

What Works

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Volume 19



The Data Warehousing Institute (TDWI) is very pleased to bring you Volume 19 of our *What Works: Best Practices in Business Intelligence and Data Warehousing* series, an outstanding collection of best practices in our industry. The publication you are holding contains a snapshot of some of the best and most innovative business intelligence (BI) and data warehousing teams and implementations in the world today.

A decade ago TDWI was formed to provide data warehousing professionals a single source of information to help them do their jobs more effectively and to stay current with the rapidly developing industry in which they worked. Over the years, this has evolved to include BI and business professionals, changing the focus and content of the types of articles that you now see in *What Works*. In addition to celebrating the 10-year anniversary of publications like *What Works*, TDWI now delivers education and research online, onsite, and through more than 20 events worldwide.

Even after 10 years of experience and practical education, we at TDWI are still observing IT and business professionals who are stretching beyond their realms of expertise to learn new techniques and skills in order to meet the needs of their companies. This is often a challenging task; however, companies depend on their teams and individuals to build better, more competitive businesses, based on the knowledge they can obtain through innovative BI and data warehousing systems, training, and IT resources like *What Works*. In this publication you will find valuable case studies featuring the accomplishments of teams that have risen to this challenge.

In addition to these case studies and to our insightful Q&A section, *What Works* includes articles from leading experts in the services, software, and hardware vendor community in what we call "Lessons from the Experts." These experts share technology perspectives and some of their convictions about what it takes to build a successful BI and data warehouse environment. While the articles vary in style and topic, all contribute significantly to the knowledge base needed to implement your business information strategy.

You will also find a timely article by Wayne Eckerson, TDWI's director of research, entitled "Next-Generation Business Intelligence," along with excerpts from two of TDWI's recent research reports: *Developing a BI Strategy for CRM/ERP Data* and *Development Techniques for Creating Analytic Applications*. Both reports provide definitions and frameworks for understanding these emerging technologies, as well as survey results that examine the current state of the market.

The Data Warehousing Institute strives to provide our readership with information that is educational, enlightening, and pertinent. We will continue to publish this thought-provoking collection of case studies and "Lessons" articles, and we look forward to your comments. If there is anything we can do to make this publication more valuable to you, please let me know. I would personally like to thank the companies who shared their stories and successes, along with the sponsoring vendors who are willing to share their technology insights and the lessons they have learned.

Please enjoy *What Works*, Volume 19.



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What Works

BEST PRACTICES IN BUSINESS INTELLIGENCE
AND DATA WAREHOUSING

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Next-Generation Business Intelligence

By Wayne Eckerson, Director of Research, TDWI

A new wave of business intelligence tools has arrived. This next generation of BI blends the once distinct worlds of reporting and analysis inside a dashboard interface, occupying the business intelligence “sweet spot.” (See Figure 1.) Tools or applications in this sweet spot deliver the analytical functionality that a majority of users in an organization—typically around 80 percent—want and need to do their jobs effectively.

The information needs of these users are best summed up in the mantra: “Give me all the data I want, but only the data I need, and only when I need it.” In other words, most users don’t want to be bothered with data unless there is an exception condition they need to examine. Then, and only then, they want to look at all data that might possibly be relevant to the situation, and they want to do this quickly and efficiently.

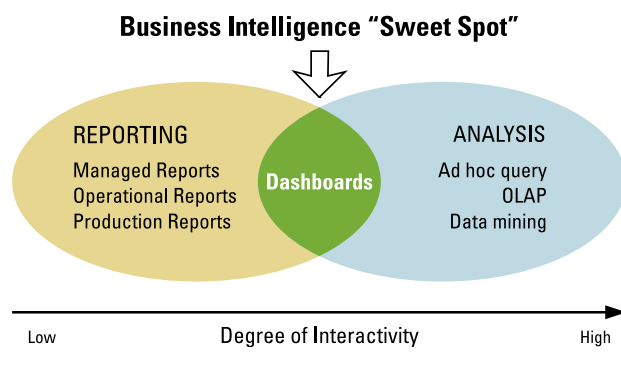


Figure 1: Business intelligence “sweet spot.” Performance dashboards blend the attributes of reporting and analysis to create a dynamic or “drillable” report that meets the needs of 80 percent of your workforce.

Key Features

The next generation of BI tools supports this user mantra primarily by providing Web-based dashboards that let users monitor the health of the processes they manage at a glance. Color-coding, alerts, and easy-to-read charts and tables enable users to quickly see when performance is above or below expectations. Then, if desired, they can click on a metric and get more information about what is driving the exception condition.

Thus, a Web-based dashboard conforms to the ways most users want to work. They provide only the information users need, when they need it. Dashboards don’t overwhelm users with a dizzying array of reports or analytical options; they keep things simple by highlighting anomalies that users need to investigate and providing additional information only as

needed. In essence, performance dashboards are “prettified” exception reports with built-in analytical tools that make it easy and fast for users to get to the information they need to do their jobs.

Performance dashboards provide the perfect blend of reporting and analysis because they parcel out information in layers. Like peeling the layers of an onion, dashboard users peel back layers of information to get to the root cause of a problem. Each successive layer in a dashboard provides additional details and perspectives and enables users to move from reactive monitoring to proactive analysis and action.

The next generation of BI tools starts users at a much higher level of analysis than did previous generations of tools, which presented users with operational reports or analytical tools and expected them to find anomalies and examine their root causes. A performance dashboard takes much of the guesswork and time out of this process by adding a monitoring layer on top of analytical and reporting tools and integrating all three layers into a seamless whole. Next-generation BI tools start with exceptions, move to analysis, and generate detailed reports only when users require them. In short, the tools conform to the way users want to work instead of the other way around.

Twenty Characteristics

Although the following list is not comprehensive, many of the characteristics of next-generation BI tools can be summed up as follows:

1. **Web-based**—Provides easy access, simplifies user navigation (i.e. “back,” “forward,” and “refresh” options), and centralizes data management and administration.
2. **Portal-like**—Provides a single place on the Web where users can go to get all the information they need.
3. **Dashboard interface**—Displays a few key metrics on the front page that let users compare performance to targets at a glance. Groups key metrics for other departments or divisions using tabs or folders.
4. **Layered**—Arranges data in multiple layers, with each successive layer providing increasingly detailed data about a metric, process, or event. Allows users to drill down from the dashboard front page to successive levels of detail.

5. **Interactive**—Lets users easily navigate through or “slice and dice” the data, including the ability to drill down to more detail, drill across to different subjects (i.e. dimensions), or page through the data by category (Eastern region, Western region, and so on). Users can also insert new data or columns, add new calculations, or search, sort, format, filter, or pivot the data.
6. **Guided**—Provides guidance to “casual” users about what reports, paths through the data, or actions they should take based on the context of the data they are viewing.
7. **Timely**—Metrics and reports are updated in a timely fashion—in seconds, minutes, hours, or days—to meet user requirements.
8. **Proactive**—Provides a rules engine that lets users (or developers) define targets and thresholds for various metrics and specify when and how they should be notified about an exception condition (e.g., an “alert”) and whether to trigger an automated action or series of actions (e.g., an “agent”).
9. **Customizable**—Customizes the dashboard by user role and level, displaying only the tabs, metrics, reports, and data that each user is authorized to see.
10. **Personalizable**—Allows users to select objects from an authorized list and arrange them on the dashboard to suit their preferences.
11. **Flexible access**—Lets users natively access data and reports from multiple front-ends, including Microsoft Office applications and wireless devices.
12. **Collaborative**—The tools make it easy for users to share views or reports with colleagues. Users can embed comments in the reports, send or publish the reports to a list of users, or set up a workflow that requires a predefined group of users to review and sign off on critical information.
13. **Flexible delivery and formatting**—Lets users schedule and publish reports to any channel, including the Web, e-mail, printer, or wireless device, and in any format, including Excel, PowerPoint, PDF, HTML, and handheld formats.
14. **Self-defining**—Makes it easy for users to find out the origins and nature of any metric or object in the dashboard (i.e., provides business metadata). Hooks into a metadata repository where business and technical people store standard terms, rules, and definitions.
15. **Printable**—Lets users print data or metrics in document format with proper page breaks and headings in any order they prefer. This can be a make-or-buy feature when deciding which commercial tool to purchase to build a dashboard.
16. **Timely**—Delivers data to users as soon as they require it (i.e., in “right time”).
17. **Fast**—Provides sub-second response times to user clicks and requests for data.
18. **Scalable**—Performance doesn’t degrade no matter how many users are on the system at any given time.
19. **Responsive**—Developers can deliver new data and functionality within days or weeks, not months or years, thanks to a service-oriented architecture.
20. **Portable**—Lets users disconnect from the network and take data with them for further analysis. This can be done by exporting to Excel or creating a replica of the original view or report.

Summary

A new generation of BI tools that blend reporting and analysis capabilities inside a Web-based performance dashboard promises to finally empower all knowledge workers. When combined with a robust data warehousing infrastructure, the new tools provide the right data to the right person at the right time to optimize decision making, improve efficiency, and accelerate results. ■

Wayne Eckerson is currently working on a book titled Performance Dashboards: Measuring, Monitoring, and Managing the Business, due out in October 2005.

Bombardier Transportation Ensures a “Smooth Ride” with Data Quality

Commentary by Dr. Claudio Gruler, Project Integration Manager, Bombardier Transportation

Setting the Standard

Standards are critical for the railway industry, in which seamless interoperability of parts is fundamental. When it comes to data quality standards, however, rail manufacturers are prone to the same challenges many other companies face.

After many years of acquiring and consolidating businesses, Bombardier Transportation, the global leader in the rail equipment manufacturing and servicing industry, faced profound disarray in its corporate data. The company had more than 70 databases in eight legacy systems; they contained data on 2.8 million materials and discrete parts from over 200,000 suppliers. All of this critical information was stored in more than nine million records in five different languages.

Bombardier recognized the importance of achieving a harmonized view of the supply chain. This became the major driver of an enterprise data quality initiative.

Supply Chain Efficiencies

Like any capital-intensive manufacturer, Bombardier saw opportunities for big savings in streamlining its \$1.3 billion procurement operation and in reducing inventory. Bombardier will likely gain a savings of 3–5 percent annually by negotiating more favorable contracts based on an enterprisewide understanding of supplier relationships. For example, once the Trillium Software System® was in place, the team discovered that one supplier, which was thought to have contributed \$4–5 million to the company’s business, actually did \$135 million.

An up-to-date, unified view of all inventory enabled Bombardier to save significant time and money. The company spent less by using surplus from one location to supplement inventory at another, and it eliminated the weeks, sometimes even months, of delay in waiting for specialty parts ordered from a supplier. Bombardier also reduced inventory by



eliminating rarely used and obsolete parts. The results rippled through the supply chain: better inventory management increased on-time deliveries and shortened repair times.

“We can now track globally where parts are with the push of a button,” says Dr. Claudio Gruler, Project Integration Manager at Bombardier.

The Free-Form Text Challenge

One overarching goal was to reduce the amount spent on procurement by 30 percent in three years. To support this goal, Bombardier needed a data quality solution that could improve critical product and inventory data, including orders, parts, and materials in addition to name-and-address data. However, much of the identifying data was buried in free-form text. In choosing the Trillium Software System, Bombardier found a solution that could process name-and-address and specific business data concurrently—all for the price of a standard license.

Reliable, Up-to-Date Reports

Reports that used to take up to six months to prepare are now done weekly. Nine million records are integrated, including 3 GB of changed records on average. Now, data for strategic analysis and business intelligence is distributed across the enterprise to about 300 decision makers. Once wary of the outdated

and incomplete data they received, they now fully trust the weekly reports to help them make the best decisions.

The Road to ROI

The results of the data quality efforts exceeded Bombardier’s expectations. Before implementing the Trillium Software System, less than half of the records contained accurate codes. After implementation, the system matched 88 percent of records with product codes, which actually covered 96 percent of all of Bombardier’s parts and materials.

Bombardier developed custom business rules and logic within the Trillium Software System to meet its specific needs. The software now interprets free-form text, finding commodities, parts, and products, and assigns standard codes for each.

The data quality project has given Bombardier a unified customer view that has increased the company’s up-sell and cross-sell success and allows the company to apply common pricing policies to all its suppliers and customers around the world. In addition, through a better understanding of product and parts lifecycles, it can anticipate and plan for demand, both in manufacturing and in proactive marketing.

Says Gruler, “It is an intelligent tool that we can teach how to interpret our data.” ■

Meredith Corporation Gains Marketing Intelligence

Commentary by Julie Liggett, Senior Business Analyst, Meredith Corporation

Meredith Corporation is one of the nation's leading media and marketing companies, with businesses focused on magazine and book publishing, television broadcasting, integrated marketing, and interactive media. The Meredith Publishing Group, the country's foremost home and family authority, features 18 magazine brands, including *Better Homes and Gardens*, *Ladies' Home Journal*, *American Baby*, and approximately 150 special-interest publications.

Prior to implementing MicroStrategy, Meredith had many roadblocks preventing it from effectively analyzing and reporting on its marketing campaigns. Meredith had multiple data sources with no clear or easy method to analyze campaigns across its publications. "Some of our groups didn't have an analytical system, or if they did, it was an outdated series of Access databases with a Visual Basic front-end," explains Julie Liggett, senior business analyst at Meredith Corporation. "This old system couldn't deliver the information our marketing and circulation managers needed. In addition, it was very inflexible. New report requests would require programmer resources since users couldn't modify any reports. Certain manual reports were taking support staff literally 40 hours each month to pull together disparate data and then download it to Excel."

In 2004, Meredith reengineered its customer database and added an ETL process around each of its disparate data sources. Today, Meredith's marketing campaign data is in one Teradata® data warehouse, and MicroStrategy is the business intelligence standard used to analyze and report on crucial customer information to plan and implement effective marketing campaigns.

Meredith's business users are now able to track the performance of marketing campaigns and use the information across all of the company's publications and campaign types. "In the past, the data

for each publication and marketing campaign was separate from one another," says Liggett. "Today, we have a global view of our new subscriber, gift promotion, billing renewal, and online marketing campaigns—and the insight gained from one campaign can benefit all the publications."

Not only are Meredith's end users getting transparent access to the data they want, but their operational reporting is also being enhanced. As an example, rec-

"Today, we have a global view of our new subscriber, gift promotion, billing renewal, and online marketing campaigns—and the insight gained from one campaign can benefit all the publications."

—Julie Liggett, Senior Business Analyst, Meredith Corporation

onciliation reports are allowing employees to apply real-time fixes to fulfillment issues as they appear. One type of reconciliation report tracks subscription transactions from the time a Web order is taken and written to the database, to the time the order reaches the fulfillment vendor, and through the point that the fulfillment vendor processes the subscription order.

Meredith analyzes promotion profitability using MicroStrategy reports. Meredith is able to determine whether a given promotion campaign was profitable by comparing the revenue received from the promotion against the costs (such as printing or postage) involved.

Meredith is also able to conduct test analysis and apply the uncovered insight to all of its publications. "With MicroStrategy we have a big-picture view of all the magazine test results," says Liggett. "This kind of analysis helps us spend our test budget wisely and better analyze which



test campaigns work really well and which ones don't work as effectively."

Meredith has identified real advantages with its reporting system, citing reduced charges with fulfillment vendors, higher employee productivity, and greater focus on planning and implementing

marketing campaigns. "Our marketing managers and circulation directors are empowered to work with greater independence and accuracy, and focus on the real issues of our business instead of having to chase down the data," says Liggett.

"Consider our marketing manager in charge of direct mail campaigns for our largest publication, who's an avid user of MicroStrategy," adds Liggett. "She is able to look at the data in ways that she was not able to previously do. It has helped her better plan her campaign and make decisions that ultimately impact the success of the marketing campaign. That's the beauty of our consumer marketing application. Our trained marketers can consume the data in multiple ways and focus on planning and implementing effective marketing campaigns that increase response rates and revenues, which is the real benefit to having our business intelligence system." ■

ALSTOM Power Fuels Success with Customer Data Management

Commentary by Daniel Teachey, Corporate Communications Director, DataFlux, a SAS company

The Business

ALSTOM is a global leader in energy and transport infrastructure. The company serves the energy market through its activities in power generation, and the transport market through its rail and marine activities. ALSTOM employs 75,000 people in over 70 countries worldwide.

The Challenge

For any company with operations across multiple locations, it is difficult to get a true view of the enterprise across geographic and corporate boundaries. ALSTOM Power, a division of ALSTOM, has multiple business systems—including enterprise resource planning (ERP) and customer relation management (CRM)—that contain customer information. Previously, this information was not standardized, and contained duplicate data within and across these systems.

ALSTOM's global corporate strategy of "One Face to the Customer" drove ALSTOM Power's Data Warehouse group to develop a "customer information broker."

This broker provides a single representation of each customer identity, along with a cross-reference to each business system's source record.

For ALSTOM, the customer information broker does not create new information. Rather, it systematically generates a single customer identity based on a modular-designed architecture. This modular design includes data-driven relationships, application-oriented business rules, and user-selected overrides, all of which define how each data element in the customer identity record is populated. For instance, the customer name comes from system A, the street address comes from system B, and the postal code comes from system C. To accomplish this, ALSTOM needed a solution that could:

- Standardize each customer record while maintaining the original value
- Group similar customer entries to remove duplication
- Match according to multiple criteria to increase the potential of positive matches
- Define parent-child relationships, enabling reporting at any customer hierarchy level (holding company, operating company, plant/site, etc.)

"Our data quality issues aren't any worse than other organizations our size, and we have just as much difficulty getting a clear picture of our information," said Mike Sykes, U.S. data warehouse manager at ALSTOM. "To achieve 'One Face to the Customer,' however, we needed to increase our level of data quality dramatically."

The DataFlux Solution

ALSTOM Power selected dfPower Studio, a data management solution from DataFlux, to help build a more comprehensive

view of its customers. dfPower Studio offered ALSTOM Power a variety of features, including comprehensive data standardization and de-duplication capabilities, USPS address verification, prebuilt rules that streamlined initial deployment, and transportable rules logic that enables the transfer of rules to other dfPower Studio installations. The architecture of the DataFlux product suite also provides the scalability that will be needed as ALSTOM's data-quality activities mature.

"The first iteration of our customer information broker utilized 25,000 customer records from four business systems," Sykes says. "With dfPower Studio, we created a predictable and repeatable process for generating multiple matching scenarios across our business systems. This was a key feature, as it allowed us to select the highest positive match, which in turn reduced our de-duplication effort."

The Results

"dfPower Studio has performed beyond our expectations and is an integral component of our customer information broker infrastructure," Sykes says. "The software has an intuitive GUI and allows us to customize the underlying standardization and matching logic to meet our needs."

With dfPower Studio, ALSTOM Power has more accurate customer data, resulting in more accurate reports of customer activity. For example, customer revenues are now reported in the 97 percent accuracy range—an achievement that would be almost impossible without a data management solution.

"dfPower Studio allows ALSTOM to view customer information with greater accuracy than ever before," Sykes says. "This translates into real business benefits for ALSTOM, our customers, and our vendors." ■

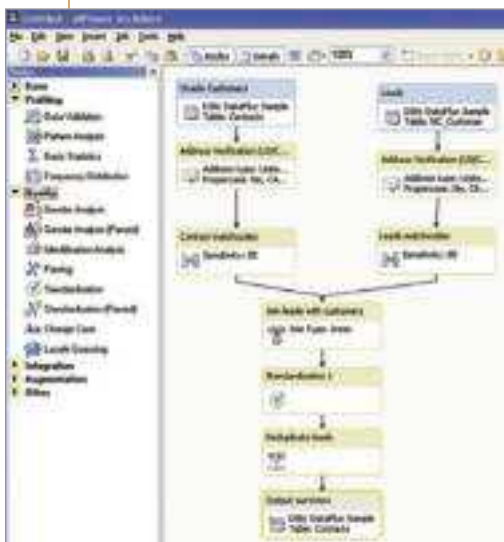


Figure 1: An easy-to-use workflow builder allows users to perform complex routines, such as address verification, data standardization, and de-duplication, in a single pass of the data.

NASCO: Creating a Data Warehousing Strategy to Deliver Exceptional Customer Service

Commentary by NASCO

Company Overview

The National Account Service Company, better known as NASCO, is a system and service organization dedicated to processing BlueCross® and BlueShield® Plan healthcare claims across the U.S. Each year NASCO processes more than 120 million healthcare claims for 7 million members belonging to 1,700 local and national accounts. NASCO offers its clients the best connectivity and the fastest, most scalable processing system.

Recently, as NASCO's business expanded, its executives recognized that continued growth might eventually hinder its customer service. While excellent customer service is critical at almost every company, it is even more important at NASCO, where it is considered a primary differentiator.

Its total-solution approach to health benefits processing helps Blue Plans gain a competitive edge in the market.

Business Challenge

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To combat potential customer service problems long before they could arise, and to accommodate customer requests, NASCO began exploring numerous strategies, including a data warehouse strategy. Recognizing the magnitude of undertaking a full-scale

data warehousing initiative, NASCO took a "first-things-first" approach to investigating options before considering an action plan.

While creating the data warehousing strategy, NASCO executives recognized numerous implementation benefits. Specifically, the strategy could enhance customer service in several inventive ways. Chief among these was the ability to create a Web-based, interactive reporting and analysis environment for

its customer BlueCross and BlueShield Plans. In addition, NASCO would be able to give Plans access to an extract-creation capability. Improving the reporting structure is important to BlueCross and BlueShield Plans.

These enhancements would represent a far more flexible approach and provide customers with greater service, in addition to self-service capabilities. Enhanced reporting and analysis would also enable NASCO to resolve customer requests more quickly, at less cost, and with less intervention from information technology professionals.

To create its data warehousing strategy, NASCO engaged Collaborative Consulting, a partner on other business and technology projects within the organization. After listing the requirements,



NASCO and Collaborative Consulting created a clear vision of a new, Web-based data warehousing platform. NASCO also gained a detailed, step-by-step road map spelling out what actions it must undertake to achieve its short- and long-term data warehousing objectives.

Benefits

Today, NASCO is well equipped for its future growth. The company's leaders know precisely what the organization must accomplish to achieve their interactive reporting objectives.

And because NASCO considered its customers' perspectives throughout the process of establishing a data warehousing vision and road map, it is closer to offering enhanced customer service when the business intelligence system is established. The vision and technical blueprint for providing key reports and analytical insights are critical to NASCO's Plan customers, who will benefit from improved service and in their ability to manage their growing business.

In addition, the data warehousing vision and road map calls for value-added releases over time, enabling NASCO to build on the valuable analytical capabilities that will be established upon beginning the data warehousing initiative. As time goes on, NASCO will be able to extend that functionality in a managed, skillful manner. ■

Top Wealth Management Firm Cleans Up with Data Flow Technology

Commentary by Data Warehouse Director, Large Private Bank

Group 1 is used by many leading financial institutions to deliver integrated, accurate information to thousands of decision makers. Some banks have also taken advantage of Group 1's unique data flow technology to transform their entire data infrastructure. One wealth management firm in particular has used Group 1 to turn a chaotic patchwork of spreadsheets and databases into a streamlined, sophisticated data management system that seamlessly feeds everything from their main data warehouse to the bank's anti-money-laundering applications.

The Business

As a private wealth management institution built on the foundation of personalized, "old-fashioned" banking services, the bank prides itself on provid-

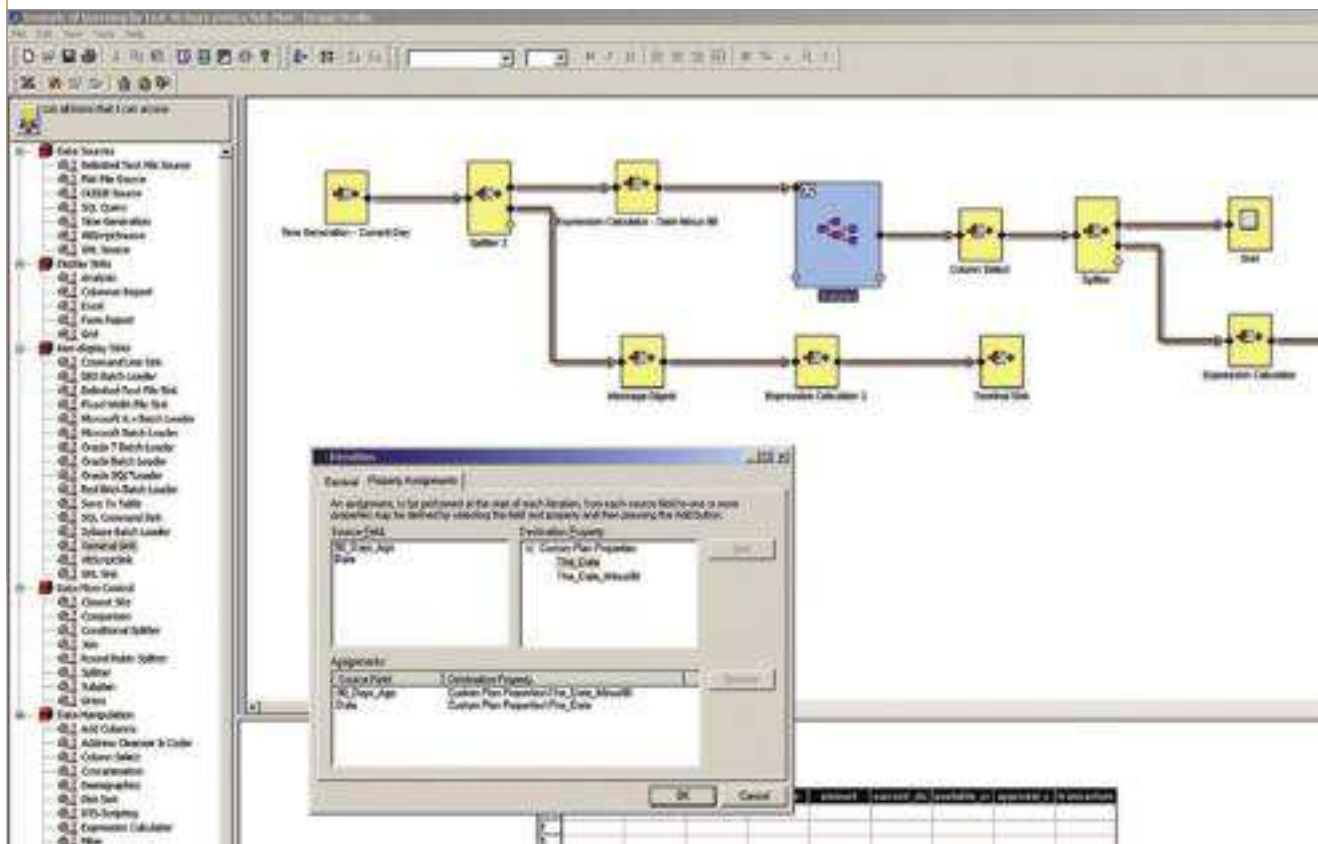
Initially envisioned as a straight ETL (extract, transform, and load) solution, the Group 1 system has evolved to power both data warehousing as well as reporting, and has helped transform the bank's entire data management infrastructure.

ing customers with an outstanding level of personal service. The bank is known for its wide variety of personal and business deposit products, private banking, and investment advisory services to meet clients' needs. As specialists in luxury home lending, the bank also offers a broad range of lending options, from

traditional fixed-rate and adjustable-rate residential mortgages to customized construction and renovation loans.

The Challenge

Delivering personalized, "high-touch" service requires a sophisticated, integrated data management environment.



However, the bank had recently undertaken a number of strategic acquisitions, and as is often the case in M&A situations, these acquisitions brought more than just new customers to the table.

Within a short period, the bank's IT department found itself coping with disparate product and customer databases, new and inconsistent data naming conventions, multiple analysis and reporting methods, and manual data movement processes, among other issues. To meet their information needs in this confusing environment, departments within the bank had taken to relying on cumbersome spreadsheets and rapidly proliferating data marts to work around the complicated system. Hand data entry and manual data loading

The Group 1 ETL system pulls data directly from an offsite DB2 database, external application files, as well as internal SQL Server databases, and automatically transforms and moves the integrated data to the bank's data warehouse and other target databases, such as the bank's anti-money-laundering database. With Group 1's ability to access a wide variety of data sources, relational databases, flat files, and application repositories, the bank can quickly and easily integrate new external and internal data sources into its data warehousing mix.

Data Manipulation

Group 1 Software is also being used to generate both ad hoc and automated reports for several hundred users.



While faster access to data has enabled the bank's information consumers to make better business decisions, it has also had significant cost benefits. For example, with daily data loads, the data management group is able to supply users with the necessary data for compliance with government regulations such as Sarbanes-Oxley and the USA Patriot Act. According to the bank's IT director, having their applications vendors supply the necessary data extracts for these activities would have added significant cost to the budget.

Greater automation and streamlined operations have also helped keep IT resource costs low. In fact, the bank's IT director estimates that Group 1's automation capabilities have reduced the load and validation process from two to three man-hours per day to just 10 minutes. The bank has been able to grow the business without adding many IT staff, something the bank's IT director feels "would not have been possible in the old manual spreadsheet environment."

Stronger customer relationships

Finally, this streamlined data management system has enabled the bank's relationship managers to have fast and consolidated access to the information they need to best service the bank's clients, which is, for this bank, the most important benefit.

While the bank might pride itself on delivering banking services "the old-fashioned way," technology from Group 1 is helping them achieve that level of old-fashioned, personal service. ■

The bank's IT director estimates that Group 1's automation capabilities have reduced the load and validation process from two to three man-hours per day to just 10 minutes.

processes were commonplace; unfortunately, few of these processes were documented along the way. The bank realized that the system needed improvement if it was to continue its steady path of growth.

The Solution

Data access and integration

The bank turned to Group 1's Sagent Data Flow technology to help build a streamlined data warehousing environment. According to the bank's IT director, Group 1 was selected from among a number of leading vendors for its "ease of use and its strong automation and visualization capabilities," and because of Group 1's fast proof-of-concept feature that had a solution up and running in a matter of days. While initially envisioned as a straight ETL (extract, transform, and load) solution, the Group 1 system has evolved to power both data warehousing as well as reporting, and has helped transform the bank's entire data management infrastructure.

Group 1's powerful transformation capabilities mean that users can formulate complex queries that get results in an instant, even against data that has to be transformed on the fly... a capability the bank says "has put Group 1 far ahead of other tools that only accommodate simple queries." The bank also takes full advantage of Group 1's powerful visual development environment, which speeds and simplifies the creation of sophisticated data transformations, to execute quick queries that allow them to explore data without having to rely on data exploration tools.

The Results

Reduced costs, increased revenues

Group 1 Software has given the bank accelerated access to critical data by increasing the number of data loads they are able to execute on a monthly basis. Whereas two years ago the bank was only able to achieve three or four data loads monthly, they can now do 15 to 20 data loads on a daily basis.

ACNielsen Selects a High-Performance Data Transformation Solution for Europe's Largest Retail Sales Data Factory

Commentary by Craig Abramson, Technical Analyst, Syncsort Incorporated

The Challenge

ACNielsen, a VNU business, is building what is to become the largest retail sales data factory in Europe. New Factory is designed to analyze sales data from many retailer channels and countries throughout the region. The analysis is intended to provide insight into such interesting questions as:

- How much impact did a specific promotion have on product sales?
- How well did brands perform in comparison with other brands?
- How successful was the launch of a new product?

It is through innovations like New Factory that ACNielsen has become the world's leading marketing information provider. Offering services in more than 100 countries, the unit provides measurement and analysis of marketplace

facts, simple roll-up or cube functions would not be sufficient. These are just some of the reasons why ACNielsen began a thorough search to find a powerful, high-performance data transformation solution that could complete the aggregations. DMExpress from Syncsort Incorporated proved to be that solution.

The Solution

DMExpress was installed by ACNielsen in a proof of concept to aggregate an initial 2.7 billion facts over four different dimensions, varying in hierarchy depth from two to nine levels. According to Technical Director Michael Benillouche, "When we started developing our data factory application, called New Factory, we knew that performance was going to be an issue. We searched for a solution that could handle the high volume of data we were processing in the shortest amount of time. After considering ETL software from major vendors, we selected DMExpress. DMExpress easily

different dimensions each week in order to aggregate the thousands of datascope accessed through the New Factory Web applications.

The Benefits

ACNielsen discovered that as data volumes grow, so do the performance advantages of DMExpress. With the ability to process in parallel, DMExpress speeds through data-intensive applications. Application development is also much faster with the advanced, easy-to-use graphical user interface (GUI). Instead of focusing on processing the data, you can use the time to create what you need.

Discussing ACNielsen's use of DMExpress for aggregation, Andrew Coleman, Syncsort's director of software engineering, said:

More and more, we see the aggregation step being the critical performance issue in our customers' data warehouse applications. The hardware capacity is typically available, provided that the software can fully exploit it. Our combination of proprietary aggregation algorithms and relentless pursuit of parallelization across multiple processors and multiple servers allows DMExpress to achieve the maximum from the hardware.

"When we started developing our data factory application, called New Factory, we knew that performance was going to be an issue."

—Michael Benillouche, Technical Director, ACNielsen

dynamics and consumer attitudes and behavior. Clients rely on ACNielsen's market research, proprietary products, analytical tools, and professional service to understand competitive performance, to uncover new opportunities, and to raise the profitability of their marketing and sales campaigns.

The need to complete a large number of complex aggregations represented a potential performance bottleneck for New Factory. Further, due to the necessary computation of non-additive distribution

integrated into New Factory's distributed computing framework and provided us with the outstanding results we needed."

ACNielsen tested DMExpress in New Factory, running it on a large-scale UNIX server with 16 CPUs, 32 GB of memory, and terabytes of disk arrays. The server is capable of delivering data at a sustained rate of 600 MB/sec. Once in production, data will be constantly processed in this carefully designed factory. It is estimated that 12 billion sales facts will be aggregated along four

Why DMExpress?

DMExpress™ is a high-performance data transformation product for UNIX, Linux, and Windows environments. It extracts data at very high speed from any source database or flat file, applies any kind of record level transformation and/or field level transformation, and then loads the data into any target database or flat file. ■

Dell Consolidates European Support System to Achieve 172 Percent ROI in Five Years

Commentary by Mainstay Partners, an independent technology analyst consultancy

Challenges

In just 20 years, Dell has risen from a radical idea hatched in Michael Dell's college dorm room to a \$47 billion global enterprise. One-to-one customer relationships are the hallmark of Dell's success, coupled with its ability to keep costs low by effectively wielding information technology to manage one of the most efficient supply chains in the world, fueling incredible growth.

This fast growth put a strain on the existing infrastructure in Dell's Europe, Middle-East, and Africa (EMEA) region, which generates nearly one-fourth of Dell's total annual revenue (US\$9.7 billion). Some 1,200 EMEA decision makers rely on Dell's large-scale internal data repository, called Eurostar.

To keep up with EMEA's fast growth, Eurostar had expanded to four servers, each running a separate copy of the database. This distributed system required constant data replication to stay in sync. But with surging usage, updates became more difficult. The database often fell out of sync, which had a serious impact on data consistency and quality, and poorly constructed queries could hang the system, resulting in outages.

Faced with a fragmented system architecture, Dell's IT staff addressed performance issues by continually reorganizing tablespaces, provisioning additional storage, and constantly restarting and re-synchronizing databases. This meant it was more difficult than ever for Eurostar's managers to meet the internal service-level agreements (SLAs) of the 1,200 EMEA users.

Solution

Dell decided to replace the fragmented infrastructure with a consolidated system built around Oracle Grid Computing technology running Linux Red Hat Advanced Server. Eurostar's new system features a cluster of Dell PowerEdge

servers running Oracle Database 10g with Real Application Clusters in concert with a high-capacity EMC storage array. The entire system is managed through Oracle Enterprise Manager Grid Control.

Dell successfully consolidated on this new Oracle/Red Hat infrastructure in March 2004, migrating from four separate databases to a single clustered database, and from a complex, siloed computing environment to a more easily managed, single consolidated system. The move to

with Oracle's Automatic Storage Management, which simplifies the provisioning and management of storage.

With the new Oracle system, smoother performance is evidenced by a sharp decline—more than 50 percent—in daily trouble tickets; Mainstay estimates that Dell would have had to hire at least one half-time employee to handle these extra issues. IT staff can also perform information loads and roll-ups about two hours faster with the new consolidated grid system—

“The last bastion of ‘big iron’ is the database. As a hardware company, we want to run our own product, and Oracle’s 10g grid computing environment made that possible with Eurostar.”

—Brian Koster, IT Director, Data Management Services, Dell, Inc.

Oracle immediately improved Eurostar's speed and capacity, laying the foundation for future continued growth.

“What we've done is simplify our environment,” says Brian Koster, Dell IT director for data management services. “Part of the reason we save is that we have fewer moving parts, greater flexibility, and more manageability. We're proving the power of scale-out over scale-up, with a growing terabyte-plus system.”

Results

Mainstay Partners, an independent technology consultancy, has documented a number of performance improvements in the consolidated cluster, ranging from higher system availability and faster data processing to streamlined infrastructure management. Dell's IT staff now spends less time on troubleshooting and maintenance, and more time on strategic initiatives and delivering better business intelligence. Dell increased productivity

a 25 percent improvement. Mainstay also found that consolidating on Oracle has been a boon for end users, as daily reports are now running faster and are available 50 percent sooner, resulting in greater productivity and faster, better-informed decisions.

Mainstay found that Dell should expect to gain approximately \$7.15 million in cumulative benefits over five years. Savings come from a combination of labor productivity savings, cost avoidance, software cost savings/avoidance, and hardware cost savings/avoidance. The project is expected to generate \$3.3 million in net benefits over five years, achieving an overall ROI of 172 percent and an internal rate of return of 52 percent. Dell's investment is expected to pay for itself in 19 months.

For Further Information

Read the entire Dell Eurostar/Oracle Case Study from Mainstay Partners at: <http://www.oracle.com/customers/studies/roi/delleurostar.pdf>. ■

BearingPoint Uses D&B as Cornerstone of Its Global Siebel Implementation

Commentary by Matt Oleksiak, Director of Global Sales Operations, BearingPoint

Challenge

In March 2002, BearingPoint—a respected business advisor and systems integrator—faced mounting pressure from investors and expanding business conditions to grow its global footprint and, at the same time, develop a global customer information system to compete more effectively. BearingPoint's customer information files contained different business indicators based on regional applications. Compounding the data discrepancies, each group of users tackled data problems and business issues differently, depending on which application and view was used. In addition, data challenges existed as a result of multiple customer environments, which did not allow a true 360-degree view of individual customers.

Solution

Within 15 months of recognizing the mountain under their data issues, the company evaluated, purchased, and implemented a Siebel CRM application, including the Siebel D&B Integration Solution. BearingPoint recognized the value of global coverage and identification of company details attached to D&B's standardized business identification key—the D-U-N-S Number[®]—and chose to integrate this information within its Siebel 7.5 deployment. BearingPoint formed a data management group whose main purpose was to ensure consistency and cleanliness of customer master data. This group's first task was to consolidate account data from the seven customer databases into one front-end customer management system database that would drive all back-office and interfaced customer databases. This initial activity encompassed interactive D&B updates regarding the customer database and reconciliation of multiple address details, on a global basis, and the rounding out of D-U-N-S Number details within the

Siebel master database that was deployed. The D&B D-U-N-S Number was then leveraged to link between Siebel and multiple back-office systems for data consistency.

Within 10 months of project inception, a global deployment using batch processes for initial cleansing and standardization has produced the first truly global database within BearingPoint.

To keep the customer information fresh and valuable, the ongoing role of the data management group is to ensure a scheduled data maintenance strategy that includes interacting directly with D&B on individual and monthly batch updates and then facilitating the loading of up-to-date details within the global Siebel customer database.

Success

Within four months of the first phase of implementation, manual interactions between D&B and BearingPoint's data management group provided clear and concise identification of data across two global regions as stored within the Siebel application. Within 10 months of project inception, a global deployment using batch processes for initial cleansing and standardization has produced the first truly global database within BearingPoint. Monthly updates continue to cleanse the data. Control via the data management group ensures ongoing consistency of data and flexibility for end users to concentrate on expanding market share, while having a control organization responsible for customer data cleanliness and accuracy as supplied by D&B.

Matt Oleksiak, BearingPoint's director of global sales operations, states, "As we expanded to a global company, tracking accounts and opportunities across the entire organization took on added

importance. We turned to D&B to provide the foundation of our global account identification within our Siebel CRM solution. This has turned into a powerful yet simple solution which we use constantly to manage our sales pipeline and related account information." The successes of the implementation have allowed BearingPoint to maximize customer relationships by globally identifying 360-degree views of customers, as well as to achieve more effective account management and prospect identification, improved marketing campaigns, and expanded analytical capability to drive corporate strategies.

In addition, BearingPoint now has a complete view of its Global 2000 customer base, which is a key business tracking tool to understand the impact of such views in a global marketplace. ■

Israel Defense Forces: Robust Functionality Delivers Significant Benefits

Commentary by Israel Defense Forces

The history of the Israel Defense Forces (IDF) is marked by milestones recognizable to even casual observers of the Middle East: The Six-Day War of 1967... the Raid on Entebbe in 1976... the 1981 airstrike that crippled an Iraqi nuclear reactor.

In 2004, the Israeli military achieved another milestone by improving the IDF's ability to mobilize forces and material with greater speed, precision, and efficiency.

This time, the theater was the data management environment of the IDF Technology and Logistics Directorate—a sprawl of incompatible applications that frustrated the Army's efforts to manage its equipment and resources.

"We had a forest of systems throughout Logistics," said Lt. Col. Yossi, the Technology and Logistics Directorate head of Enterprise Resource Planning Project Administration, based in Tel Aviv. "Each was a separate system that would speak its own language. We could do the job, but not in a fluent way."

The IDF Technology and Logistics Directorate embarked on an ambitious initiative that would migrate Army data from mainframe and legacy applications to a set of SAP R/3, selecting Informatica PowerCenter as the data integration system.

A first phase of the initiative aimed to migrate data from five key areas—spare parts, medical supplies, gas and oil, construction materials, and office materials—to SAP R/3 4.7, which was running under Linux on an IBM zSeries 990 with a DB2 database.

In production since April 2004, accessed by many users, the integrated SAP logistics environment is helping the Army improve supply chain efficiency, reduce costs, and fine-tune operations based on a single, consolidated view of its data.

Since discovering the capabilities of PowerCenter, the IDF has broadened the scope of their integration initiative, and

are now integrating data from all service branches (Army, Navy, and Air Force) using Informatica.

Above and Beyond the Call of Duty

According to Lt. Col. Yossi, PowerCenter's ease of use and robust functionality delivered benefits far beyond the expectations of the IDF, including:

- Reduced the number of man-years by a factor of five to six. The project was completed with 10 man-years of labor versus an estimated 60.

"With PowerCenter, conversion was faster, data movement was faster, and because of the way Informatica uses mappings, we were able to identify data errors at the source level."

— Lt. Col. Yossi, IDF Technology and Logistics Directorate

- Decreased the project duration from three years to one.
- Enabled completion of the significantly expanded project scope (all service data versus Army data only) within their new one-year timeline and 25 percent below budget.
- Supplied data quality validation that cleansed/standardized more than 100 million records.
- Was readily learned and adopted by 20 programmers.

"Originally, we thought we would have to expend 60 years of human work to perform the conversion," said Lt. Col. Yossi. "In reality, it only took 10 man-years. With PowerCenter, conversion was faster, data movement was faster, and because of the way Informatica uses

mappings, we were able to identify data errors at the source level."

Among the first objectives was to examine the mainframe and legacy information for data quality—redundancy, inconsistent definitions, and differing codes for the same materials across disparate systems.

"We were about to install a new system, and didn't want the old 'garbage in, garbage out' problem," Lt. Col. Yossi said. "We wanted to do everything we could to ensure the new system would be as clean as possible."

The IDF team had created a custom application to perform data cleansing.

PowerCenter provides the capability to seamlessly integrate such external applications as custom transformations. The highly visual Informatica PowerCenter development GUI provided a foundation for programmers to customize 24 mappings, allowing them to use their external program as another transformation. PowerCenter moved data from source-to-target and cleansed data in one operation. This exposed an alarming quantity of issues with source-level quality that would otherwise have gone undetected, Lt. Col. Yossi said. In some cases, the IDF used PowerCenter's Advanced External Procedures feature to streamline the most complex mappings.

"The results were amazing," Lt. Col. Yossi said. Moreover, cleansing and de-duplication reduced data volumes by roughly 20 percent, saving on storage requirements. ■

A business intelligence or data warehouse implementation can be a formidable undertaking. In these pages, leading business intelligence and data warehousing solution providers share their answers to the questions they hear often from industry professionals. Tim Feetham, an independent consultant, provides his analyst viewpoint to each Q&A.

Business Objects

What should I look for when investigating data integration technology from a BI vendor?

Not all extraction, transformation, and load tools are created equal. Performance remains key to batch data movement. Enterprise-class data integration platforms should be able to move data in real time, access a wide array of sources, and have built-in profiling and cleansing capabilities. Once established, a unified data integration and BI platform should allow for impact analysis from source systems to end-user reports, the ability to share and audit ETL and BI metadata, and provide visibility into data lineage to users of BI tools. This will help reduce administration costs, improve BI user adoption, and help your standardization initiatives.

Analyst Viewpoint:

BI vendors have been expanding their tool suite capabilities over the past several years by strengthening their data management infrastructure technologies. These products have been referred to historically as ETL tools. ETL has most often been associated with batch processing, but the growing demands of data integration initiatives that combine BI analytics and real-time access to data have driven ETL beyond its core functionality. Real-time feeds, operational and development support, auditing, plus metadata integration between tools are critical to a modern BI program. Customers will be well served to check out their BI tool suite vendor's offerings in this area.

Request more information about Business Objects

Cognos Inc.

As organizations implement BI solutions, what considerations would help them to achieve cross-organizational visibility?

The first consideration is how best to leverage your existing data assets and data integration strategies, including enterprise information integration (EII) and extract, transform, and load (ETL) software. Second, choose a BI vendor that offers visibility into other data integration technologies in addition to its own. Third, select a single BI vendor with an open data strategy so you can reap the benefits of standardizing on a BI tool without losing previous data or investments. Achieving visibility into a single version of the truth across the organization contributes to predictability, accountability, and transparency—the pillars of superior corporate performance management.

Analyst Viewpoint:

Organizations that have delivered data marts and data warehouses through the use of a good set of BI tools often find themselves asked to expand the reach of these tools to other data sources. Business users are especially interested in gaining access to ERP data such as SAP, as well as heritage systems via enterprise information integration (EII) technologies. They may want to include data from these sources along with the data warehouse in the same report. Wise BI managers will select BI tool suites that provide comprehensive data access and provide the functionality, such as scorecarding, to meet future demand.

Request more information about Cognos Inc.

Collaborative Consulting

Can I use Microsoft SQL Server as my data warehouse platform?

The short answer is: quite possibly. The SQL Server solution set, which comes bundled with all key components—ETL, DBMS, and BI—features an attractive total cost of ownership, much lower than corresponding market leaders' tools. Its drawbacks are scalability and out-of-the-box functionality. While SQL Server 2005 promises better of both, it currently has severe limitations.

While many espouse rules of thumb, real factors to consider are data volume, concurrent usage, and transformation and BI complexity. For companies with few sources, simple transforms, low concurrent usage, and basic reporting and analytical needs, SQL Server could be a viable option.

Analyst Viewpoint:

Many small- to medium-sized businesses have successfully deployed Microsoft SQL Server as their data warehousing platform. Microsoft has created an attractive bundle with support for ETL, OLAP, data mining, and reporting services. However, as data warehouse programs have grown in complexity, firms have found themselves purchasing supplemental ETL and reporting tools. Even though Microsoft's SQL Server 2005 promises enhancements in these spheres, any company undertaking a data warehouse program should realize that success might well drive it to migrate to higher-end technologies. Working with the right consulting firm, one that understands both ends of the spectrum, will ease that transition.

Request more information about Collaborative Consulting

Conversion Services International

The cost of data quality improvement is growing at an alarming pace, and correcting data quality often means duplicated efforts, divergent technologies, and inconsistent remediation strategies. What are some emerging trends and forward-thinking approaches for addressing these issues?

One trend gaining momentum within corporate inner circles is establishing enterprisewide data quality competency centers. Governed by highly visible, respected business leaders and supported by business and IT professionals, these centers:

- Improve the accuracy and reliability of data through developing and disseminating consistent standards, best-practice methodologies, and other technologies
- Mitigate risk and enhance effectiveness of strategic data-driven initiatives
- Govern all processes that monitor and continually improve data quality performance
- Ensure that data quality concepts and value are instilled within the corporate culture

Analyst Viewpoint:

The general success of data warehousing initiatives over the past decade has been tempered by the spotlight that these initiatives have shone on poor data quality. Although the first reaction has often been to “shoot the messenger,” intelligent organizations are realizing that poor data quality is not a data warehousing issue. It is a corporate issue. One forward-thinking healthcare organization addressed this issue by creating an independent data quality office headed up by a chief data quality officer who was an MD. This organization was ultimately able to measure the value of the DQ office through lives saved.

*Request more information
about Conversion Services International*

DataFlux Corporation

How does data monitoring fit into an existing data quality program?

Regardless of the industry or company size, bad data is everywhere. The obvious solution is a data quality technology that can improve data integrity in a “once-and-done” project. But maintaining good corporate data takes constant vigilance. To make data quality a corporate priority, organizations must institute a data management program that includes a continual, routine control mechanism. Data monitoring takes the same rules from an initial data quality effort and applies them over time to enforce corporate standards. This allows companies to understand trends about data integrity—and flag and resolve problems before they significantly impact operations.

Analyst Viewpoint:

The issue of poor data quality often comes to light through data warehousing initiatives. The tendency to want to “fix” the problem through hard-coded data warehousing load programs offers an incomplete solution and may mask problems in operational systems. However, the cost of modifying those operational systems to improve data quality might be quite high. Data quality monitoring software, which incorporates business rules and can alert the organization to quality issues, offers a solution to this conundrum. Data warehousing teams can deploy this software between the extract and load functions in order to notify the organization of data-quality problems.

Request more information about DataFlux Corporation

USDA Farm Service Agency: Enhanced Accounting Operations Management with Business Intelligence

Commentary by Jeffrey O'Connell, CORE Data Warehouse Project Manager and Accountant, Accounting Systems & Planning, USDA

Background

The Farm Service Agency administers, manages, and controls legislation passed by Congress to assist the agricultural community. Legislation includes loans and subsidies to producers, conservation programs, price and inventory stabilization programs, foreign export of agricultural products, foreign and domestic food donations, and disaster relief. FSA provides program support to producers and the administrative support needed to maintain these programs.

FSA's financial management division goals for 2001–05 include:

1. Allowing customers to share data and receive services electronically via the Internet
2. Improving the quality, availability, and speed with which information is shared with the public, other agencies, and private-sector entities
3. Having a financial information system that can produce auditable financial statements and provide reliable data for decision making
4. Fully implementing the DCI Act of 1996 to maximize debt collection
5. Implementing an automated, efficient HR system for workforce planning/reporting that decreases the personnel resources

The old reporting system was antiquated, unfriendly, and required specialized programmers to generate reports. Employees in state and county offices were held accountable for their budgets, but were lacking timely budget management reports. Detailed payroll information was simply not available. A county could be told they were over budget, but they had no way to access details. Producers' farm loan debt information was scattered across multiple systems with no consolidated view of outstanding balances and payment history.

Solution

The data warehouse and Hyperion BI solution were designed and implemented by Advanced DataTools (ADTC), a Hyperion consulting and training partner. The FSA data warehouse (SUN E6500 with 12 CPUs, 6 GB of memory, and 264 disks [2.4 TB] using an IBM Informix database server) is loaded with fresh data every night, after which Hyperion Intelligence generates over 200 new reports. These prebuilt Hyperion reports are ideal for decision makers.

With Hyperion Intelligence, local office managers view a variety of reports empowering them to track loan payments and expenses, ensure timely vendor payments, and conduct projections of lease agreements. State offices access prebuilt payroll reports that are quality assured by accounting staff, compared with the General Journal and OMDR (modified detail record), and delivered within 10 days of payroll. At headquarters, the Hyperion BI solution is used to track national wage and time reporting, as well as perform cost-benefit analyses. Users can immediately identify budget and payroll coding errors. Employees can change their W-4 and see the detail of the changes in their payroll within days.

New data marts are under development. They include a payments data mart to consolidate and track producer payments, and a public access data mart to allow producers online access to loan information and FSA services and programs.

Results

FSA's goals and payment collections are facilitated through a consolidated view of producers' loans and payment history via the data warehouse and Hyperion reports and queries. FSA is better able to manage farmers' debt. State and county executive directors manage their budgets with data that is only one day old.

Improved information enables better decisions to guide the agency. According to Jeffrey O'Connell, CORE data warehouse project manager and accountant for Accounting Systems & Planning, "Hyperion is our future, our flagship software, and is what runs this office. I am now training headquarters, state, and county office staff in financial data of every form and fashion—I don't know where we'd be without it." The data warehouse is employed in 2,540 counties, with over 10,000 staff. Reports are routinely generated for managers at all levels, Congress, and other agencies.

For more information, please visit www.hyperion.com/cornerstones. ■



Company

U.S. Government Agency administers programs to assist the agricultural community

Industry Government

Product

Hyperion Business Intelligence Platform for Reporting

Challenge

- Employees were held accountable for budgets, but lacked timely budget reports
- Replace reporting system that delivered paper reports with six-week-old data

Solution

- Local office managers access some 200 reports, all with fresh data
- Reports help manage loan payments, expenses, vendor payments, and lease agreements

Result

- Improved information enables better decisions to guide the agency
- FSA is better able to manage farmers' debt
- More is done with smaller headcount
- Significant savings from not mailing paper reports

Fairfax County Public Schools Launches Education Decision Support Library (EDSL)

Commentary by Michael Carver, Business Project Manager, Fairfax County Public Schools

Challenge

The Fairfax County Public School (FCPS) District in Virginia is one of the largest—and most successful—school systems in the United States. In the fall of 2003, the twelfth largest district in the nation welcomed 166,600 students through its doors across 241 elementary, middle, and high schools. Of the district’s graduating seniors, 90 percent

data—while keeping costs within a tight budget.

Approach

FCPS launched what it calls the education decision support library (EDSL) to help administrators, teachers, county executives, and parents make more informed decisions about everything from student skill assessments to resource planning for

FCPS chose Crystal Enterprise™, an infrastructure for data access, reporting, and information delivery. Michael Carver, business project manager at FCPS, explains, “After a year and a half of research, we chose Crystal Enterprise because it is easy to implement and has a familiar interface for non-technical users such as principals and teachers.”

“School districts need to enlist smarter strategies to combat shrinking school budgets, fewer resources, and higher ratios of students to teachers. Detailed data from Business Objects software in our decision support system has given us the metrics we need to ensure that each student receives the right course offerings and personal attention for success.”

—Michael Carver, Business Project Manager, Fairfax County Public Schools

will continue to higher education and 95 percent of special education students will receive further learning or job placement within nine months after graduation.

Although FCPS students continually succeed above state and national averages, the schools strive for 100 percent achievement. This drive for excellence led FCPS to seek newer and better ways to track, understand, and manage student performance mandates such as the Virginia Standards of Learning (SOL) and the No Child Left Behind Act through the use of technology. School administrators wanted to know exactly who wasn’t achieving and why, how to better allocate resources to meet student needs, and how to simplify everyday tasks such as managing attendance

the upcoming school year. EDSL is an ongoing project designed to:

- Track student trends, performance, progress, and program effectiveness
- Understand how student trends impact one another to identify the root cause of issues
- Manage school resources such as teachers and programs to better meet student needs

EDSL includes an integrated data warehouse that stores information for all aspects of the school system including enrollment, student test scores, grades, disciplinary trends, and special services.

To drill deeper into the information stored in the EDSL data warehouse,

Industry

K–12 Education

Business Pain

As education budgets shrink and student performance expectations expand, the Fairfax County Public School District needed access to data in its integrated decision support system to better track, understand, and manage student performance across 241 schools, 22,000 employees, and 166,600 students.

Why Business Objects?

With Crystal Enterprise, school employees have fast access to preformatted, easy-to-understand reports on the student population that include:

- No Child Left Behind Act compliance
- Enrollment and marks
- Student test achievement
- Disciplinary trends
- Special services
- Enrollment and demographics

Administrators use these reports to effectively plan and apply resources such as special programs, teachers, and funding where it will make the greatest educational impact on the students in times of government budget reductions.



Gary Policastro, EDSL software development manager, adds, “From an IT perspective, Business Objects was the right choice. Without Business Objects, we would have had to double our development staff and delivery time to add the same functionality on our own.”

Results

Carver says faster, easier, and more secure access has helped everyone within the school system become more accountable to the school board. “Depending on the complexity, it used to take hours, days, or weeks to find answers to questions from the school board,” explains Carver. “Now, we have over 240 standard reports at the fingertips of every school employee to answer these questions and assist in decision making. And if we don’t already have a report for a specific query, we can easily piece together the right information.”

Improved access to information has already left a positive impact on the students of FCPS. For example, by drilling deeper into student test scores and demographics, one school in the district

discovered that, of the 5 percent of students failing, 85 percent were minorities. The principal and teachers then used the data to determine the best mix of special courses, such as English for speakers of other languages (ESOL), to help failing students.

Educators are now better equipped to plan for the rest of the student population. Before students arrive for the first day of school, administrators and principals have already spent months planning the right combination of education programs such as advanced placement, ESOL, special education, and speech therapy for incoming students.

For example, it was especially difficult for principals to assess the needs of students entering junior high from the elementary schools because there was little measurable data available. Now, principals and administrators refer to reports from Crystal Enterprise to evaluate everything from standard test scores to socio-economic demographics to effectively allocate resources for incoming students. “Most principals

weren’t statistics majors in college,” says Pam Latt, principal at Centreville High School. “But Crystal Enterprise makes it easy for us to analyze trends and support our decisions with measurable data.”

Investing in technology has proven to be a wise business decision for FCPS. Administrators and principals now have the data on their desktops to support fundraising and grant-writing efforts. With EDSL, Fairfax County can supply current performance information, which places the school system at the head of the class for complying with the reporting requirements for the No Child Left Behind Act and other performance mandates.

“School districts need to enlist smarter strategies to combat shrinking school budgets, fewer resources, and higher ratios of students to teachers,” notes Carver. “Detailed data from Business Objects software in our decision support system has given us the metrics we need to ensure that each student receives the right course offerings and personal attention for success.” ■

ENECO Energie Finds Savings with Corporate Performance Management

Commentary by Ton van den Dungen, Manager, Business Intelligence and Control, ENECO Energie

ENECO Energie supplies gas, electricity, and heat to more than two million business and domestic customers. With sales in excess of €3.5 billion, ENECO Energie is one of Holland's top three energy suppliers in terms of sales and market share. The company is based in Rotterdam and operates five autonomous divisions, each serving separate market sectors: Retail, Infra, Business to Business, Services, and ENECO NetBeheer.

Challenges Faced

- Market liberalization
- Incomplete customer profiling and insufficient insight into processes
- Lack of an established planning and monitoring cycle
- Different versions of the truth

With liberalization of the energy market on the horizon in 2002, ENECO Energie decided to carry out a thorough reorganization of its structure. This included replacing its regionally focused, horizontally oriented business units with nationally operating, vertical market-oriented divisions, each responsible for its own profit performance. ENECO Retail serves domestic and small-business customers, and customer retention is currently one of this division's strategic objectives. In order to manage the company on this basis, its management wanted to be able to monitor and adapt its operations continuously. As Ton van den Dungen, manager, Business Intelligence & Control, said, "We needed the best possible information on customer development: which customers were leaving us, which were we acquiring, and are they profitable customers? Linking this information to defined metrics gives you an early warning system that alerts you to the loss of good customers, giving you time to take positive action."



At the same time, ENECO Retail wanted to be able to monitor and measure the activities of its fully outsourced front- and back-office processes. "To achieve a comprehensive picture of your customers and the operations focused on them, one of the areas you need to measure is customer satisfaction, the number of calls, and how they are processed," continued van den Dungen. "We also wanted to optimize our processes, so debtor processing was a hot topic. All the data was there, but we were not using it in any way to structure the process." There was also a real need for more cohesion in the organization. "We wanted to set up a predetermined planning and monitoring cycle and, very importantly, one version of the truth," said van den Dungen. "Therefore, we wanted one system to produce all the reports and provide everyone with the same results."

- Business Intelligence
- Scorecarding
- Query & Reporting
- Corporate Performance Management

Strategy Followed

- Balanced Scorecards as the basis for CPM
- Planning and monitoring based on financial, performance, and risk management
- KPIs from a range of different perspectives
- Generate goodwill for the solution from within the business

In 2003, ENECO Retail decided to use Balanced Scorecards as the foundation for its corporate performance management (CPM) system. ENECO's intention was to manage the business using agreed rules and responsibilities, to base decision making on facts and figures as far as possible, and to define targets from cohesive objectives. The company opted for a management philosophy using three pillars as the basis for setting up the planning and monitoring cycle: financial management, performance management, and risk management. Scorecards constitute the channels of communication between the three pillars, and various KPIs are used to indicate how performances compare with objectives.

This is done from several perspectives: learning and growth, finance, customer, and process. There are three possible reporting levels: the board of directors, division management, and department heads.

Initially, ENECO Retail started by using scorecards that had to be filled out manually. "To set this up, first we asked

over the past year and a half. The fact that we can now manage using facts and figures enables us to operate more effectively. We have a comprehensive view of customer behavior, which products they buy, how they pay, whether they are likely to switch, etc. This will yield large financial rewards, since we know precisely which customers are the most

middle management's knowledge and skills, and compared them with what we need to achieve our objectives, thus enabling us to take the necessary measures," added van den Dungen. ENECO Retail's financial processes have also been made transparent and manageable. As van den Dungen confirmed, "This will save us substantial sums of money. Improvements to our collections process alone will save us millions of euros. Our overall objective is to cut costs by 30 percent within four years."

"With CPM, we can manage our organization using facts and figures, enabling us to operate more effectively and make significant savings."

—Ton van den Dungen, Manager, Business Intelligence & Control

managers throughout the entire organization what information they needed to manage," said van den Dungen. "So it was not a case of a solution imposed by the ICT department, but truly something from within the business. Subsequently, this became an important success factor." To generate a degree of goodwill, ENECO Retail also started two projects designed to yield rapid success, improving debtor processing and the customer contact center's processes. After building a data warehousing infrastructure in early 2004, the company opted for the implementation of Cognos solutions for scorecarding, business intelligence, and query & reporting to flesh out its CPM strategy.

valuable to us and how we can best adapt our activities to satisfy them."

ENECO Retail has also succeeded in obtaining an overall view of and optimizing the front- and back-office processes. "We have even made it possible to distribute calls in the customer contact center using skill-based routing. In particular, this routes specific types of inquiries to those of our employees best able to deal with them effectively and efficiently. But, for example, we have also examined

Why Cognos?

Only Cognos delivers a complete range of integrated, scalable software for business intelligence, planning, and scorecarding—in short, corporate performance management. Cognos products enable organizations to drive performance. They plan and budget activities organization-wide with enterprise planning. They monitor their performance on a daily basis with scorecarding. They understand it with business intelligence reporting and analysis. Founded in 1969, Cognos now serves more than 23,000 customers in over 135 countries. ■

Benefits Realized

- Total customer profiling
- Transparent and efficient processes
- Goal-oriented management
- Substantial cost savings

Cognos CPM solutions enabled ENECO to combine a wide range of systems and processes, and to achieve a better and more comprehensive profile of its customers. The company will soon be moving over to a single retail activity monitoring system so that it can migrate to fully information-based marketing in early 2005. As van den Dungen confirmed, "We have achieved a great deal



Developing a BI Strategy for CRM/ERP Data

Excerpted from the full October 2004 report. TDWI appreciates the sponsorship of Hummingbird Ltd., Hyperion Solutions Corporation, Informatica Corporation, SAP America, Inc., Siebel Systems, Inc., and Teradata, a division of NCR.

By Colin White

A Growing Marketplace. Following a hiatus after the year 2000, the use of application packages is once again growing rapidly across all business areas, especially in front-office CRM systems and back-office ERP systems. This growth is occurring not only for application packages that handle business transaction (BTx) processing, but also for packaged solutions that support business intelligence (BI) and data warehousing (DW).

The Application Suite. Several vendors offer complete suites of products that contain a set of integrated applications that support both BTx and BI processing for a wide range of business areas from the front office to the back office.

A Complete IT Infrastructure. Application package suites frequently come with development tools for building BTx and BI applications, middleware for integrating other applications and data, and an application server environment for running and managing packaged and custom-built applications.

Using Business Intelligence to Drive the Business. In parallel with the growth in the use of BTx and BI application packages, the BI industry is also going through a period of significant change. BI is no longer used just for doing strategic and tactical reporting and analysis, but also for driving and optimizing daily business processes and workflows. BI is no longer nice to have, but essential to business success. The rapid evolution of application packages, application package suites, and business intelligence raises several important questions.

1. In what business areas are companies deploying BTx and BI application packages today? How successful are application suites, what benefits do they offer, and what strategies are being used by organizations to deploy them throughout the enterprise?
2. How does the use of packaged application solutions in business units impact existing and future BI projects? What strategies should be used to integrate data between application packages and with an existing data warehousing environment? How does the use of application packages and application suites affect BI/DW product selection? Should companies focus on buying their solutions from a single applications vendor, or should they buy best-of-breed products?
3. How do evolving BI/DW technologies such as in-line and real-time BI, performance management, predictive analysis, and support for XML and Web services affect the selection and use of packaged application solutions?

The objective of this report is to answer these questions and offer suggestions for addressing the issues they raise. The goal of the report is also to suggest possible strategies for building a BI system and underlying data warehouse for processing CRM and ERP data managed by application packages.

The Landscape for Packaged Application Solutions

This report compares and contrasts different approaches to developing business intelligence applications using transaction data managed by application packages from vendors such as Oracle, PeopleSoft, SAP, and Siebel. To put this topic into perspective, this section of the report discusses how business users run, optimize, and communicate about business processes. It then looks at how application packages have evolved to support those processes.

Business Transaction Processes

At the heart of any corporate data processing system are the BTx processes for handling day-to-day business operations such as front-office customer relationship management (CRM), middle-office finance and human resources, and back-office enterprise resource planning (ERP). The techniques and tools for developing and deploying these BTx processes and their underlying applications have evolved over several generations of computer hardware and software.

Custom Coding. Initially, BTx applications were custom developed using programming languages such as Assembler, COBOL, and PL/I. Over time these languages were superseded by object-oriented languages such as C++ and Java.

BTx Application Packages. As BTx application usage grew, development groups looked for faster ways of building applications. This need led to visual programming tools and packaged BTx application solutions. Initially, packaged BTx applications provided stand-alone solutions for specific business areas. More recently, however, application vendors have been marketing complete suites of integrated packages that meet customer needs for deploying a wide range of related and interconnected BTx applications.

BTx Application Package Evolution. The use of BTx application packages increased as companies struggled to replace and reengineer their aging legacy systems in anticipation of year-2000 issues. This was especially the case in ERP deployments. At the beginning of 2000, the pace of migration to packaged solutions slowed. Both ERP and CRM packages suffered a number of well-publicized failures. As both types of BTx

packages have matured, however, the rate of adoption has once again increased. The move to reduce IT costs and standardize on products has also encouraged continued growth in the use of BTx application packages.

Using BTx Application Package Suites. BTx application package suites are used by organizations to replace in-house legacy applications and also stand-alone application packages. The pros and cons of employing an application package suite are well documented. Their main benefits are business models based on best industry practices, faster deployment time, reduced IT resources, and greater integration across applications.

When selecting an application package suite, you should consider issues like reliance on a single vendor, and the customization and maintenance effort required to modify the suite to match the organization's business processes. The cost of application suites is another common issue. Given the objective of a suite is to reduce development and maintenance costs, then the total cost of ownership (TCO) is a better cost comparison against other approaches.

Several companies interviewed for this report said their senior management had decided to adopt a single vendor suite of BTx packaged solutions because they wanted to reduce IT expenditure. The level of investment organizations had made in a suite was the driving force behind this decision. Executives wanted to offset the cost of deploying a suite with a corresponding decrease in IT resources and software overhead. Moving from multiple dispersed application packages to an integrated product set from a single vendor has obvious financial benefits, but this strategy will take time to implement and has key implications for existing and future BI projects.

Many Organizations Have Deployed Multiple BTx Packages. We asked respondents in our survey about the number of vendors who supply BTx application packages to their organizations: 29 percent are using packages from one vendor, 26 percent from two vendors, 16 percent from three vendors,

Number of BTx Application Package Vendors in Use

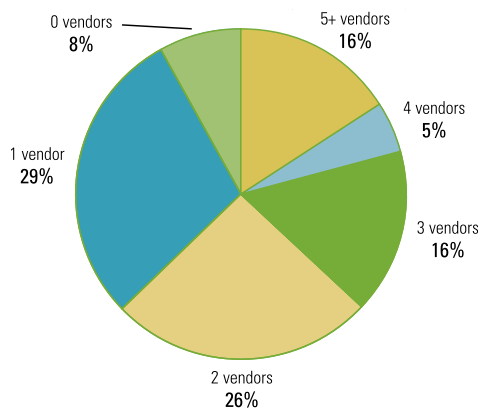


Illustration 1. How many software vendors supply your organization with BTx application packages? Based on 542 respondents.

and 5 percent from four vendors (see Illustration 1). Some 16 percent are using packages from five or more vendors. In total, more than 50 different packages are listed in survey responses. It is likely that some respondents answered this question for their own division or business unit, and in reality the number of packages used by organizations may be higher than the numbers shown.

Business unit autonomy and company mergers and acquisitions are two reasons why companies have multiple packages. Also, individual business units have deployed application solutions at different points in the BTx application package lifecycle, and the maturity of packaged solutions for particular business areas often determined the development approach and products used.

Applications Areas Supported by BTx Packages. The main business areas supported by BTx application packages (see Illustration 2) include finance (78 percent of respondents), sales (54 percent), and human resources (49 percent). It was very common for organizations to support the front office and back office with CRM and ERP packages from different vendors. Also, middle-office human resource and finance departments frequently have their own stand-alone packaged BTx solutions.

Business Areas Addressed by BTx Application Packages

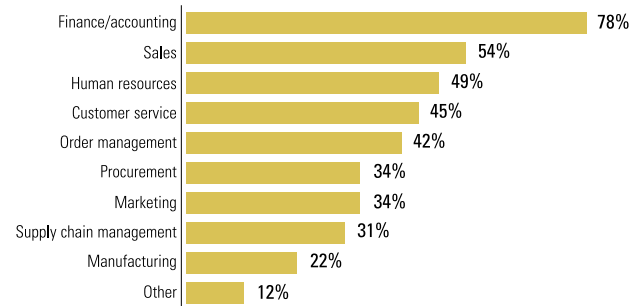


Illustration 2. Which business areas do your BTx application packages support? Based on 522 respondents.

When comparing the number of packages used with corporate revenue, 50 percent of companies with three or more packages have revenues in excess of \$1 billion. Surprisingly, 19 percent of companies with three or more packages have revenues of less than \$100 million, which shows that even smaller companies have to deal with the issue of handling multiple packages.

Business Intelligence Processes

BI application development mirrors the evolution of BTx applications. Organizations began initially by coding their own BI applications, but rapidly progressed into the use of interactive BI productivity tools and packaged BI applications.

BI Application Package Use Is Growing. Like the BTx applications market, the BI area is also seeing growth in the use of application packages. The worldwide BI application package market is forecast to reach over \$4.8 billion in 2007, according to IDC. All three of the IDC BI application package market sectors are projected to enjoy revenue growth through 2007. CRM analytics will grow the fastest with a compound annual growth rate of 12.9 percent, followed by financial analytics/performance management at 10.3 percent, and operations/production analytics at 7.4 percent. Financial analytics/performance management, however, is by far the largest market segment at present.

Survey results show (see Illustration 3) that 30 percent of companies are not using BI application packages from their BTx application vendors, while 37 percent are using just one package. The remaining 33 percent are using two or more of these solutions. Leading business areas being addressed by BI packages (see Illustration 4) include finance (70 percent of respondents), sales (56 percent), and marketing (45 percent). The top two business areas, finance/accounting and sales, are the same as those for BTx application packages. Marketing, however, is more dominant in BI processing than it is in BTx processing.

Number of BI Application Package Vendors in Use

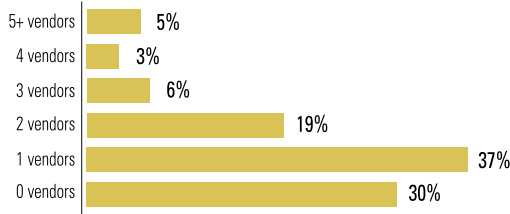


Illustration 3. How many BTx application vendors supply your organization with BI application packages? Based on 545 respondents.

Business Areas Addressed by BI Application Packages

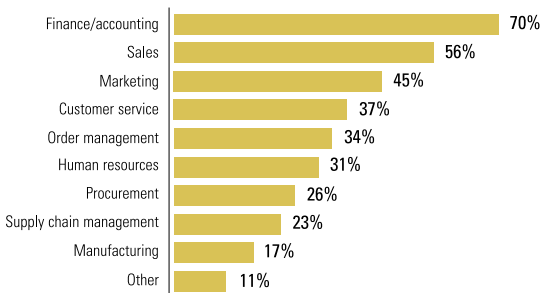


Illustration 4. Which business areas do your BI application packages (from BTx application vendors) support? Based on 482 respondents.

BI Strategies for BTx Package Data

Having outlined how companies use BTx application packages, we now move on to look at different BI strategies for reporting on and analyzing the data from those packages, and for solving the data integration issues involved.

Possible BI/DW Strategies

There are three main BI/DW approaches for processing data managed by BTx application packages. These can be thought of as the *Adopt*, *Avoid*, and *Accommodate* strategies.

Some of the main business and technology requirements that affect product choice include political issues, existing BTx and BI environments, IT skills and resources, product features and functions, integration capabilities, performance and scalability, total cost of ownership (TCO), and vendor relationships and support.

What BI/DW Strategies are Companies Actually Using?

The most popular BI/DW strategy for handling BTx package data according to TDWI survey results is *Accommodate*, followed closely by *Avoid*. Of the three strategies, 32 percent of respondents rated the *Accommodate* strategy as being a “very high” or “high” match to their corporate BI/DW approach. The *Avoid* strategy matched 29 percent of corporate BI/DW approaches, while the equivalent figure for the *Adopt* strategy was 24 percent (see Illustration 5).

BI/DW Strategies for Processing BTx Package Data

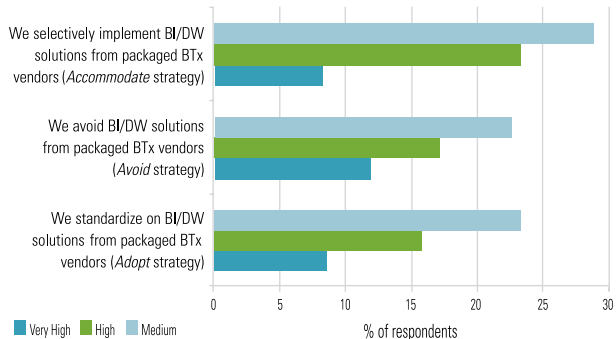


Illustration 5. To what degree do these statements match your BI/DW strategy for processing BTx package data?

Another way of looking at these results is 56 percent of respondents are using BI/DW solutions from BTx applications vendors (*Adopt* or *Accommodate* strategies), and 61 percent are using third-party BI/DW products (*Accommodate* or *Avoid* strategies). These figures clearly show the direction of companies toward incorporating BI/DW solutions from BTx applications vendors in their BI environments.

Although 29 percent of respondents rated the *Avoid* strategy as being either a “very high” or “high” match, nearly half of the same companies have purchased BI/DW products from their BTx application package vendor. One explanation for this anomaly is that individual business units may have a different BI/DW strategy from that of the central IT group. A business unit may implement a BI/DW solution from a BTx application package vendor, even though the central IT group may have adopted an *Avoid* strategy.

Other Factors That Influence Product Choice. The survey also looked at some of the factors that influence product choice. Two key factors are integrating best-of-breed products for gaining maximum functionality, and the total cost of ownership (TCO) of the BI/DW application solution. A best-of-breed approach is used by 62 percent of respondents, which is close to the figure of 61 percent for people employing the *Avoid* or *Accommodate* approaches (i.e., people using third-party BI/DW products). Nearly half of the respondents rate TCO as “very high” or “high” in importance. TCO requirements should be independent of strategy.

Conclusion

The TDWI survey and follow-up interviews show that most companies have a complex mixture of applications and data stores for handling CRM and ERP data, and for reporting on and analyzing this data for corporate decision making. Providing executives and managers with a consistent and integrated view of business operations in such an environment is a difficult task, and companies use a variety of BI and DW techniques and products to support this task. However, some common patterns and trends can be seen in the survey findings.

1. The deployment of BTx and BI application packages and suites is growing, especially in business areas such as finance, sales and marketing, and human resources.
2. Many companies are content to allow individual business units to deploy their own BTx and BI application packages. These packages offer many advantages to the individual business units, but they can complicate the creation of an enterprise data warehouse and cross-business-unit BI processing. Data integration in this environment is often done by copying warehouse data between a business unit application package data warehouse and a central enterprise DW.
3. To increase the ROI of their IT software investments, some senior executives are mandating the use of an integrated BTx and BI product set from a single vendor across all business units. Whereas this approach helps eliminate the data warehouse and BI issues outlined in item 2 above, it is unlikely in the short term that these companies can eliminate the use of legacy applications and individual application packages completely across all business units.

4. Although the creation of an enterprise DW is still the goal, for the foreseeable future many companies will need to employ a hybrid DW architecture that can accommodate BI tools and application packages from both BTx application and third-party vendors. Such an environment requires an open BI/DW framework that can easily absorb new BI/DW products and technologies as the marketplace evolves.
5. Key requirements for BI/DW for application packages are an open and integrated framework for handling data and metadata, scalability and performance, total cost of ownership, ease of use, and analysis and reporting power.
6. Many companies are nominating business process owners in each business unit to improve communications with IT about the business use of application packages, and to identify business and information requirements for new BI applications.
7. Business intelligence is now being used not only for strategic and tactical decision making, but also to drive day-to-day business operations. In some cases, this is being achieved by integrating BI processes into the business transaction workflow.
8. Many companies are focused on reducing IT costs, rather than using modern BI technology to build smarter businesses. This is making the creation of an enterprise data warehouse for cross-business-unit planning and action difficult to create. IT organizations need to work closely with senior executives to explain the business benefits of integrating business intelligence from the demand side of the organization, with that of finance and the supply side of the organization. ■

Colin White is president of BI Research. With more than 34 years of IT experience, he has been a consultant for dozens of companies around the world, and is a frequent speaker at leading IT events. For more information, write to info@bi-research.com.

The Deadliest Sin of Data Warehousing

By Kim Stanick, VP Product Marketing, DATAlegro

You've likely heard of the seven deadly sins. Much has been written on them throughout the ages by scholars and theologians.¹ Dante, in his epic poem *Purgatorio*, ranked pride as the sin closest to hell—effectively making it the deadliest sin. Likewise, when one considers data warehousing, pride is indeed the deadliest sin. Here's why.

Pride Can Lead a Data Warehouse Team To:

Make assumptions

A data warehouse's success depends on its usability, which can only truly be determined by the user. Making assumptions can lead a team to fall prey to the “build it and they will come” mentality. Making the *wrong* assumptions can lead to significant rework.

Become complacent

Complacency can cause a team to be content with the state of the data warehouse and falsely believe that the data warehouse exists in and of itself—that it is important merely because it exists.

Be overconfident

Overconfident teams may take on additional requirements, often without adjusting the delivery time frames (scope creep). Then, when they can't deliver on time, they are seen as ineffective. An overconfident team may also believe that it is talented enough to acquire experience it lacks along the way. Intelligence and exuberance, while important, are not replacements for experience.

Think they're done

If there's one thing that experienced data warehouse professionals know, it's that the data warehouse is never done.

Pitfalls of Pride	Humble Solutions
Pride can lead a DW team to make assumptions	Over-do due diligence
Pride can lead a DW team to become complacent	Seek honest feedback
Pride can lead a DW team to be overconfident	Adopt a service-center approach
Pride can lead a DW team to think they're done	Innovate with the business

If the data warehouse isn't growing, or changing, then it isn't being used or isn't useful. A data warehouse should reflect the business at large. If the business is growing rapidly, but the data warehouse isn't, something is wrong.

There is Hope

Just as there are seven deadly sins, there are seven cardinal virtues to counterbalance each sin. *Humility* is the virtue that counteracts pride. Here are some actions that will help your data warehouse team use humility to be more successful.

Over-do due diligence

To overcome the tendency toward making assumptions, go overboard when soliciting user input during needs analysis and early design phases. There is often a feeling among data warehouse implementers that users are overly prone to changing their minds. However, sometimes users' needs are changing rapidly or they have more needs than they can easily prioritize.

Seek honest feedback

To overcome the tendency toward complacency, solicit ongoing feedback from users. Sometimes users don't know how or are reluctant to give feedback. Make it easy for them. Formal feedback (user surveys, feedback forms) is good,

but so is informal feedback (hallway conversations, pizza lunches). Most important, all feedback must be acknowledged and acted upon.

Adopt a service-center approach

To combat overconfidence, adopt a service-center approach. By behaving as a service provider to the business, a data warehouse team will not fall prey to believing that their data warehouse's existence is more important than its usefulness.

Innovate with the business

Just when you thought you were done, a new user need will arise, or new technology will come along to make you want to enhance your existing solution. This is healthy. Request for change is a sure sign that you have a successful data warehouse—that people are *using* it.

Overall, a philosophy of humility can ensure the data warehouse team is continually focused on meeting user needs. Don't wait for users to come your way. Look around your business. If it's growing faster than the data warehouse or is evolving into areas that aren't in future data warehouse plans, you might not be doing all you can to help the business. Therefore, put pride aside and humbly offer your assistance. ■

¹ In case you've forgotten, the seven deadly sins are: pride, envy, gluttony, lust, anger, greed, and sloth.

The Perils of Data Warehouse Success

By Kim Stanick, VP Product Marketing, DATAlegro

A successful data warehouse is a double-edged sword. Because growing demand increases pressure on limited resources, data warehouse success involves a constant weighing of priorities. Disappointment can result when concurrent demands cannot be feasibly met within the budget.

The problem may be a simple situation of budget cycles, but it may also be an indicator of a more chronic condition. As a business grows and evolves, so must the data warehouse. Diminishing effectiveness can be very subtle and difficult to recognize. To overcome it, one must recognize the leading indicators. Here are a few to watch for:

A growing backlog of enhancement requests. User requests for additional data or queries cannot be fulfilled because of limited capacity.

Limits placed on data warehouse use. Limits are placed on things like ad hoc queries, concurrency, access windows, query execution time, complexity of queries (no joins), non-priority use (exploration), additional users, etc.

New applications never leave the “back burner.” There are desirable new applications that leverage existing data,

but the current platform can't handle the additional workload.

Historical data is archived too soon. Users would like to access deeper history but there is insufficient capacity to allow it.

It may be an acceptable condition for a successful new data warehouse to be slightly “behind the curve” (more requests coming in than can be handled quickly), but a successful *mature* data warehouse should not have a huge and growing backlog of unmet needs, because its viability has been established and planning efforts are more predictable. If a mature warehouse does have a growing backlog, the situation should be analyzed to find out why.

If you notice any of these leading indicators, your data warehouse's effectiveness may be diminishing. The cause often boils down to lack of scalability in one form or another, and can be explained by what is known as the data warehouse *capability gap*. The capability gap exists when the rate of data growth outpaces the data warehouse platform capability. The effects of this condition are increased total cost of ownership (it costs more to get smaller increments of

additional performance) and, eventually, hitting a physical technology barrier (the platform has literally reached its maximum configuration limits). Both of these situations lead to non-consumption (usage limits, delayed implementations, etc.) and therefore diminishing data warehouse effectiveness.

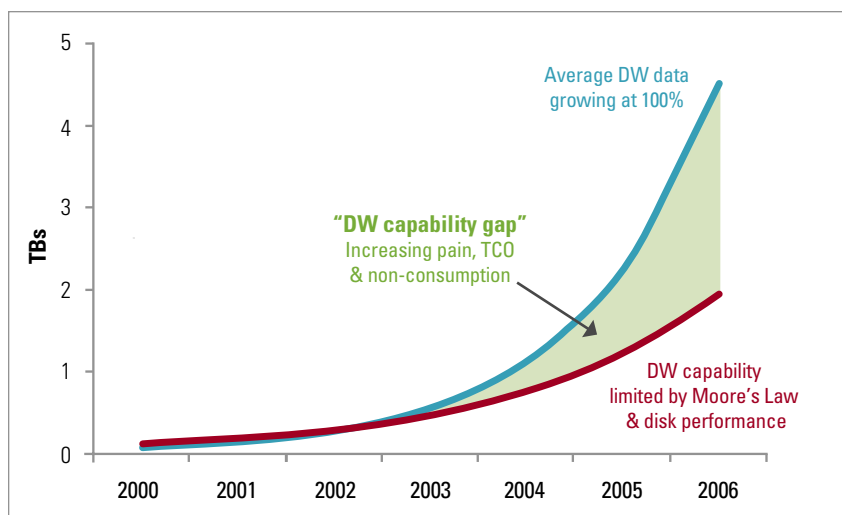
Keeping step with technology advancements is an important part of an overall strategy to avoid the problem of diminishing data warehouse effectiveness. Here are a few tips on how to do that:

Harness rapid improvements in price performance. Given today's climate of rapid technology improvements and commoditization, good price performance is much easier to ensure. Designing an environment to nimbly take advantage of price performance gains will give you more mileage out of your existing data warehouse budget.

Reduce the amount of integration. Maturing of open standards and the trend toward “pre-integration” means you can shift more of the integration burden onto the vendor. This will allow you to spend less time and effort rolling out new functionality.

Ensure platform scalability. Lack of scalability (concurrency, complexity, capacity) will limit your data warehouse's effectiveness. When selecting data warehouse technology, be sure it can achieve linear scale-up (double the platform and you double the performance) and scale-out (double the platform and the workload and you get the same performance).

By resisting the temptation to limit data warehouse usage and instead taking advantage of improved price performance, a data warehouse's effectiveness can be maximized and its success can be long-lived. ■



Improve Your Analysis Capabilities

By Craig Abramson, Senior Technical Analyst, Syncsort Incorporated

Today's businesses are accumulating ever-increasing volumes of data from a variety of different sources at record paces. For example, a successful Web site alone can generate over a billion clickstream records a day. Now add to this the data generated daily from high-volume transaction processing, coupled with detailed historical transactions already stored in a data warehouse. Then there's the inventory and billing data, detailed financial information, customer data, and much more. While the growth of the data results in longer processing time, increased hardware costs, and more administrative requirements, demands on the data have also been increasing. This lesson describes two ways in which you can prepare your data in order to meet these demands: by performing data transformations and utilizing metadata.

Transform Your Data for Faster Queries

Transforming your data makes it easier and more efficient for you to directly access just the information that you need, minimizing the elapsed time of your queries. There are three different levels in which the data transformation processes can take place in order to reduce the elapsed times of your applications and speed the analysis of information:

Source level operations. At this level, you can convert database tables to flat files and vice versa.

Record level operations. This would encompass such processes as joins, sorts, merges, or just copying records to the appropriate target(s). Before outputting the records, they can then be filtered or reformatted for faster access. You can also perform aggregations at this level. Aggregates are one of the best ways to speed warehouse queries. A query answered from base-level data can take hours and involve millions of

data records and millions of calculations. With precalculated aggregates, the same query can be answered in seconds with just a few records and calculations.

Field level operations. This includes data type and format conversions, arithmetic operations, string operations, date-time operations, pattern matching, and conditional operations.

These kinds of transformations allow you to cleanse data, create business rules for data quality, and concentrate on only the information you need. The data can then be loaded into a data warehouse or other data-intensive application for analysis. Additional processing may have to be completed in order to move specific data to the appropriate data mart.

Utilize Metadata to Quickly Find the Information You Need

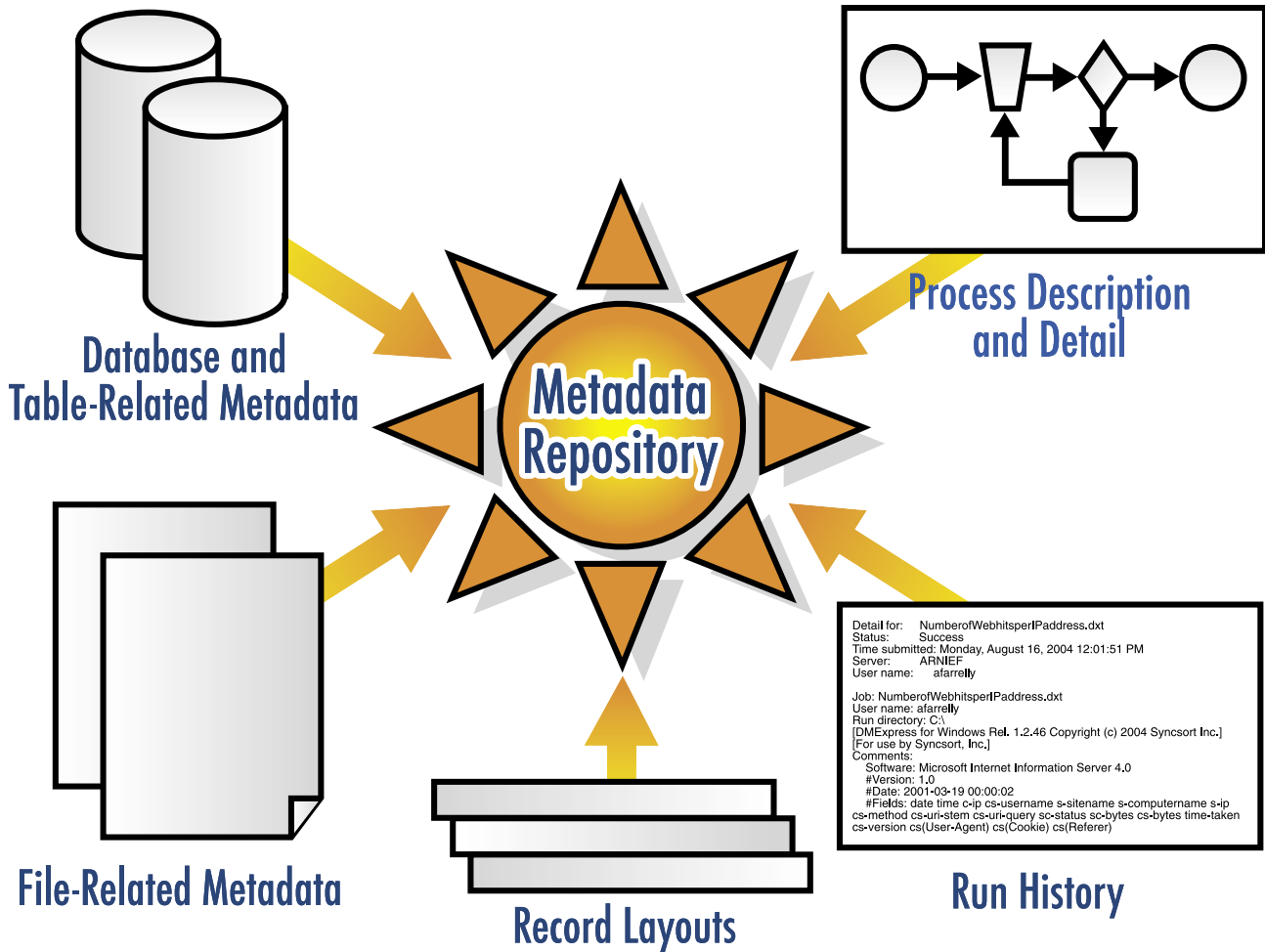
Another way to minimize the elapsed times of your queries is to use metadata. Metadata describes what information is contained in your data. It details the context, structure, and location of the data, making it much more manageable. This may not sound like an important feature when you don't have a large amount of data... but when the gigabytes start adding up, metadata helps you quickly find and utilize the data you need for your specific applications. To highlight the benefit that metadata provides in this type of environment, imagine that you're in a large warehouse that's filled with wooden crates. None of the crates have labels. Now imagine that your boss asks you to find and collect all the crates that contain parts relating to the production of widgets. This would be a daunting and time-consuming task for anyone. But what if you approached the same task with crates that are all clearly labeled? You can imagine how much easier the labels would make your job and how much faster you could get it done. That's one of the advantages that metadata provides.



Metadata is also critical for data integration, which is the process of accumulating and combining data sets from disparate sources in various locations. It helps you identify the data sets so that, once again, you are only collecting the information you need. Data integration then incorporates the ETL process—the sequence of applications that extract data from various sources, bring them to a data staging area, and apply a sequence of processes to prepare the data for migration into the data warehouse and the actual loading process. After the data is extracted, a number of transformations may be applied in preparation for data consolidation and subsequently loaded into data marts, data warehouses, or dimensional data structures used for decision support or business intelligence systems. Metadata then provides the contextual information you need to effectively analyze the data.

Metadata can be located either within the data warehouse or scattered throughout a network. Source metadata is located within the data warehouse and includes all information about the source data. It can provide such details as:

- **Record layouts.** Each record from the source is made up of a series of fields that contain information on a particular item. The pattern of fields, together with the data types and lengths of the individual fields, is termed the *record layout*.
- **Business rules.** The metadata layer of the data warehouse enforces information consistency by allowing data to be defined in business terms, as opposed to using the database jargon. Rules that specify how business terms are determined or calculated, i.e., the business rules, are also defined within the metadata layer.



Metadata makes data more manageable.

- **Derived data.** The transformation definitions derived from the contents of a source field in the records and/or from constants are referred to as *derived data* or *derived values*. Derived values provide a mechanism to simplify and reuse transformations defined on the source data.
- **Customized collating sequences.** To order character values according to a sequence other than one of the standard collating sequences, you have to define the rules that detail how character values are to be ordered. These rules describe a special collating sequence that defines the order in which single characters, and possibly double characters, collate.

Speed Your Backups with Metadata

The use of metadata is also emerging in the area of backup and recovery strategies. For instance, on NetWare versions 6.5 and higher, you can back up data using a pool snapshot, which is a point-in-time metadata copy of a data pool. In addition to increasing the speed of backup jobs, pool snapshots can eliminate job disruptions caused by failed attempts to back up open files. Once a snapshot is taken, the original data pool is immediately available to users, instead of being unavailable for the length of the backup job. Scripts can be run before and after the snapshot to change the state of a database, gather information at the time of a snapshot or job, or perform other manual tasks.

Conclusion

In order to minimize the elapsed times of your applications and speed queries, you'll need the right software to perform the necessary data transformations, process metadata, and quickly back up your critical information using snapshot technology. It's important to test the various tools in your environment and take advantage of any proof-of-concept offers that are available. This will ensure that you make the right choice and reach the full potential that your data has to offer. The performance advantages that you'll gain with the right tools will also give you more time to run additional applications and leverage your existing hardware investment. ■

Data Warehouse Governance: Ensuring Lasting Business Intelligence Value

By John Williams, Vice President of Technology, Collaborative Consulting

Even when constructed efficiently, data warehouses are expensive. As a consequence, companies that invest in them must ensure they receive the best possible return on their investment. A comprehensive data warehouse governance program ensures that business intelligence assets are expended for business benefit—both directly and indirectly—and that optimal value is achieved from the data warehousing environment.

Continuous, vigilant governance is critical. Without it, a data warehouse initiative will probably fail, even if it is a tactical success.

Key Elements of a Governance Structure

To execute a governance program, an organization must combine three key elements: sponsorship, organization, and process.

Ensure executive sponsorship. Successful data warehousing programs feature thorough executive sponsorship, i.e., solid, enthusiastic senior management backing. Without that, governance programs, like most programs, fall flat. Senior management must support the program and (most important) provide funding and access to resources for data initiatives.

Tip: The champion must sit at least a level above individual constituencies and lines of business.

Structure an oversight organization. Establishing the appropriate team is another key governance component. Start with a governance board comprising senior business and technology contributors. They will ensure that the right people provide direction and have a vested interest in the success of data initiatives.

Data owners, data stewards, and data beneficiaries are also critical to a data

warehouse organization. Owners include groups that provide data to benefit the organization; they own the content and the corresponding definition of quality. Stewards manage data on behalf of the organization. They execute processes that support the organization's SLAs. Beneficiaries receive value by using information. The governance model must consider brokering dialogue among these constituencies. Then, data collection, management, and use can achieve optimal value.

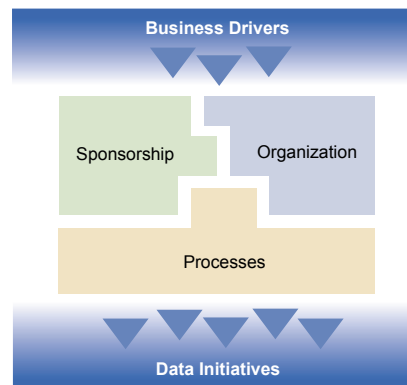
Tip: The governance board should feature an executive sponsor, as well as business-unit and information-technology decision makers.

Establish lasting processes. Once the proper sponsorship and organization are in place, fundamental processes can also be established. These focus primarily on alignment, prioritization, funding allocation, measurement, arbitration, and program management. The directed execution of these ongoing processes allows the data warehouse to provide clear near-term and optimal lasting value. Most data warehouses that fall short of expectations lack the process discipline to ensure success beyond the first few releases. This shortcoming often reflects an insufficient focus on and discipline in process management.

Tip: Processes must focus on long-term success, not just near-term tactical goals.

Imperatives, initiatives, and requirements. A governance model must, first and foremost, consider the needs of the business—e.g., profitability growth, compliance, and operational efficiency improvements—as its primary driver. Framing the business problem first, apart from specific data-centric activities, provides clarity and helps teams focus in proper areas. This can be achieved by defining imperatives, initiatives, and requirements.

DATA WAREHOUSE GOVERNANCE



Imperatives represent the organization's business requirements and objectives. Initiatives are data warehousing activities that help achieve imperatives. Establishing a direct correlation between both and leading efforts accordingly clarifies a data warehouse's value proposition. The priority of business imperatives, and the effort required to accomplish them, drives the initiative-based program, and therefore keeps data warehouse efforts in lockstep with business needs.

Requirements are specific details of what is needed to support business imperatives. Initiatives group requirements into executable projects, which are managed and directed by the governance structure.

Maintain High Performance

Data is extremely valuable for companies able to exploit it—despite the time, expense, and complexity involved. However, when one considers all the effort required to establish a highly functional, robust business intelligence system, constant, diligent, and vigilant governance only makes sense. Otherwise, entirely preventable problems may arise, hindering performance and reducing value. ■

Controlling Data Quality to Improve Business Decisions

By Tony Fisher, President/General Manager, DataFlux

Anyone who has ever flown a plane—or even glanced into a cockpit when boarding a commercial flight—can appreciate the complex array of gauges and monitors that the pilot must check. All the data about a plane’s speed, course, fuel, and other details are in easy view, each giving the pilot the information necessary to make sound, safe decisions.

Similarly, organizations rely on data to provide the foundation for business decisions. For years, companies have

“Once and Done” is Not Enough

The impact of “data decay” can influence—and hinder—many enterprise initiatives. Imagine a manufacturing company that builds a data warehouse to serve as a single repository for all of its information about customers, products, and inventory. From that data, they can uncover trends about customer adoption, resource allocation, and future needs.

After a review of the data, this company finds that new, non-standard



data monitoring puts checks and controls on incoming information to keep high levels of data quality.

A data monitoring regimen can accomplish a number of tasks, such as:

- **Detect problems from incoming data.** Since data warehouses typically receive periodic loads, this allows companies to validate existing data against established business rules. This will help them to uncover and address data integrity issues—before they become a problem later during business intelligence programs.
- **Generate instant alerts.** Set up automated system notifications and e-mails to flag problematic data as new, inconsistent records enter the system.
- **Identify trends in data quality metrics.** View ongoing statistics about data to see when the value of data starts to decline.

Data monitoring extends the reach of traditional data quality programs by making good data a corporate priority. When data does get out of control, users know immediately—and they can react to problems before the quality of the data declines.

Add Monitoring to Data Management Initiatives

Building consistent, accurate, and reliable data is not easy. Periodic fixes will only provide temporary relief from the various problems that can arise because of bad data. With data monitoring, companies can better control their data and build more reliable information to support any future business intelligence efforts. ■

Building and keeping good data on customers, prospects, products, and inventory takes constant vigilance. To manage data effectively, an organization must institute a data management program based on continual, routine monitoring of data to increase the control on data quality.

implemented business intelligence (BI) programs to achieve one goal: to make better decisions from their corporate information. Many companies have discovered one inescapable truth: it’s impossible to make an informed decision based on outdated or erroneous information. Just as a pilot needs to monitor the health of the aircraft, organizations need to constantly gauge the health of their data.

Companies often believe that after cleaning data once, they have solved their data problems. However, building and keeping good data on customers, prospects, products, and inventory takes constant vigilance. To manage data effectively, an organization must institute a data management program based on continual, routine monitoring of data to increase the control on data quality.

information is constantly arriving at the repository. The effect of this bad data may not be felt until much later. Whenever the company explores this data to identify patterns or tendencies, the presence of bad data can skew the results.

The solution for building high-quality corporate data on an ongoing basis is data monitoring. With data monitoring, technology and business users can create rules to examine data automatically to uncover problems as they occur. These users can also chart metrics related to data quality on a periodic basis and begin to address some of the underlying reasons that bad data is being collected in the first place.

The Role of Data Monitoring

The role of data monitoring is similar to quality improvement methodologies like Six Sigma. Instead of loading questionable information into a data warehouse,

DATALlegro, Inc.

How can I optimize a multi-vendor data warehouse platform?

The integration effort required to provide optimal data warehouse performance is often underestimated. Many different technologies require optimization, including server, storage, OS, and RDBMS—at a minimum. These are typically acquired from different vendors, who make no promises and often point fingers when pressured about performance. Tunable parameters exist, but the selection is daunting. Considering all this, the simplest way to achieve reliable data warehouse performance is to push the burden of integration and optimization onto the shoulders of a single vendor who accepts responsibility for ensuring performance of the entire stack.

Analyst Viewpoint:

If you are like many data warehousing professionals today, you started out small and supplemented your data warehousing platform as you went. At some point, the platform became complex enough that optimization became an issue. A class of cost-effective technologies is emerging to address this need. These are technologies that come with integrated hardware, operating systems, and DBMS engines. The best of breed include high-performance parallel processing, support ANSI standard SQL, provide interfaces for all of the major BI and ETL tools, and require minimal tuning. They are essentially plug-and-play upgrades to your data warehouse platform.

Request more information about DATALlegro, Inc.

Dun & Bradstreet Sales & Marketing Solutions

Why is establishing 360-degree views of customers through BI/DW applications so critical?

The ability to see and understand customers from every angle is the crux of ROI from a BI/DW application, and it paves the way for increased corporate revenue. With 360-degree views of every customer, you can more accurately calculate their total profitability, lifetime value, and credit assessment—your risk exposure. Identifying all the points in a customer organization also uncovers new opportunities to sell more deeply and widely. The result is more sales opportunities and increased customer acquisition—and greater profitability.

Analyst Viewpoint:

A 360-degree view of a customer is not just about collecting all of the interactions that a customer has with an organization into a single application. It is also about understanding where that customer fits with other customer interactions over time. Operational systems facilitate day-to-day individual interactions with customers, but the data warehouse offers the type of historical and integrated data that will support activities such as identifying a customer within a group of other customers. The benefits of identifying a customer within a group include understanding the risks and service opportunities that a given customer is likely to present.

Request more information about Dun & Bradstreet

Group 1 Software, A Pitney Bowes Company

Weekly, my users request reports requiring new data sources that aren't (yet) in the DW. How can these requests be accommodated without compromising the DW and impacting other users?

This is a common situation. Group 1 OpenLink provides enterprises with a BI tool that enables users to integrate new data sources with data from the DW without compromising the data integrity.

Group 1 OpenLink works by allowing any ODBC- or JDBC-compliant software application to leverage the analytical power of Group 1's Data Flow Server. Business analysts working with BI tools such as Actuate, Brio, Business Objects, Cognos, Crystal Decisions, and Microsoft Excel can now use Group 1 OpenLink to transparently incorporate advanced analytics into existing reports and BPM solutions.

Analyst Viewpoint:

Many of those requests will be for operational data. As organizations realize the benefits of their data warehouse-centric BI platforms, their business users are demanding direct access to systems using those same BI technologies. In response, IT groups are implementing enterprise information integration (EII) platforms. EII provides access to operational data for most common BI platforms. EII also provides data transformations "on the fly" so that information is delivered with names and formats that meet organizational standards. EII does not take the place of the data warehouse when users need historical data, but it can provide integrated data for operational reporting.

Request more information about Group 1 Software

HyperRoll

Is there a better way to manage my data warehouse or data mart while improving my query performance?

Ventana Research recently found that most companies *react* to the issues of query and report performance. In addition, organizations tend to employ mitigating strategies that provide only minimal improvements. To realize the high performance required by today's demanding analysis and reporting needs, organizations must take a proactive, structured approach to managing performance. This was not possible until a new category of technology became available: data aggregation solutions. These innovative solutions can help you proactively manage query and reporting performance to meet the ever-changing and growing needs of your company.

Analyst Viewpoint:

Data warehousing initiatives often grow out of IT-centered, enterprise reporting efforts that have "hit the wall" in terms of delivery turnaround and performance. A data warehouse will definitely benefit such an effort. However, data warehousing initiatives usually face heavy demand for ad hoc reporting and analysis from business users. Ad hoc access will add value to the warehousing initiative, but pose a serious challenge for the database designer. Design options include adding summary tables, multi-dimensional cubes, or a technology that provides aggregation, caching, and compression algorithms to the existing technical architecture. Data warehousing teams should check out this last option.

Request more information about HyperRoll

Informatica Corporation

What should I consider when choosing a data migration solution?

Determine the scope of the overall effort. It is useful to review the following when choosing a solution:

- Number and complexity of legacy systems
- Type of migration (i.e., batch, synchronous, or real-time)
- Legacy data quality
- Amount of data and history to be converted
- Target application architecture
- Bandwidth and availability
- Budget

Next, IT organizations need to select the most appropriate approach given the project scope. Flexibility, reusability, and total lifetime cost should be considered.

Analyst Viewpoint:

The term “data migration” seems to describe a one-time event. However, any organization that chooses a data migration tool based on that perception may be making a mistake. The care and feeding of BI data stores are ongoing, with load management requirements and ever-expanding data migration processes. In addition, most organizations will migrate different operational systems over time. Therefore, selecting a data migration technology that can not only meet the needs of the project at hand, but can also be expanded with the options needed to meet the requirements of migration projects on the horizon, makes good business sense.

Request more information about Informatica Corporation

MicroStrategy

Does BI standardization only have the CFO and CIO’s best interests in mind?

Arguably the biggest driver for BI standardization is lower ownership costs, followed closely by streamlined processes and improved efficiencies. It is clear, then, that both the CFO and CIO stand to gain by consolidating their investments in BI. Ultimately, however, it is the business user who reaps tremendous rewards from a single BI platform that is a comprehensive, straightforward solution. MicroStrategy continually puts the business user’s needs first as the only BI platform with intuitive, easy, one-stop shopping for monitoring, reporting, and analyzing business performance. MicroStrategy customers such as Ace Hardware, Sprint, and Shaw Industries have standardized on the MicroStrategy platform to drive cost efficiency, optimize resources, and enhance business productivity.

Analyst Viewpoint:

No, the whole organization stands to gain. Any organization that standardizes on a single BI platform can expect synergies between business users who can tackle business problems using a common tool. There is nothing more frustrating to a business user than trying to find somebody who knows how to do a certain operation with the tool he or she is working with. This results in non-productive time that is often hard to quantify. Without standardization and a formal support program, plus the development of informal support among the business community, the organization can expect to collect a lot of shelf-ware.

Request more information about MicroStrategy

Syncsort Incorporated

What kind of transformations can I apply to large data volumes to achieve faster query processing?

You can speed your data-intensive applications by employing the following techniques: At the source level, convert database tables to flat files, and vice versa. At the record level, use joins, sorts, aggregates, or simply copy records to the appropriate target(s). Data type and format conversions such as arithmetic operations, pattern matching, and conditional operations are appropriate for the record level. Applying these transformations will cleanse your data, create business rules for data quality, and quickly yield only the information you need for further analysis.

Analyst Viewpoint:

Selections and precalculations need to be at the top of your list for data transformations that will lead to faster queries. If you move selection to the extract stage using an industrial-strength sort program, you will also gain performance on the overall time that it will take you to load your BI data store. Building tables with popular summary statistics and derived columns calculated during the load process will not only make queries run faster, but also the user will not have to spend as much time formulating the query and that user will generate more consistent and accurate reports.

Request more information about Syncsort Incorporated

Trillium Software®, a division of Harte-Hanks

How do I secure executive buy-in for my data quality initiative?

Detail the specific business problem your company is faced with and how a data quality solution can impact the organization as a whole. For example, explain that: “The procurement department is losing \$10 million per year because they are not able to negotiate competitive rates for suppliers.” Underscore the specific business benefits you expect to receive from the data quality project—a more accurate view of supplier relationships to negotiate price and save the company millions. Then discuss other business benefits that will occur—better customer service, new business opportunities, and the ability to derive value out of existing procurement systems.

Analyst Viewpoint:

One way to secure executive buy-in for a data quality initiative is to document how poor data quality affects different areas of the organization. Although data quality problems may surface during a BI initiative, most can be traced back to operational systems. As such, these problems can have impacts on operations and strategic decision making. By quantifying and combining the costs of the problems in these areas, with the assistance of those managers who are affected, you can often put forward a compelling case for a data quality initiative. You will also gain the support of management in the process.

Request more information about Trillium Software

Integrating Business Reporting and Analysis

By Fred Richards, Senior Director of Marketing Programs, MicroStrategy

Leading organizations have recognized the benefits of putting information into the hands of all their employees, regardless of job title or function. And, aware of it or not, business users rely on business intelligence to make better business decisions and streamline operations. Here's how specific people within a company use an integrated BI solution to report, analyze, and monitor business performance. Consider these scenarios:

Executive

A vice president of sales can receive sales performance reports by subscribing to a schedule-driven distribution service that e-mails her weekly sales reports. After a review of one such weekly report on regional sales, the vice president notices that the sales for one store have dropped significantly from previous weeks. She can click on some lower-than-expected figures and immediately drill to the underlying data, which shows that three best-selling products are surprisingly underperforming. She can also monitor sales performance by accessing an executive dashboard with visually compelling tables, graphs, gauges, and other graphical indicators optimized for the executive's quick absorption.

Manager

A store manager can receive daily store performance reports generated by the report distribution engine. After discovering an issue, the store manager can click on the report to quickly delve deeper into the issue and drill into that area of the data to which he has permission. This particular store manager can compare his store's sales results against the sales plan, against sales results at other stores like his, and against previous years' seasonal patterns. As a Web user, the manager can view trend indicators as well as create and adjust metrics and

perform new calculations to refine his analysis.

Analyst

An analyst is able to build her own reports that display data across all regions and stores with advanced metrics. The analyst can investigate past regional performance with statistical analysis and generate powerful predictive analysis on future quarter performance. The analyst can create reports that empower executives and managers to continuously monitor sales performance.

In all three scenarios, users can report, analyze, and monitor the data to uncover problems, make intelligent decisions, and preserve their company's exceptional level of performance. MicroStrategy is the first and only business intelligence architecture to unify reporting, analysis, and real-time monitoring into one seamless experience for the business user, into one efficient and scalable architecture for the IT professional, and into one economical and extensible utility for the CIO.

The key to driving better and more predictable business performance is to deliver timely and actionable information to the hands of every person throughout the enterprise. MicroStrategy delivers a range of world-class capabilities for reporting, analyzing, and continuously monitoring business performance.

- **Report the detailed information needed by everyone for day-to-day decision making.** MicroStrategy reporting delivers detailed data on current and historical performance to users across the enterprise. An intuitive user interface and Web reporting allows businesses to deliver insight to everyone for better decision-making, every day.

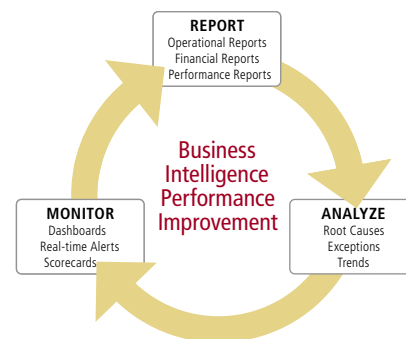


Figure 1: Business intelligence empowers users to move through the cycle of business performance improvement, and through reporting, analyzing, and monitoring, gain critical insight to improve business performance and streamline operations. Users with different roles enter the cycle at any stage and move throughout the process to obtain the desired business insight.

- **Analyze data to uncover root causes and trends in business performance.** Provide detailed insight into the business from many different angles so that managers can uncover the causes of performance problems, identify opportunities, and predict results. Users leverage the advanced analysis to reveal reasons for performance peaks or aberrations.
- **Monitor the performance of your organization at all levels and in real time.** Companies should employ monitoring technology to constantly track business metrics. Users can then use their scorecards and dashboards to create actionable information and alerts about ongoing business activity. Users are empowered with up-to-the-minute information for their business decisions. ■

The Corporate Asset Your Board Is Missing: Data Quality as a Boardroom Issue

By Len Dubois, Vice President of Global Marketing, Trillium Software®, a division of Harte-Hanks

What is your organization's single most important asset? It could be your company's devoted employees, proprietary technology, or award-winning customer service. Or it could be the one common denominator every company has, but rarely leverages to its full potential—data. Vital information lives throughout a company's corporate infrastructure, from simple customer databases to complex enterprise resource planning (ERP) systems. Despite data's role as an invaluable resource, most organizations today put more value on high-priced applications used to access and deliver information, while paying little attention to the accuracy and quality of the data living within their infrastructure. Unfortunately, data quality is not just an IT issue. Poor data quality causes havoc in your boardroom and across your organization, jeopardizing customer retention, decreasing the value of your current IT investments, and hindering your ability for global relationship comprehension.

Customer Retention/ Acquisition

Each customer interaction presents new revenue opportunities. However, at each customer touchpoint within an organization there is the potential for data corruption and thus potential for a disastrous customer exchange. Data quality becomes imperative to a satisfying customer experience, providing corrections to human error and reducing the costs of the transaction in the process. Accurate data also offers a complete, well-rounded view of the customer, providing the opportunity to up-sell and cross-sell products to a more historically receptive audience. The more an organization can refine and maximize the value of customer data, the more instrumental that

information becomes for impacting the bottom line.

Increasing Value of IT Investments

Organizations must take advantage of the vast numbers of data elements created and stored in existing systems, and integrate that information across the organization. Consider how important it

an organization's competitive position in this type of competitive global marketplace. The power of data to deepen relationships within a given market is proven, but it takes on new meaning in uncharted waters. Companies may only get one chance to broach new customers, so it is critical their data is customized culturally—enabling the information to work for them, not against them. Oth-

“Without enterprisewide data quality, organizations are poised to lose revenue and miss major opportunities for cost savings and new business ventures.”

—Len Dubois, Vice President of Global Marketing, Trillium Software, a division of Harte-Hanks

is for a large manufacturer to understand each supplier. It isn't unusual for a manufacturer to hold a number of contracts with one supplier that services different divisions of the company. Leveraging the total value of the relationship is only possible if there is an accurate, unified view of the supplier relationship. Data quality technology enables organizations to maximize the value of the old and the new data, while leveraging existing IT investments and keeping costs to a minimum. Smart IT spending does not have to be an oxymoron.

Global Relationship Comprehension

Technology has opened up the global marketplace to every company. To penetrate these new markets, companies must be able to draw on accurate, relevant, real-time information that transcends the barriers of language, culture, and location to make decisions and market products. Faulty data can undermine

erwise, these organizations run the risk of alienating potential customers indefinitely and jeopardizing legitimate global expansion.

Running a successful business is an ongoing improvement cycle. It means refining procedures and processes time and time again. By ensuring that accurate, reliable information is in place, organizations are empowered to take advantage of tangible business opportunities on a daily basis. For this reason, data quality extends far beyond the IT level, beyond database duplicates, and beyond simple name and address matching. Without enterprisewide data quality, organizations are poised to lose revenue and miss major opportunities for cost savings and new business ventures. Try explaining that one to the board. ■

Data Aggregation—Seven Key Criteria to an Effective Aggregation Solution

By Rich Ghioffi, VP Product Management and Marketing, HyperRoll

Companies today are faced with reporting and data analysis applications that are hamstrung by performance. Market and regulatory pressures are placing company CIOs in difficult positions. Furthermore, the amount of data being collected is increasing—as are the demands for more detailed analysis and reporting. Among the areas hardest hit by these challenges are:

- The need for timely financial close reporting
- Accurate sales and marketing data to develop more profitable customers, and
- Real-time disclosure to meet compliance regulations.

In response, organizations have resorted to all manners of stop-gap measures to coax performance out of BI applications—with little to no success.

What Is Data Aggregation and Why Should You Care?

Data aggregation is any process in which information is expressed in a summary form for purposes such as reporting or analysis. Ineffective data aggregation is currently a major component that limits query performance. And, with up to 90 percent of all reports containing aggregate information, it becomes clear why proactively implementing an aggregation solution can generate significant performance benefits, opening up the opportunity for companies to enhance their organizations' analysis and reporting capabilities.

But how do you go about selecting an effective aggregation solution? First, let's review the typical quick fixes that are used to improve query performance

today. Then we'll review the seven key criteria that will help companies evaluate an effective data aggregation solution.

- **Report caching and broadcasting.** While caching may provide some performance relief, global organizations

An effective data aggregation solution can be the answer to your query performance problems. Free your organization from the arbitrary restrictions placed on your BI infrastructure as a result of quick fixes, and turn reporting and data analysis applications into strategic, corporate-wide assets.

Don't Settle For Quick Fixes

Traditional approaches to solving ineffective data aggregation are no longer enough:

- **New server hardware.** BI applications relying on RDBMS infrastructure perform only incrementally better when additional hardware is introduced. Clearly, the added costs of capital equipment acquisition do not yield the exponential performance improvements required by today's operational BI applications.
- **Partitioning, denormalization, and creating derivative data marts and OLAP cubes.** Although they are more difficult to implement than many of the other quick fixes, these tried and true techniques have been used for many years to improve query performance. But the reality is that tuning requires time, and is a continuous process that will not improve query performance enough to deliver the timely reports businesses require.

servicing geographically dispersed users find it increasingly difficult to allocate sufficient blocks of time to process these reports. The result of report caching and broadcasting is stale, canned reports that are hours or days old—providing limited benefit in an environment where ad hoc, on-demand reporting is a requirement.

- **Summary tables.** Anecdotal evidence suggests that organizations build only a limited number of summary tables that cover a very small percentage of all possible user requests. The maintenance burden introduced by even several dozen summary tables quickly outweighs their incremental benefit.

The following key criteria were developed in collaboration with leading BI analysts and practitioners. Companies using these new criteria can now evaluate innovative technologies that have the capability to address ineffective data aggregation.

Seven Key Criteria to Selecting an Effective Aggregation Solution

- **Enterprise-class solution.** Enterprise-class solutions share a number of characteristics that should be required by any company serious about business intelligence. These solutions are architected to support dynamic business environments. They provide mechanisms to ensure high availability and easy maintenance, they allow for multi-server environments, and they support activities such as backup and recovery. They typically also have more than one way to interface into the system.
 - Once designed, the solution is easily maintainable; little to no management is necessary.
 - The solution must be able to adapt to ever-changing business requirements by having the ability to support changing hierarchies and structures (e.g., attribute to a dimension).
 - The system must leverage existing IT investments in BI environments and DB infrastructures.
 - Integration with the existing applications and systems must be simple. At a minimum, there must be a set of published APIs to popular BI applications and DB systems.
- **Flexible architecture.** A flexible architecture is one that allows for exponential growth and flexibility. This allows the solution provider to be ultra-responsive to the shifting needs of its customers—extremely important, as the business environment is always changing.
 - The solution should use standard industry models to support complex aggregation needs.
 - The solution should support all types of reports and reporting environments.
 - The ideal architecture should optimize pre-aggregation with aggregation on the fly.
- **Performance.** Performance refers to the speed, responsiveness, and quality of the application. Queries that take hours to run are no longer acceptable to business users. Moreover, the data they receive must be fresh. The market demands current information in seconds to minutes in order to make judicious business decisions.
 - Query performance must be virtually instantaneous.
 - Users will not be required to trade excessive build (pre-aggregations) times for good query performance.
 - Performance must be predictable—not dependent on users, data, or time-of-day variations.
- **Scalability.** The amount of data being collected is increasing. And, with the proliferation of technologies that facilitate gathering even more transactional data such as RFID, scalability will become even more important to plan for in the future.
 - The solution should support billions of rows and tens of dimensions with millions of members.
 - Incremental updates should take minutes per day to enable near-real-time processing.
 - The solution should support hundreds to thousands of concurrent users.
- **Fast implementation.** With implementation costs running at two to three times the price of software, it is imperative to evaluate implementation time as well as a product's reliance on expensive IT resources.
 - The system should have a proven implementation methodology and approach.
 - The GUI tool should provide users with a wizard to speed development.
 - The solution should require little to no training.
- **Efficient use of hardware and software resources.** Solutions need to be evaluated on their ability to use hardware and software resources efficiently. Systems that promise significant improvements may also require exponentially more resources—which can be unanticipated and costly.
 - Utility management and control processes should be in place.
 - There should be minimal to no increase in CPU/processing requirements.
 - Minimal to no increase in storage requirements (e.g., no more than 20 percent of the storage required to store your fact data).
 - The solution should provide embedded compression and caching mechanisms.
- **Price/performance.** The criteria used in selecting the technology requirements must coincide with the value of the solution to make it worth implementing. Making financially responsible decisions is no longer just a goal, but rather a necessity.
 - The solution must be priced to scale with the needs of your business.
 - There should be no hidden long-term costs associated with supporting the solution.

An effective data aggregation solution can be the answer to your query performance problems. Free your organization from the arbitrary restrictions placed on your BI infrastructure as a result of quick fixes, and turn reporting and data analysis applications into strategic, corporate-wide assets. For more information on this topic and on how to evaluate your aggregation solution's effectiveness, visit www.hyperroll.com/7_Key_Criteria. ■

Strategy and Approach for the Next-Generation Data Warehouse

By Glenn Peipert, EVP, Chief Operating Officer, and Mark Albala, Principal Consultant, Data Warehousing Practice, Conversion Services International, Inc.

The Business Need

For most organizations, data warehouse success remains obscure. Many organizations have data warehouses that no longer align with current business requirements, that provide incomplete information, or that deliver information too late to enable organizations to make accurate and quick decisions. The result is a data warehouse that provides diminishing value at escalating cost.

Competitive pressures, evaporating profits, shrinking budgets, increasing compliance requirements, customer demands, and the need for greater operational efficiencies are forcing change. These business pressures continue to drive the need for a new and improved, next-generation data warehouse that is more strategic to the organization.

The Business Value

The information supply chain—orchestrated through the emergence of a more valuable data warehouse environment—will drive faster, more responsible decisions among customers, suppliers, and vendors through automated means. The next-generation data warehouse will provide real-time access to critical business performance metrics with actionable tasks that enhance and accelerate decision-making processes. This significantly impacts an organization by:

- Optimizing operational efficiency
- Better positioning the organization for competitive advantage
- Containing and reducing cost

- Creating a healthier top and bottom line
- Improving customer satisfaction
- Accurately measuring business performance against strategic objectives

Finally, the business value that has always been promised is on its way.

What Is the Next-Generation Data Warehouse?

Just as we witnessed the functions of manufacturing and distribution evolve to a just-in-time philosophy, IT and all its disciplines must also make the leap to just-in-time information. The worst offender has been data warehousing, which has been focused on long-term trends and, at best, near-real-time information. The new model will need to integrate real-time metrics with the context of historical information. Business activity monitoring (BAM) infrastructure will need to be integrated with the data warehouse to support this new model. The next-generation data warehouse will advance and align the strategies and objectives of both IT and the business, as well as extend and integrate information across organizational boundaries.

Are You Ready for the Next Generation?

We are experiencing the evolution of software feature/function capabilities made available through business intelligence and data warehousing (BI/DW) technologies. The macroscopic view of the BI/DW technology stack outlined



in Figure 1 provides a glimpse of what will be commonplace within the next five years.

Main focus

Early adopters of data warehousing supported business sponsors who sought general information and efficient data delivery. Companies now seek specific information, a single version of the truth, and a trusted source of information.

Data volume/data quality/education vehicle

The concept of “trusted” information is further complicated by the fact that volumes of data are growing astronomically, and most organizations do not have a formal process or methodology to address data quality. In fact, many organizations are still in denial about the quality of their data. The creation of centers of excellence to support and elevate enterprise information quality is a new concept and one necessary to ensure the ongoing integrity of enterprise information.

Data provisioning

Data provisioning has evolved from scripting processes to the use of extract, transform, and load tools (ETL), and today may also include the use of EAI and EII tools. It is important to understand the implications of each tool and which tools are appropriate for your organization.

Audience

The data warehouse audience is maturing, and the demand for real-time information delivery is mounting. There are many ways to address those needs. Organizations will be forced make “build versus buy” decisions. Viable options include business performance management applications, business activity management applications, or building your own real-time delivery mechanism by leveraging the capabilities of your business intelligence technology stack and ETL stack.

Business intelligence approach

Future business intelligence implementations will need to support thousands—not

hundreds—of users. BI suites have matured, and each product has specific capabilities that will be of interest to your organization. Determine which tools can support your flavor of business intelligence and can scale to support your particular needs.

How Do You Get There?

The CIO, with assistance from the business stakeholders, must transform the IT organization so it can reduce cost of ownership and increase contributions to business growth and efficiency. This may sound simplistic; however, advancing and standardizing the technologies within a dynamic organization can be as difficult as changing the tires on a

moving 18-wheeler. A successful transformation requires an effective strategy and a multi-year plan, as well as an understanding of current and emerging technologies, operational needs, information needs, and organizational readiness.

Once transitioned to the new model of data warehousing, the next-generation tools will exist effortlessly in this new, extended enterprise. This new model will provide the environment to distribute the information necessary to deliver just-in-time knowledge from various platforms through a single user interface shared across trading partners that is sufficiently fluid in structure and content to be redirected as the challenges of business present themselves. ■

BI/DW Software Era	EIS/DSS	BI/DW	Next Generation
Main focus	Insight for a small, self-contained audience; functionality	Single version of the truth; data organization and performance	Context-driven insight driving a single version of the truth across trading partners; data organization, functionality, and security
Audience	Senior management	Internal stakeholders	All stakeholders, customers, suppliers
Stated business drivers	Drowning in paper	Drowning in data	Data is too latent for the decision-making process
Typical data volume	<1 gigabyte	<5 terabytes	>1 exabyte
Data organization	Simple	Star schema or MDDB	Hybrid relational/object/model
Data quality	Quality issues surfaced through EIS & DSS efforts	Data quality must be baked in at the start of efforts	Data quality across participating stakeholders and business units mandatory
Data quality approach	Passive	Reactive	Proactive
Early signals requiring attention	Senior management buried in paper	Stovepipes or islands of BI applications	Disjointed portals, BPM, BAM, predictive modeling, BI/DW applications, & operational systems
Data refresh rate	Monthly	Daily	Real time
Data provisioning	Simple scripted process	ETL	Merged ETL/EAI/EII/BPM/change data capture
Business intelligence approach	Reporting/OLAP	Scorecards/dashboards	Predictive analysis/alerts & notifications
Educational vehicle	Specialized development team	Centers of excellence	To be evolved

The Key to Mastering Customer Relationships

By Krishna Chettayar, Assistant Vice President, D&B Sales & Marketing Solutions

One promise of new sales and marketing technology is the ability to interact with customers on a more personal level. By improving the ability to identify, remember, and relate more fully to customers, a company can make significant gains in customer retention and growth. For example, retaining just 5 percent more customers can increase revenues by as much as 85 percent.

Yet managing customer views is not an easy task. Companies are challenged

customer penetration and acquisition efforts. The first step in this effort is the customer integration process, which presents major challenges for marketers. Customer information is collected and maintained in discrete information systems across the enterprise, and is often stored in inconsistent formats. For instance, accounting may view the customer from one perspective, the service group sees the customer from another angle, and the sales team has its own



Sales & Marketing Solutions

Some CRM systems are getting better at developing an architecture to support multiple customer views, but they are often application-specific. The reality is that companies will have multiple applications and databases that must all work together. What's needed is a common customer directory residing outside of any particular system, yet capable of supporting all systems. The directory should serve up integrated customer views and related information—including analysis—whenever and wherever they are needed.

The answer is not more technology. The answer is better data through processes that are already available. The result is the right information, at the right time, in the right form, and about the right customer—the key to successful CRM.

With a complete customer view, sales can uncover “hidden” revenue opportunities, marketing can deliver higher-impact campaigns at lower cost, and IT can get more value out of existing enterprise systems. Customers get better, more responsive service, increasing their satisfaction and likelihood of buying an increased level of products or services. ■

The answer is better data through processes that are already available. The result is the right information, at the right time, in the right form, and about the right customer—the key to successful CRM.

to do it consistently and well. The key is a customer taxonomy and system for enabling companies to access relevant customer views, so that the end user, or even the customer, can make business decisions with confidence.

The Challenges of Becoming a Customer-Focused Organization

Consider the marketing department in a company, which has specific needs to manage disparate views of a customer. Marketing teams work with IT to integrate and analyze customer information to, at a minimum, identify the customers that provide the most revenue and profit. More sophisticated marketers try to identify any predictive variables that may determine future purchases or signs of attrition, and use the profile to guide

perception. In this situation the customer takes on three different faces, but the true identity is in fact expressed by all of these views as part of a complex “corporate family” that has different members responsible for different activities. The marketer has the difficult job of piecing together all of these views into a picture of demand that can form the basis of actionable information.

Given that other departments in the same organization likely need to manage their customer views as well, it is evident that the situation can quickly become even more complex. Companies often buy CRM systems thinking they will provide an overarching solution, but in fact such systems are little more than repositories of information and are only as good as the quality of information they hold and dispense (“garbage in, garbage out”).

Data Migration: Lowering Cost and Risk to Move to New Systems and Applications

By Harriet Fryman, Group Director, Product Marketing, Informatica Corporation

Today's drive to maximize IT value while leveraging IT to empower strategic business initiatives has also driven many organization to put significant focus on data migration.

Whether the organization is seeking to rationalize its IT infrastructure to comply with the latest regulatory requirements, reduce IT cost and complexity by moving to more commoditized platforms to combat the high cost of maintaining heterogeneous environments, or looking to implement or upgrade to the latest business applications—there is a need to migrate the data.

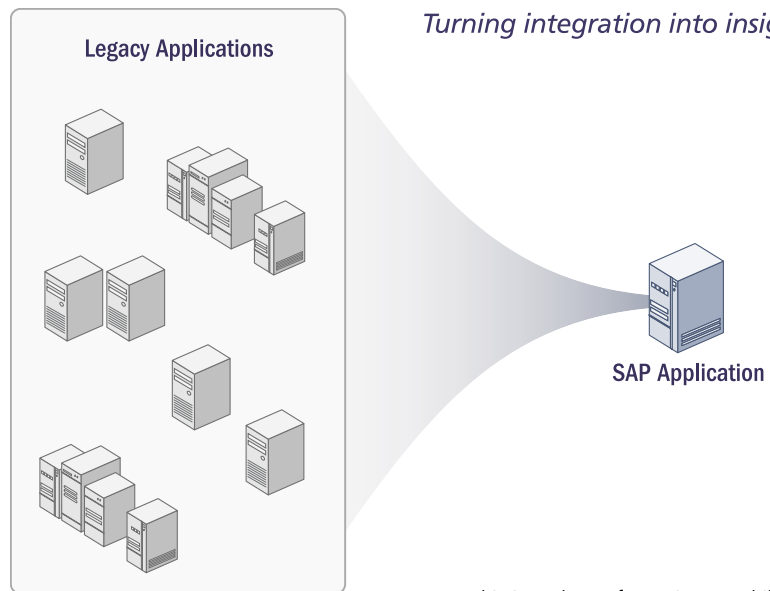
However, regardless of whether the migration involves moving from old applications to new or packaged applications, or from older application versions to the latest release, or from old systems to a new hardware platform, the prospect of data migration can be overwhelming.

In fact, many IT managers familiar with this often complicated and potentially high-risk process will postpone the move until there is such a pressing business need that they have no choice. Studies show that data migration costs can often escalate to 10 times the original budget or cause scope contraction and therefore poor cost-benefit return.

Challenges

The challenges that make data migration costly and often risky include:

- Older and legacy systems require scarce and costly specialist skills to access the data
- Systems tend to lack up-to-date documentation so data content and quality are unknown
- Often multiple systems are migrated to a single system, causing a need to resolve significant redundancy and inconsistency



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- The need for a number of departments to work together through multiple iterative designs creates unexpected additional workload and time overruns, despite the expectation of a one-off, easily outsourced project

Choosing a Migration Solution

Organizations should consider a secure, scalable, and on-demand enterprise data integration platform with the key capabilities required to satisfy the unique demands of data migration under budget and with greater accuracy.

Key criteria include:

- Seamless, non-invasive access to complex systems including mainframe and legacy systems through a common, graphical, SQL-like interface
- Built-in data profiling to discover content, structure, and quality of data in all systems, and reuse those findings in the transformation process

- Sophisticated transformation capabilities with built-in data cleansing processing to reconcile all data and automatically document business rules
- Highly productive team development environment with automated documentation and full audit trail, enabling disparate and geographically disperse teams to work effectively and rapidly

Benefits

By leveraging an enterprise data integration platform for data migration, organizations benefit from:

- Faster, lower-cost data migration efforts
- Reduced risk of scope cutting, cost overrun, or project delay
- Improved data consistency across systems, processes, and organizations
- Increased responsiveness to the business ■

Development Techniques for Creating Analytic Applications

Excerpted from the full March 2005 report. TDWI appreciates the sponsorship of ADVIZOR Solutions, Inc., arcplan, Inc., Business Objects, Microsoft Corporation, MicroStrategy, ProClarity Corporation, and SAP America Inc.

By Wayne W. Eckerson, Director of Research, TDWI

Definition

Business intelligence (BI) professionals throughout the world have one thing in common: no matter how they design or architect their systems, the end result is an *analytic application*. Yet, this phrase is vague and generally misunderstood by most data warehousing and business intelligence (DW/BI) professionals and their business counterparts.

This confusion exists partly because we, as an industry, tend to focus on the tools, technologies, and architectures that we use to create analytic applications, rather than their output. But if we've made the term ambiguous from lack of attention, we've also bastardized it by giving it a multiplicity of definitions. Although no definition will satisfy every constituency and industry pundit, we use the following definition in this report:

An *analytic application* consists of a series of logically integrated, interactive reports, including dashboards and scorecards, that enable a wide range of users to access, analyze, and act on integrated information in the context of the business processes and tasks that they manage in a given domain, such as sales, service, or operations.

Build versus Buy

There is a range of approaches for creating analytic applications. On one end of the spectrum—the “buy” side—organizations purchase packaged analytic applications that require minimal customization and little or no coding across a range of functionality. On the other end—the “build” side—programmers write the entire application from scratch using custom code. Between these two poles are hybrid options that blend both packaged and custom approaches.

Pros and Cons. Many organizations seek to purchase tools or packages to standardize their software investments, accelerate deployment, and reduce total cost of ownership. Unfortunately, many companies end up *over*-customizing the commercial software, undermining its potential to reduce costs and accelerate deployment. And although building applications from scratch provides complete flexibility, it can become very expensive to keep developers on staff to maintain and extend an application that may already exist commercially.

The Need to Customize. Today, no single development approach delivers a complete analytic application out of the box. Even packaged analytic applications supply only 60 to 80

percent of requisite functionality, depending on users' requirements, the organization's existing infrastructure, and the data sources used. Thus, organizations must find ways to customize existing BI packages and tools using a variety of “build” approaches.

While the industry is beginning to coalesce around a buy-and-extend approach to creating analytic applications, some organizations are still committed to build-only or buy-only methodologies.

Buy and Extend. It's no surprise, then, that the majority of respondents to our survey (52 percent) said their organizations prefer to both build *and* buy application components—the “buy and extend” approach. Here, organizations purchase a BI tool or analytic package and then customize it.

The remaining 48 percent of respondents took a hard line, preferring to either build or buy analytic applications. Nearly twice as many of these “hard-liners” prefer to build rather than buy (31 percent to 17 percent). This two-to-one ratio mirrors the findings in our September 2002 report, *The Rise of Analytic Applications: Build or Buy?*

While the industry is beginning to coalesce around a buy-and-extend approach to creating analytic applications, some organizations are still committed to build-only or buy-only methodologies.

Spectrum of Development Techniques

Below is a list of development techniques that organizations use to create analytic applications. Illustration 1 shows the extent to which each can deliver a complete analytic application.

1. **Packaged Analytic Application.** Delivers 60 to 80 percent of a complete analytic application out of the box, usually in a specific business domain.
2. **Packaged Data Marts.** Provides an ETL tool, source adapters, a target data model, and source-to-target mappings for specific source systems.

3. **BI Starter Kits.** Templates in a BI tool that contain style sheets, metrics, reports, and some business logic tailored to a business domain.
4. **Microsoft Office Tools.** Microsoft Excel, PowerPoint, and Access.
5. **BI Tools.** Query, reporting, and analysis tools.
6. **Analytic Development Environments (ADEs).** Graphical, point-and-click development environments for rapidly building analytic applications.
7. **Scripting.** Lightweight programs that enable developers to quickly customize a BI tool or package’s look and feel or functionality.
8. **Portal Integration Kits.** APIs and code samples that make it easier to embed BI reports and controls into a third-party portal.
9. **BI Software Development Kits (SDKs).** A set of documents that describe a BI tool’s API and how to use it.
10. **Custom Code.** A programming language such as 3GL, 4GL, Web scripts, or SQL used to build or modify applications.
11. **Modeling Tools.** Tools to create conceptual, logical, and physical models for a data warehouse or data mart.
12. **ETL.** Extract, transform, and load routines or tools to populate data warehouses and data marts.

developers will need to modify or extend them to meet business requirements.

Clearly, no technique alone creates an analytic application, although packaged applications and custom coding go the farthest toward delivering comprehensive functionality.

Development Techniques in Practice

Primary Technique. Given the spectrum of development techniques for building analytic applications, which techniques or combination of techniques do organizations employ in practice?

Not surprisingly, the largest percentage of respondents (36 percent) selected BI tools as the primary technique for developing their analytic applications. Less than half as many selected custom code (16 percent), Microsoft Office tools (15 percent), and packaged analytic applications (11 percent).

All Techniques. Next, we asked respondents to select all the development techniques they used to create their single largest or “primary” analytic application. Their answers would tell us which techniques organizations employ most often, as well as the combination of techniques in use.

Although organizations prefer to build their primary analytic application with BI tools, on the whole, they use custom coding more than any other development technique. More than half (52 percent) of respondents use custom code when building an analytic application. Next, BI tools were selected by nearly the same percentage as in the previous question (35 percent), followed by Microsoft Office tools (28 percent), packaged analytic applications (22 percent), BI tool SDKs (21 percent), and starter templates (11 percent).

Profile of an Analytic Application. Extrapolating from this data, the “typical” analytic application consists of a BI tool that has been customized using custom code, scripts, or SQL, is written partially against the SDK, and supports Excel as an alternative front-end. (See Illustration 2.)

Application Completeness

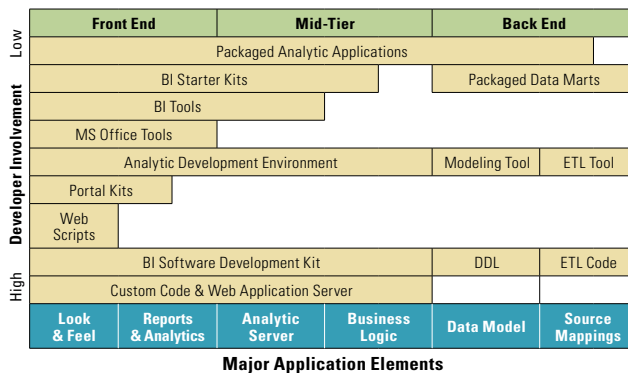


Illustration 1. No development technique supports all major elements required to deliver an analytic application.

Application Completeness. An analytic application comprises many elements. At a high level, these include: (1) look and feel, (2) reports and analytics, (3) analytic server, (4) business logic, (5) data model, and (6) source mappings. These elements must be either built or purchased; even if purchased,

Development Techniques Used in Primary Analytic Applications

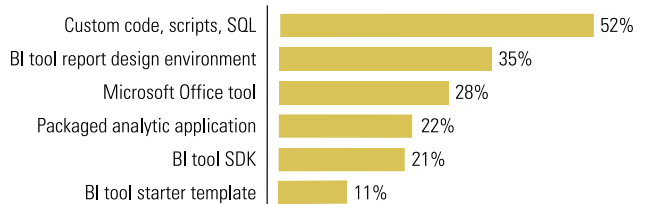


Illustration 2. Techniques that groups used to build their primary analytic application. Respondents could select multiple choices. Based on 473 respondents.

Customization Practices. In practice, organizations are most likely to build analytic applications around a BI tool, but

then add substantial amounts of custom code (mostly SQL) to customize and extend the application. Most organizations also customize the BI tool itself, focusing on the GUI, calculations, and navigational elements. Developers also spend significant time customizing ETL mappings and data models in packaged applications. Developers—mainly IT staff and application programmers—make frequent changes to analytic applications, while power users are often enlisted to change the front-end environment.

Analytic Development Environments

There is an emerging category of tools that makes it faster and easier to create custom analytic applications. TDWI calls this new toolset an *analytic development environment*, or ADE.

An ADE is the analytic counterpart to the integrated development environment, or IDE, which developers have used for years to build operational applications. Examples of the more popular IDEs today are Microsoft Visual Studio.NET, Borland's JBuilder, Eclipse, IBM's WebSphere Studio, and BEA's

ADEs promise to accelerate the development of custom-built analytic applications as well as make it easier and faster to customize packaged analytic applications.

WebLogic Workshop, to name a few. ADEs are the spiritual heir to IDEs, both in functionality and name.

A Promising Future. ADEs promise to accelerate the development of custom-built analytic applications as well as make it easier and faster to customize packaged analytic applications. An ADE enables developers to drag and drop analytic components onto a screen to rapidly create analytic applications. More than a report designer, ADEs give developers precise control over the look and feel, functionality, and workflow of an application.

As a result, users will soon be using ADEs to “buy and extend” analytic applications, quickly customizing the last 20 to 40 percent of the front end.

In fact, the drag-and-drop nature of ADEs will further shift development responsibilities from IT developers to power users in the field. With an ADE, a power user can easily modify a packaged analytic application, flesh out a report definition, or create a new application or report from scratch (once IT has established data connections and BI query objects). Thus, ADEs will once and for all get the IT staff out of the business of creating reports so they can focus on what they are best at: building robust data architectures and abstraction layers for end users.

ADE tools will also accelerate the trend towards rapid prototyping. Developers and power users can use an ADE tool in a joint application design session to get immediate feedback from users on data, application screens, metrics, and report designs. This iterative process results in better-designed applications that are delivered more rapidly. Many vendors are shipping ADEs for specific applications to facilitate rapid prototyping. For example, many dashboard and scorecard solutions are ADEs.

Service-Oriented Architecture. The real power behind ADEs comes from the fact that vendors have componentized the functionality of their BI tools. In the past, vendors hard-wired presentation, logic, and data functionality together. But the advent of object-oriented programming and service-oriented architectures has enabled vendors to open up their products, componentizing functionality within a services-oriented framework. The upshot is that ADEs enable developers to create multiple instances of components, store them centrally, and reuse them in other applications. This is a much more efficient way of creating and extending applications.

Clearly, BI vendors have recognized the need to deliver “buy and extend” capabilities. Most are starting to deliver ADEs or ADE-like capabilities. In both cases, the tools provide an easier-to-use authoring environment, which is helping to finally move development out of the hands of professional developers and into the hands of power users and business analysts.

Using ADEs to Build Dashboards and Scorecards

Rapid prototyping using ADEs will soon become the predominant method for building dashboards and scorecards. Already, many BI vendors now offer specialized ADEs for creating dashboards.

Definition. A *dashboard* or *scorecard* is a graphical display that compares performance against predefined goals. Most people use these two terms interchangeably, although there is a subtle difference. A dashboard records actual performance or behavior—like an automobile dashboard—while a scorecard measures that performance against objectives or goals. In other words, a dashboard tells you *how* you are doing, while a scorecard tells *how well* you're doing. We will use the term “dashboard” from now on to refer to both types of analysis.

Popularity. Dashboards are increasingly popular; a majority of our survey respondents said their group uses a dashboard as its primary analytic application (31 percent) or has deployed one elsewhere (28 percent). Another 24 percent are currently developing a dashboard or scorecard. Thus, almost three-quarters of the people who took our survey either have a dashboard or scorecard or are developing one.

Dashboard Tools. Most organizations created their dashboards from BI tools (41 percent), followed by custom code (22 percent) and Microsoft Office (13 percent). Only 17 percent have purchased a packaged dashboard solution from a vendor. We expect this percentage to rise in the next few years as more vendors provide robust dashboard solutions.

Most dashboards support a range of functionality. In general, dashboards have three levels: they let users drill down from high-level graphical indicators (72 percent) to a table or chart (82 percent) that can be filtered to show different views of data (71 percent) to detailed transaction data (54 percent). (See Illustration 3.)

Dashboard Functionality

Dashboard Levels	1	Graphical Indicators 72% <i>(Dials, gauges, speedometers, maps)</i>
	2	Interactive Tables/Charts 82% <i>(OLAP, parameterized reports, linked reports)</i>
	3	Transaction Detail 54% <i>(Contained in a data warehouse or legacy systems)</i>

Illustration 3. Percentages of respondents who support each level. Based on 240 respondents.

Advanced dashboard implementations make it easy for executives to add or modify metrics. This ability is not overwhelmingly employed, although power users are enlisted to update dashboards in one-third of organizations. Currently, the IT and application development departments are the most likely candidates to update the dashboard to reflect new requirements. (See Illustration 4.)

Who Updates the Dashboard?

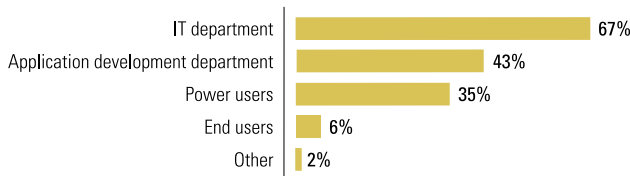


Illustration 4. Respondents could select multiple answers. Based on 240 responses.

Summary: Dashboards are quickly becoming the primary interface to business intelligence information because they conform to the way the majority of users wish to access, analyze, and act on that information. While most dashboards today are strategic in nature and enterprise in scale, the number and type of users supported indicate that we are still in the early stages of dashboard deployments in most organizations.

Conclusion

The goal of a BI professional is to deliver an effective analytic application that makes it easy for a range of users to access, analyze, and act on information tailored to their business processes and domain. The best analytic applications contain navigational logic that steps users through the process of analyzing and acting on data. Building intuitive analytic applications is not easy. Organizations spend an inordinate amount of time customizing and extending commercial products to meet user requirements.

Fortunately, there is help on the way. Most BI vendors are componentizing their BI tools and exposing them through a graphical interface. TDWI calls these tools analytic development environments (ADEs), and they promise to greatly accelerate development time and reduce costs.

The Future is Clear. Many vendors have released their first-generation ADEs, and many are now tailoring them to dashboards and scorecards, where there is a heightened need to customize the interface, especially for executive-level scorecards. Next-generation BI tools will in fact become ADEs or will be embedded in packaged applications to facilitate customization. This next generation of BI tools will support users' desire to "buy and extend" existing tools and packages rather than start from scratch. ■

To download the complete report on Development Techniques for Creating Analytic Applications, as well as prior issues of TDWI's Report Series, visit <http://www.tdwi.org/Research/ReportSeries/index.aspx>.

Mission

TDWI™, a division of 101communications, is the premier provider of in-depth, high-quality education and research in the business intelligence (BI) and data warehousing (DW) industry. Founded in 1995, TDWI is dedicated to educating business and information technology professionals about the strategies, techniques, and tools required to design, execute, and maintain successful BI and DW projects. Within the community it serves, it provides a comprehensive resource for professional development and fosters knowledge sharing and the advancement of research. TDWI sponsors and promotes a worldwide Membership program; quarterly educational conferences; regional educational seminars; monthly role-based training; onsite courses; certification; solution provider partnerships; awards programs for best practices and leadership in DW, BI, and other innovative technologies; resourceful publications; an in-depth research program; and a comprehensive Web site (www.tdwi.org).

Membership

As the BI and DW field continues to evolve and develop, it is necessary for information technology professionals to connect and interact with one another. TDWI provides opportunities to learn from each other, network, share ideas, and respond as a collective whole to the challenges and opportunities in the industry.

Through Membership in TDWI, these professionals make positive contributions to the industry and advance their professional development. TDWI Members benefit through increased knowledge of the latest trends in BI and DW, which makes TDWI Members some of the most valuable professionals in the industry. TDWI Members avoid common pitfalls, learn fundamentals quickly, and network with peers and industry experts to give their projects and companies a competitive edge in deploying BI and DW solutions.

TDWI's Membership includes more than 4,000 BI, DW, and information technology (IT) professionals from *Fortune* 1000 corporations, consulting organizations, and governments in 45 countries.

Benefits to TDWI Members include:

- Quarterly *Business Intelligence Journal*
- Access to Members-only content at www.tdwi.org, including TDWI articles, research, and archives
- Annual TDWI *Business Intelligence Salary, Roles, and Teams Report*
- Quarterly *Ten Mistakes to Avoid* series
- Biweekly *FlashPoint* electronic bulletin
- In-depth and timely research reports

- Quarterly *Member Newsletter*
- Special discounts on all conferences and seminars
- A 15 percent discount on all industry books and course books purchased at TDWI conferences
- A 15 percent discount on TDWI merchandise

Membership in TDWI is available to all BI, DW, and IT professionals for an annual fee of \$249 (\$299 outside the U.S.). TDWI also offers Team Membership for organizations that register five or more individuals as TDWI Members.

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Education Programs

TDWI offers educational programs throughout North America and Europe that inform IT professionals about industry best practices and the effective use of business information. These programs include quarterly conferences, regional educational seminars, intensive role-based training, and onsite courses.

TDWI has developed a comprehensive BI/DW curriculum, and its faculty includes the highest-rated instructors in the industry—most of whom are well-known consultants, practitioners, and recognized experts. TDWI has helped to educate more than 30,000 IT professionals and business users about BI and DW over the last 10 years.

During these unique educational events, IT professionals share real-world experiences, lessons learned, and tips and techniques they have used to exploit corporate information for competitive advantage. No other organization provides such educational opportunities.

TDWI World Conferences

TDWI's quarterly education and training conferences offer a rigorous training environment in a conference setting and incorporate an intensive, full-day course format and extended course programs that expand over several days. All courses are selected for content and quality and are evaluated by attendees to ensure adherence to TDWI standards. TDWI attendees gain knowledge through a full-day format that prepares them

to quickly apply their new knowledge toward a more successful BI or DW initiative. TDWI's unique conference model has set a standard for education that is now imitated at other conferences.

TDWI's courses are taught by leading experts on a wide range of topics and include multi-day methodology courses that provide step-by-step guides for designing, building, and maintaining a BI/DW environment. These methodology courses represent a range of approaches, from "top-down" methods for deploying an enterprisewide data warehousing architecture, to "bottom-up" data mart methods using dimensional modeling techniques, to everything in between.

Conference attendees also benefit from hearing leading visionaries discuss critical issues and trends in the industry during panel discussions and keynote presentations. In addition, many TDWI courses are designed to be interactive, so attendees receive immediate feedback from instructors as well as other class participants.

Seminar Series

The TDWI Seminar Series makes it easier for busy professionals and project teams to receive training closer to home and in less time. These courses assist managers in bringing new team members up to speed quickly and cost effectively.

FastTrack: Role-based Training

New for 2005, TDWI offers intensive, role-based training at TDWI's Headquarters in Seattle, WA. TDWI FastTrack provides you with an intensive learning experience that takes you from concepts to hands-on experience.

Onsite Courses

For the ultimate in convenience, TDWI can bring top-rated certificate courses onsite. The benefit of onsite education is that the course can be customized to meet a group's particular challenges and issues. It also provides a quick and easy way to give all team members an equivalent understanding of the core issues and concepts of BI and DW, and how they apply to a company's environment.

Certification Programs

TDWI offers several options for certifying professional development. Certificate Courses provide a record of completion of a TDWI designed and developed course. A TDWI Certificate provides proof that an attendee has completed the course and is prepared for further education, or to begin or join a BI/DW effort for further experience. TDWI Certificate Courses ensure that each member of a team has received the same level of education, to avoid confusion on the fundamentals.

TDWI On-Track is a certificate program based on completion of a carefully selected series of required and elective courses, offered in five different disciplines.

Certified Business Intelligence Professional (CBIP), a true test-based certification program, is offered in five key specialties for BI success: Administration & Technology, Business

Analytics, Data Analysis & Design, Data Integration, and Leadership & Management. These specialties are aligned with TDWI's learning paths and TDWI On-Track, a well-defined curriculum program that directly ties learning objectives with job roles and responsibilities. CBIP is developed and delivered in partnership with the Institute for Certification of Computing Professionals (ICCP).

TDWI Awards for Best Practices and Leadership

The annual TDWI Best Practices Awards identify successful BI and DW models to follow. Top professionals and analyst organizations assist TDWI in identifying practitioners (individuals who have implemented BI and DW within their companies) who exemplify the best approaches to solving various problems facing managers and staff.

TDWI also recognizes one organization each year that has demonstrated true leadership in BI and DW. The TDWI Leadership Award winner is selected from the TDWI Best Practices winners, who have been evaluated against TDWI Leadership criteria. This award has quickly become the most coveted in the industry.

Publications and Research

TDWI supports, develops, and distributes a wide range of publications to keep its Members up to date on new techniques, events, and issues in BI and DW, as well as the trends within the vendor community. These publications are available to Members at a special discounted rate:

- *Business Intelligence Journal*
- TDWI Report Series
- *FlashPoint* electronic bulletin
- TDWI *Member Newsletter*
- TDWI *Business Intelligence Salary, Roles, and Teams Report*
- *Ten Mistakes to Avoid* series
- Business intelligence and DW books
- *What Works: Best Practices in Business Intelligence and Data Warehousing*
- *Market Solutions*, a comprehensive online buyers guide
- Technology poster

Solution Provider Exhibitions

TDWI's quarterly conferences provide a forum in which BI and DW vendors and service providers can demonstrate their products and offerings. To enhance the educational value of the exhibits, each exhibitor has the same size booth. Also, TDWI

exhibitions are reserved solely for conference attendees and TDWI Members, providing more quality time for attendees and vendors to meet one-on-one and educate one another about their requirements and offerings.

Solution Provider Programs

TDWI works closely with the vendor community to bring its Membership the most up-to-date and important information regarding BI and DW solutions. TDWI's goal is to give Members the opportunity for knowledge sharing with vendors, and also the flexibility to decide the level of interaction for this exchange. TDWI has worked to create a hype-free atmosphere at our conferences, and also in our publications, that is conducive to Members' education and needs, unlike what may be seen at other conference exhibitions.

Web Site

Members may take advantage of a growing collection of reports, white papers, Webinars, case studies, articles, conference programs, vendor directories, schedules of events, subscriptions, registration, and much more at www.tdwi.org.

The Business Intelligence and Data Warehousing Industry

The BI/DW industry encompasses a host of disciplines and technologies used to analyze corporate information, including: data modeling, data migration and transformation, data quality, decision support, metadata management, data marts, online analytical processing, database management, data mining, knowledge discovery, closed loop decision support, and various analytic applications, such as customer relationship management, sales force automation, Balanced Scorecards,

marketing automation, supply chain management, and vertical industry applications.

Founded in 1998, 101communications is an integrated media company in the business-to-business market aimed at the many specialized targets within the greater information technology community. 101's portfolio includes nine publications, 21 Web sites, 30 e-newsletters, and 40 conferences, trade shows, and seminars worldwide in seven areas:

- Software Development: Application Development Trends
- Business Technologies: Enterprise Systems, The Data Warehousing Institute (TDWI), the IT Compliance Institute
- Government Technology: Federal Computer Week, E-Gov
- Windows Networking & Certification: Redmond Magazine, Redmond Channel Partner, MCPmag.com, ENTmag.com, TCPmag.com, CertCities.com
- Office Imaging Technologies: Recharger
- Education Technology: Campus Technology, T.H.E. Journal, EduHound, T.H.E. Institute
- International IT: OBJEKTSpektrum, JavaSPEKTRUM, SIGS-DATACOM ■



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Business Objects is the world's leading business intelligence (BI) software company. With more than 29,000 customers worldwide, including more than 80 percent of the *Fortune* 500, Business Objects helps organizations gain better insight into their business, improve decision making, and optimize enterprise performance. The company's BI platform, BusinessObjects™ XI, offers the BI industry's most advanced and complete platform for reporting, query and analysis, performance management, and data integration.

BusinessObjects XI includes Crystal Reports®, the industry standard for enterprise reporting. Business Objects has also built the industry's strongest and most diverse partner community, with more than 3,000 partners worldwide. In addition, the company offers consulting and education services to help customers effectively deploy their BI projects.



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Cognos is the world leader in business intelligence (BI) and performance planning software for the enterprise. Its solutions let companies improve and direct corporate performance by enabling all of the key steps in the management cycle—from planning and budgeting, to measuring and monitoring performance, to reporting and analysis. Cognos is the only company to support all of these key management activities with a complete solution that spans all of the essential components of corporate performance management—enterprise planning, scorecarding, and BI.



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Collaborative Consulting is a leading professional services organization dedicated to helping clients optimize their business and technology assets. By extending the value of their systems and processes, we help clients achieve lasting business value and maximize return on IT investments. Our key service areas include business process management, CRM analytics, data services, IT optimization, performance engineering, and supply chain management. Collaborative is committed to building long-term relationships, and strives to be a trusted partner with every client. Founded in 1999, the organization serves clients from offices across the U.S., with headquarters in Woburn, MA. Collaborative's Web site is www.collaborative.ws.



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Conversion Services International, Inc. (CSI) is the premier professional services firm exclusively focused on delivering value in business intelligence, data warehousing, and data management solutions to Global 2000 organizations and other businesses. As a trusted advisor to clients for more than 15 years, CSI helps companies define, develop, and implement the warehousing and strategic use of both enterprisewide and specific categories of data. CSI's current customers include Verizon Wireless, Morgan Stanley, Pfizer, Goldman Sachs, Merck, and Standard & Poor's. For more information, visit www.csiwhq.com or contact CSI at 888.274.5306.



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DataFlux offers complete, end-to-end data management solutions for organizations that want to realize more tangible, immediate value from their information assets. A wholly owned subsidiary of SAS (www.sas.com), DataFlux helps companies improve the consistency, accuracy, and reliability of critical customer and business data. DataFlux solutions—consisting of data profiling, data quality, data integration, data augmentation, and data monitoring—allow companies to build a solid information foundation that can enhance the effectiveness of data-driven applications, including customer relationship management (CRM), enterprise resource planning (ERP), data warehousing, and database marketing. To learn more about DataFlux, visit www.dataflux.com.



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DATAAllegro offers a data warehouse appliance (software, hardware, and storage) that provides dramatic performance improvement to large-volume data warehouses, without replacing the existing infrastructure. Using DATAAllegro's patent-pending technology, companies can run significantly faster and more complex queries on their data in order to increase their business intelligence. Priced at \$150,000 per terabyte and providing table-scanning at one terabyte per minute, DATAAllegro is the industry leader in price and performance. Based in Aliso Viejo, CA, DATAAllegro delivers a fast, flexible, and affordable solution that allows a company's data to grow at the pace of its business.



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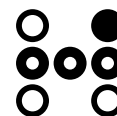
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D&B Sales & Marketing Solutions provides information-driven products and services for acquiring, servicing, and retaining business customers. Within the S&MS family, customer information management (CIM) solutions address customer data quality issues by integrating customer information from a company's internal systems, enriching it with a wealth of relevant detail from the D&B business database—the world's largest—and providing the tools to maintain quality information over time. Driven by D&B's unique DUNSRight™ Quality Process, CIM solutions ensure that D&B customers have quality information behind every business decision they make.



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Hyperion is the global leader in business performance management software. More than 10,000 customers—including 91 of the *Fortune* 100—rely on Hyperion software to translate strategies into plans, monitor execution, and provide insight to improve financial and operational performance. Hyperion combines the most complete set of interoperable applications with the leading business intelligence platform to support and create business performance management solutions. A network of more than 600 partners provides the company's innovative and specialized solutions and services. Hyperion is traded under the Nasdaq symbol HYSL. For more information, please visit www.hyperion.com/cornerstones.



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HyperRoll provides data aggregation software that delivers immediate and substantial improvements in business intelligence application performance, accelerating data access and analysis. Using HyperRoll, Global 2000 organizations get more value out of their existing BI investments while immediately reducing their hardware, storage and manpower costs. HyperRoll combines patented aggregation, caching and compression algorithms to provide lightning-fast access to large data volumes while drastically reducing the need for additional system resources, and works seamlessly within a customer's existing business intelligence systems to dramatically improve query performance and load times by as much as 100x. Customers include Wachovia, General Electric, Deutsche Bank and MasterCard.



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Informatica Corporation is a leading provider of data integration software. Using Informatica products, companies can access, integrate, visualize, and audit their enterprise information assets to help improve business performance, increase customer profitability, streamline supply chain operations, and proactively manage regulatory compliance. More than 2,100 companies worldwide rely on Informatica to meet their end-to-end needs for enterprise data integration.



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Founded in 1989, MicroStrategy is a worldwide leader in the business intelligence software market. Leading *Fortune* 2000 companies are integrating MicroStrategy's business monitoring, reporting, and analysis software into their operations. The MicroStrategy Business Intelligence Platform™ distills vast amounts of data into vital insight to help drive cost-efficiency, revenue-generation, and productivity.

MicroStrategy's enterprise-class customers include Aventis, eBay, General Motors, Lowe's Companies, Pfizer, Sprint, Telecom Italia, U.S. Postal Service, Visa International, Wells Fargo, and Yahoo!. MicroStrategy also has relationships with systems integrators and application development and platform partners, including IBM, HP, PeopleSoft, Sun, and Teradata, a division of NCR. MicroStrategy is listed on Nasdaq under the symbol MSTR. For more information or to purchase or demo MicroStrategy's software, visit MicroStrategy's Web site at <http://www.microstrategy.com>.



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Syncsort Incorporated is a leading developer of high-performance backup, data management, and data warehousing software for mainframe, UNIX, and Windows environments. For more than 35 years, Syncsort has built a reputation for superior product performance and technical support. An independent market research firm has named Syncsort one of the top Data Warehouse 100 Vendors for seven years in a row. In addition, Syncsort was recently chosen as the leading provider of data acquisition and integration products. Syncsort's products are used to back up and protect data in distributed environments, speed data warehouse processing, improve database loads, and speed query processing.



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Dedicated to increasing the value of information assets through enterprise-wide data quality management, Trillium Software®, a division of Harte-Hanks, is today the most trusted provider of technologies for continuous global data analysis, cleansing, enhancement, and monitoring. Designed for diverse enterprise environments, the scalable and modular components of the Trillium Software System® solution for global data quality and Trillium Software Discovery solution for data profiling can be ported across diverse systems, integrated with enterprise applications, iteratively tuned for consistent results, and globally enabled for business without borders. Many of the world's leading companies currently use the Trillium Software System and Trillium Software Discovery to dramatically lower the costs and risks associated with data integration, data transformation, enterprise data quality, and data-dependent regulatory compliance.

TDWI PARTNER MEMBERS

The TDWI Partner logo recognizes solution providers that have joined TDWI as special Partner Members for 2005 and share TDWI's strong commitment to quality and content in education and knowledge transfer for business intelligence and data warehousing. TDWI Partner Members receive TDWI research and education and contribute to TDWI's goal of knowledge transfer through white papers, journal articles, case studies, and support at TDWI events.



30,000

**business intelligence
and data
warehousing
professionals
educated**

A Decade of Excellence

Business Intelligence and Data Warehousing Education, Research, and Community

TDWI was formed in 1995 with a clear mission: Provide data warehousing professionals with comprehensive, unbiased education and information to help them do their jobs more effectively. The industry has seen impressive growth and change since 1995. Because business intelligence and data warehousing initiatives are mission-critical for organizations worldwide, the professionals who build and implement these programs are invaluable, and their knowledge crucial. TDWI's only job is to meet the professional development needs of this community.

Download TDWI's 2005 Education Catalog

www.tdwi.org/one

World Conferences

TDWI Conferences feature world-class instructors, one-on-one sessions with industry gurus, hype-free exhibits, and opportunities to network with your peers.

Onsite Education

Bring top-rated instructors and high-quality education, tailored to address your particular challenges, issues, and skill levels, directly to your location.

Regional Seminars

We take our high-quality education and top-notch instructors on the road, making it cost-effective and easy for you to get the in-depth, content-rich training you need.

FastTrack Program

FastTrack offers intensive, role-based training that will equip you with core concepts and allow you to explore what you learn with hands-on practice.



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BEST PRACTICES IN BUSINESS INTELLIGENCE
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Volume 19

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TDWI has gathered a collection of the most outstanding white papers available for the business intelligence and data warehousing industry. Please select as many white papers as you would like to receive in any of the categories below. These will be sent directly to you—with no obligation. (To select your desired white papers, please click on the titles. Note that you must be connected to the Internet.) You can also access these white papers on our Web site at <http://www.tdwi.org/publications/whitepapers/ww19whitepapers.aspx>

BI Services

1. Mitigate Business Intelligence Project Risks with Rule-Based Audits and Proof-of-Concepts
2. What a Data Quality Initiative Can and Cannot Do for Your Organization

Business Analytics

3. Business Intelligence: Maximizing the Value of Information
4. The Five Styles of Business Intelligence
5. Implementing Business Intelligence Standards and Competency Centers

Data Integration

6. Accelerating Application Data Migration
7. Continuous Data Quality Improvement: Establishing a Data Quality Competency Center
8. Customer Data Integration: Creating a Single, Unified View of the Customer
9. Data Quality and Data Integration: The Keys for Successful Data Warehousing
10. Gaining a More Profitable Understanding of Your Business Customers: Corporate Households and the D-U-N-S Number
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12. BI Moves Operational—The Case for High-Performance Aggregation Infrastructure
13. A Fresh Look at Data Warehouse Technology: Introducing the Data Warehouse Appliance
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