A Cognos® White Paper

LEVERAGING YOUR SAP® DATA WITH
BUSINESS INTELLIGENCE FROM COGNOS

COGNOS®

Better Decisions Every Day™

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OVERVIEW

As a leading Enterprise Resource Planning (ERP) application, the SAP R/3 system offers two key advantages for companies of all sizes across all industries: it addresses every business function and it offers the means to link related tasks into a business process that is supported by computer-based transactions. By providing corporate-wide integration of an organization's business processes, the R/3 system meets a broad range of business requirements. It also stores essential data related to these critical business functions, which include financial accounting and controlling, sales and distribution, materials management, production planning, and human resources management.

While companies have been successful at reengineering their business processes with R/3, they face significant challenges as their implementation progresses toward satisfying end-user reporting and analysis needs.

> *Flexible on-demand report creation.* While some reports are created by the SAP R/3 system, they do not provide end users with the ad hoc reporting and analysis capabilities required by competitive organizations today.

> *Identifying the right data for reports.* The underlying database that supports the installation of the entire R/3 system is comprised of eight to ten thousand tables. This large number of tables makes it difficult to identify where the data desired for a specific report actually resides.

> *SQL provides limited data exposure.* Within the specialized SAP R/3 environment, it is not possible to expose all of the data using SQL. Some critical data resides in pool and cluster tables and can only be exposed using proprietary interfaces from SAP, such as ABAP/4 (Advanced Business Application Programming 4GL).

> *ABAP programming is time consuming and highly specialized.* While ABAP allows data from all SAP R/3 tables to be extracted, it is a time-consuming process that requires specialized skills that are costly and increasingly difficult to find. Not only is the initial implementation of ABAP extracts expensive, but these programs are difficult to enhance and maintain as user requirements evolve over time.

The solution to addressing these issues involves both data warehousing and business intelligence. First, data must be extracted from the SAP R/3 production system and moved to a data mart or data warehouse environment. Moving data away from the SAP database server ensures that there is no performance degradation to the SAP transactional system.

Once SAP data is stored in the open, non-proprietary target database format, users can easily access, analyze, and report on their data using business intelligence tools. Cognos business intelligence tools are the established tools of choice for delivering the potential of data warehouses and data marts.

However, companies still need enabling technology that allows a data warehouse or data mart environment to be created from SAP data. Cognos now delivers an extraction,

transformation, and loading (ETL) tool that makes it possible for SAP customers to cost-effectively migrate their transaction data into a data warehouse. With Cognos Accelerator™ for SAP, designers can easily identify the required SAP and non-SAP data they wish to include in their data warehouse or data mart, apply transformations for cleansing or reformatting the data, and extract it on an incremental basis to populate a target database for reporting and business analysis.

Cognos Accelerator was designed to eliminate costly and time-consuming SAP extraction projects. Its tight integration with SAP, coupled with its ease-of-use and automated ABAP/4 generation, makes it the fastest route to maximizing the return on investment in SAP.

This paper addresses the following key issues facing SAP customers today:

> The need for reporting and decision support

> The limitations of existing approaches to reporting and decision support within the SAP environment

> The need to overcome SAP reporting and decision support limitations

> The return on investment that Cognos business intelligence delivers to the SAP environment

THE NEED FOR REPORTING AND DECISION SUPPORT

In today's increasingly fast-paced business environment, corporations are forced to seek more effective ways of gaining competitive advantage. Many organizations have discovered that changing the way they use information and deliver it to people across the enterprise can have a profound effect on their ability to compete successfully. Essentially, information must be readily available and easy to work with.

The increased adoption of data warehouses is testimony to corporations' desire to leverage their investments in transactional data—to achieve both increased operational responsiveness and decision support at the managerial level. However, in order to achieve these organizational goals information systems must possess the following critical characteristics:

1. *Responsiveness.* The system must have fast and predictable response times in order for users to have sufficient faith to make consistent use of it.

2. *Quality.* Users must have confidence that the data being reported is correct, whether it is derived from single or multiple operational systems, or is combined with external data, such as industry averages or competitive data.

3. *Flexibility.* Many operational reports are used in the same way each day and can be predefined to suit the needs of many users who have similar requirements. Often, however, companies face a further challenge: a worthwhile decision support system must provide users with the flexibility to look at data in new ways, without relying on IT intervention.

4. *Ease-of-Use.* In order to leverage the return on investment in data, end-user tools for accessing the data must be sufficiently easy to use. This way, users can satisfy most of their own information requirements without extensive training or IT assistance.

5. *Functionality.* Given the breadth of business processes within a single corporation and the variety of user functions that must be supported, the reporting and decision support environment must offer a wide range of functionality, including:

> Operational reporting, such as traditional detail/summary reports

> Analysis based on summarized data, typically for comparative studies or trend analysis

> Statistically-based analysis that uncovers trends in data that would otherwise be missed

> The ability to forecast future results based on historical data and user-defined parameters

The most effective way to address end-users' operational and strategic requirements is to deploy business intelligence software tools. In addition to providing users with the capabilities to perform reporting and analysis on corporate data, these tools also deliver the flexibility and ease-of-use that ultimately determine how successful an enterprise reporting and decision support initiative will be.
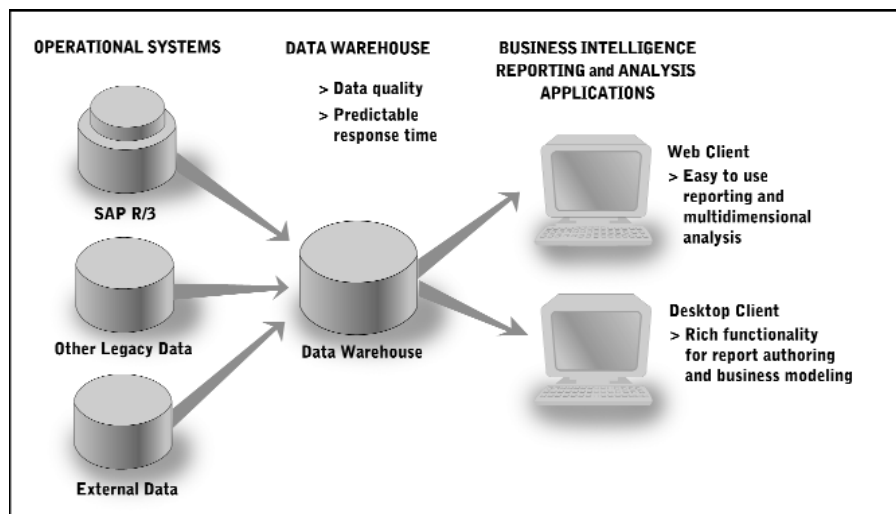
Corporations may need to bring together their ERP data, data from other operational systems, and external data, into an integrated reporting environment or data warehouse. Once there, the data quality and predictable response times encourage users to satisfy their reporting and analysis needs from either a desktop or browser client.

To achieve this in the SAP R/3 environment, IT professionals need solutions that allow them to cost-effectively access the data in their SAP transactional systems. Currently, this presents a number of challenges.

THE SAP ENVIRONMENT: REPORTING AND DECISION SUPPORT LIMITATIONS

Many of the challenges companies face when creating a reporting and decision support solution within the SAP environment stem from R/3's internal architecture, which is optimized for transaction processing rather than for query and reporting. SAP R/3 supports over 1,000 business processes and offers companies the ability to add new processes by customizing the software to meet their own specialized needs.

While this system is designed to meet the processing needs of its customers, the same cannot be said of its reporting environment. The R/3 system does provide a number of predefined reports for each business function; however, many companies find that these do not satisfy all of their operational reporting requirements or the decision-making needs of line-of-business managers.

To address these end-user requirements, customers have tried the following approaches:
> Developing custom ABAP reports
> Providing end-user reporting tools
> Extracting SAP R/3 data to a data warehouse

DEVELOPING CUSTOM
ABAP REPORTS

The proprietary SAP programming language, ABAP/4, is used to produce custom reports that retrieve data directly from any type of SAP table for either screen display or printing. Most corporations have developed at least a few custom reports in this way; some up to hundreds of separate reports.

Since ABAP programming requires highly specialized skills, reports must be created by trained programmers. This has proven to be both expensive and time-consuming—not only for report creation, but for report maintenance as well. End-user communities' continual requirements for changes in report content and formatting have made this approach unfeasible, due to the drain on IT resources that it represents. Consequently, there is a large backlog of reporting requirements in most SAP customer sites today.

PROVIDING END-USER
REPORTING TOOLS

SQL-based reporting tools provide the flexibility and features that end users demand for standard and ad hoc reporting. There are two major challenges faced by organizations that want to deploy these tools widely for use against the R/3 system.

The first challenge is related to the broad appeal these tools have with end-user communities. With SQL-based reporting tools, people can perform minor report changes, such as formatting, they can add data to reports, filter and sort information, and create their own new reports without IT involvement. The popularity of end-user reporting tools has led to mass deployment in many organizations. However, widespread end-user querying and reporting can result in negative performance impact on the SAP R/3 production system.

The second challenge results from the fact that end-user reporting tools are SQL-based, and as such, are unable to access all of the data in an R/3 system. Certain table types, such as pool and

cluster tables, are not visible to tools that directly access the underlying RDBMS, and make this approach unsuitable in many cases. By accessing the underlying database directly, these tools also circumvent SAP's security system as well as table locking and other mechanisms that ensure data integrity.

In order to avoid these situations, many SAP installations have embarked on data extraction projects that move SAP data out of the production environment into an open, non-proprietary relational database.

EXTRACTING SAP R/3
DATA TO A DATA WAREHOUSE

Extracting SAP R/3 data to a data warehouse is commonly regarded as the best first step toward deploying an end-user querying, reporting, and analysis environment. However, building a warehouse from R/3 data presents IT with another set of challenges related to the complexity of the SAP schema and data structures, as well as the need for ABAP programming.

1. The Complexity of the SAP Schema
A complete R/3 system may contain over 8,000 tables, each of which may have a large number of fields. Without an in-depth knowledge of specific SAP modules, it is very difficult to locate desired data and understand inherent relationships in the data. While it is possible to use consulting resources to provide more in-depth SAP knowledge, these resources can be expensive and hard to find, and are not available on an as-required basis.

2. The Complexity of SAP Data Structures
Adding to the complexity of having a very large number of database tables are the special data structures employed by the SAP system. Often, several logical tables are grouped together to form a single physical table. This technique is used to handle the many small tables R/3 requires to drive application configuration, hierarchical data, and important transaction data. These tables are not accessible using conventional SQL database access tools.

3. ABAP Programming
SAP recommends the use of its proprietary programming tools such as ABAP/4 to access data within the SAP system. These tools do not access the data directly through the RDBMS; rather, they use SAP's Data Dictionary to determine how to correctly interpret the data within the R/3 system. The special formats described above require the use of ABAP programming to unlock the data in order to transfer it into the data warehouse.

4. Performance
Many corporations are finding that the available window for data warehouse updates is shrinking rapidly. This is due mainly to two factors: increasing globalization and increased transaction rates. As companies expand their businesses overseas, the requirement for 7x24 service expands. There is always someone somewhere who is adding transactions to the operational system while someone else needs to query the data warehouse. Expansion has also given rise to an increased number of transactions, as have point-of-sale systems and other data-capture technologies. The result is an increased number of transactions and a decreased amount of available time in which to update the warehouse with new content.

5. *The Need to Integrate SAP and Non-SAP Data*

SAP is often implemented on a module-by-module basis. This means that the Finance module may be deployed, while a company's Sales and Distribution functions still run on operational legacy systems. Alternatively, some organizations have no plans to move all of their business functions to the SAP environment, preferring custom solutions or other ERP applications for specific activities. In addition, organizations purchase competitive or industry data against which they benchmark their own performance. This mixed environment presents a situation in which both SAP and non-SAP data must be combined to populate the warehouse.

OVERCOMING SAP REPORTING AND DECISION SUPPORT LIMITATIONS

To overcome the limitations of existing reporting solutions for SAP and the SAP-specific requirements for data warehouse population, a viable reporting and decision support solution must:

1. Have tight integration with SAP

2. Be customizable to suit corporation-specific needs

3. Provide access to required data—including pool and cluster tables—without ABAP programming

4. Offer the ability to combine SAP and non-SAP data

5. Have no negative impact on the performance of the SAP production system

6. Allow incremental updating of the warehouse

7. Create the data warehouse in an open format so that it can support the organization's reporting tools of choice

Cognos Accelerator for SAP was developed to solve the SAP-specific limitations to reporting. It is a unique extraction, transformation, and loading tool that dramatically reduces the time and costs involved in populating a data warehouse with SAP R/3 data. Accelerator has two key components: the Designer and the Transformation Server.
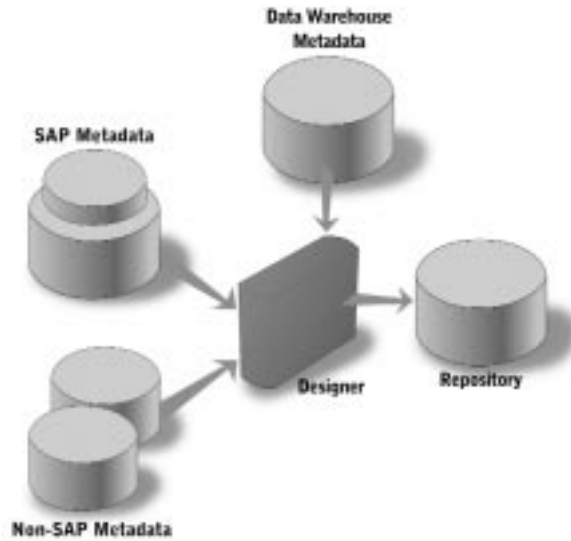
THE DESIGNER

The Designer is the graphical user interface that streamlines the process of defining the data movement specifications, transformations, and control logic required to populate the warehouse. With drag-and-drop simplicity, the data warehouse designer can define data mappings between sources and targets, and can focus on the iterative design and testing of the data mart or data warehouse. Familiar SQL expressions are used to define transformations on the data. Additional transformations are provided with the tool, along with a scripting language for creating custom transformations.

These data mapping rules, along with the metadata for SAP and non-SAP data sources and the target warehouse are stored in the metadata repository. When metadata is imported from SAP, the repository is populated with the table and column names and their descriptions, regardless of whether these are transparent, pool, or cluster tables. The information is stored in relational tables that are easily accessible with SQL.

Designer Architecture

Designer offers an efficient means of storing metadata from a variety of sources in a central repository.

THE TRANSFORMATION SERVER   The Transformation Server uses the metadata repository to extract and integrate data from SAP and non-SAP data sources, and to perform the required transformations. It automatically generates ABAP/4 code that is optimized to extract data from SAP tables—even pool and cluster tables. The server itself uses in-memory transformations, parallel pipelining, and data flow optimization to increase data throughput.
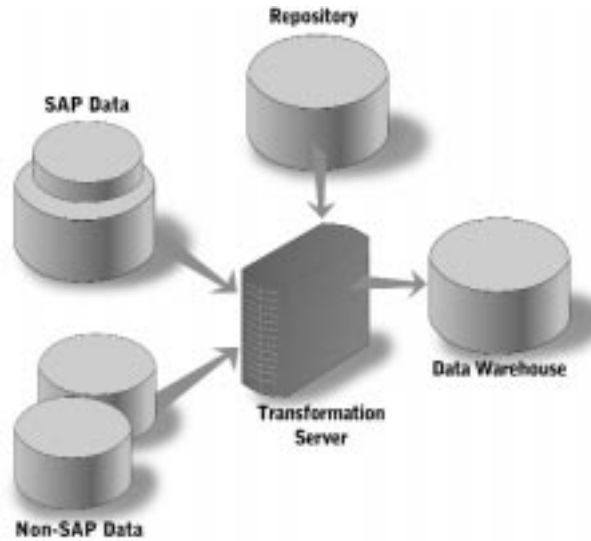
The Transformation Server uses the metadata repository to extract and integrate data from SAP and non-SAP data sources, and to perform transformations.

Each warehouse project may comprise many different jobs, each with its own execution schedule. The administrative functions in the designer are used to schedule and monitor jobs, as well as to check completion status and execution statistics.

THE ADVANTAGES OF
COGNOS ACCELERATOR

Tight Integration with SAP

Cognos Accelerator provides the tight integration with SAP R/3 environments that is essential to developing a sound reporting environment. Its graphical interface provides a tree view of the SAP schema, which makes it easy to see the logical groupings of tables within an SAP module. Each column has its SAP description displayed, taking the guesswork out of mapping SAP columns to target columns. This, coupled with Accelerator's search capability, lets warehouse designers navigate underlying SAP data models with ease. Once the required SAP data has been identified, it can be quickly mapped, along with any non-SAP data, to target database fields.
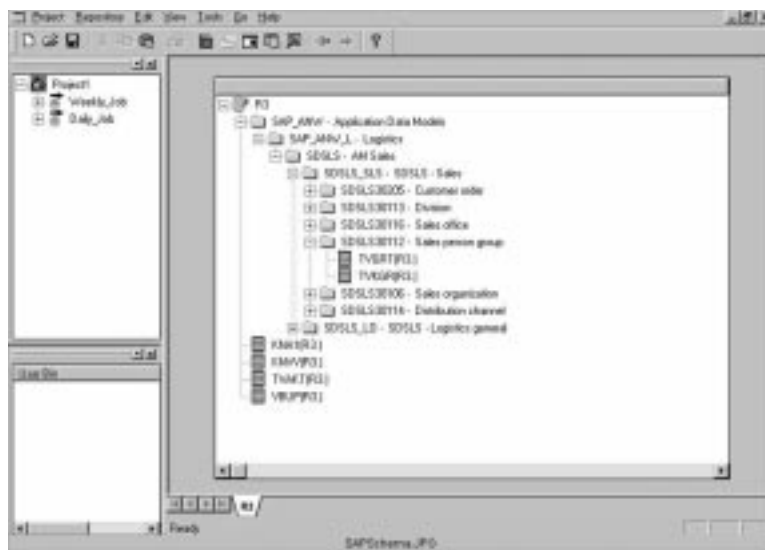
Cognos Accelerator's Designer significantly simplifies navigating the SAP schema.

Customization

Accelerator can be customized to suit corporation-specific needs. Any modifications customers make to their SAP database are reflected in Accelerator's view of the SAP Data Dictionary. This customized data is available for mapping to the warehouse in the same way as data defined by the standard SAP modules. While Accelerator provides a number of predefined transformations, further transformations can be defined using its scripting language. As well, custom functions can be written in C or ABAP, then used via the same user interface.

Data Access Without ABAP Programming

Accelerator provides access to all required data—including pool and cluster tables— by dynamically generating ABAP code from the mapping specifications created in the user interface. The ABAP generation function translates standard ANSI SQL constructs into optimized OPEN SQL, which is supported by ABAP/4. In addition, Accelerator translates common warehousing functions, such as lookups, into ABAP code. Changes or additions to the mappings between source and target databases can be easily made within Accelerator's GUI. It then dynamically regenerates the ABAP code to reflect any changes. In this way, the

warehouse can be designed using an iterative approach, which eliminates the lengthy and costly cycles typically associated with this activity. As well, the ongoing evolution of the warehouse is easily supported.

Combine SAP and Non-SAP Data

Most customers have both SAP and non-SAP data that they wish to combine in their data warehouse. With Accelerator, designers use the same interface to extract both types of data, which eliminates the need to use two different tools. By having both types of data available in the same interface, designers can ensure that all data is transformed into the correct output format, regardless of original input formats and locations.
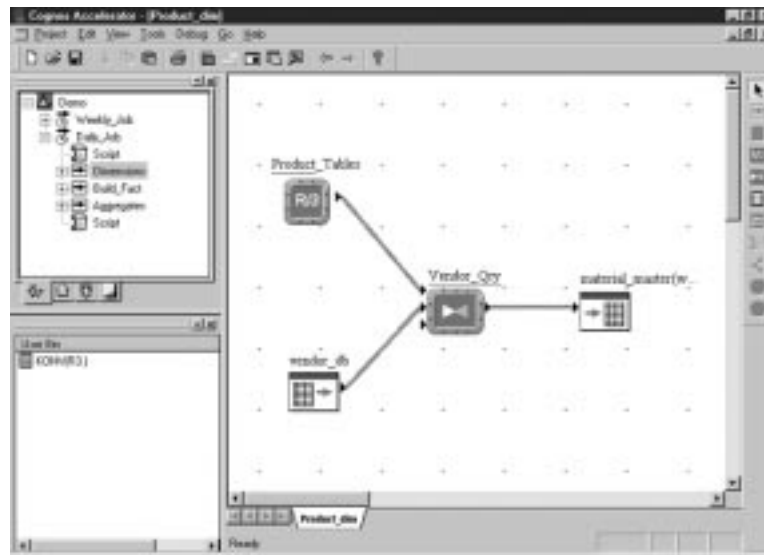
With Cognos Accelerator, you can integrate SAP and non-SAP data into your warehouse.

Minimal Impact on the SAP Production System

One of the major concerns with any query or extraction against the SAP production system is performance. This is because SAP does not contain a query optimizer, and OpenSQL does not support SAP JOIN statements. As a result, the responsibility for query optimization traditionally falls to the ABAP coder. However, by generating OpenSQL and employing query optimization techniques, Accelerator addresses this concern automatically. Optimal join ordering is determined using SAP's suggested ordering in the logical database.

Incremental Warehouse Updates

Given the requirement to perform data extraction in the shortest timeframe possible, Accelerator allows for the design and specification of incremental updates to the data warehouse. SAP has no consistent architecture for capturing incremental data changes. With Accelerator, a variety of techniques can be used, depending on the SAP data required.

Open Warehouse Format

Accelerator lets designers create the data warehouse in an open relational format. Because there are no proprietary structures, database administrators can manage the warehouse using third-party tools or those available from their database vendor. In addition, end users can query, report on, and analyze warehouse data using their business intelligence tools of choice.

ACCELERATED DATA MART FUNCTIONALITY

In keeping with our long-term SAP strategy, Cognos is currently developing preconfigured data marts. These will include the data definition language for data marts based on specific SAP modules, as well as the data mappings required to populate the models. It is our intention to provide SAP customers with the ability to easily extend these data marts to include non-SAP data and to customize them to meet their unique business requirements.

THE RETURN ON INVESTMENT THAT COGNOS BUSINESS INTELLIGENCE DELIVERS TO THE SAP ENVIRONMENT

Once R/3 data has been cost-effectively deployed to a data warehouse with Accelerator, it can be leveraged by Cognos' award-winning business intelligence tools for data query, analysis, and reporting. SAP R/3 users can maximize the power of their superior business application with the best business intelligence tools available for both LAN and Web environments.

Cognos business intelligence software turns corporate data into meaningful information and channels it to support business goals across departments. With our tools, you can deliver information across the enterprise—to senior executives and business managers, to remote sales forces and branch offices across the globe—in a way that reflects their view of the business, not the way the database or data warehouse is structured.

Cognos delivers PowerPlay®, Impromptu®, Scenario™ and 4Thought™ for the client/server environment, while PowerPlay Server Web Edition, Impromptu Web Query, and Impromptu Web Reports make analysis and reporting possible via Web browsers. Each delivers a preferred solution for a specific set of users, as depicted in the table below:

User Functionality	Tools
• Rich reporting and analysis functionality	CognoSuite (Impromptu, PowerPlay, and Scenario)
• Easy access to detailed information or aggregate data • Drill through to detail from summary information • Standard reports available in Web browser • Predictive modeling	PowerPlay Server Web Edition Impromptu Web Query Impromptu Web Reports 4Thought

RICH REPORTING AND ANALYSIS

Impromptu's query and reporting capabilities are unified in one interface, and give SAP users a business view of their data. PowerPlay, with the response time and functional capabilities of an OLAP (online analytical processing) engine, provides SAP users with a multidimensional view of their database. Scenario's robust statistical engine, combined with its intuitive user interface, gives users the ability to easily uncover important patterns and relationships within SAP data.

Together as CognoSuite, these tools offer SAP R/3 users a complete business intelligence environment for effective decision support.

Impromptu offers:

> Reporting on SAP data warehouses

> Reporting across SAP modules

> One tool for reporting on SAP data, legacy data, or corporate warehouses

> Immediate access to SAP data

> Powerful ad hoc query and reporting capabilities

> HeadStart catalogs, for reporting directly against the production data, for the following SAP modules: FI/CO, SD, MM, LIS, and HR

Easily prepare reports on your SAP data using Impromptu's rich report authoring environment

PowerPlay offers:

> Market-leading OLAP analysis for SAP data

> Easy, programming-free creation of PowerCubes™

> The ability to drill down on charts and dimensions

> The ability to manage large volumes of data via LAN or Web infrastructures
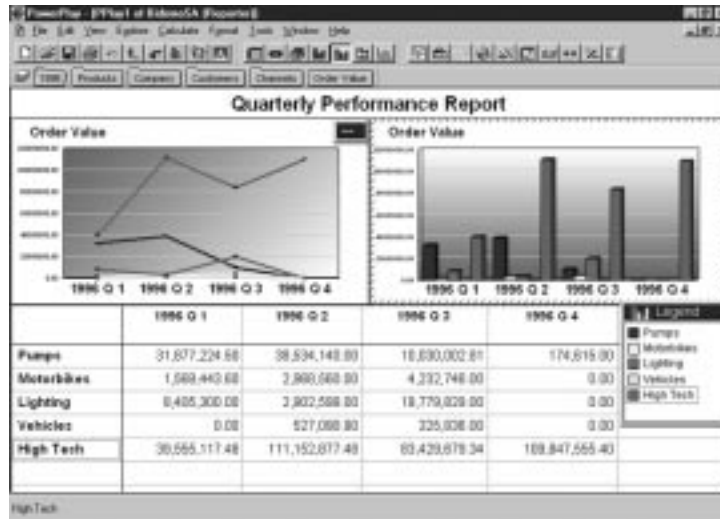
Easily track your key performance indicators using PowerPlay against your SAP data.

Scenario offers:

> Analysis techniques that ensure complete, objective results

> Easy identification and ranking of the factors that have an impact on any target business measure, such as profit margin

> Full integration with PowerPlay and Impromptu
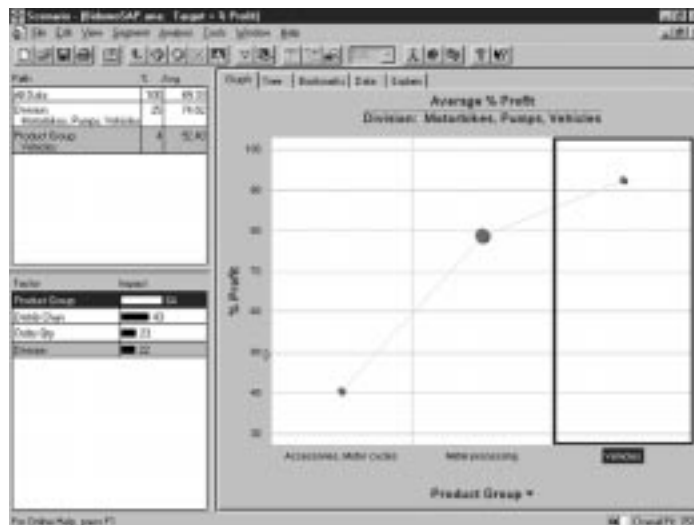
Use Scenario to identify and rank the factors that impact a target. For example, you can see that the divisional success is due primarily to the Vehicles product group.

EASY ACCESS TO INFORMATION
USING THE WEB BROWSER

Deploying Cognos business intelligence over the Web lets companies cost-effectively deliver its capabilities to everyone across the enterprise.

With PowerPlay Server Web Edition, users can interactively explore information in charts and crosstabs using their Web browsers. They can filter, sort, and view information in any combination and from any angle. Since users explore information with their Web browser, no client software needs to be deployed to the desktop.

Determine the top ten most profitable cities in a sales territory with PowerPlay Server Web Edition's easy-to-use browser-based graphical interface.

With Impromptu Web Query, users can take advantage of their browser's intuitive hyperlink interface to navigate corporate data as easily as they surf the Web. Impromptu Web Query presents users with a simple and integrated business view of SAP R/3 and other enterprise data sources, so they can easily locate the information that is important to them.

Easily create your own reports or choose from a list of predefined queries with Impromptu Web Query. While viewing the data, you can link to related information.

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BUSINESS MODELING
AND FORECASTING

Cognos 4Thought brings the power of predictive modeling to business planners. It automates what-if analysis, forecasting, and effectiveness measurement, so you can make accurate decisions that will steer your enterprise toward greater profitability.

Using award-winning technologies, 4Thought ensures the best predictive results from typical business data. It lets you easily collect and validate data, create accurate models, and quickly interpret your results in a business-oriented interface.
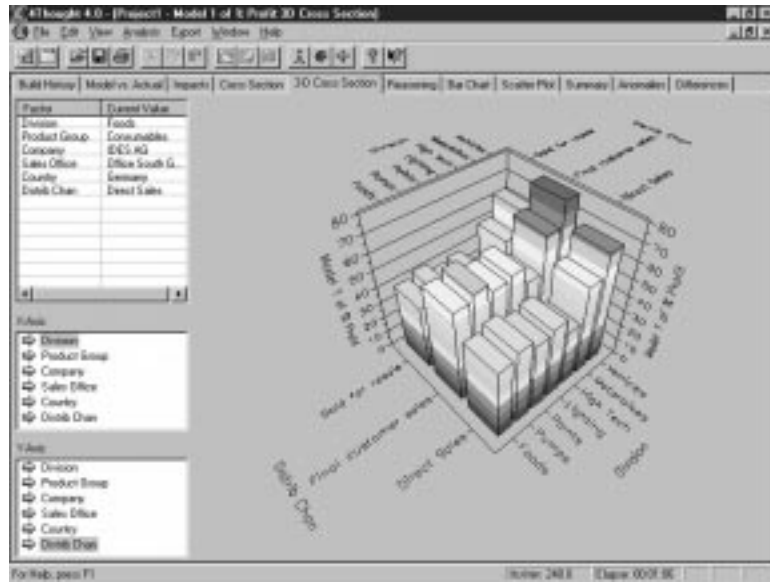
Use 4Thought to build highly predictive and accurate business models that can predict, for example, the percentage profit across channels in each division.

SUMMARY
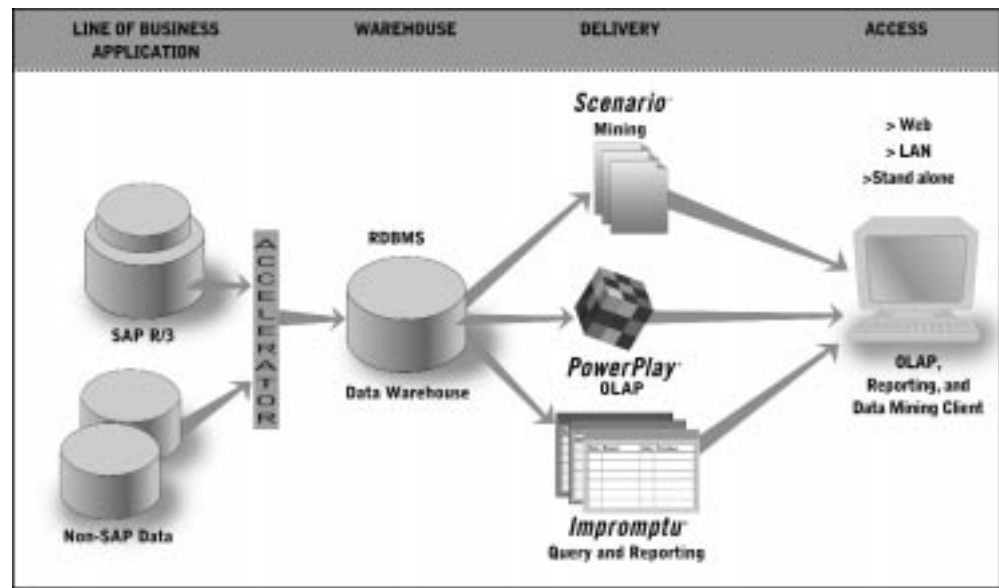
Accelerator makes it possible for SAP customers to cost-effectively migrate their SAP R/3 and non-SAP transaction data into relational and multidimensional reporting environments where it can be accessed, analyzed, and reported on by end users throughout the enterprise.

Accelerator's tight integration with SAP, its easy-to-use graphical interface, and automated ABAP/4 generation makes it the fastest route to maximizing the return on investment in SAP data.

In combination with Cognos' award-winning business intelligence tools, Accelerator is the enabling technology that unlocks the business knowledge contained in your SAP R/3 system. This knowledge can now be acted upon by your end users without affecting the performance of the production SAP system. Accelerator allows users to have their data in the right place, at the right time, and in the right form to make better business decisions, every day.

ABOUT COGNOS

Cognos delivers software that satisfies enterprise-wide business intelligence needs. With more than 900,000 seats in thousands of companies worldwide, Cognos business intelligence products consistently deliver the highest productivity gains to the user, the most manageable solution to the administrator, and the fastest return on investment (ROI) to the enterprise. The products support over 100 relational and OLAP data sources and seamlessly integrate with many enterprise applications, including Baan, Oracle Financials, PeopleSoft, and SAP. Available in seven languages, Cognos products are distributed through the company's sales offices and by 1,500 resellers worldwide.

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