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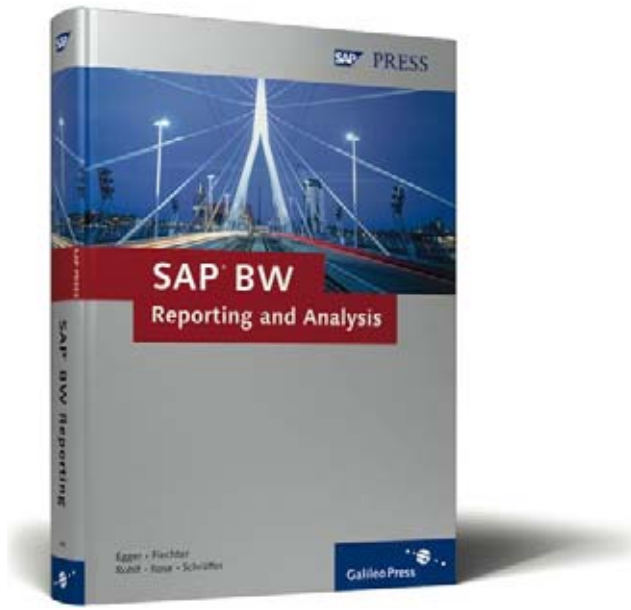
Jens Rohlf, Jörg Rose, Oliver Schrüffer

SAP BW Reporting and Analysis



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Contents

4 The SAP Business Explorer Query Designer

Queries are the core of the reporting and analysis functionality in SAP BW. They provide a flexible and intuitive platform for data analysis that can be developed using the SAP Business Explorer (BEx) Query Designer. The following chapter will present all essential functionalities of an SAP BW query, as well as the corresponding design tools.

4.1 Data Analysis with SAP Business Information Warehouse—The Query Concept

Business intelligence tools are intended to support users in understanding the enterprise performance and to help users make appropriate decisions based on their understanding. One critical aspect here that you should note is the need to give all users an equal insight into the enterprise—an insight based on consistent data and standard analytical definitions. For consistent enterprise control, a unified view of information for all users is indispensable.

On the one hand, this is achieved by the SAP Business Information Warehouse (SAP BW) functionality for extraction and data warehousing via a consistent data basis. Conversely, queries can provide a unified and flexible analysis platform according to the *Single Point of Truth* concept. This means that within an enterprise, a piece of information (or a dataset) exists once as a reference and cannot be falsified by locally changed variants.

Essentially, a query is a database research action with interesting additional functionality like currency scenarios, complex calculation options, and analysis functions. However, analyses born out of queries can be applied flexibly to a multitude of areas in a multidimensional dataset of an SAP BW InfoProvider. This is enabled by combining analytical functionality with the provided drilldowns and filter options. Therefore, one query or few queries can often map an entire analytical application.

Within this chapter, all essential functionalities of an SAP BW query and the associated design tool are introduced, both in terms of their conceptual design and in examples that increasingly build on each other. The

examples are analysis solutions for the data model that was already developed in the first two volumes of the SAP BW Library.[1]

4.1.1 Functional Overview of the BEx Query Designer

The Query Designer is a standalone tool that—to a great extent—can be handled intuitively. A look at the Query Designer's user interface helps to illustrate its functionality.

First Steps in the Query Designer

Open the Query Designer

Therefore, the first practical step should be to open the Query Designer in order to gain a quick overview of its different areas.

- You can start the Query Designer directly from the Windows program menu via **Business Explorer · Query Designer** (see Figure 4.1, Step 1).
- In the logon dialog, log onto your system (Step 2).
- Start by creating a query on the MultiProvider ZECOPAM1 Profitability Analysis (actual & plan data) (Steps 3 and 4).

The **Open** dialog (Step 4) allows you to display objects according to different perspectives. These can be recently opened objects, favorites, roles or InfoAreas. InfoAreas form the global folder structure, which is technically stored in the system. Additionally, roles and favorites can map individual folder structures.

Areas of the Query Designer

The Query Designer interface is divided into three main areas that are described in detail in the following sections:

- Available elements of the InfoProvider (see Figure 4.2, 1)
- Query definition (2)
- Toolbar (3)

1 See Chapter 3, *Sample Scenario*, and Appendix H, The *SAP BW Library*.

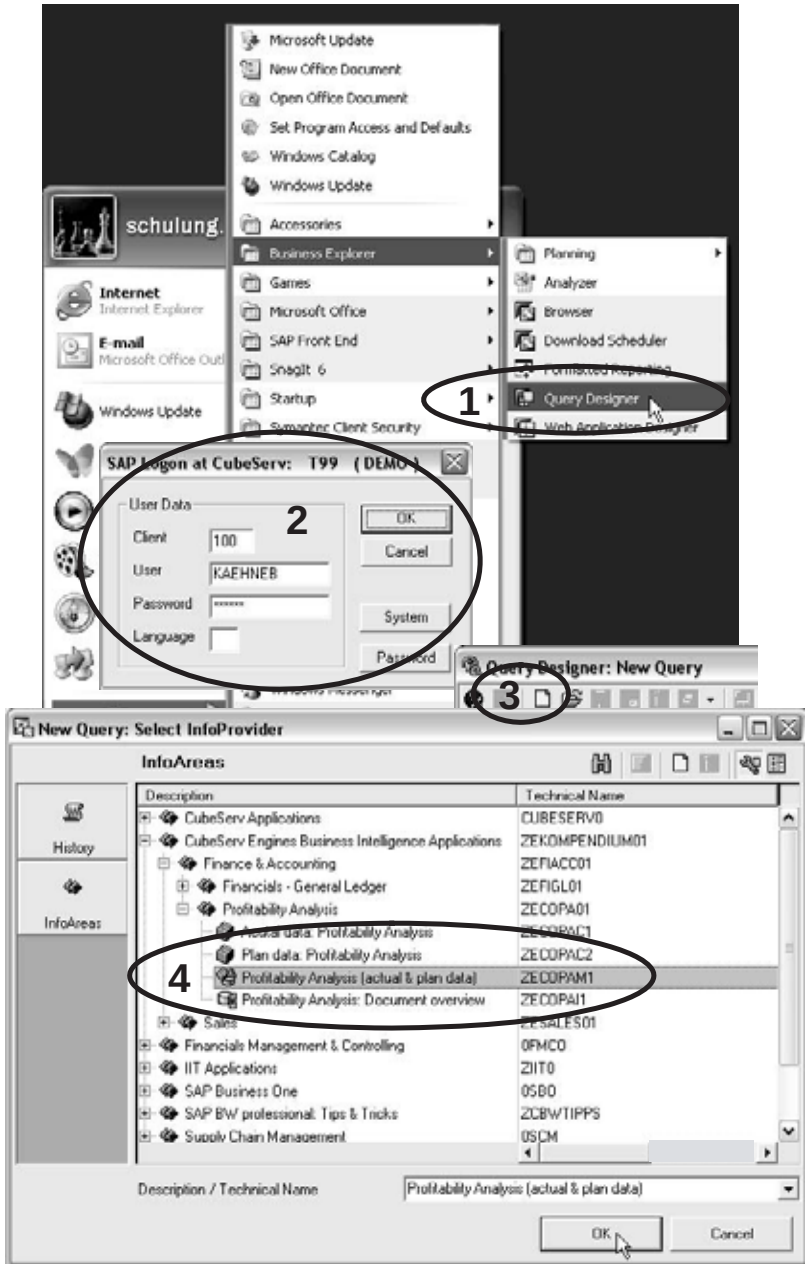


Figure 4.1 Opening the Query Designer with a New Query

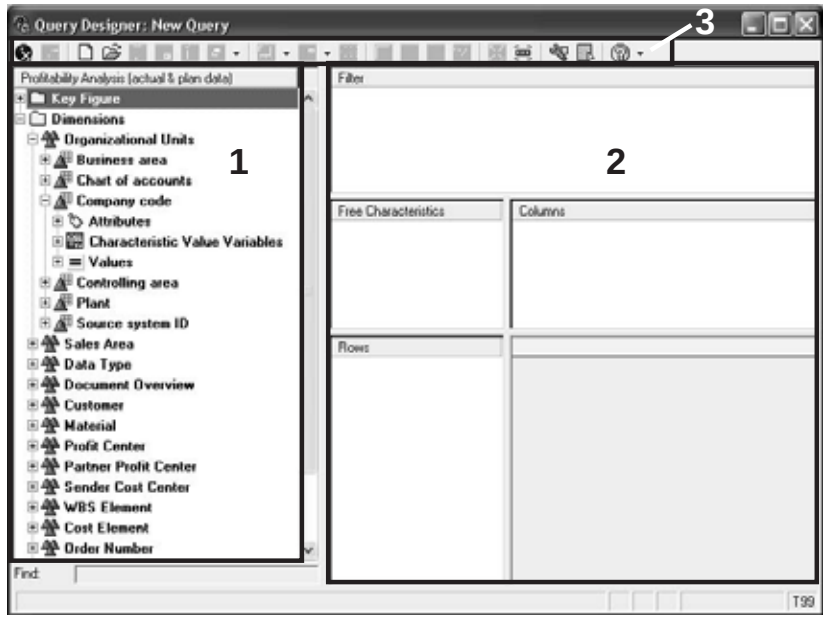


Figure 4.2 Areas of the Query Designer

From the available elements of the InfoProvider, you can create most parts of the query definition by simply using Drag&Drop. All other functions are provided via the toolbar and the context menu (which is called using the right mouse button). The standard functions of the context menu are highlighted in bold and can be executed by double-clicking.

Available elements of the InfoProvider

All characteristics, navigation attributes, and key figures of the InfoProvider are available for the query definition.

- *Characteristics* and *navigation attributes* include the master data (e.g., company codes, material).

Excursus

The essential difference between using a characteristic and using a navigation attribute is the modeling of time dependency. *Characteristic values* remain in the database and cannot be changed (frozen history). *Navigation attributes* are a master data attribute of such a characteristic (e.g., product hierarchy of the material). These attributes can be updated irrespective of the InfoProvider's transaction data and can also be presented in a time-dependent manner (rewrite history). Details can be found in Volume 1 of the SAP BW Library.[2]

2 Egger, Fiechter, Rohlf 2005.

- *Key figures* usually store value or quantity information. If global query elements have been created for the InfoProvider—for example, calculated or restricted key figures or structures—they can be included in the query definition as well.

Global query elements are those elements of data selection and calculation that are valid for the entire InfoProvider and simultaneously do not physically exist in the InfoProvider, but are determined only during the runtime of the OLAP processor.

The available characteristics are arranged in a hierarchical structure according to the dimensions of the InfoProvider. The available characteristic values and variables are then displayed beneath a characteristic.

Areas of the Query Definition and the target elements

The query definition contains the following areas:

- **Rows and Columns**
  You can specify the details or granularity to be used for the first call of the query. If characteristics are entered here, they are presented in the report as dynamic drilldown. All characteristic values that exist as data in the InfoProvider and that are relevant to the current data selection are displayed.

  You can also define fixed drilldowns in the form of structures. In this context, a separate data selection or formula can be defined for every structure element.

- **Free Characteristics**
  You can specify characteristics that will be available during the query navigation for filtering and as drilldown. These characteristics are not displayed as drilldown when the query is called for the first time.

- **(Fixed) Filter**
  You can specify characteristics that are restricted using filter values, but that are not to be used in the additional navigation. A drilldown using these characteristics is not possible.

In general, the available elements of the InfoProvider are included in the query definition per Drag&Drop. Within the query definition, all data definition and data presentation functions can be accessed via the context menu.

In addition to the query definition areas that are visible immediately, you can also separately define selections and formulas of single cells in a query. In this case, the definition of single cells of a two-dimensional structure matrix is controlled individually (see also Section 4.3.4).

Toolbar The toolbar (see Figure 4.3) provides the functionality for managing and running the query. Additionally, you can specify settings that globally apply to the query and that determine the query's behavior, irrespective of the query areas mentioned above (see also Section 4.4.6). From here, you also access the definitions of the condition and exception analysis functions (see Section 4.7.1).

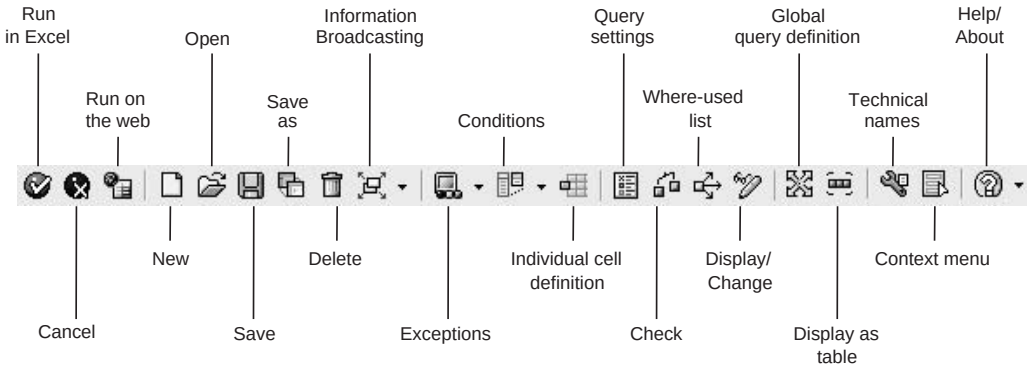


Figure 4.3 The Query Designer Toolbar

One important note before you will now create the first query. Particularly for flexible queries, it is advisable to limit the number of characteristics displayed in rows and columns for the initial call in order to enable an ideal performance. For this purpose, the characteristics released for navigation should be moved via Drag&Drop to the Free Characteristics and not to the Columns or Rows, wherever possible. For frequently used initial calls of queries, appropriate aggregates should be additionally provided.[3] This can help reduce the query runtime.

Create a Simple Query Based on CO-PA Data

In the first example, you will create two queries—a query of the gross revenues from CO-PA as well as a query for the master data reporting for customers.

- For CO-PA reporting, you can continue using the query you started on the ZECOPAM1 MultiProvider. There, set the display of technical names (see Figure 4.4, Step 1). Now Drag&Drop the **Revenue** key figure to the query definition, as shown in Figure 4.4 (Steps 2 and 3).

3 More information about aggregates can be found in Volume 1 of the *SAP BW Library*: Egger, Fiechter, Rohlf, 2005.

- The characteristics from the available elements will be placed in the different areas of the query definition (Steps 4 to 7).
- Set the view on your data by additionally limiting the characteristics in the filter area (Steps 7 to 8).
- The query can now be stored in your favorites or in a role (Step 9) as well as be executed on the web (Step 10).

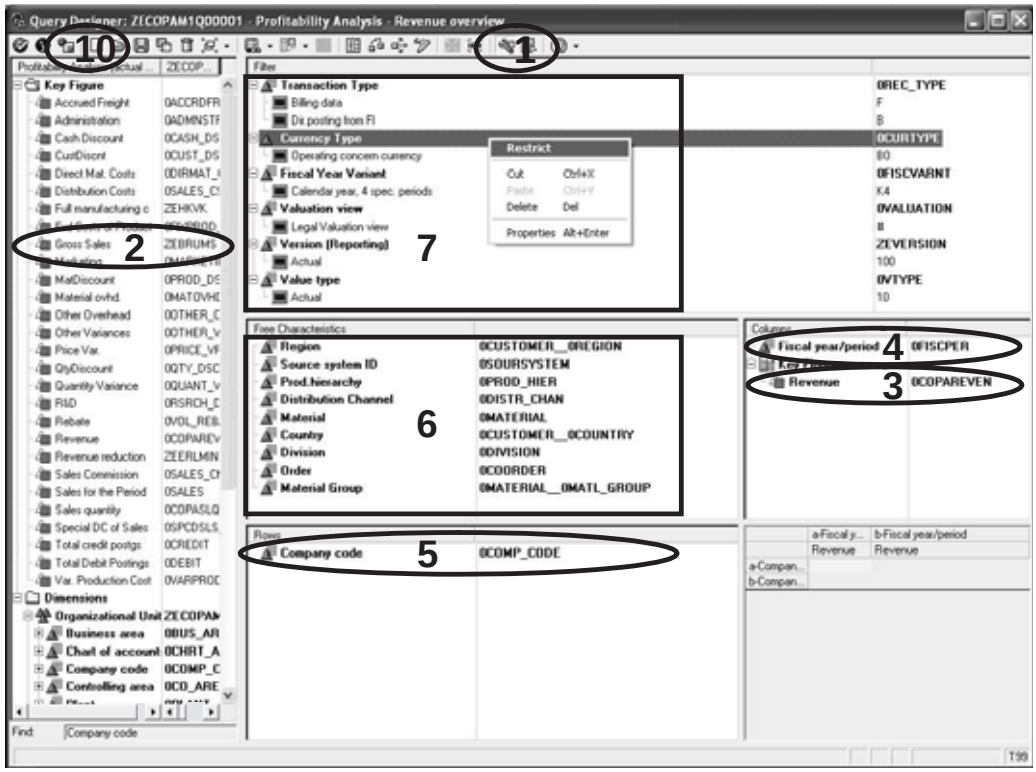


Figure 4.4 Simple Query: Revenue Reporting from CO-PA (Part 1)

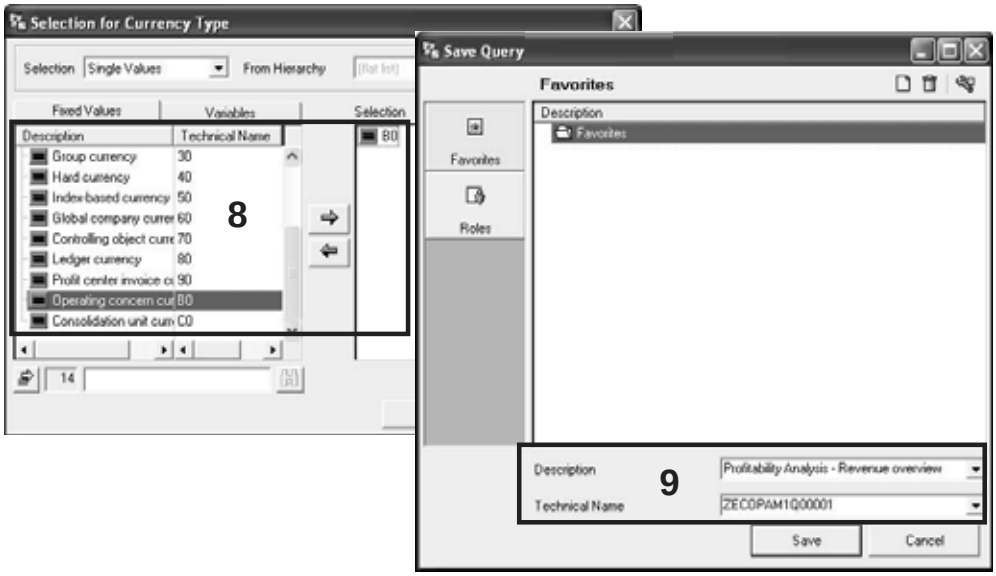


Figure 4.4 Simple Query: Revenue Reporting from CO-PA (Cont'd.)

If several variants of the data can be retrieved from the data model, like various internal management reporting views or views underlying external reporting guidelines, a correct data selection should already be ensured in the query definition. In this way, you can avoid using the query incorrectly at a later stage. In Figure 4.4, this was achieved using the global filters.

Create a Simple Query for Master Data Reporting of Customer Data

If a characteristic is released as an InfoProvider and thus released for master data reporting, queries can also be run directly against the master data tables of the respective characteristic:

- Create a query for the 0CUSTOMER characteristic (see Figure 4.5, Step 1).
- You can enter the name in the search field to avoid clicking through the InfoProvider structure (Step 2).
- Drag&Drop the attributes to be displayed immediately to the Rows field (Step 3) and the other available attributes to the Free Characteristics field (Step 4).
- You can now save the query as Customer master data report ZE0CUSTOMERQ00001 and start it (Step 5).

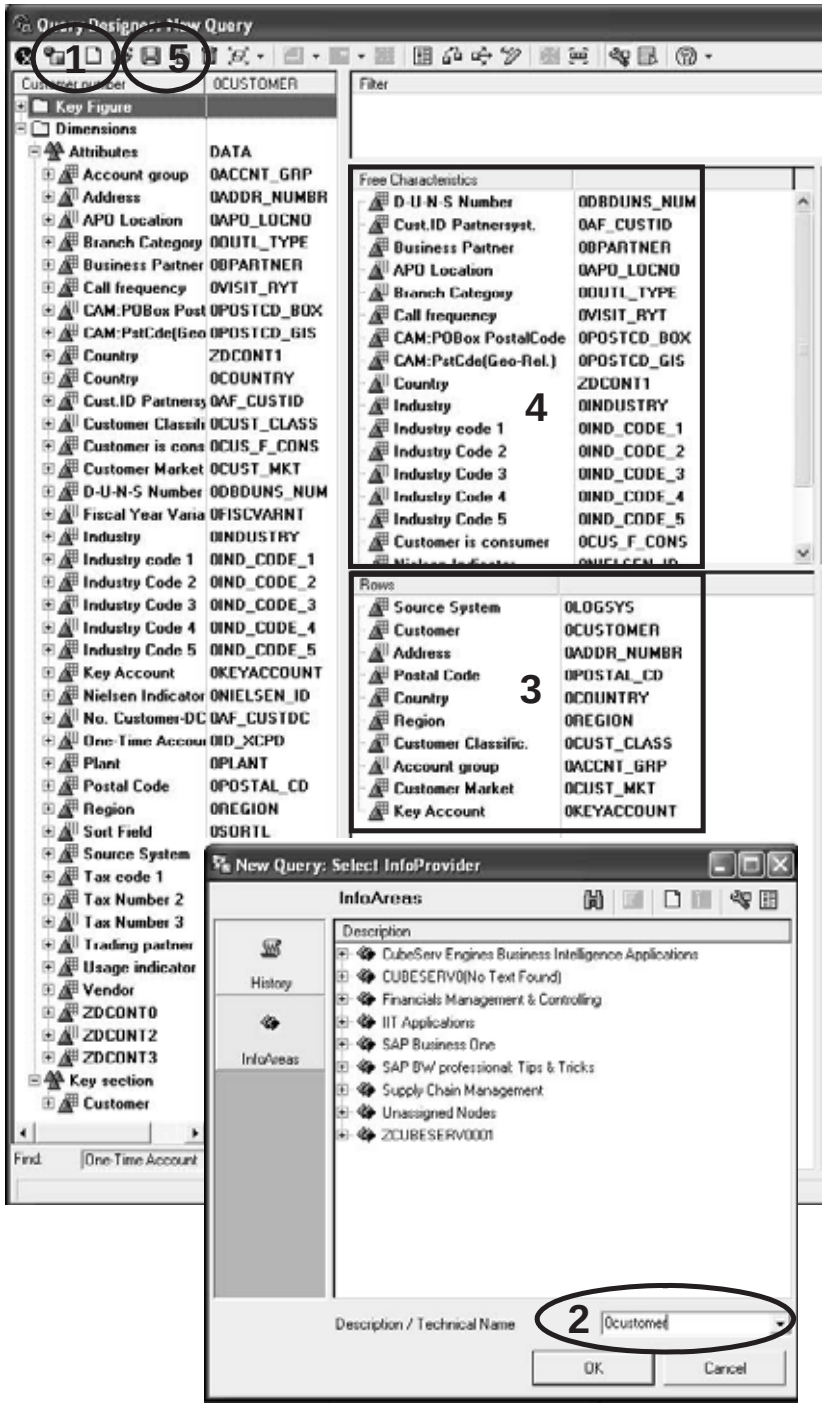


Figure 4.5 Query: "Customers" Master Data Report

The queries created here can still be substantially optimized, which is further explained in the following sections.

4.1.2 Overview of Query Elements

You can use different elements in the definition of a query. If these elements are visible, they are assigned a corresponding icon in the Query Designer (as illustrated in the figures of the following examples). Here is a short overview of the various elements:

- **Characteristics**
  Characteristics define the available level of details (also called granularity) of the database. Therefore, you can filter data and define details for drilldowns.
- **Selections**
  Selections usually query the value or quantity information of the database stored in key figures. Additionally, filter restrictions can be included for user-definable characteristic values so that the key figure value is issued for only these characteristic values. During the execution of the query, amounts can be converted using currency scenarios.
- **Formulas**
  In formulas, further calculations can be carried out using the values determined by selections and other formulas. Several previously defined selections or formula results can be combined and included in the results of a formula.
- **Structures**
  Every selection or formula is embedded in a structure as an element. From the user's perspective, these structures seem like characteristics that enable the selection of single structure elements. These structures often map the analytical functionality of the query.
- **Filter values**
  The values of a characteristic that are available at query runtime can be determined in the query definition by using filter values.
- **Variables**
  In most cases, characteristic variables are used to determine the characteristic values to be filtered before executing the query instead of specifying them already in the query definition. Additionally, text variables provide the possibility to dynamically determine the description of structure elements.

- **Hierarchies**
  Characteristic values or structure elements can be displayed hierarchically during the execution of the query. It is also possible to navigate in hierarchies by displaying and filtering subtrees.

However, there might be elements in the query definition that are not immediately visible:

- **Data definition in cells**
  If a query possesses two structures, single cells of the matrix formed by these structures can be defined separately. These can be either independent data selections or formulas that refer to other cells of the matrix.
- **Conditions**
  The display of details can be controlled not only by selecting characteristics, but also depending on the value or quantity information in structures. For example, this enables typical top n analyses.
- **Exceptions**
  Exceptions can be used to highlight data depending on the value or quantity information. Additionally, status information can be determined, which can be analyzed in separate exception reports.

The following sections discuss these elements in detail. They will then be integrated in the reporting solutions of the case study.

4.1.3 Global and Local Query Definition

Within the query definition, elements that are valid for all users can be distinguished from those elements that can be varied on demand. The latter can be changed both in the global and in the local query definitions. For the application of the query in Excel, for example, this is a significant advantage.

Open the Query Designer from Excel

The Query Designer can also be started from the BEx Analyzer in Excel. Open it via the Windows program menu by selecting **Business Explorer · Analyzer**.

- Using the Business Explorer menu in Excel, change to the global query definition. The functionality available here is identical to the functionality available when opening the Query Designer directly—in this case, however, the query can also be executed in Excel.

- Close the Query Designer and open the local view of the query (see Figure 4.6, Step 1).
- Exchange the elements **Fiscal year/period** and **Company code** (Step 2). In contrast to the navigation in Excel, this can be done via Drag&Drop for the local query definition in the Query Designer.
- The functionality is reduced to display and navigation settings in the local view (Step 3). In this view, you cannot filter characteristics or define formulas, as well as conditions or exceptions. But, you can change the layout easily using Drag&Drop functionality. Furthermore, you can define scaling factors and hierarchies in the local view.

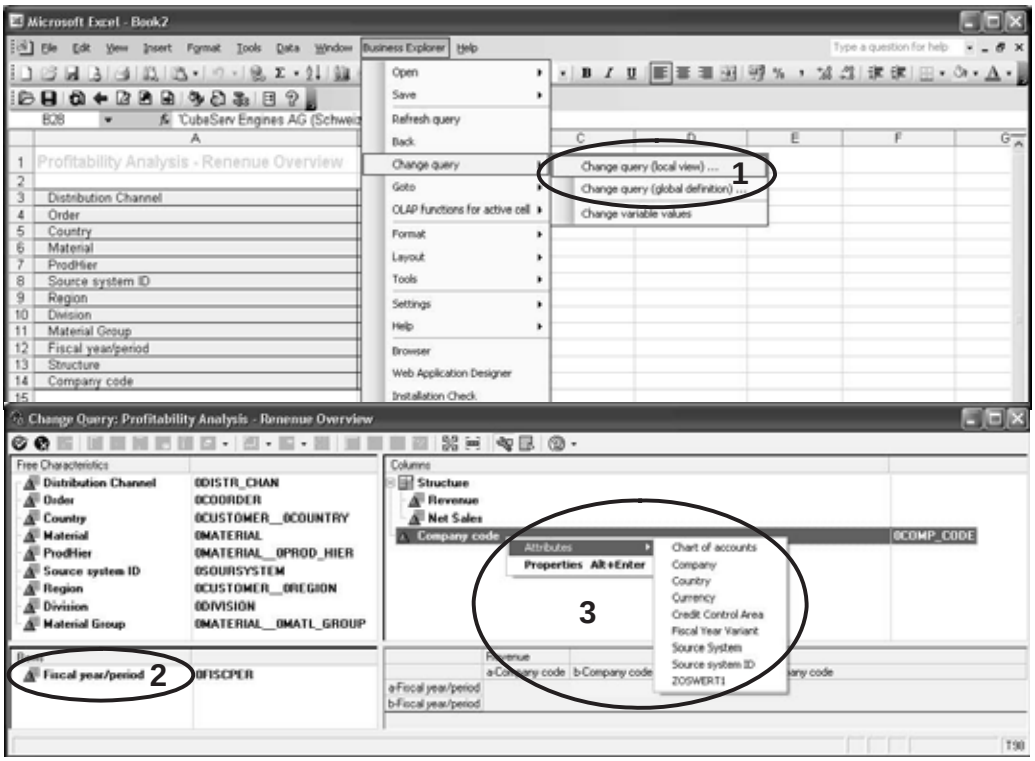


Figure 4.6 Calling the Local Query Definition in Excel

Centralized or decentralized control

Another important difference from the characteristics shown in the previous example is that all changes to the global query definition are stored on the server. Changes to the local view, however, are valid only for the currently selected query within the Excel workbook. Therefore, the query behavior can be controlled either in a centralized or a decentralized manner.

However, you can also store local views centrally on the server. As of BW Release 3.5, this can be on the web as well. Starting with BW 3.5, the navigational states stored in this way can be used for easily controlling flexible web cockpits.

This different validity area can be very useful for complex solutions, but also rather confusing at first. In simple solutions and at the beginning, it is therefore advisable to work with only the global query definition.

Authorization and Transport

Another important aspect is the authorization for changing the two views. While changing the global view requires the authorization for changing the query definition on the server, changing the local view requires only the authorization for running the query. If a query is defined on the development system and transported to the production system, which is common practice, the aforementioned authorization aspect also applies to the change options of the query. All changes to the global view must take place on the development system. The local view, however, can be adapted as necessary on every system on which the query may be executed.

4.2 Reusable Query Elements

Modularization

To make the design of queries within reporting solutions efficient, you can modularize and reuse various query elements. You can use these elements across several queries. A one-time central change of the element immediately affects all queries using the respective element.

This modularization option is a very effective means for centrally controlling the functionality of reporting solutions and for avoiding multiple development. But, clear guidelines for design and naming conventions—as well as the communication of requirements and responsibilities—are important prerequisites to ensure efficiency for several query developers.

In the following section, the special aspects of these elements are presented, in particular, regarding their reusability. The corresponding definition and presentation possibilities are discussed in detail in later sections.

4.2.1 Flexible Query Control with Variables

If a query was developed for particular analyses, its parameters should be controllable in a flexible way and without the necessity to change. In many cases, this is achieved using variables.

Variables are created globally per BW. Once a variable exists in the system, it can be used in all queries. Particularly in this context, it is recommended that you use naming conventions that are intuitive, that is, the name that you've assigned to the variable is synonymous with its function. Consequently, the obvious advantages of this principle can be used to their full extent, and all developers can work with the same variables.

You can find detailed background information about variables in Section 4.5. The following examples (up to Section 4.5) can be edited without having this information.

Include Variables in a Query

Now you'll create the restriction for fiscal period and other characteristics using variables for the ZECOPAM1Q00001 query that you just defined.

- For this purpose, open the global query definition. Using the context menu of the 0FISCPER characteristic, go to the filter menu (see Figure 4.7, Step 1).
- On the **Variables** tab (Step 2), select the 0I_FPER variable (Step 4). This variable of the "Interval" type is delivered by SAP as Business Content.
- To find the variable, you can first display technical names using the context menu (Step 3). You can also define variables.
- Restrict further characteristics of the query definition (Step 5).
- The variables now selected are marked as ready for input and will be displayed in a popup before the query is executed.
- You can specify the order of the variable query (Step 7) in the query properties (Step 6). For background information about the definition of user-defined variables and the available parameters, as well as an example of a variable popup, see Section 4.5.

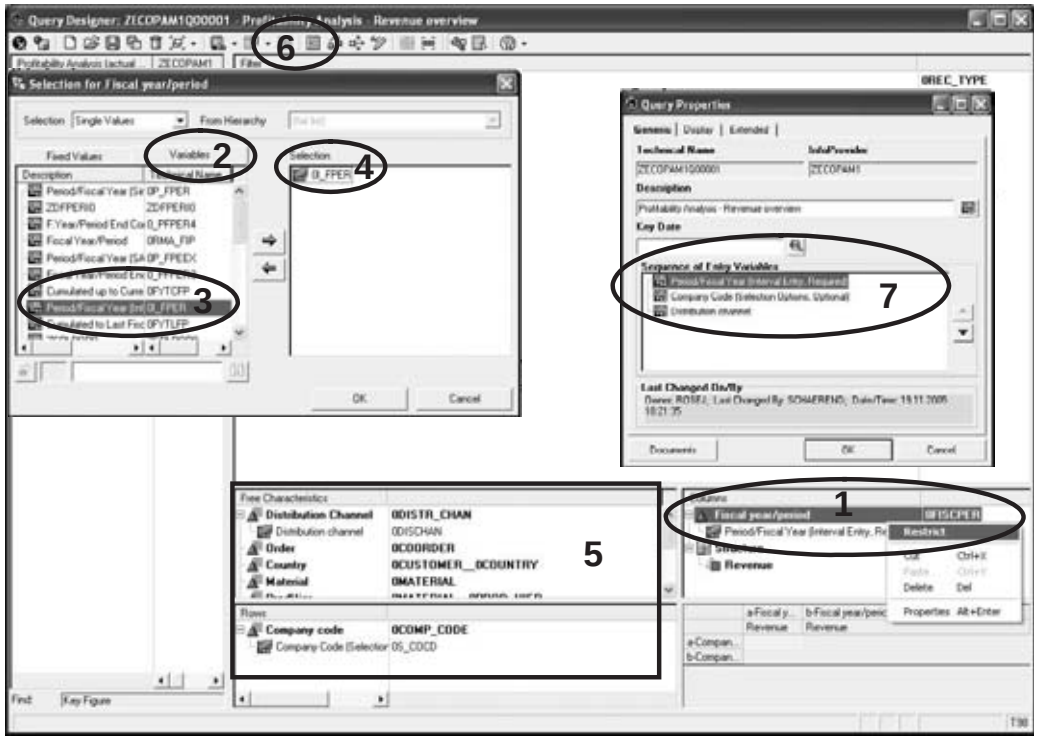


Figure 4.7 Inserting Variables in the Query Definition

4.2.2 Calculated Key Figures

Another group of reusable query elements are *restricted* and *calculated key figures*. You can globally define formula definitions per InfoProvider by using calculated key figures.

Validity area

These key figures are unique per system (i.e., a specific technical name can be used once per system); however, they can only be reused within the InfoProvider for which they were created. This context calls for a viable naming convention as well.

The creation of calculated key figures has several advantages:

- Effective mass changes can be carried out in the short term by changing one central element.
- Consistent data definitions can be easily enforced for even a multitude of queries and developers.

- The reuse of the same variables can be ensured. This allows for the combination of variable inputs when running several queries simultaneously.
- The largest part of the query definition can be effected by dragging and dropping predefined, frequently used selections, which simplifies the process considerably.

These arguments also apply to the restricted key figures and global structures described in the following section.

Available functions

The formula definition in calculated key figures corresponds to the definition of normal formula elements of a structure. Besides the usual mathematical operators, further functions provided by SAP can be utilized. However, results-based calculations are not available (see also Section 4.3.2).[4]

Calculation time

In general, formulas are analyzed after reading the data and its aggregation. This is advisable particularly for performance-related reasons. In simpler formulas, the calculation can be carried out even before the aggregation. As a prerequisite, only constants, basic key figures, or other simple calculated key figures with the same aggregation can be used as operands of the formula.

To avoid a loss of performance, as a solution alternative to mapping the reporting requirements, you should precalculate the value to be determined and, if possible, store it in the InfoProvider. If the data required for the calculation is stored as an attribute of a characteristic used in the report, you can also implement a formula using a formula variable with a substitution from the attribute data (see Section 4.6.4).

Create a Calculated Key Figure for Net Sales from CO-PA

In the following example, the sales analysis just created from the results calculation will be extended by the net sales and methodically optimized. For this purpose, you will extend the previously created ZECOPAM1Q00001 query by a calculated key figure for analyzing the net sales:

- Open the query and create a new calculated key figure for the net revenue via the key figures context menu (see Figure 4.8, Step 1).

4 An example of such a calculation is the percentage of a single characteristic value (e.g., "Sales of Material A") in the total of all characteristic values ("Sales of All Materials").

- In the formula editor displayed, the formula can be composed as usual, by double-clicking on the operands and functions or via Drag&Drop and keyboard input for basic functions (Steps 2 and 3).
- The result is determined by the key figures for:
  Revenue (actual cube) + sales (plan cube) – several discounts (actual cube) – revenue reductions (plan cube).
- Since the CO-PA data model stores both revenues and expenses as positive numbers in the respective key figures, expenses must be subtracted from the revenues in the formula (Step 3, **Formula**).
- Indicate in the description that a restriction to specific views of the net sales hasn't been applied yet (Step 3, **Description**).
- After confirming your changes by clicking on OK, the formula properties are displayed. Assign a technical name and leave the other parameters unchanged for the present (Step 4).
- After saving the key figure to the InfoProvider, you can add it to the column definition via Drag&Drop (Step 5, **New Selection**).
- Since a restriction to the data view has already been effected in the query itself, the text of the already created structure element can be changed back to **Net sales** (Step 5, **Change description**). Thus, this change of the description is valid only within the query, and the global key figure still bears the required annotation.

Aggregation behavior

You can also define exception aggregations in calculated key figures if the complexity of the formula is restricted to assigning a basic key figure. A typical example is the presentation of inventory key figures, for example, those of warehouse stocks. Naturally, when aggregating across several stock items, a total number must be used. When aggregating across time characteristics, though, the last available status is relevant rather than a summation. This can be achieved using an exception aggregation with regard to time characteristics.

In a normal aggregation, the resulting values (usually totals) are always displayed in relation to the drilldown currently used in the query. In an exception aggregation, the results can be displayed in relation to another characteristic of the InfoProvider.

To enable exception aggregations for additional characteristics for a key figure, further key figures referencing the original key figure must be created.

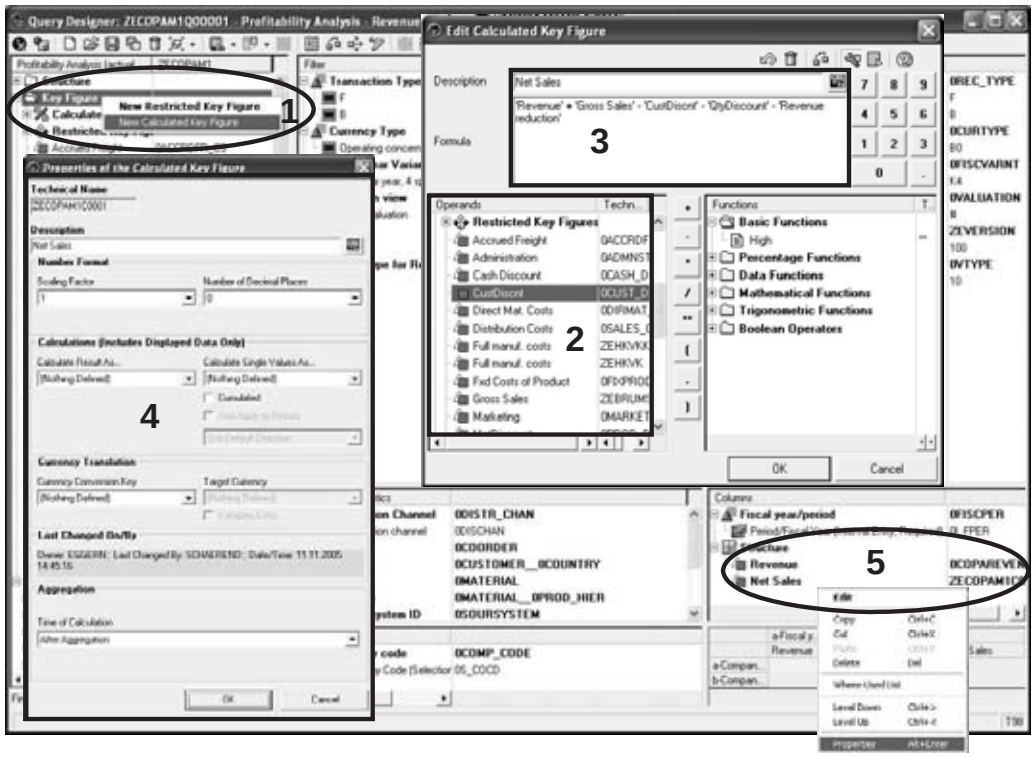


Figure 4.8 Net Sales Calculated Key Figure from CO-PA

Figure 4.9 shows the appropriate setting of the characteristic definition in the key figure definition of the Administrator Workbench.

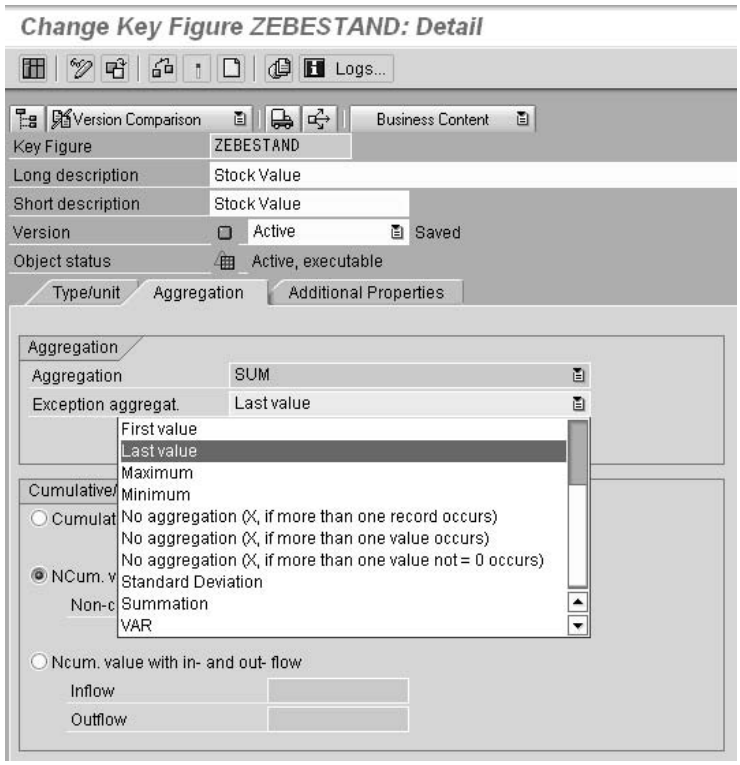


Figure 4.9 Definition of the Exception Aggregation of the Key Figure

4.2.3 Restricted Key Figures

As with calculated key figures, recurring selections for an InfoProvider can be created as a restricted key figure. Therefore, restricted key figures globally define a key figure and filter selection per InfoProvider.

The data selection in restricted key figures works like it does in normal structure elements. Even currency translation and scaling can be set in restricted key figures.

Create Restricted Key Figures as a Basis for a Comparison with the Previous Year in CO-PA

While the sales analysis query created up to now was very well suited for data retrieval and time series analysis, we will now create a query for a more detailed analysis of the sales performance during a specific period. This query provides data as a basis for the net sales comparison with the previous year, with monthly and cumulative values from the beginning of the fiscal year.

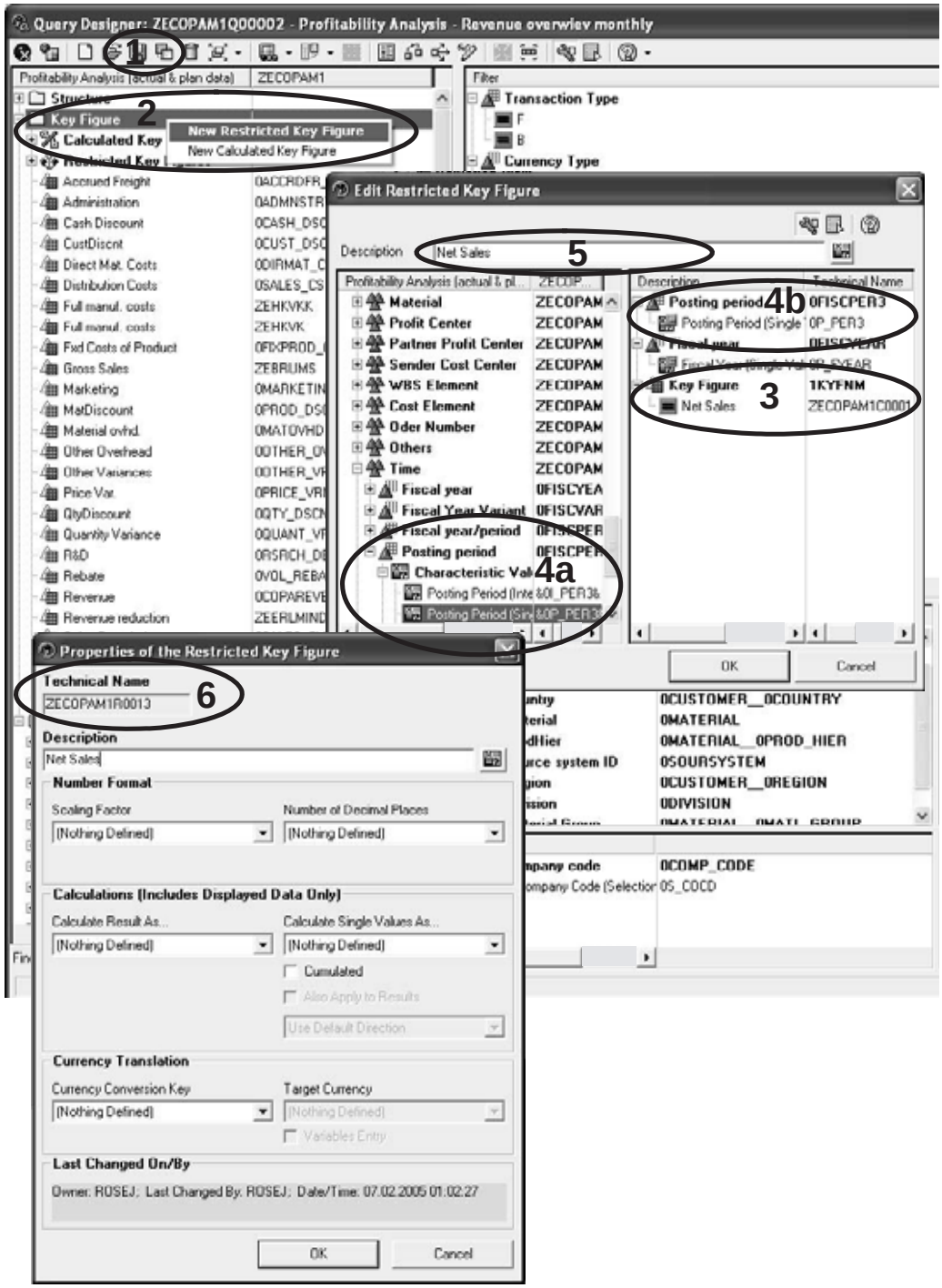


Figure 4.10 Restricted Key Figure: Selected Month MTH

- Save the ZECOPAM1Q00001 query as a copy under ZECOPAM1Q00002 **Profitability Analysis—Revenue overview monthly** (see Figure 4.10, Step 1).
- Create a restricted key figure for the monthly values (Step 2).
- In the selection editor, Drag&Drop the calculated net sales key figure created above to the definition (Step 3).
- The selection is further restricted by the characteristics 0FISCPER3 and 0FISCYEAR with the variables 0P_PER3 or 0P_FYEAR, respectively. In the list of available elements, you can browse directly to the variable (Step 4a) and transfer it via Drag&Drop (Step 4b).
- Enter a description (Step 5) and confirm your selection. A property window is displayed where you can simply enter the technical name for the time being (Step 6).
- For the key figure of the cumulative value for the previous year, proceed as described in Steps 2 to 4.
- Then the description needs to be adapted according to the definition (see Figure 4.11, Step 1).
- The selection for the fiscal year still needs to be edited in detail (Step 2).
- Specify a variable offset to set the filter value to the year before the entered variable value (Steps 3a and 3b).
- Additionally, the cumulation of the data must be stopped as of period 1. (Posting period 0 is not used in our data model.) Therefore, an interval of 1 up to the value of the 0P_FPER3 variable is defined in the detailed definition of the 0FISCPER3 characteristic (Step 4).
- For this purpose, first select the **Value Range** type (Step 5). Then, the 1 is moved via Drag&Drop from the fixed values to the definition to form the lower limit of the interval (Steps 6a, b, and c).
- Now the variable can be moved via Drag&Drop to the definition and then specifies the upper limit of the interval (Steps 7a, b, and c). Save the calculated key figure and give it a technical name.
- Then two other key figures must be created for MTH Y-1 and YTD values. The procedure is the same as the one described above.

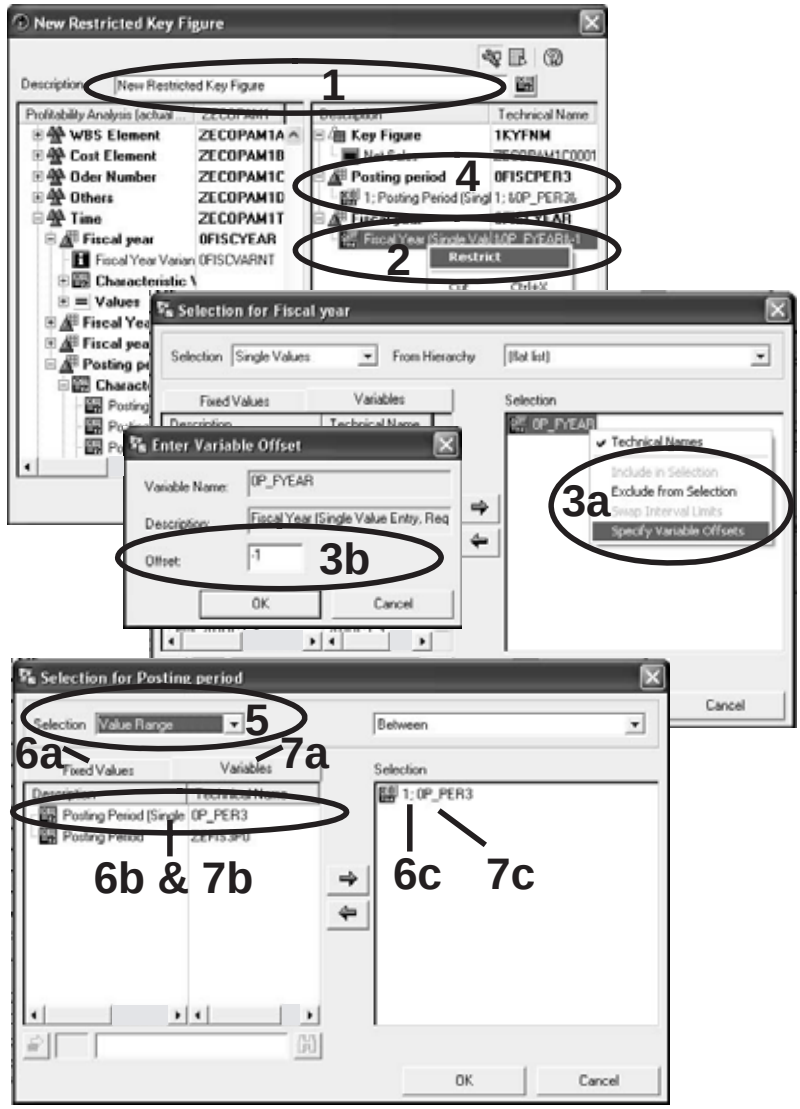


Figure 4.11 Restricted Key Figure: Month of the Previous Year, Cumulative

- Since you now have key figures that combine both time and key figure selection (see Figure 4.12, Step 1), you can remove the existing column definition.
- Then simply Drag&Drop the new key figures to the column definition to form a new structure (Step 2).
- In the query context, the key figures can be assigned more user-friendly names. Even line breaks are admissible (Step 3).

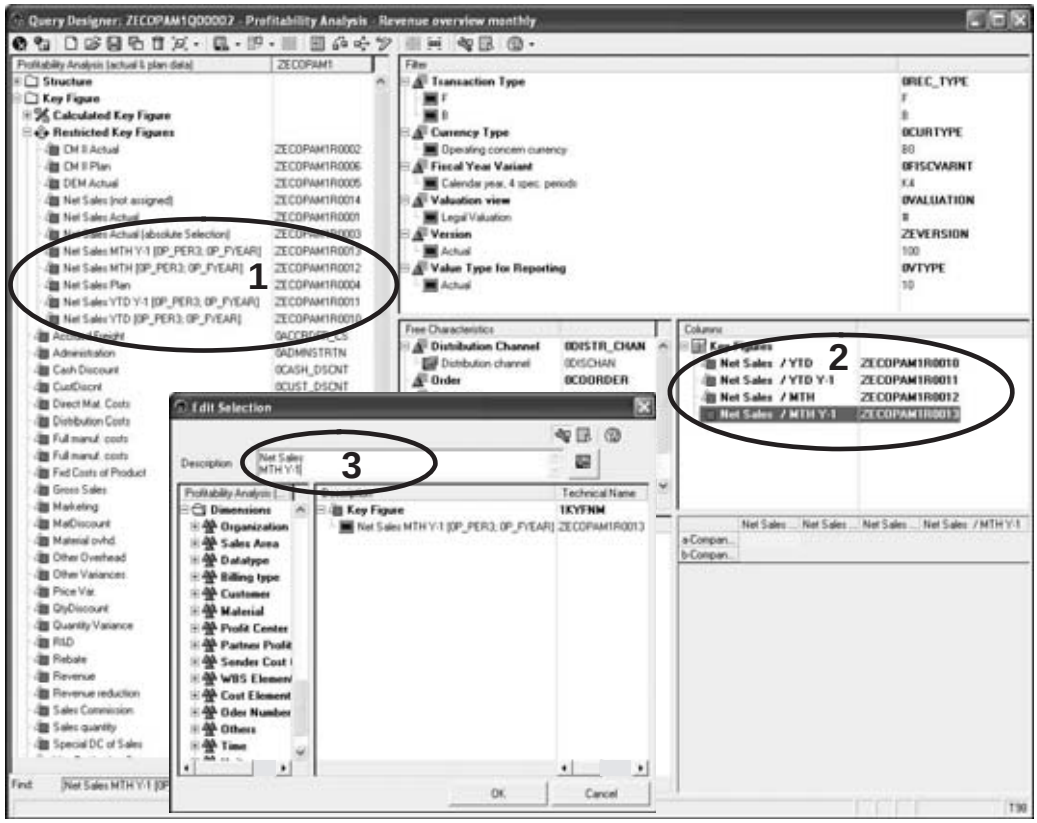


Figure 4.12 Query with Restricted Key Figures for CO-PA

At this point, you may be thinking that this is too much effort for deriving these four scenarios; however, please consider that a Drag&Drop and the renaming of the structure element is all that is necessary for the next query to be defined. Additionally, if you do need to change the calculation method for net sales or to use different variables, this effort is only necessary once and in one place.

The current query has the disadvantage that the time selection is not visible in the column description. This can be solved by using text variables, which is described in detail in Section 4.6.3.

4.2.4 Restricted and Calculated Key Figures with Mutual Dependencies

Since BW 3.0, you can use restricted and calculated key figures in any combination. In the previous example, a calculated key figure was already used within a restricted key figure. Even more complex combinations are theoretically possible.

This ability to nest one key figure within another key figure, in particular, allows for very flexible solution approaches. But, you should note that more complex nesting can negatively affect the performance of the OLAP processor.

Complex Calculated Key Figure for Sales Variance in CO-PA

In the following example, for the sales analysis based on CO-PA data, the variance percentage—as compared to the previous year—is stored on the InfoProvider using global key figures. In this way, these key figures can be easily added to other queries at a later stage. The query ZECOPAM1Q00002 Profitability Analysis—Revenue overview monthly that has just been created is then extended by these key figures:

- Create a new calculated key figure (see Figure 4.13, Step 1).
- The formula result is the **Percentage Variance** function (Step 2) between the Net Sales YTD operands of the current and the previous year (Step 3).
- The individual elements can be re-inserted using Drag&Drop or by double-clicking (Step 4).
- Save the calculated key figure. When saving, you should set the scaling factor in the properties; otherwise, the OLAP processor will return the numbers with the highest possible accuracy.
- Repeat this procedure to determine additional key figures for the monthly sales variance percentage—as compared to the previous year—as well as the monthly and the cumulative absolute variances (Step 5).
- You can now transfer the available key figures for the sales variance to the query structure using Drag&Drop functionality (Step 6).
- Figure 4.14 shows the result on the web. Here you have all the navigation options; for example, exchanging or adding drilldowns or sorting by sales growth.

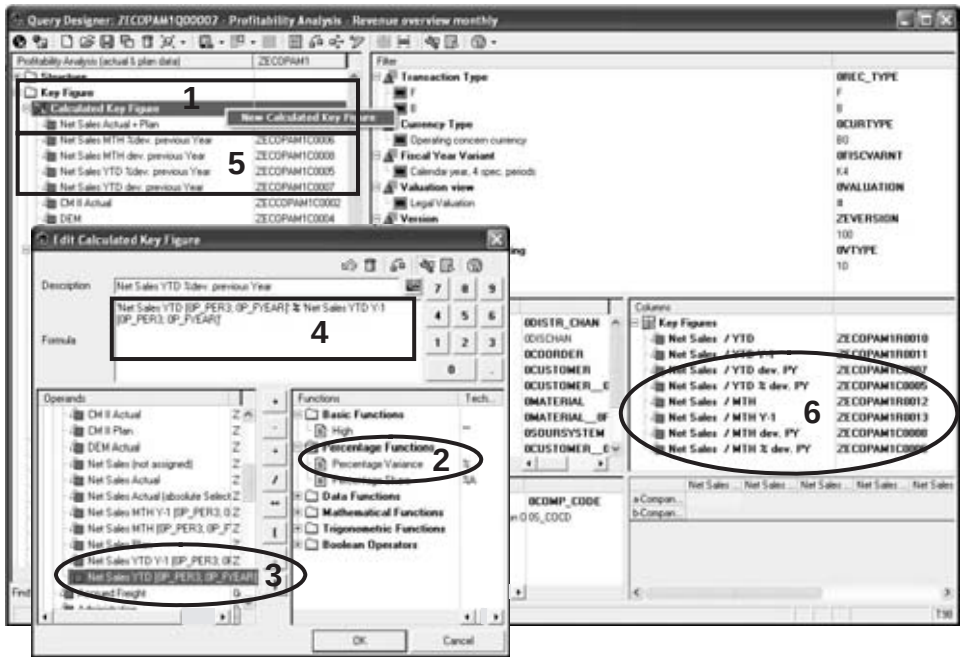
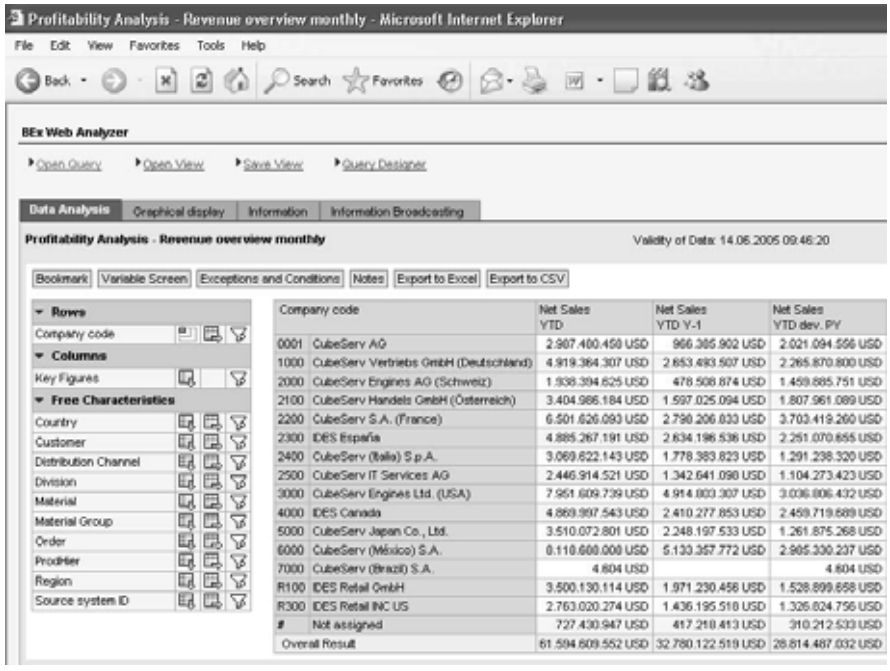


Figure 4.13 Global Key Figure for Sales Variance in CO-PA



Company code		Net Sales YTD	Net Sales YTD Y-1	Net Sales YTD dev. PY
0001	CubeServ AG	2.907.400.450 USD	966.365.902 USD	2.021.094.556 USD
1000	CubeServ Vertriebs GmbH (Deutschland)	4.919.364.307 USD	2.653.493.507 USD	2.265.870.800 USD
2000	CubeServ Engines AG (Schweiz)	1.938.394.825 USD	478.508.874 USD	1.459.885.751 USD
2100	CubeServ Handels GmbH (Österreich)	3.404.986.184 USD	1.597.025.094 USD	1.807.961.089 USD
2200	CubeServ S.A. (France)	6.501.626.093 USD	2.798.206.833 USD	3.703.419.260 USD
2300	IDES España	4.885.267.191 USD	2.634.196.536 USD	2.251.070.655 USD
2400	CubeServ (Italia) S.p.A.	3.069.622.143 USD	1.778.383.823 USD	1.291.238.320 USD
2500	CubeServ IT Services AG	2.446.914.521 USD	1.342.641.098 USD	1.104.273.423 USD
3000	CubeServ Engines Ltd. (USA)	7.951.609.739 USD	4.914.803.307 USD	3.036.806.432 USD
4000	IDES Canada	4.869.997.543 USD	2.410.277.853 USD	2.459.719.689 USD
5000	CubeServ Japan Co., Ltd.	3.510.072.801 USD	2.248.197.533 USD	1.261.875.268 USD
6000	CubeServ (México) S.A.	8.110.600.000 USD	5.133.357.772 USD	2.965.330.237 USD
7000	CubeServ (Brazil) S.A.	4.804 USD		4.804 USD
R100	IDES Retail GmbH	3.500.130.114 USD	1.971.230.456 USD	1.528.899.658 USD
R300	IDES Retail INC US	2.763.020.274 USD	1.436.195.518 USD	1.326.824.756 USD
#	Not assigned	727.430.947 USD	417.218.413 USD	310.212.533 USD
Overall Result		61.594.609.552 USD	32.780.122.519 USD	28.814.487.032 USD

Figure 4.14 Query on the Web: Sales Growth Analysis

4.2.5 Global Structures

Frequently used combinations of different data selections or formulas can be created as a global structure. They have the same functionality, as do structures that are defined only within a specific query.

The following applies to the validity area: Like restricted and calculated key figures, global structures are created per InfoCube. They can be used in all queries for that particular InfoCube. The technical name of a global structure must be unique on the system.

All settings of the global structure are copied to all queries using that structure. In this context, it is significant that this applies to both data definitions and display settings. Contrary to restricted and calculated key figures, the display options in the query definition cannot be overridden. Hiding a structure element in one query, for example, will activate this behavior in all other queries using this global structure.

You can use a maximum of two structures within one query. If only one structure is used in the query, you can activate the tabular display as well. (see also Section 4.4.5.) When using two structures, you can define single cells (see Section 4.3.4). Within a query, only one structure can contain key figures of an InfoProvider.

Remove a reference

If a query has been using a global structure that should be valid only locally within that query, you can remove the reference to the global structure. During this procedure, a copy of the global structure is created within the query definition.

Alternatively, a structure that exists only within one query can be made available as a global structure of the InfoProvider, as is illustrated in the following example.

Structure template

You can also use global structures as templates for query definitions, provided that the definition of the query structure deviates slightly from the global structure. For this purpose, the global structure is transfered into the query via Drag&Drop, and the reference is then removed. All further changes to the structure within the query will no longer be transferred to the global structure.

When working with locally stored Excel workbooks, however, you must be careful when removing and creating global structure references. This process changes the (generated) technical name of the structure. If a workbook previously existed with a local view of this structure, this view is lost and the new structure will be displayed.

Create a Global Structure for Determining the Local Contribution Margin

The following example uses the full data range of CO-PA to create a contribution margin calculation. In our data model, this contribution margin calculation can be used for analyzing subsidiaries. It does not yet include any consolidated sales or expenses where the intercompany sales have been eliminated:

- Create a second copy of the query ZECOPAM1Q00001 as **Profitability Analysis—Contribution Margin Overview** with the technical name ZECOPAM1Q00003.
- Remove the key figure structure from the columns. Only the **Fiscal year/period** characteristic should be included (see Figure 4.15, Step 1).
- Drag&Drop the **Company code** characteristic from the Rows field to the Free Characteristics field (Step 2).
- In the Rows field, create a new structure to contain the contribution margin scheme (Step 3).
- Define the structure characteristics as shown in Table 4.1. Every row of this table contains a structure element and its definition.
  - The first column describes the row number in the structure.
  - Column 2 contains S for a selection and F for a formula. The row should be hidden if this column additionally contains the letter **H** (for Hide).
  - Columns 3 and 4 contain the description and definition of the structure element.

  Figure 4.15, Step 4, contains the example formula for contribution margin III (see table entry no. 23). For all other structure elements, you can proceed as shown in this example.
- The structure can now be saved globally as ZECOPAM1S00001 **Structure Contribution Margin I-V (local)** and then be used in other queries.

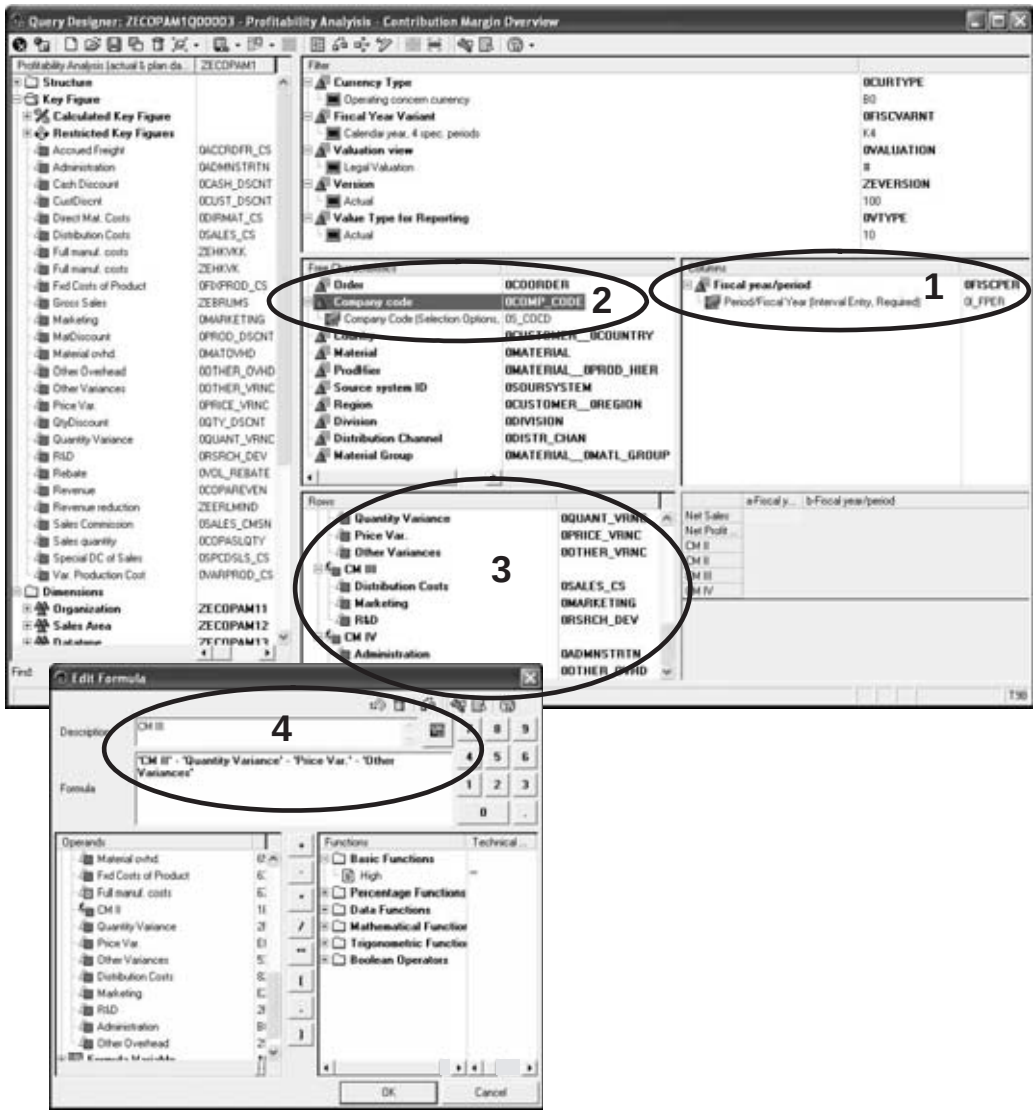


Figure 4.15 Query: CO-PA Contribution Margin Scheme

No.	FSH	Description	Selection/Formula
1	SH	Revenue	0COPAREVEN
2	SH	Gross sales	ZEBRUMS
3	**F**	**Gross sales**	**= (1) + (2)**

Table 4.1 Local Contribution Margin Scheme of the Example

No.	FSH	Description	Selection/Formula
4	S	Customer discount	0CUST_DSCNT
5	S	Material discount	0PROD_DSCNT
6	S	Other revenue reductions	ZEERLMIND
7	**F**	**Net sales**	**= (3) – (4) – (5) – (6)**
8	S	Cash discount	0CASH_DSCNT
9	S	Volume rebate	0VOL_REBATE
10	S	Sales commission	0SALES_CMSN
11	S	Special direct costs of sales	0SPCDSLS_CS
12	S	Accrued freight costs	0ACCRDFR_CS
13	**F**	**Net sales revenue**	**= (7) – (8 … 12)**
14	S	Direct material costs	0DIRMAT_CS
15	S	Variable production costs	0VARPROD_CS
16	S	Material overhead costs	0MATOVHD
17	S	Fixed production costs	0FIXPROD_CS
18	S	Full costs of production	ZEHKVK
19	**F**	**CM II**	**= (13) – (14 … 18)**
20	S	Quantity variance	0QUANT_VRNC
21	S	Price variance	0PRICE_VRNC
22	S	Other variance	0OTHER_VRNC
23	**F**	**CM III**	**= (19) – (20 … 22)**
24	S	Cost of sales	0SALES_CS
25	S	Marketing costs	0MARKETING
26	S	Research & development costs	0RSRCH_DEV
27	**F**	**CM IV**	**= (23) – (24 … 26)**
27	S	Administration costs	0ADMNSTRTN
28	S	Other overhead costs	0OTHER_OVHD
29	**F**	**Operating profit**	**= (23) – (27) – (28)**

Table 4.1 Local Contribution Margin Scheme of the Example (Cont'd.)

Index

C

D

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V

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