

Business Intelligence: Overview



SAP NetWeaver 7.0

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Example text	Emphasized words or phrases in body text, graphic titles, and table titles.
EXAMPLE TEXT	Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.
Example text	Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.
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Icon	Meaning
	Caution
	Example
	Note
	Recommendation
	Syntax

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Business Intelligence: Overview

This documentation is geared to beginners who would like a quick introduction to the functions offered by SAP NetWeaver Business Intelligence (SAP NetWeaver BI). An overview of the key areas is given. The tools, functions and processes of SAP NetWeaver BI that enable your company to implement a successful business intelligence strategy are introduced.

1 What Is Business Intelligence?

The Purpose of Business Intelligence

During all business activities, companies create data. In all departments of the company, employees at all levels use this data as a basis for making decisions. Business Intelligence (BI) collates and prepares the large set of enterprise data. By analyzing the data using BI tools, you can gain insights that support the decision-making process within your company. BI makes it possible to quickly create reports about business processes and their results and to analyze and interpret data about customers, suppliers, and internal activities. Dynamic planning is also possible. Business Intelligence therefore helps optimize business processes and enables you to act quickly and in line with the market, creating decisive competitive advantages for your company.

Key Areas of Business Intelligence

A complete Business Intelligence solution is subdivided into various areas. **SAP NetWeaver Business Intelligence** (SAP NetWeaver BI) provides comprehensive tools, functions, and processes for all these areas:

A data warehouse **integrates, stores, and manages** company data from all sources.

If you have an integrated view on the relevant data in the data warehouse, you can start the **analysis and planning** steps. To obtain decisive insights for improving your business processes from the data, SAP NetWeaver BI provides methods for multidimensional analysis. Business key figures, such as sales quantities or revenue, can be analyzed using different reference objects, such as Product, Customer or Time. Methods for pattern recognition in the dataset (data mining) are also available. SAP NetWeaver BI also allows you to perform planning based on the data in the data warehouse.

Tools for accessing and for visualization allow you to display the insights you have gained and to analyze and plan the data at different levels of detail and in various working environments (Web, Microsoft Excel).

By **publishing content from BI**, you can flexibly broadcast the information to all employees involved in your company's decision-making processes, for example by e-mail or using an enterprise portal.

Performance and **security** also play an important role when it comes to providing the information that is relevant for decision-making to the right employees at the right time.

Preconfigured information models in the form of **BI Content** make it possible to efficiently and cost-effectively introduce SAP NetWeaver BI.

The following sections give an overview of the capabilities of SAP NetWeaver BI in these areas. You can find out more about the tools, functions, and processes provided by SAP NetWeaver BI using the links to more detailed information in the documentation.

2 Integration, Storage and Management of Data

Comprehensive, meaningful data analyses are only possible if the datasets are bundled into a business query and integrated. These datasets can have different formats and sources. The data warehouse is therefore the basis for a business intelligence solution.

Enterprise data is collected centrally in the Enterprise Data Warehouse of SAP NetWeaver BI. The data is usually extracted from different sources and loaded into SAP NetWeaver BI. SAP NetWeaver BI supports all kinds of sources - relational and multidimensional, SAP and non-SAP. Technical cleanup steps are then performed and business rules are applied in order to consolidate the data for evaluations. The consolidated data is stored in the Enterprise Data Warehouse. This entire process is called **extraction, transformation and loading (ETL)**.

Data can be stored in different layers of the data warehouse architecture with different granularities, depending on your requirements. The **data flow** describes the path taken by the data through the data warehouse layers until it is ready for evaluation.

Data administration in the Enterprise Data Warehouse includes **control of the processes** that transfer the data to the Enterprise Data Warehouse and broadcast the data within the Enterprise Data Warehouse as well as convert strategies for optimal data retention and history keeping (limiting the data volume. This is also called **Information Lifecycle Management**.

With **extraction to downstream systems**, you can make the data consolidated in the Enterprise Data Warehouse available to further BI systems or further applications in your system landscape.

A **metadata** concept permits you to document the data in SAP NetWeaver BI using definitions or information in structured and unstructured form.

The **Data Warehousing Workbench** is the central work environment that provides the tools for performing the tasks in the SAP NetWeaver BI Enterprise Data Warehouse.

2.1 Extraction, Transformation and Loading (ETL)

SAP NetWeaver BI offers flexible means for integrating data from various sources. Depending on the data warehousing strategy for your application scenario, you can extract the data from the source and load it into the SAP NetWeaver BI system or directly access the data in the source without storing it physically in the Enterprise Data Warehouse. In this case the data is integrated virtually in the Enterprise Data Warehouse. Sources for the Enterprise Data Warehouse can be operational, relational datasets (for example in SAP systems), files or older systems. Multidimensional sources, such as data from other BI systems, are also possible. Transformations permit you to perform a technical cleanup and to consolidate the data from a business point of view.

Extraction and Loading

Extraction and transfer processes in the initial layer of SAP NetWeaver BI as well as direct access to data are possible using various interfaces, depending on the origin and format of the data. In this way SAP NetWeaver BI allows the integration of relational and multidimensional data as well as of SAP and non-SAP data.

- **BI Service API** (BI Service Application Programming Interface)

The BI service API permits the extraction and direct access to data from SAP systems in standardized form. This can be SAP application systems or SAP NetWeaver BI systems. The data request is controlled from the SAP NetWeaver BI system.

- **File Interface**

The file interface permits the extraction from and direct access to files, such as csv files. The data request is controlled from the SAP NetWeaver BI system.

- **Web Services**

Web services permit you to send data to the SAP NetWeaver BI system under external control.

- **UD Connect** (Universal Data Connect)

UD Connect permits the extraction from and direct access to both relational and multidimensional data. The data request is controlled from the SAP NetWeaver BI system.

- **DB Connect** (Database Connect)

DB Connect permits the extraction from and direct access to data lying in tables or views of a database management system. The data request is controlled from the SAP NetWeaver BI system.

- **Staging BAPIs** (Staging Business Application Programming Interfaces)

Staging BAPIs are open interfaces from which third party tools can extract data from older systems. The data transfer can be triggered by a request from the SAP NetWeaver BI system or by a third party tool.

Transformation

With **transformations**, data loaded within the SAP NetWeaver BI system from the specified interfaces is transferred from a source format to a target format in the data warehouse layers. The transformation permits you to consolidate, clean up and integrate the data and thus to synchronize it technically and semantically, permitting it to be evaluated. This is done using rules that permit any degree of complexity when transforming the data. The functionality includes a 1:1 assignment of the data, the use of complex functions in formulas, as well as the custom programming of transformation rules. For example, you can define formulas that use the functions of the transformation library for the transformation. Basic functions (such as and, if, less than, greater than), different functions for character chains (such as displaying values in uppercase), date functions (such as computing the quarter from the date), mathematical functions (such as division, exponential functions) are offered for defining formulas.

Availability Requirements for Data in SAP NetWeaver BI

For different business problems, the data might need to be more or less up-to-date.

For example, if you want to check the sales strategy for a product group each month, you need the sales data for this time span. Historic, aggregated data is taken into consideration. The scheduler is an SAP NetWeaver BI tool that loads the data at regular intervals, for example every night, using a job that is scheduled in the background. In this way no additional load is put on the operational system. We recommend that you use **standard data acquisition**, that is schedule regular data transfers, to support your strategic decision-making procedure.

If you need data for the tactical decision-making procedure, data that is quite up-to-date and granular is usually taken into consideration, for example, if you analyze error quotas in production in order to optimally configure the production machines. The data can be staged in the SAP NetWeaver BI system based on its availability and loaded in intervals of minutes. A permanently active job of SAP background processing is used here; this job is controlled by a

special process, a daemon. This procedure of data staging is called **real-time data acquisition**.

By loading the data in a data warehouse, the performance of the source system is not affected during the data analysis. The load processes, however, require an administrative overhead. If you need data that is very up-to-date and the users only need to access a small dataset sporadically or only a few users run queries on the dataset at the same time, you can read the data directly from the source during analysis and reporting. In this case the data is not archived in the SAP NetWeaver BI system. Data staging is virtual. You use the **VirtualProvider** here. This procedure is called **direct access**.

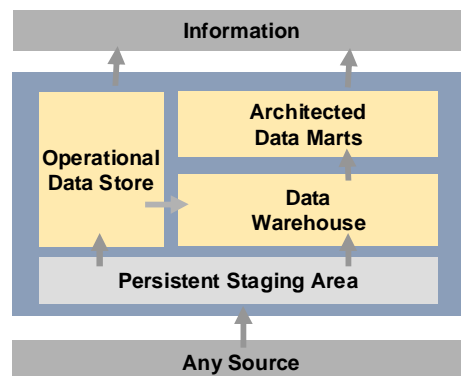
2.2 Data Storage and Data Flow

SAP NetWeaver BI offers a number of options for data storage. These include the implementation of a data warehouse or an operational data store as well as the creation of the data stores used for the analysis.

Architecture

A multi-layer architecture serves to integrate data from heterogeneous sources, transform, consolidate, clean up and store this data, and stage it efficiently for analysis and interpretation purposes. The data can be stored with varying granularity in the layers.

The following figure shows the steps involved in the data warehousing concept of SAP NetWeaver BI:



- **Persistent Staging Area**

After being extracted from a source system, data is transferred to the entry layer of the Enterprise Data Warehouse, the persistent staging area (PSA). The data from the source system is stored unchanged in this layer. It provides the backup status at a granular level and can offer further information at a later time in order to ensure a quick restart if an error occurs.

- **Data Warehouse**

The way in which data is transferred from the PSA to the next layer incorporates quality-assuring measures and the clean up required for a uniform, integrated view of the data. The results of these first transformations and cleanups are stored in the data warehouse layer. It offers integrated, granular, historic, stable data that has not yet been modified for a concrete usage and can therefore be seen as neutral. The data warehouse forms the foundation and the central data base for further (compressed) data retentions for analysis purposes (data marts). Without a central data warehouse, the enhancement and operation of data marts often cannot be properly designed.

- **Architected Data Marts**

The data warehouse layer provides the mainly multidimensional analysis structures. These are also called architected data marts. Data marts should not necessarily be equated with added or aggregated; highly granular structures that are only oriented to the requirements of the evaluation can also be found here.

- **Operational Data Store**

An operational data store supports the operational data analysis. In an operational data store, the data is processed continually or in short intervals, and be read for operative analysis. In an operational data store, the mostly uncompressed datasets therefore are quite up-to-date, which optimally supports operative analyses.

Data Store

Various structures and objects that can be used depending on your requirements are available for the physical store when modeling the layers.

In the persistent staging area (PSA), the structure of the source data is represented by **DataSources**. The data of a business unit (for example, customer master data or item data of an order) for a DataSource is stored in a transparent, flat database table, the PSA table. The data storage in the persistent staging area is short- to medium-term. Since it provides the backup status for the subsequent data stores, queries are not possible on this level and this data cannot be archived.

Whereas a DataSource consists of a set of fields, the data stores in the data flow are defined by **InfoObjects**. The fields of the DataSource must be assigned with transformations in the SAP NetWeaver BI system to the InfoObjects. InfoObjects are thus the smallest (metadata) units within BI. Using InfoObjects, information is mapped in a structured form. This is required for building data stores. They are divided into **key figures**, **characteristics** and **units**.

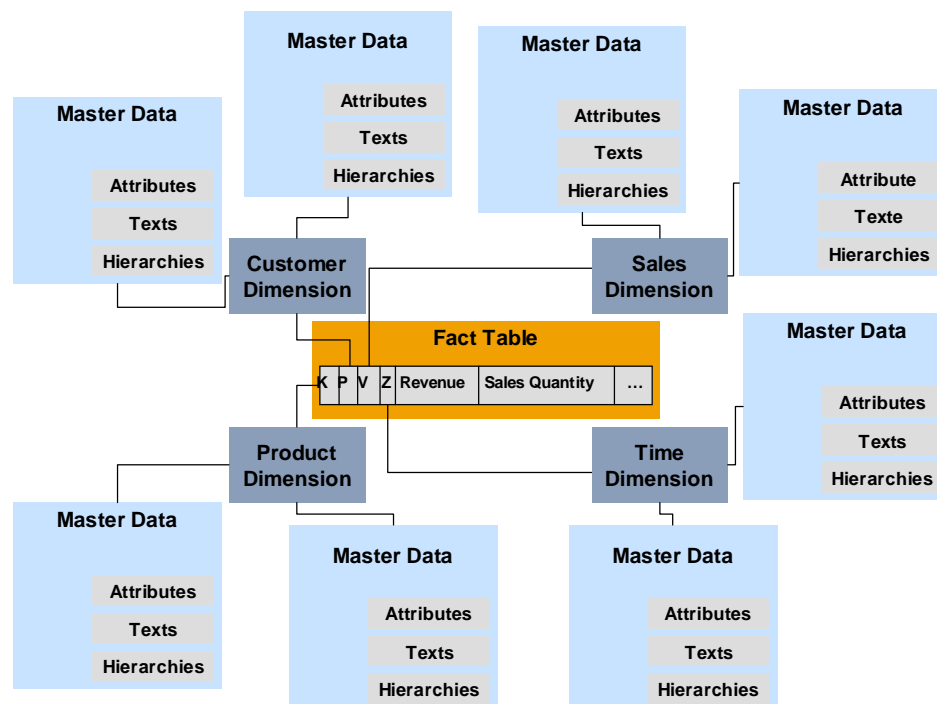
- Key figures provide the transaction data, that is the values to be analyzed. They can be quantities, amounts, or numbers of items, for example sales volumes or sales figures.
- Characteristics are sorting keys, such as product, customer group, fiscal year, period, or region. They specify classification options for the dataset and are therefore reference objects for the key figures. Characteristics can contain master data in the form of attributes, texts or hierarchies. Master data is data that remains unchanged over a long period of time. The master data of a cost center, for example, contains the name (text), the person responsible (attribute), and the relevant hierarchy area (hierarchy).
- Units such as currencies or units of measure define the context of the values of the key figures.

Consistency on the metadata level is ensured by your consistently using identical InfoObjects to define the data stores in the different layers.

DataStore objects permit complete granular (document level) and historic storage of the data. As for DataSources, the data is stored in flat database tables. A DataStore object consists of a key (for example, document number, item) and a data area. The data area can contain both key figures (for example, order quantity) and characteristics (for example, order status). In addition to aggregating the data, you can also overwrite the data contents, for example to map the status changes of the order. This is particularly important with document-related structures.

Modeling of a multidimensional store is implemented using **InfoCubes**. An InfoCube is a set of relational tables that are compiled according to an enhanced star schema. There is a (large) fact table (containing many rows) that contains the key figures of the InfoCube as well

as multiple (smaller) surrounding dimension tables containing the characteristics of the InfoCube. The characteristics represent the keys for the key figures. Storage of the data in an InfoCube is additive. For queries on an InfoCube, the facts and key figures are automatically aggregated (summation, minimum or maximum) if necessary. The dimensions combine characteristics that logically belong together, such as a customer dimension consisting of the customer number, customer group and the steps of the customer hierarchy, or a product dimension consisting of the product number, product group and brand. The characteristics refer to the master data (texts or attributes of the characteristic). The facts are the key figures to be evaluated, such as revenue or sales volume. The fact table and the dimensions are linked with one another using abstract identifying numbers (dimension IDs). As a result, the key figures of the InfoCube relate to the characteristics of the dimension. This type of modeling is optimized for efficient data analysis. The following figure shows the structure of an InfoCube:



You can create logical views (**MultiProviders**, **InfoSets**) on the physical data stores in the form of InfoObjects, InfoCubes and DataStore objects, for example to provide data from different data stores for a common evaluation. The link is created across the common Info Objects of the data stores.

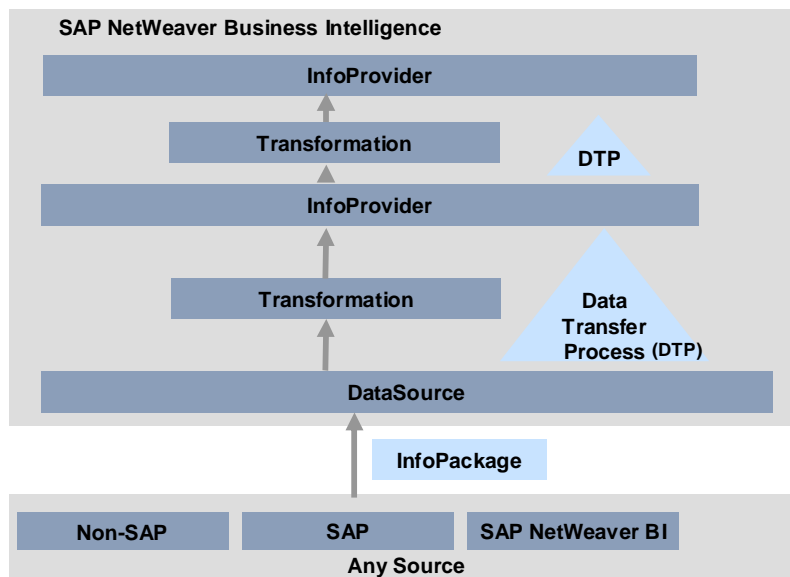
The generic term for the physical data stores and the logical views on them is **InfoProvider**. The task of an InfoProvider is to provide optimized tools for data analysis, reporting and planning.

Data Flow

The data flow in the Enterprise Data Warehouse describes how the data is guided through the layers until it is finally available in the form required for the application. Data extraction and distribution can be controlled in this way and the origin of the data can be fully recorded. Data is transferred from one data store to the next using load processes. You use the **InfoPackage** to load the source data into the entry layer of SAP NetWeaver BI, the persistent staging area. The **data transfer process** (DTP) is used to load data within BI from one physical data store into the next one using the described transformation rules. Fields/InfoObjects of the source store are assigned to InfoObjects of the target store at this time.

You define a load process for a combination of source/target and define the staging method described in the previous section here. You can define various settings for the load process; some of them depend on the type of data and source as well as the data target. For example, you can define data selections in order to transfer relevant data only and to optimize the performance of the load process. Alternatively, you can define if the entire source dataset or only the new data since the last load should be loaded into the source. The latter means that data transfer processes automatically permit delta processing, individually for each data target. The processing form (delta or entire dataset) for InfoPackages, that is the loading into the SAP NetWeaver BI System, depends on the extraction program used.

The following figure shows a simple data flow using two InfoProviders:



2.3 Control of Processes

As already described, the data passes a number of stations on its way through BI. You can control the processes for data with **process chains**. Process chains take on the task of scheduling data load and administration processes within SAP NetWeaver BI in a meaningful order. They allow for the greatest possible parallelization during processing, and at the same time prevent lock situations from occurring when processes execute simultaneously. Process chains also offer a number of functions, for example to define and bind operating system events or customer processes.

The processes are processed under event control. If a process has in a certain result, for example "successfully finished", one or more follow-on processes are started. Process chains therefore make central control, automation and monitoring of the BI processes as well as efficient operation of the Enterprise Data Warehouse possible. Process chains for automating certain processes can also be used in functions for business planning that are integrated in SAP NetWeaver BI. These are described in a subsequent section.

Since the process chains are integrated in the Alert Monitor of the Computer Center Management System (CCMS), processing of the BI processes is embedded in the central SAP Monitoring architecture of the CCMS.

2.4 Information Lifecycle Management

Information Lifecycle Management in SAP NetWeaver BI includes strategies and methods for optimal data retention and history keeping. It allows you to classify data according to how current it is and archive it or store it in near-line storage. This reduces the volume of data in the system, improves the performance, and reduces the administrative overhead.

Archiving solutions can be used for InfoCubes and DataStore objects. The central object is the **data archiving process**. When defining the data archiving process, you can choose between classic ADK archiving, near-line storage, and a mixture of both solutions. We recommend near-line storage for data that might no longer be needed. Storing historical data in near-line storage reduces the data volume of InfoProviders; however, the data is still available for reporting and analysis. Certified partners offer integrated near-line storage tools in SAP NetWeaver BI.

2.5 Extraction to Downstream Systems

You can use the **data mart interface** and **open hub destination** to broadcast BI data to systems that are downstream from the SAP NetWeaver BI system.

The data mart interface can be used to extract data to further SAP NetWeaver BI systems that you loaded into a SAP NetWeaver BI system and consolidated there. InfoProviders that were already loaded with data are used as the data source.

You can also extract data from a SAP NetWeaver BI system to non-SAP data marts, analytical applications and other applications. To do so, you define an open hub destination that ensures controlled distribution across multiple systems. Database tables (of the underlying database for the BI system) and flat files can be used as open hub destinations. You can extract the data from the database to a non-SAP system with Application Programming Interfaces (APIs) using a third-party tool.

2.6 Metadata and Documents

Metadata describes the technical and semantic structure of objects. It describes all the objects of a SAP NetWeaver BI system, including InfoObjects, InfoProviders, and all objects for analyzing and planning, such as Web applications. These will be explained later on in the document. You can use the **Metadata Repository** to access information about these objects centrally and to view their properties and the relationships between the various objects.

You can also add unstructured SAP NetWeaver BI information to data and objects. Unstructured information is **documents** in various formats (such as screen or text formats), versions and languages. The documents help to describe data and objects in BI in addition to the existing structured information. This allows you for example to add images of employees to their personnel numbers or to describe the meaning of characteristics or key figures in a text document.

3 Data Analysis and Planning

To analyze business data consolidated in the Enterprise Data Warehouse, you can choose between various methods. The analysis can be used to obtain valuable information from the dataset, which can be used as a basis for decision-making in your company.

Online Analytical Processing (OLAP) prepares information for large amounts of operative and historical data. SAP NetWeaver BI's OLAP processor allows multi-dimensional analyses from various business perspectives.

Data Mining helps to explore and identify relationships in your data that you might not discover at first sight.

You can implement planning scenarios with the solution for **business planning**, which is fully integrated in SAP NetWeaver BI.

3.1 Online Analytical Processing

The **OLAP** processor in BI provides the functions and services you need to perform a complex analysis of multidimensional data and to access flat repositories. It gets the data from the Enterprise Data Warehouse and provides this data to the BI front end, the Business Explorer, or certain interfaces (open analysis interfaces) as well as third party front ends for reporting and analysis. The InfoProviders serve as data providers. The data query of an InfoProvider is defined by a query. Queries are thus the basis of analyses in BI.

Functions and Services

The OLAP processor offers numerous functions for analyzing the data in a query:

- Navigation in queries, such as filter and drilldown methods (*Slice and Dice*), navigation in hierarchies (*Drill-down*) and swapping drilldown elements (*Swap*)
- Layout design for the result rows and hierarchy structures
- Formulation of conditions to hide irrelevant numbers in analyses and to define exceptions, hereby emphasizing critical values.
- Performance of calculations, such as aggregations, quantity conversions, and currency translations, and use of calculated key figures or formulas.
- Variables for parametrizing queries
- Option to call certain applications (*targets*) inside and outside of the BI system from within a query.
- Authorization concept for controlling user rights during data access
- Concepts for optimizing performance during data access, for example by indexing the underlying InfoProvider with aggregates or the SAP NetWeaver Business Intelligence Accelerator, or with caching services.

You can find a detailed explanation of how the query works, the individual analysis methods, and how to optimize performance in the following sections of this document.

3.2 Data Mining

You can use **data mining** to detect less obvious relationships and interesting patterns in large amounts of data. Data mining provides you with insights that had formerly gone unrecognized or been ignored because it had not been considered possible to analyze them.

The data mining methods available in BI allow you to create models according to your requirements and then use these models to draw information from your BI system data to assist your decision-making. For example, you can analyze patterns in customer behavior and predict trends by identifying and exploiting behavioral patterns.

The grouping algorithms provided by SAP data mining methods include for example clustering and association analysis. With clustering, criteria for grouping related data as well as the groupings themselves (clusters) are determined from a randomly ordered dataset. With **association analysis** you can detect composite effects and thereby identify for example cross-selling opportunities.

3.3 Business Planning

SAP NetWeaver BI provides you with a fully integrated solution for business planning. **BI Integrated Planning** enables you to make specific innovative decisions that increase the efficiency of your company. It includes processes that collect data from InfoProviders, queries, or other BI objects, convert them, and write back new information to BI objects (such as InfoObjects).

Using the **Business Explorer (BEx)** for BI Integrated Planning you can build integrated analytical applications that encompass planning and analysis functions.

Planning Model

The integration of planning functions is based on the planning model. The planning model defines the structure (such as granularity or work packages) of the planning. It includes:

- **Data storage.** All the data that was or will be changed is stored in real-time InfoCubes. MultiProviders or virtual InfoProviders can be used to edit the data, but they must always contain a real-time InfoCube. You can define logical characteristic relationships between the data (such as hierarchical structure, relationships by attributes) on the level of the InfoCube. Using data slices you can also protect data areas either temporarily or permanently against changes. On the InfoCube level, version concepts are prepared and hierarchical relationships are defined within characteristics.
- **Data selection** (characteristics and key figures) **for individual planning steps.** Aggregation levels that are used to structure or define views on data are defined here. (The aggregation level is the InfoProvider on which the input-ready queries are created.) In this way you can define the granularity in which the data should be processed.
- **Methods for manual or automatic data modification.** Planning functions with which you can copy, reevaluate, broadcast or delete data are provided for this purpose. You can define complex planning formulas; comprehensive forecasting functions are also available. The planning functions can be included in BEx applications as pushbuttons, but you can also include them in process chains and execute them at predefined times. You can combine planning functions in sequences (called planning sequences). In this way, administrative steps can be automated and tasks can be performed between different planning process steps, making processing easier to use for everyone involved. Examples include automatic currency conversion between various group units or inserted broadcasting steps for top-down planning.
- **Tools, such as filters, that can be used in queries and planning functions.** You can use these tools to personalize planning more flexibly. The variables for parametrizing the objects can also be used; these can normally be used at least wherever selections are important, for example in data slices.
- **Central lock concept.** This concept prevents the same data from being changed by different users at the same time.

Modeling Planning Scenarios

To support you in modeling, managing and testing your planning scenarios, BI Integrated Planning provides the **Planning Modeler** and the **Planning Wizard**.

The **Planning Modeler** offers the following functions:

- Selection of InfoProvider.
- Selection, modification and creation of InfoProvider of type *aggregation level*.

- Creation, modification and (de)activation of characteristic relationships and data slices.
- Creation and modification of filters.
- Creation and modification of variables.
- Creation and modification of planning functions.
- Creation and modification of planning sequences.

The **Planning Wizard** provides an easy introduction to planning modeling by offering guided navigation.

Creation of Planning Applications

Planning applications are BI applications that are based on a planning model. In a planning application, the objects of the planning model are linked to create an interactive application that permits the user to create and change data manually and automatically. The modified data is available immediately (even if it was not saved first) for evaluation using all the OLAP functions.

Performing Manual Planning

You can either create and execute BI applications with the BEx Analyzer or you can create them with the Web Application Designer and execute them on the Web.

If you use the BEx Analyzer, you have access to all the functions of Microsoft Excel, also for planning. You can process the data locally in Microsoft Excel and then load it back to the central database. You can enhance the centrally managed application to suit your needs using Microsoft Excel; the centrally defined process steps remain protected and can be filled with additional calculations using a defined Microsoft Excel function.

4 Tools for Accessing and Visualizing Data

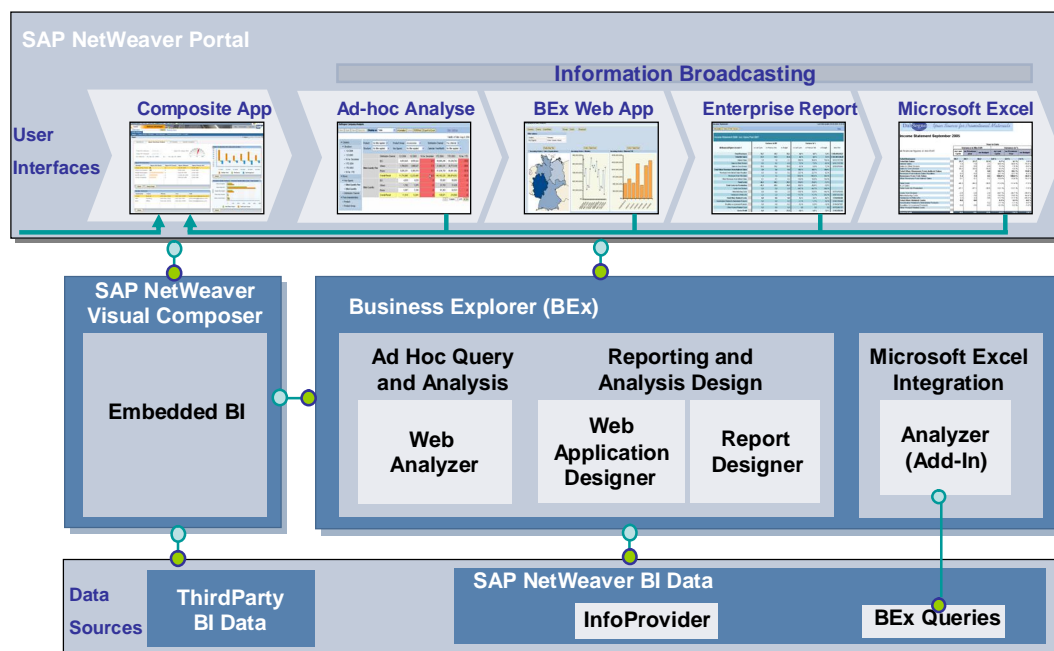
With the **Business Explorer (BEx)**, SAP NetWeaver BI provides you with a business intelligence comprising flexible tools for operative reporting, strategic analysis and decision making in your organization. These tools include query, reporting, and analysis functions. Authorized employees can analyze both historical and current data in various levels of detail and from various perspectives. The data can be stored in the BI system or other systems.

You can also use Business Explorer tools to create planning applications, and for planning and data entry.

Data analysis and planning of enterprise data can be either web-based (using SAP NetWeaver Portal, for example) or can take place in Microsoft Excel.

You can also take data from the BI system together with data from other systems and make it available for users in what are known as composite applications. **SAP NetWeaver Visual Composer** helps you to create web-based analytical applications

Tool Overview



BI applications are created using the various tools in Business Explorer or SAP NetWeaver Visual Composer. They can then be published to SAP NetWeaver Portal.

BEx queries are created using BEx Query Designer and can be used in BEx Analyzer for analysis in Microsoft Excel or for web-based analysis. The data analysis can also be based on InfoProviders from SAP NetWeaver BI or on multidimensionally stored data from third-party providers.

For web-based analysis, Web Application Designer allows you to create Web applications. Report Designer enables you to create formatted reports, while Web Analyzer provides tools for ad hoc analysis.

Planning applications can be created using BEx Analyzer and BEx Web Application Designer.

Using information broadcasting, you can broadcast the generated BI applications by e-mail, or publish them to the portal.

4.1 Query Design

As a basis for data analysis and planning, you define **queries** for the various InfoProviders. By selecting and combining InfoObjects (characteristics and key figures) or reusable query elements, you determine the way in which you evaluate the data in the selected InfoProvider.

The BEx Query Designer is the tool you use to define and edit queries.

Main Components

The most significant components of the query definition are filters and navigation:

- The **filter** defines the possible set of results that is restricted with selections of characteristic values of one or more characteristics. For example, you restrict the characteristic *Product* to the characteristic value *Fax Devices*.
- You define the contents of the rows and columns for the **navigation**. The arrangement of row and column content determines the initial view for the query.

You can also select free characteristics to change the initial view at query runtime. You use this selection to specify the data areas of the InfoProvider through which you want to navigate.

For example, the characteristic *Customer* is in the rows of the initial view. By filtering on the product *Fax Devices* you only display customers who purchased a fax device. If you include the characteristic *Distribution Channel* from the free characteristics in the rows, you enhance the initial view of the query. You see which customers bought fax devices from which distribution channels.

The query is based on the two axes of the table (rows and columns). These axes can have a dynamic number of values or be mapped using structures. **Structures** contain a fixed number of key figures or characteristic values. You can save the structures in the InfoProvider so they can be used in other queries.

Defining Characteristics and Key Figures

Query definitions allow the InfoProvider data to be evaluated specifically and quickly. The more detailed the query definition, the faster the user obtains the required information.

You can specify the selection of InfoObjects as follows:

- You restrict characteristics to characteristic values, characteristic value intervals, or hierarchy nodes

For example, you restrict the characteristic *Product* to the characteristic values *Telephone* and *Fax Devices*. The query is then evaluated for products *Telephone* and *Fax Device* only, and not for the entire product range.

- You restrict key figures to one or more characteristic values

For example, you can include the key figure *Revenue* in the query twice. You limit the revenue once to the year 2006 and once to the year 2007 (2006 and 2007 are characteristic values of the characteristic *Calendar Year*). In this way you only see the revenue data for these two years.

- You use a formula to calculate key figures

For example, you can define a formula that calculates the percentage deviation between net sales and planned sales.

- You define exception cells

You can define exception cells for tables with a fixed number of rows and columns. This is only the case for queries, such as for a corporate balance sheet.

For example, you can override the values at the intersections of rows and columns with formulas. These values that are recalculated using the formula are displayed instead of the default values.

- You define exceptions

In exception reporting, you select and highlight values that are in some way different or critical. You define exceptions by specifying threshold values or intervals and assigning priorities to them (bad, critical, good). The priority of the exception defines the warning symbols or color values (normally shading in the traffic light colors red, yellow, and green) that the system outputs depending on the strength of the deviation. You also specify the cell restriction with which you specify the cell areas to which the exception applies.

- You define conditions

Conditions are criteria that restrict the display of data in a query. This allows you to hide data you are not interested in.

You can specify whether a condition applies to all characteristics in the drilldown, to the most detailed characteristic along the rows or columns, or only to certain drilldowns of defined characteristics or characteristic combinations.

When defining conditions, you enter threshold values and operators such as *Equal To*, *Less Than*, *Between*, and so on. Alternatively, you display the data as ranked lists with operators such as *Top N*, *Bottom N*, *Top Percentage*, *Bottom Percentage*, and so on.

For example, you define a ranked list condition that displays the top three products that generate the largest net sales. You want to see the top three sales channels for each of these products. All other products and sales channels are hidden.

If you restrict or calculate key figures, you can save them in the InfoProvider for re-use in other queries. When using reusable query elements, you only have to edit the query element in one query, and the changes then automatically affect all other queries based on this InfoProvider and that contain this query element.

Flexible Use of Queries

To use queries flexibly, you can define variables. These serve as placeholders for characteristic values, hierarchies, hierarchy nodes, texts, or formulas. At query runtime, users can replace the variables with specific values. A query definition therefore can therefore serve as the basis for many different evaluations.

Use of Queries

A query is displayed with BEx Web in the predefined initial view in the SAP NetWeaver portal or in the BEx Analyzer, which is the design and analysis tool of the Business Explorer and is based on Microsoft Excel. By navigating in the query data, you can generate different views of the InfoProvider data. For example, you can drag one of the free characteristics into the rows or columns or filter a characteristic to a single characteristic value. To ensure that the views of the query you create in this way are also available for use in other applications, save them as **query views**.

4.2 Enterprise Report Design

Reports (Formatted Reports) for Print and Presentation

The Enterprise Report Design is the reporting component of the Business Explorer. With the Report Designer, it provides a user-friendly desktop tool that you can use to create formatted reports and display them in the Web.

You can also convert the reports into PDF documents to be printed or broadcast.

The purpose of editing business data in the form of reports is to optimize reports such as corporate balance sheets and HR master data sheets for printing and presentation. The focus of the Report Designer is therefore on formatting cells and fields. The row pattern concept

permits you to design the layout and to format dynamic sections of the report, independently of the actual amount of data (number of rows).

The data binding is provided by data providers; for reports, these are queries or query views. The Report Designer generates group levels according to the drilldown state of a query or query view. These group levels contain row patterns for the initial report view. You can adjust the layout and formatting of the initial view to your requirements.

Report Structure

A report can include **static and dynamic sections**. Both the static and the dynamic sections are based on queries or query views as data providers.

The data provider of a **static section** always contains **two structures**, one each in the rows and in the columns. You can place the fields wherever you like within a static section. This allows you to freely design the layout of corporate balance sheets, for example.

The data provider of a **dynamic section** has **one or more characteristics in the rows** and one structure in the columns. Within a dynamic section, the fields can only be moved from external group levels to internal ones. In dynamic sections, **the number of rows varies at runtime, whereas the number of columns is fixed**.

Easy Implementation of Formatting and Layout Requirements

The Report Designer offers a number of formatting and layout functions.

- You can use **standard formatting functions** such as font, bold and italics, background colors, and frames.
- You can **include texts, images, and charts** in your reports.
- You can **change the layout** of a report. For example, you can add rows and columns, change the height and width of rows and columns, position fields (such as characteristic values, key figures, filters, variables, user-specific texts) using drag and drop, as well as merge cells.
- You can **apply conditional formatting** to overwrite the design for specific characteristic values, hierarchy nodes, and so on, specified by the row patterns.
- You can **display BI hierarchies** in your report.
- You can **freely design the header and footer sections** of your report, as well as the individual pages.
- You can **create reports that comprise multiple independent sections** that have different underlying data providers. These sections are arranged vertically in the report.
- You can **define page breaks** between report sections or for group level changes.

4.3 Web Application Design

Web Applications with BI Contents

With the Web application design you can use generic OLAP navigation on your BI data in Web applications and dashboards and create Web-based planning applications. Web application design incorporates a broad spectrum of Web-based business intelligence scenarios, which you can adjust to meet your individual needs using standard Web technologies.

Web Application Designer

The central tool of Web application design is the BEx Web Application Designer, with which you can create interactive Web applications with BI-specific contents, such as tables, charts and maps. Web applications are based on Web templates that you create and edit in the Web Application Designer. You can save the Web templates and access them from the Web browser or the portal. Once they are executed on the Web, Web templates are referred to as Web applications.

You can use queries, query views and InfoProviders as the data provider for Web applications.

Predefined Web Items for Data Visualization and Layout Design of Web Applications

A number of predefined **Web items** are available for visualizing the data and for designing the layout of Web applications. Each Web item has **characteristics (parameters)** that can be overwritten and adapted to the particular application. Web items can be stored as **reusable elements** and used as a template for other Web items.

You can use the *Analysis*, *Chart*, *Map* and *Report* Web items to **visualize the data**.

- The *Analysis* Web item displays the values of a data provider as a table in the Web application. The table contains a large number of interaction options for data analysis.
- The *Chart* Web item represents the data in a graphic. You can select a chart type (bar chart, line chart, doughnut chart, pie chart, etc.) and configure it individually.
- The *Map* Web item represents geographic data in the form of a map in which you can navigate.
- The *Report* Web item represents the data in formatted reports. The BEx Report Designer, described in the previous chapter, offers numerous options for layout design and formatting.

There are also numerous Web Items available for **layout design** of the Web application, such as *tab page*, *group*, and *container*. These Web items arrange the contents of the Web applications in a meaningful manner.

Interaction in Web Applications

By interacting within the Web application you can **change the data displayed** (for example, by setting filter values or changing the drilldown state). You can also influence **the display of data and the layout of the Web application** (for example, by changing the representation as analysis table or chart or by showing or hiding panes).

The following options are available for interaction within the Web application:

- Context menu
You can show and hide the entries in the context menu as needed.
- Web items with which you can change the status of data providers and Web items
These include the Web items *filter pane*, *navigation pane*, *dropdown box* and *properties pane*.
- Command wizard
The command wizard is available in the Web Design API for special interactions (see section *Web Design API* below). With the command wizard, you can create your own command sequences and connect them with interaction elements.

In this way you can link commands to the Web items *button group*, *link*, *dropdown box* and *menu bar*. You can also link commands with an HTML link.

Web Design API

Business Explorer Web application design allows you to create **highly individual scenarios with user-defined interface elements** using standard markup languages and Web design APIs. In this way you can design the interaction in the Web applications as needed. The Web Design API provides the following functions:

- Creation of commands for data providers, planning applications, Web items and Web templates.
- Parameterization of Web items

The main tool for generating commands is the **command wizard**, which is an integral part of the Web Application Designer. With the command wizard you can easily generate commands such as *Refresh Data*, *Create and Edit Conditions and/or Exceptions* or *Export Web Application* step by step. Each command has parameters that you can set as required. The command is automatically inserted into the Web template.

Reusability of Web Applications

If a Web application only differs from another one in a few objects (a different data provider is displayed, for example, or a pushbutton does not appear or another Web item is used to display the data), you can reuse it in another Web application. In this way all the elements that existed in the first Web application are also displayed in the second one. Here you can overwrite individual Web items or data providers.

Further reusable Web applications are BI patterns such as the Information Consumer Pattern or the Analysis Pattern. These Web applications are designed for particular user groups and are used to unify the display of BI contents. For the user, this means that the same function is always located in the same place with the same name. The actual logic for display and interaction in BI applications is stored centrally for each pattern in just one Web template and must be changed only there if required.

4.4 Data Analysis in BEx Web Applications

Once the BEx Web applications have been created and made available, users can access them in the SAP NetWeaver Portal and change the view on the data as needed using various navigation functions. Different navigation functions are available, depending on the Web items that have been included in the Web application.

Navigation Using Drag and Drop

In a Web application, data is displayed by default in a table. Various navigation functions and additional areas, such as the navigation pane and the filter pane, are available for data analysis purposes.

The navigation pane displays the navigational state of a data provider. All the characteristics and structures of the data provider are listed. The navigational state specifies which characteristics and key figures are located in the columns, cells and free characteristics, and the order in which they are displayed. The filter pane displays the characteristics of the data provider and enables users to filter characteristics according to their characteristic values.

You can change the drilldown state of the query view in a Web application using drag and drop and display the required detailed information. For example, if you swap the axes in the navigation area using drag and drop, the analysis grid changes accordingly. For example, to get a detailed view that shows what the number of a certain cell consists of, drag the

corresponding characteristic or corresponding characteristic value from the navigation pane to the cell in the analysis grid using drag and drop.

Navigation Using Context Menu

The context menu also offers a number of navigation and analysis functions in the analysis grid, navigation pane, charts and maps. You can access these functions with a secondary mouse click on the text of a cell (characteristic, characteristic value, or structural component).

The context menu offers various functions, depending on the cell, the Web item and the settings when designing the BEx Web application:

Some of the most important standard functions are listed below:

- **Back**
Undoes the last navigation step on the underlying data provider.
- **Filters**
Filters the data according to various criteria:
You can select values for characteristics and structures in order to filter the Web application.
In one work step you can filter a characteristic on one value and drill down on the same axis according to a different characteristic.
If you only want to see the data for one characteristic value, you can define this value as the filter value. The characteristic itself is removed from the drilldown.
- **Change Drilldown**
Changes the display of the data. You can add a characteristic to the drilldown at exactly the required position. Furthermore, you can swap a characteristic or structure with another characteristic or another structure or swap the axes of the query.
- **Print Version**
Generates a print version of the Web application as a PDF file.
- **Broadcast and Export**
Broadcasts the Web application to other users by e-mail or in the portal. Alternatively you can schedule the Web application for printing or export it to Microsoft Excel.
- **Goto**
Goes to other queries, Web applications or Web-enabled reports, functions and transactions within and outside of the SAP NetWeaver BI system.

BEx Web Analyzer

The BEx Web Analyzer is a tool for data analysis that is called with a URL or as an iView in the portal. In the Web Analyzer you can open a data provider (query, query view, InfoProvider, external data source) and generate views on BI data (query views) using ad-hoc analysis. The query views can be used as data providers for further BI applications. You can also save and broadcast the results of your ad hoc analysis.

4.5 Data Analysis with Microsoft Excel

The **BEx Analyzer** helps you to analyze and present BI data in a Microsoft Excel environment. Queries, query views and InfoProviders that are created with the BEx Query Designer are embedded in workbooks for this purpose.

You can adapt the interaction of the workbooks individually and use formatting and formula functions of Microsoft Excel. The workbooks that are created can be saved as favorites or made available to other users using the role concept. The workbooks can also be sent to other user groups by e-mail. The broadcasting of BI contents will be explained in a later section.

SAP NetWeaver BI provides a default workbook with which you can create reports with no significant formatting effort. The default workbook is the workbook into which queries are opened. You can adapt this workbook to your needs or create a new one using the functions of Microsoft Excel or the design functions of the BEx Analyzer. You can then define this self-defined workbook as the default workbook for all subsequently opened queries.

In the BEx Analyzer, you work in three modes: In **analysis mode** you navigate in the report results, in **design mode** you develop flexible individual workbooks, and in **formula mode** you format the results area of the analysis pane to suit your requirements.

Analysis Mode

Once you have inserted a query in a workbook, the first view on the analysis grid displays the distribution of the characteristics and key figures in the rows and columns of the query. You can change the query and generate additional views on the BI data using the **navigation functions**.

When you navigate, you execute OLAP functions such as filtering, drilling down, and sorting characteristics and key figures in rows and columns of the analysis grid. You can also expand hierarchies as well as activate or deactivate conditions and exceptions. In the **variable dialog** you can specify variable values so that you only fill individual components of the query or the entire query with values when it is displayed in the BEx Analyzer.

There are the following types of navigation:

- Context Menu
You open the context menu for a given cell using the alternative mouse button.
- Drag and drop
You move individual cells in the analysis grid or in the navigation pane using the mouse.
- Symbols
The analysis grid and the navigation pane can contain various types of symbols for navigation, for example a symbol for sorting in increasing or decreasing order.
- Double-click the left mouse button
You can for example double-click a key figure in the analysis grid to filter the results according to this structure member.

Formula Mode

From analysis mode, you can go to formula mode from the context menu of the analysis grid. In formula mode you can use all the formatting functions of Microsoft Excel, including the auto-formatting functions.

In formula mode the result values called from the server with the formula are still displayed in the analysis grid. The formula of the selected cell is displayed in the formula bar. You can move/copy a formula to another position in the worksheet, thereby displaying the corresponding value in another cell of the worksheet independently of the table. For example, you can highlight or compare individual values, such as sales, for a certain period in the workbook outside the analysis grid. When you navigate in the analysis grid, only the data for the values is retrieved from the server; the standard formatting of the analysis grid is not retrieved. Your individual formatting is retained.

You can also add **VBA programs** (Visual Basic for Applications) that you defined yourself.

Design Mode

In BEx Analyzer design mode, you design the interface for your query applications. As for Web items in the Web Application Designer, you use design items to visualize the data and to design the layout of the workbooks. You can define characteristics that suit your requirements for each design item that you insert in a workbook.

In design mode, your workbook appears as a collection of design items represented by their respective icons. In analysis mode, the results of the query are displayed in accordance with the configuration in the design items. With the design items you create an interface that defines how you will analyze the results and how you will navigate in them in analysis mode.

Results of the query are displayed in the *analysis grid* design item, in which you also navigate and analyze the query results, with the assistance of the *navigation pane* design item. The interface of your query can be designed by adding and restructuring design items.

You can define filters with various design items, such as with a *dropdown box* or *radio button group*, and display a *list of filters* that are currently active.

The *List of Conditions* and *List of Exceptions* design items permit you to list all existing conditions and exceptions and the corresponding status, and to activate or deactivate them in the list.

4.6 Embedded BI and Composite Applications

The **SAP NetWeaver Visual Composer** helps you to create composite applications. It is delivered with SAP NetWeaver Composition Environment (SAP NetWeaver CE), a platform for developing Java-based applications. By embedding SAP BI in the Visual Composer, BI information can be linked directly with data from other business processes and the results can be reused at operational level. This can accelerate decision-making processes.

Using the entirely Web-based Visual Composer, you can create analytical applications whose data comes from a number of data sources without any programming knowledge. Your models can be based on data from various relational data sources and OLAP data sources of SAP as well as on third-party data. As with the Business Explorer (BEx), you can use **queries and query views** for your models with the SAP BI Connector; you can also integrate **data from SAP ERP and third parties**.

In the visual modeling environment, you can simply build the analytical applications and implement the results in the SAP NetWeaver Portal. Portal pages and integrated views on portal pages (iViews) can be created with BI contents or adjusted to your individual requirements. All portal users can access these pages and iViews from their PC.

Modeling BI Data

With the SAP NetWeaver Visual Composer, you can model the logic of your BI contents, design the layout of the user interface components, and integrate your model in the SAP NetWeaver Portal.

When you model the data logic, you configure which components of the user interface are displayed in the model at runtime and how users can work with the components. By simply dragging and dropping, you can move the UI components around the layout in order to size them according to their contents and position them next to or under one another.

Once you have modeled the logic, designed the layout of your BI contents, and generated the model in the portal, the SAP NetWeaver Visual Composer converts your model into code and sends it to an iView in the SAP NetWeaver Portal. It is available there immediately.

5 Publishing Content from BI

To make the various BI applications available to other employees in the company, Business Explorer provides you with a series of publishing functions.

BEx Broadcaster makes it easy to broadcast BI applications by e-mail or to the portal. Once you have created a BI application (query, Web application, enterprise report or worksheet), you can broadcast it straight away as either a precalculated document or as an online link to the application (depending on your settings).

You can also integrate the BI applications and the documents created in the BI system in the SAP NetWeaver Portal. In the portal, employees have a single point of access to structured and unstructured information from various systems and sources, allowing close real-time collaboration.

5.1 Broadcasting Content from BI

You can use BEx Broadcaster to make BI applications that you have created with the various BEx tools available to other users.

For beginners and end users, the Broadcasting Wizard is of particular interest. This Wizard provides step-by-step instructions in how to define the parameters required for broadcasting.

Broadcasting with BEx Broadcaster

You can use BEx Broadcaster to precalculate queries, query views, Web templates, reports and workbooks, and to broadcast them by e-mail, to the portal or to the printer. As well as precalculated documents in various formats (HTML, MHTML, ZIP, and so on), which contain historical data, you can also send online links to the BI applications, thus providing recipients with access to up-to-date data.

Further broadcast options and functions are available that are specially customized for system administration. These include the generation of alerts for the purpose of exception reporting, broadcasting by e-mail based on master data (bursting), broadcasting in multiple formats using various channels, and precalculation of objects for performance optimization.

Access in the SAP NetWeaver Portal

To store and manage BI content in the portal, the Knowledge Management functions from the SAP NetWeaver portal are used. In the portal, the ideal way for users to access BI information is via a central entry page (like the BEx Portfolio). This shows the documents in the Knowledge Management folder in which you published the content.

5.2 Integrating Content from BI into the Portal

You can integrate business content from the BI system into the SAP NetWeaver Portal. The portal allows you to access applications from other systems and sources, such as the Internet or intranet. Using one entry point, you can access both structured and unstructured

information. In addition to content from Knowledge Management (KM), business data from data analysis is available from the Internet and intranet.

By integrating content from BI into the portal, you can work more closely and more promptly with colleagues. This can be useful, for example, if you need to insert notes and comments for key figures and reports or run approval processes automatically. You participate here in decisions in a wider business context.

Integration Options

In addition to the option of broadcasting precalculated documents and online links to BI applications in KM folders within information broadcasting, the information for users is available in the enterprise based on roles. Since the BI system uses a role concept, you can carry out a simple integration of BI content into the portal. Depending on their role, users can view the same content that is available in their BI role in the portal.

They can also integrate BI applications using the iView concept. Users can link individual BEx Web applications into the portal as iViews; they can also display and use them on a portal page, together with iViews from the BI system or from other systems.

The documents and metadata created in the BI system (including metadata documentation) can be integrated into Knowledge Management of the portal using repository managers. There they are displayed together with other documents in a directory structure. Individual documents can also be displayed as iViews.

Calling Content from BI in the Portal

You have the following options when you call BI content:

- The BEx Web applications are started directly from portal roles or portal pages as iViews.
- The BEx Web applications are stored as documents and links in the Knowledge Management (KM). They are displayed for selection with the iView *BEx Portfolio* or *KM Navigation iView*.

A complete Knowledge Management folder is displayed in the KM navigation iView. The KM Navigation iView allows you to execute Collaboration functions for these documents and links. The BEx portfolio is a special visualization of the KM navigation iView that is specially adapted to the needs of BI users.

6 Performance

A variety of functions are provided to help you improve the performance of your BI system. The main functions are:

- **SAP NetWeaver Business Intelligence Accelerator**

This tool will help you to achieve significant performance improvements when reading queries from an InfoCube. It is available with installed and preconfigured software on specific hardware. The data in an InfoCube is provided in compressed form as a BI accelerator index. SAP NetWeaver BI Accelerator thus provides you with rapid access to any data in the InfoCube, while keeping the administration effort to a minimum. It can be used for complex scenarios with unpredictable request types, high data volume and request frequency.

- **Aggregates**

Relational aggregates are another way in which you can improve the read performance of queries when reading data from an InfoCube. The data in an InfoCube is saved in

relational aggregates in aggregated form. Relational aggregates are useful if you want to improve the performance of one or more specific queries, or make specific improvements to reporting with characteristic hierarchies.

- **OLAP Cache**

A global and local cache are both available for buffering query the results and navigation states calculated using the OLAP processor:

The global cache is a cross-transaction application buffer, in which the query navigation states and query results calculated using the OLAP processor are stored on the application server instance. With similar query requests, the OLAP processor can access the data stored in the cache.

Queries can be executed much faster if the OLAP processor can read data from the cache. This is because the cache can be accessed far faster than InfoProviders since it is not necessary to access the database.

In the local OLAP processor cache, the results calculated by the OLAP processor are stored in a special storage type in the SAP Memory Management System (roll area) for each session.

A global and local cache are both available for buffering query the results and navigation states calculated using the OLAP processor:

7 Security

You define who may access what data so that your Business Intelligence solution can map the structure of you enterprise while at the same time satisfying the security requirements.

An authorization allows a user to perform a certain activity on a certain object in the SAP NetWeaver BI system. There are two different concepts for this depending on the role and tasks of the user: **standard authorizations** and **analysis authorizations**.

Standard Authorizations

All users who for example work in the Data Warehousing Workbench, the BEx Broadcaster or the Query Designer need standard authorizations

Standard authorizations are based on the SAP authorization concept Each authorization refers to an object and defines one or more values for each field that is contained in the authorization object. Individual authorizations are grouped into roles by system administration. You can copy the roles delivered by SAP and adjust them as needed. The authorizations are assigned to the master records of individual users in the form of profiles.

Analysis Authorizations

All users who want to display transaction data from authorization-relevant characteristics require analysis authorizations for these characteristics. Analysis authorizations use their own concept, which takes the special features of reporting and analysis in SAP NetWeaver BI into consideration. For example, you can define that employees may only see the transaction data for their cost center.

You can add any number of characteristics to an analysis authorization and authorize single values, intervals, simple patterns, variables as well as hierarchy nodes. Using special characteristics you can restrict the authorizations to certain activities, such as reading or changing, to certain InfoProviders, or to a specified time interval. You can then assign the authorization to one or more users either directly or using roles and profiles. All characteristics of the underlying InfoProvider that are indicated as authorization relevant are checked when a

query is executed. Using the special authorization concept of SAP NetWeaver BI to display query data, you can thus protect especially critical data.

8 BI Content

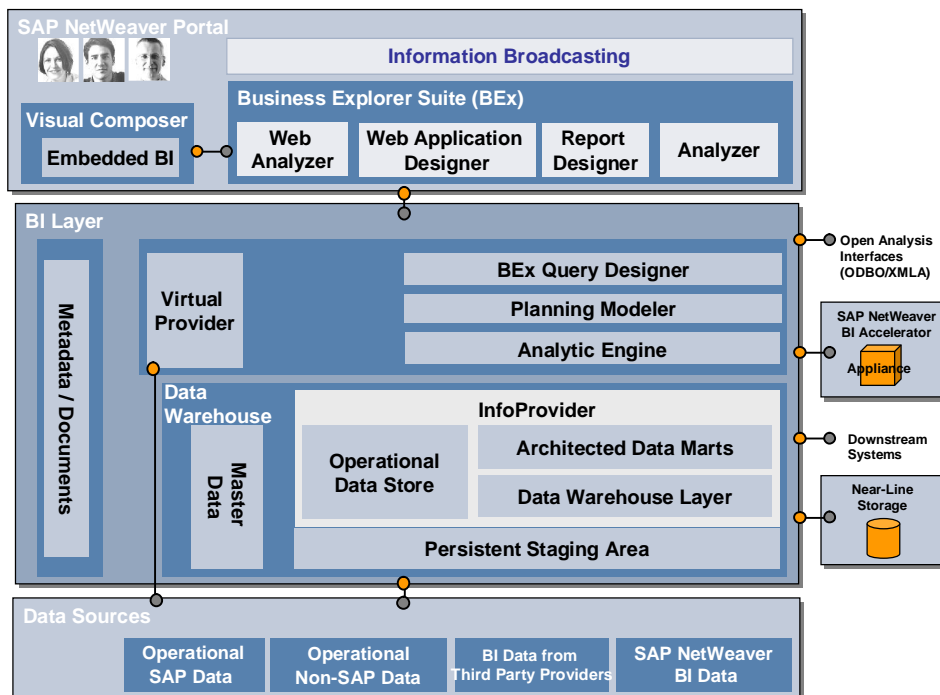
SAP shares its deep knowledge of the most varied business and industrial applications with its users. This knowledge, which helps users to make their decisions, is available as **BI Content**. The high degree to which SAP applications are integrated with SAP NetWeaver BI enables you to use **preconfigured, role-based information models** of BI Content for analysis, reporting and planning. BI Content provides the relevant BI objects for selected roles within a company, from extraction to analysis, in an understandable, consistent model. BI Content thus permits you to introduce SAP NetWeaver BI efficiently and cost-effectively in your company.

BI Content is delivered by SAP and can be used either directly or as a template to be adapted to customer needs. Customers and partners can create their own BI Content and deliver this content to their customers or business areas.

BI Content contains sample data (demo content) that can be used as display material.

9 Overview of the Architecture of SAP NetWeaver BI

The figure below shows a simplified view of the architecture of a complete BI solution with SAP NetWeaver BI:



SAP NetWeaver BI can connect any data sources using various interfaces that are aligned with the origin and format of the data.

This makes it possible to load the data into the entry layer, the Persistent Staging Area. From there, one or more layers of the data warehousing architecture prepare the data so it can be used for a specific purpose and stores it in InfoProviders. During this process, master data enriches the data models by delivering information such as texts, attributes, and hierarchies.

While data can be replicated from the source to the SAP NetWeaver BI system, it is also possible to access the source data directly from the SAP NetWeaver BI system using VirtualProviders.

The analytic engine provides methods and services for analysis and planning as well as generic services such as caching and security.

You can use the planning modeler to define models that allow data to be entered and changed in the scope of business planning.

You can use the BEx Query Designer to generate views of the InfoProvider data that are optimized for analysis or planning purposes. These views are called queries and form the basis for analysis, planning, and reporting.

Metadata and documents help to document data and objects in SAP NetWeaver BI.

You can define the display of the query data using the tools of the Business Explorer Suite (BEx). The tools support the creation of Web-based and Microsoft Excel-based applications for analysis, planning, and reporting.

You can use the SAP NetWeaver Visual Composer to create Web-based analytical applications. This enables you to provide users with the data from the SAP NetWeaver BI system together with data from other systems in composite applications.

You can use information broadcasting to broadcast the BI applications you created using the BEx tools by e-mail or to the SAP NetWeaver portal. You can also integrate content from BI into the SAP NetWeaver portal using roles or iViews.

SAP NetWeaver BI has an open architecture. This allows the integration of external, non-SAP sources, the broadcasting of BI data to downstream systems, and the moving of data to near-line storages to decrease the volume of data in InfoProviders. Third-party tools for analysis and reporting can also be connected using the open analysis interfaces (ODBO, XMLA).

The SAP NetWeaver BI Accelerator improves the performance of queries when reading data from InfoCubes. It can be delivered as an appliance that is preconfigured to partner hardware.