, bank account, and payment method) should be valid and stable. From a data quality or even fraud detection perspective it is interesting to look at vendor master data that was changed frequently.

- How often is vendor master data changed per vendor?
- Were critical fields involved in those frequent changes, e.g. Bank Account Data or Alternative Payee?
- Though SAP® provides One-Time-Account functionality, are vendor master records misused as one-time-accounts without properly flagging them?

3.2.2 Customer credit limit changes

In days of the credit crunch and financial crisis it is important to look at the risks in Sales & Distribution. The change tables can be used perfectly to look at the customer's history. They contain the date the credit limit was changed, the old value of the limit and the new value. So the following questions can be answered:

- How often was the credit limit changed per customer?
- What is the absolute delta between the first and the last change that was recorded?
- How many time is in between the changes, are they very frequently or each and every x-months?
- Are the changes followed by an immediate sales order with an appropriate amount?

3.2.3 Re-Animated purchase orders

Once a purchase order is issued to a vendor and delivered, it should be set to “fully delivered & fully invoiced” and/or set to delete. Sometimes the purchase order value is higher than the invoice was, leaving some non-invoiced amount left on that closed purchase order. Yet it could be the case that such a purchase order is re-animated again, means the block or fully-delivered / fully-invoiced flag is removed and it is used again.

- Which purchase order line items were unblocked?
- Where, on which vendor accounts are the fully-invoiced / fully-delivered flag erased and later on set again, maybe more than one time in the history of those vendors?
- Are the changes followed by an incoming invoice?

4 Conclusion

It's the intention of this article to point out the advantages of digital data analysis. Data, which are stored in SAP® tables and especially change tables, turn out to be a real gold mine for every analyst or auditor.

Standard SAP® reports only look at the "as-is" state of documents, e.g. the current payment term, the current bank account. But the change tables hold the complete history of master data and business documents. Accessing that history is a huge advantage, as it provides level of information that was not possible beforehand.

This meets the trend that nowadays it's inevitable to analyze huge amounts of data, which are produced in a company's SAP® system.

In a world of daily raising digital data this is the only way to ensure quality, effectiveness and efficiency of analysis and audits from a data point of view. There are tools to extract the data without harming the systems performance, and there are tools to analyze the data in an intelligent way. These tables are currently just too big to be performed directly on an operative SAP® system, because of system time-outs or influencing the daily operating business.

So data analysis on the one hand requires appropriate audit tools (data extraction software plus data analytics tools), and on the other hand it will still be just a tool. We need for an effective, efficient and qualitative data analysis three areas of knowledge which have to be combined: ***SAP® know-how*** about the business processes how they are build up in the system as well as the structure of tables and fields, secondly the ***business know-how***, knowing how the processes should be organized and last but not least the ***competent handling of data analytics software***, transferring the shortcomings of business processes into meaningful, analytical algorithm.

In other words the content is as important as the tool itself. Establishing specialists and a suitable software environment including the content seems to be a challenge in a lot of cases – but it's a must-have for every forward-looking company.

About the dab:Group

The dab:Group, founded in 2004, delivers top-end data analytic solutions for SAP® customers.

Combining business knowledge with analytic expertise and detailed SAP® technical know-how has made the dab:Group one of the preferred partners of large organizations across the globe.

Building on this experience dab:Group has developed a complete set of proven solutions that enable its customers to convert data into the knowledge they need to run their day to day operations.

For more info please visit www.dab-europe.com

Need more details? Want to know how we can help you with your current challenges?
Feel free to contact us using the coordinates below:

dab:GmbH
Edlmairstrasse 9
94469 Deggendorf
Germany

Phone: +49 (0)991-991 358 0
info@dab-gmbh.de
www.dab-gmbh.de

dab:Europe
Interleuvenlaan 62
3001 Heverlee
Belgium

Phone: +32 (0)16-39 78 36
info@dab-europe.com
www.dab-europe.com