TDWI
report series

Developing a BI Strategy for CRM/ERP Data

By Colin White

tdwi
A DECADE OF EXCELLENCE

Developing a BI Strategy for CRM/ERP Data

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About the Author

Colin White is the President of BI Research. He is well known for his in-depth knowledge of leading-edge business intelligence and business integration technologies, and how they can be integrated into an IT infrastructure for building and supporting the "smart business." With more than 34 years of IT experience, he has consulted for dozens of companies throughout the world and is a frequent speaker at leading IT events. Mr. White has co-authored several books, and has written numerous articles on business intelligence and enterprise business integration for leading IT trade journals. He writes a regular column for *DM Review* magazine, entitled "Building the Smart Business." Prior to becoming an independent consultant in 1984, he worked for IBM as an IMS and DB2 specialist, and for Amdahl as a database systems architect.

About the TDWI Report Series

The TDWI Report Series is designed to educate technical and business professionals about critical issues in business intelligence and data warehousing (BI/DW). TDWI's in-depth reports offer objective, vendor-neutral research consisting of interviews with practitioners and industry experts and a survey of BI/DW professionals worldwide. TDWI in-depth reports are sponsored by vendors who collectively wish to evangelize a BI/DW discipline or emerging technology.

Acknowledgements

About TDWI

The Data Warehousing Institute (TDWI), a division of 101communications LLC, is the premier provider of in-depth, high-quality education and training in the BI and DW industry. TDWI offers quarterly educational conferences, regional seminars, onsite training, professional membership and certification, leadership awards, print and online publications, and a public and private (Members-only) Web site.

Definitions

Application Vendor: A software vendor who provides off-the-shelf business transaction and/or business intelligence application packages. These packages may include tools for modifying, extending, running, and/or managing the packaged applications.

Business Intelligence (BI): An umbrella term that encompasses data warehousing, reporting, analytical processing, performance management, and predictive analysis. BI applications report on, measure, and recommend ways to optimize business operations with the objective of reducing costs and increasing revenues.

BI System: A set of BI applications with an underlying data warehouse for analyzing and optimizing business operations.

BI Application Package: An off-the-shelf vendor application that can be tailored to suit an organization's BI reporting and analytical processing needs.

Business Transaction (BTx): An umbrella term used to describe a computerized process that runs day-to-day business operations such as order entry, inventory control, bookkeeping, etc. BTx applications are responsible for running business transactions and managing the data associated with them. These applications can be run in a batch or online mode. When run online, the term *online transaction processing* (OLTP) is sometimes used to describe this style of application processing.

BTx System: A set of BTx applications and underlying BTx databases and files.

BTx Application Package: An off-the-shelf vendor application that can be tailored to suit an organization's BTx processing needs.

Data Warehouse (DW): A set of shared data structures containing summarized and/or detailed data for strategic, tactical, and operational BI application processing. DW applications use ETL processes to extract data and/or capture events from source systems (BTx applications, operational data stores, other data warehouse, etc.) for integrating into a data warehouse. There are several types of data warehouse (enterprise data warehouse, data mart, operational data store, etc.), which may be combined in a single database, or may exist as separate databases on multiple servers.

Extract, Transform, and Load (ETL): A process or technique used to extract data and/or capture events from source systems, and transform and load them into a data warehouse.

Operational Data Store: A data structure containing low-latency BTx data or operational events that are used for operational BI processing, master/reference data integration, propagating data between BTx systems, and/or building new BTx applications. An ODS can exist as an independent data store, or may be a component of an enterprise data warehouse.
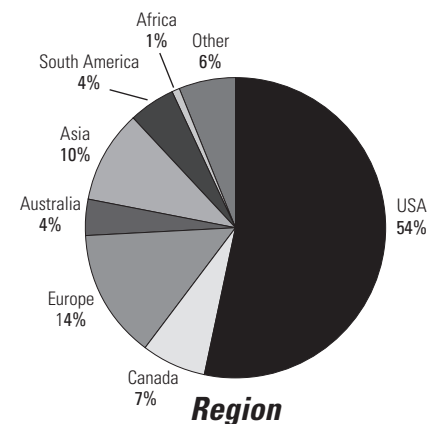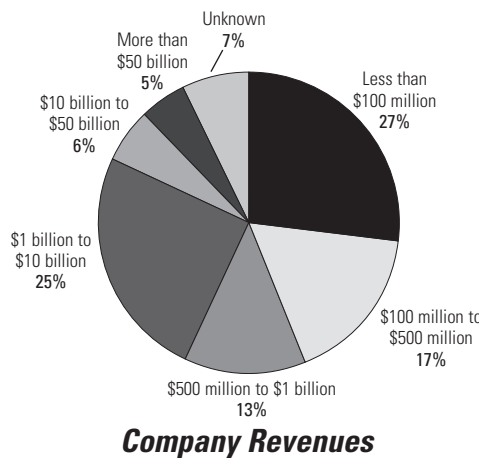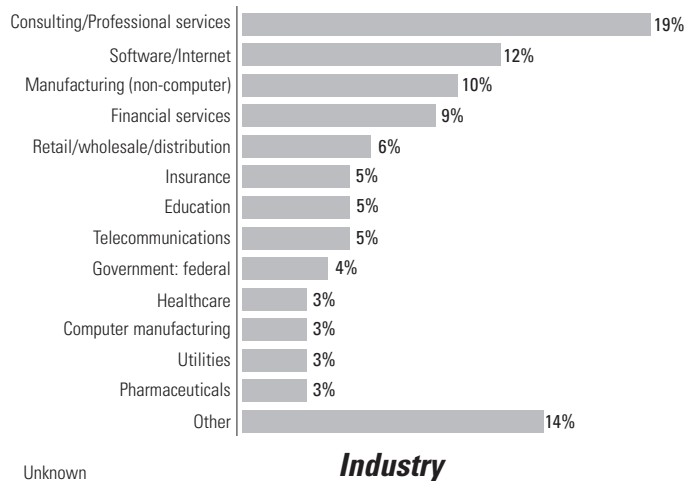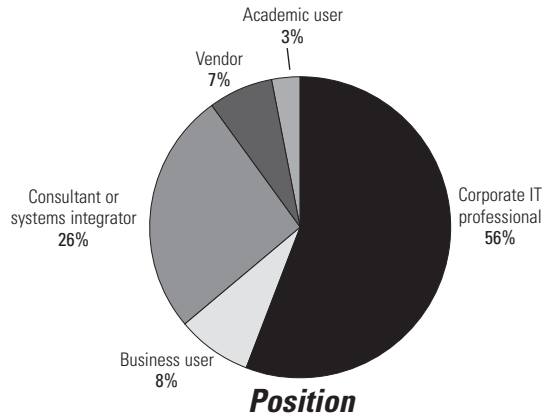
Research Methodology

Report Scope. This report is intended for technical executives who are exploring ways of building business intelligence (BI) applications and underlying data warehouses (DW) using data from business transaction (BTx) application packages for tasks such as customer relationship management (CRM) and enterprise resource planning (ERP). The report provides an overview of the various approaches to building BI applications using BTx package data, and examines the advantages and disadvantages of each approach.

Methodology. The research for this report is based on a survey that TDWI conducted in July 2004, as well as interviews with experts in the field, including end-user organizations, BI consultants, industry analysts, and report sponsors.

Survey Methodology. TDWI contacted BI and DW professionals in its database and 101communications' database. (TDWI is a business unit of 101communications.) In total, 552 people responded to the survey. Of these respondents, 38 identified themselves as part of the vendor community and 14 as part of the academic community. These two groups have been included in the results because in most cases these respondents completed the survey with respect to the use of BI and DW in their own organizations. Multi-choice questions and rounding techniques account for totals that don't equal 100 percent.

Survey Demographics. A majority of the survey respondents (56 percent) are corporate IT professionals. The remainder are consultants/systems integrators (26 percent), business users (8 percent), vendors (7 percent), or academic users (3 percent). Respondents to the survey were split fairly evenly among companies with revenues less than $100 million (27 percent), those with revenues between $100 million and $1 billion (30 percent), and those with revenue in excess of $1 billion (36 percent). The majority of respondents (61 percent) are based in North America and work in a range of industries, the largest portion of which are consulting, software, and manufacturing. Consultants and systems integrators were asked to fill out the survey with their most recent client in mind.

Demographics

Position

- Corporate IT professional 56%
- Consultant or systems integrator 26%
- Business user 8%
- Vendor 7%
- Academic user 3%

Industry

- Consulting/Professional services 19%
- Software/Internet 12%
- Manufacturing (non-computer) 10%
- Financial services 9%
- Retail/wholesale/distribution 6%
- Insurance 5%
- Education 5%
- Telecommunications 5%
- Government: federal 4%
- Healthcare 3%
- Computer manufacturing 3%
- Utilities 3%
- Pharmaceuticals 3%
- Other 14%

Company Revenues

- Less than $100 million 27%
- $100 million to $500 million 17%
- $500 million to $1 billion 13%
- $1 billion to $10 billion 25%
- $10 billion to $50 billion 6%
- More than $50 billion 5%
- Unknown 7%

Region

- USA 54%
- Europe 14%
- Asia 10%
- Canada 7%
- Other 6%
- South America 4%
- Australia 4%
- Africa 1%

Executive Summary

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).

Use of ERP and CRM Application Packages Is on the Rise Again

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.

Packages Can Support Both BTx and BI Processing

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 not 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.

BI Is Essential to Business Success

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.

Three types of Business Processes

Type of Business Process: Data processing systems support three main types of business processes (see Illustration 1.1):

- *Business transaction (BTx) processes* for running day-to-day business operations
- *Business intelligence (BI) processes* for analyzing and optimizing business operations
- *Business collaboration processes* for communicating and sharing information about business operations.

When combined, these three types of process enable business users to manage and communicate about all aspects of the business.
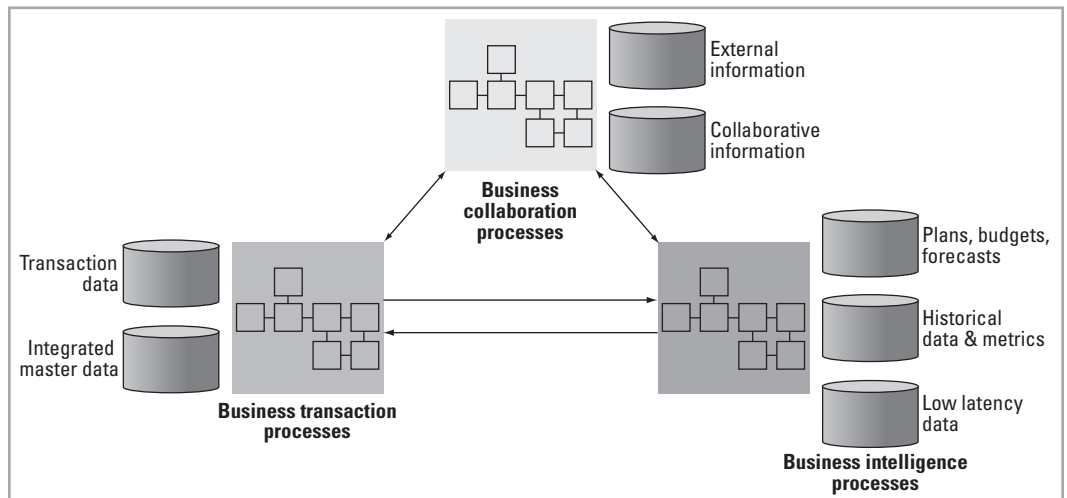

Illustration1.1: Types of business processes. (Courtesy of BI Research)

Business Transaction Processes

BTx Processes Handle Day-to-Day Business Operations

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.

Packaged BTx Applications Initially Provided Stand-Alone Solutions

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.

Migration to Packaged Solutions Slowed in 2000

According to IDC, the worldwide back-office ERP package market is expected to reach $26.7 billion in 2004, compared to the near $25 billion in revenues achieved in 2003. IDC expects the ERP applications market to grow to $36 billion by the end of 2008. Growth in the ERP applications market is attributed to general IT spending increases, as well as the pent-up demand for more integrated solutions to boost productivity, profitability, and competitiveness.[1]

ERP Applications Market: $36 Billion by 2008

IDC predicts the worldwide front-office CRM package market will reach $11.4 billion in revenues by 2008, a compound annual growth rate of 8.9 percent over the period 2004-2008. A study of CRM usage by the Aberdeen Group shows that the largest CRM segment is sales force automation, followed by marketing automation and customer service automation.

In-Line BI Processing. One trend among BTx application package vendors is to use *real-time* BI to improve and optimize business operations. Application examples here include fraud detection, up-selling, assessing the impact of delayed orders, product pricing, sales quotas, and so forth. In some applications this involves integrating the BI processes into the BTx application package itself, while in other situations it entails interconnecting BTx with external BI processes. The real-time use of BI by BTx applications is sometimes called *in-line analytics.*

In-line Analytics: The Real-Time Use of BI by BTx Applications

"External BI processes or cached results can be used in a business transaction workflow," says Dave Schrader, Director of Applications Strategy and Marketing at Teradata, a division of NCR. "This allows a high-performance BI system to be used to optimize daily business processes by providing additional context like the propensity of a customer to defect. Using BI to provide the rest of the picture, either historical interactions with the company or the prediction of future customer behavior, adds the context needed to optimize the business process. The problem is many decision-making processes are not written down. You must understand how your business processes work to exploit this approach. You need something like a Six Sigma for CRM."

Although in-line analytics can be used for many operational processes, it is found frequently in front-office systems. "Business intelligence is no longer just used for reporting," says Paul Rodwick, VP of Marketing at Siebel. "There is increasing demand for cross-business-unit analytics in the front office to drive operational workflows and actions. Customer service representatives, for example, need relevant insights about the customers they are talking to. They need to know if a customer has high potential value or is likely to churn, in order to conduct the most beneficial interaction."

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,

Suites Reduce Deployment and Maintenance Costs

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.

Moving to a Single Vendor takes Time and Affects Existing Projects

"Several of our clients have taken the decision to standardize on a single application vendor," says Kevin McDonald, Executive VP and General Manager, SAP practice, Inforte. "They have already invested a lot of money in a vendor and need to get a return on their investment. This decision is made at a senior level, which means that some business units can be told to toe the line."

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, and 5 percent from four vendors (see Illustration 1.2). Some 16 percent are using packages from five or more vendors. In total, over 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 life cycle, 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

Number of BTx Application Package Vendors in Use
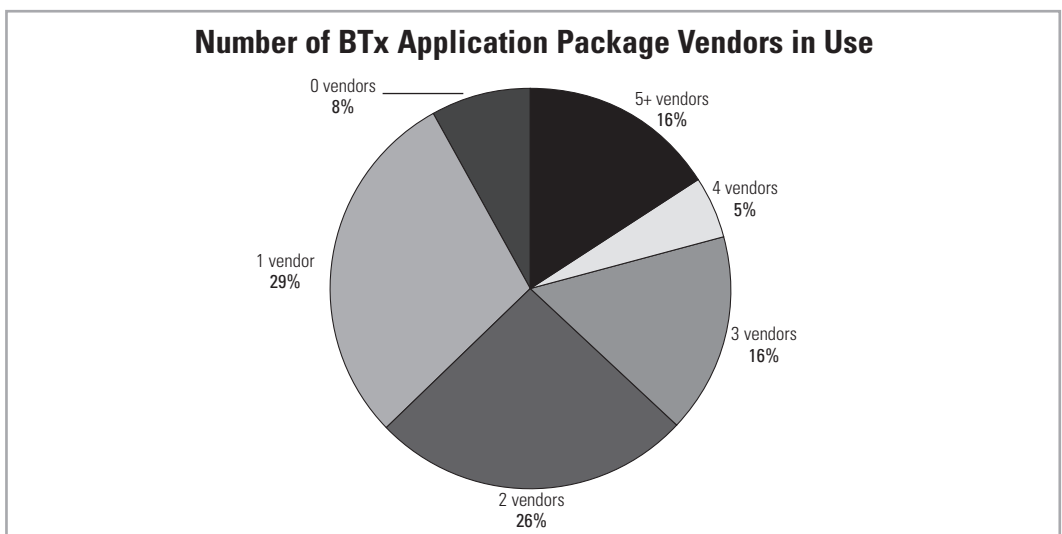
Illustration 1.2: How many software vendors supply your organization with BTx application packages? Based on 542 respondents.

Business Areas Addressed by BTx Application Packages

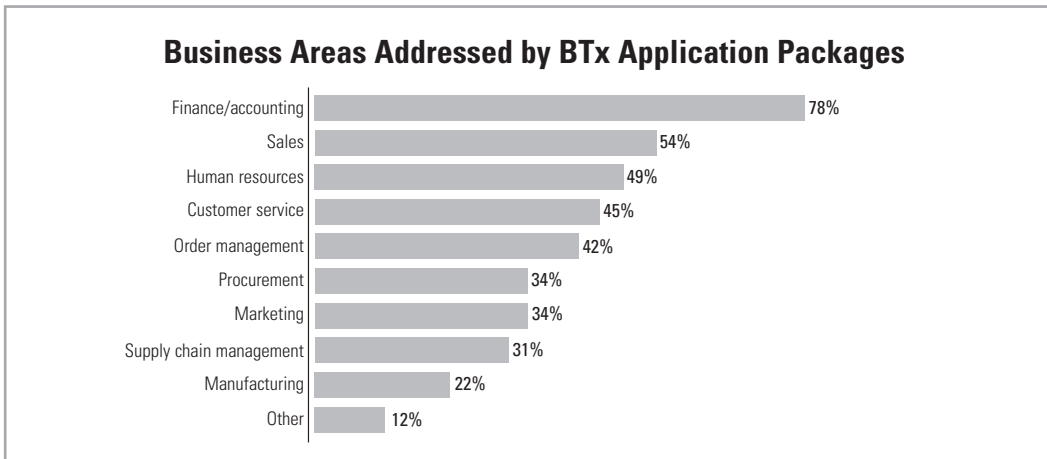| Business Area	Percent
Finance/accounting	78%
Sales	54%
Human resources	49%
Customer service	45%
Order management	42%
Procurement	34%
Marketing	34%
Supply chain management	31%
Manufacturing	22%
Other	12%

Illustration 1.3: Which business areas do your BTx application packages support? Based on 522 respondents.

packages (see Illustration 1.3) 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.

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.

Amount of BTx Data Managed by Packages. The quantity of data managed by an application package is one indicator of the amount of BTx processing supported by the package. Only 9 percent of companies manage all their data using BTx application packages, but some 50 percent use them to manage a "large amount" of data (see Illustration 1.4). These figures demonstrate the increasing dominance of BTx application packages in the enterprise, which means more and more data is originating from these applications.
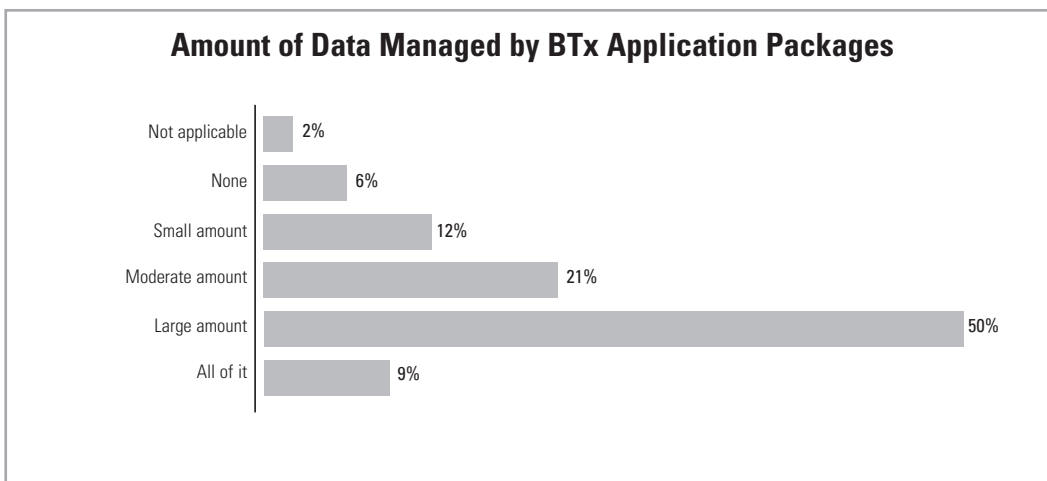
Amount of Data Managed by BTx Application Packages

	Percent
Not applicable	2%
None	6%
Small amount	12%
Moderate amount	21%
Large amount	50%
All of it	9%

Illustration 1.4: Approximately how much of your transaction data is managed by BTx application packages? Based on 537 respondents.

Middle-Office Departments Often Have Their Own BTx Packages

Even Smaller Companies Must Handle Multiple Packages

More and More Data is Originating from BTx Package Applications

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. Figure 1.5 shows the spectrum of development approaches used today for the three types of business processes.
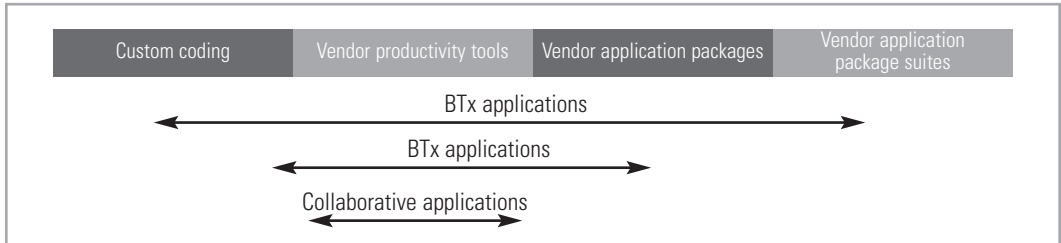

Illustration 1.5: Application development approaches.

Application Package Use Is Also Growing in the BI Area

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.
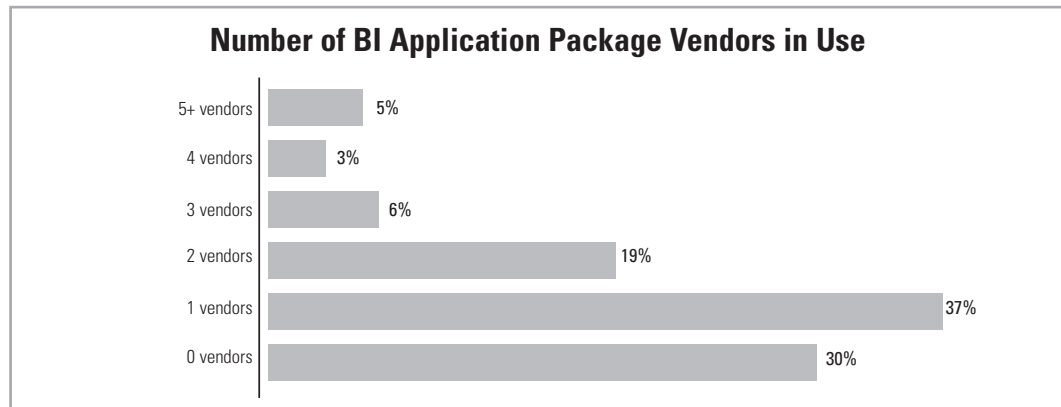

Illustration 1.6: How many BTx application vendors supply your organization with BI application packages? Based on 545 respondents.

30 Percent Don't Use BI Application Packages from Their BTx Application Vendors

Survey results show (see Illustration 1.6) 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 1.7) 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.

It's interesting to compare the usage of BI application packages in this survey with the results in TDWI's 2002 report *The Rise of Analytic Applications: Build or Buy?* The 2002 report showed that 34 percent of the companies surveyed had purchased BI application packages. This compares with 70 percent in our 2004 survey.
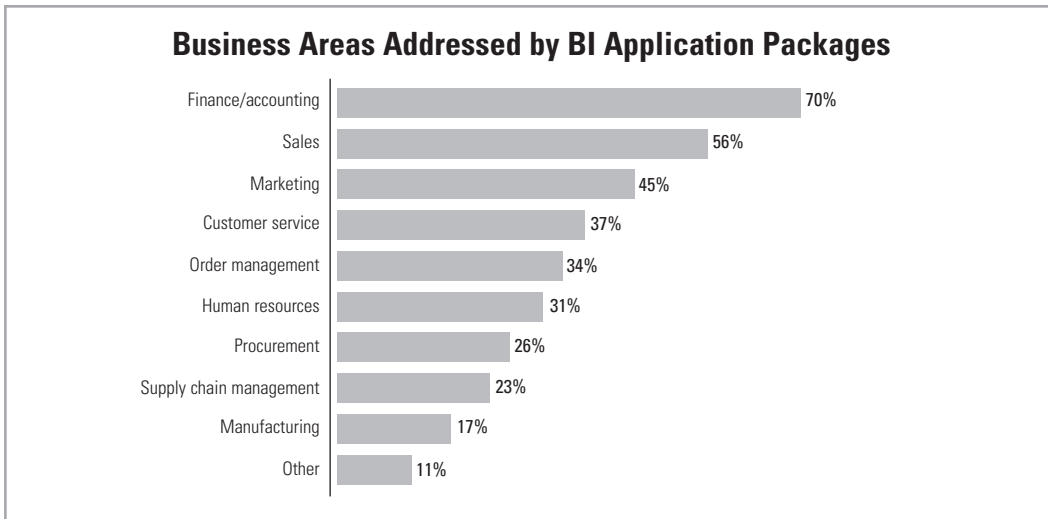
Business Areas Addressed by BI Application Packages

Business Area	Percentage
Finance/accounting	70%
Sales	56%
Marketing	45%
Customer service	37%
Order management	34%
Human resources	31%
Procurement	26%
Supply chain management	23%
Manufacturing	17%
Other	11%

Illustration 1.7: Which business areas do your BI application packages (from BTx application vendors) support? Based on 482 respondents.

Differences between the two surveys, however, could affect the results. The first is that the 2004 survey focuses on companies that have purchased BTx application packages, and these companies may be more inclined to also buy BI application packages. The second difference is the results in Illustration 1.6 only show BI packages purchased from BTx applications providers; they do not show those purchased from independent third-party vendors. Regardless, these results do show clearly that BI application package usage is growing.

Amount of Reporting and Analysis Done by BI Application Packages. Organizations do not currently deploy BI packages as much as BTx packages. This is because the BI application package market is less mature and more complex than the BTx market. In Illustration 1.8, you can see that 4 percent of respondents noted that "all" of their BI processing is done by BI application packages, whereas 23 percent said a "large amount" of processing is handled by these packages.

The BI Application Package Market Is Less Mature and More Complex Than the BTx Market

Amount of Processing Handled by BI Application Packages

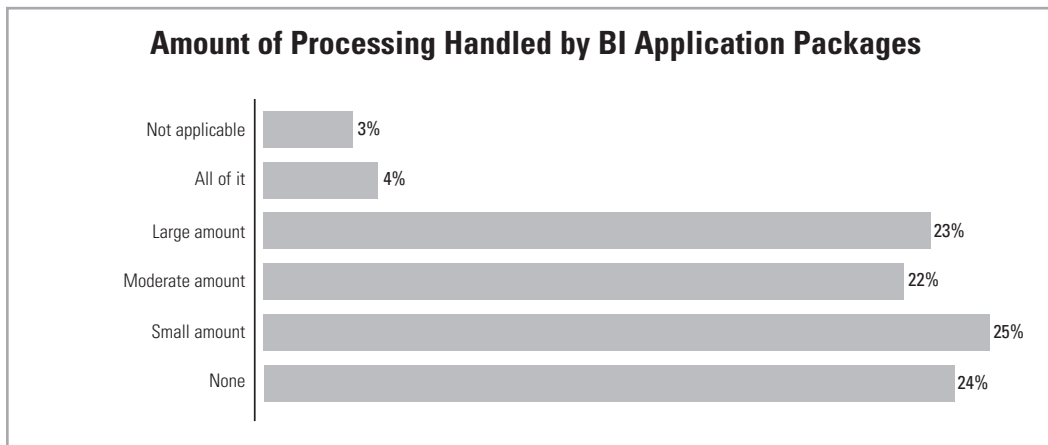|	Percentage
Not applicable	3%
All of it	4%
Large amount	23%
Moderate amount	22%
Small amount	25%
None	24%

Illustration 1.8: Approximately how much of your reporting and analysis is done by BI application packages supplied by BTx application vendors? Based on 536 respondents.

Business Collaboration Processes

Collaboration is the third type of business process supported by a data processing system. The use of collaborative processing has existed for many years, but it was the advent of Web technology that led to significant growth in the use of collaborative processing for applications like e-mail, instant messaging, project management, online meetings, video conferencing, etc. In most situations, collaborative processing is done using interactive productivity tools, rather than by custom-built applications or application packages. Where application packages are used, the functionality is often provided by a BTx or BI application package.

Data Integration Considerations When Using Application Packages

Organizations employ a variety of approaches for building and deploying BTx, BI, and collaborative applications. These approaches range from custom-coded applications to the use of interactive productivity tools and application packages. These application solutions in turn employ an assortment of technologies to store and maintain business data. The outcome is that most organizations have data stores that are dispersed across many different application systems, which leads to a complex set of data integration issues.

Business Transaction Data Integration

A Distributed Architecture Presents Problems for Doing Operational Reporting

BTx applications store and manage data in file and database systems that reside on a number of different servers. This distributed architecture presents problems for doing operational reporting and for maintaining an integrated and consistent view of master/reference data.

Two Approaches to Operational Reporting against BTx Package Data. Companies can create reports by accessing data in BTx systems directly (i.e., they report against live BTx data) or by accessing low-latency data that has been integrated into an operational data store (ODS). Accessing live BTx package data has the benefit of providing real-time results. Using an ODS, on the other hand, allows data to be integrated from multiple BTx application packages and other data sources, which improves consistency, but of course adds data latency to the report results.

An ODS can help solve BTx Data Reporting and Integration Problems

A large percentage of organizations use an ODS to help solve BTx data reporting and integration problems. Whereas 74 percent of companies are doing, or planning, reporting against live BTx package data, the same percentage are building an ODS of integrated BTx package data for operational reporting. A similar number are using an ODS for providing an integrated view of master/reference data (see Illustration 2.1).
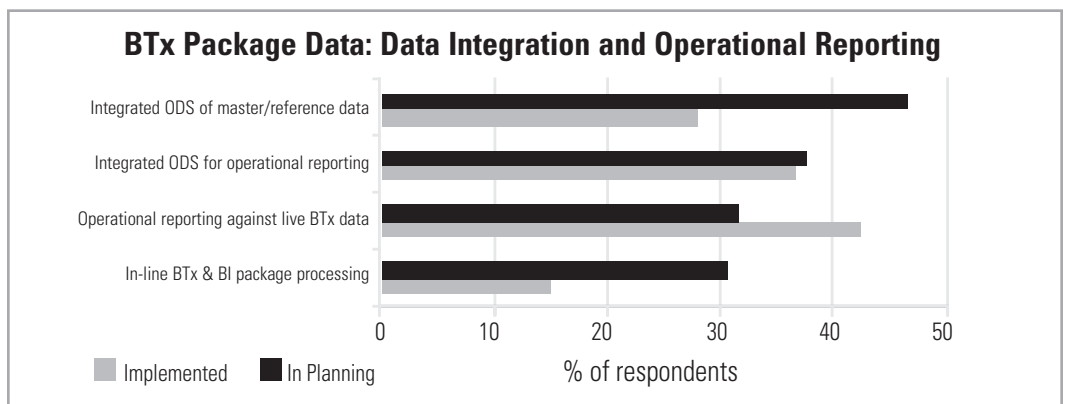
Illustration 2.1: What types of operational reporting and data integration has your company implemented using data from packaged BTx applications?

In-Line BI Processing. Some 15 percent of companies are using in-line BI processes with their packaged solutions, and 31 percent are planning to do so in the future. This shows that, in addition to its traditional use for historical reporting and analysis, business intelligence is now being tightly integrated with daily operational BTx application processing.

BI Is Integrating with Operational BTx Application Processing

Business Intelligence Data Integration

A BI system consists of reporting and analysis applications that process live BTx data, and/or data that has been extracted from BTx applications and integrated into a data warehouse. Most companies (88 percent) surveyed have implemented, or are planning, a data warehouse to store BTx package data for historical reporting and analysis (see Illustration 2.2).
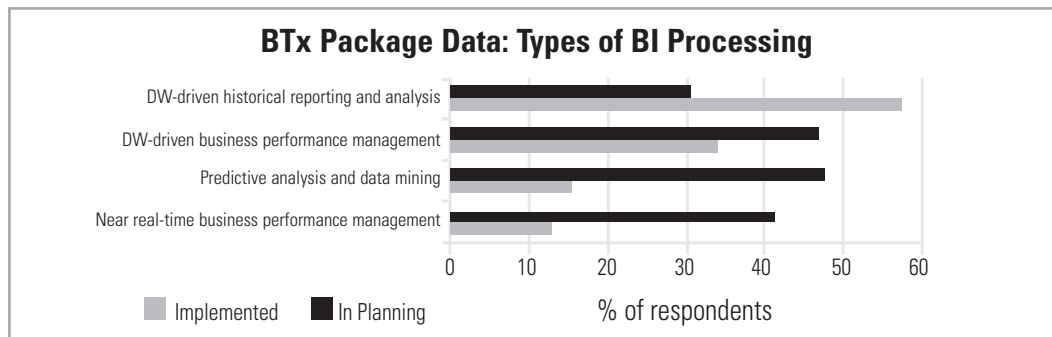
BTx Package Data: Types of BI Processing

DW-driven historical reporting and analysis	
DW-driven business performance management	
Predictive analysis and data mining	
Near real-time business performance management	

Implemented ☐ In Planning ■   % of respondents

Illustration 2.2: What types of BI/DW solutions has your company implemented using data from packaged BTx applications?

Challenges to Building a DW

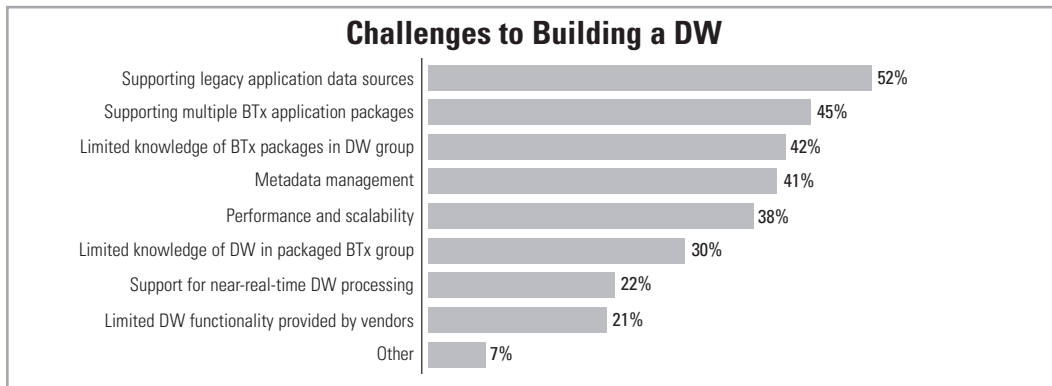|	
Supporting legacy application data sources	52%
Supporting multiple BTx application packages	45%
Limited knowledge of BTx packages in DW group	42%
Metadata management	41%
Performance and scalability	38%
Limited knowledge of DW in packaged BTx group	30%
Support for near-real-time DW processing	22%
Limited DW functionality provided by vendors	21%
Other	7%

Illustration 2.3: What are the top three challenges in building a DW using BTx package data?
Based on 538 respondents.

Challenges to Building a DW. Handling the integration of data from legacy systems (52 percent of respondents) and dealing with multiple application packages (45 percent) are the two biggest challenges to building a data warehouse using data from BTx application packages (see Illustration 2.3.) Solving these data integration issues is a key success factor and an important consideration when selecting products for developing BI/DW applications. This issue is discussed in more detail in the section on product requirements, beginning on page 23.
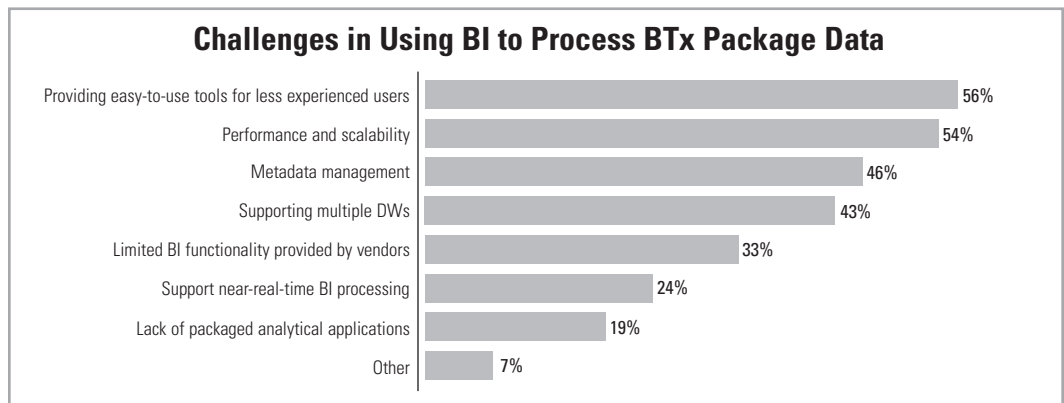
Solving Data Integration Issues Is a Key Success Factor

Business Process Owners. Another challenge to building a data warehouse is the data warehousing team's ability to understand the business aspects of BTx application packages. As Illustration 2.3 shows, this issue is ranked third in importance. Many of the companies interviewed felt a better job must be done to educate

BI/DW staff about BTx application packages. Several organizations have improved communication between the BI/DW group and individual business units by appointing business process owners in each business unit. "We use information process owners on the business side to help align IT and business unit thinking," says an IT architect at a large US manufacturing company. "These process owners help identify business requirements, data needs, and key performance indicators."

Business Process Owners Function as Business Unit Data Stewards

Business process owners function as business unit data stewards, but they also have in-depth expertise about BTx application packages and the business processes they support. This expertise is very valuable when working with BI/DW staff to design BI applications. These process owners are also knowledgeable about business unit data warehouses that may need to be accessed by enterprise-level BI applications for creating cross business reports and analyses.

Challenges in Using BI to Process BTx Package Data

Challenge	Percent
Providing easy-to-use tools for less experienced users	56%
Performance and scalability	54%
Metadata management	46%
Supporting multiple DWs	43%
Limited BI functionality provided by vendors	33%
Support near-real-time BI processing	24%
Lack of packaged analytical applications	19%
Other	7%

Illustration 2.4: What are the top three challenges in using BI to process BTx package data? Based on 531 respondents.

Companies Use BI Aggressively to Drive Business Operations

Types of BI Processing. In addition to data reporting and analysis (see Illustration 2.2), companies are also using, or planning to use, BTx package data for strategic and tactical business performance management (81 percent of respondents), predictive analysis (63 percent), and operational (or near-real-time) business performance management (54 percent). The growth figures in these latter two application categories are especially noteworthy as they prove unmistakably that companies are beginning to use BI aggressively to drive their business operations. The large number of companies planning to develop predictive analysis applications demonstrates that this technology is now at last entering the mainstream BI marketplace.

Challenges to Building BI Applications. There are many challenges to developing BI applications, and they apply equally to applications that process BTx package data. Significant issues (see illustration 2.4) are easy-to-use interfaces for less experienced users (56 percent of respondents), performance and scalability (54 percent), and metadata management (46 percent).

Business Units Often Have Independent DWs and BI Applications

Another significant challenge for BI users is creating an enterprise-level view of the business when the required data is stored in multiple data warehouses. Nearly half (43 percent) of the respondents listed this as an issue. Interviews show that each business unit or division often has its own independent data warehouses. These are frequently created and maintained by individual application packages. Even when a company has a central enterprise data warehouse, business units also frequently have their own independent data warehouses and BI applications.

"Management would like an enterprise data warehouse, but they also realize that business units like to be autonomous and don't always have the luxury of waiting for central IT resources to be available to meet their needs," says Michael O'Shaughnessy, Senior Manager of Information Architecture at Pfizer. "We are starting

to move in the direction of harmonizing data across business units, but the business case is difficult. A catalyst, like the need for financial data in the sales organization, is often required to jump-start enterprise projects." Another IT architect agrees: "Our business units make their own decisions. BI applications that span business units are difficult to justify because nobody wants to pay for them. The momentum must come from an individual business unit that can justify the project to senior management."

Jill Dyché, partner with Baseline Consulting Group and author of *The CRM Handbook,* sees a blurring of the lines between operational applications and data warehouses. "Organizations are finding it increasingly difficult to build operational systems in a vacuum," she says. "Packaged applications, most notably in the CRM space, are not only using existing data, they're also generating new data, driving the need for more formal data management and cross-functional analytical capabilities provided by enterprise data warehouses."

Rather than giving business users direct access to multiple data warehouses, companies often solve this data integration challenge by copying data and metadata between data warehouses. This approach makes it easier to ensure that users see consistent data. "A business unit data warehouse often contains short-term detail data for operational reporting, whereas an enterprise data warehouse is for longer term planning and analysis," says David Lyle, VP of Product Strategy at Informatica Corporation. "Customers often need a bi-directional hub to move data between the two types of data warehouses."

Two Different Approaches to Using Packaged Applications. Summarizing the results so far, we see there are two quite different application package strategies in use. In some companies, executives have decided to move toward using a single applications vendor for supplying both BTx and BI packaged applications. In other companies, each business division, business unit, or business area is autonomous, and is free to determine its own application package strategy. The first type of company is more likely to have a central enterprise DW, whereas the latter type will have multiple business-unit-based data warehouses, and may or may not have an enterprise data warehouse for inter-business-unit BI.

Collaborative Data Integration

Collaborative applications provide a range of different capabilities, including e-mail, instant messaging, online conferencing, etc. Data associated with collaborative processing is often spread across multiple file and database systems. In some collaborative environments, a content management system is used to manage access to this unstructured and dispersed data.

As with BI processing, a key data integration issue for collaborative applications is providing business users with a single interface to help manage and access the many different types of collaborative data that may exist. Another integration concern is connecting and coordinating related BI and collaborative information. Two potential solutions to these problems are enterprise information integration (EII) and an enterprise portal. Both technologies provide access to dispersed data, and in some applications may be used together. Both EII and enterprise portals are discussed further in the section on product requirements, starting on page 23.

The objective of this report is not to address all data integration issues outlined above—this will be the subject of a broader TDWI report to be published in 2005. Instead, the objective is to focus on data integration issues associated with BTx application packages, and on how solutions to these data integration issues are influenced by the presence of data from legacy systems, and other internal and external data sources. The section that follows discusses this subject in detail.

Business Intelligence 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.

"A Catalyst Is Often Required to Jump-Start Enterprise Projects"

Copying Data between DWs Can Ensure Consistent Data

Two Different Application Package Strategies Are In Use

Strategy	Description	General Guidelines
ADOPT	Always use BI/DW solutions from your BTx applications vendor.	You have standardized (or are planning to standardize) mainly on a single BTx application vendor throughout your enterprise. You do not have an existing BI environment (or are not satisfied with your existing BI environment) and the BTx application package vendor can satisfy your BI/DW requirements.
AVOID	Always use BI/DW solutions from independent third-party vendors.	You do not wish to become dependent on a single BTx application vendor. Your existing or planned BI environment can satisfy your BI/DW requirements.
ACCOMMODATE	Use BI/DW solutions from your BTx application vendor as appropriate.	You have an existing BI environment, but it cannot fully satisfy your BI/DW requirements. Your BTx application package vendor's BI/DW solution is superior to your existing BI environment. You have a business unit who prefers to implement a BI/DW solution from a BTx application vendor.

Three BI/DW Approaches to Processing Data Managed by BTx Application Packages

Figure 3.1: Strategies for using BI/DW solutions from BTx application vendors.

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. A description of these strategies and some general guidelines for using them are shown in Figure 3.1.

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 3.2).

BI/DW Strategies for Processing BTx Package Data
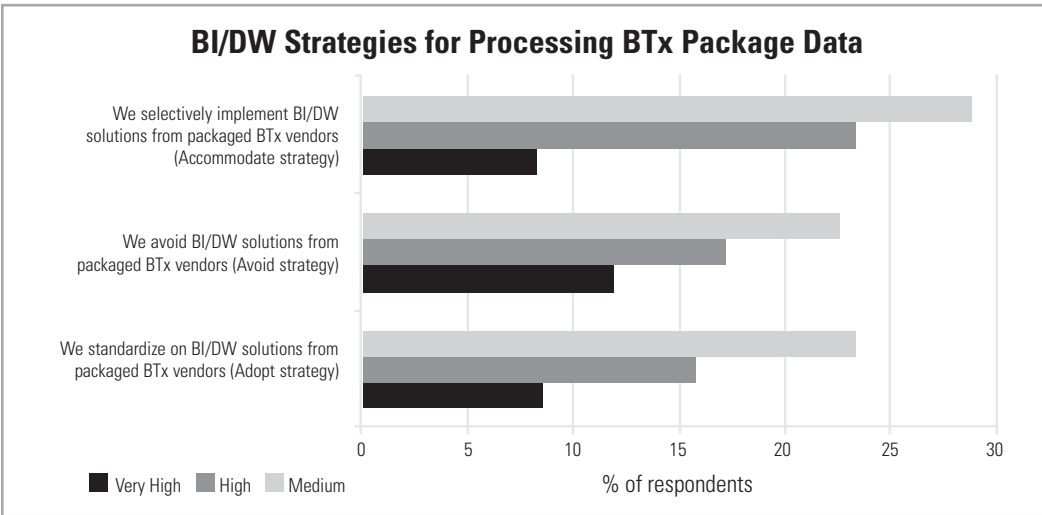
Illustration 3.2: To what degree do these statements match your BI/DW strategy for processing BTx package data?

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 (see Illustration 3.3), 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.

Building the Data Warehouse

There are three possible approaches to building a data warehouse using information extracted from packaged BTx applications: *enterprise DW* architecture, *hybrid DW* architecture, and *independent DW* architecture.

Enterprise DW Architecture. An enterprise DW (sometimes called a *central DW*) architecture (see Illustration 3.4) enables the organization to centralize information in a single data warehouse that may

Other Factors Influencing BI/DW Product Choice

Illustration 3.3: Do factors like TCO and the need to use best-of-breed products affect your choice of BI/DW products?

or may not have underlying dependent data marts. Either the *Adopt, Avoid,* or *Accommodate* BI/DW strategies can be used to build and maintain an enterprise DW. The strategy used will depend primarily on the type of information to be maintained in the data warehouse. As we will see later, performance and scalability also play an important role in the choice of strategy.

Type of Information to Be Managed Determines Strategy

If the focus of the BI system is primarily on the data managed by BTx application packages, then an *Adopt* strategy is the more likely candidate. When BI applications use data from mainly independent sources, then the *Avoid* strategy is appropriate. The *Accommodate* strategy is common when the enterprise DW requires data from both BTx application packages and other internal and external data sources.

Independent DW Architecture. In the independent DW architecture (see Illustration 3.5) each business area or business unit has its own data warehouses—there is no concept of a central enterprise data warehouse. This approach lends itself to an *Accommodate* strategy. With this approach, the key issue is that information is dispersed across multiple data warehouses, which means that business users doing cross-data-warehouse analyses could get inconsistent results.

Independent and Hybrid DW Architectures Lend Themselves to the Accommodate Strategy

Hybrid DW Architecture. The hybrid data warehouse architecture is a combination of the enterprise DW and independent DW approaches (see Illustration 3.6). This approach also lends itself to an *Accommodate* strategy. The ETL capabilities provided by the BTx application vendor are used to build data warehouses that source only BTx package data (*DWa* in Illustration 3.6), while ETL tools from a third-party vendor and/or the BTx application vendor can be used with mixed data feeds (*DWb* in Illustration 3.6).
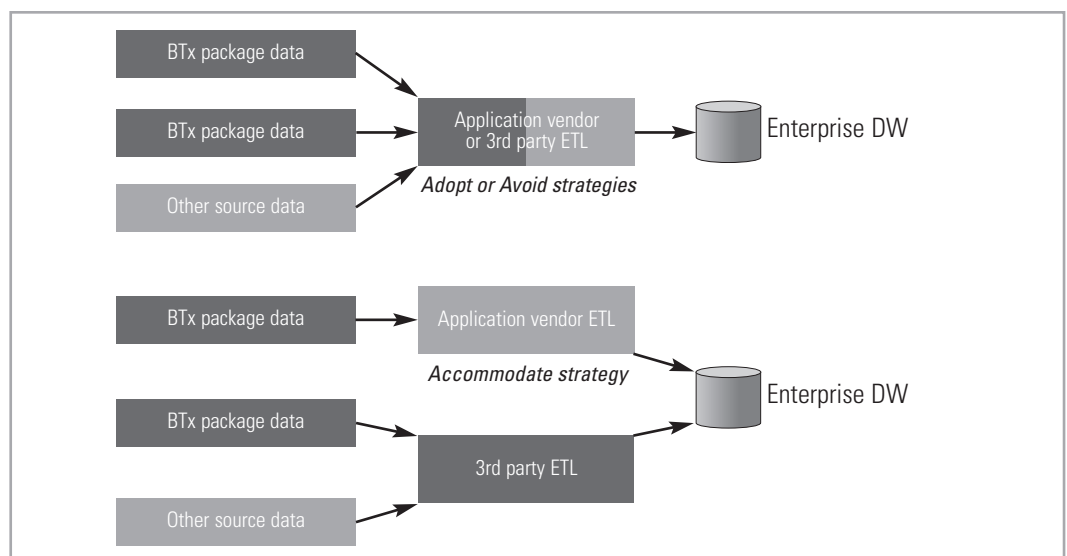
Illustration 3.4: Enterprise DW architecture for handling BTx package data.
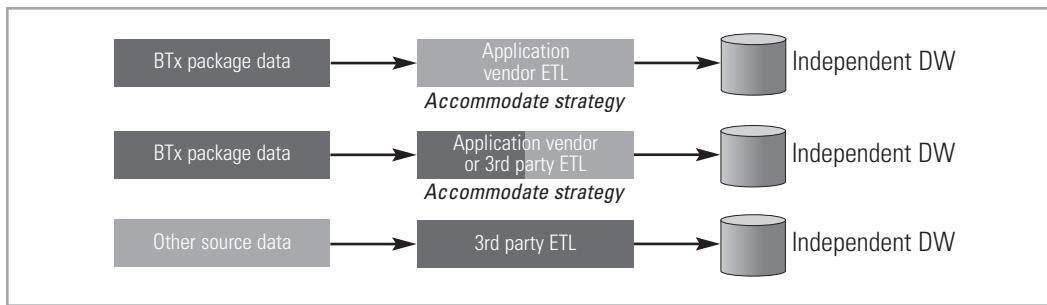
Illustration 3.5: Independent DW architecture for handling BTx package data.

Business Unit Data Warehouses Become Data Sources. A hybrid DW architecture has a major effect on the techniques used by the central BI/DW group for enterprise-level and cross-business-unit reporting and analysis. A common hybrid DW situation is for some corporate business units to obtain their own independent BTx and BI/DW solutions from an applications vendor. The central BI/DW group then extracts and consolidates BTx and DW data from the business unit applications into a central enterprise DW. With this hybrid DW scenario, a business unit or BTx application package data warehouse often acts as a direct data feed for the enterprise DW. The direct feed removes the need for the central BI/DW team to be involved in extracting data from the BTx application packages of the business unit. These feeds are shown by a dotted line in Illustration 3.6.
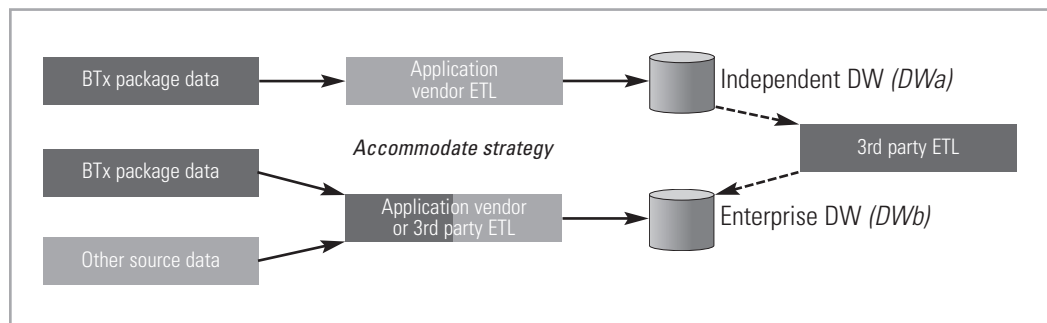
Illustration 3.6: Hybrid DW architecture for handling BTx package data.

What Is the Most Popular DW Architecture? To determine the data warehousing approaches used by organizations for handling BTx package data, respondents were asked to describe their DW architecture. Half (51 percent) are managing both their BTx package data and other types of data in a single enterprise data warehouse (see Illustration 3.7). Over a third of companies (37 percent) use a combination of both approaches in different parts of the organization. In a smaller number of cases (12 percent), each BTx application package has its own independent data warehouse.

"We see both hybrid and enterprise data warehouse architectures used," says Roman Bukary, VP of Product Marketing at SAP. "In addition to technology and data usage issues, the other critical factors to consider when selecting products are the overall TCO of the complete BI solution and also the specific business scenario where these products and tools are being used."

Where multiple data warehouses are being used, three-quarters of respondents said they would like to reduce and consolidate the number of data warehouses they have. The TDWI report *In Search of a Single Version of the Truth: Strategies for Consolidating Analytic Silos (July 2004)* discusses data warehouse consolidation in more detail.

37 Percent Use a Combination of Both Approaches

Three-Quarters Want to Consolidate DWs

DW Approach Used for BTx Package Data

Independent DW architecture **12%**

Hybrid DW architecture **37%**

Enterprise DW architecture **51%**
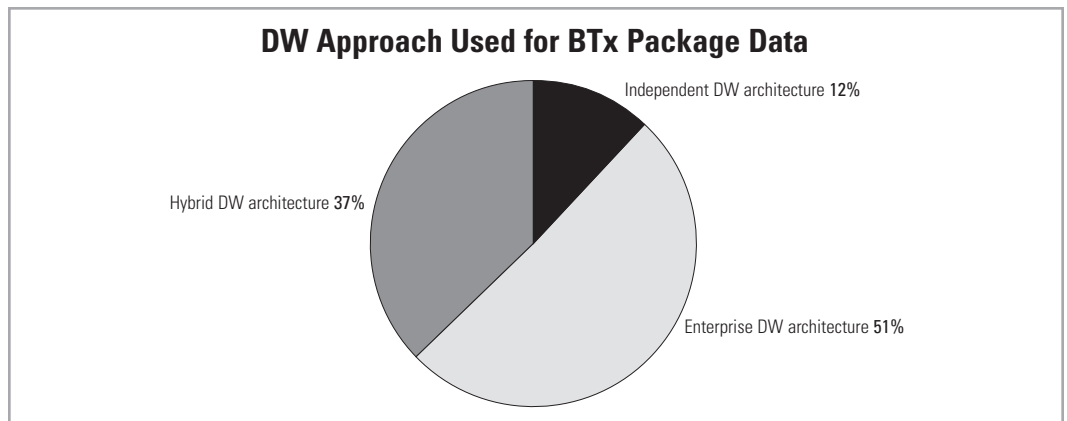
Illustration 3.7: Which best describes your DW approach for packaged BTx data? Based on 531 respondents.

To validate how the *Adopt*, *Avoid*, and *Accommodate* strategies map to different DW architectures, we asked respondents about the types of ETL tool they are using. The results show (see Illustration 3.8) that 40 percent are using tools from third-party vendors, 19 percent from their BTx application vendor, and 41 percent from both types of vendors. Although follow-up interviews suggest that many companies still use custom code to develop ETL processes, the results show that most respondents are also using ETL tools. The "build versus buy" decision for developing ETL processes has been explored in the TDWI report *Evaluating ETL and Data Integration Platforms.*

Most Companies Use ETL Tools

DW Approach Used for BTx Package Data

Tools provided by the BTx vendor
(Adopt strategy) **19%**

A combination of BTx package and 3rd party vendor tools
(Accommodate strategy) **41%**

Tools provided by 3rd party vendors
(Avoid strategy) **40%**
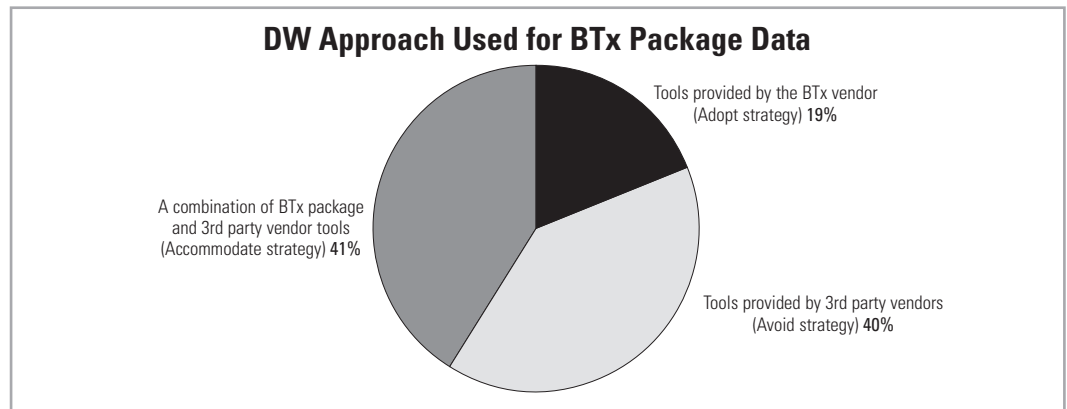
Illustration 3.8: What ETL tools do you use to create a DW containing BTx package data? Based on 519 respondents.

ETL Tools Usage and Data Warehouse Architecture. When we compared ETL tool usage with DW architecture, the most popular approach for building an enterprise DW (see Illustration 3.9) was to use third-party ETL tools (52 percent of enterprise DW users). A number of companies (19 percent of enterprise DW users), however, are using BTx application vendor tools to build an enterprise DW, again indicating that data from BTx application packages is becoming important for many enterprise DW projects. As expected, a combination of BTx application vendor and third-party tools is used by the majority of companies for building an independent DW (37 percent of users) and hybrid DW (61 percent of users).

Third-Party ETL Tools: Most Popular Approach to Building an Enterprise DW

ETL Tools Used for Each DW Architecture
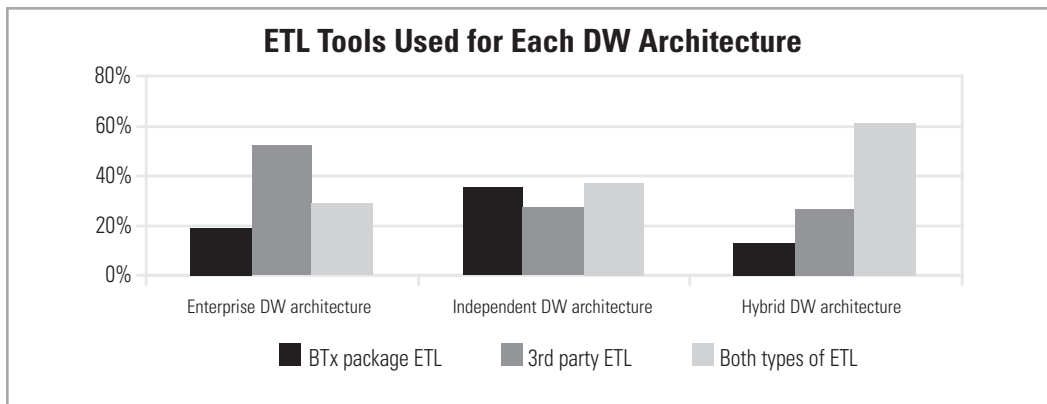
Illustration 3.9: ETL tool usage and DW architecture. Based on 513 respondents.

Developing BI Applications

The strategy used by companies to select BI tools and packaged applications is likely to be similar to that used for choosing ETL tools for building the data warehouse (see Figure 3.10). The one exception may be when a company deploys a BI/DW solution from a BTx applications vendor (*Adopt* strategy). In this situation the organization may also need to use third-party BI tools and packaged applications (*Accommodate* strategy) to fill any gaps in the application vendor's BI capabilities.
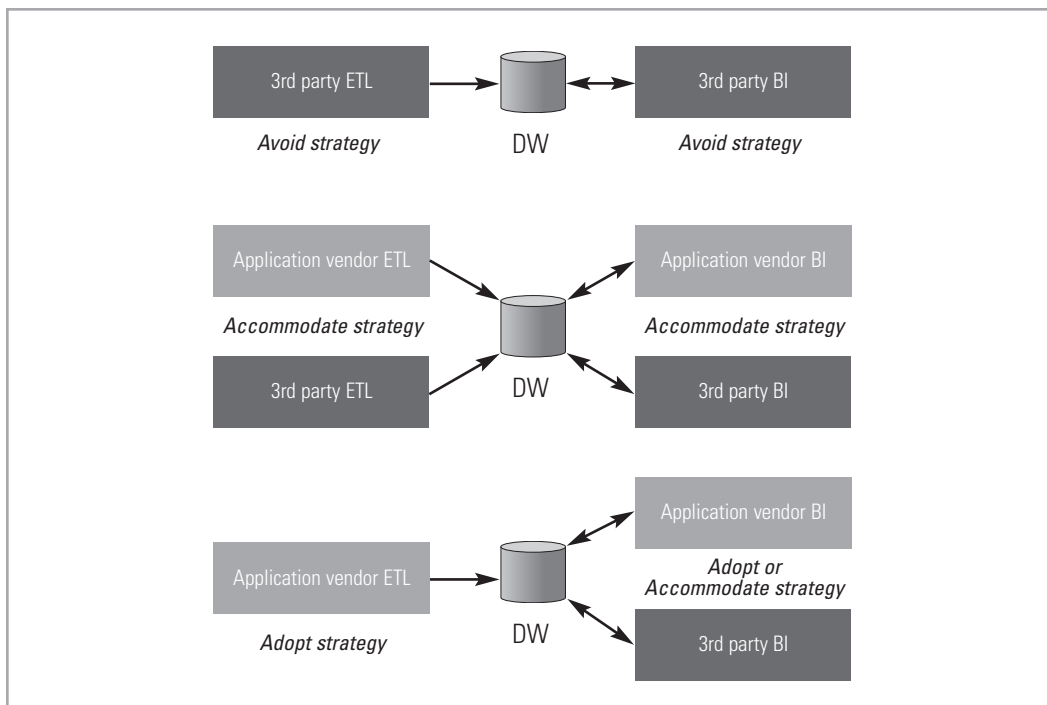
Illustration 3.10: BI approaches for processing DW data.

Survey results (see Illustration 3.11) show that 14 percent of respondents exclusively use BI solutions supplied by their BTx application vendors, while 48 percent use only BI tools and packages from third-party vendors. The remaining 38 percent of respondents use a combination of BI solutions from both BTx and independent vendors.

BI Tools Used to Process BTx Package Data

Tools provided by BTx application vendor (Adopt strategy)
14%

A combination of BTx package and 3rd party vendor tools (Accommodate strategy)
38%

Tools provided by 3rd party vendor (Avoid strategy)
48%
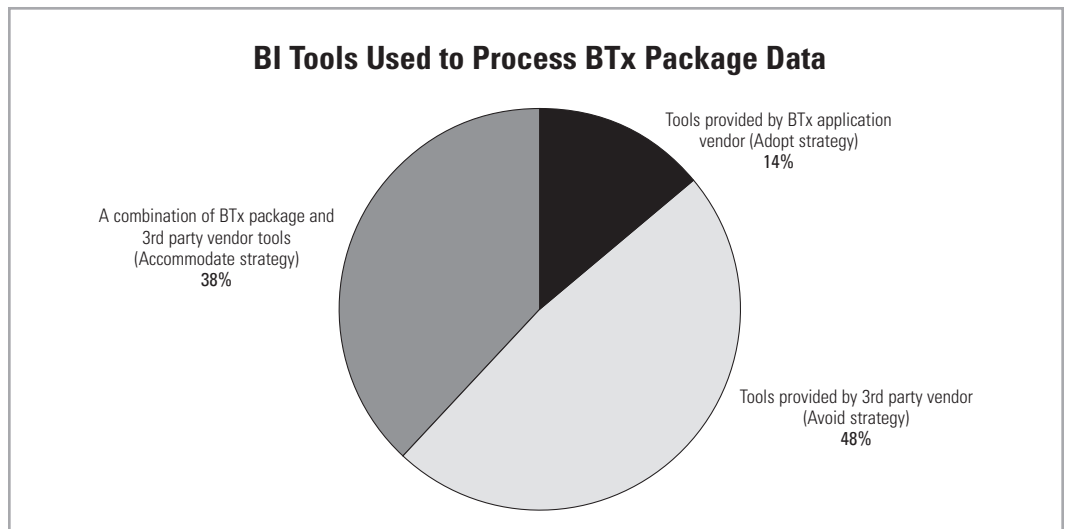
Illustration 3.11: Which BI products do you use for processing packaged BTx data that has been extracted into a data warehouse? Based on 525 respondents.

BI Product Usage and DW Architecture. When we compared BI tool usage with DW architecture (see Illustration 3.12), the results were similar to that for ETL tools, except that the use of BTx application vendors' package BI tools was generally lower, especially for a hybrid DW architecture.

BI Tools Used for Each DW Architecture

	Enterprise DW architecture	Independent DW architecture	Hybrid DW architecture

Legend: ■ BTx package BI   ■ 3rd party BI   ■ Both types of BI
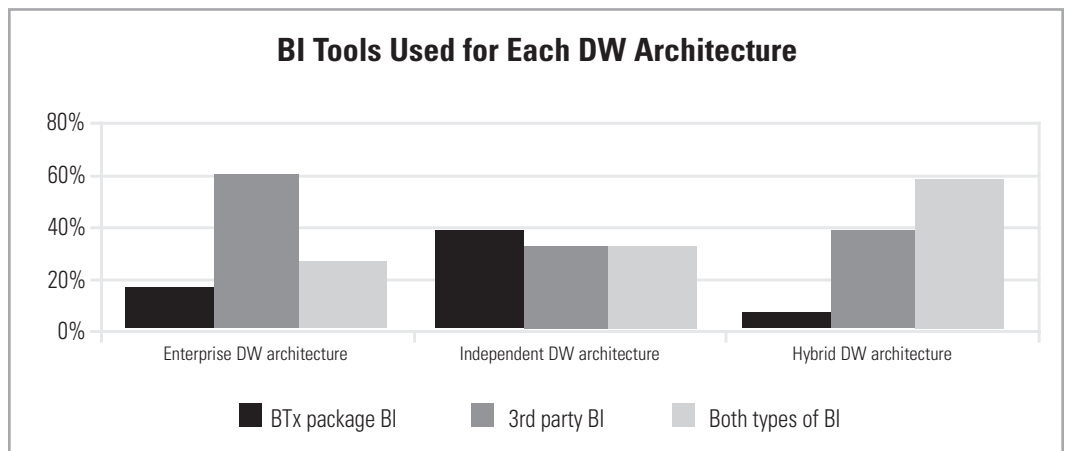
Illustration 3.12: BI tool usage and DW architecture. Based on 518 respondents.

BI Solutions from BTx Package Vendors Are Used for Operational Production Reporting

Third-Party BI Tools Dominate BI Applications Requiring Ad Hoc Reporting

Filling the Gaps in BTx Vendor BI Solutions. BI products from BTx package application vendors are often viewed as tools used for operational reporting, rather than for in-depth strategic, tactical, and operational data analysis. To determine whether this is really the situation, we asked respondents about the types of tool they use for different kinds of BI application. The results in Illustration 3.13 show BI solutions from BTx application package vendors are used primarily for operational production reporting, and also for planning, forecasting, and budgeting applications. Independent third-party BI tools, on the other hand, dominate BI applications that require ad hoc reporting and analytical processing. The results also show that both types of BI products are used for a wide variety of BI applications.

Vendor Tools Used for BI Processing
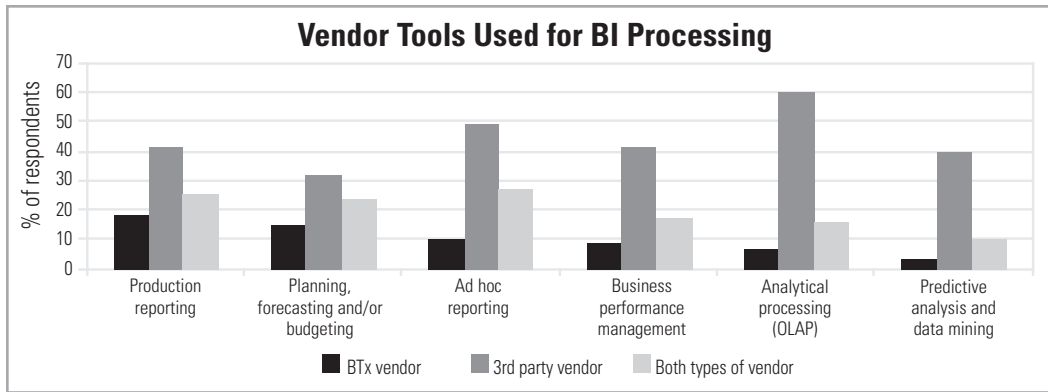
Illustration 3.13: Which vendors' BI tools do you use for BI processing against BTx package data?

BI/DW Product Landscape for Handling BTx Package Data

Four Categories of BI/DW Products in a BI System

Many factors determine what BI/DW products an organization will use to process BTx package data. Some of these factors are concerned with political issues and business requirements, while others are related to technology needs. This section focuses on the technology requirements to consider when selecting BI/DW products for processing BTx package data.

The BI/DW Product Set

A BI system consists of custom-built and packaged BI applications that process data in live BTx application files and databases, and/or a data warehouse. The BI/DW products that make up a BI system fall into one of four main categories:

- *Information distribution tools and applications* for displaying and delivering information to business users
- *Packaged BI applications* for reporting on and analyzing data warehouse and BTx application data
- A *BI development suite* for creating custom-built BI applications
- A *data integration platform* for creating, integrating, and managing the data and metadata associated with a BI environment
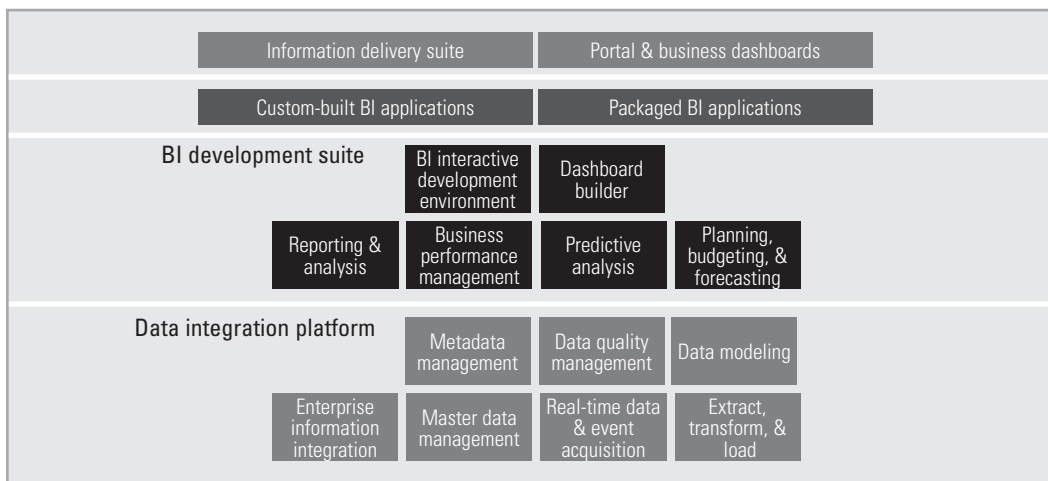
Illustration 4.1: BI system product set. (Courtesy of BI Research)

Information delivery suite	A set of products for delivering business information to desktop, Web, and mobile devices
BI portal and dashboards	A personalized Web user interface for accessing corporate business information and business metrics
Packaged BI applications	Vendor-supplied packaged applications for doing BI reporting and analysis
Custom-built BI applications	In-house BI applications developed using the facilities of a BI development suite
BI interactive development environment	A component-based set of tools for doing BI application development
Dashboard builder	A development facility for creating dashboards that display business metrics
Reporting and analysis	A set of BI productivity tools for doing ad hoc and production reporting, and data analysis
Business performance management	A development facility for creating applications that produce actionable BI
Predictive analysis	A set of tools for building and deploying predictive models and applications
Planning, budgeting, and forecasting	A set of tools and applications for doing ongoing business planning
Data integration platform	A complete set of tools for integrating data and building a data warehouse. The suite may contain EII, master data management, real-time data/event acquisition, ETL, metadata management, data quality management, and data modeling tools

Illustration 4.2: Overview of BI/DW suite components.

Illustrations 4.1 and 4.2 provide an overview of the BI/DW products in each of these categories. These illustrations can be used to measure the functional completeness of any given vendor's BI/DW offerings, and to identify technology requirements for an enterprisewide BI/DW solution.

Top Requirements: Scalability/Performance

We asked survey respondents to rate a list of product requirements for building a data warehouse and deploying BI applications that handle BTx package data. Possible ratings were "very important," "important," or "not important." Results are shown in Illustrations 4.3 and 4.4.

Companies Realize the Potential of Data Integration Technologies

Data Warehouse Requirements. The top "very important" requirements for data warehousing are scalability and performance (63 percent of respondents), total cost of ownership (51 percent), master data integration (49 percent), and a well integrated BTx and data warehousing environment (46 percent). Surprisingly, although new data integration technologies like near-real-time processing, and support for XML and Web services, received the largest rating for "not important," about half the respondents did rate them as "important." These results demonstrate that companies are focused on existing mainstream data integration issues, but at the same time also realize the potential importance of new and evolving data integration technologies.

Data Warehouse Product Requirements
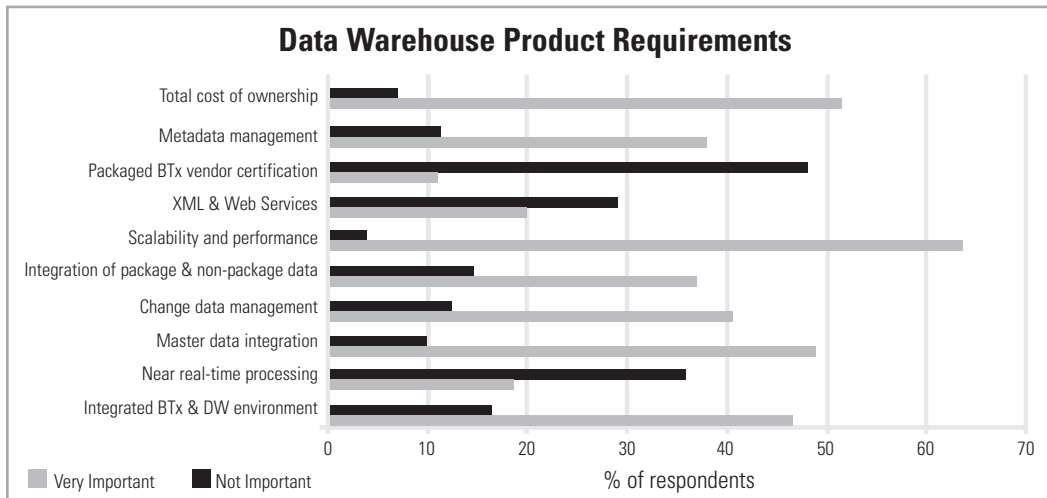
Illustration 4.3: How important are these data warehouse facilities when selecting products? Based on 537 respondents.

BI Tool Product Requirements
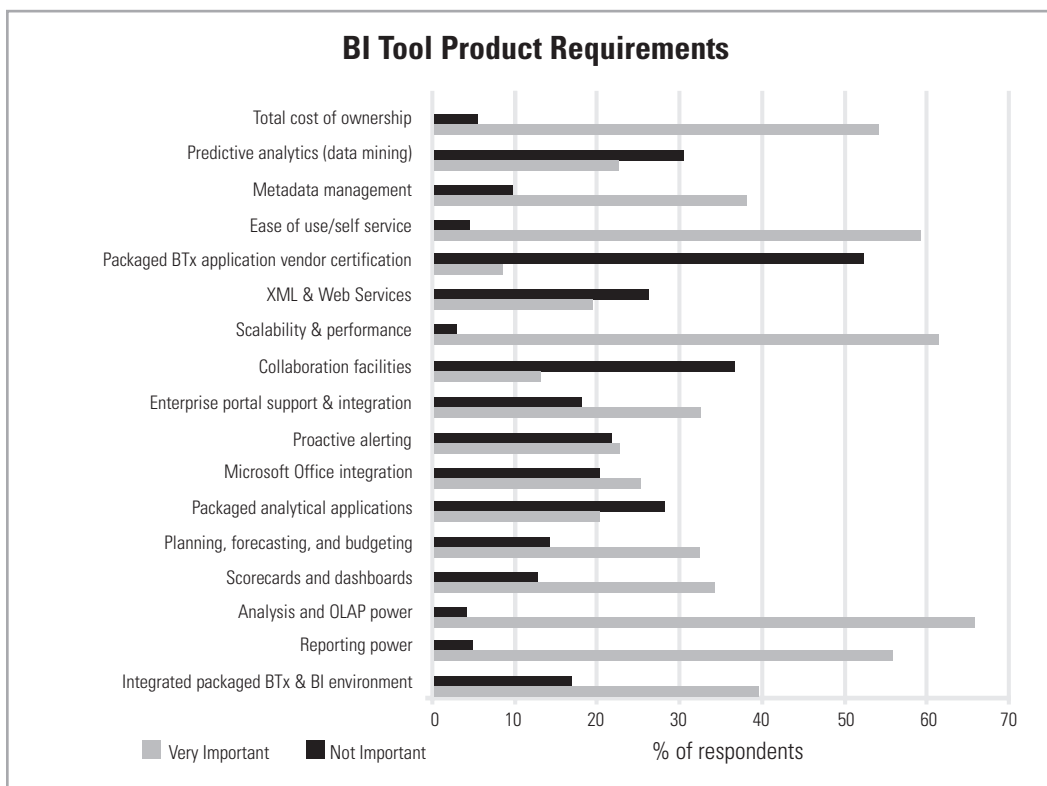
Illustration 4.4: How important are these BI facilities when selecting products? Based on 533 respondents.

BI Requirements. The top-rated "very important" requirements for BI are analysis and OLAP power (66 percent of respondents), scalability and performance (62 percent), ease of use and self service (60 percent), report formatting/bursting/distribution power (56 percent), and total cost of ownership (54 percent).

What is striking about BI system customer requirements is how many of them are not related directly to product features and functions. Requirements like total cost of ownership, ease of use, an integrated product set, and scalability and performance all rate high. The issue here is that these requirements are often intangible and difficult to assess when evaluating products. The discussion that follows addresses some of these more intangible aspects of choosing BI/DW products for handling and processing BTx package data. The discussion is broken down into the following four topics:

- Build or Buy?
- Completeness: Components or a Complete BI/DW Suite?
- Openness: Integration with Third-Party Tools and Technologies
- Scalability and Performance

Build or Buy?

Developers of BI applications and their underlying data warehouses have the choice of coding custom applications, or using off-the-shelf tools and application packages.

Interviews carried out during our survey suggest that ETL tools are widely used to extract data from BTx application packages for loading into a data warehouse. In several instances, however, developers built custom programs to extract BTx package data because their data requirements are too complex for generalized ETL tools to handle. For more information about the pros and cons of building ETL applications versus buying ETL tools, see the TDWI report *Evaluating ETL and Data Integration Platforms* (March 2003).

For BI reporting and analysis, companies have the choice of using vendor BI productivity tools to build applications, or use off-the-shelf analytical application packages. More information on the build versus buy decision can be found in the TDWI report *The Rise of Analytic Applications: Build or Buy?* (September 2002). As mentioned earlier, results show that the use of packaged BI products has grown substantially since this report was published. This fact demonstrates the growth in this segment of the market, but it may also indicate that purchasers of BTx application packages are more likely to buy packaged BI solutions as well.

Completeness: Components or Complete BI/DW Suite?

When selecting BI and DW products, companies have the option of licensing an integrated suite of products from a single vendor, integrating best-of-breed tools and application packages, or employing a combination of both.

BI and DW Product Suites. Integrated BI and DW product suites come in three flavors:

1. A *data integration platform* for building and managing a data warehouse
2. An *integrated BI development suite* of tools for developing and deploying BI applications
3. A complete *BI/DW product suite* for building a data warehouse and developing BI applications

Most Third-Party Vendors Provide Option 1 or 2

Most third-party vendors provide one of the first two options, whereas BTx application package vendors usually offer the third option. There are exceptions, however. A few independent vendors do offer a complete suite of BI/DW products, but the strength of the suite is usually in the front-end BI tools and applications.

Some BTx applications vendors have relationships with third-party data integration platform vendors to provide the DW component of their BI/DW suites. These arrangements remove arguments about whether the applications vendor's ETL capabilities are better than those of third-party suppliers.

Using Best-of-Breed Products: In theory, purchasing best-of-breed products offers the most functionality, but experience shows this functionality cannot always be fully realized because products cannot integrate

seamlessly. Integrating best-of-breed products is complex and resource-intensive. This complexity leads to project delays and frustration by business users because products do not work well with each other. This is especially true when using best-of-breed BI application productivity tools and analytical application packages. It is less true when selecting DW development tools, because these tools are used by more experienced DW staff, and best-of-breed DW tools are often needed to support multiple data sources and the required function and performance.

Using an Integrated Product Suite: Using integrated suites of products is the most productive approach to developing BI applications and their underlying data warehouses. Missing features in the suite can be filled in using best-of-breed products. This approach enables projects to be deployed faster, and provides better usability for business users. The integrated suite approach also usually results in a lower total cost of ownership, compared with the cost of licensing and integrating individual products.

Careful evaluation is still required even with an integrated BI or DW product suite. Products may appear to be integrated at the user interface level, but under the covers, poor data and metadata integration may require the user to constantly copy information between products in the suite.

Interviews with survey respondents show that companies using an *Adopt* strategy are more likely to use an integrated product suite. This was because these companies are looking for a single solution for both their BTx and BI application processing needs. Where there were functional gaps in a particular vendor suite, they were usually filled with third-party solutions.

Companies using an *Avoid* or *Accommodate* strategy, on the other hand, are more inclined to use best-of-breed approaches. This is probably because third-party vendors have only recently begun providing BI and DW product suites. Results from our survey support these interview findings. Of the respondents rating the *Adopt* strategy as "low" or "very low," 66 percent rated use of best-of-breed solutions as "high" or "very high." The results also show, however, that even in companies using best-of-breed approaches, there is a trend toward standardizing on products from a single vendor.

Integration: Access to BTx Source Data

For users of BTx application packages, one of the more important requirements is giving BI applications and business users easy and seamless access to both BTx package and non-BTx package data. Extracting and integrating source data into an ODS or DW is the most common approach for handling BTx package data in a BI system. Some companies, however, also use enterprise information integration (EII) middleware to directly access live BTx package source data.

ETL Approach. When selecting an ETL tool for building a DW, it is essential that the product support the metadata and data sources of the BTx application packages installed in the organization. The ETL tool may also need to extract information from business unit data warehouses to a central enterprise DW for cross-business-unit reporting and analysis.

How well an ETL capability interacts with a BTx application package is of crucial importance for both ease of use and performance. A BTx application package may store its transaction data in many hundreds of underlying physical data files. BTx applications supplied with the package are usually separated from these physical files by a business metadata layer that presents the physical data to the applications in a business context, such as an invoice. When building ETL applications it is important that developers can also interact with this metadata layer, rather than having to deal with hundreds of underlying physical tables.

Third-Party ETL Tools. Third-party ETL tools have traditionally been very efficient at handling non-BTx package database and file data. Their support for application packages varies, however. ETL tool interfaces to an application package vendor's products require careful evaluation. One way of determining the ability of a

Integrating Best-of-Breed Products Is Complex and Resource-Intensive

Using Integrated Suites Is the Most Productive Approach

Some Companies Use EII Middleware to Access Live BTx Package Source Data

tool to use and exploit a specific interface to an application package is to check whether the tool has been certified by the applications vendor. Surprisingly, certification rated very low on the list of both data warehousing and BI application product requirements in our survey (see Illustrations 4.3 and 4.4). Even the certification results for many of the companies with an *Adopt* strategy in the survey show a rating of "not important"—less than 25 percent rated it "very important." Vendors obviously need to educate their potential customers and clients about the benefits of certification.

Check Whether Tools Have Been Certified by Application Vendors

Application Vendor ETL Tools. ETL facilities from applications vendors inevitably focus on supporting the vendor's BTx applications. Their support for non-package data in these solutions requires careful review. As already mentioned, some vendors of application packages have relationships with third-party ETL vendors to provide ETL capabilities. These relationships are an obvious advantage for the application vendor product suite.

EII Approach. Another approach for accessing BTx package and other source data from a BI application is using an EII middleware server. EII allows applications to access live BTx source data, without the need to copy the data into an ODS or DW. The source data is presented to EII-based applications in a *virtual business view*. This is why EII is sometimes called *virtual data warehousing*.

EII Allows Applications to Access Live BTx Source Data

EII middleware is capable of accessing a mixture of live BTx data, low-latency data in an ODS, and historical data managed by a data warehouse. The ability to access mixed data is useful, for example, for displaying both operational and historical business performance metrics in a business executive dashboard.

The engineering group at Union Pacific Corporation uses the EII features of their analytics tool to access both business transaction and data warehouse information. "We need a Web-based BI tool that can give our mobile workers out in the field easy access to both operational and analytical data," says Jim Holder, Director of Engineering at Union Pacific. "The problem we faced was that this information was spread across several operational and data warehousing systems. Our analytics tool solves this problem by presenting a single business view of this data to our users."

A complete report could be written about the pros and cons of EII (TDWI's data integration report planned for 2005 will include a detailed analysis of EII). The main issues to note about the EII approach concern its ability to handle source data consistency and quality problems, metadata synchronization with source systems, and large volumes of data. The query optimization capabilities of the EII server play a large role in the performance of this approach.

EII Should Be Viewed As an Extension to Data Warehousing

EII is becoming an important data integration tool, but it should be viewed as an extension to data warehousing, rather than a replacement for it. "EII has its place in situations where on-the-fly integration is possible," says David Lyle at Informatica. "In most cases, however, the optimal solution is to integrate data in a data warehouse, and then use EII to extend the warehouse view of data with federated information from other sources as required."

BI Application Access to BTx Package Data. We can see then that BI tools and packaged applications can:

- Access a data warehouse containing extracted BTx data
- Access live and real-time BTx source data
- Employ EII software to access both live BTx data and data warehouse information

Processing data in a data warehouse is the same, regardless of whether the warehouse contains BTx package data or other types of data. In some cases, a BI tool may first extract data into a separate data store or data cube for analysis. This of course adds overhead to the processing, and it is usually much better if the tool can process the data in the warehouse directly.

When a BI application needs to access live BTx application package data, the considerations are similar to those for building a data warehouse from this data—the application must be integrated tightly with both the data and metadata interfaces of the BTx package.

The Business Metadata Template. BTx application packages and EII both employ a business metadata layer or *template* between physical source data files and the application. These metadata templates provide a simpler business view of data, and also isolate applications from physical data changes. Many BI tools also provide metadata templates between BI applications and the physical data in data warehouses.

One area where metadata templates have received less use, even though some ETL tools support them, is for providing an isolation layer between source data systems and a data warehouse. These data warehouse templates can help isolate ETL processes from source data changes (see Illustration 4.5).

Data warehouse templates are very powerful when used with BTx application packages, because they help overcome the issues identified earlier concerning the understanding of BTx application packages by the data warehousing team. Experts in BTx application packages can map source data into these templates, and data warehouse experts can then map data from these templates into data warehouse structures.

Metadata Templates Provide a Simpler Business View of Data
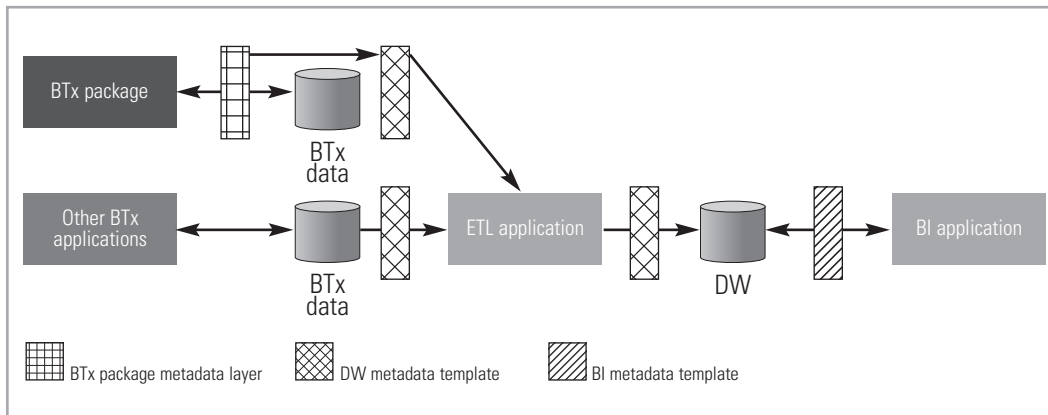
Illustration 4.5 Using business metadata templates. (Courtesy of BI Research)

Openness: Integration with Third-Party Tools and Technologies

Regardless of a company's BI and DW product strategy, it is almost certain that the IT organization will be faced with having to integrate additional BI and DW products into the BI system. Integration of the BI system with other IT products such as portals and BTx applications will also be necessary.

Users, applications, and information can be integrated at the user interaction, business process, application, or data level. In the BI environment, most integration will occur at the data (and metadata) level. The most critical integration feature of a BI or DW product lies in its ability to support industry-accepted standards for data and metadata interfaces and interchange mechanisms. Lack of this support quickly relegates the product to being an isolated island of processing and data.

An open architecture is also critical to reducing integration costs. "Each custom point-to-point connection costs between about $80,000 and $100,000 to develop," says Dave Schrader at Teradata. Illustration 4.6 shows the key integration points that need to be considered in a BI environment.

An Open Architecture is Critical to Reducing Integration Costs

Industry Standards. There are a wide variety of industry-accepted open interfaces for data and metadata access and interchange. Examples here include ODBC, JDBC, JSQL, OLE DB, XMLA, and CWM. One clear direction of the industry is toward using XML for data interchange, and XML vocabularies

(or metadata models) for metadata sharing. Many of the protocols being developed for handling this interchange revolve around Web Services. BI/DW product support for both XML and Web Services will be crucial as these technologies mature and companies become more aware of their value for integration.
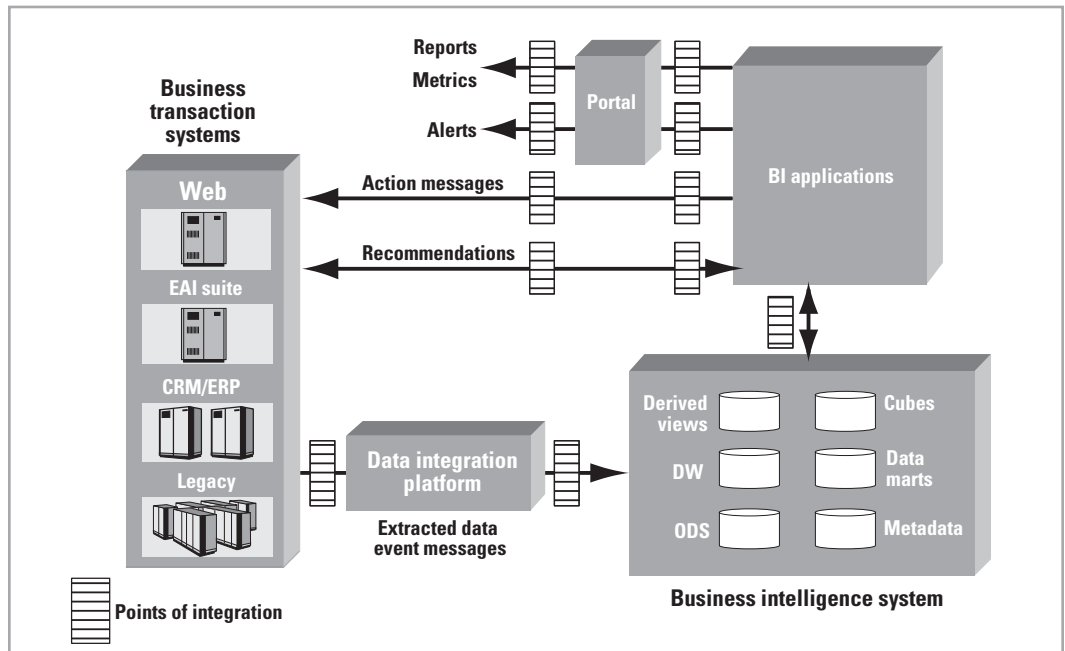
Illustration 4.6: BI system integration points. (Courtesy of BI Research)

The Single Vendor Solution. One important trend worth noting in business integration is the move by BTx application package vendors into the infrastructure software market. Several application vendors now offer business process management, application integration, application server, and portal software. The objective here is to offer customers a complete package of applications and systems software. The level of integration between the various components of the solution is of course a key factor, but this move by application vendors will further motivate companies toward using single vendor solutions.

Scalability and Performance

Scalability and performance are top requirements in most IT projects. This is especially the case in a BI system where both data volumes and the number of users to be supported are increasing dramatically. New and evolving technologies like RFID sensor networks and mobile computing will only add to scalability and performance needs. Illustrations 4.3 and 4.4 show that "scalability and performance" is the top requirement for data warehousing products, and the second to top requirement for BI products.

Data Warehousing Performance. For processing BTx package data, the performance of the ETL interface to the BTx data sources and the transformation power of the ETL tool are likely to be the critical factors to consider for high-volume applications. The ability of the underlying database system to handle high DW update rates and complex queries is also an important factor. In a near-real-time data warehousing environment, mixed workloads of concurrent database updates and queries need to be handled efficiently. In extreme high-volume data warehousing applications, best-of-breed ETL and DBMS products geared toward high performance may need to be used.

BI Application Performance. To date most BI applications have been used by a select audience of business analysts and senior executives. The move toward the Web and the need to deploy BI applications to a wider

audience of line-of-business managers and users is placing increasing scalability demands on BI tools and packaged solutions. Many companies now want to deploy BI applications to a potential audience of several thousand users, and companies are becoming increasingly concerned about the ability of BI vendors to support these large audiences. As in data warehousing, careful product selection is required for high-volume BI environments.

Scalability Demands on BI Tools and Packaged Solutions are Increasing

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.

Business Units Often Deploy Their Own BTx and BI Application Packages

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 these companies can eliminate the use of legacy applications and individual application packages completely across all business units.

Senior Executives Are Mandating the Use of a Single Vendor for BTx and BI Product Sets

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 (see Figure 4.1) 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.

Business Process Owners Can Improve Communication with IT

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.

Figure 5.1: Hybrid BI and DW environment.