Application Integration (EAI) Market Opportunities, Strategies, and Forecasts,

2002 to 2007

Application Integration Market Assessment

Picture by Susie Eustis

MOUNTAINS OF OPPORTUNITY

WinterGreen Research, Inc.

WinterGreen Research, Inc.
Lexington, Massachusetts   www.wintergreenresearch.com

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WinterGreen Research,

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Reports focus on opportunities to expand existing markets or develop new markets. The reports access corporate positioning, market strategies, and product marketing opportunities. Reports evaluate the impact of new technologies. Reports assess the strategies and positions of leading participants.

The principals of WinterGreen Research have been involved in analysis and forecasting of international business opportunities in telecommunications and advanced computer technology markets for over 30 years.

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WinterGreen Research authors use a structured, consistent, and detailed research approach. The methodology supports an analytical approach to market research. In depth comparisons are made of many aspects of the market. Data relating to Industry segments is developed to permit presentation of forecasts and market share positioned to have substantive value.

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Application Integration (EAI) Market Opportunities, Strategies, and Forecasts, 2002 to 2007

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Application Integration Executive Summary

Market Needs For Application Integration

Markets need application integration solutions that are reliable, secure, centrally managed, and scalable to a very large number of disparate users. The business and economic environment presents companies with challenges. Competitive pressures, macroeconomic volatility, corporate mergers and acquisitions, the Internet, shortened product development times, shortened production cycles, shifting supplier relationships, and diverse customer demands are forcing companies to adapt to changing market conditions.

Application Integration supports implementation of aggressive e-Business initiatives. Business transactions and relationships are conducted electronically over networks. Networks need to support messages that hold transactions.

The e-business initiatives need application integration to operate more efficiently and communicate better with suppliers, customers and partners. Companies have made significant investments in a range of custom and packaged software applications such as enterprise resource planning, or ERP, supply chain management, or SCM, customer relationship management, or CRM, decision support, and e-Commerce technologies.

However, these applications generally were not designed to interact with each other. The proliferation of these diverse technologies has resulted in highly disconnected and disparate information technology infrastructures. These diverse systems and applications often reside on different hardware platforms with varying and incompatible data formats and communication methods. As a result, information remains trapped within isolated systems.

To enable automated business processes, isolated systems must be integrated. Enhanced profitability depends on integration solutions that enable dynamic and real-time connections across systems, applications, and enterprises. Automation and active management of business processes is becoming critical.

Companies try to bridge disparate systems through custom development of point-to-point interfaces. This approach is no longer viable. The number of applications, the cost, the time, and the resources required to create and to maintain integration in a rapidly changing environment demands packaged solutions.

Linking through point-to-point interfaces means companies have difficulty responding quickly. Businesses need data to be exchanged in real time. Integrating with customers and partners systems is an additional challenge that requires expertise in Internet technologies.

Integration of e-Business presents major technical challenges. ERP and EDI technologies represent major integration technical challenges. Solutions each have their own limitations in terms of time-to-market, cost, performance or flexibility, and no one approach fully addresses the entire e-business integration challenge.

Many current packaged e-business integration offerings address only a portion of customer integration requirements. The market needs technology that resolves complex differences in application content and semantics, while also providing a common architecture.

Other key elements of e-business integration provide advantages over internally developed solutions. Cost and long-term maintenance are central issues.

Application Integration Market Trends

IT managers in the enterprise to improve the efficiency of internal network communication and implement external B2B and Internet exchange operations using application integration. Vendors are implementing return on investment tools that operate in the background to gather metrics that prove the efficiency of the integration systems.

Networks have made the integration systems an essential aspect of doing business. Businesses rely on significant integration of servers to address the business needs of division, partners, distributors, and other affiliated groups to achieve efficient information access, enterprise-wide communication, and business process systems automation.

Application integration (AI) permits businesses to achieve a level of integration that improves business efficiency. Table ES-1 illustrates networked business systems integration.

TABLE ES-1

NETWORKED BUSINESS SYSTEMS INTEGRATION

- Achieve significant integration of servers

- Address business needs of workers and partners

- Automate the supply chain

- Achieve efficient information access for management

- Implement enterprise-wide communication

- Tie together back end systems

- Tie back end systems to front end systems

- Leverage efficiency of front-end systems, creating greater access to computer telephony integration systems

- Support business process systems automation

- Implement business exchanges

- Implement B2B systems

- Permit businesses to achieve a level of integration that improves business efficiency.

Source: WinterGreen Research, Inc.

The need for enterprises to work together is the B2B and exchange aspect of AI. The ability to exchange information efficiently and automatically with other organizations represents a strategic initiative for every enterprise.

Integration systems linked to the business applications arise in the context of supply chain, value chain, distribution, channel strategy, and strategic partnering considerations.

Application Integration Broker Markets Shares

Application integration broker markets shares for 2001 are shown in Figure ES-2. IBM was the market leader in the application integration market in 2001 with 15% market share, up from 14% market share in 2000. IBM had 18% market share when the CrossWorlds acquisition is counted.

Tibco had strong market participation in application integration software license markets with 12.6% market share in 2001. Tibco and IBM are the market leaders in breadth of product offering and substantial participation in the market.

webMethods had market participation of 10.5% market share. SeeBeyond was the number four market participant with 8.7% market participation. Vitria was the number five market participant with 6.1% of the market for software licenses. GE GXS had 6% market participation.

Figure ES-2
Worldwide Integration Broker Market Shares,

IBM 15%
Tibco 13%
webMethods 10%
SeeBeyond 9%
Vitria 6%
GE eXchange 6%
Sun / iPlanet 5%
Sybase / New Era 5%
Mercator 5%
BEA 4%
Other 22%

Source: WinterGreen Research, Inc.

Total $1.265
Billion 2001

(AI) Integration Broker Market Forecasts

The application integration software license market grew 10% in 2001 to reach $1.265 billion, up from $1.1 billion in 2000. Markets are expected to grow 25% in 2001 reaching $1.6 billion.

By 2007 application integration software license revenue is expected to be $5.9 billion reflecting the need to use integration to conduct commerce over networks. (See Figure ES-3.)

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FIGURE ES-3
WORLDWIDE APPLICATION INTEGRATION (EAI)
MARKET FORECASTS, 2001-2007

Year	In Millions of Dollars
2001	1,265.5
2002	1,585.7
2003	2,125.8
2004	2,852.8
2005	3,761.4
2006	4,834.3
2007	5,894.7

Source: WinterGreen Research, Inc.

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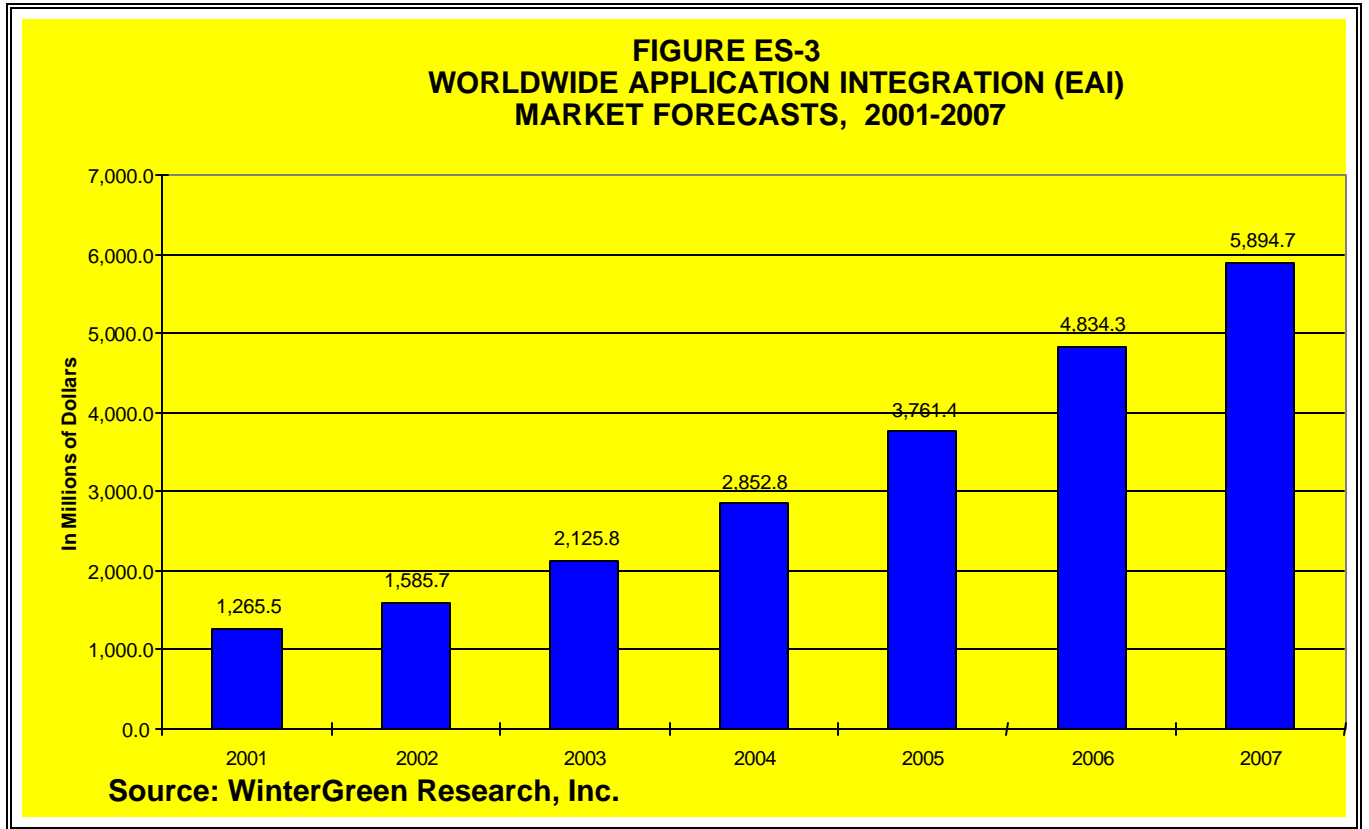
Homegrown Integration Systems

Homegrown integration systems are unwieldy and expensive to build. They are impossible to maintain. New application integration systems combine rules engine, portals, application servers, and Web services to create network solutions.

Home- grown interface systems are generally implemented as point to point solutions. Under traditional multi-point integration, every 10 systems require 99 interfaces. Routers with a hub create a switch architecture simplify application integration through a central core, making both ongoing maintenance and new interface development far easier to accomplish.

Application Integration Retrieval of Information From Disparate Places

Applications industry infrastructure provides a complement to data warehouses and storage area networks. In practice the ability to store data centrally in its original form and access it as a record does not work. Application integration makes it work. Accessing data from disparate places is more manageable using application integration. The data stored in its original form is more likely to be up to date and coherent.

Storage area networks and data repositories are distinguished in part by their inability to keep data current and the difficulties of eliminating redundancy. The concept of centralizing all the data of an enterprise is flawed by the technical difficulty of building a facility that can store all the data being used in a format that is useful.

Storage networks are evolving platform independent, application independent functionality.

Difference Between An Application Server and Application Integration

An application server is designed to be a synchronous transaction-processing device that performs a specific transaction related task inside the server. An application server can do component-based integration, but it is mainly about run-time deployment services.

An application integration system is mainly about real-time transport of events contained in messages. Messages are sent to disparate applications across platforms and across operating systems. An application integration platform is a system designed to send transaction information electronically from one application to another, e.g. from a SAP order entry system to a Peoplesoft inventory control system, and both types of information into a mainframe.

Difference Between Business Process Management (BPM) and Workflow

An understanding of the difference between business process management (BPM) and workflow can be enhanced by analogy. Consider a construction project. You can use a painter to put in sheet rock, but it might take 2 weeks and cost ten times as much as using an expert that can install the sheet rock in two hours.

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Application Integration Executive Summary

Workflow is optimally used to implement long running processes and to manage processes that require human intervention. Business process management (BPM) is optimally used to completely automate exchange of complex information between applications. I.e. transmission of order information to the shipping and inventory department might be a business process management (BPM) task.

When someone has to pick up a piece of paper or look at a transaction in the middle of the process, workflow is optimal. When the process is completely automated, BPM is the most effective system to use.

Business process management (BPM) encourages the design of new business processes. Business processes relate to the implementation of rules and the management of constraints. BPM relates to the decisions about managing the business, the evaluation of the most efficient way to make decisions about transactions.

BPM products are positioned to provide dynamic, distributed, event-driven integration of different applications. Definition, execution and tracking of complete business processes are possible. The systems support cost analysis, simulation, and return-on-investment functions for modeling and monitoring business process implementation.

The difference between workflow and business process management (BPM) is that workflow handles a flow of information where the flow may be interrupted, while BPM handles automation of decisions about the business. Workflow utilizes an existing process to route information from one location to another.

Workflow allows the interjection of the human into the process to achieve exception management. The rest of the time, the flow of information is automated by the BPM systems. Both are needed.

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1. Application Integration Solutions

1.1 Creating Advanced E-Business Infrastructure

Companies use application integration to create an advanced e-business infrastructure. E-business infrastructure is positioned to provide significant benefits to customers, resellers, independent agents, distributors, and the enterprise. Companies have enhanced existing infrastructure and systems with business applications. Applications have been implemented with the desire to increase efficiency and lower costs.

Companies spend upwards of two years researching the optimal architecture and choosing a supplier for e-business infrastructure. The key decisions relate to design of a hub-and-spoke, standards-based (XML and Java) approach versus a distributed messaging approach. The hub and spoke architecture has essential mission critical functionality as the base for information exchange while the distributed messaging system relies on artificial imposition of mission critical protection of data as a separate architecture layer.

Hub and spoke systems are built on rules engines and asynchronous once and only once delivery of messages. Application servers and Java represent basic functionality as well. Distributed message architecture represents a publish-subscribe format that is similar to IP packet switching. Packets are sent around the network looking for nodes that recognize a header or subject content of the message.

1.2 Application Integration Technical Advantages

The advantage of application integration is that it utilizes asynchronous technology. This means that messages can leave a source without having an open end-to-end connection to a destination. In the same manner that IP architecture is replacing circuit switches in telecommunications networks, so also application integration supports an efficient network architecture for transmitting messages between applications.

Application integration embraces the reality of heterogeneous computing environments. If all computers had the same operating system, e.g. Windows or NT, application integration would not be needed. But, this is not the case. The competitive atmosphere of the computing industry has evolved a range of choices that customers have for hardware and operating systems platforms. Application integration provides the glue that interconnects these systems, permitting the exchange of information via a message-based structure.

Application integration technical advantages are centered on the asynchronous communication network use of application integration rules engines. Application servers' technical advantages are centered on the fact that synchronous systems leverage the connectivity of servers within a network. Application servers leverage failover, clustering, and load balancing. These are synchronous tasks that support a stable connection between a group or groups of servers. The application server is designed to manage the connection between servers in a network, continuing to function when one or a group of servers go down.

Application Integration Solutions Market Description

Application servers enable businesses to build and deploy reliable, scalable e-business applications. The primary function is to manage transactions over an internal enterprise network and to support transactions over the Web. The systems are distributed transaction servers utilize failover, load balancing, clustering, and advanced mission critical systems capability to complete transactions. Application servers are the systems that manage distributed transaction situations. Application servers provide mission critical management of transaction in local venues. Transactions require mission critical management.

The e-business infrastructure in implemented to be live and solid. It serves as the basis for a dozen business-critical applications that benefit both the end customers and independent distributors. It is highly integrated with internal and external applications. Seamless XML-based integration with financial portals allows partners to transact business across financial providers from a single point.

Technical advantages relate to increased flexibility of deploying development resources that the common infrastructure has enabled. The technology helps partners connect to multiple vendors using the same integration tools.

Application integration is positioned to permit users to continue to evolve business processes to meet the increasingly complex business environment. As change in product cycles is accelerated to as soon as every six months, companies need to be able to adjust internal business processes at the same pace.

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1.2.1 Application Integration Business-Oriented Advantages

Application integration and application servers are positioned to co-exist. They optimize management of different functions. Business-oriented advantages of application integration relate to faster time-to-market for new applications.

Companies seek to position as technically leading partners. Challenges relate to the increasing speed and complexity of business, coupled with rising customer expectations. Customers expect access, information, and service. These issues pose a challenge to every business category.

Added government regulations in parts of many services and consumer product industries relate to need for more integration that automates the transfer of information between departments and partners. Government regulations have capped the charges that can be made in some areas creating increased need for efficient operations.

1.2.2 Reducing Costs

Lowering costs has competitive and revenue implications. Lower margins permit vendors to better run their own businesses. This can lead to more competitive advantage, profitable operation, and loyal customers.

Streamlining business processes relates both to making internal processes simpler and passing some of the processes directly to the customer. Self-administration and contribution collection direct from the employer represent ways to reduce costs of doing business.

1.2.3 Addressing A Complex Marketplace

A challenge to business process reengineering is managing the increasing complexity of transaction marketplaces. Indirect customer relationships need to be managed. Aggregators or competitors may come together to offer new combinations of services to agents or customers.

Product providers need to work together. Industry-sponsored portals enable a vendor to get multiple price comparisons for any service or component. A client with a single request may receive several bids. Aggregation sometimes demands multiple responses to various requests. Aggregation allows all of the customer's holdings to be seen in a single view. So, where it makes sense, vendors collaborate with other product providers, at the same time competing in areas such as product terms, investment performance, financial stability, service and support.

1.2.4 Better Customer Service

Opportunities that are garnered from better customer service are significant. More and more customers can be better serviced using Web enabled systems. More customers can be services at a lower cost. Online service is more efficient. Many customers prefer doing business online, when the online systems are efficient and work.

Companies see an opportunity to differentiate themselves to both partners and end customers by providing a solid online experience. Emerging technology provides the opportunity for companies to engage in more multi-channel delivery.

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1.3 Application Integration Market Drivers

Application integration infrastructure is needed to permit companies to deliver on the promise of a brand. Integration infrastructure is needed to support systems that manage information across multiple products and channels. Table 1-1 illustrates key application integration market drivers.

TABLE 1-1

KEY APPLICATION INTEGRATION MARKET DRIVERS

- Address an aging existing infrastructure

- Provide cost reduction for the core businesses

- Address increasing competitive pressures

- Manage new government regulations

- Support the online needs of customers

- Maintain and improve the quality of customer service

- Provide a consistent cross-channel experience

- Enable new applications

- Enable new channels of product and services delivery

- Deploy systems quickly as new business needs arise

- Establish an online brand to protect against new dot com market entrants

Source: WinterGreen Research Inc.

1.4 Internet As A Sales Channel

Using the Internet to sell goods and services represents a new channel for reaching customers. Efficient and cost-effective electronic-commerce opportunities depend on application integration. E-commerce over the Internet is poised for unprecedented growth.

1.4.1 Impact Of XML

The Internet standard eXtensible markup language, XML, supports e commerce. Companies that are serious about the potential of e-commerce need to understand how XML can and will affect their business, particularly as it relates to electronic data interchange (EDI). Enterprise application integration (EAI) and supply-chain management represent core technology for making business run more efficiently.

XML enables independent computer systems to exchange, interpret, and act on data, even if those systems run on different hardware and are programmed in different languages. The data stream can be presented as a traditional looking Web page in HTML (HyperText Markup Language). XML is flexible. Web developers can control and display data the way they control text and graphics.

With XML, Web pages can be more useful than HTML. The current HTML Web language allows XML to provide enhanced hypertext linking. Linking abilities improve browser performance. It makes it easier to re-use information across multiple Web pages. XML has been used to make internal data available on the Internet.

Businesses must plan for and adopt XML to maximize the potential of Internet-based e-commerce. XML has the ability to process information rather than just display it. The language is used to implement business-to-business e-commerce on a global basis. Businesses and industries collaborate with a universal format to be used on invoices, purchase orders and other business documents.

1.5 Internet Commerce

Internet commerce is changing business. All companies need an online presence. New Internet standards are designed to enable computers to communicate directly with each other about the content of the information displayed on their screens.

The e-commerce industry is using Web services protocols SOAP, WSDL, and UDDI in combination with XML to implement integrated communication. Web services have the potential to improve the speed and convenience of doing business electronically. XML and Web services depend on universal standards.

Application integration works to support variety in industries. Industries are undergoing change in response to the challenge of the Internet. Universal standards depend on getting agreement between vendors. To provide systems that meet universal standards companies have to give up proprietary market advantage for the purpose of providing systems that are useful to customers.

Application Integration Solutions Market Description

Open systems represent one way to bypass proprietary systems. However, in competitive markets, typically universal standards are not the norm. Standards initiative solve only part of the cross platform cross application, cross operating system, cross language need for integration. Diversity continues to exist in IT markets, stimulating competition.

XML is a new language that is being evaluated in terms of its impact on some fundamental, proven business practices and processes. XML impacts areas critical to business-to-business (B2B) electronic commerce.

Electronic data interchange (EDI) is a well-established technology for computer-to-computer exchange of formatted documents. XML supplements EDI by permitting small vendors not EDI certified to communicate messages. The EAI transformation engines available from several vendors translate messages on the fly, making EDI and XML interchangeable.

Enterprise application integration (EAI) tools and technologies are used for integrating disparate applications, both within a company and with external trading partners. EAI provides improved data translation, information routing, publish subscribe technology, business process management, workflow, and tracking.

Supply-chain management uses XML to effectively to align suppliers, manufacturers, employees and customers for reduced costs, improved cycle times, and greater efficiencies.

1.6 Complexity Of Integrating Internal And External Systems

Across every industry, large organizations are struggling with the complexity of integrating both internal and external systems. Benefits accrue to companies who can successfully address these challenges. Companies that do not address the challenges of integration become less relevant and ultimately doomed to failure in the competitive environment of business. Table 1-2 illustrates the benefits of application integration.

TABLE 1-2

BENEFITS OF APPLICATION INTEGRATION

- Gain better control of the value chain

- Leverage improved control for competitive advantage

- Reducing inventory costs

- Improve the process integration with suppliers

- Provide a consistent customer experience

- Permit the organization to function across a range of channels

- Improve customer loyalty

- Realize the benefits of mergers

- Support effective communications across diverse systems

Source: WinterGreen Research Inc.

Benefits of AI include streamlining volumes of data, e.g. from electronic banking. AI supports collecting transactions from multiple customers and systems. Systems increase the rapidity and accuracy of transaction exchange.

Systems provide for future expansion of applications for customers and implement new systems architecture without interfering with existing customer processing. Table 1-3 illustrates enterprise application integration benefits.

TABLE 1-3

ENTERPRISE APPLICATION INTEGRATION BENEFITS

- **Streamline large volumes of data**

- **Support transaction exchange from multiple customers and systems**

- **Increase rapidity and accuracy of transactions**

- **Provide for future expansion of applications for customers**

- **Enable implementation of systems architecture**

Source: WinterGreen Research, Inc.

AI provides a cost- and time-effective solution for automated enterprise-wide application integration. Packaged solutions are positioned as easy to implement, maintain and change. Systems are increasingly scaleable. Users demand efficient and reliable solutions that support a fault tolerant environment.

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With AI, time and resources devoted to custom coding integration can be diverted to other projects. AI automated application integration is the vehicle that will fulfill the promise of distributed, enterprise network computing. AI implements intranets and extranets. AI implements B-to-B business exchanges.

Enterprise-level application integration software creates a unified, distributed system, permitting the enterprise to retain the legacy investment, and provide flexibility to meet rapidly changing competitive demands.

Table 1-4 illustrates integration advantages.

TABLE 1-4

INTEGRATION ADVANTAGES

- Reduction in the time, complexity, and cost of implementing new enterprise application solutions

- Help change applications to meet new business needs

- Support changing processes rapidly

- Introduces a framework for creating, executing, and managing business processes

Source: WinterGreen Research Inc.

Vendors are positioning integration suites to provide a complete and consistent model for information exchange within the enterprise and across the Web. Enterprise application integration (EAI) has been extended to mean B2B integration. The same integration brokers handle all the integration for the enterprise both inside and outside the firewall. All integration is done in one place.

Processes can span applications and enterprises and be managed as a single complete, flexible solution. Process management capability provides for lifecycle management. Integration is managed across an entire process, not just a given workflow.

1.7 Choice Of Systems - Site Visits

Critical to the decision to purchase application integration systems is a set of onsite visits and teleconferences with other customers using systems. Potential customers need to be confident that IT divisions in other large companies are advocating an architecture choice.

Chase Manhattan Bank is a significant customer reference site for the vendors supplying infrastructure. Chase Manhattan Bank has millions of messages per day flowing through its Global Technology Architecture. Chase architecture used WebSphere MQ Integrator. Integrator is IBM's information broker, which includes a one-to-many connectivity model plus transformation, intelligent routing, and information flow modeling across multiple disparate business systems. Other vendors have customer reference sites that are equally significant for closing business. Industry specific applications of integration represent competitive market advantage.

1.7.1 Service-Oriented Architectures

The economy is transitioning to a service-oriented architecture. That helps with the interactions. Integration models create both service-oriented and event-oriented messaging.

Because service-oriented integration products are designed to get information in and respond to requests that users make. Event-oriented architecture means the application has to proactively notify things. Collaborative applications leverage notification of event exchange as well as messaging. Web services depend on collaborative applications.

1.8 Automating Business Processes

Automating internal business processes is a significant part of creating more efficient systems. Return on investment analysis is a significant aspect of implementing application integration systems. Some systems are more efficient than others. In general companies seek to pay for the cost of the application integration software within six months.

Automation of internal enterprise processes relates to getting applications from different software vendors to exchange information automatically. This automation is an essential aspect of eliminating the time and cost of retyping information to enter the same information into multiple different applications.

Sharing information with partners has become a significant aspect of improved business process. Business information systems are being Web enabled so that the exchange of information can occur over the Internet. The Internet has become a new channel for selling goods and services.

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The Web is used to support joint development efforts that have teams that are located in different places. The Internet is used to develop electronic exchanges.

Supply chain integration systems are implementing economies of scale on the order of magnitude of 1,000 to 1. Orders that used to cost $150 to process are being implemented for pennies. The lower cost of doing business provides improved efficiency of operations, but forces change in every industry.

Lower inventory costs are being achieved. Just in time inventory systems decrease inventory shrinkage and decrease the carrying costs of products and supplies. Table 1-5 illustrates aspects of automating internal business processes.

TABLE 1-5

ASPECTS OF AUTOMATING INTERNAL BUSINESS PROCESSES

- Automating entry of information creates more efficient systems

- Return on investment is a compelling part of sales presentations

- Continuing ROI analysis significant aspect of implementing application integration systems

- Automation of getting applications from different software vendors to exchange information automatically

- Automation an essential aspect of eliminating the time and cost of retyping information

TABLE 1-5 (CONTINUED)

ASPECTS OF AUTOMATING INTERNAL BUSINESS PROCESSES

- Sharing information with partners significant aspect of improved business process

- Business information systems Web enabled

- Exchange of information over the Internet

- Internet a channel for selling goods and services

- Web is used to support joint development efforts in different places

- Internet used to develop electronic exchanges

- Supply chain integration implementing economies of scale on the order of magnitude of 1,000 to 1

- Lower inventory costs being achieved

- Just in time inventory systems decrease inventory shrinkage and decrease the carrying costs of products and supplies

Source: WinterGreen Research, Inc.

1.9 Change In Integration Markets

Effective application integration is vital to an organization's ability to respond to changing market demands, seize new market opportunities, improve customer service, and achieve business growth potential (See Table 1-6).

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TABLE 1-6

RESPONSE TO CHANGE IN MARKETS

- **Leverage market opportunities**

- **Increase value of partnerships**

- **Address change in market conditions**

- **Communicate with outsourcers to make them work like internal processes**

- **Automate sales management process**

- **Implement just in time inventory**

- **Control suppliers by monitoring supplier systems as though they were internal processes**

- **Improve customer service**

- **Achieve business growth potential**

- **Revitalize business processes**

- **Implement automation of integrated business processes**

Source: WinterGreen Research, Inc.

Application Integration Solutions Market Description

Competitive pressure is the primary driver for implementation of application integration systems. Companies use systems to lower costs, deliver universal information across an enterprise, and create systems to share information with strategic partners. Application integration fuels the trend to incorporate and exploit existing information systems, prior technology investments, legacy systems, distributed systems, and other established applications and databases. Table 1-7 illustrates primary drivers for implementation of application integration systems.

TABLE 1-7

APPLICATION INTEGRATION SYSTEMS SUPPORT FOR CHANGE IN MARKETS

- Lower costs

- Deliver universal information across an enterprise

- Eliminate duplicate entry of information into systems

- Share information with strategic partners

- Exploit existing information systems

- Preserve prior technology investments

- Transferring distributed information to legacy systems

- Provide access to both applications and databases

Source: WinterGreen Research, Inc.

1.10   Rapid, Reliable, Scalable Integration Solutions

Companies need to develop rapid, reliable, scalable cross application integration solutions. The integration issues are much greater than they have ever been. Legacy and closed systems need to be interconnected to distribute systems within the enterprise. They need to be interconnected to other legacy and closed systems within partner enterprise organizations.

Integration software enables enterprises and users to automatically transmit, receive, filter and personalize digital information in real-time. Systems facilitate real-time, two-way communications between applications across distributed computer networks and mobile information devices such as hand-held computers, pagers and digital cellular phones.

Integration software is in use by over 9,000 companies in diverse markets including telecommunications, manufacturing, energy, financial services and Internet portals.

Table 1-8 illustrates integration software functions. Table 1-9 illustrates application integration software industries targeted.

TABLE 1-8

APPLICATION INTEGRATION SOFTWARE FUNCTIONS

- Enables enterprises and users to communicate data and information across a network

- Automates data communications

- Automates data transmission

- Automates data receiving

- Automates data filtering

- Automates data personalization

- Automates digital information transfer in real-time

- Facilitates real-time, two-way communications between applications across distributed computer networks

- Permits mobile information devices to communicate data

- Activates data exchange in hand-held computers

- Activates data exchange in pagers

- Activates data exchange in digital cellular phones

Source: WinterGreen Research, Inc.

TABLE 1-9

APPLICATION INTEGRATION SOFTWARE INDUSTRIES TARGETED

- **Products in use by over 9,000 companies**

- **Banking**

- **Financial services**

- **Insurance**

- **Telecommunications**

- **Healthcare**

- **Retail**

- **Manufacturing**

- **Energy**

- **Wholesale**

- **Internet portals**

Source: WinterGreen Research, Inc.

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1.11   Linking Internal Operations

Software products enable businesses to link internal operations, internal operations to business partners, and internal operations to customer channels in real time. Software products allow multiple distinct applications, web sites, databases and other content sources to be integrated and managed within a common framework.

Applications integration products enable enterprises to extend their information technology infrastructure and business processes across the Internet to conduct all forms of electronic business using the Internet: business-to-business, business-to-consumer and business-to-employee systems.

Core technology is known as an "integration broker". Brokers are supported with adapters, connectors, XML, transformation engines, rules engines, workflow, and business process engines. Table 1-10 illustrates internal enterprise application integration tasks.

TABLE 1-10

INTERNAL ENTERPRISE APPLICATION INTEGRATION TASKS

- Provide interconnection between ERP vendor packages, SAP, Peoplesoft, etc.

- Implement message brokers

- Provide adapters

- Provide connectors

- Provide XML

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TABLE 1-10 (CONTINUED)

INTERNAL ENTERPRISE APPLICATION INTEGRATION TASKS

- Provide transformation engines

- Provide rules engines

- Provide workflow

- Provide business process engines

Source: WinterGreen Research, Inc.

Application logic may reside in purchased applications such as ERP, CRM and SCM packages, in databases or in legacy applications within a single company. The logic of business is dependent on infrastructure to connect and interconnect the application information.

Newly developed Internet server code must be tightly integrated with the existing applications and data to deliver end-to-end business functionality.

1.12   Automated Solutions Requirements

Custom coding of interface logic is a function of the past. Automated, packaged solutions are more efficient and more effective. Packaged solutions provide more functionality, over a longer span of years. Spreading the cost of implementation over a large user base supports improved functionality. AI complements stand- alone mission critical messaging. Customers who benefit from AI include those with a profile that matches the user parameters shown in Table 1-11.

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TABLE 1-11

AI USER PARAMETERS

HAVE:

- Significant investment in legacy systems

- Multiple strategic partners

- Applications on multiple platforms

- Data stored according to a variety of database schema

- High volume data distribution requirements

- High volume software distribution requirements

- Complex application integration needs that change frequently

NEED TO:

- Integrate companies acquired

- Add new applications such as ERP packages

- Adapt to changes in business rules

- Adapt to changes in regulatory requirements

- Achieve growth through acquisition

Source: WinterGreen Research, Inc.

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1.13 Routing And Communication

Application integration (AI) supports the integration of enterprise activities by connecting together application systems inside and outside the organization. In order to be able to carry out application integration AI must support the following routing alterations illustrated in Table 1-12.

TABLE 1-12

AI ROUTING ALTERNATIVES

- Point to point interconnecting

- Mission critical once and only once queued messaging with configuration logic

- Hub based software switch

- File based FTP processing

- Database cross platform data transfer

- ERP single solution provider cross module routing

- Publish-and-subscribe dynamic routing

- Redistribution of data (one-to-many routing)

- Combination of data (many-to-one routing)

- Publishing (many to many routing)

- Reformatting of data

- TCP/IP multi-server routing

- Virtual private network routing

TABLE 1-12 (CONTINUED)

AI ROUTING ALTERNATIVES

- Replication of data (one-to-many message production)

- Consolidation of data (many-to-one message production)

- GUI-driven deployment

- Message-based model of communication
Source: WinterGreen Research, Inc.

Efficient enterprise networking depends on scalability. Scalability represents the ability to manage and process all the information that flows in a complex enterprise. Extensibility is also an essential aspect of network routing. Extensibility represents the ability to add functionality cleanly and quickly.

Communication with applications is achieved by re-usable modules that convert the communications mechanisms used by applications to and from messages conveyed on queues. AI depends on queues that are configured in a commodity queuing engine. Message-oriented-middleware is defined by the de facto standard established by IBM WebSphere MQ. AI is generally offered in combination with IBM's WebSphere MQ. Table 1-13 illustrates communication modules. Communication is central to integration.

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TABLE 1-13

AI COMMUNICATION MODULES

- **Terminal emulation**

- **File reading**

- **File writing**

- **File transfer**

- **Data insertion to a database**

- **Data extract from a database**

- **TCP socket communication**

- **Dialup to a value-added network**

- **AI communication modules**

- **Dialup to a proprietary network**

- **Data taken from a MOM queue**

- **Data delivered to a MOM queue**

Source: WinterGreen Research, Inc.

1.14   Message Brokers

Rules engines improve user productivity and simplify integration implementation. Rules, adapters, publish subscribe, formatters, and transformation engines are at the center of message broker suites.

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Integrator engine product strengths lie in the ability to control the overall interaction among the various applications through content-based routing and dynamic real-time transformation. Systems need reliable message and queuing delivery, as well as platform scalability. Table 1-14 illustrates the types of message broker suite engines.

TABLE 1-14

MESSAGE BROKER ENGINES

- Rules

- Routers

- Packet transmission

- Multicasting

- Adapters

- Connectors

- Transformation

- Process

- Workflow

Source: WinterGreen Research, Inc.

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1.15   Transformation Solutions

Transformation engines may be based on messages, files, data from a database, or other format. Transformation technology provides a platform for creating data solutions that satisfy application integration requirements across a variety of computing environments.

The architecture of the AI transformation is based on object concepts, providing reusability, interoperability, and scalability during the design process and in the resulting solutions. The transformation platforms permit efficient construction and delivery of integration solutions for specific markets. The architecture allows ISV's and SI's to embed transformation functionality within their own offerings.

Data transformation maps are combined with one or more run-time execution engines. A map is an executable module that describes the required transformation and re-ordering of data between source and destination objects such as files, databases, applications and messages. Authoring systems provide an intuitive drag-and-drop environment for defining the source and destination data, defining the rules for mapping the sources to the destinations, and building the resulting map.

1.16   Broker Agent Architecture

Message broker agent architecture parameters support the evolution of systems that support the management of complexity and change. Table 1-15 illustrates message broker agent architecture parameters.

TABLE 1-15

PROCESSING EXTENSIONS

- Direct inclusion of user exits

- Separate message processing from the application

- Run either locally or on remote systems

- Configuration flexibility

- Broker shared queue

- Load balancing

- Workload partitioning

Source: WinterGreen Research, Inc.

The broker agent architecture enables a more flexible and scalable approach to providing AI processing. Direct user exits to the broker are not always possible.

By separating the processing, broker agents can be run either locally on the same system, or on one or more remote systems for more configuration flexibility. One or more broker agents of a given type can be connected to a broker- shared queue, with the broker providing automatic load balancing and workload partitioning. These systems begin to evolve an AI platform.

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1.17   Multicasting

Multicasting is an aspect of publish subscribe infrastructure. Sophisticated algorithms are used for sending one message to large numbers of nodes. The nodes can subscribe to the stream of information and pick those topics of interest. Examples are stock ticker information and airline arrival and departure information.

These publish subscribe systems can be managed with header information that accompanies a packet similar to IP Internet protocols. Or, they may be content based where the message is directed to a particular destination based on the information inside the message.

Partner application integration systems provide integration across the Internet. Systems that integrate information across the firewall utilize service level agreements, urls, xml, Web services, and html. Table 1-16 illustrates systems integration tasks.

TABLE 1-16

EXCHANGE SYSTEMS INTEGRATION TASKS

- Process modules

- Service level agreements

- Url

- Html

- XML

- Web Services

Source: WinterGreen Research, Inc.

Exchange systems have evolved to deal with more complexity. The need to share information with partners demands sophisticated process and transformation infrastructure. Systems requirements relate to providing integration across the Internet.

Business logic may exist outside the enterprise in customer or exchange systems. E-business automation software is used to implement supply chain automation. Systems that offer the ability to configure and deploy application integration with the same development solutions needed for component construction and assembly is a unique and valuable capability for the IT community.

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Vendors enable a unique platform for implementing front-to-back business processes based on application integration processes.

Key business advantages include leveraging time-to-market for business process and business model innovation. By allowing developers to focus on the critical logic for business processes rather than on the complexity of APIs, integration infrastructure permits partners to create significant value.

1.18   Web-Based Applications

Vendors develop and market e-business products and services that integrate Web-based applications with a company's core operational systems. Systems enable Internet systems to communicate with business processes and exchange information in real time. An enterprise can automate end-to-end processes, fulfilling orders and managing inventory directly from a Web site.

Infrastructure is used to improve the speed and volume of application information exchange. Infrastructure that supports integration is required to compete in the e-business environment.

1.19   Record-Keeping Inside Applications

AI permits record- keeping inside applications to operate as usual, while making information accessible to business analysts outside the application. AI permits managers and business analysts to use systems information to build a more accurate understanding of the enterprise.

Analysis of customers, sales cycles, distribution, channels, and strategic alliances occurs by using sophisticated interface logic that supports access information from a variety of sources. Information is put on a screen or in another application. Table 1-17 illustrates enterprise application integration functions. Table 1-18 illustrates enterprise business process integration functions.

TABLE 1-17

ENTERPRISE APPLICATION INTEGRATION FUNCTIONS

- Integrate applications

- Support change of network configurations

- Implement routing instead of point to point logic

- Support access to enterprise information

- Implement packaged integration software in place of custom built interfaces

- Support ERP, CRM, and supply chain function integration

- Permit management of ERP multiple vendor applications

- Provide an application infrastructure

- Support integration of applications from multiple platforms

- Integrate mainframes, clients and servers, home grown systems, and Internet applications

Source: WinterGreen Research, Inc.

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TABLE 1-18

BUSINESS PROCESS INTEGRATION FUNCTIONS

- Integrate business processes

- Support business environment change

- Provide a layer of integration above the infrastructure layer

- Support looking at enterprise information as a cohesive whole

- Be responsive to business process needs

Source: WinterGreen Research, Inc.

1.20   Uses Of Application Integration

Business analysts use AI application integration to compile data from multiple sites and applications. AI systems eliminate redundant data entry to reduce expenses and improve data quality.

AI extends existing mainframe system investments. AI supports exchange of messages in three-tier systems. Mergers and acquisitions have complicated the business situation by adding even more applications, platforms, and databases to integrate. Table 1-19 illustrates enterprise application integration uses.

TABLE 1-19

APPLICATION INTEGRATION USES

- Implement automation of the supply chain

- Interconnect distributed servers and mainframes

- Support business process analysis

- Provide flexible and seamless integration of ERP applications

- Provide flexible and seamless integration from multiple vendors

- Help companies consolidate records

- Make information accessible to applications outside the application

- Help the enterprise build an accurate understanding of customer bases

- Use sophisticated interface logic

- Access information from a variety of sources

- Put information on a screen for use by a customer service representative

- Compile data from multiple sites and applications

- Eliminate redundant data entry

- Reduce expenses

- Improve data quality

Source: WinterGreen Research, Inc.

1.21   Comprehensive Storage Solutions

Storage SAN solutions are targeted to particular platforms. Solutions for mixed SUN and NT environments illustrate that cross platform SANs are evolving. Table 1-20 illustrates comprehensive SAN Solutions.

TABLE 1-20

COMPREHENSIVE SAN SOLUTIONS

- Implement cross platform solutions, e.g. mixed SUN and NT environments

- Provide comprehensive packages

- Combine hardware, software and services

- Solve IT challenges

- Implement server system storage consolidation

- Evolve storage as a separate stand alone system component

- Implement high-speed backup and recovery

- Provide high-availability data access

- Support systems clustering

Source: WinterGreen Research, Inc.

Comprehensive packages are comprised of hardware, software, and services that solve IT challenges, including server and storage consolidation, high-speed backup and recovery, high-availability data access, and systems clustering.

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Storage area networks (SANs) promise to be a significant technology inside data centers. Technical and political issues remaining to be resolved relate to management of transactions, cross platform technology, application integration, I/O, IP enabling, packet architecture, and the addition of intelligent systems.

The adoption of fiber channel ranks among the most important IT trends. Vendors are turning this technology into real solutions that are having a major impact on the way customers manage explosive data growth and serve the ever-increasing numbers of users requiring data access. Solid execution and quick delivery of high-quality products represent factors needed to achieve a leadership position in this burgeoning market.

SAN solutions have been largely implemented on a single platform. They have not provided a way to move information from one application to another within the storage domain. As SANs are implemented on a widespread basis, there is demand for cross platform, cross application SAN functionality.

AI promises to provide essential functions to SANs as they extend their base. Once storage is independent of processing, there is superior architecture to be achieved by accessing information from the SAN from multiple applications.

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2. AI Market Forecasts

2.1 Application Integration Market Trends

IT managers in the enterprise to improve the efficiency of internal network communication and implement external B2B and Internet exchange operations using application integration. Vendors are implementing return on investment tools that operate in the background to gather metrics that prove the efficiency of the integration systems.

Networks have made the integration systems an essential aspect of doing business. Businesses rely on significant integration of servers to address the business needs of division, partners, distributors, and other affiliated groups to achieve efficient information access, enterprise-wide communication, and business process systems automation. Application integration (AI) permits businesses to achieve a level of integration that improves business efficiency.

Table 2-1 illustrates networked business systems integration.

TABLE 2-1

NETWORKED BUSINESS SYSTEMS INTEGRATION

- Significant integration of servers

- Address business needs of workers and partners

- Achieve efficient information access for management

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TABLE 2-1 (CONTINUED)

NETWORKED BUSINESS SYSTEMS INTEGRATION

- Implement enterprise-wide communication

- Tie together back end systems

- Tie back end systems to front end systems

- Leverage efficiency of front-end systems, creating greater access to computer telephony integration systems

- Support business process systems automation

- Implement business exchanges

- Implement B2B systems

- Permit businesses to achieve a level of integration that improves business efficiency.

Source: WinterGreen Research, Inc.

2-2

2.1.1 Enterprise Application Integration (AI) For Back End Systems

Emerging real time enterprise strategies advance the goal of timeliness in the management of information. AI facilitates immediate awareness and appropriate response to events across an entire enterprise. Table 2-2 illustrates business benefits of AI.

Table 2-2
Business Benefits Of AI

- Eliminates the need for writing or generating custom interface programs

- Facilitates packaged applications systems to transport, route, and convert information between applications

- Gives business analysts direct access to application information outside the application

- Reduces maintenance of custom interfaces

- Dramatically accelerates integration projects

- Replaces months of development with integration implementation in a few days

- Eliminates the cost of replacing or adding new systems

- Provides interoperability between existing systems

Source: WinterGreen Research, Inc.

Table 2-3 illustrates Enterprise back end system advantages achieved from AI.

2-3

TABLE 2-3
Enterprise Back End System Advantages From AI

- Maintain application integrity

- Maintain database integrity

- Allow applications to carry out existing processes by referencing other applications data

- Integrate applications without reprogramming

- Integrate applications without modifying existing applications

Source: WinterGreen Research, Inc.

2.1.2 Enterprise Application Integration (AI) For Front End Systems

Companies using enterprise application integration (AI) for front-end systems are positioned to capitalize on new business opportunities sooner than their competitors. Table 2-4 illustrates enterprise market advantages from AI.

TABLE 2-4
Enterprise Market Advantages From AI

- Position front end systems to be more automated

- Capitalize on new business opportunities sooner than competitors.

- Permit quick adaptation to changing business environment

- Integrate applications that are 'locked'

- Integrate applications that have no documentation

Source: WinterGreen Research, Inc.

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2.1.3 Customer Service

AI growth will be fueled by the need for every enterprise to offer a high level of customer service in order to remain competitive in markets. Customers expect a higher level of accessibility and support than was possible before the advent of the Internet.

Internet purchases drive usage of AI. The ability to connect to the customer service representative over the Internet stimulates purchases and provides competitive advantage. AI permits customer service representatives to access information needed to provide a high level of customer support.

PC-based telemarketing/call center systems perform automated call distribution, assigning incoming calls to the next available agent, and minimizing customer-waiting time. Systems provide audiotex menus, fax-on-demand, and information or music on hold. On the outbound side, PC systems place calls automatically from phone-number lists. AI is expected to continue to support CTI evolving more sophisticated systems integration.

2.1.4 Partner Business Drivers

The need for enterprises to work together is the B2B and exchange aspect of AI. The ability to exchange information efficiently and automatically with other organizations represents a strategic initiative for every enterprise. Integration systems linked to the business applications arise in the context of supply chain, value chain, distribution, channel strategy, and strategic partnering considerations.

Table 2-5 illustrates integration targeted to B2B and exchanges.

2-5

TABLE 2-5
Integration Targeted To B2B And Exchanges

- Ability to exchange information efficiently

- Ability to exchange information automatically

- Integration systems linked to the businesses

- In the context of supply chain

- In the context of value chain

- In the context of distribution, channel strategy

- In the context of strategic partnering

Source: WinterGreen Research, Inc.

2.1.5 Business Process Integration

Connectivity solutions for leading applications, and business process integration modules called collaborations extend common business processes across systems. Vendors are developing tools that can be used to build integration solutions, or to extend and customize pre-built components.

Business process integration supports achievement of competitive advantage. Enterprises with a fast reaction time have a competitive advantage. Improved sales and customer service provide strategic advantages. Models of business processes implemented using AI achieve integrated services outside existing applications.

Business processes are modeled in software systems and implemented using AI tools. Table 2-6 illustrates business process integration advantages.

<div align="center">

TABLE **2-6**

BUSINESS **P**ROCESS **I**NTEGRATION **A**DVANTAGES

</div>

- Supports achievement of competitive advantage

- Gives enterprises with a fast reaction time

- Improves sales and customer service

- Provides strategic advantage

- Permits modeling of business processes

- Implements integrated services outside existing applications

- Creates a network-centric computing model

- Mirrors the way a business operates

- Allows information resources to be incrementally integrated into the system at any time

- Supports scalability and flexibility

Source: WinterGreen Research, Inc.

Systems create a network-centric computing model that mirrors the way a business operates. Allowing information resources to be incrementally integrated into the system at any time supports scalability and flexibility. Business processes and information requirements drive systems.

2.1.6 Integration Of Business Processes

AI is positioned to help companies manage business processes across applications. AI has evolved in response to the Internet and network computing. With secure cross platform exchange of information AI depends on VPN and firewall technology to achieve information transfer.

AI continues to support a broad spectrum of products from mainframes to minicomputers to personal computers. Client PCs promise to use AI to get information from multiple applications located in multiple servers. Internet and Intranet AI systems permit corporations to add new, often incompatible, hardware and software to existing information infrastructures.

2.2 Impact Of Mergers And Acquisitions

As companies merge with and acquire other entities, their computing systems dramatically increase in complexity, potentially spanning many local and wide area networks and multiple mainframes. The trend to blend information into systems illustrates the complexity of managing separate sets of information in different systems. The recent explosion of the Internet and the increasing usage of Intranets have led to the emergence of another class of enterprise applications, adding yet another dimension of complexity to the enterprise.

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Application Integration Market Forecasts

Within these disparate enterprise-computing environments, which comprise numerous applications, databases, operating systems, hardware platforms, and communication protocols, companies are realizing competitive advantage by providing access to data and information across the organization. Companies cannot effectively compete in today's marketplace without bringing their desktop-bound users, work groups, departments, dynamic data warehouses, and information processing elements together.

To better leverage existing information systems, companies are integrating previously independent systems and databases; each component of the enterprise is being combined into a cohesive computing environment that compiles and delivers information efficiently and quickly.

Corporations maximize return on technology investment by retaining legacy systems and integrating them into distributed computing environments while continuing to design, develop, and add new applications and systems to the network.

Exchange of information from applications depends on use of AI message broker modules, which are interface logic. System modules need to be interconnected via interfaces. Interfaces are needed to achieve AI.

AI interfaces are comprised of mission critical messaging, formatting, routing, transformation, adapter logic, connector logic, and systems management. Systems represent sophisticated switching mechanisms that support communications with a sub structure. Messages carry information in a header, or the message itself can be decoded to determine appropriate routing. Table 2-7 illustrates enterprise application integration processes.

TABLE 2-7
Enterprise Application Integration (AI) Processes

- Supports management of business environment characterized by change

- Supports management need to look at information from different applications

- Supports management of complexity

- Supports management of geographical distance

Source: WinterGreen Research, Inc.

Enterprise application integration (AI) relates to the need to manage market changes using automated business process tools. The enterprise business environment is characterized by change. Market changes are driving the need to look at disparate applications as a cohesive whole.

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2.2.1 Expand Strategic Partnerships

Vendors intend to continue to develop and extend our strategic partnerships to promote adoption of our business integration solutions. Strategic partnerships provide a competitive advantage.

Partnerships are being negotiated with systems integrators, enterprise application, and other technology vendors provide sales and marketing support and access to required technology and expertise. Systems integrator partners increasingly provide the resources needed to implement our products and include solutions in their bundled service and product offerings.

2.3 Electronic Commerce

E-Business describes the range of automated, electronically meditated, information exchange between organizations that do business with one another. Electronic commerce requires a company's business and operational infrastructure to be integrated. Security is essential for doing business on the Internet. By using AI to enable E-commerce, companies are able to get products and services to market faster, while increasing customer satisfaction.

AI supports Internet commerce and EDI. In the banking and finance industry, straight through processing (STP) offers significant advantages in cost and speed. Some level of integration with existing applications is required for straight through processing.

Most enterprises have computing systems that have evolved over many years. These systems have grown and changed through multiple generations of hardware and software.

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Batch, transactional and client/server systems coexist and interact to meet the processing needs of a business. Most software systems are modified to meet short-term, tactical goals, with little regard for the longer-term consequences. These tactical changes result in short-term business gains, but often restrict the ability of the business to react in the future.

Table 2-8 illustrates e-business objectives. Table 2-9 illustrates electronic commerce infrastructure requirements. Table 2-10 illustrates how AI functions enable e-commerce. Table 2- 11 illustrates AI support for Internet commerce and EDI.

TABLE 2-8

E-BUSINESS OBJECTIVES

- Implement a range of automated transactions

- Electronically meditate transactions and orders

- Implement information exchange between organizations that do business with one another

Source: WinterGreen Research, Inc.

2-12

TABLE 2-9

ELECTRONIC COMMERCE INFRASTRUCTURE REQUIREMENTS

- Integration infrastructure offer range of brokers

- Integration brokers provide best in class capabilities

- Integration brokers integrate with each other

- Integrated business and operational infrastructure

- Security essential for doing business on the Internet

Source: WinterGreen Research, Inc.

TABLE 2-10

AI FUNCTIONS ENABLE E-COMMERCE

- Get products to market faster

- Get services to market faster

- Increase customer satisfaction

- Automate supply chain

Source: WinterGreen Research, Inc.

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TABLE 2- 11

AI SUPPORT FOR INTERNET COMMERCE AND EDI

- Support straight through processing (STP) in the banking and finance

- Support some level of integration with existing applications as required for straight through processing

- Offer significant advantage in cost and speed

- Support enterprise computing systems that have evolved over many years

- Support systems that have grown and changed through multiple generations of hardware and software

- Support coexisting batch, transactional and client/server systems

- Accommodate tactical changes that result in short-term business gains, without restricting the ability of the business to react in the future

Source: WinterGreen Research, Inc.

2.4 Role Of Mission Critical AI

AI is driven by the availability of mission critical messaging including the defacto industry standard MQSeries asynchronous queuing systems.

The evolution of corporate computing models and information technology infrastructure has resulted in large, dispersed, heterogeneous information systems. A new wave of technology is bringing handheld pervasive computing devices and mobile communications systems that support data. Internet exchange of information is bringing increased demand for new AI functionality.

AI systems support business change and immediate reaction to perceived market opportunity. Mission critical messaging middleware provides the basis for AI. Messages generated by messaging systems have cross platform, application independent capability.

Messaging oriented middleware (MOM) sits between applications and the operating systems on which they run. The messaging mission critical functionality is an essential base for AI. AI middleware provides the ability for information to be moved between the components of distributed applications.

Use of appropriate AI middleware contributes to application integration projects. The majority of issues facing designers relate to exchange of information between application components, whether running on the same system or on different systems. Considerable diversity exists between the methods by which communication is carried out and by which the results are made available to applications.

Tightly coupled application interfaces increase technical rigidity and restrict the organization's ability to change to meet new challenges. E-business platforms improve business agility and flexibility by providing an underlying technology that promotes loose business coupling.

Loose coupling between components can be achieved by a number of technologies, including directories, which improve location independence, and messaging middleware, which improves time independence. Integration brokers provide advanced rules, transformation, formatting, and routing capabilities that allow applications to communicate even when they do not share a common view of the data or information that they exchange.

2.5 Market Driving Forces

Market driving forces for AI are comprised of a number of direct and indirect factors impacting markets. Direct factors relate to the need for application integration between every different type of enterprise resource planning (ERP) system.

Supply chains are automated using AI and AI technology.

Electronic commerce needs AI to function.

New customer service systems need AI in order to be implemented. Indirect factors relate to the migration of existing products from separate market segments to being subsumed by AI. File transfer, CTI, applications development, and workflow illustrate these segments.

Application Integration Market Forecasts

Enterprise application integration is occurring in the context of corporate adoption of best-of-breed AI application strategies. Mergers, acquisitions, reorganizations are increasing. The driving force is the need to leverage economies of scale brought by the Internet. A desire to develop closer links with customers, suppliers and partners is also evolving. These event all drive demand for AI.

Dynamically growing businesses must meld applications, databases, operating systems, and hardware platforms. Vendors fold applications seamlessly into networks supporting mainframes, client/server platforms, and PCs.

Companies trying to pick up the IT pieces following a merger or acquisition need AI. Those involved in front office/back office integration and those working to comply with new regulations all face the need to implement integration. Table 2-12 illustrates AI market driving forces.

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TABLE 2-12
AI Market Driving Forces

- Speed corporate adoption of best-of-breed applications

- Support Internet strategies

- Manage mergers, acquisitions and reorganizations

- Develop closer links with customers, suppliers and partners

- Fold applications seamlessly into networks

- Support mainframes, client/server platforms, and PCs

- Meld applications, databases, operating systems, and hardware platforms

- Integrate packaged ERP applications, such as PeopleSoft, SAP, S.W.I.F.T.

- Integrate packaged database applications, such as Oracle, Sybase, NT SQL Server, DB2, Informix, and Enscribe.

- Build interfaces to Scopus, Clarify, Vantive information management systems

- Extend investment in legacy applications

- Enable client/server and network computing

- Provide electronic commerce over the Internet

- Integrate new Y2K-compliant solutions with legacy applications

Source: WinterGreen Research, Inc.

2.6 Message Broker Market Description

AI message broker technology permits multiple central controllers, automatic alphanumeric paging, and remote service dial-up through a modem to provide transport of information.

Message brokers represent an opportunity to sell systems into the business side of the enterprise in addition to the IT department where infrastructure, middleware, and hardware are sold traditionally. To the extent that events understandable to the business analyst can be captured and utilized to manage the business directly, message broker systems can be sold into the business side of the enterprise.

Business analysts can capture and utilize events directly, giving them incentive to purchase the software directly. Message broker market drivers and opportunities are illustrated in Table 2-13.

TABLE 2-13
Message Broker Market Description

- Business analysts can capture and utilize events directly

- Business analysts purchase message broker software

- Events understandable to the business analyst can be captured without programming

- Multiple central controllers interconnect

- Automatic alphanumeric paging supports system repair notification

- Remote service dial-up provides transport of information

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TABLE 2-13   (CONTINUED)
Message Broker Market Description

- Mission critical movement of information over the Internet facilitated

- Information moved from distributed environments to existing CICS and other mainframe computing environments

- Transformation and formatting of information achieved

- Routing managed based on a number of parameters, including the content or the subject of the message or event

Source: WinterGreen Research, Inc.

2.7 Application Integration Challenges

Key challenges for application integration (AI) projects relate to developing point solutions that will scale. Fast systems operation is a significant aspect of project implementation. Point solutions implemented in a departmental environment may not scale to the entire enterprise. Speed is a significant factor in system evaluation. AI system challenges are illustrated in Table 2-14. Achievement of business agility and flexibility is a primary AI system integration goal.

TABLE 2-14
Key Challenges Of Application Integration

- **Need to maintain business agility**

- **Need to accommodate the continuing shortage of IT skills**

- **Need to contain project risks**

- **Need to protect existing IT investment**

Source: WinterGreen Research, Inc.

Accommodation of the continuing shortage of IT skills is solved by AI, because packaged interface logic is substituted for the need to use programmers to build custom interface logic. Many AI systems need services that cost ten times as much as the packaged software to implement the system. This situation is changing as new AI software is easier to install and to use.

AI facilitates containment of project risks because it implements known packaged code to provide solutions to problems in a range of different enterprise environments. Packaged code represents a way to spread the cost of developing software over a range of users rather than forcing each IT department to absorb the costs of building custom interface logic.

Software requirements relate to implementation of connecting a range of discrete computing centers. This trend for multiple centers to co-exist in an enterprise is further evolving. Integrated applications permit departments to function autonomously while contributing data to the central processing and information center of the IT facility. AI systems design derives from market forces that relate to the Internet. E-business platforms are implemented in the context of AI infrastructure challenges.

2.8 Business Benefits

Products and integration architecture provide strategic advantage to customers. Architecture is evolving to provide a focus on business process automation across the enterprise and across trading partners, distributors, suppliers and customers.

The integration modular architecture allows customers to isolate business processes from their applications, which gives the flexibility to add, upgrade, or replace applications in their information technology environment. People use systems that work without redefining all of their process interfaces.

By reusing integration products and processes, customers gain the ability to respond quickly to new market initiatives, such as e-business initiatives or company mergers, thereby achieving a competitive advantage

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Cost of maintenance is lower because customers need to support and maintain fewer interfaces than companies who implement messaging-based integration solutions or point-to-point integration.

To accelerate integration implementation, customers use pre-built adapters. Connectors, transformation, connectivity, and business process tools are positioned too support network communication between applications. Vendors have a repository of sample components and templates.

These allow customers to gain time-to-market advantage over companies that have chosen integration solutions with fewer pre-built components, a messaging approach, or a less comprehensive toolset.

2.9 Application Integration Market Shares

IBM leads application integration infrastructure markets in 2001. IBM has been a defining presence in the market, creating demand for infrastructure and lending credibility to all the market participants with its strong advertising campaign and its firm dedication to the market.

Integration broker markets represent a response to the Internet. Even the AI systems that are used on private networks are a response to IP technology. As companies seek to exchange information across departments, to integrate acquisitions, and to share information with strategic partners, infrastructure systems are being integrated. Integration brokers represent point solutions that are very strategic.

They include brokers that perform specific functions. Application integration (AI) infrastructure rests on a base of messaging that supplements the information provided by brokers and provides mission critical secure transmission support.

Application integration broker markets shares for 2001 are shown in Figure 2-15 and Table 2-16. IBM was the market leader in the application integration market in 2001 with 15% market share, up from 14% market share in 2000. IBM had 18% market share when the CrossWorlds acquisition is counted.

Tibco had strong market participation in application integration software license markets with 12.6% market share in 2001. Tibco and IBM are the market leaders in breadth of product offering and substantial participation in the market.

webMethods had market participation of 10.5% market share. SeeBeyond was the number four market participant with 8.7% market participation. Vitria was the number five market participant with 6.1% of the market for software licenses. GE GXS had 6% market participation.

Application Integration Market Forecasts

**Figure 2-15
Worldwide Integration Broker Market Shares, 2001**

IBM 15%
Tibco 13%
webMethods 10%
SeeBeyond 9%
Vitria 6%
GE eXchange 6%
Sun / iPlanet 5%
Sybase / New Era 5%
Mercator 5%
BEA 4%
Other 22%

Source: WinterGreen Research, Inc.

**Total $1.265
Billion 2001**
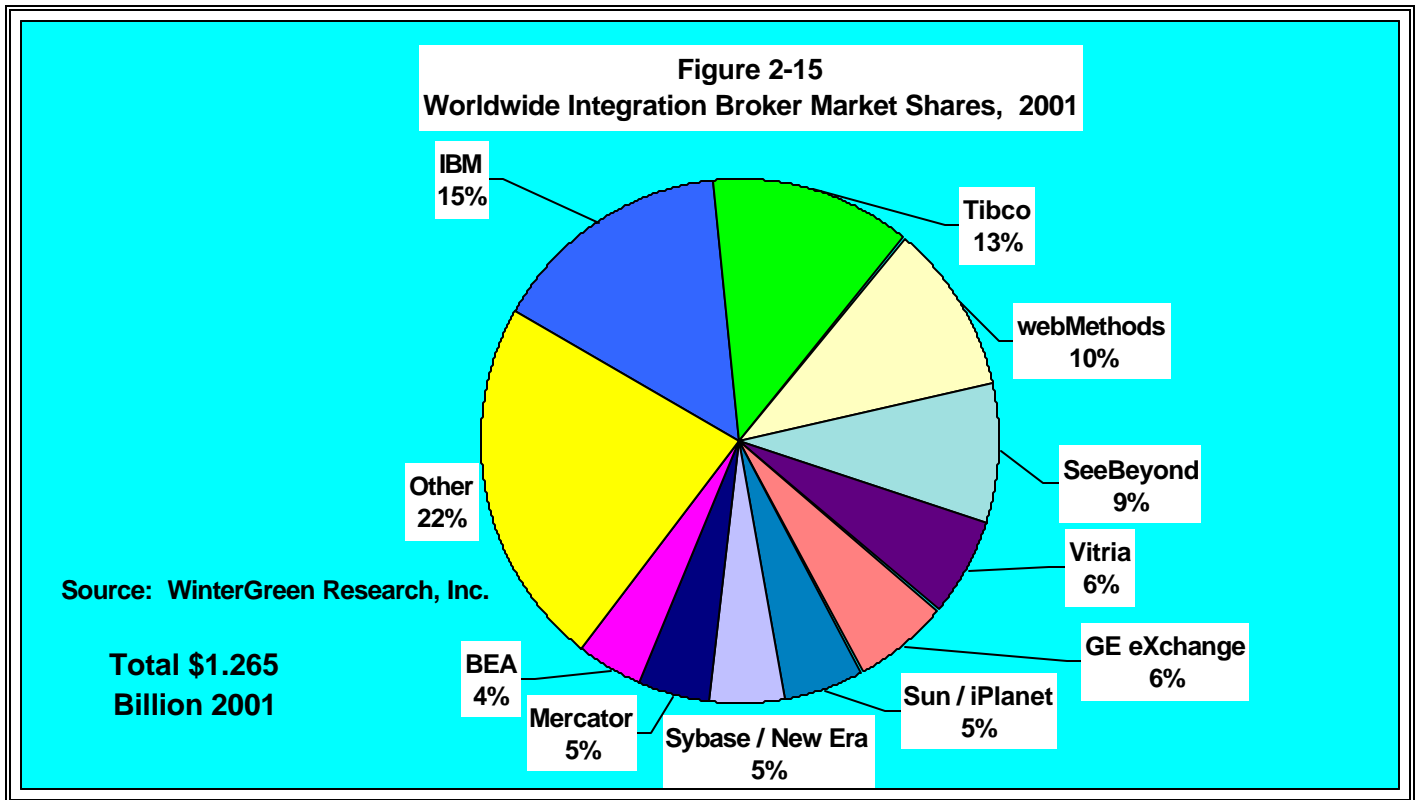
TABLE 2-16
APPLICATION INTEGRATION
MARKET SHARES, 2001
In Millions of Dollars

	MM$	% Market Share	% Growth
IBM	190.0	15.0	18.0
Tibco	159.0	12.6	18.0
webMethods	132.6	10.5	14.5
SeeBeyond	109.6	8.7	67.6
Vitria	77.5	6.1	-24.2
GE eXchange	75.4	6.0	16.0
Sun / iPlanet	63.2	5.0	12.0
Sybase / New Era	59.4	4.7	-42.9
Mercator	59.0	4.7	-26.3
BEA	53.1	4.2	8.9
Other	286.7	22.7	13.2
Total	**1,265.5**	**100.0**	**10.0**

Source: WinterGreen Research, Inc.

The market for AI products and services is extremely competitive and subject to rapid change. While vendors offer a comprehensive suite of application integration solutions, they compete with various providers of more limited application integration products.

IBM has the most complete set of products for application integration and is the market leader in most segments. IBM is also the market leader in the complementary application server market.

Tibco is good at selling a large contract to an enterprise and letting the client use all the modules to solve the integration problem. In this manner an integration solution is evolved. Specialized e-business connectivity companies include WebMethods. Vitria has a strong participation in business process management.

Tibco has portal, middleware messaging management, and separate publish subscribe product revenue that complement its EAI market participation, giving it enormous strategic advantage over the companies WebMethods and SeeBeyond.

2.10   (AI) Integration Broker Market Vendor Growth

IBM and Tibco had the most solid growth in the industry, growth based on providing functionality that covers the broad requirements of sophisticated customers. SeeBeyond grew the most rapidly. WebMethods and GE GXS represent companies that grew in line with the market for license revenue in 2001.

The leading four market participants had strong growth in the context of the weak economic picture. (See Figure 2-17.)

FIGURE 2-17
APPLICATION INTEGRATION VENDOR MARKET GROWTH, 2001

Vendor	Percent Growth
IBM	18
Tibco	18
webMethods	14.5
SeeBeyond	67.6
Vitria	-24.2
GE eXchange	16
Sun / iPlanet	12
Sybase / New Era	-42.9
Mercator	-26.3
BEA	8.9
Other	13.2

In Percent Growth

Source: WinterGreen Research,

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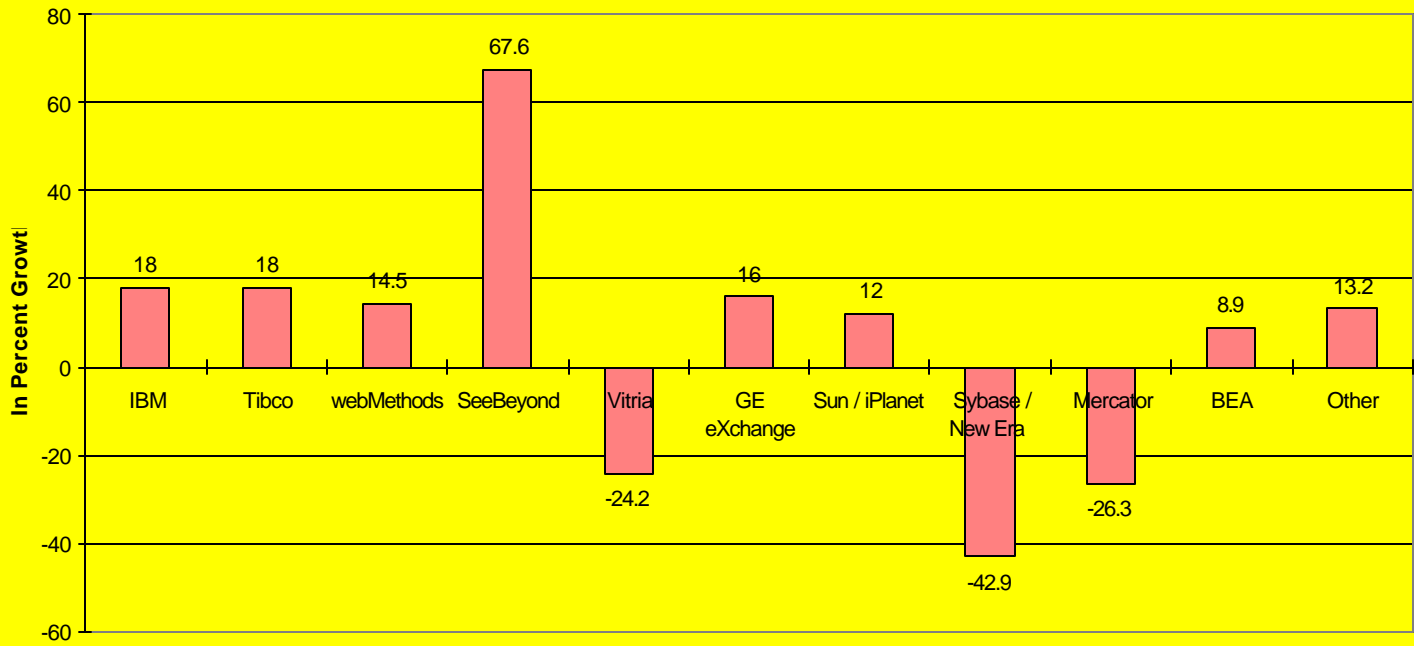
2.11   Vendors With A Broad Suite Of Products

The increase in software license revenue reflected an increase in market awareness and acceptance of integration products. Expansion of international sales resources, the continued growth of an installed base, more service attention to accounts helped grow the markets. Reference accounts serve as guides for new customers, provide repeat business from existing customers, and advise on expanded functionality of the suite of vendor products.

2.11.1   Total Segments By Vendor

E-business supports in-house and trading partner systems integration and business management capabilities. Existing AI systems by and large support tightly and loosely coupled applications relationships. These capabilities provide the backbone for enterprise ERP applications integration.

New market directions relate to using application integration techniques for B2B transactions. Application integration supports trading relationships in the online marketplaces. Application service providers, customer supply chains, and inter-divisional business processes need integration software.

Software integration architecture permits customers to have the flexibility to conduct business with partners using any common Internet data and messaging standard, which allows them to quickly link up to partners and trading communities using their preferred trading standard.

Application Integration Market Forecasts

The variety of segments and vendor offerings in AI markets is illustrated in Figure 2-18 and Table 2-19.

FIGURE 2-18
TOTAL APPLICATION INTEGRATION MARKET SEGMENTS, 2001

Segment	In Millions of Dollar
Rules / Routing	299.1
Transformation	213.8
Publish Subscribe	51.7
Adapter	231.2
Business Processes	266.5
Workflow	203.2

Source: WinterGreen Research,
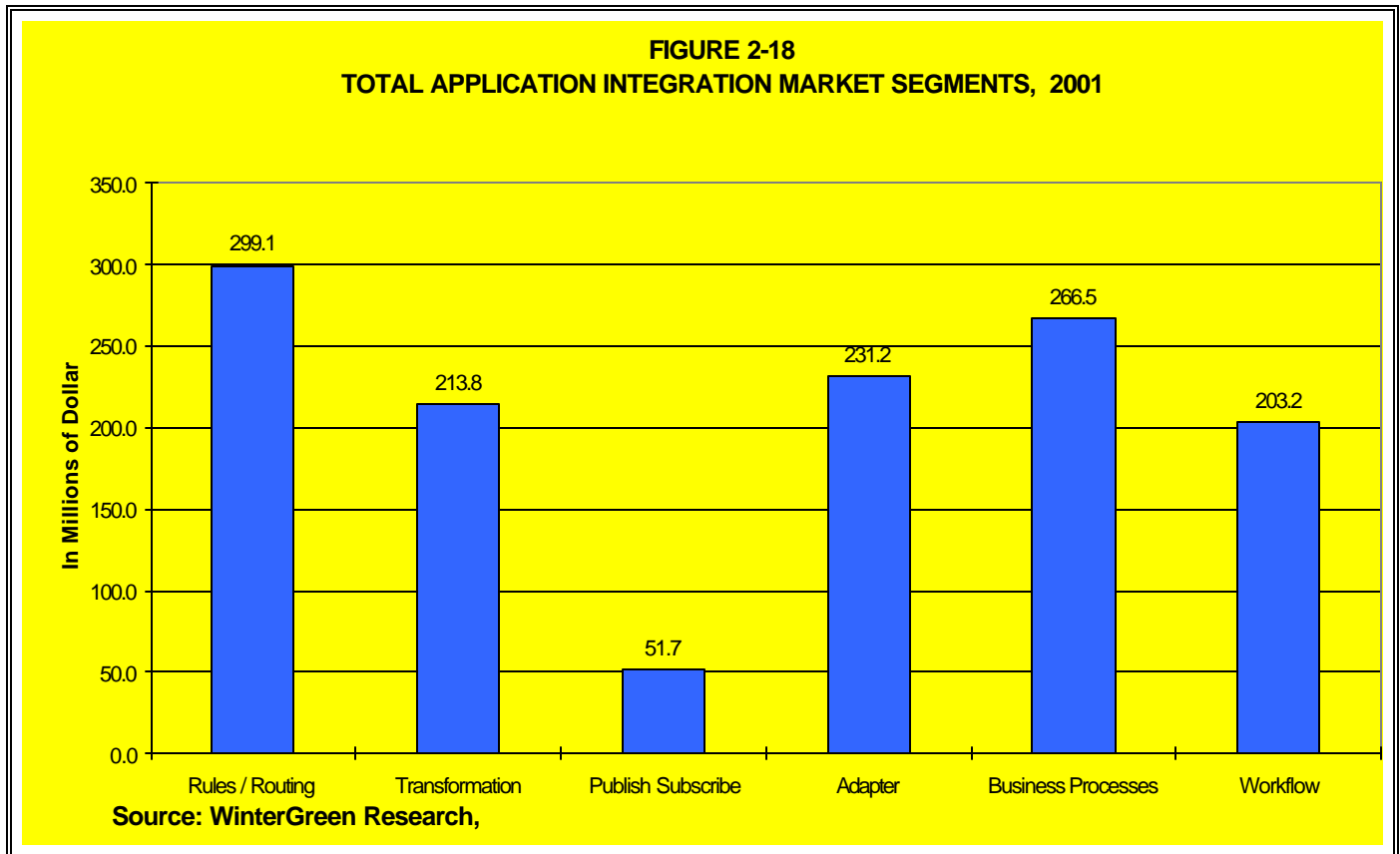
TABLE 2-19
APPLICATION INTEGRATION SEGMENT
MARKET SHARES, 2001
In Millions of Dollars

	Total MM$	Rules / Routing	Trans- formation	Publish Subscribe	Adapter	Business Process Mgmt	Workflow
IBM	190.0	62.7	1.9	11.4	36.1	34.2	43.7
Tibco	159.0	62.0	4.8	14.3	19.1	39.8	19.1
webMethods	132.6	53.0	37.1	0.0	9.3	33.2	0.0
SeeBeyond	109.6	49.3	0.0	8.8	19.7	31.8	0.0
Vitria	77.5	1.6	0.0	0.0	6.2	69.8	0.0
GE eXchange	75.4	0.0	75.4	0.0	0.0	0.0	0.0
Sun / iPlanet	63.2	0.0	0.0	0.0	0.0	0.0	63.2
Sybase / New Era	59.4	31.5	0.0	0.0	26.7	1.2	0.0
Mercator	59.0	1.2	40.1	0.0	16.5	1.2	0.0
BEA	53.1	14.9	0.0	0.0	34.5	1.1	2.7
Other	286.7	22.9	54.5	17.2	63.1	54.5	74.5
Total	**1,265.5**	**299.1**	**213.8**	**51.7**	**231.2**	**266.5**	**203.2**

Note: Subtotals add to larger than total due to revenue from other segments, not EAI.

Source: WinterGreen Research, Inc.

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IBM and Tibco are the only vendors with broad integration product market participation. IBM, Tibco, Sybase / New Era, and SeeBeyond are expected to leverage their position in routing and rules brokers to encompass the full functionality of integration broker suites in the marketplace. Rules engines provide the core of AI, making it possible to make decisions about information as it is transferred from one application to another.

Vitria has staked a position with the Fortune 1000, implementing business process automation. GXS and Mercator are known for the large installed base of transformation broker products that provide broad integration capability outside the firewall. Mercator also has broad integration capability for messages, flat files, and data bases. WebMethods has a large installed base of XML connectors and application systems adapters that provide capabilities for varied integation.

2.11.2   IBM

IBM has a strong presence in the routing and rules portion of the message broker market, but it complements this strong offering with the broadest portfolio of integration modules available in the industry. In addition to rules, it provides adapters, workflow, transformation, and business process capability.

The recent strengthening of the presence in the adapter market comes from the acquisition of CrossWorlds. This emphasizes the process capabilities of the integration suite, permitting support for integration inside and outside the enterprise. (See Figure 2-20.)

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Application Integration Market Forecasts

The workflow and business process management sectors are beginning to converge, making this the largest segment of IBM participation in integration markets.

FIGURE 2-20
IBM APPLICATION INTEGRATION MARKET SEGMENTS, 2001
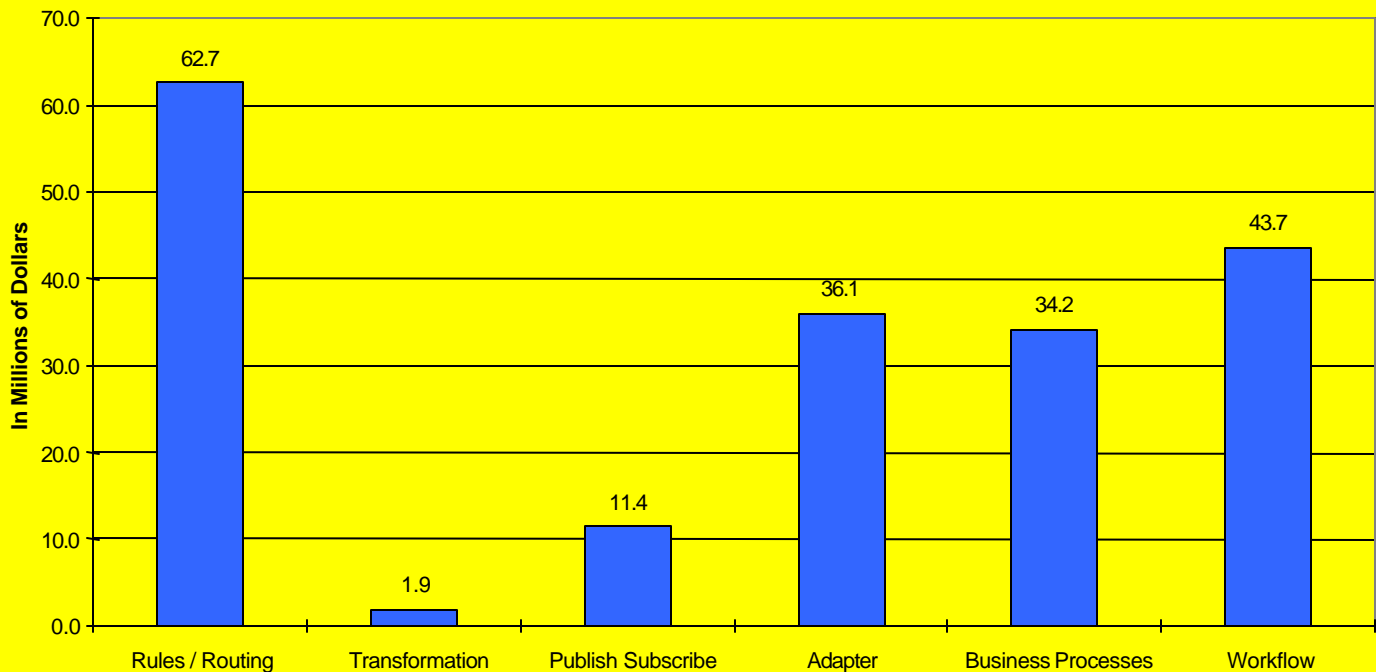
Source: WinterGreen Research, Inc.

The strength of the IBM integration infrastructure is that it is based on the defacto mission critical messaging standard WebSphere MQ. WebSphere MQ provides a mission critical messaging system that enables secure, guaranteed delivery of information.

2.11.3   Tibco

Tibco has a unique distributed architecture that relies on the Tib distributed processing broker that is similar in concept to IP architecture. Because of the system architecture that provides flexibility, multicasting, and high speed, the message delivery is not inherently guaranteed.

Data is packaged with headers that can be read by nodes as they bounce around a network. This forms the basis for 32 other integration modules that provide integration. Tibco excels in distributed message brokers as shown in Figure 2-21. Tibco has a broad integration suite packaged software offering that provides customers with a range of choices in implementing

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FIGURE 2-21
TIBCO APPLICATION INTEGRATION MARKET SEGMENTS, 2001

In Millions of Dollar

Rules / Routing	Transformation	Publish Subscribe	Adapter	Business Processes	Workflow
62.0	4.8	14.3	19.1	39.8	19.1
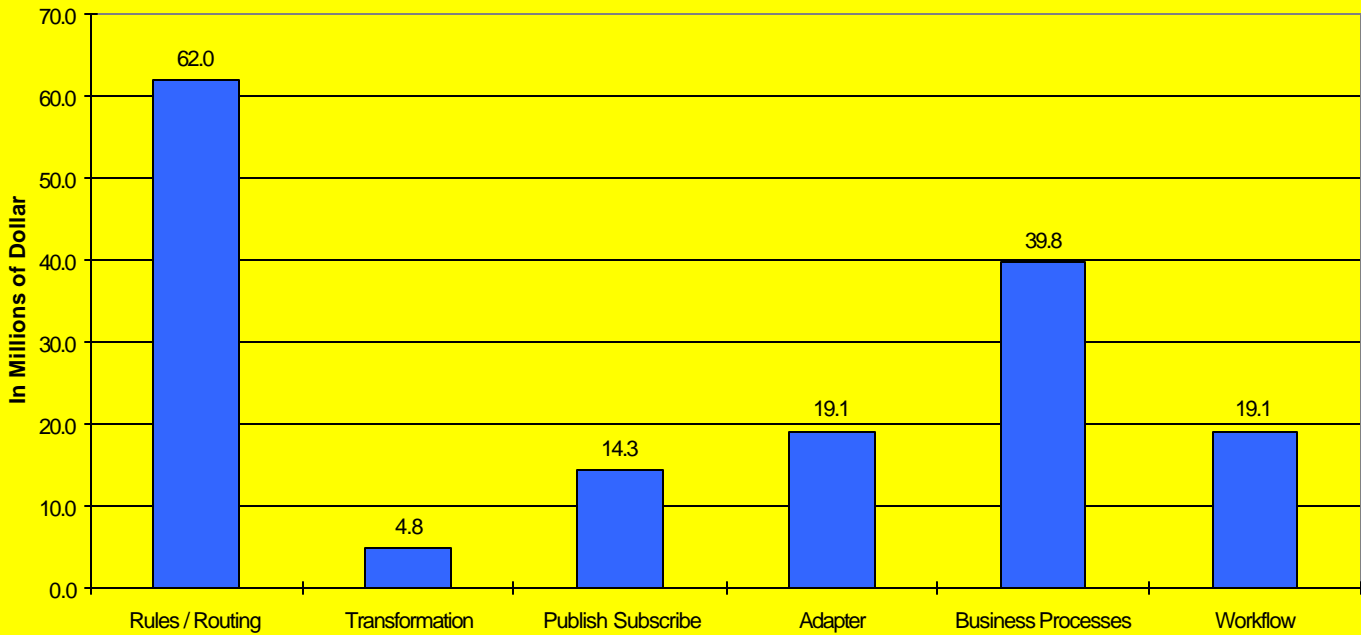
Source: WinterGreen Research,

2.12 (AI) Integration Broker Market Forecasts

The application integration software license market grew 10% in 2001 to reach $1.265 billion, up from $1.1 billion in 2000. Markets are expected to grow 25% in 2001 reaching $1.6 billion.

Application Integration Market Forecasts

By 2007 application integration software license revenue is expected to be $5.9 billion reflecting the need to use integration to conduct commerce over networks. (See Figure 2-22 and Table 2-23.)

FIGURE 2-22
WORLDWIDE APPLICATION INTEGRATION (EAI)
MARKET FORECASTS, 2001-2007

Year	In Millions of Dollar
2001	1,265.5
2002	1,585.7
2003	2,125.8
2004	2,852.8
2005	3,761.4
2006	4,834.3
2007	5,894.7

Source: WinterGreen Research,

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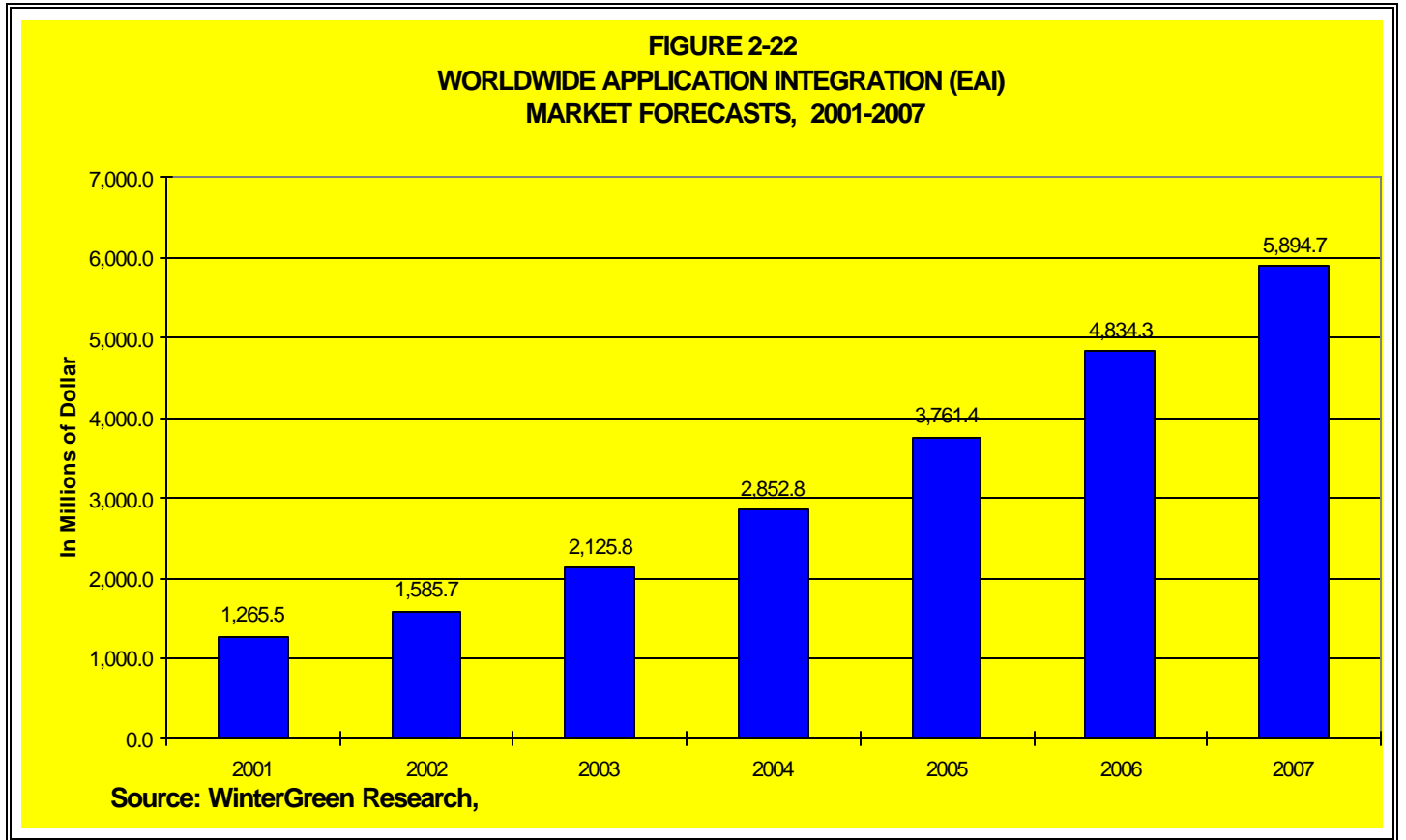
	2001	2002	2003	2004	2005	2006	2007
TABLE 2-23 **SUMMARY APPLICATION INTEGRATION BROKER** **MARKET SEGMENT FORECAST, 2001-2007** In Millions of Dollars							
Routing and Rules Engines	299.1	344.0	491.9	664.1	796.9	924.4	1,026.1
Transformation Engines	213.8	245.9	331.9	464.7	627.3	815.5	1,019.4
Adapter Engines	231.1	258.9	292.5	336.4	383.5	441.0	493.9
Business Process Engines	266.6	357.2	471.5	650.7	923.9	1,191.9	1,489.8
Publish Subscribe Engines	51.7	111.6	178.6	259.0	336.7	387.2	425.9
Process Workflow Engines	203.2	268.2	359.4	478.0	693.1	1,074.4	1,439.6
Total Integration Broker	**1,265.5**	**1,585.7**	**2,125.8**	**2,852.8**	**3,761.4**	**4,834.3**	**5,894.7**
% growth	10.0	25.3	34.1	34.2	31.9	28.5	21.9
Source: WinterGreen Research, Inc.							

Computers can no longer exist as isolated centers of excellence in the enterprise. Computing is distributed throughout the enterprise. Data is exchanged with partners and suppliers.

AI prices for software licenses range from $40,000 to several million dollars per installation. Market forecasts for AI are based on analysis of over 200 variables.

Market growth of 28% per year is fueled by trends to bring the cost of custom programming under control and to shift the expense to purchase of packaged software. Packaged software spreads the cost of upgrading functionality over an increasingly large user base.

Companies continue to insist on implementing point solutions that solve particular problems. These point solutions are justified by continuing return on investment analysis.

2.12.1   AI Integration Broker Segment Market Analysis

Segments are not discrete, rather overlapping. Segment analysis is an attempt to show that there are different flavors of integration with different emphases.

Markets for business process and workflow dominate AI segments with 37% in 2001 as shown in Figure 2-24. Rules engines represent a significant aspect of application integration, providing base functionality that is difficult to implement in any other way. Rules engines account for 24% of the market in 2001.

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Figure 2-24
Worldwide Integration Broker Market Segments, 2001

Routing and Rules Engines 24%

Transformation Engines 17%

Process Workflow Engines 16%

Adapter Engines 18%

Source: WinterGreen Research, Inc.

Publish Subscribe Engines 4%

Business Process Engines 21%

Total $1.265 Billion 2001
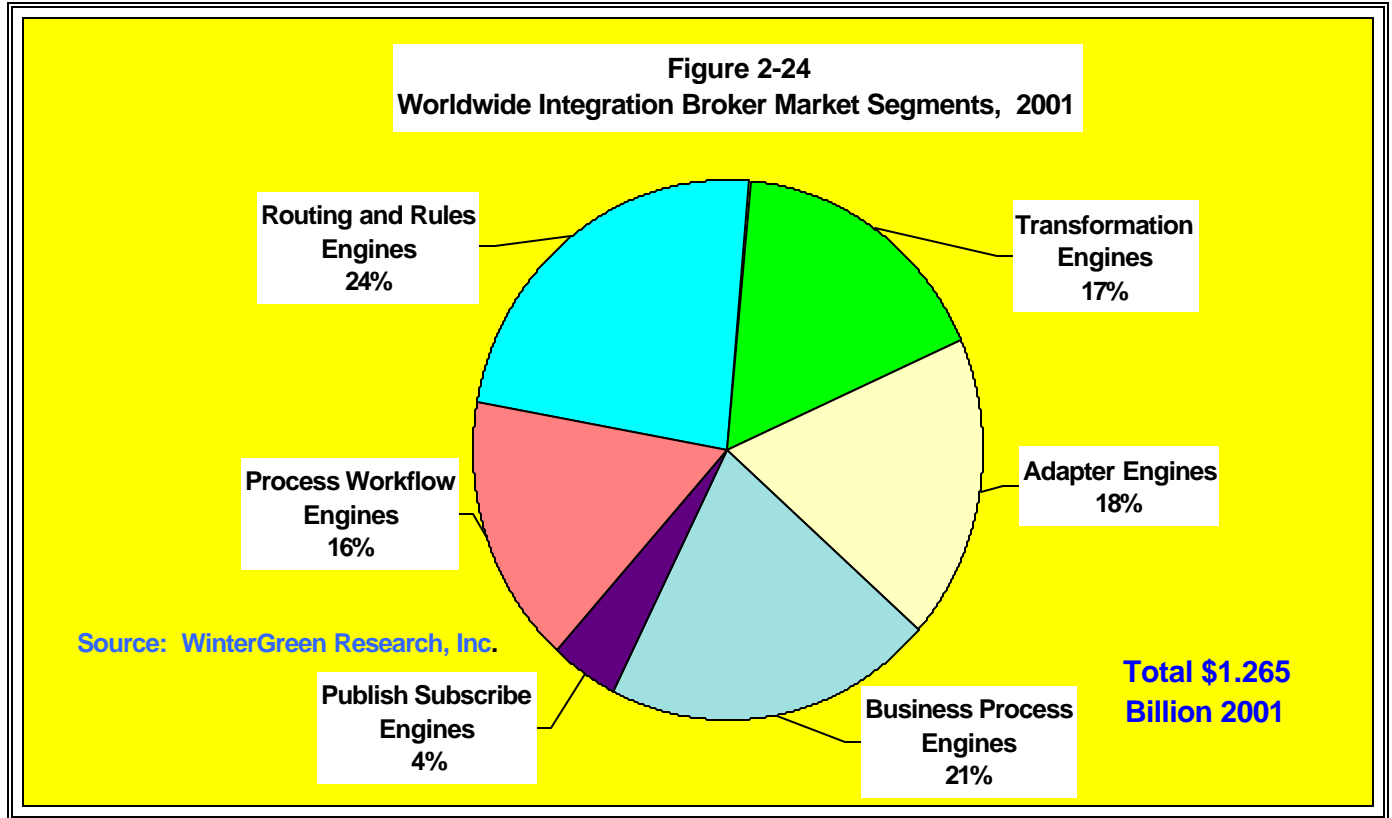
Workflow represents exception management and long running business processes. Business process management relates to gathering information that permits more efficient management of the organization. These segments grow faster than the total market as shown in Figure 2-25. By 2007 they represent % of the total application integration market. While workflow and business process management have been different markets in the past, they are converging to be the same market by 2007.

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Application Integration Market Forecasts

Adapters represent a large market segment with 18% in 2001. Transformation engines are used to transmit information outside the firewall to partners, distributors, and agencies. Transformation engines account for 17% of the AI market in 2001. This percent is expected to grow faster than other segments of the market. Distributed broker publish subscribe portion of the EAI markets accounted for 4% of the AI market in 2001.

Markets for integration brokers are expected to be at $5.9 billion in 2007. By this time, markets are dominated by business process analysis / workflow products. These account for 51% of shipments in 2007. Rules engines and transformation engines account for 17% each of shipments. Adapter prices are expected to erode, accounting for with 8% of shipments in 2007. Adapters will proliferate at ever decreasing prices. Rules and routing engines represent a continuing major market force. (See Figure 2-25)

Figure 2-25
Worldwide Integration Broker Market Segments, 2007

Routing and Rules Engines 17%

Transformation Engines 17%

Adapter Engines 8%

Process Workflow Engines 25%

Total $ 5.9 Billion 2007

Source: WinterGreen Research, Inc.

Publish Subscribe Engines 7%

Business Process Engines 26%
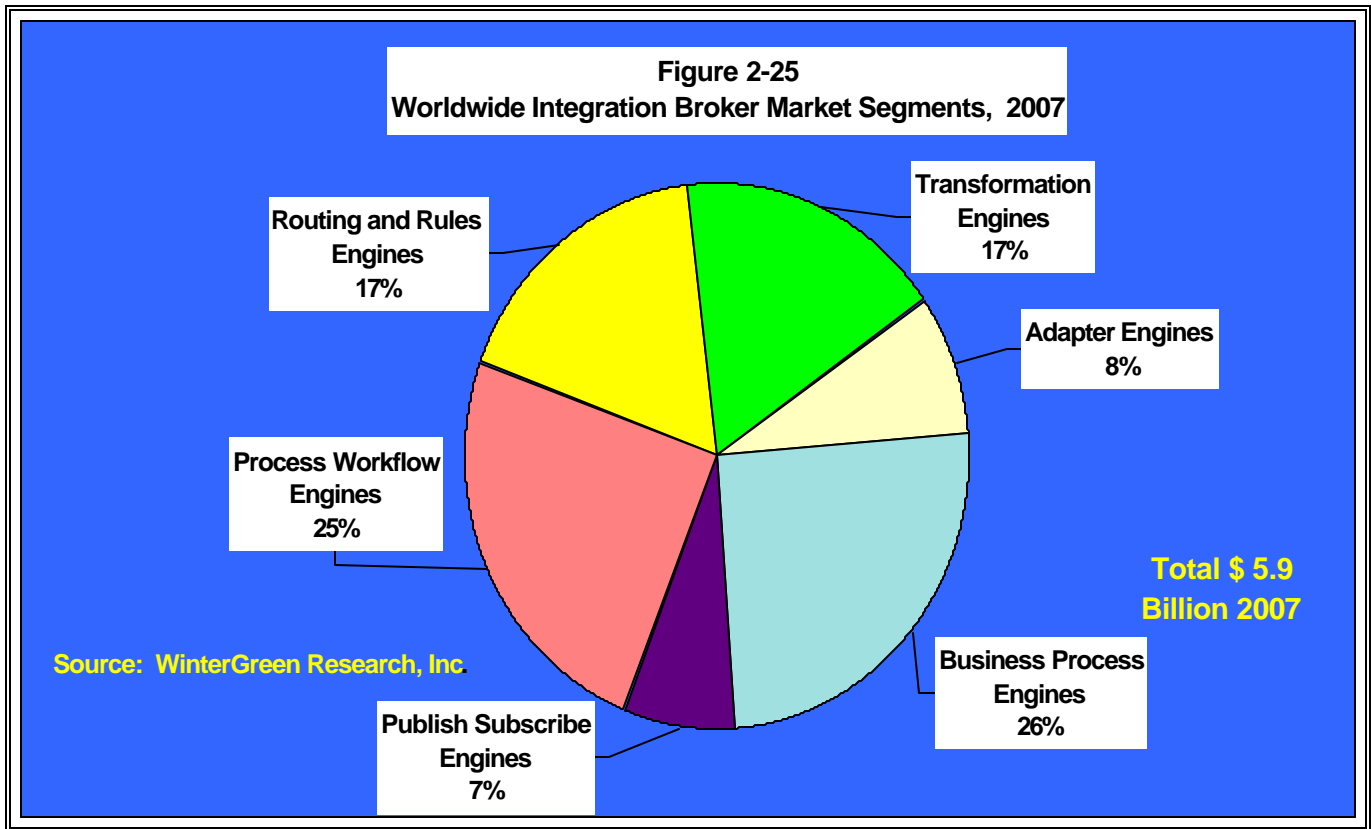
The fact that budgets are in place that pay for existing integration functionality drives market growth for AI. Functionality provided by AI automates processes in a manner not accomplished by custom coding. AI offers improved efficiency and significantly lowers costs of integrating systems and implementing supply chain efficiencies, providing a market driving force.

2.13   Routing and Rules Brokers

Routing and rules brokers drive AI markets. Rules engines form the base for all message brokers. Rules engines permit systems to be developed that look at the content of a message to determine the basis of a route. A routing decision is made after determining how the specific content matches the specific rule. Development of comprehensive solutions to AI integration occurs within a node or location. Rules permit taking an analytical approach to AI implementation.

IBM and Tibco are in the leadership position for AI routing and rules brokers with each company having 21% share market participation in 2001. (See Figure 2-26 and Table 2-27.) webMethods, SeeBeyond, Sybase / New Era of Networks, BEA, and Tibco participate in the market segment with strong product offerings.

**Figure 2-26
RULES ENGINES MARKET SHARES, 2001**
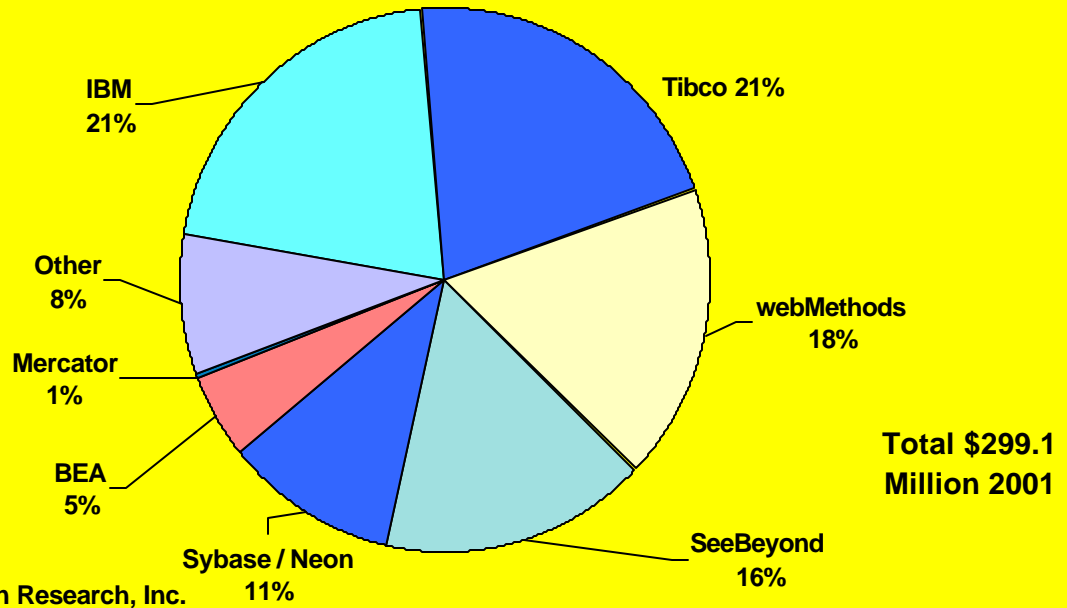
IBM
21%

Tibco 21%

Other
8%

webMethods
18%

Mercator
1%

**Total $299.1
Million 2001**

BEA
5%

SeeBeyond
16%

Sybase / Neon
11%

Source: WinterGreen Research, Inc.

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TABLE 2-27
ROUTING / RULES ENGINES
MARKET SHARES, 2001
In Millions of Dollars

	MM$	**%**
IBM	62.7	21.0
Tibco	62.0	20.7
webMethods	53.0	17.7
SeeBeyond	49.3	16.5
Sybase / New Era	31.5	10.5
BEA	14.9	5.0
Mercator	1.2	0.4
Other	24.5	8.2
Total	**299.1**	**100.0**

Source: WinterGreen Research, Inc.

IBM and Tibco are positioned with broad AI product lines that leverage rules broker to give each company a market leading position in application integration markets. Rules engines are central to achieving integration.

IBM WebSphere MQ Integrator rules broker products support rules definition, event transformation, hub based routing, and adapter logic.

IBM integrates enterprises in virtually every business discipline, including banking, brokerage, financial services, asset management, manufacturing, telecommunications, utilities, managed healthcare and others. IBM is the industry leader in providing enterprise application integration (AI) solutions.

The IBM MQ architecture is positioned to achieve business integration with end- to- end solutions. IBM WebSphere MQ mission critical messaging provides the base for application integration systems.

Tibco rules engines are based on the company's publish subscribe message technology that is optimized for network transmission. 34 other AI modules provide base functions that complement Tibco rules engines.

Sybase / New Era of Networks offers rules brokers that are targeted to the healthcare industry. Advanced integration brokers serve specific industry segments. Application integration brokers are positioned to provide a proven and flexible application integration technology, easy to use by business analysts. Rules brokers allow GUI-driven application integration to legacy systems and databases.

Fully-featured integration brokers are useful for environments requiring S.W.I.F.T. messaging capabilities, making it appropriate for use by banking and financial enterprises adhering to the S.W.I.F.T. standard. AI rules broker market growth is fueled by a trend toward implementing business rules in the context of events or messages that are available independently of applications.

Business rules represent a significant means for achieving control over business processes. The ability to impose business rules on messages gives the IT department of the enterprise and business analysts some measure of control over change in market structure. Business rules are at the center of the business process improvements offered by AI.

SeeBeyond integration brokers are installed in hundreds of enterprises that rely on HL7 messaging. Healthcare rules brokers are targeted to hospitals, IDNs, physician clinics, and other healthcare environments. SeeBeyond has been able to extend its customer base into several industry segments.

WebMethods is leveraging its expertise with XML to implement rules engine functionality.

2.13.1 Ai Rules Engine Message Broker Market Forecasts

Markets for AI rules engine message brokers at $299.1 million in 2001 are expected to reach $1 billion by 2007. (See Figure 2-28 and Table 2-29.) Rules engines form the base for application integration. Rules permit intelligent management of information being routed on a network.

Rules engines address the content of the message and permit making choices on the fly, as information is being directed to people and computers within a network.

**FIGURE 2-28
ROUTING AND RULES BASED BROKERS, 2002-2007**
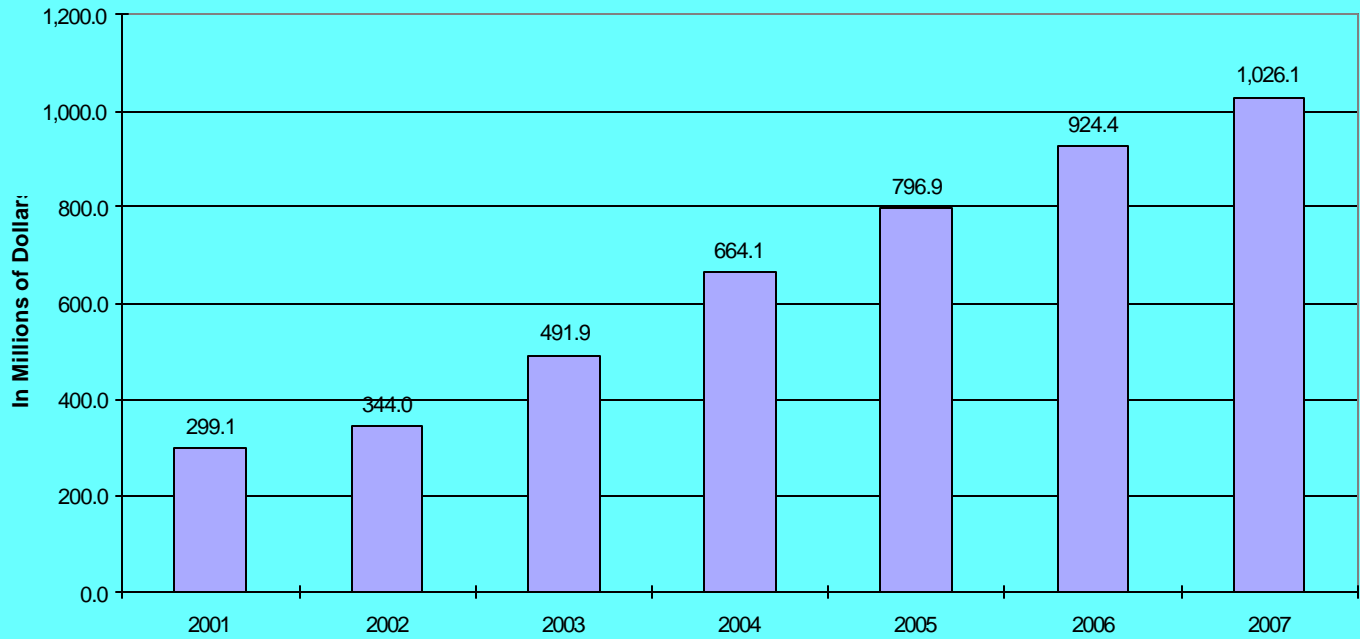
Source: WinterGreen Research,

2-47

TABLE 2-29
ROUTING AND RULES ENGINES MARKET FORECASTS, 2002-2007
In Millions of Dollars

	2001	2002	2003	2004	2005	2006	2007
Number of Units (000)	1,269.7	1,339.6	1,824.4	2,368.2	2,759.0	3,137.7	3,448.4
% Growth	60.0	5.5	36.2	29.8	16.5	13.7	9.9
Price per Rules Engine (000)$	235.6	256.8	269.6	280.4	288.8	294.6	297.6
% Growth	10.0	9.0	5.0	4.0	3.0	2.0	1.0
Routing and Rules Engines	**299.1**	**344.0**	**491.9**	**664.1**	**796.9**	**924.4**	**1,026.1**
% growth	8.0	15.0	43.0	35.0	20.0	16.0	11.0

Source: WinterGreen Research, Inc.

The AI rules broker market is anticipated to average strong growth at 26% per year on average. Rules brokers represent a broad AI functionality that permits users to design processes that fit the needs of the enterprise and ensure flexibility in transporting information.

2.14   Adapter Brokers

IBM has the largest collection of adapters in the industry. The CrossWorlds acquisition added significantly to an already large cadre of adapters. Vitria has a system that provides 3,000 adapters. WebMethods has an XML and adapter based integration approach.

Application Integration Market Forecasts

IBM led adapter markets in 2001 with 30% market share as shown in Figure 2-30 and Table 2-31. BEA was the number two market participant with 15% market share and Sybase / New Era of Networks with 12% market participation had leadership position as well. SeeBeyond and Tibco had market leadership positions. Mercator and webMethods also participate in the market with measurable market share.

Figure 2-30
ADAPTER ENGINE MARKET SHARES, 2001

- Other 16%
- webMethods 4%
- Mercator 7%
- Tibco 8%
- SeeBeyond 9%
- Sybase / New Era 12%
- BEA 15%
- IBM / CrossWorlds 29%

Source: WinterGreen Research, Inc.

Total $231.2 Million 2001
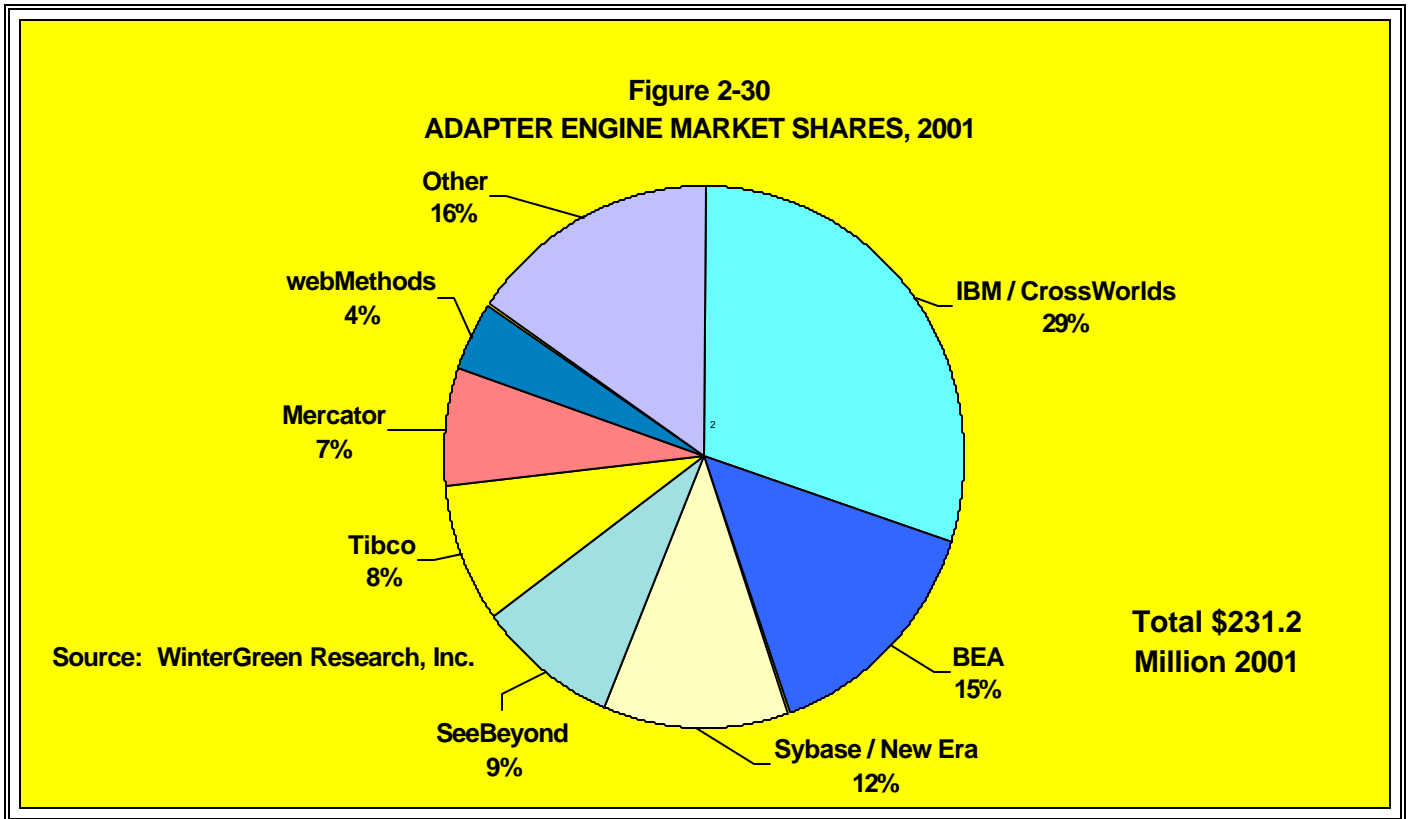
TABLE 2-31
ADAPTER / CONNECTOR / XML
MARKET SHARES, 2001
In Millions of Dollars

	MM$	%
IBM / CrossWorlds	69.2	29.9
BEA	34.5	14.9
Sybase / New Era	26.7	11.6
SeeBeyond	19.7	8.5
Tibco	19.1	8.3
Mercator	16.5	7.1
webMethods	9.3	4.0
Other	36.2	15.6
Total	**231.2**	**100.0**

Source: WinterGreen Research, Inc.

Adapters and connectors provide significant value in time and cost savings to both end users and system integrators.

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2.14.1   Adapter Broker Engine Market Forecasts

Adapters support building and maintaining integrated systems. Vendor integration systems allow organizations to integrate their patchwork of computer systems and application resources with a solution based on business events, thus enabling faster response to business needs.

Markets for adapter brokers at $231.2 million in 2001 are expected to reach $494.1 million by 2007. (See Figure 2-32 and Table 2-33.) Price erosion keeps these markets significantly below one billion for the forecast period even as unit volume explodes.

Market growth is fueled by trends to use adapters like application plugs to solve real problems at the applications level in conjunction with the more profitable rules engines. Connectors and adapters represent a way to facilitating a direct AI solution using integration technology.

XML is a cross platform, cross application solution for formatting data, but it comes at the expense of a lot of overhead. The fact that XML is extensible means that there are a lot of versions floating around that make XML proprietary.

Adapters are like plugs at the end of an electrical appliance, permitting companies to interconnect software applications directly.

FIGURE 2-32
WORLDWIDE ADAPTER ENGINE MARKET FORECASTS, 2002-2007

In Millions of Dollars

Year	Value
2001	231.2
2002	259.0
2003	292.6
2004	336.5
2005	383.7
2006	441.2
2007	494.1

Source: WinterGreen Research,

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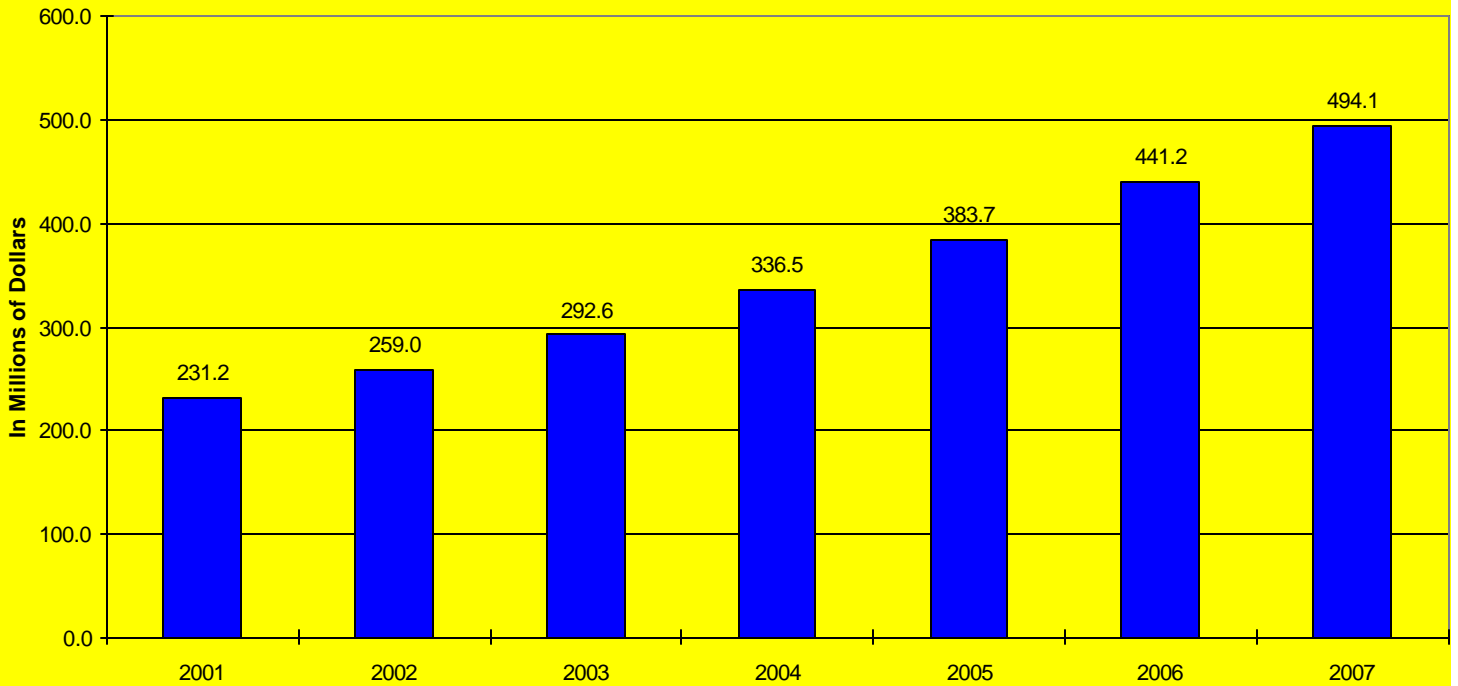
Application Integration Market Forecasts

TABLE 2-33 ADAPTER / CONNECTOR / XML MARKET FORECASTS, 2002-2007 In Millions of Dollars							
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Number of Units (000)	312.5	297.6	279.2	276.3	268.5	239.8	196.5
% Growth	8.9	18.6	21.0	20.0	21.0	22.0	23.0
With Integration Broker							
Price per Adapter Engine (000)$	185.0	191.5	199.1	207.1	214.3	220.8	226.3
% Growth	3.0	3.5	4.0	4.0	3.5	3.0	2.5
Number of Units (000)	9,127.5	11,310.3	14,271.2	17,702.2	21,754.5	27,263.8	32,892.2
% Growth	8.9	18.6	21.0	20.0	21.0	22.0	23.0
Without Integration Broker							
Price per Adapter Engine (000)$	19.0	17.9	16.6	15.8	15.0	14.2	13.7
% Growth	10.0	-6.0	-7.0	-5.0	-5.0	-5.0	-4.0
Adapter Engines	**231.2**	**259.0**	**292.6**	**336.5**	**383.7**	**441.2**	**494.1**
% growth	6.0	12.0	13.0	15.0	14.0	15.0	12.0
Source: WinterGreen Research, Inc.							

IBM, WebMethods, BEA, and Tibco are among competitors offering XML integration systems that permit businesses to integrate front- and back-office applications, realizing significant competitive advantages and operational efficiencies.

Technology and business managers face an increasing demand for information and a decreasing ability to deliver.

The difficulty in finding and hiring system programmers, the pressure to deliver solutions on tighter deadlines, and the trend toward mergers and acquisitions mean greater challenges for the CIO and IT staff. Adapters provide a point solution to these difficulties.

2.15   Business Analyst Message Broker Market

Application integration promises to take the islands of knowledge, data and business rules that represent the core of enterprise activities and unite them into a business system. Business automation allows companies to rapidly automate and analyze business processes that flow across multiple applications. Leveraging Intranets and the Internet, application integration business process solutions present new levels of flexibility, customer service, and operational efficiency across an extended enterprise.

IBM and Vitria are the market leaders in business process markets with 26% and 27% market share. Tibco has 15% market share. (See Figure 2-34 and Table 2-35.)

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Figure 2-34
BUSINESS PROCESS ENGINE MARKET SHARES, 2001

IBM / CrossWorlds
26%

webMethods
12%

Vitria
27%

Tibco
15%

Other
8%

BEA
1%

Sybase / New Era
1%

SeeBeyond
12%

**Total $266.5
Million 2001**

Source: WinterGreen Research, Inc.
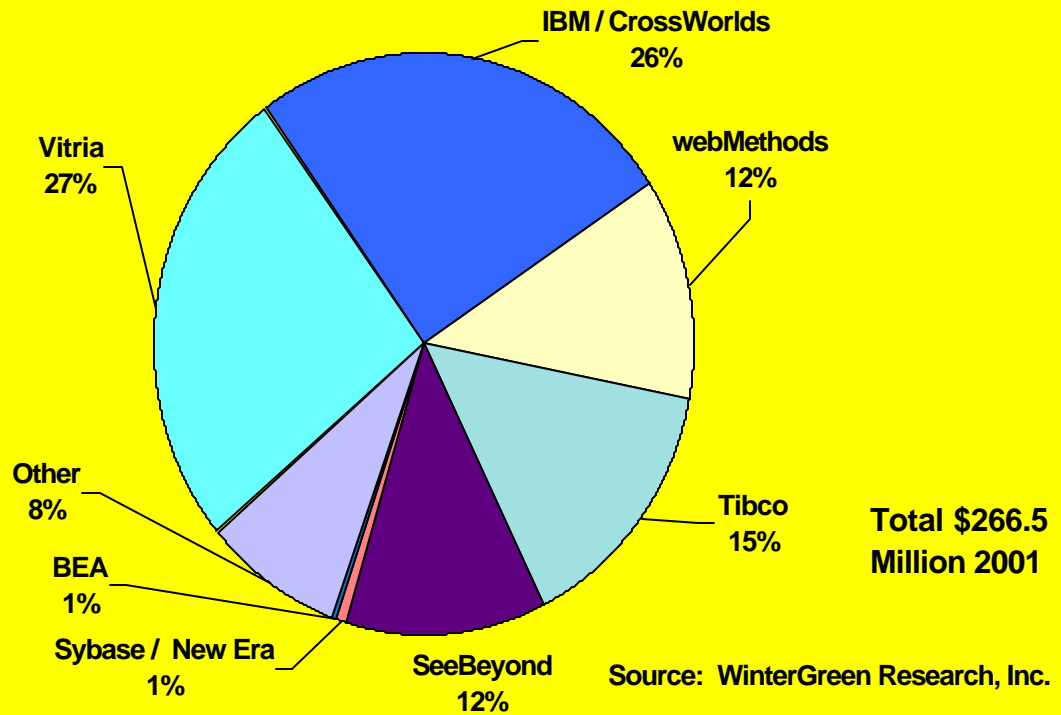
TABLE 2-35
BUSINESS PROCESS ENGINE
MARKET SHARES, 2001
In Millions of Dollars

	MM$	%
Vitria	69.8	26.2
IBM / CrossWorlds	68.0	25.5
webMethods	33.2	12.4
Tibco	39.8	14.9
SeeBeyond	31.8	11.9
Sybase / New Era	1.2	0.4
BEA	1.1	0.4
Other	21.9	8.2
Total	**266.6**	**100.0**

Source: WinterGreen Research, Inc.

WebSphere MQ Integrator uses the rules engine along with workflow and BPM from CrossWorlds to implement business process management. The workflow works for BPM, but is not as efficient solution as that offered by the CrossWorlds technology.

Vitria BusinessWare is a rules broker at a high level that implements BPM. Vitria BusinessWare pricing starts at $40,000, licenses are targeted to departmental level systems. Vitria has sophisticated packaged business analyst functionality.

IBM has staked a position in the business analyst market and is expected to continue to provide strong market participation based on its integration infrastructure product suite. Tibco and webMethods have positioned with business process brokers that have unique architecture.

2.15.1   Business Process Management Market Forecasts

Business process management engine markets at $266.5 million in 2001 are expected to reach $1.5 billion by 2007. (See Figure 2-36 and Table 2-37.) Products will resemble a spreadsheet or word processor in that they support ease of use for business analysts. Business analysts systems are expected to become ubiquitous and provide a useful purpose for PCs. Logical functions will be used to create analytical sheets. The formats will permit capture and manipulation of messages, events, database information, and real time data.

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FIGURE 2-36
WORLDWIDE BUSINESS PROCESS ENGINE MARKET FORECASTS, 2002-2007

In Millions of Dollars

Year	Value
2001	266.6
2002	357.2
2003	471.5
2004	650.7
2005	923.9
2006	1,191.9
2007	1,489.8

Source: WinterGreen Research, Inc.
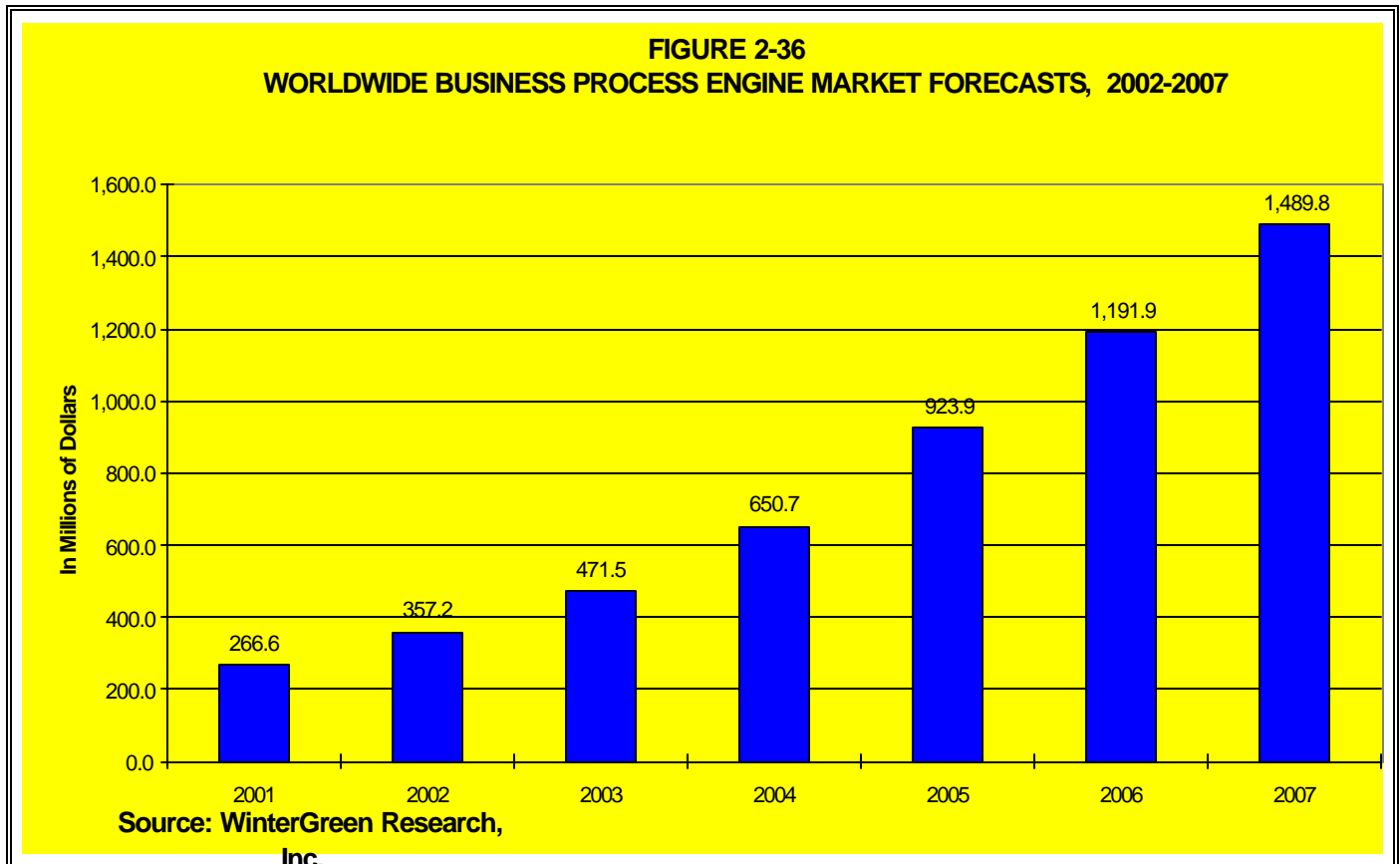
TABLE 2-37
BUSINESS PROCESS MANAGEMENT ENGINE MARKET FORECASTS, 2002-2007
In Millions of Dollars

	2001	2002	2003	2004	2005	2006	2007
Number of Units (000)	1,134.3	1,407.4	1,720.1	2,177.7	2,837.1	3,357.6	3,850.5
% Growth	8.9	18.6	21.0	20.0	21.0	22.0	23.0
Price per Bus/Proc Engine (000)$	235.0	253.8	274.1	298.8	325.7	355.0	386.9
% Growth	8.0	8.0	8.0	9.0	9.0	9.0	9.0
Business Process							
Engines (MM$)	**266.6**	**357.2**	**471.5**	**650.7**	**923.9**	**1,191.9**	**1,489.8**
% growth	25.0	34.0	32.0	38.0	42.0	29.0	25.0

Source: WinterGreen Research, Inc.

2.16   Distributed Processing Publish Subscribe Integration Broker Market Shares

Tibco led distributed broker AI market shares in 2001 with 28% market participation. (See Figure 2-38 and Table 2-39.) IBM also participates in this publish subscribe market with 22% market share.

Figure 2-38
WORLDWIDE PUBLISH SUBSCRIBE / DISTRIBUTED BROKER MARKET SHARES, 2001

Tibco
28%

IBM
22%

Other
33%

SeeBeyond
17%

Total $51.7 Million 2001

webMethods
1%

Source: WinterGreen Research, Inc.
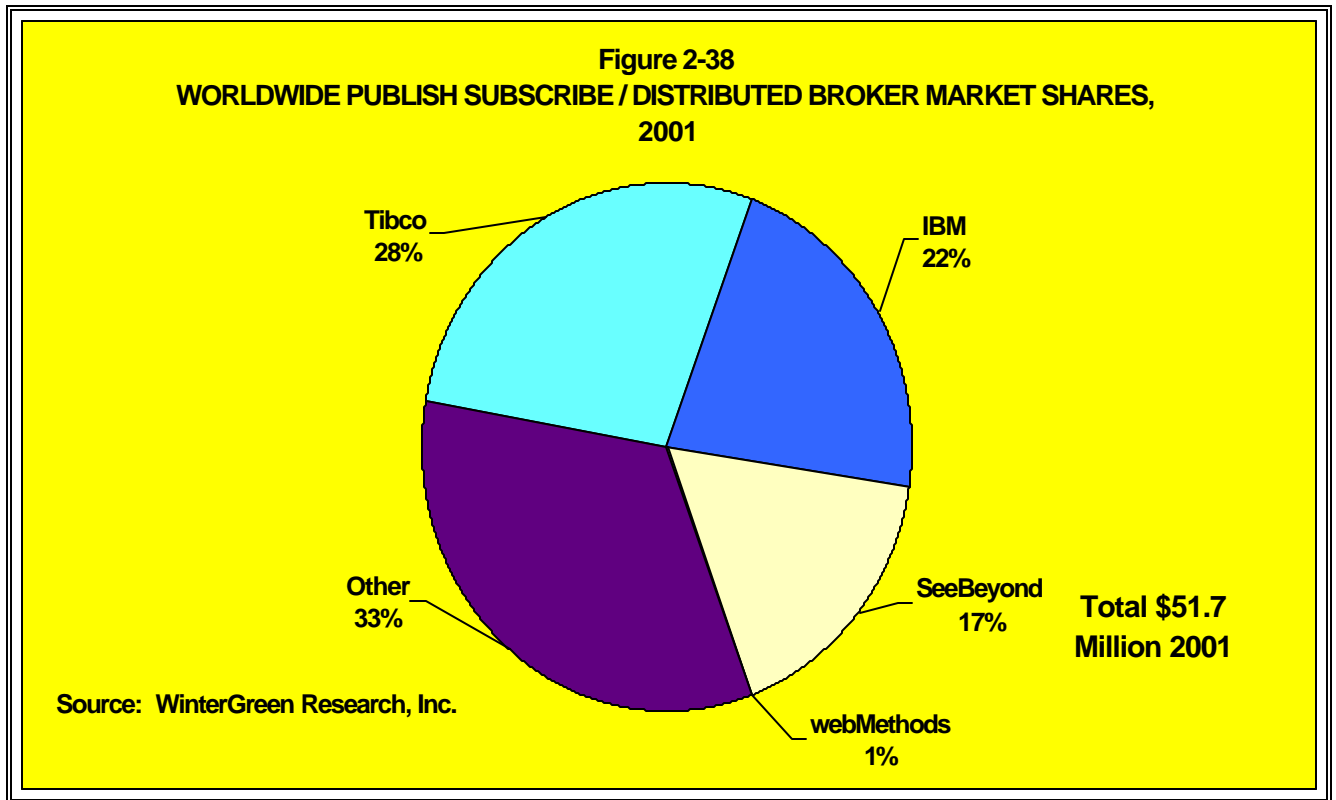
TABLE 2-39 PUBLISH SUBSCRIBE / DISTRIBUTED ENGINE MARKET SHARES, 2001 In Millions of Dollars		
	MM$	**%**
Tibco	14.3	27.7
IBM	11.4	22.1
SeeBeyond	8.8	17.0
Other	17.2	33.3
Total	**51.7**	**100.0**
Source: WinterGreen Research, Inc.	**51.68**	

Most of the publish subscribe revenue comes from separate shrink wrapped publish subscribe products that are not detailed here, presented otherwise in the middleware messaging market description. This is only a small part of the total revenue for the publish subscribe market.

Publish subscribe messages have headers that can be read and managed by network servers. In this manner messages can be sent to many destinations from one source.

Tibco and IBM have a dynamic distributed broker architecture that is useful for diverse distributed computing projects including pushing a stock quote data out or managing manufacturing.

The Tibco architecture is useful in a range of contexts. Tibco has positioned to migrate its distributed broker system into other market segments. It also seeks to extend its AI presence. Tibco has a dynamic distributed broker architecture that is useful for diverse distributed computing projects including pushing a stock quote data out or managing manufacturing.

IBM has a strong architecture that uses a very efficient push computing architecture. The nodes on the system resemble IP architecture. SeeBeyond has a very strong publish subscribe architecture.

2.16.1 Distributed Processing Publish Subscribe Integration Broker Market Forecasts

Distributed broker publish subscribe AI market forecast analysis indicates that 2001 revenue of $51.7 million is expected to reach $425.9 million by 2007. (See Figure 2-40 and Table 2-41.)

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FIGURE 2-40
WORLDWIDE PUBLISH SUBSCRIBE DISTRIBUTED PROCESSING MARKET FORECASTS,
2002-2007

Source: WinterGreen Research,
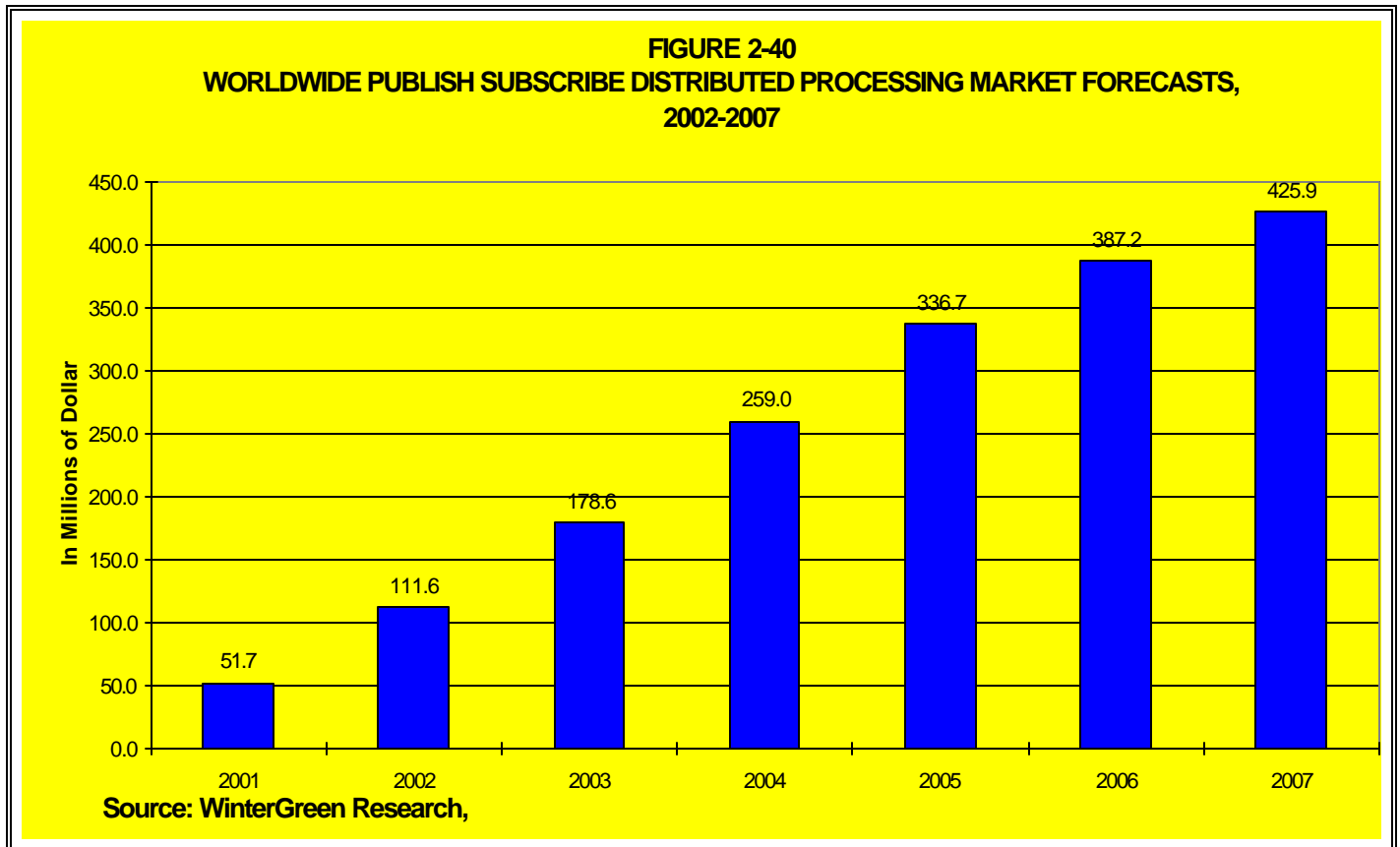
This publish subscribe technology is being extended to provide an architecture similar to IP for integration systems. Market growth is fueled by trends to use push computing in distributed computing situations in combination with application integration.

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TABLE 2-41
DISTRIBUTED ENGINE PORTION OF PUBLISH SUBSCRIBE MARKET FORECASTS, 2002-2007
In Millions of Dollars

	2001	2002	2003	2004	2005	2006	2007
Number of Units (000)	2,042.7	4,047.9	6,168.2	8,768.5	11,631.7	13,790.2	15,801.3
% Growth	8.9	18.6	21.0	20.0	21.0	22.0	23.0
Price per Distributed Engine (000)$	25.3	27.6	29.0	29.5	28.9	28.1	27.0
% Growth	10.0	9.0	5.0	2.0	-2.0	-3.0	-4.0
Distributed Broker Engines (MM$)	**51.7**	**111.6**	**178.6**	**259.0**	**336.7**	**387.2**	**425.9**
% growth	125.0	116.0	60.0	45.0	30.0	15.0	10.0

Source: WinterGreen Research, Inc.

2.17   Transformation Broker Markets Shares

Transformation broker markets shares in 2001 are illustrated in Figure 2-42 and Table 2-43.

Figure 2-42
TRANSFORMATION ENGINES MARKET SHARES, 2001
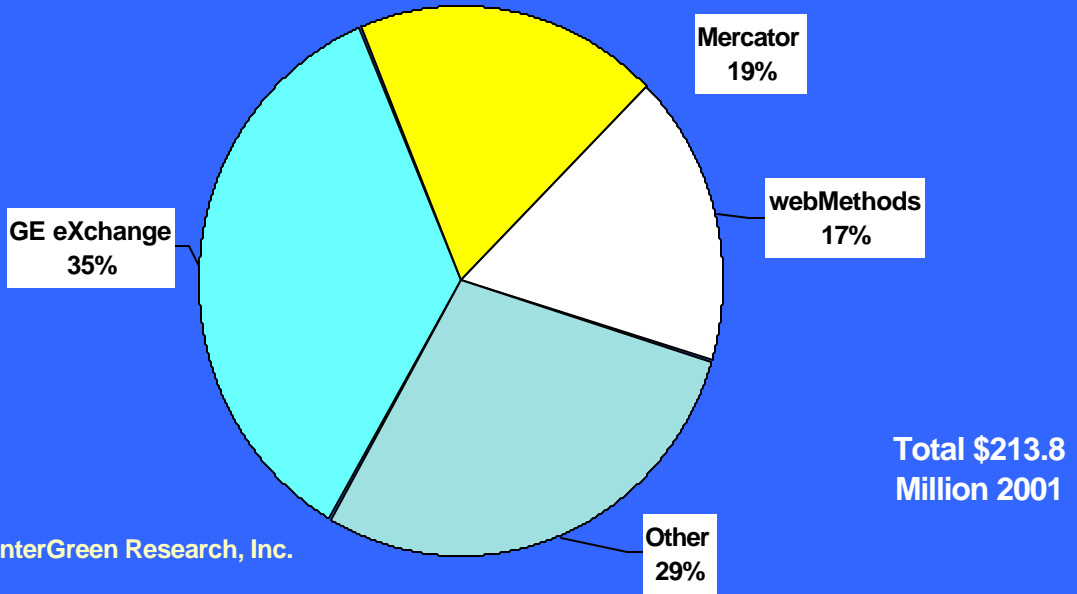
Mercator
19%

webMethods
17%

GE eXchange
35%

Total $213.8
Million 2001

Other
29%

Source: WinterGreen Research, Inc.

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TABLE 2-43
TRANSFORMATION ENGINE
MARKET SHARES, 2001
In Millions of Dollars

	MM$	%
GE eXchange	75.4	35.3
Mercator	40.1	18.8
webMethods	37.1	17.4
Other	61.1	28.6
Total	**213.8**	**100.0**

Source: WinterGreen Research, Inc.

GE eXchange had 35% market share and has had 40% growth in this segment in 2001, achieving many OEM bid wins. Mercator had 19% of the market. GXS has sophisticated ability to transform complex application data from EDI to XML and from one XML flavor to another.

The GXS market position proposition is based on the theory that suppliers and vendors each have multiple different groups with whom they must communicate. These groups need transformation in the middle to assure continuity of communication. A supplier may have 200 to 6,000 different vendors with whom it needs to exchange order and bid information.

GE Global eXchange has a base from its dominant position in EDI markets. It has major OEM customers for transformation brokers and captured 23% of the EDI transformation market in 2001.

Transformation companies like GXS and Mercator are needed to translate messages from one XML format to another. Mechanisms for condensing XML messages are sure to be implemented as XML explodes information by as much as 100 times with formatting controls.

The bidding process is too complex for each vendor to be linked directly to each supplier with proprietary, expensive systems. Likewise, each vendor may have as many as 30,000 suppliers that need to be interconnected to the vendor systems. If each of those suppliers only had one vendor to whom they needed to connect, then it would be easy to develop integration systems.

But, each supplier in turn, as noted above, has 200 vendors each with different XML or EDI systems. Thus, XML and EDI transformation is needed for each link, as each vendor and supplier have a different format and protocol.

Mercator is positioned as a solution provider that goes beyond messaging to flat files and other transfer modes for integrating applications with legacy systems, best-of-breed application modules, e-commerce, databases, files, and data warehouses. Pre-built format definitions and automatic import facilities provide off-the-shelf support for a wide range of application formats.

2.17.1   Transformation Broker Market Forecasts

Distributed transformation broker market forecasts indicate that 2001 revenue of $213.8 million is expected to reach $1 billion by 2007. (See Figure 2-44 and Table 2-45.)

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Application Integration Market Forecasts

Transformation broker architecture is useful for supporting business exchanges and e-commerce diverse distributed computing projects including managing exchange of information between suppliers. Transformation engines are basically supply chain integration systems. .

FIGURE 2-44
WORLDWIDE TRANSFORMATION ENGINE MARKET FORECAST, 2002-2007

Source: WinterGreen Research,
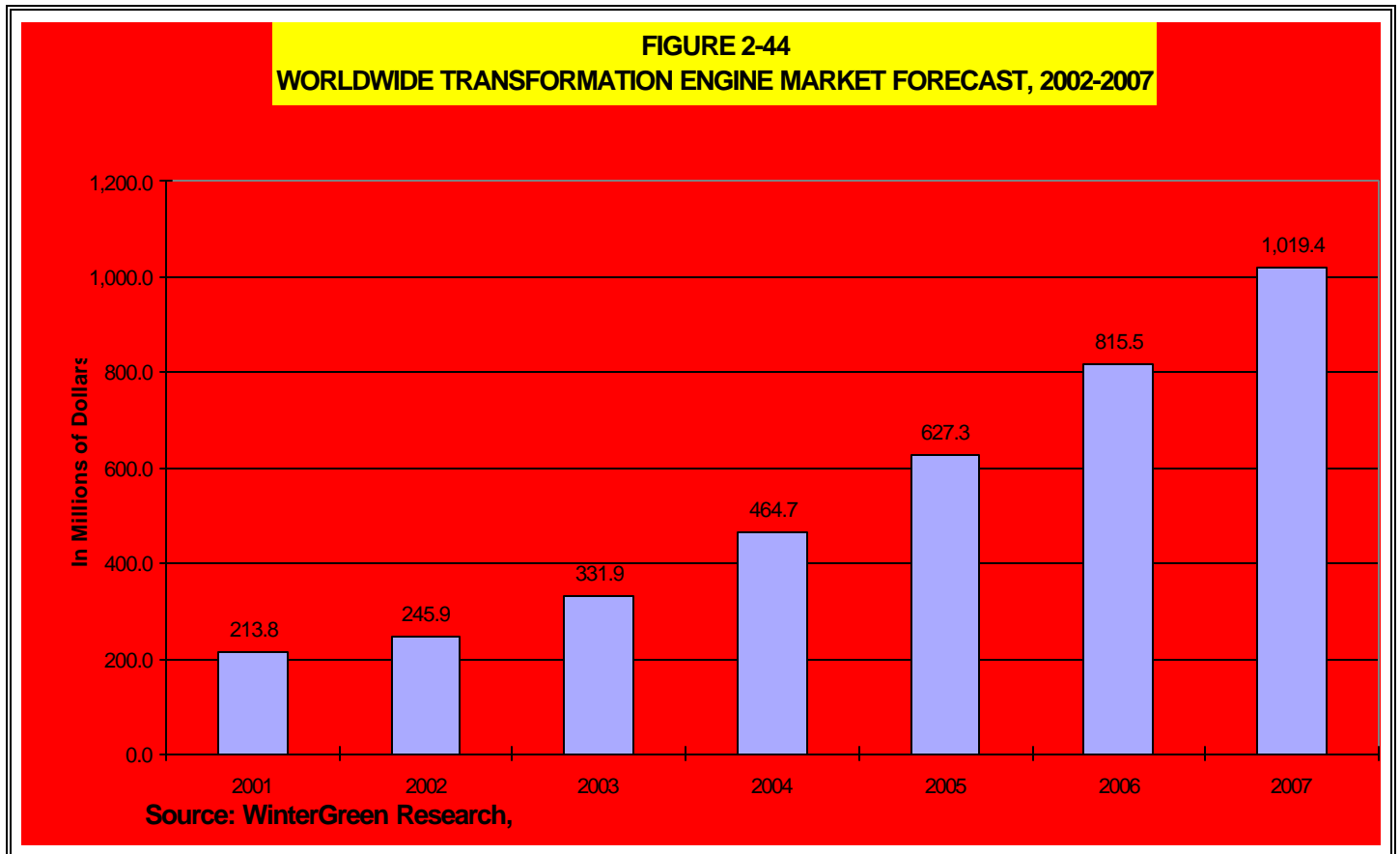
TABLE 2-45
TRANSFORMATION ENGINE MARKET FORECASTS, 2002-2007
In Millions of Dollars

	2001	2002	2003	2004	2005	2006	2007
Number of Units (000)	6,343.9	8,017.1	11,392.7	16,443.1	22,651.1	29,743.9	37,555.5
% Growth	45.0	26.4	42.1	44.3	37.8	31.3	26.3
Price per Transformation Engine (000)	33.7	30.7	29.1	28.3	27.7	27.4	27.1
% Growth	-8.0	-9.0	-5.0	-3.0	-2.0	-1.0	-1.0
Transformation Engines (MM$)	**213.8**	**245.9**	**331.9**	**464.7**	**627.3**	**815.5**	**1,019.4**
% growth	12.0	15.0	35.0	40.0	35.0	30.0	25.0

Source: WinterGreen Research, Inc.

This transformation technology is being extended to provide an architecture that supports exchange of information between EDI and XML systems. Market growth is fueled by trends to use push computing in distributed computing situations.

2.18   Process Workflow Market Shares

Markets shares for process workflow markets in 2001 are illustrated in Figure 2-46 and Table 2-47. Sun / iPlanet has a strong product offering in this arena. Without the AOL / Netscape mantra, this product should move more into the mainstream of enterprise information sharing.

iPlanet had the leadership position in process workflow in 2001 with 31% market participation and IBM came on strong in this market segment with 22% market participation at the number two market position.

Figure 2-46
WORLDWIDE PROCESS WORKFLOW MARKET SHARES, 2001
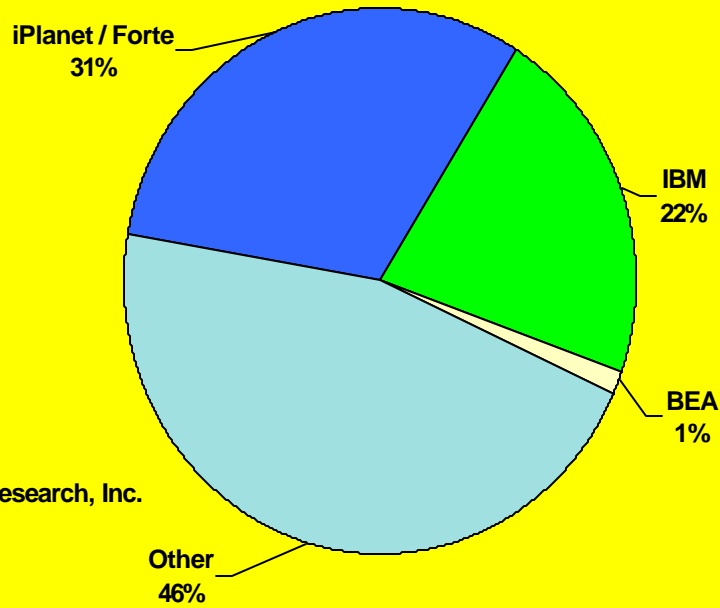
iPlanet / Forte
31%

IBM
22%

BEA
1%

Total $203.2
Million 2001

Source: WinterGreen Research, Inc.

Other
46%

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TABLE 2-47
BUSINESS PROCESS WORKFLOW
MARKET SHARES, 2001
In Millions of Dollars

	MM$	**%**
iPlanet / Forte	63.2	31
IBM	43.7	22
BEA	2.7	1
Other	93.6	46
Total	**203.2**	**100**

Source: WinterGreen Research, Inc.

2.18.1   Process Workflow Market Forecasts

Workflow markets are divided between document management workflow and manufacturing process control workflow. This analysis discusses those portions of the workflow market that have to do with process. Document management is different.

Markets for process workflow at $203.2 million in 2001 are expected to reach $1.4 billion by 2007. (See Figure 2-48 and Table 2-49.) Workflow markets are being merged with other AI broker market segments in 2001.

FIGURE 2-48
WORLDWIDE PROCESS WORKFLOW MARKET FORECAST, 2002-2007
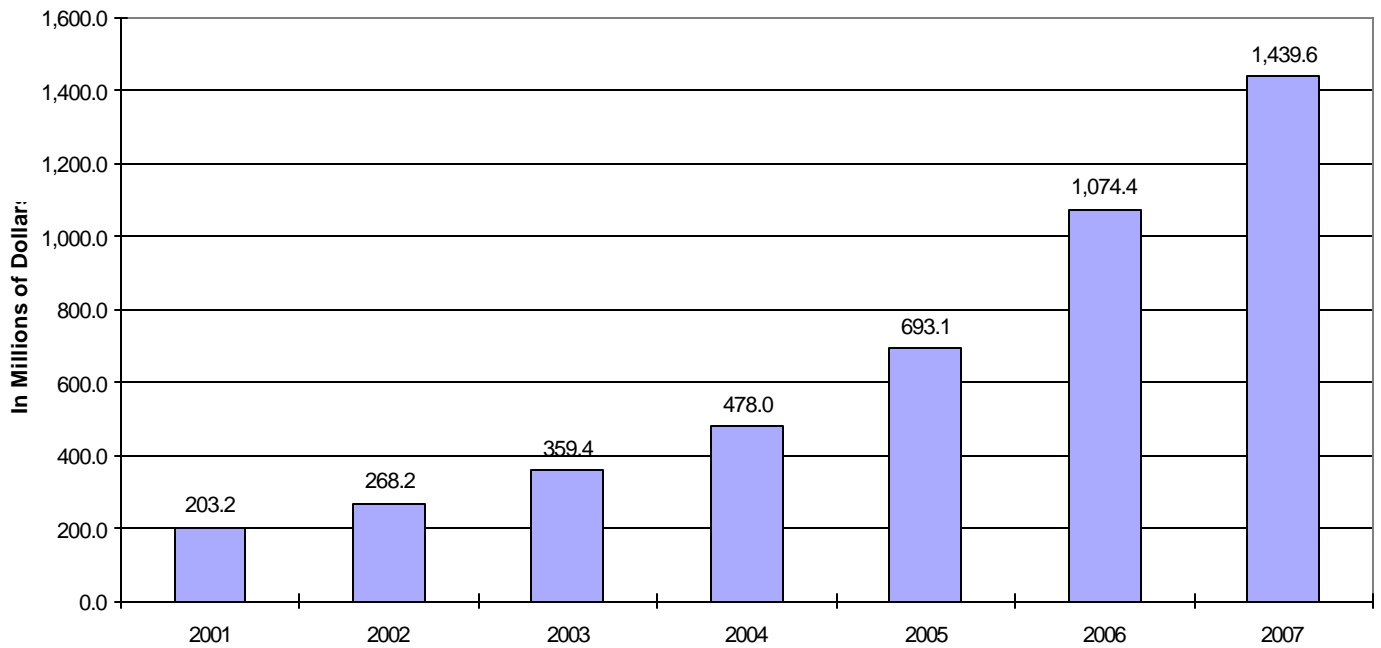
Source: WinterGreen Research,

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TABLE 2-49 BUSINESS PROCESS WORKFLOW MARKET FORECASTS, 2002-2007 In Millions of Dollars	2001	2002	2003	2004	2005	2006	2007
Process Workflow	203.2	268.2	359.4	478.0	693.1	1,074.4	1,439.6
% growth	35.0	32.0	34.0	33.0	45.0	55.0	34.0
Source: WinterGreen Research, Inc.							

By 2007, a large part of this market segment will be considered part of the workflow market business process management market. Workflow market growth is fueled by trends to automate business processes and reduce paperwork and eliminate manual duplicate entry into computing systems. Workflow is being relegated to exception management.

2.19   E-Business

Utilizing the Internet to do B to B exchange represents incredible efficiencies. E-business is dramatically altering business-to-business (B2B), business-to-consumer (B2C), and business-to-employee interactions. Companies are actively pursuing innovative business models to take advantage of this e-Business opportunity. AI is at the center of the technology used to implement e-business.

The Internet is being used to create exchanges that resemble the Chicago mercantile exchange but are implemented for every business segment. Prices float. Business partners share in the development and fulfillment of orders. E-business participants include traditional companies moving to new Internet-enabled business models, new companies chartered especially to deliver products and services via the Internet, and e-market makers that facilitate e-business through online trading communities.

E-business organizations operate in an environment distinguished by constant change and complex business interactions that stretch across an extended, virtual enterprise of Internet-enabled customers, suppliers and partners.

Speed, agility and accuracy are the tools required to achieve competitive advantage. Companies must conduct business in real-time, providing immediate communication with customers, vendors and other partners via clearly defined business processes. Processes must be constantly monitored and modified to maximize efficiency. Automating business processes is fundamental to success in the e-business environment.

Substantial benefits impact procurement to order fulfillment of automating business processes across the enterprise. A company that automates procurement processes with their suppliers can shorten cycle times and reduce inventory while locating the best price, all of which lowers costs and increases profits.

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Similarly, an organization that allows customers to place and check order status via a Web site and e-mail improves customer satisfaction and increases market opportunity while decreasing the costs of customer service and order processing.

The business revolution is in its infancy and has substantial growth potential. Every business is moving to establish and enhance its e-business capabilities. Goods and services providers are leveraging online trading opportunities. Communities that form exchanges include both established companies and the new Internet-based virtual businesses.

Online trading communities facilitate e-markets for goods and services. These e-market makers bring together multiple suppliers and consumers in an electronic marketplace far more efficiently than anything in the physical world.

2.19.1   B to B

The B2B segment is substantially larger and growing even more rapidly. $284 billion of B2B commerce was conducted via e-business in 2001. By 2003 B2B transactions on line reach $2.7 trillion. Growth is expected to bring more efficient ways of conducting business. B to B electronic commerce markets reached $42.2 trillion by 2007. (Figure 2-50 Table 2-51.)

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FIGURE 2-50
Worldwide B To B E-Commerce Market Forecasts, 2002-2007

Source: WinterGreen Research,

2-77
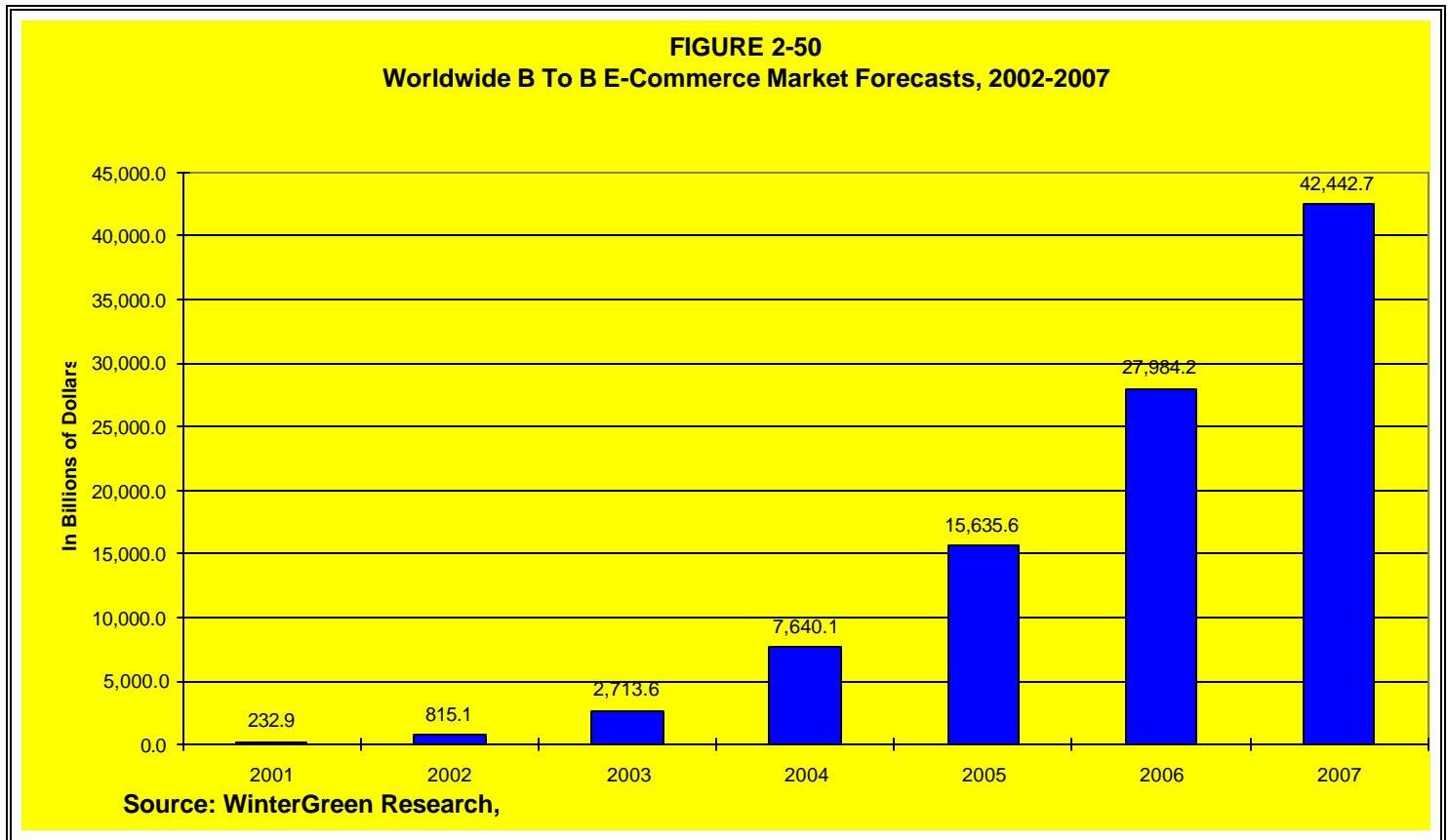
TABLE 2-51
WORLDWIDE INTERNET TRANSACTIONS CONDUCTED, 2002-2007
In Billions of Dollars

	2001	2002	2003	2004	2005	2006	2007
Consumer	51.1	178.9	516.9	1,243.7	2,132.1	3,109.4	4,197.6
B2B / Supply Chain	232.9	815.1	2,713.6	7,640.1	15,635.6	27,984.2	42,442.7
Transactions	**284.0**	**994.0**	**3,230.5**	**8,883.9**	**17,767.8**	**31,093.6**	**46,640.3**
% Growth	340.0	250.0	225.0	175.0	100.0	75.0	50.0

Source: WinterGreen Research, Inc.

The number of online trading communities increased dramatically in 2001 to 9,600. This number is expected to double by the end of the year 2002. Every industry organization is positioning to become a trading exchange via the Internet. Some will be more effective than others.

Goods and services e-business and online trading community exchange growth is interdependent. Online trading communities sprout in direct response to the escalating opportunities of goods and services e-Business.

Markets for direct e-business are reached by exploiting the efficiencies afforded by online trading communities.

B2C transactions transpired in 2001 through companies such as Amazon.com and Web-based and consumer retail companies like Lands' End. This market is expected to realize growth worldwide based on electronic commerce conducted over the Internet.

2.19.2   Global Exchange Services

Global exchange services relate to outsourcing internal data networks and implementing B2B e-commerce enterprise networks. The two largest market participants IBM and GE Global exchange services have a worldwide presence, each with more than 100,000 trading partners.

The enterprise and Internet networks pass 2.3 billion transactions annually, accounting for $4 trillion in goods and services exchange. Service providers apply quality processes to provide e-commerce solutions that help businesses remove costs from their supply chains.

B2B e-commerce enterprise networks depend on integration technology. The two largest market participants IBM and GE Global eXchange services have more than 100,000 trading partners.

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2.20   AI Regional Analysis

AI markets at $1.265 billion had as the largest segment the U.S. with 55% of the total in 2001. Europe was at 36%, Asia Pacific 4%, and Japan had measurable market share. (See Figure 2-52 and Table 2-53.)

Figure 2-52
EAI Regional Market Shares, 2001

U.S.
55%

Other
2%

Asia / Pacific
4%

Japan
3%

Europe
36%

Total $1.2 Billion
2001

Source: WinterGreen Research, Inc.
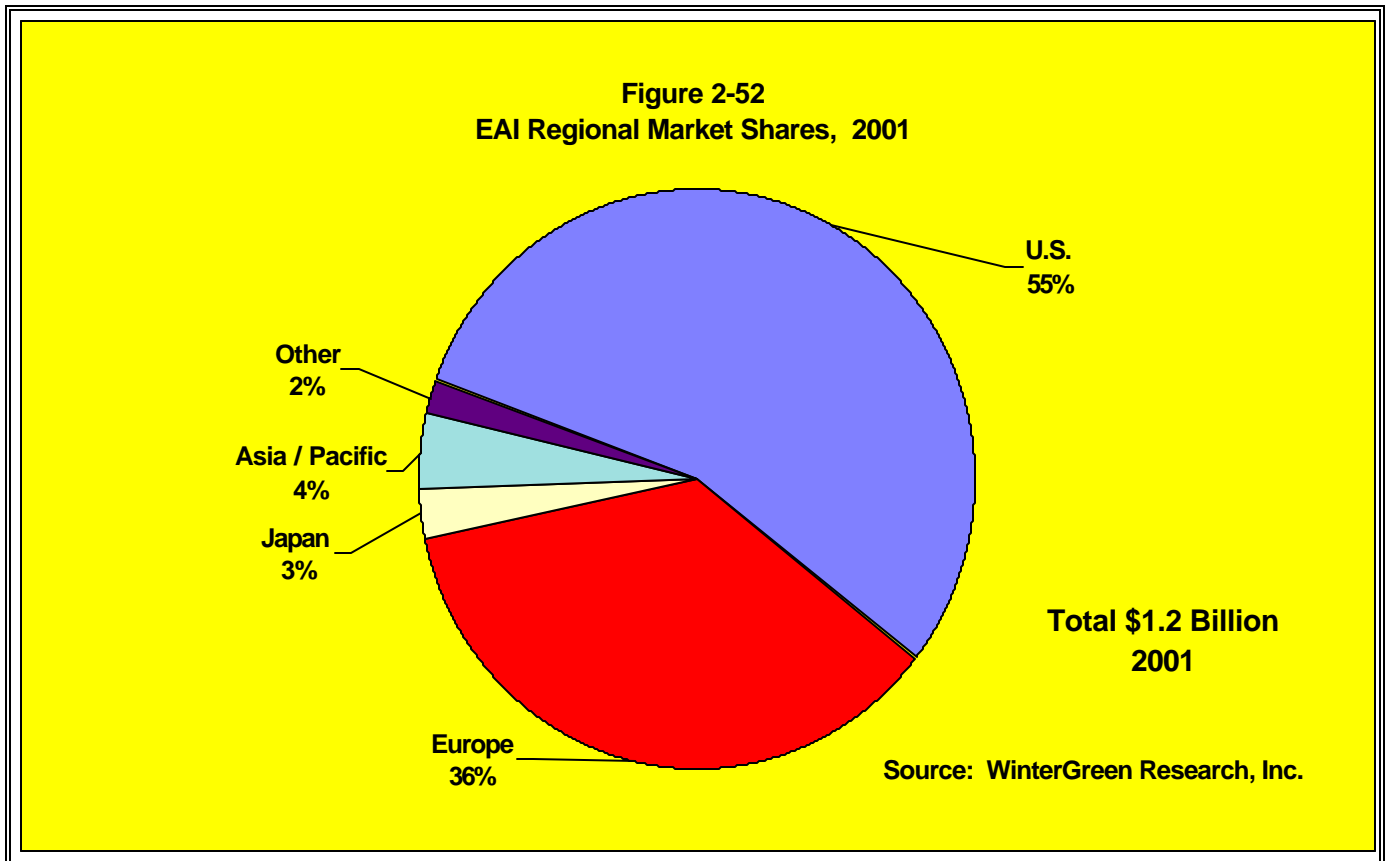
Table 2-53
AI Regional Market Shares, 2001
In Millions of Dollars

	2001	%
U.S.	696.0	55
Europe	455.6	36
Japan	38.0	3
Asia / Pacific	50.6	4
Other	25.3	2
Total	**1,265.5**	**100**

Source: WinterGreen Research, Inc.

In 2007, AI continues to have more revenue from the U.S. than from other regions, 51% of the total $5.9 billion market. For the rest of the world, Europe is at 32%, Japan has 7%, and the Asia Pacific region other than Japan has 7% market share. (See Figure 2-54 and Table 2-55.)

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Figure 2-54
Worldwide Application Integration Software Regional Market Shares, 2007
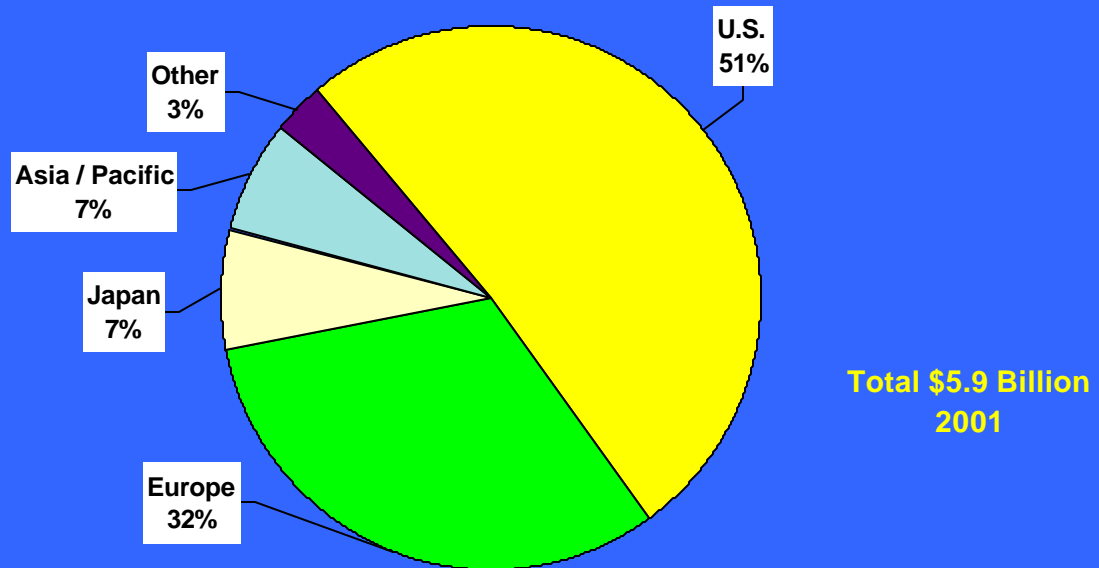
- U.S. 51%
- Other 3%
- Asia / Pacific 7%
- Japan 7%
- Europe 32%
- Total $5.9 Billion 2001

Source: WinterGreen Research, Inc.

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Table 2-55 **AI Regional Market Shares, 2007** In Millions of Dollars		
	2007	**%**
U.S.	3,006.5	51.0
Europe	1,886.4	32.0
Japan	436.2	7.4
Asia / Pacific	389.1	6.6
Other	176.9	3.0
Total	**5,895.0**	**100.0**
Source: WinterGreen Research, Inc.		

Market growth globally is fueled by trends to improve supply chain integration inside companies and with partners. Customer service systems improvement is on a par with the Internet as a market driver worldwide. Enterprise applications need to show the status of orders, shipments, and product prices.

Table 2-56 illustrates AI APPLICATION Development market segments. These segments will be implemented in different regions differently.

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Table 2-56
AI Application Development Market Segments

- Internet site management

- E-commerce

- Strategic partner interconnectivity

- Supply chain automation

- Business analysis

- Remote productivity

- CTI / call processing

Source: WinterGreen Research, Inc.

2.21   Direction Of EAI Markets

The direction of EAI markets promises expansion beyond the rules and other engines that represent the market today. IBM and Tibco are positioned to address the markets as they expand while other competitors have more work to do to develop broad EAI and related functionality.

2.21.1   Major Participants Going Forward

IBM and Tibco have a broad messaging base, portal capability, and management systems. IBM has Tivoli and Tibco has Tib Hawk. Other market participants do not have such substantial market positioning. Both IBM and Tibco have a leading participation in the messaging market. Messaging provides the base for AI and EAI by creating messages that are then used to integrate applications.

Figure 2-57 and Table 2-58 illustrate that Tibco and IBM break away from other market participants. There is plenty of room for a variety of participants in this large and vital integration software segment. What is essential to have long term staying power in the market is to have a strong rules engine, a full complement of EAI and AI modules, a portal, and Web services.

Figure 2-57
Worldwide Market Shares, Application Integration,
EAI, Portal, System Management Middleware, 2001

IBM
22%

Tibco
15%

Web Methods
9%

SeeBeyond
8%

Other
46%

Total $ 1.5
Billion 2001

Source: WinterGreen Research, Inc.

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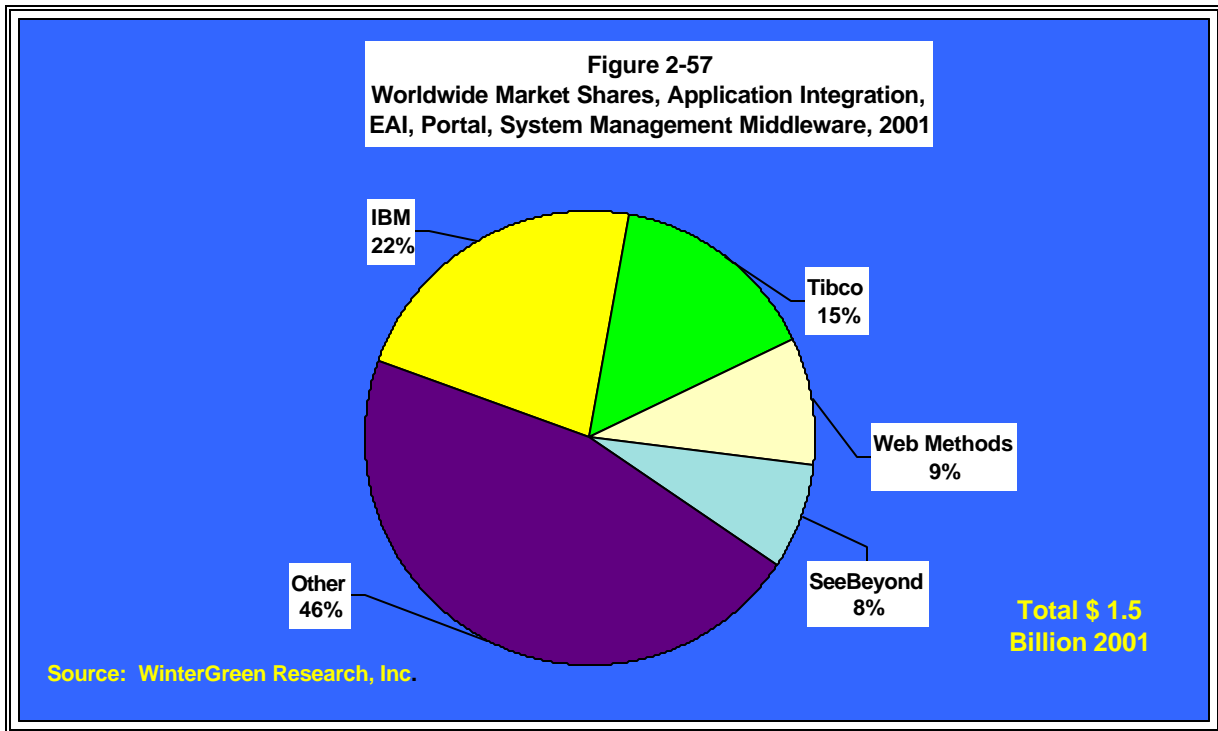
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TABLE 2-58
MARKET SHARES, APPLICATION INTEGRATION
EAI, PORTAL, SYSTEM MANAGEMENT MIDDLEWARE
2001

Company	$MM EAI, Portal, Mgmt Software Licensing Fees	% Market Share
IBM	324.7	12.0
Tibco	217.3	9.1
Web Methods	132.6	6.4
SeeBeyond	109.6	5.1
Other	671.3	46.2
Total	**1,455.5**	**78.8**

Source: WinterGreen Research, Inc.

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3. Application Integration Products

3.1 Rules Engines and Brokers

Enterprise portals, Internet applications, and enterprise application integration are positioned to provide suites of functionality that have at their center rules engines. Rules engines provide point solutions that drive acceptance of these infrastructure suites. Integration systems are offered as rules engines that solve particular business problems relating to the network. The integration market is addressing specific integration solutions and ROI analysis of the immediate return of investment for that solution.

Rules engines and brokers provide the infrastructure to manage change. Rules engines form the base for message brokers by permitting the redirection of information on the fly.

Information is contained in messages that are transmitted across the network. These messages frequently contain information that needs to be redirected based on the content of the message. For example, transactions of a certain size go one place, of another size go another place. The rules engine manages the redirection of the information.

3-1

3.1.1 IBM WebSphere MQ Integrator

IBM WebSphere MQ Integrator offers a full complement of AI capabilities. The AI suite is [part of a larger product offering that includes an application server, portal, mission critical messaging, and Web services/XML functions. The product suite is based on a strong rules engine system to permit control of mission critical messaging and message paths.

An adapter strategy combines a wide variety of adapters. Application vendor adapters are different for each product version. Third party adapters, pluggable adapters, an adapter builder, and reusable adapter modules are offered.

Workflow is designed to be versatile for business process management and exception handling. Highly evolved mission critical asynchronous and synchronous integration logic is part of the product positioning. Table 3-1 illustrates IBM WebSphere MQ Integrator functions.

Table 3-1

IBM WebSphere MQ Integrator Functions

- Full complement of AI capabilities

- Offering includes application integration, application server, portal, mission critical messaging, and Web services/XML

- Strong rules engine system to permit control of mission critical messaging and message paths

3-2

Table 3-1 (Continued)

IBM WebSphere MQ Integrator Functions

- Adapter strategy combines a wide variety of IBM adapters with application vendor, third party, pluggable, adapter builder, and reusable adapter modules

- Workflow that is versatile for business process management and exception handling

- Business process management

- Highly evolved mission critical asynchronous and synchronous integration logic

Source: WinterGreen Research, Inc.

3.1.2 MQ Integrator

MQ Integrator software is used to implement transaction systems integration in every industry. The systems are used to direct information to where it is needed, when it is needed. Systems provide access to corporate data, wherever it is, in whatever format.

The product holds the promise of permitting users to revamp business practices using business knowledge based on information obtained from applications and databases.

3-3

The system is used to integrate applications into corporate information networks. Core technologies have been integrated into an enterprise level integration server architecture that leverages the benefits of individual modules to deliver brokering. Employment of dynamic formatting and guaranteed delivery abstract the translation and delivery of information across applications. Table 3-2 illustrates MQ Integrator software functions.

Table 3-2

MQ Integrator Software Functions

- Used to implement transaction systems integration in every industry

- Used to direct information to where it is needed

- Used to direct information when it is needed

- Provide access to corporate data

- Used to direct information wherever it is

- Used to direct information in whatever format it comes

- Permits users to revamp business practices using business knowledge

3-4

Table 3-2 (Continued)

MQ Integrator Software Functions

- Permits decision making based on information obtained from applications and databases

- Used to integrate applications into corporate information networks

- Integrates core technologies into an enterprise level integration server architecture

- Leverages benefits of individual modules

- Delivers brokering

- Provides dynamic formatting

- Provides guaranteed delivery

- Manages information across applications

Source: WinterGreen Research, Inc.

Systems simplify the intrusion into new or legacy programs. Intrusion is needed for such programs to inter-operate. MQ uses a non-programmatic and declarative rather than procedural definition toolset, allowing configuration and maintenance workloads to scale comfortably by describing formats for input and output as the number of interfaces increases.

It maintains transaction level reliability and state matching for the transmission of critical data. It provides independent scalability across all modules to service information-intensive enterprises.

It combines implicitly asynchronous architecture and high reliability to permit all nodes of a network to operate at enhanced efficiency. It operates transparently over the wide range of computing hardware, network and operating software often found in today's information technology environments.

Table 3-3 illustrates IBM integration systems functions. Table 3-4 illustrates IBM integration system architecture.

Table 3-3
IBM Integration Systems Functions

- **Simplify the intrusion into new or legacy programs**

- **Support intrusion so programs can inter-operate**

- **Use a non-programmatic procedural definition toolset**

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Table 3-3 (Continued)

IBM Integration Systems Functions

- Use declarative rather than procedural definition toolset

- Allow configuration of workloads

- Allow maintenance of workloads

- Permit systems to scale comfortably

- Describe formats for input and output

- Manage an increasing number of interfaces

- Maintain transaction level reliability

- Maintain state matching

- Support transmission of critical data

- Provide independent scalability across all modules

- Target to service information-intensive enterprises

Source: WinterGreen Research, Inc.

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Table 3-4

IBM Integration Systems Architecture

- Combines implicitly asynchronous architecture and high reliability

- Permits all nodes of a network to operate at enhanced efficiency

- Operates transparently over the wide range of computing hardware, network and operating systems

- Abstracts the translation and delivery of information to independent variable that can be managed independently of a particular application, database, or storage location

Source: WinterGreen Research, Inc.

3.1.3 IBM Infrastructure For Real-Time Network

WebSphere MQ Integrator is positioned to turn the enterprise infrastructure into a dynamic, real-time, application network, exploiting all resources and achieving business integration. Business events include receiving an order, pre-empting a customer's question, building new stock, searching for economies, billing and payment.

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Processes handled by the enterprise become cooperative processes, dynamically and freely sharing information, overcoming the traditional gaps between different business applications and between different workgroups. MQ Integrator is a second-generation message broker. It has an open architecture. It is designed to provide flexibility to handle future business and technology changes.

Integrating the diverse aspects of business is accomplished by using IBM MQ messaging middleware enables applications on different platforms to talk to each other and takes care of network interfaces, assures the delivery of messages, deals with communications protocols, and handles recovery after system problems. Table 3-5 illustrates IBM strategy for integrating the diverse aspects of business.

Table 3-5

IBM Strategy For Integrating The Diverse Aspects Of Business

- Enables applications access

- Enables entry to information stored on different platforms

- Enables entry to information in different applications

- Enables platforms and applications to talk to each other

- Permits dials for information in a manner similar to a voice call

3-9

Table 3-5 (Continued)

IBM Strategy For Integrating The Diverse Aspects Of Business

- Takes care of network interfaces

- Assures delivery of messages

- Deals with communications protocols

- Handles recovery after system problems

Source: WinterGreen Research, Inc.

3.1.4 Business Need

MQ Integrator sits at the heart of the enterprise and all messages pass through it. It applies enterprise rules that decide which applications should be recipients, and directs messages accordingly -- reformatting as necessary. Instead of two programs communicating as directed by a programmer, Integrator intervenes and directs a message to one or more queues that uses rules specified by a programmer.

MQ Integrator enables business analysts, who understand the processes and strategies of the enterprise, to create, inspect or change rules. Now it is the business need that defines the integration connections.

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Application Integration Products

A business need can be just about any action the enterprise wants to take, involving applications, resources or people, to carry on day-to-day business, make it more efficient, provide better customer service, or introduce new ventures.

MQ Integrator can send messages to queues and to relational databases. A bank account exceeding $10,000, for example, could trigger a message to a bank employee to call the owner with financial advice on investments. This is a service to the account holder and increased business for the bank.

MQ substitutes middleware for programming. It reduces costs and decreases the need for special programming skills. It enables the expertise of business analysts and business managers to be captured and applied to automate flexible business processes. Flow is defined by information content or by a process model.

Graphical process modeling tools are used for constructing critical data or business events. Handling occurs visually connecting a sequence of processing function to dynamically manipulate and route messages, combining them with data from corporate databases, warehouse in-flight message data for auditing or subsequent analysis, make computations on message content, apply filtering, and distribute information efficiently to business applications.

It exploits and complies with industry standards such as Structured Query Language (SQL) and eXtensible Markup Language (XML), enabling different systems to share information and to directly support emerging e-business standards.

Integrator's ability to support XML, and bridge it to nonXML users as they migrate to XML, accelerates the penetration of supply chain e-commerce by reliably carrying transactions between customers, suppliers, manufacturers and finance organizations.

MQ Integrator has an open architecture. Built-in processing components can be combined with those from third-party software vendors or the enterprise. Examples of third-party software are data cleansing packages that apply filters to warehouse data to extract business intelligence, and timing packages that correlate time-sensitive events such as guaranteed fix time for service calls, and trigger alerts at chosen intervals during countdown.

Message formats can be defined through a message dictionary -- either the one supplied with the product, the MQ Integrator compatible dictionary, or a third-party dictionary that has been enabled by a vendor.

3.1.5 MQ Integrator Platforms

MQ Integrator platforms cover the range of mainframe, Unix server, NT server, and PC platforms as illustrated in Table 3-6. There are the WebphereMQ Integrator agents for CICS and MQ Integrator partner product plug-ins. MQ Integrator works on AIX, Microsoft Windows NT, and Sun Solaris.

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Table 3-6
Selected MQ Integrator Platforms

- IBM AIX

- Sun Solaris Unix

- HP-UX Unix

- IBM Mainframe OS/390

- IBM Scaled Server OS/400

- Microsoft Windows NT

- Linux

Source: WinterGreen Research, Inc.

IBM EAI product suite is positioned as an integration engine. IBM enterprise integration engine targeted to business applications. MQIntegrator, the center of the EAI suite extends messaging to the business arena.

The MQIntegrator rules engine routes every message to the correct location with table-driven rules bases. MQIntegrator is comprised of a group of modules shown in Table 3-7.

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TABLE 3-7
MQ Integrator Modules

- Business EventManager

- Enterprise ProcessExecutive

- Forms the first layer of IBM's Business Integration with MQ

- Facilitates adding, extending, or replacing applications in an MQ network

- Applies intelligent routing to seamlessly integrate applications, databases, and networks

- Enables application-to-application message transformation

- Supports custom built and predefined application libraries

Source: WinterGreen Research, Inc.

MQIntegrator transforms data on the fly across all the leading application systems, including DB2, MQ, and Oracle. The dynamic formatter is easy to load, use and maintain. E messages format applications and the formatter maps every message.

MQ is a very attractive technology that delivers new approaches to building applications. In combination with the WebSphere integration suite, it provides a complete e-business infrastructure. Rapid application development is achieved with MQ. Table 3-8 illustrates IBM integration features.

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Table 3-8

IBM Integration Features

- Forms product in the message brokering layer

- Provides IBM business integration framework

- Makes adding, extending, or replacing applications

- Makes network simple and easy

- Applies intelligent routing to seamless integration applications, databases, and networks

- Enables application-to-application message transformation

- Supports custom built and predefined application libraries

- Supports PeopleSoft GL, SAP R/3, and S.W.I.F.T. templates

Source: WinterGreen Research, Inc.

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3.2 Tibco Software

Tibco real-time e-business infrastructure software product lines include TIBCO ActiveEnterprise®, TIBCO ActiveExchange™, TIBCO Extensibility™, and TIBCO ActivePortal™. Products enable businesses to integrate enterprise applications, interact with other businesses in B2B commerce, and efficiently deliver personalized information.

Products enable the real-time distribution of information through the Information Bus®, or TIB®. TIB technology was first used to digitize Wall Street streaming of stock ticker information. TIB technology, once shrink wrapped, has been positioned to meet the needs of diverse industries including telecommunications, electronic commerce, manufacturing, and energy.

3.2.1 Tibco Suite Of Message Brokers

Tibco Active Enterprise is evolving a suite of message broker products positioned to deliver enterprise integration. Tibco offers independent, open systems modules that support EAI functions. Tibco Rendezvous publish and subscribe messaging technology is a foundation of TIB/ActiveEnterprise. The publish subscribe model is efficient in some situations where a hub architecture does not work as well.

TIB/ActiveEnterprise is a suite of products bringing event-driven computing to the Internet and corporate Intranets. Rendezvous is positioned to deliver information delivery.

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The TIB technology facilitates the distribution of information and the integration of business processes by connecting each application to the network through a single interface, instead of linking each application directly to all others. The TIB technology supports a broad range of key eBusiness technologies such as eXtensible Markup Language, or XML, an emerging standard for sharing data over the Internet, and related XML e-Commerce frameworks, such as RosettaNet.

3.2.2 TIB Products

The product set includes dozens of applications and technologies that solve fine-grained technical challenges. To present these products as easily-understood business solutions, they are packaged in product lines that address each of the key challenges mentioned above.

Products are sold as individual pieces to solve specific technical challenges that a business may be facing, but the emphasis of our sales efforts is to sell them as a complete solution that solves an entire business problem. Tibco product lines are shown in Table 3-9.

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Table 3-9

Tibco Product Lines

- TIBCO ActiveEnterprise(TM), an Enterprise Application Integration (EAI) platform that lets applications talk to each other in real-time and automates business processes

- TIBCO ActivePortal(TM), a portal infrastructure platform that lets people interact with systems and information using the Web and wireless devices

- TIBCO ActiveExchange(TM), a B2B Integration (B2Bi) platform that lets businesses automate transactions and processes with other companies

- TIBCO Extensibility(TM), a platform that lets businesses efficiently manage XML documents and business objects, as well as the rules that define those documents and objects

Source: WinterGreen Research, Inc.

Tibco provides robust e-business infrastructures that give companies the ability to manage and profit from change and become e-businesses. Tibco targets brick-and-mortar business looking to take advantage of the Internet.

Tibco systems permit companies with a recognized brand to expand market share by utilizing the Internet as a new channel. The customer base achieves cutting-edge market advantage by utilizing systems that facilitate commerce intermediary exchanges that bring buyers and sellers together. Table 3-10 illustrates Tibco target markets. Table 3-11 illustrates Tibco product positioning.

Table 3-10

Tibco Target Markets

- Robust e-business infrastructures service providers

- Companies that want the ability to manage and profit from change

- Companies that want to leverage e-businesses opportunities

- Brick-and-mortar business looking to take advantage of the Internet

- Cutting-edge commerce exchange intermediaries

- Business exchanges that want to bring buyers and sellers together

Source: WinterGreen Research, Inc.

Table 3-11

Tibco Product Positioning

- **Integrate internal systems**

- **Automate business processes**

- **Extend business communication to employees**

- **Extend business communication to customers**

- **Extend business communication to partners**

- **Connect with other enterprises**

- **Extend business communication to e-marketplaces**

Source: WinterGreen Research, Inc.

Tibco infrastructure is positioned to be powerful and reliable. Systems are positioned to help users take advantage of the Internet, be flexible, and scale to meet needs as they increase over time. TIBCO provides robust e-business infrastructures that give companies the ability to manage and profit from change and become e-businesses.

3.2.3 Tibco Active Enterprise

Integrating disparate applications, databases and business processes is the primary task of Tibco software. Systems are designed to make an entire company run complex processes. Turning a set of disconnected applications and sub-processes into a cohesive system can dramatically improve the way a business works. TIBCO ActiveEnterprise does this by performing the following functions illustrated in Table 3-12.

Table 3-12

TIBCO ActiveEnterprise Functions

- Application-to-application communications

- Business process automation

- System monitoring and management

Source: WinterGreen Research, Inc.

Tibco is positioned to connect distributed applications and sub-processes into a cohesive system. Application-to-application communication is enabled. TIBCO ActiveEnterprise routes information through businesses by connecting enterprise applications and information sources.

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It enables real-time communications among CRM, ERP and e-procurement applications, databases and mainframes, and home-grown and legacy applications. Information sources are extended for the enterprise.

Business process automation has been able to grow EAI market opportunity. Tibco ActiveEnterprise automates complete business processes by automating electronic tasks and managing the workflow of tasks performed by people.

Tibco ActiveEnterprise lets businesses remotely monitor and manage hardware and software assets to help them keep their systems up-and-running 24 hours a day. System monitoring and management is enabled with Tib Hawk.

3.2.4 Tibco Active Exchange

B2B integration improves the execution of existing business processes. By automating interactions with other businesses, those interactions are made more dynamic and collaborative. Tibco ActiveExchange functions are shown in Table 3-13.

Table 3-13

TIBCO ActiveExchange Functions

- Automating Business Processes with Partners

- Enhancing Interaction with Partners of All Sizes

- Ensure the Security of B2B Interactions

Source: WinterGreen Research, Inc.

Tibco supports automating business processes with partners. TIBCO ActiveExchange automates business processes between companies such as the placement of a purchase order, the return of excess inventory, or the act of updating a catalog entry. The basic building block of this functionality is the secure exchange of documents over the Internet, but the automation of the process by which those documents are exchanged is where the most benefit is found.

Tibco supports enhancing interaction with partners of all sizes. TIBCO ActiveExchange lets businesses establish process-based relationships with other large enterprises, and also lets them interact with smaller partners in basic business document exchange-oriented relationships. This lets them efficiently expand their network of trading partners to include companies of all sizes around the world.

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Tibco ensures the security of B2B interactions. TIBCO ActiveExchange provides security mechanisms that help ensure the security of interactions, and supports many leading standards and data formats.

3.2.5 WebMethods B2Bi Solution Suite

The WebMethods B2Bi Solution Suite automates business processes inside the enterprise and with partners and customers over the Internet. The comprehensive solution suite includes B2B, enterprise, mainframe and partner integration offerings that enable Global 2000 companies and B2B exchanges to deploy a complete, end-to-end solution for integrating customers, suppliers and partners into real-time B2B trading networks, while also increasing internal operational efficiencies.

3.2.6 WebMethods Security Initiatives

By developing and adopting open security standards that can transcend company and application boundaries, companies can securely exchange information with their customers, partners or suppliers regardless of the security systems or applications that they have in place.

WebMethods security initiatives support B2B transactions that involve multiple business partners. Security standards reduce complexity and transcend application boundaries. WebMethods offers comprehensive support of open security standards. It provides the framework for secure e-business transactions across multiple and diverse business partners to enable faster and more secure B2B transactions.

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3.2.7 WebMethods Open Security Standards Initiative

The WebMethods product family was designed to provide broad support for open standards and protocols. Protocols include XML, RosettaNet, ebXML, FpML, cXML, xCBL, OBI, OAG, ACORD and the BizTalk framework as shown in Table 3-14. .

Table 3-14

WebMethods Protocols

- XML

- RosettaNet

- EbXML

- FpML

- CXML

- XCBL

- OBI

- OAG

- ACORD

- BizTalk

Source: WinterGreen Research, Inc.

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WebMethods has partnered with industry leaders to expand its support of the following security standards shown in Table 3-15.

Table 3-15

WebMethods Support For Security Standards

- SAML is the first industry standard for enabling secure e-commerce transactions through the eXtensible Markup Language (XML). SAML was developed to provide a common language for the sharing of security services between companies engaged in B2B and B2C business transactions.

- The SAML effort grew out of the S2ML effort led by Netegrity (of which WebMethods was a key player) and the AuthXML effort led by Securant. SAML is an open industry initiative, operating under the OASIS banner, in which any organization can participate and implement the specifications.

- XKMS revolutionizes the development of trusted B2B and B2C applications by introducing an open framework that enables virtually any application developer to easily build in access to public key infrastructure products and services. With the XKMS specification, developers are able to integrate advanced technologies such as digital signature handling and encryption into their Web-based applications.

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Table 3-15 (Continued)

WebMethods Support For Security Standards

- The XKMS specification promotes the interoperability of these advanced technologies through its use of XML.

- Jointly designed and prototyped by VeriSign, Microsoft and WebMethods with industry support from other technology leaders. The XKMS standard was submitted in February of 2001 to the appropriate Web standard bodies for consideration as an open Internet standard.

- XML encryption allows for selective encryption of XML documents, thus allowing for key fields to be accessible to some recipients but not others. XML encryption began as a W3C working group in early 2001.

Source: WinterGreen Research, Inc.

Automating mission-critical business processes using the WebMethods' integration platform allows organizations to achieve new efficiencies: WebMethods enables companies to increase market share by allowing companies to bring products to market more rapidly.

Systems are positioned to strengthen relationships with customers, suppliers and partners. The WebMethods platform provides companies the ability to interact directly and securely with a variety of customers, suppliers and partners, resulting in streamlined business transactions and faster response times for customer inquiries.

WebMethods solutions help companies achieve significant cost saving and productivity enhancements by reducing cycle times, lowering inventories and reducing error rates through the real-time exchange of information. In this manner, systems increase supply chain efficiencies.

Systems increase returns on technology investments and provide rapid integration implementation. WebMethods platform helps companies to maximize their return on investments in ERP and other enterprise applications by extending the benefits provided by those applications to a company's customers, suppliers, and other trading partners.

3.2.8 SeeBeyond

SeeBeyond offers the e*Xchange eBusiness Integration™ suite. It is positioned as a complete eBusiness Integration (eBI) solution that supports end-to-end eBusiness.

e*Gate™ Integrator is a robust eBusiness Integration (eBI) platform. It is used to integrate disparate legacy systems, databases, packaged applications, middleware products, communication protocols, and messages. Proprietary or standard messaging formats are formatted with unprecedented performance, scalability and reliability.

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Table 3-16 illustrates SeeBeyond e*Gate™ integrator functions. Table 3-17 illustrates SeeBeyond e*Gate™ integrator messaging formats.

Table 3-16

SeeBeyond e*Gate™ Integrator Functions

- Robust eBusiness Integration (eBI) platform

- Integrates disparate legacy systems

- Integrates databases

- Integrates packaged applications

- Integrates middleware products

- Integrates communication protocols

- Integrates messages

Source: WinterGreen Research, Inc.

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Table 3-17

SeeBeyond e*Gate™ Integrator Messaging Formats

- Proprietary messaging formats

- Standard messaging formats

- Formatted to support performance

- Formatted to support scalability

- Formatted to support reliability

Source: WinterGreen Research, Inc.

e*Xchange™ Integrator is an application positioned to achieve automating business processes, managing dynamic trading partner relationships, and conducting secure eBusiness transactions directly with other enterprises and indirectly through trading exchanges or networks.

3.2.9 SeeBeyond E-Business Integration™ Suite

The SeeBeyond eBusiness solution allows organizations to establish trading partner relationships and manage trading partner agreements, efficiently automate and control external and internal eBusiness processes, and to integrate B2B data exchanges into back-office systems.

3.2.10   Sybase / New Era Of Networks

Sybase has created an e-business division, integrating New Era of Netowrks integration products with the enterprise portal solution. Customers are offered streamlined software solutions that promote the rapid deployment of IT solutions. Sybase is positioning to offer broad e-business platforms and solutions.

Sybase gives customers open, scalable, flexible platforms based on an industry leading rules engine.

3.2.11   Sybase E-Business Enabling Software

Sybase / New Era of Networks e-business software provides core integration technology. The rules engine is among the best in the industry. Sybase / New Era of Networks integrates and automates e-Business processes, helping companies bring end-to-end business functionality to the Internet in the shortest possible time frame.

Sybase / New Era of Networks products help companies establish direct, electronic links with customers, suppliers and partners; build and participate in Internet markets. Sybase / New Era of Networks software is used to distribute and access information across applications in an efficient manner.

Sybase / New Era of Networks suite of integration software was designed to address the needs and challenges of leading industries such as financial services, healthcare, insurance, retail, utilities, manufacturing, telecommunications and others.

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Table 3-18 illustrates Sybase / New Era of Networks target markets.

Table 3-18

Sybase / New Era of Networks Target Markets

- Financial services

- Healthcare

- Insurance

- Retail

- Utilities

- Manufacturing

- Telecommunications

Source: WinterGreen Research, Inc.

3.2.12   Sybase / New Era Of Networks Product Suite

Sybase systems are positioned to help businesses make the transition from bricks to clicks, connecting core operational systems and Web-interfacing applications for seamless, effective integration.

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Table 3-19 illustrates Sybase / New Era of Networks integration product suite.

Table 3-19

Sybase / New Era of Networks Integration Product suite

- Sybase / New Era Of Networks e-Biz Integrator™ - An advanced integration server designed for speed and volume in large NT or UNIX-based enterprises

- Sybase / New Era Of Networks e-Biz 2000™ - The integration backbone for mass deployment in NT-based enterprises

Source: WinterGreen Research, Inc.

Sybase / New Era Of Networks combines multiple elements in a single integration broker offering. E-business Integration software is illustrated in Table 3-20.

Table 3-20

Sybase / New Era of Networks Integration Engine

- Integration Servers -- enable multiple applications to share information by moving data between systems, determines which information needs to be routed to which application, and transforms information to meet the requirements of the receiving application

- Process Automation -- map out multi-step, multi-process business processes

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Table 3-20 (Continued)

Sybase / New Era of Networks Integration Engine

- Manage the runtime execution of the process including interaction with participating applications

- Monitor key performance

- Provide operational metrics of running processes to locate performance bottlenecks

- Enable modification of processes over time to maximize business results

- Predefined Adapters -- extend SYBASE / NEW ERA OF NETWORKS offerings to support leading e-Business packages such as BroadVision and Commerce One and operational systems such as SAP R/3, PeopleSoft, Oracle and J.D. Edwards

- Technology Adapters -- interface with custom and legacy systems

- Internet Communications -- provide tight integration with leading application servers from vendors such as BEA, IBM, iPlanet and Microsoft

- Native Support -- for e-Business and business-to-business standards including XML, EDI, HTTP, FTP, HTML, FIX and S.W.I.F.T.

- Packaged e-Business Integration Applications -- provide packaged offerings to meet specific e-Business information sharing and process automation needs in various industry verticals

Source: WinterGreen Research, Inc.

3.2.13 *iPlanet*

iPlanet E-commerce solutions are positioned to support Sun-Netscape alliance needs for integration. Net-enabling software supports achieving communications services in the context of Internet services.

Open standards are designed for cross-platform integration. iPlanet solutions offer the combined strengths of usability, reliability and efficiency. The results are seamless scalability and secure performance for your e-commerce infrastructure.

iPlanet next generation communication and collaboration relate to messaging server and calendar server capability. Systems are targeted to the enterprise and service provider markets.

XML and Java™ technology support for integration with existing enterprise applications and interoperability with partners. The products are integrated to enhance collaboration. By using the iPlanet messenger server it is possible to seamlessly notify users of events entered in the calendar server.

The collaboration-enabling end user features are elements that benefit the enterprise. Of considerable significance is their capability to lower total cost of ownership.

An integrated software stack enables interoperability. The architecture is integratable, which allows the use of standards-based products and emerging technologies from other vendors. Sun helps users implement Web services to extend the life and capability of existing systems and avoid the prohibitive cost of whole-sale systems replacement.

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Application Integration Products

Sun continues to build upon its world-class iPlanet Application Server and now offers developers at all levels of expertise the ability to rapidly create sophisticated enterprise applications that fully leverage the robust capabilities of the J2EE platform.

iPlanet powers many of the world largest e-business environments, this new product line extends and leverages that expertise to help enable a broader range of capabilities. OmniSpace Technologies a service provider, has developed an innovative B2B collaborative workspace application on the iPlanet application server platform that helps enable multiple businesses to work together online as one, sharing processes and information across enterprises.

The iPlanet application server is an infrastructure that offers a high degree of scalability, security and availability, as well as improves time to market for new services. The OmniSpace.net platform leverages iPlanet-expanded capabilities to help continue to grow collaborative workspace applications.

iPlanet server technology is being calibrated to escalating e-commerce needs. The product line provides tiers of functionality as follows shown in Table 3-21.

Table 3-21

IPlanet Tiers Of Functionality

- iPlanet Web Server 6.0 – Targeted to Global Fortune 500

- iPlanet Web Server 6.0 - Scalable, flexible platform for the delivery of dynamic web content

- iPlanet Application Server - low-cost entry point to enterprises who want to build highly scalable and available web applications using the J2EE platform.

Source: WinterGreen Research, Inc.

Scalable, flexible platform for the delivery of dynamic web content is positioned for enterprises and service providers. New features in 6.0 include further performance improvements, the support of virtual domains, and enhanced security to ensure that organizations can handle the massive volume demanded by successful sites and to help them to improve the management of their operations.

3.2.14   BEA

BEA offers quality of service on a Web Services provider platform that is positioned to provide applicatin integration. It depends on the maturity, scalability and integrity of the underlying platform.

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BEA depends on the maturity and functional richness of the Web services standards and protocols. The software infrastructure has vendors with established enterprise credibility will have a strong advantage in the Web Services.

Architecture business Web services is a natural extension to the WebLogic application server. Qualities have made WebLogic server large-scale deployments, Java and XML capabilities, Web integration, and 1,500 value-added channel partners.

BEA Web Services strategy demonstrates linkage between the industry standard J2EE platform and next-generation e-business systems. BEA continues to enhance J2EE as the foundation platform for building and delivering Web Services.

3.2.15   BEA Web Services Architecture

BEA provides a complete offering that supports simple, informational Web Services, as well as complex, transaction-based Web Services in one integrated platform. Key product components of BEA's Web Services architecture include the following shown in Table 3-22.

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Table 3-22

BEA's Web Services Architecture

- **BEA WebLogic Server** - As the market-leading J2EE application server and cornerstone of the WebLogic E-Business Platform, BEA WebLogic Server hosts and exposes simple, one-call, one-response Web Services. BEA WebLogic Server today offers support for the basic protocols and standards, such as SOAP, with support planned for emerging standards such as UDDI and WSDL.

- **BEA WebLogic Collaborate** - BEA's open and extensible B2B collaboration platform, BEA WebLogic Collaborate, integrates trading partners across the Web and enables complex Web Services to be deployed with transactional integrity, security, and reliability. BEA WebLogic Collaborate extends simple Web Services into sophisticated Business Web Services required for complex, B2B commerce and integration.

- **BEA WebLogic Process Integrator** - As the workflow engine for BEA WebLogic Collaborate, BEA WebLogic Process Integrator controls the sequencing of various stages of a Web Service to help execute collaborative B2B processes.

   Source: WinterGreen Research, Inc.

3.3 Adpaters

Adapters are positioned to permit users to create applications to quickly and easily exchange information with popular packaged software. They are used to connect application servers, legacy systems, and packaged solutions, using technology that can be integrated in both the development and production environments with adapters.

3.3.1 IBM WebSphere Adapters

WebSphere adapters provide solutions for connecting legacy systems and packaged applications. WebSphere MQ Integrator has an open framework. Components from third parties work with the system. Message formats are defined either in supplied message dictionaries or a self-defining XML messages.

IBM's adapter framework is based on open standards provides an effective way to build more pluggable reusable adapters. The CrossWorlds acquisition greatly enhances the IBM position in the adapter market.

Open standards connect WebSphere Application Servers or MQ family applications to packaged software. Each adapter contains a connector and tooling, which can be used for development and production in the specified package environment. Customized connectors and beans can be deployed to use with WebSphere and MQ family applications. Table 3-23 illustrates selected WebSphere adapters.

Table 3-23

Selected WebSphere Adapters

- WebSphere Adapter for Ariba Buyer

- WebSphere Adapter for J.D. Edwards

- WebSphere Adapter for mySAP.com

- WebSphere Adapter for Oracle

- WebSphere Adapter for PeopleSoft

Table 3-23 (Continued)

Selected WebSphere Adapters

- Peregrine Integration Adapters

Source: WinterGreen Research Inc.

IBM offers an extensive family of open standards based adapters. Adapters are built on a common architecture that supports data-level integration, and emerging application server integration technologies.

IBM integration suites have components that are able to function as stand alone adapters. Adapters are optimized to integrate IBM WebSphere application server and MQ family products with a wide variety of packaged applications, legacy systems, databases, and technologies. Table 3-24 illustrates the variety of IBM WebSphere adapters.

Table 3-24

Variety of IBM WebSphere Adapters

- Packaged applications

- Legacy systems

- Databases

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Table 3-24 (Continued)

Variety of IBM WebSphere Adapters

- Technologies

- Files

- Terminals

- HTTP

- Utility Adapters

- Baan

- PeopleSoft

- BEA Tuxedo

- RDBMS

- CICS TS

- SAP

- Clarify

- Siebel

- Tibco

- J.D. Edwards

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Table 3-24 (Continued)

Variety of IBM WebSphere Adapters

- Oracle Applications

- Oracle Database

- Vantive

- Sybase / New Era Of Networks

- Broadvision

- PeopleSoft

- EDI formats - X12, HIPAA, UN/EDIFACT, TRADACOM, EANCOM

- Web services protocols

- e-mail

- SAP R/3

- Enterprise Siebel

- FIX

- SWIFT - "Gold Ready"

- I2 Terminals

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Table 3-24 (Continued)

Variety of IBM WebSphere Adapters

- J.D. Edwards

- XML

Source: WinterGreen Research Inc.

IBM has the resources to achieve the strongest adapter market presence. It has leveraged those resources to achieve a set of adapters optimized to work with its rules and formats nodes in WebSphere MQ Integrator. The extensive family of adapters is positioned to provide data level integration with WebSphere MQ Integrator.

3.3.2 IBM® WebSphere MQ Adapter Builder

IBM® WebSphere MQ adapter builder gives applications a business-standard language, so they can work easily with each other. The adapter builder is positioned to make IT departments more productive by giving any adapter wanted, when it is wanted. The adapter builder educes the risk, complexity, and cost of managing application integration.

The CrossWorld acquisition enhanced this product functionality considerably.

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3.3.3 IBM Adapter Packages

Support packages provide MQAO adapter samples for Baan IV, SAP R/3 4.5 and J.D.Edwards. Additional Sybase / New Era of Networks adapters are available to support more operating systems and databases. The Crossworlds acquisition brought a strong additional adapter product suite to the WebSphere product lien.

Peregrine integration adapters integrate IBM WebSphere and WebSphere MQ family of products with a variety of target applications. IBM J2EE connectors are available for the WebSphere e-business platform.

3.3.4 Tibco Extensibility

Tibco leverages the benefits of integrating all of a businesses' applications and data sources by enabling the business to more efficiently manage business documents. Because business documents are shared, resources on the network are comprised of accessible objects. The objects are maintained by specific applications in their own data format.

TIBCO extensibility gives businesses the tools they need to efficiently and securely manage these shared and publicly accessible document formats. XML and related formats and standards include CXML, XML Schema, SOX and RosettaNet.

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3.3.5 Tibco XML Support For Databases

Tibco Software has expanded its database support to include Software AG's database technologies. XML Canon/Developer™ is a design-time repository for XML assets, such as schemas, DTDs, and instance documents. The additional database support enables customers to leverage XML and XCD for e-business. Systems are positioned to reduce costs for customers.

XCD enables organizations to access, integrate, and reuse the vocabulary from schemas or DTDs in any XML-based application, such as CommerceOne, WebMethods, or Microsoft solutions. XCD introduces logical schema analysis as an approach for obtaining XML vocabularies and grammars. These can be accessed and re-purposed with new semantic meaning.

Database technology expands the number of database platforms supported by XCD.

Control of XML vocabularies provides adaptability and scalability as e-business continues to grow. Tibco seeks to leverage XML-enabled information using XML tied to their existing databases. The TIBCO Extensibility product line provides an enterprise class platform for the development and deployment of XML-enabled e-business applications. XML has a development life cycle for enterprise-wide initiatives because it is an extensible protocol.

3.3.6 Tibco XML Canon/Developer™

Tibco Software real-time infrastructure software product potfolio includes an XML wrapper. Canon/Developer™ is a member of the TIBCO Extensibility product family.

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Application Integration Products

XML Canon/Developer (XCD) enables organizations to build an XML infrastructure that accesses, stores, and integrates the vocabulary from schemas or DTDs in any XML-based application, such as CommerceOne, WebMethods, or Microsoft solutions.

XML and XCD will become a key component of an organization's strategy that can be leveraged for e-business and reducing costs. XCD introduces logical schema analysis as an approach for obtaining XML vocabularies and grammars. These can be re-purposed with new semantic meaning.

Tibco gives companies centralized control and distributed access of their XML assets, which can then be dynamically browsed, searched, and re-constructed for e-business collaboration and cost reduction.

XCD enables enterprises to have ease in integrating their XML based e-business applications into a single repository, facilitating reuse and lowering costs. Key features of XCD enable the following illustrated in Table 3-25.

Table 3-26 illustrates XML vocabularies, grammars, and component-level reuse. Table 3-27 illustrates Tibco XML distributed collaboration aims.

Table 3-25

Key Features of Tibco XCD

- Enables design-time repository for XML assets

- Enables organizations to reduce development

- Reduces costs by permitting enterprise to take control of its XML assets

- Enables control at the document-level

- Enables control at the component-level

- Supports elements, attributes, types, model groups

- Supports a centralized repository.

- Enables control of the documents and components by categorizing, staging, browsing

- Enables the inter-relationships searched to create a comprehensive view of an Enterprise's XML assets.

Source: WinterGreen Research, Inc.

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Table 3-26

XML Vocabularies, Grammars, and Component-level Reuse

- Unleashes the extensible power of XML by enabling the analysis of schemas and DTDs at the component-level

- Creates a data dictionary or vocabulary of an Enterprise's XML assets

- Serves as an enterprise vocabulary

- Can be browsed, searched, and re-constructed

- Creates an infinite set of new semantically different schemas

Source: WinterGreen Research, Inc.

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Table 3-27

Tibco XML Distributed Collaboration Aims

- Facilitates collaboration across departments

- Facilitates collaboration across divisions

- Facilitates collaboration across trading partners

- Facilitates collaboration across industry groups

- Provides Web-based access of an organization's XML assets

- Provides access, set by permission

- Creates a virtual workplace

- Allows people around the world to collaborate on the development of schemas/DTDs

Source: WinterGreen Research, Inc.

XML schemas and their components or the grammars and vocabulary, form a component for integration in the emerging digital economy. TIBCO is positioned to enable companies to have centralized control and distributed access of these components.   Components can be browsed, searched, and re-constructed to create an infinite set of new, semantically different schemas.

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3.3.7 Sybase / New Era Of Networks Adapters

Sybase / New Era of Networks has adopted an adapter strategy to provide market definition. Sybase / New Era of Networks offers an assortment of prepackaged solutions called Sybase / New Era of Networks adapters. These are designed to work with specific off-the-shelf applications and standards.

These adapters jump-start integration efforts by reducing valuable development time, and provide reliable, documented, and configurable connections between applications by enabling them to work with one or more integration servers. Table 3-28 illustrates Sybase / New Era of Networks adapters.

<div align="center">

Table 3-28

Sybase / New Era of Networks Adapters

</div>

- SYBASE / NEW ERA OF NETWORKSadapter for XML

- SYBASE / NEW ERA OF NETWORKSadapter for BroadVision

- e-Business Adapter

- Development Kit

- SYBASE / NEW ERA OF NETWORKSadapter for Oracle Applications

- SYBASE / NEW ERA OF NETWORKS Enterprise Adapter™

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Table 3-28 (Continued)

Sybase / New Era of Networks Adapters

- SYBASE / NEW ERA OF NETWORKSadapter for E-mail

- SYBASE / NEW ERA OF NETWORKSadapter for EDI

- SYBASE / NEW ERA OF NETWORKSadapter™ for i2

- SYBASE / NEW ERA OF NETWORKSadapter for S.W.I.F.T.

- SYBASE / NEW ERA OF NETWORKSadapter for R/3

- SYBASE / NEW ERA OF NETWORKSadapter for FIX

- SYBASE / NEW ERA OF NETWORKSadapter for Siebel eBusiness

- Applications

- SYBASE / NEW ERA OF NETWORKSadapter for Terminals

- SYBASE / NEW ERA OF NETWORKSadapter for PeopleSoft

- SYBASE / NEW ERA OF NETWORKSadapter for Protocols

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Table 3-28 (Continued)

Sybase / New Era of Networks Adapters

- SYBASE / NEW ERA OF NETWORKSadapter for J.D. Edwards

Source: WinterGreen Research, Inc.

3.3.8 Sybase / New Era Of Networks E-Commerce Solutions

New Era of Networks e-commerce technology simplifies transactions processes over the Internet. Sybase / New Era of Networks technology replaces in house data translation programs. Sybase / New Era of Networks solutions save time, money, and increase the efficiency of systems

In the health care industry, systems are used by hospitals in preparation for Health Insurance Portability and Accountability Act (HIPAA) compliance. HIPAA is the single most pressing IT priority among health care providers. Health care transactions include claims, eligibility and enrollment. These are required to be directed through multiple processes before adjudication.

Table 3-26 illustrates health care transaction types.

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Table 3-26

Health Care Transaction Types

- Claims

- Eligibility

- Enrollment

- Directed through multiple processes

- Require adjudication

Source: WinterGreen Research, Inc.

Sybase / New Era of Networks provides technology efficiently translate and manage processing and remittance of transactions. The technology supports different formats, including via the Internet. Critical technology enables accepting claims in many formats. Sybase / New Era of Networks's solution offers the flexibility to accept claims in such forms as Web, FTP and e-mail allowing users to streamline processes.

Sybase / New Era of Networks technology complies with administrative simplification. Organizations conduct electronic business transactions in a standard data format. With SYBASE / NEW ERA OF NETWORKS's solution, organizations are enabled to achieve enterprise systems and standards compliance quickly, easily, and accurately. Internet-based claims and remittance procedures are the future for e-commerce in the health care industry.

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3.3.9 Sybase / New Era Of Networks Healthcare

Data extraction, mapping, transformation validate the enterprise integration PeopleSoft environment. Sybase / New Era of Networks provides native integration capabilities for J2EE Java developers. New Era of Networks e-business infrastructure provides product offerings. Development relates to a vision for integrating J2EE application servers with a total e-business environment.

Java connectors provide the benefits of Sybase / New Era of Networks's world-class adapters to Java developers through the Java Connector Architecture (JCA) standard. The JCA standard is part of the J2EE specification. Sybase / New Era of Networks delivers a set of integration capabilities for the Java developer.

As a result of corporate emphasis on e-business, there has been a resurgence of custom development. Much of this new development is being done on application severs such as BEA WebLogic and IBM WebSphere.

Data and processing logic are required to complete a business interaction exists outside the application server. The logic may reside in purchased applications such as ERP, CRM and SCM packages, in databases or in legacy applications within a single company. It may also exist outside the enterprise.

Newly developed code must be tightly integrated with the existing applications and data to deliver end-to-end business functionality.

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The J2EE standards provide the technology specifications for connecting to external applications and data. Integration is best achieved using standard code and packaged applications.

Enterprise Application Integration (EAI) software from Sybase / New Era Of Networks requires at least two types of developers, one with EAI skills and the other with Java application server development skills. Sybase / New Era of Networks products provide native Java access to its integration software. Application integration is within the reach of a Java developer.

3.3.10   Sybase / New Era Of Networks Adapters

Sybase / New Era of Networks's solution has the ability to do J2EE integration for legacy applications and data, as well as popular application packages, while retaining the scalability of architecture. J2EE solutions leverage Sybase / New Era of Networks adapters. Adapters incorporate technical and business level capabilities, so the Java developer needs to know very little about how to interface with a software package.

The Sybase / New Era of Networks Java connectors are the first in a suite of products. Sybase / New Era of Networks is introducing to facilitate application server-based Java development and deployment. The connectors provide Enterprise Java Bean (EJB) components that connect to Sybase / New Era of Networks's adapters, creating the ability to seamlessly interact with applications and data inside the enterprise.

A Java developer may be able to create, retrieve or update a purchase order in an SAP R/3 application by appropriately invoking an EJB in the

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application server. When combined with other Sybase / New Era of Networks product offerings, open business interchange, integration can take place outside the enterprise as well.

Sybase / New Era of Networks has their J2EE initiative a leading provider of e-business automation software. Offering the ability to configure and deploy application integration with the same development solutions needed for component construction and assembly is a unique and valuable capability for the Java developer community.

With this initiative, Sybase / New Era of Networks will enable a unique platform for implementing front-to-back business processes based on Java and J2EE. The key business advantage is time-to-market for business process and business model innovation.

By allowing developers to focus on the critical logic for business processes rather than on the complexity of APIs, Sybase / New Era of Networks and partners create significant value for customers.

3.3.11   XML

XML is positioned to support interoperability between systems. Integration is evolving in the context of users that take full advantage of the extensibility of XML, creating multiple standard versions of XML.

3.3.12   Web Methods

The WebMethods B2Bi Solution Suite provides software integration. Tightly integrated applications both inside the firewall and with trading partners

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via the Internet makes it possible for companies to automate their most strategic business processes and accelerate time to market with key electronic commerce initiatives.

3.3.13   WebMethods XML Standards

Major B2B exchanges utilize the WebMethods support for open security standards such as Security Assertion Markup Language (SAML), XML Key Management Specification (XKMS) and XML Encryption. Through support of these standards, WebMethods enables Global 2000 customers and B2B marketplaces to integrate security services across company boundaries thereby simplifying and accelerating the deployment of secure B2B transactions.

Companies are increasingly conducting business transactions between different enterprises and across multiple marketplaces that have their own unique security solutions.

3.4 Business Process Management (BPM)

Business process management (BPM) encourages the design of new business processes. Business processes relate to the implementation of rules and the management of constraints. BPM relates to the decisions about managing the business, the evaluation of the most efficient way to make decisions about transactions.

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BPM products select and distribute information to applications and databases. Users can implement real-time, application-to-application message transformation and intelligent message routing in the context of supporting business rules particular to the needs of the business.

Business effectiveness across the enterprise is improved by tighter integration with existing hardcoded applications, leading enterprise resource planning (ERP) systems, and software package applications.

3.4.1 Business Process Management Layer Above Message Broker

Business process management is a layer above the message broker integration functions. Business processes are an element of information management. Business processes need to be managed in an automated manner to improve the efficiency of enterprise operations.

Business process management architecture that is evolving is robust, standards-based, scalable, and flexible.

New applications are being developed in the context of helping to solve point-to-point interconnection problems with thousands of applications. The goal of business process management is to ensure that best-of-breed applications can have access to any and all data necessary to allow companies to implement and easily change provisioning, customer support and billing processes.

Due to the high number of applications, both within and across enterprises, BPM vendors rely on a strong integration infrastructure offering. BPM vendors are involved in the complete process of delivering services. Integration implementations have a significant services component.

3.4.2 Business Process Management For Financial Services

Financial services institutions need to mitigate the risk of market exposure and default. Rapidly growing trade volumes create the need to settle trades in real time or very close thereto. The most pressing challenge for the financial services industry is the Securities and Exchange Commission (SEC) mandated compliance of T+1, a move to shorten trade settlement periods to trade plus one day, by June 2005.

To achieve T+1, financial institutions must adopt an STP solution, a key prerequisite to operating in compressed cycle times. STP is the top technology priority for U.S. broker/dealers for the next two to three years.

3.4.3 Business Process Management For The HealthCare Industry

BPM for health care markets is positioned to address the increasing complexity and cost of care delivery. Hospitals depend on keeping costs in check so they can continue to be profitable businesses. An increasingly demanding and rapidly growing customer base is the result of the aging of the population.

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Mergers and acquisitions are creating heterogeneous computing environment that the hospital IT department must manage. Physician and pharmacy systems are frequently independent of the hospital.

Increasingly strict regulatory controls such as the Health Insurance Portability and Accountability Act (HIPAA) require very sophisticated systems. As a result, health care providers and payers are facing the significant challenges of providing better service. Hospitals are being held accountable for meeting federal regulatory requirements.

3.4.4 Business Process Management For The Utility Industry

Energy companies that have invested in CRM systems can dramatically increase the return-on-investment (ROI) of their IT expenditures by combining incompatible systems and responding more efficiently to customer inquiries. BPM solutions are positioned to offer end-to-end customer management.

These systems are configured for the energy sector. They integrate front-office and back-office systems. BPM provides a layer of business process integration to make exchange of information between applications useful. Customers of utilities receive services at a lower cost.

With the rapid deregulation of energy markets, combined with increased competition, utility companies must closely manage their customer relationships. To assure the greatest customer satisfaction, utility companies are sourcing best practices to target, win, and retain the most valuable customers.

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BPM systems are targeted to permit adopting effective marketing, sales and customer service techniques across all communication channels. Leading business integration solutions are positioned to address the issues of the energy industry to solve these challenges. ERP partners like Siebel and SAP are creating products designed specifically to meet the needs of energy service providers.

Focus is on competitive retail markets. Service providers are improving the operational efficiency of customer service. Utility companies are asking their call centers to do more than ever before. Customer relationship management (CRM) applications play a critical role in achieving these objectives.

The number of applications and amount of information required in the call center is proliferating, placing further demands on CSRs . It is increasingly common to see a CSR access multiple applications to handle a single customer inquiry. Customer data can be contained in the CRM application and CIS, as well as other systems, such as outage and work management systems. Integrating this information onto one CSR's, or one sale representative's or one service technician's, desktop is increasingly vital to the success of quality service and sales.

3.4.5 IBM WebSphere MQ Integrator Business Process Management

IBM WebSphere® MQ Integrator provides business integration and business process management (BPM) functions. It is positioned as a platform for e-business. It increases the efficiency of supply chain management, enterprise resource planning, mergers, acquisitions, and straight-through processing.

Application Integration Products

Operations include dynamically manipulating and routing messages, such as augmenting in-flight data with that from corporate databases or storing information in corporate databases. It uses business-related rules to enable the business intelligence of an enterprise to be implemented and applied to business events.

GUI tools support a flexible and scalable application integration solution. Business analysts can design, use, and manipulate business routines as needed, without detailed product knowledge. Applications can be added, extended, or replaced. IT departments can interact with different applications and respond rapidly to changing requirements

The system orchestrates the flow of information based on policies or business rules. It can dynamically route information in the format required by the receiving application.

BPM products from IBM are positioned to provide dynamic, distributed, event-driven integration of different applications. Definition, execution and tracking of complete business processes are possible. The systems support cost analysis, simulation, and return-on-investment functions for modeling and monitoring business process implementation.

One business process that may need to be implemented is a simple exchange of information with my.SAP.com and Ariba Buyer processes. BPM is what is used to achieve this. BPM provides the ability to extend internal enterprise processes to suppliers, trading partners, and customers. Table 3-27 illustrates IBM BPM product positioning.

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Table 3-27

IBM BPM Product Positioning

- Provide dynamic, distributed, event-driven integration of different applications

- Definition, execution and tracking of complete business processes

- Support cost analysis, simulation, and return-on-investment functions

- Support modeling and monitoring business process implementation

- Permit implementation of simple exchange of information between different applications

- Extend internal enterprise processes to suppliers, trading partners, and customers

Source: WinterGreen Research Inc.

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3.4.6 Vitria Business Process Management

Vitria BusinessWare integration platform is supported by pre-built out-of-the-box configurable industry specific solutions designed to help customers reduce integration project complexity, cost, and time. By solving common recurring integration problems involving management of collaborative processes within and across the enterprise, BusinessWare implements integration at a layer above information brokers and rules engines.

3.4.7 Vitria BusinessWare Collaborative Applications

Vitria integration platform, BusinessWare, provides out-of the-box solutions for collaborative problems. Global straight through processing is a collaboration problem that requires companies in the financial services value chain to work together to reduce the time and cost of trading securities. Complex processes manage the flow of information between investment managers, broker/dealers and custodian banks to support securities trading, allocation and settlement.

In addition to automating these process flows, each of these companies must manage data that is stored in many different vocabularies or formats including SWIFT, FIX and GSTP XML. Each company needs to track and analyze key metrics associated with the process flows to identify and eliminate bottlenecks and errors, reduce cycle times, track order status, and better manage risk. Vitria strength is in business process management. Vitria business process management includes vocabulary management and process intelligence. Table 3-28 illustrates Vitria business process management functions.

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Table 3-28

Vitria Business Process Management Functions

- Vocabulary management

- Process intelligence

Source: WinterGreen Research Inc.

Vitria collaborative applications leverage these capabilities. The Vitria family of products includes the following illustrated in Table 3-29.

Table 3-29

Vitria Family Of Products

- VCA for CIM Synchronization horizontal application for connecting enterprise applications -- Oracle, Peoplesoft and SAP

- VCA for HIPAA 2.0 for the healthcare and insurance industries

- VCA for GSTP 2.0 for financial markets

- VCA for demand management for manufacturers

- VCA for outage management for utilities companies

Source: WinterGreen Research Inc.

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Application Integration Products

Vitria is also working with partners to develop additional collaborative applications to run on the BusinessWare platform. The VCA solutions allow customers to streamline collaborative business processes across the value chain by automating end-to-end business processes and integrating underlying information systems and partners. This enables companies to manage their business in real time, resulting in decreased order cycle time, reduced time-to market for new products and increased customer lifetime value.

Vitria has developed collaborative applications to be the next logical step in the advancement of integration. With standards such as J2EE and WebServices simplifying the tactical plumbing layer of integration, companies can more quickly leverage integration at the strategic process layer and gain a competitive advantage through collaborative applications that enable them to run their businesses more efficiently and effectively.

Major EAI vendors are taking multiple and also unique approaches to the next generation of their products. Vitria BusinessWare collaborative applications focus on automating multiple transactional or analytical applications. Collaboration is supported within one company or between companies.

Collaborative applications provide off-the-shelf solutions to industry specific problems such as HIPAA (Healthcare Information Portability and Accountability Act) compliance in healthcare and T+1 compliance in financial services.

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3.4.8 Vitria Collaborative Information Models

Vitria integration solutions products include VCA for CIM (Collaborative Information Models). The solutions are built on an extensible framework. Synchronization allows customers to connect packaged applications and extend functionality. Synchronization is used to integrate transactional applications, including SAP, PeopleSoft, Siebel, and Oracle.

Vitria synchronization provides extensible support for pre-configured integration between major applications. Integration works because there is a framework for defining common processes and objects.

3.4.9 Tibco Software BPM

Tibco Software BPM improves information flow, increases efficiencies, and reduces costs associated with cross-border trading and T+1 compliance. TIBCOTM™ Real-Time Trade Management for Financial Services, an end-to-end integration and Business Process Management (BPM) solution for the financial services industry.

The solution is designed to support the Global Straight Through Processing Association (GSTPA) and T+1 (trade date plus one day) initiatives. It manages complex, mission-critical, high transaction volume business processes.

Tibco Real-Time Trade Management enables management of domestic and cross border trading and takes straight through processing (STP) integration to the next level. It automates and streamlines trades to improve trade lifecycle management operations and increase efficiencies.

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The product is positioned to permit customers to achieve faster time-to-market, lower operational costs, and reduced risk. Tibco Real-Time Trade Management is designed for companies belonging to the GSTPA, an industry association open to all investment managers, broker/dealers and global custodians involved in the processing of cross-border trades.

As the industry moves toward settlements of T+1, TIBCO Real-Time Trade Management provides a solution that easily and cost effectively meets the technological demands necessary to achieve T+1 status by changing the dynamics of the information flows associated with cross-border transactions. Based on a combination of industry-leading technology and a strong history in the financial services industry, TIBCO is uniquely positioned to deliver a comprehensive end-to-end solution for the GSTPA and its members.

The TIBCO real-time trade management solution provides a level of functionality that helps brokers/dealers increase efficiencies, maximize capital and reduce operating expenses as they move to T+1 compliance.

3.4.10   Tibco Real-Time Trade Management Solution

The TIBCO real-time trade management solution accelerates the flow of cross-border trade information, helps reduce the number of failed cross-border trades, helps reduce the risks and costs of cross border trade settlement, and brings firms from T+3 to T+1 compliance efficiently and effectively.

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Application Integration Products

Tibco real-time trade management solution provides connectivity to the virtual matching utility, also known as the transaction flow manager. The system manages timeouts, number of trades outstanding, and service quality on a per-counter party basis. It allows customers to view trades and settlement progress.

The system organizes trade failures from TFM in a logical way and helps organize responses. It enables routing of failed trades through the firm for repair and reintroduction.

The system provides an integration and BPM platform that enables connections to back-end systems to monitor and manage such operations as trades, risk management, surveillance, and accounting. The GSTPA is working to improve the overall structure of information flow for the financial services industry.

Tibco real-time customer service for utilities is designed to provide an integrated customer service solution. It offers out-of-the-box integration between Siebel eEnergy and CIS systems, such as SAP's IS-U/CCS. A flexible framework facilitates the rapid introduction of new business processes and reduces the cost of application upgrades and migrations.

Tibco platform gives companies the ability to rapidly solve sophisticated integration challenges and enable cross-platform Web Services for new and legacy systems.

Table 3-30 illustratesTIBCO real-time customer service for utilities positioning.

Table 3-30

TIBCO Real-Time Customer Service for Utilities Positioning

- Increase customer retention in a deregulated market

- Ensure consistent, accurate, customer enrollment and information across channels

- Improve the response time to customer inquiries

- Leverage existing Information Technology (IT) investments in CIS and other systems, reducing Total Cost of Ownership (TCO)

- Reduce duplicate data entry in the call center

- Implement the infrastructure to promote customer self-care

- Impart decision-making by capturing and reporting key performance indicators (KPIs) used to identify customer care issues, and to determine marketing, up-sell and cross-sell opportunities

- Speed agent training time using one desktop workspace

- Provide flexibility and scalability, with re-useable objects

- Speed implementation time for new workflows and application versions

Source: WinterGreen Research, Inc.

3.4.11   iPlanet Business Process Automation

Business process automation services and connectivity to enterprise applications are provided through an integration framework. The framework enables developers to retrieve data and business logic out of SAP and other back-end systems without having to leave the Java technology environment.

3.4.12   Sybase / New Era Of Networks Business Process Manager

Sybase / New Era of Networks XML-based business process design tool helps users integrate IT systems into a business process flow that can speed response times, improve efficiency and reduce operational costs. Table 3-31 illustrates Sybase / New Era of Networks BPM process server.

Table 3-31

SYBASE / New Era Of Networks Process Server

- Design and implement business processes quickly and easily

- Execute business process flow at Internet speeds

- Monitor business processes real-time

- Audit business processes

Source: WinterGreen Research, Inc.

Sybase / New Era of Networks process server delivers graphical process design, allowing business users to design, review and maintain processes via an easy-to-use graphical user interface. By maintaining a self-documenting view, Sybase / New Era of Networks process server simplifies maintenance and knowledge transfer for an organization.

Sybase / New Era of Networks process server is available for Windows NT 4.0, Windows 2000 and Sun Solaris and supports most common queuing technology including IBM WebSphere MQ and Microsoft BizTalk.

3.4.13   Sybase BPI Suite

Sybase business process integrator (BPI) suite is a comprehensive business process development, management and integration solution built on an open application server platform. ·Rapid automation and deployment of business processes represent benefits.

GUI-based tools are targeted to business analysts and programmers. Tools are used to automate business processes. ·Control, management, and optimization of automated processes are possible.

Business processes are analyzed for bottlenecks and can be modified to stop possible problems before the systems fail. ·Deployment of integration projects can be done incrementally to reduce the risk of enterprise-wide project risk. ·

BPI Suite is part of the strategic integration platform. The Sybase e-business platform allows companies to integrate applications incrementally inside the enterprise and later extend integration to trading partners.

BizTracker provides intelligent monitoring of infrastructure or applications. It allows users to view how messages move through the messaging process across the organization. Process server is a business process management tool that integrates new and existing IT systems into a cohesive business process flow.

E-Biz integrator routes and transforms messages based on the content. It ensures that data is translated from one system to another. An open, J2EE, standards-based application server enables e-businesses to quickly extend both new and existing applications to the Web.

3.5 Supply Chain Transformation

Data transformation is used to permit vendors and suppliers to input information into one end of a pipe and have it come out transformed as needed at the other end of the pipe. Data transformation occurs during the transmission. Data transformation forms the basis of supply chain automation.

Data transformation works by achieving integration on the fly. Data is transformed from one format to another during the time it is in the network.

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3.5.1 GE Global Exchange

GE Integration Solutions (EAI) provides software that permits any business application to send and receive business information to other business applications in a secure and reliable manner.

GE Interchange Solutions works with both EDI and XML. It automates paper, fax, telephone and email transactions to improve quality and efficiency in a supply chain. Table 3-32 illustrates GE GXS transformation engine positioning.

Table 3-32

GE GXS Transformation Engine Positioning

- Supply chain initiatives that support vendor partner exchange of information

- Strong data transformation product suite

- Positioning XML as system to maximize the potential of Internet-based e-commerce

- XML positioned to strengthen business ability to perform electronic data interchange (EDI)

Source: WinterGreen Research, Inc.

GE marketplace solutions implement exchanges. It provides the business applications and technology infrastructure to enable the development, integration and service of high-volume, one-to-many and many-to-many B2B electronic marketplaces.

3.5.2 GE Global Exchange Intelligent Supply Chain

GE Global eXchange Services reduces the instability of operations between trading partners by identifying and eliminating costly defects in their supply chains. Intelligence in the supply chain allows a business to gain access to the data it needs to make informed, timely decisions.

By adding intelligence to a supply chain, users can improve customer service, reduce cycle times, decrease operational costs, and increase revenues.

Enterprise collaborative communications software an alliance to develop and market an interactive communication solution. The solution is designed to enable companies to integrate customer, partner and employee feedback into internal business systems including customer relationship management (CRM).

Solutions help companies to gather and process information in a more efficient manner, decreasing response time and improving communication between companies and their key constituents. Online product satisfaction surveys can be sent automatically to a company CRM system, prompting an immediate service call.

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Responses to a new benefits plan, submitted online by employees, can be sent automatically to a company human resources system, supporting cost-saving benefit adjustments

Companies from diverse industries are able to streamline and enhance their communications with constituents using the integrated solutions. The system enhances collaboration between companies and customers.

3.5.3 GE GXS Sourcing

GXS-hosted supply chain services help companies reduce overpayments, capture rebates and lower contract processing costs. GE Global eXchange Services B2B electronic commerce services are designed to automate the contract compliance process between buyers and suppliers.

The e-sourcing is addressed by GE Global eXchange Services (GXS). GE GXS is offering a suite of e-commerce services designed to automate the supply chain source-to-pay process.

Source-to-pay services includes facilities for posting and responding to requests-for-quotes (RFQs) and online auctions. It supports catalog purchases, invoice tracking, and payment settlements.

GXS hosts and operates the new services. Services help companies lower procurement costs, compress procurement cycle times, and lower working capital requirements. The service primarily targets direct materials.

Services interconnect buyers and suppliers so they can exchange documents such as purchase orders and invoices securely over the Internet or

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private networks. Systems integrate information exchange with back-office systems.

GXS also provides a six-sigma assessment of procurement business processes. It offers recommendations for improving those processes in connection with a GXS implementation and defines return-on-investment (ROI) projections that can be matched against actual results over time through analysis of supply chain data.

3.5.4 GE GXS Services

GE GXS services are designed to help companies quickly increase efficiency and decrease cost through participation in e-marketplaces. These services allow buyers and sellers to take advantage of their existing investments in electronic commerce solutions, such as electronic data interchange (EDI), in order to exchange business documents within e-marketplaces.

Services are designed to help e-marketplaces more rapidly achieve liquidity. Exchange Transaction Services from GE Global eXchange Services (GXS) are designed to remove the barriers that can hinder buyers and suppliers from fully participating in e-marketplaces.

Table 3-33 illustrates GE Global eXchange Services (GXS) transaction services benefits.

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Table 3-33

GE Global eXchange Services (GXS) Transaction Services Benefits

- Transparent document translation between popular data formats

- Electronic data interchange (EDI) and eXtensible markup language (XML) transformation

- Proprietary format transformation

- Seamless integration between enterprise resource planning (ERP) and other internal systems, including legacy systems

- E-commerce program outsourcing services allowing companies to focus on their core business

Source: WinterGreen Research, Inc.

3.5.5 Mercator

Mercator E-business broker suite of products encompass a large component of transformation. Transformation capabilities include the lack of coding, superior translation, and open, non-invasive architecture.

Transformation delivers speed, efficiency and flexibility to IT systems faced with rapidly changing technical and business requirements.

Mercator offers integrated, stand-alone business process integration and messaging solutions. Mercator Web Integrator has direct, open interfaces to Java application servers BEA WebLogic, IBM Websphere, Bluestone Total-e-Business, and Allaire Jrun.

Mercator commerce broker has SWIFTReady certification. Mercator GSS is a financial services product that enables customers to achieve global securities trade transaction processing with both front office and back office applications.

3.6 Publish/Subscribe

Publish subscribe EAI engines support reliable multicast technology. They enable customers to send a single message to multiple recipients rather than sending multiple copies of the same message.

Multicast technology works across Local Area Networks (LANs), Wide Area Networks (WANs), terrestrial networks, and satellite networks. Message recipients can be geographically dispersed. The multicast content transport product enables high-performance, event-driven data exchange among distributed applications across the enterprise.

3.6.1 Tibco

Tibco is the premier publish subscribe vendor. All the Tibco product line is based on the TIB architecture which provides very fast routing of messages in the manner of stock ticker information distribution to thousands of desktops. Table 3-34 illustrates Tibco distributed message architecture.

Table 3-34

Tibco Distributed Message Architecture

- Distributed message architecture base that provides flexible packet based messaging across multiple nodes simultaneously

- Suite of 35 EAI modules offered to customers as components that can be applied as solutions to integration problems

- Strong workflow module

Source: WinterGreen Research, Inc.

3.6.2 Tibco / Talarian Multicast Technology

Talarian software is positioned to offer infrastructure solutions for content and data delivery in real-time. Talarian and Oracle have worked together to develop a multicast content transport solution (a propagator), which can both increase critical network bandwidth and improve CPU efficiency.

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The Propagator® has been built around Talarian's pragmatic general multicast (PGM) technology and Oracle's advanced queuing technology. It allows Oracle database customers requiring efficient and reliable content distribution to propagate business-critical information in a more cost-effective manner.

Oracle is working with Tibco and Talarian to offer a data distribution solution based on advanced queuing technology. The system permits distribution of a vast amount of information from one location to many locations.

3.6.3 IBM WebSphere MQ Integrator Publish/Subscribe

IBM WebSphere MQ Integrator combines application data with business data using dynamic content and topic based publish/subscribe capabilities. Features include improved support for industry standards and industry solutions, the ability to build custom nodes, including input nodes, in Java.

MQ Integrator has a publish/subscribe service, which is compatible with the MQ base publish/subscribe function, and includes significant features illustrated in Table 3-35.

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TABLE 3-35

Ibm WebSphere MQ Integrator Publish/Subscribe Service

- Routing a message to interested subscribers

- Routing based on message topic

- Routing based on message content

- Authorization based on multiple levels of topic name

- Support for more flexible topologies

- Support for publish/subscribe brokers

Source: WinterGreen Research, Inc.

Messages using any code page can flow through the system. Business flows are enabled. MQ Integrator .0 makes the natural, logical flow of information visible. Programmers are no longer needed to define the flow: processes and relationships are easily defined and observable. An example of a process flow might be the handling of an order for a car. The order form is held in a message dictionary.

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Application Integration Products

Related to the message dictionary capability of MQ Integrator is a logical message construction interface, the Common Message Interface (CMI), which is supported by base MQ. An image of the car order form or an optimized role-based order form may be displayed.

As the form is completed, information may be enriched or checked for completeness. If the customer shows interest in features that cost extra, these prices are shown. If the customer is interested in looking at engineering specifications, clicking a button will display the details. XML from the engineering database is enabled.

The CMI dynamically constructs and parses messages, interrogating and modifying them as appropriate. Using the broker permits specification of filters to select interesting information and warehouse it for later analysis and action. The broker can be used to select the owners of expensive cars, design attractive offers, and ensure finely targeted marketing. In-flight messages are used to see in what part of the country the order was placed and alert a local distributor, agent, or dealer.

Interfaces are enabled and made easier to use. Programmers who wanted to message-enable applications used to have to know the message queue names, and decide message characteristics like priority, retries, expiry time etc. With MQ Application Messaging Interface (AMI) users can define standard policies to handle messages.

A policy of always using persistent messages, retrying six times, and if the destination message queue is full to keep trying locally for the next 20 minutes; or users may have a simple nonpersistent policy for query activities.

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These characteristics can go into a policy register, and the policy can be accessed by any number of applications.

The AMI implements the concept of a service name: this will commonly be a message transport (queue) but it could be, for example, communication to a database, a printer, or an e-mail. he service calls another piece of software. A service can be input or output, for example, input to a database, which looks just like someone accessing it.

3.6.4 IBM WebSphere MQ Mission Critical Messaging

IBM WebSphere MQ mission critical messaging is the defacto standard for connecting any commercial system across operating systems and across platforms. The ability to send messages from one computer to another depends on having those messages be delivered in a mission critical manner.

Queued messages are needed to ignore network disruptions. There is a fundamental difference between a synchronous system and an asynchronous one. Synchronous systems are implemented with two-phase commit. Two-phase commit requires that both machines be devoted to sending and receiving a message without interruption. If there is an interruption, the message does not get through. Two phase commit has two disadvantages. If the synchronous connection is disrupted in the respect that one computer is not available during the transfer of information, the information is lost, sometimes irretrievably.

Also, some transactions are delayed, requiring a response that may take a while. A delay ties up the two computers that are transferring messages.

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Application Integration Products

With asynchronous systems, messages are sent from the source computer to a queue where they wait until they are transferred to the destination computer. These asynchronous systems can guarantee important data is always delivered. Asynchronous messaging systems form the base for EAI, providing a solid connection for data passing between computers. The communication is independent of time and distance. Table 3-36 illustrates the advantages of IBM WebSphere MQ mission critical messaging.

Table 3-36

Advantages of IBM WebSphere MQ Mission Critical Messaging

- Use less time, skills and resources to implement e-business functions

  Connect with business partners

  Provide interconnectivity between disparate systems

- Provide information to customers more quickly and with greater detail

- Achieve quantum improvement in level of customer service

Source: WinterGreen Research Inc.

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IBM publish subscribe systems use the foundation of MQ mission critical messaging. Table 3-37 illustrates features of IBM WebSphere MQ mission critical messaging functions.

Table 3-37

Features of IBM WebSphere MQ Mission Critical Messaging

- Heterogeneous any-to-any connectivity from desktop to mainframe (over 35 platforms supported)

- Comprehensive family of APIs designed to make coding for any messaging task straightforward

- Integration of disparate islands of automation supported

- Time independent communication

- Assured one-time delivery

Source: WinterGreen Research, Inc.

Consideration of IBM WebSphere MQ mission critical messaging illustrates that the system is fast. MQ supports high volume throughput. Customers are able to transmit 250 million messages a day. This is faster than synchronous systems in many cases.

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Application Integration Products

The market perception has been that a queued message going through an intermediary server to back up the message would be transmitted slower than a synchronous message going through a direct connection between two computers.

In fact, the asynchronous messages have been faster because of the overhead of two phase commit in synchronous systems that makes it possible to back out a transaction that is not completed.

Both synchronous and asynchronous systems have overhead to protect the data. What is significant is that the asynchronous systems operate quickly enough to support sending 250 million messages a day.

Table 3-38 illustrates IBM WebSphere MQ mission critical messaging metrics.

Table 3-38
IBM WebSphere MQ Mission Critical Messaging Metrics

69% market share

550 independent vendors offer MQ-based services and products

3000 people representing more than 1000 different companies worldwide have passed an MQ family certification test

66% of Top 100 North American and European banks use MQ

7000 customer sites use MQ

350 of IBM's top 500 customers use MQ

MQ supports high volume throughput, customer experience in excess of 250 million messages a day

MQ support provided for Oracle, Sybase, Informix and SAP

Source: WinterGreen Research Inc.

3.7 Workflow

The difference between workflow and business process management (BPM) is that workflow handles a flow of information while BPM handles decisions about the business. Workflow utilizes an existing process to route information from one location to another. Workflow allows the interjection of the human into the process to achieve exception management. The rest of the time, the flow of information is automated by the workflow.

3.7.1 IBM WebSphere MQ Workflow

The key features provided by IBM WebSphere workflow products are scalability, compliance with the workflow coalition, and multi-platform capabilities. Table 3-39 illustrates IBM WebSphere MQ Workflow features.

Table 3-39

IBM WebSphere MQ Workflow Features

- Model-driven e-business process automation and tracking

- Support for evolving systems

- Support for systems and people interacting

- Support for spanning application and organizational boundaries

Table 3-39 (Continued)

IBM WebSphere MQ Workflow Features

- Reduce work hand-off and cycle time

- Enhance customer service

- Transactional and universal integration based on MQ mission critical messaging and XML

- Ensure nothing gets lost

- Ensure nothing gets executed twice

- Provide performance that scales with growing workload needs and server capacity

- Ease process tuning based

- Permit audited experience

- Permit faster reaction to changing business needs

Source: WinterGreen Research Inc.

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3.7.2 Tibco InConcert

Tibco offers a strong workflow product offering. The product is offered as part of the message broker suite from Tibco. Workflow gives Tibco the opportunity to offer customers a range of modules to address particular integration issues. Workflow is offered as part of a total integration solution.

3.8 Web Services

Web services have to solve the technical problems of scalability and security. People are trying Web services while they wait for the maturity of systems. Web services depend on mission-critical, secure message transmission. That has to be in place before it becomes the underlying infrastructure.

SOAP (simple object access protocol) is not very scalable inside the firewall. SOAP is a lightweight integration protocol. It is an insecure protocol for working with partners. That is slowing down the adoption rate for serious use of Web services. Web services provide integration of program languages.

3.8.1 IBM WebServices

IBM offers the broadest range of Web services capabilities available in the market. The Web services are offered in the context of EAI integration, applications server, and portal capabilities. Web services complement and extend the capability of all these leading products.

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3.8.2 Sybase Web Services

Sybase integrator Web services integrator (WSI) is a platform for seamless integration of business processes and enterprise data between trading partners. Systems can be used within multiple locations inside an enterprise. It allows users to build, deploy, and locate Web Services components via a J2EE development platform. Adapters for XML automate the specification of XML message structures.

3.8.3 Vitria Rosettanet Web Services

Vitria participates in the RosettaNet consortium. Vitria has been a leading member of the RosettaNet consortium since it was founded in 1998.

3.8.4 BEA WebLogic

BEA WebLogic provides services software that allows business functions to be accessed by applications over the Internet using Web-standard protocols. A comprehensive Web Services architecture enables direct business to business integration and collaboration.

Web services extend the Web platform with standards that enable business applications to directly and automatically interact with other business applications across the Internet. BEA offering gets quotes, checks inventories, and places orders. It uses Internet collaboration to create multi-vendor products.

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3.8.5 BEA's Web Services Architecture

BEA provides an offering that supports simple, informational Web services, as well as complex, transaction-based Web services in one integrated platform. Key product components of BEA's Web services architecture include the following shown in Table 3-40.

Table 3-40

BEA's Web Services Architecture

- **BEA WebLogic Server** - J2EE application server and cornerstone of the WebLogic E-Business Platform. Hosts and exposes simple, one-call, one-response Web Services. Offers support for the basic protocols and standards, such as SOAP, with support planned for emerging standards such as UDDI and WSDL.

- **BEA WebLogic Collaborate** - BEA's open and extensible B2B collaboration platform, BEA WebLogic Collaborate, integrates trading partners across the Web and enables complex Web Services to be deployed with transactional integrity, security, and reliability. BEA WebLogic Collaborate extends simple Web Services into sophisticated Business Web Services required for complex, B2B commerce and integration.

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Table 3-40 (Continued)

BEA's Web Services Architecture

- **BEA WebLogic Process Integrator** - As the workflow engine for BEA WebLogic Collaborate, BEA WebLogic Process Integrator controls the sequencing of various stages of a Web Service to help execute collaborative B2B processes.

Source: WinterGreen Research, Inc.

3.9 Mobile and Remote Integration

Mobile and remote integration promises to become a more significant aspect of application integration. Remote and wireless applications will account for an increasingly large amount of transactions over the Internet.

3.9.1 Real Time Data Acquisition

Real time systems gather data from remote sites and require integration of data into enterprise systems. SCADA is an acronym for supervisory control and event acquisition.

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A SCADA system allows equipment in many different locations to be monitored and controlled from a central location. Common applications for SCADA are oil and gas, mining, fresh water, waste- water, electrical utilities, telecommunications, and security.

SCADA is part of the enterprise resource planning (ERP) equation. Managers need to reach into dedicated units and to gather information quickly from those units in real time. Automation of devices to manufacture products or to run equipment has meant the inclusion of processing chips in those devices, and supported the ability to monitor those devices remotely. ERP goes beyond remote monitoring.

Application integration for mobile and Scada systems relates to having the ability to transport information using portable or remote computing devices.

3.9.2 IBM WebSphere MQ Everyplace

MQ Everyplace enables access to enterprise data for mobile workers and remote devices with assured message delivery and dependable security.

IBM WebSphere MQ Everyplace is positioned to empower a mobile workforce with secure access to business-critical applications and information. Customer communication is supported. Transactions are gathered from the marketplace for real time analysis.

Systems permit becoming more responsive to events in the field, making a business more agile and flexible. IBM WebSphere MQ Everyplace is positioned to extend IT infrastructure to the mobile environment, enabling e-business anytime, anyplace, anywhere.

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Table 3-41 illustrates IBM WebSphere MQ Everyplace features. Table 3-42 illustrates IBM WebSphere MQ everyplace functions.

Table 3-41

IBM WebSphere MQ Everyplace Features

- Empowers workers with PDAs, mobile phones, laptops and other mobile devices

- Operates on IBM 4690 retail systems

- Works across more than 35 platforms in an IBM WebSphere MQ network

- Enables transactions captured from electronic point-of-sale (POS) machines to feed into host systems

- Provides rich encryption and authentication

- Controls access to data

- Provides sophisticated, dependable security Extensively customizable

- Provides compression features

Source: WinterGreen Research Inc.

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Table 3-42

IBM WebSphere MQ Everyplace Functions

- Offers dependable, once-only message delivery

- Prohibits duplication of high-value transactions

  Optimizes distributed and mobile environments

- Provides a small footprint on mobile devices

- Operates with minimal administration

- Makes messaging systems suitable for unmanaged networks

- Synchronous and asynchronous messaging support mean fragile communications networks do not impede business

- Means messages can be held and transmitted at the most economical rate available or at specific times

- Helps lower transmission costs

- Integrates seamlessly with the IBM WebSphere MQ family and IBM WebSphere Everyplace offerings

Source: WinterGreen Research Inc.

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3.9.3 Evolving Systems

Evolving Systems addresses the problem that manual processes dominate and delay the design and assign stage, as well as the activation stage of service delivery. Service delivery automation improves efficiency if the network is modeled and configured in an efficient manner. Using tools that are rapidly being deployed is part of a technology called network resource management (NRM).

Evolving Systems' OSS expertise technology makes all parts of the service delivery process network aware. Systems are used to automate service provisioning.

OSS systems ensure rapid service delivery, painless application integration, and cost-saving network inventory. The benefits of Evolving Systems OSS Solutions relate to the fact that organizations that have integrated and automated their OSS business processes. Solutions from Evolving Systems achieve the benefits illustrated following in Table 3-33.

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Table 3-43

Benefits of Evolving Systems Solutions

- Faster turn-up rates for new and modified services

- Faster ROI on expensive network hardware

- Standardized processes with performance metrics

- Enhanced decision support for network planning

- Instant response to customer inquiries requiring data from multiple systems

- Elimination of dropped items as a result of manual hand-offs in complex processes

- Automated escalation of service in jeopardy

- Reports on work in progress and completed work

Source: WinterGreen Research, Inc.

3.9.4 Evolving Systems Wireless Services

The Evolving Systems wireless services relate to designing, building, and operating wireless data systems. Comprehensive sets of wireless services are available in CDPD, CDMA, and TDMA technologies, including over-the-air provisioning and service activation software.

Application Integration Products

Wireless data applications are evolving as these services are adopted. Wireless data has not yet achieved measurable market share.

OMNIpresence Server™ application is being offered to carriers and infrastructure providers to broaden and enhance messaging and e-mail services. Software and consulting services have been provided to nine major wireless service providers. Specific areas of expertise include the following shown in Table 3-44.

Table 3-44

Evolving Systems Specific Areas Of Expertise

- Over-the-Air Service Provisioning

- CDMA Packet Data IWF

- CDMA A-Interface

- Cellular Digital Packet Data

- Advanced Intelligent Networks

- Network Elements

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Table 3-44 (Continued)

Evolving Systems Specific Areas Of Expertise

- Integration and Infrastructure Services

- Network Management

- Cellular Call Processing Mediation

Source: WinterGreen Research, Inc.

Evolving Systems telecommunications software solutions are positioned to provide complex wireline and wireless data applications. Customers include Regional Bell Operating Companies, InterExchange Carriers, and several of the nation's largest wireless carriers. Evolving Systems is a leading provider of local number portability solutions. The company is establishing an expanding presence in the high-growth wireless data communications market.

Evolving Systems possesses special expertise in operations support system software that encompasses order management, complex provisioning, service activation and customer care systems.

A full suite of services include software development, consulting, system integration, training and customer support. Evolving Systems integration expertise relates to automation of key network and business support activities such as service order entry, order management, service provisioning, billing, network management, and network elements.

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3.10   Integration Platforms

Integration platforms do not work well. Platforms represent an attempt to impose a unified, proprietary solution on integration solutions. But, it is the nature of integration to deal with heterogeneous computing environment and the idea of a platform is an anomaly.

Integration brokers are composite groups of modules that support a particular approach to application integration. Positioning an EAI offering occurs in the context of supporting cross application exchange of information inside an enterprise or between strategic partners, outside the enterprise.

Virtually every competitor has basic functionality, but significantly different strengths. Approaches are evident in the product descriptions. Each vendor has significantly different ways to analyze the problem, address solutions, and support installations.

Product positioning relates to the ability to automate integration processes. On the average, the cost of the integration software represents one tenth of the cost of the services associated with installation.

Table 3-45 illustrates integration platform functions.

Table 3-45

Integration Platform Functions

- Provide brokers that represent composite groups of modules

- Support a particular approach to application integration

- Position AI and EAI offering in a context

- Support cross application exchange of information inside an enterprise

- Support cross application exchange of information between strategic partners

- Support cross application exchange of information outside the enterprise

- Support cross application exchange of information between the enterprise and customers

- Support cross application exchange of product information between a web site and customers

- Support cross application exchange of transaction information between a web site and customers

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Table 3-45 (Continued)

Integration Platform Functions

- Support personal portals to configure exchange of messages across multiple messaging platforms

Source: WinterGreen Research, Inc.

There are many types of integration platform. Application integration and enterprise application integration represent only one part of the total integration platform market. There are customer portals, personal portals, distributed transaction management systems, transformation systems, EDI systems, AI systems, and EAI systems. This study addresses the latter two types of integration systems.

Virtually every competitor has basic functionality, but significantly different strengths. Approaches are evident in the product descriptions. Each vendor has significantly different ways to analyze the problem, address solutions, and support installations.

Product positioning relates to the ability to automate integration processes. On the average, the cost of the integration software represents one tenth of the cost of the services associated with installation.

3.10.1   Different Approaches To The AI Market

IBM, Tibco, Vitria, Sybase / New Era of Networks, and GXS have different approaches to the applications integration (AI) market. IBM provides a complete solution, not simply a technology. An enormous services staff takes the software integration packages and helps IT departments utilize specific functionality in a manner that is useful to solve a particular problem.

Tibco provides a license to a large suite of products and lets the customer evolve solutions from the license of the suite of solutions.   Vitria defines the integration problem one of automating business processes and provides business process automation solutions.

GXS provides a transformation solution. The integration problem is defined as the need to take information from suppliers and transmit it to a vendor. This problem is also a issue of providing information from one supplier to 200 or more vendors. Each supplier and each vendor has different configurations on each end of the connection and the integration issue revolves around transforming the information for communications compatibility.

Table 3-46 illustrates selected different approaches to the AI market.

Table 3-46

Selected Different Approaches To The AI Market

- **IBM**

- Defines separate problem of integrating applications information inside the enterprise

- Defines problem of integrating applications information between partners

- Provides a complete solution, not simply a technology

- Backed by an enormous services staff

- Provides sophisticated software integration packages

- Helps IT departments utilize specific functionality

- Positions software in a manner that is useful to solve a particular problem

- Provides process software to implement process exchange of information

- Has adapter strategy that supports service level, url, FTP, and html transfer of information across public networks and the Internet

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Table 3-4 (Continued)

Selected Different Approaches To The AI Market

Tibco

- Defines problem as transmitting information across a network in seamless manner

- Provides a license to a large suite of products

- Lets the customer evolve solutions from the license of the suite of solutions

Vitria

- Defines the integration problem as one of automating business processes

- Provides business process automation solutions

Table 3-4 (Continued)

Selected Different Approaches To The AI Market

GXS

- Defines the integration problem as one of taking information to and from suppliers and vendors

- Defines integration issue as revolving around transforming the information for communications compatibility

- Provides a transformation solution

- Provides information from one supplier to 200 or more vendors

- Permits each supplier and each vendor to have different configurations on each end of the connection

- **Source: WinterGreen Research, Inc.**

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Application Integration Products

4. Application Integration Technology

4.1 Enterprise Integration Analysis

Companies are implementing application integration as point solutions in the context of scalability and enterprise wide solutions. Response to competition means adjusting unique enterprise resources to address opportunities and respond to change in markets. Needs and demands are integral to an integration infrastructure systems implementation.

Integration of Internet servers that implement e-business with partners and open a new sales channel depend on EAI systems. Areas of demand within the enterprise include financial services, customer relationship management, e-government and e-business. Areas of demand outside the enterprise include transmitting information between strategic partners, distributors, agents, and industry exchanges. Supply chain automation utilizes EAI to make outsource manufacturers function as though they are part of the enterprise. Integration solutions are geared to unique demands with industry specific functionality and different engines that provide different functionality.

Business process integration supports achievement of competitive advantage. Enterprises have a fast reaction time. Sales and customer service are improved. Companies are positioned to capitalize on new business opportunities sooner than their competitors. Emerging 'zero-latency enterprise' strategies advances the goal of timeliness. Immediate awareness and appropriate response to events across an entire enterprise are facilitated.

4-1

4.2 EAI Business Benefits

Application integration eliminates the need to write or generate programs to interface or integrate applications/systems or convert data. It reduces maintenance of interfaces since no programs are written or generated.

It dramatically accelerates integration projects. What would take traditional integration approaches months of development can be accomplished in a few days. It eliminates the cost of replacing or adding new systems by providing interoperability between existing systems.

It maintains database integrity and audit rules by allowing applications to carry out their important, existing processes. It integrates applications without reprogramming or modifying existing applications. AI quickly adapts to changing business environments. It integrates applications that are 'locked' or have no documentation.

Models of business processes achieve integrated services. Business processes are modeled in software. Systems create a network-centric computing model that mirrors the way a business operates. Scalability and flexibility are supported by systems that allow information resources to be incrementally integrated into the system at any time. Business processes and information requirements drive the system.

4-2

4.3 Events

Events are the substance of AI. Events are comprised of information derived from an application for real time systems, or from a database. Events are most often configured as a message. AI manages events that are independent of the application. An event corresponds to a business order, quotation, or transaction.

Events are discovered or created by one resource and are of interest to other resources. Corporations define events to fit their needs and practices. Events may correspond to a quotation sent, order submitted, order shipped, payment received, employee hired, and product manufactured. Because events are grounded in business processes, their meanings are self-evident to everyone familiar with those processes.

Table 4-1 illustrates the types of information that comprise an event. Table 4-2 illustrates event management definition. Each event type contains information particular to it, such as employee number or invoice amount. Well-designed events are self-sufficient, containing all the information pertaining to a business event; such events can be analyzed at any time without reliance on other resources, such as databases, which are subject to change.

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TABLE 4-1

TYPE OF EVENT INFORMATION

- Order shipped

- Payment received / sent

- Order submitted

- Order shipped

- Payment received

- Employee hired

- Product manufactured

- Quotation

- Transaction

- Employee number

- Invoice amount

Source: WinterGreen Research, Inc.

TABLE 4-2

EVENT MANAGEMENT DEFINITION

- Information of interest to other resources

- Events that are independent of the application

- Corporations define events

- Grounded in business processes

- Event is discovered or created by one resource

- Each event type contains particular information

- Information pertaining to a business event

- Events can be analyzed at any time without reliance on other resources

- Events are independent of databases, which are subject to change

- Event type can contain semantic or header information

- Event header may be used for routing

- Event flows through the integration system using standard envelope which holds administrative information

Source: WinterGreen Research, Inc.

An event type can contain semantic or header information. An event header may be used for routing. When an event instance flows through the integration system, it has a standard envelope, which holds administrative information that applies to publisher ID, server destination, or Web services.

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New event types can be added without disrupting a running integration system. Moreover, because business processes and corporate information needs change, event types support backward-compatible versioning.

4.3.1 Event Transmission

Event-producing resources publish events. Event-consuming resources subscribe to event types and receive events of those types. Some resources publish one set of events and subscribe to another. Because event delivery is brokered on a queue that serves as an intermediary, an unavailable subscriber never delays a publisher, and a subscriber only receives events when it is ready for them. The tasks of event queuing, routing, and delivery-regardless of network status are the responsibility of information brokers. Message oriented middleware systems provide the bulk of queuing services.

The complexity of achieving mission critical, cross platform, once and only once delivery is a central underlying issue for AI systems. Messaging is necessary for AI to exist. For applications to be integrated, it is necessary to have the capability of mission critical messaging between applications. The need for messaging is met by the de facto industry standard messaging product IBM MQ. Though some suppliers expect to bypass existing messaging when implementing AI, this is not a long-term viable alternative.

AI is built on message queuing because the complexity of providing mission critical functionality cannot be bypassed by AI systems that provide connectivity without transport. The core business of AI depends on the ability to provide or adapt to messaging functionality as a base for brokering.

4-6

Platform-neutral event description is necessary for event transmission over a network. Publishing an event is the act of transmitting the event. An application publishes an event by creating an event data structure and invoking an adapter.

Information brokers have administrative functions. They maintain registries of events that developers can browse. They provide data on publish and receive rates of resources, lengths of queues exposing network problems and possibly indicating that a hardware upgrade may soon be in order. Events correspond to business processes. Broker data can be used to address business issues.

4.3.2 Business Process Automation

Events form the basis of business process automation. Business process managers are designed to solve key business functions for business analysts. Products take application integration from the level of infrastructure to useable business application tools.

Automation of the integration of multiple platforms is a key design goal. Event messages are transmitted from one kind of machine, operating system, or application to another.

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Application Integration Technology

Cross platform-messaging speeds up the process of integrating an organization's business applications with its financial applications. It also protects existing investments by rapidly integrating legacy systems. Event managers can send files or messages across multiple heterogeneous platforms. Systems scale depending on the scope of an organization's information integration needs.

Accounting and reporting rules are defined, viewed, and modified at a single location-so business rules are applied consistently across the enterprise. Businesses can make changes to application code running in multiple places once-quickly and efficiently.

Business logic is maintained using a graphical interface that makes sense to business users. The business side of the organization can accomplish tasks without involving the information technology (IT) organization. The IT organization does not have to interpret the instructions of the business organization and figure out how to implement the change across the enterprise. The people who understand the organization's business information needs make changes quickly and accurately.

Business event managers are evolving as proven, tested solutions based on core functionality developed in the AI system architecture. Business event managers have a rules engine, formatter, and format repository. This allows transformations outside of customer's application code, effectively abstracting the business rules that control how data is shared throughout the enterprise.

Business critical integration services include the following shown in Table 4-3.

TABLE 4-3

INTEGRATION SERVICES

- Provide connectivity

- Permit information resources to cooperate across heterogeneous platforms over a network

- Extend standard network protocols

- Leverage middleware multiplexing, queuing, routing, security, ordering, and guaranteed delivery

- Achieve interaction of different departmental systems

- Achieve interaction of different partner and strategic ally systems

- Provide transport flexibility, publish/subscribe, publish/deliver, request/reply, and transactional messaging

- Implement standard interface logic

- Adapt to message transport at the interface level

- Implement flexible formatting

- Achieve description of information at a semantic level

- Represent information by a unique format

- Support critical path transformation

- Support data flow

Source: WinterGreen Research, Inc.

4.4 Advanced E-Business Infrastructure

Companies use application integration to create an advanced e-business infrastructure. E-business infrastructure is positioned to provide significant benefits to customers, resellers' independent agents, distributors, and the enterprise. Companies have enhanced existing infrastructure and systems with business applications. Applications have been implemented with the desire to increase efficiency and lower costs.

Companies spend upwards of two years researching the optimal architecture and supplier for e-business infrastructure. The key decisions relate to design of a hub-and-spoke, standards-based (XML and Java) approach versus a distributed messaging approach.

The hub and spoke architecture has essential mission critical functionality as the base for information exchange while the distributed messaging system relies on artificial imposition of mission critical protection of data as a separate architecture layer.

Hub and spoke systems are built on rules engines and asynchronous once and only once delivery of messages. Application servers and Java represent basic functionality as well. Distributed message architecture represents a publish-subscribe format that is similar to IP packet switching. Packets are sent around the network looking for nodes that recognize a header or subject content of the message.

　　　　　　4-10

Hub-and-spoke architecture is useful for putting intelligence in the network. Intelligence that resides at both the hub and at the spokes means application servers can carry out specific application services. New packaged software communicates with the hub using messaging protocols.

The e-business infrastructure once live and solid serves as the basis for a dozen business-critical applications that benefit both the end customers and independent distributors. It is highly integrated with internal and external applications. Seamless XML-based integration with financial portals allows partners to transact business across financial providers from a single point.

4.4.1 Application Integration Technical Advantages

Technical advantages relate to increased flexibility of deploying development resources that the common infrastructure has enabled. The technology helps partners connect to multiple vendors using the same integration tools.

Application integration is positioned to permit users to continue to evolve business processes to meet the increasingly complex business environment. As change in product cycles is accelerated to as soon as every six months, companies need to be able to adjust internal business processes at the same pace.

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4.5 Integration System Architecture

Integration systems architecture is infrastructure aimed at permitting existing systems to exchange information. Network computing places a primary emphasis on exchanging information between applications, replacing a previous emphasis on storage and processing application data. This change to network computing is evolving enterprise application integration engines and platforms that introduce a new way of managing the enterprise.

Change is the environment of corporate IT. Business cannot be controlled or predicted by the IT system. The integration system architecture is designed to accommodate change by introducing flexibility as a systems element. Scalable distributed computing solutions are inherently complex. AI is positioned to introduce an element of simplicity and manageability.

The integration system architecture absorbs the complexity and hides it so developers and administrators can focus on business problems, not networking problems.

Productivity tools save developer and administrator time. The integration system architecture provides the regularity and control points needed to build effective tools for integrating resources and managing the resulting system. Design of the integration system architecture relates to fundamental aspects of enterprise computing systems. Table 4-4 illustrates design of the integration system architecture.

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TABLE 4-4

DESIGN CONCERNS FOR INTEGRATION SYSTEM ARCHITECTURE

- Flexibility

- Change

- Encapsulation

- Scalability

- Distributed computing

- Focus on business problems

- Productivity

- Integrating resources

- Managing systems

Source: WinterGreen Research, Inc.

4.6 Open Systems

Open systems support heterogeneous computing platforms. Efficient and affordable personal computers further enable this trend. Line and staff departments run large parts of their operations on personal computers and workstations whose hardware, software, and development tools are all different. But open systems represent a headache for IT departments.

The presence of many open systems platform types drains development resources. Instead of creating solutions to new problems, too many developers spend time and resources porting old solutions and building interface logic.

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Compounding the problem of heterogeneous platforms is the sheer number of computers in many enterprises. Distributing and installing software on thousands of machines around the world is a formidable task. AI is positioned to provide solutions by automating software distribution.

4.7 XML Standards

XML is used to enable internal and external communications with other systems. Application integration is used to address the challenges of keeping the applications independent, loosely coupled, but able to be well integrated. IT departments need to maintain independence of underlying infrastructure, allowing change to the infrastructure without rewriting the applications.

XML.ORG is the OASIS community for advancing XML industry standardization. AI companies are participating in the electronic business XML (ebXML) initiative.

ebXML was formed by the United Nations CEFACT and OASIS to develop a technical framework to enable the use of XML in a consistent manner across all business data in application-to-application, application-to-person, and person-to-application environments.

In particular, ebXML lowers the barrier-of-entry to electronic business. It is designed to facilitate trade, particularly with respect to small- and medium-sized enterprises (SMEs) and developing nations. AI companies are taking an active role in developing ebXML.

4.7.1 **XML**

XML plays two major roles in application topology. It is the prime method for communications between internal applications. All messages flying through a hub can be XML until they are transformed for the mainframe. All new services under the new architecture interface via XML.

XML has a role of in external integration. Marketplaces are being integrated via XML. Electronic market places are being designed to act as the custodian and facilitator for the XML standards for any marketplace model.

As companies constantly address new business processes, XML is a protocol for formatting information in a standard manner so that the messages are consistent. Changes in business processes are continuing to evolve across product lines, customer service functions, and in keeping with XML directions. The evolution of XML and Web Services supporting technology is a challenge.

4.7.2 **XML Meets The Integration Challenge**

XML is extensible, meaning over 200 different languages with new vocabularies are being used simultaneously. Systems of words and meanings evolve without standards. That has caused confusion, creating the need to integrate even more than before.

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4.8 Java

Java is used to provide a single application development and deployment paradigm across multiple platforms. The J2EE standards provide the technology specifications for connecting to external applications and data. Integration is achieved using enterprise application integration (AI) software.

Native Java access to integration software is evolving. Application integration is well within the reach of a Java developer. Vendors are working on J2EE integration. Solutions are positioned to do J2EE integration for legacy applications, data, and popular application packages, while retaining the scalability of the architecture.

J2EE solutions leverage adapters. Adapters incorporate technical and business level capabilities, so the Java developer needs to know very little about how to interface with a software package. Vendors seek to deliver benefit without requiring the developer to learn new technology.

Java connectors are being integrated into suites of products. Vendors can facilitate application server-based Java development and deployment. The connectors provide Enterprise Java Bean (EJB) components connect to adapters, creating the ability to seamlessly interact with applications and data inside the enterprise.

A Java developer may be able to create, retrieve or update a purchase order in an SAP R/3 application by appropriately invoking an EJB in the application server. When combined with other integration product offerings, such as open business interchange, integration can take place outside the enterprise as well inside.

4.8.1 AI Vendor Commitment To Java

Java plays a significant role in the evolving architecture of application integration. Java plays several key roles. It is the choice for an application server because of its portability and the number of product suppliers that support Java. To leverage existing internal skills, Enterprise Java Beans (EJB) is the preferred programming model, and Java is a preferred programming language.

4.8.2 Advantages Of Java In Context Of Application Integration

Java Web application servers provide flexible functionality. The large number of early Java adopters means that there is a large number of Java developers with a good skills base.

Java provides platform portability that enhances application integration. Reusable software can be built using Java. The reusable modules are provided to development teams in the form of style sheets. JavaScript, and Java frameworks are more modern programming techniques used by students and newer programmers.

Java is available for every platform, including mainframes. System testing, maintenance, and production environments are implemented in Java. Java on S/390 can be used for building new Internet applications that make the mainframe act as an application server.

4.9 Web Services

Web services are protocols designed to achieve interconnection of proprietary systems. The trouble is the protocols developed by Web services designers do not do the whole job of achieving connectivity. Web services are in fact an adjunct to application servers, enterprise portals, and enterprise application integration (EAI). Web services are a group of protocols.

These protocols provide an extremely valuable supplement to the basic systems that are used to implement e-business. Web services automate integration between programming languages – C+, Java, and others. In the same manner that application integration integrates applications, and mission critical messaging integrates platforms and operating systems, Web services automates programming languages.

4.9.1 Soap

Soap is positioned to support interoperability between servers. It is a challenge to deliver Soap-based solutions, which perform well in production environments. Scalability is a significant issue. Open-source utilities may help performance in Soap-based Web services.

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4.9.2 Apache Soap

Based in part on IBM Soap, Apache Soap is positioned as an open-source project. Apache Soap delivers a full-featured Soap implementation for Java. Apache Soap implements most of the Soap specification, supports Soap messages, server and client implementations, and comes with full source code under an Apache-style license. This license means users can change the code and deploy proprietary software products with specific changes.

Apache Soap comes with the Xerces XML parser. Any SAX-compliant XML parser can be used instead. Java developers can use JDOM as an API to use to manipulate Soap XML documents.

It allows users to change the underlying XML parser without recoding the Soap application. This flexibility gives choices when trying to solve scalability or performance problems in a particular XML parser. JDOM is also distributed under an Apache-style open-source license.

Soap has compatibility issues. The Apache and Microsoft Soap implementations both include a BigDecimal data type. However, they are not compatible. Then products are needed that map between the platform differences of XML.

4.9.3 Load Balancer With SSL Support

The Soap protocol is expected to define encryption and authentication methods. Until Soap defines an authentication method, the framework depends on writing business logic into a servlet, then using the underlying Web server's SSL support to make an HTTPS request to the Web service.

4-19

The load balancer SSL support manages encryption, encrypting and unencrypting requests. It passes requests to a Web service as an unencrypted SOAP call. This frees up the Web service server from the computing overhead of SSL.

4.9.4 Points Of Failure

The load balancer works with cookie-based session tracking. Soap has yet to define a session management mechanism. In a load-balanced environment, some Soap requests carry state information that could get lost.

For example, communication with a Web service may require multiple requests and responses in C++. The load balancer must have the option to bring a request to the same Web service server during a session. During this process, the server may become disrupted.

Most load balancers support cookie-based session tracking, but the particularities of the Soap requests introduce complexities. Soap is a new and untested system. Inside Soap are many places to harbor performance and scalability problems. Determining production-worthiness requires both unit- and system-level testing.

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4.9.5 Soap Limitations

Soap was designed to work within existing Web application environments. The protocol may introduce firewall and routing problems. Unlike a normal Web server-using HTTP, all Soap messages are the equivalent of HTTP form submits. The calls move much more data than the average HTTP GET or POST call. Network performance may deteriorate.

Special testing of the firewall and routing equipment relates to Soap issues. A firewall security policy is needed to make certain it does not monitor Soap-requests as Web traffic. The firewall shunting away Web traffic that looks like a denial of service (DoS) attack.

Soap can make call and get a response. Advanced Soap applications make a series of get and response calls until a transaction is finished. Transactional Soap calls need to identify and cache the state of sessions. Caching mechanisms for Soap transactions present potential problems for scalability.

Moving a Soap-based Web service into a production environment requires testing for states, privilege, speed, boundaries, and regression as illustrated in Table 4-5. Assurances of high availability relate to good performance.

4-21

TABLE 4-5

SOAP-BASED WEB SERVICE PRODUCTION ENVIRONMENT TESTING

- State testing

- SOAP sets server value

- Server response issue

- Privilege testing

- Access a control

- Authorization only for administrators

- Speed testing

- Web service response times

- Boundary timing testing

- Web service request time-outs

- Regression testing

- Existing Web service function continuity

Source: WinterGreen Research Inc.

These are fairly common tests for any software application. Web services are different because the testing arena expands into a matrix. In the past users could test a Web application using a Web browser. This is not true with a Soap-based Web service. Manually reading the XML documents emitted during a Soap transaction becomes time consuming very rapidly. Developing and using automated test suites is necessary.

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Programming and delivering production-quality Web services depends on testing. Quality of the service needs to be determined under the stress of multiple concurrent requests. The scripting language and test objects in the open-source utility can offer a way to make systems more productive when SOAP-based Web services are implemented.

4.9.6 **WSDL**

WSDL can be used to implement Soap communication. Developers embed WSDL definitions into their code to avoid the overhead of getting the WSDL. While this improves performance, it becomes a maintenance issue when the WSDL changes.

To avoid maintenance problems programmers can cache the WSDL in the centralized database and then periodically check the timestamp/version number of the WSDL to see if a newer one is available.

Parameter types in Soap present a scalability problem when WSDL is used with Soap. Soap defines simple data types: String, Int, Float, and NegativeInteger. WSDL may include non-trivial new data types. While reading a response, a validating XML parser will contact the pushtotest.com host to get the XML schema definition for a format. The overhead of this request can make a system unscalable if the validating parser does not cache the schema definitions.

A general performance rule is to stay with the simple SOAP data types unless there is a compelling need to use another data type. This however, limits the usefulness of WSDL.

4.9.7 WSDL Service Descriptions

WSDL service descriptions are used to map to a UDDI registry. Applications are used to publish WSDL service interface descriptions or implementation descriptions.

Requirements for this type of application relate to publish applications being able to read and understand the contents of a WSDL document. Systems need to send requests to a UDDI registry and then process any responses. Existing Java class libraries provide this functionality. The Web services description language for Java (WSDL4J) and the UDDI Java API (UDDI4J) provide these functions.

WSDL4J provides a standard Java interface, which can be used to parse existing WSDL documents or to programmatically create new WSDL documents. WSDL4J is an open source project located on the IBM developerWorks site.

The publish applications developed can be used to publish WSDL service interfaces and WSDL service implementations.

4.9.8 UDDI Registry

To run the publish applications users need to select a UDDI registry. Different types of UDDI registries use a class object to access them. There are two types of UDDI registries that can be used to run publish applications. The UDDI test registries are available on the Internet or a private UDDI registry. Users need to register with a UDDI registry. When registering users specify a user ID and password, which are needed to publish data to the registry.

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4.9.9 UDDI Test Registries

There are two public UDDI test registries. IBM hosts one and the other one is provided by Microsoft. Each registry has two interfaces. An inquire interface is used to find information in the registry. The publish interface is used to publish and remove data from the registry.

An example of a private UDDI registry is the IBM WebSphere UDDI registry preview. A private UDDI registry must be installed on a local system. After a private registry is installed on a local system, it is accessible using a set of URLs.

The UDDI proxy class provides the interface to a UDDI registry. Each of the publish applications contains a get method from Java. This method creates the UDDI proxy. The inquiry URL and publish URL are used. It adds the support that is needed to use SSL. All publish messages are sent to the UDDI test registries using an SSL connection.

4.9.10   UDDI Distributed Web Service Discovery

Service discovery defines a process for locating service providers and retrieving service description documents. It is a key component of the overall Web services model. Service discovery does not have one solution that addresses all requirements.

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The Universal Description, Discovery and Integration (UDDI) specification addresses a subset of the overall requirements by using a centralized service discovery model. The WS-Inspection specification provides a method for aggregating different types of service descriptions. Within a WS-Inspection document, a single service can have more than one reference to a service description.

A single Web service might be described using both a WSDL file and within a UDDI registry. References to these two service descriptions are put into a WS-inspection document.

A WS-inspection document provides an aggregation of references to service descriptions. These service descriptions can be defined in any service description format WSDL, UDDI, or HTML. A WS-inspection document is available at the point-of-offering for the services that are referenced within the document.

A WS-inspection document can contain a list of references to service descriptions. A service element contains one or more references to different types of service descriptions for the same Web service. The link element contains references to only one type of service description. Service descriptions do not have to reference the same Web service.

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4.9.11   UDDI Consortium

Universal Description, Discovery and Integration (UDDI) consortium is a cross-industry effort to develop the open, UDDI framework. The framework is designed to describe services that enable businesses to identify and interact with their suppliers and trading partners online.

Businesses of all sizes can benefit from UDDI. The specifications are designed to address problems that limit the growth and synergies of B2B commerce and Web Services. A set of standard Web protocols for application-to-application (A2A) commerce is evolving. Business functions use UDDI to access other business functions over the Internet to share data, business processes, and transactions.

4.9.12   WS-Inspection Document Extensibility

The WS-Inspection specification does not limit the type of service descriptions that can be referenced. Both the <description> and <link> element may contain extensibility elements. Information relates to a specific service description technology.

The WS-Inspection specification defines a set of standard extensibility elements for both WSDL and UDDI. The <description> element is used to reference a single service description. The <link> element is used to reference one or more sets of service descriptions. Extensibility elements defined for these elements need to follow this pattern.

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The WSDL extensibility elements can be used to indicate whether or not the WSDL document contains an endpoint specification. If there is more than one service element in the WSDL document, then an element is used to indicate which one is associated with the entry in the document.

Elements may appear in WSDL service description reference. Particular elements reference a binding that is implemented by the WSDL document.

The Web services inspection language provides a simple, distributed service discovery method for any type of Web service description document. WS-inspection technology is complementary to existing service discovery methods, such as UDDI, because it defines a process for inspecting a Web site for service descriptions.

This technology is useful for developing Web service crawlers. Service crawlers search through Web sites for WS-Inspection documents. The service description references from multiple sites are aggregated.

4.10   XSLT

XSLT language is used to transform XML as illustrated in Table 4-6.

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TABLE **4-6**

XSLT TRANSFORMATION **O**F **XML**

- Transforming XML into HTML

- Transforming XML into SVG

- Transforming XML into PDF

- XML messaging with SOAP

Source: WinterGreen Research Inc.

4.11   OASIS

OASIS is an industry-wide organization and its efforts to ensure open technical standards for the Internet and e-business. The organization is positioned to be a key enabler for e-business.

It supports XML (extensible markup language). Business-to-business (B2B) online trading exchanges depend on XML because it provides an open and flexible message format for exchanging information. XML is a universal standard for structuring data. It enables the transfer of information across the Internet and between organizations. It allows them to communicate in efficient ways.

The OASIS business transaction protocol (BTP) technical committee is chartered with evaluating the requirements for long-running B2B transactions on the Internet. It is evaluating the suitability of business transaction protocol (BTP) technology to meet B-to-B requirements.

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The BTP specification is an XML-based vocabulary protocol for representing and seamlessly managing complex, multi-step B2B transactions over the Internet.

4.12   ebXML

ebXML is an International Initiative established by UN/CEFACT and OASIS in late 1999. The protocol is being developed under a mandate to research and identify the technical basis upon which the global implementation of XML (Extensible Markup Language) can be standardized.

The goal of ebXML is to facilitate open trade between organizations regardless of size by enabling XML to be used in a consistent manner to exchange electronic business data.

UN/CEFACT is the United Nations body whose mandate covers worldwide policy and technical development in the area of trade facilitation and electronic business, and OASIS is a non-profit, international consortium dedicated solely to product-independent data and content interchange.

4.12.1   ebXML And Open Applications Group OAGIS Standards

ebXML message transport layer uses the Open Applications Group's OAGIS standards for the XML document payload. A message transport layer is a set of electronic protocols that work like a paper envelope works. It contains information as to who sent it and directs where to deliver the document.

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The XML payload, in an electronic sense, is the letter inside the envelope. This approach gives users the ability to exchange Internet-based messages between trading partners wrapped in a standard message framework that is being adopted globally.

ebXML set of specifications is a modular framework. Industries can adopt specific modules of the standard to meet current customer and technological requirements.

The business processes supported by EBXML are expressed as process models and encoded in XML. EBXML developed messages are encoded in XML. EBXML may transport any type of data such as binary content or EDI transactions.

A transport and delivery layer moves the XML information among partners. A formal registry and repository acts as a container for these process definitions, vocabularies, and partner profiles.

4.12.2   EBXML Standard

EBXML is composed of three infrastructure components. Document creation and business process definition are goals of ebXML services creation. The infrastructure components are orthogonal in design. They may be used together or separately in implementing an infrastructure.

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EBXML infrastructure components include collaborative protocol profile (CPP), which defines XML data structures. These describe what each trading partner supports, the components necessary to conduct electronic commerce, data communications, security, processes, document types, and telephone contacts.

Registry and repository defines the access interfaces, security and information storage format for any information that needs to be widely, yet securely shared among trading partners or potential trading partners. Messaging defines the means to move data between trading partners in a secure, reliable manner.

4.13   IP Management

Errors in IP addressing and directory management are a major source of downtime in IP networks. As businesses continue to optimize around IP, and begin exploring strategies for policy-enabled networking, the elimination of these errors increases in importance.

No one wants to run mission-critical applications on a network whose reliability is, at the best of times, unpredictable. Functions of an IP addressing device are illustrated in Table 4-7 following. Table 4-8 illustrates benefits of an IP addressing device.

TABLE 4-7

FUNCTIONS OF AN IP ADDRESSING DEVICE

- Simplifies IP Address Management

- Enables Dynamic DNS Updates

- Offers High Network Availability

- Enables Centralized Control With Distributed Management

Source: WinterGreen Research, Inc.

TABLE 4-8

BENEFITS OF AN IP ADDRESSING DEVICE

- Provides Enterprise Wide Addressing

- Provides Open, Scalable, Robust Architecture

- Provides Extensive Platform Support

- Provides Ease of Use

- Offers Comprehensive Management Platform

- Eliminates Custom Solutions

Source: WinterGreen Research, Inc.

Tracking IP addresses, maintaining directory services, automating some configuration, and performing some manual configuration tasks are supported by an IP addressing device. Manual configuration is time consuming and error prone. Automatic configuration is more efficient.

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This process underlies the Web services process. It exists at a lower layer. The process is central to providing the transport for Web services. As the transport layers achieve some value added services support, Web services begin to migrate to the transport layer.

4.14   WAP

The wireless application protocol (WAP) is an open, global specification that empowers mobile users with wireless devices to easily access and interact with information and services. The WAP Forum is the industry association comprising over 300 members that has developed the de-facto world standard for wireless information and telephony services on digital mobile phones and other wireless terminals.

Wireless Markup Language is a specification based on XML that is intended for use in specifying content and user interface for narrowband devices, including cellular phones and pagers.

E-business is rapidly moving to provide anytime, anywhere access to corporate information and business applications. WML is becoming an important e-business document format to help make this happen. As with other e-business formats it requires integration with a company's e-business environment to provide full benefit.

E-business integration broker software, simplifies the creation of WML interfaces. It provides capabilities for transforming data between applications and any other e-business formats, including XML-based standards. EDI, S.W.I.F.T., and ACORD are other standards.

In supporting wireless applications, e-business integration broker software can enable a telecommunications company service representative to receive information regarding a service outage through a WML transaction sent from a computer system in the home office directly to the rep's mobile device.

In the same exchange, the service rep can use the mobile device to check the history of service problems in the area where the problem occurred. Data required to complete this exchange includes information from home office applications and databases. The system is designed to let data be transformed easily into and out of WML using e-business integration broker technology.

4.15   Business Focus Of AI Software

Business people can combine data from different applications to achieve competitive advantage when that data is available directly without the intervention of a programmer. AI applications provide this capability. Because it solves pressing business problems and provides competitive advantage, the product category will see explosive growth and proliferation of product capability.

Table 4-9 illustrates the business focus of AI software.

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TABLE 4-9

BUSINESS FOCUS OF AI SOFTWARE

- Integrate the enterprise

- Serve those in enterprise with business focus

- Serve partners

- Implement communication between suppliers and vendors

- Implement business exchanges where people bid for goods and services

- Help managers make decisions

- Provide robust, effective platform

- Deliver event driven processing

Source: WinterGreen Research, Inc.

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Growing demand for high quality information access by business managers without compromising performance, reliability, or security is driving software markets and shaping market response. AI applications serve those with a business focus for two reasons:

(1) **Application integration** is used to maximize business performance.

(2) **Business people** responsible for the decisions on running the business can use integration systems to leverage information.

For software to provide the robust and effective infrastructure needed for application integration, it must address the needs of the enterprise's business stakeholders. They are the ones who understand the business imperatives driving the enterprise, and they are the ones who must decide how to manage application integration.

AI applications are rapidly evolving to meet the increasingly widespread customer need for application integration. This software will rapidly evolve to deliver additional capabilities such as those needed for event-driven processing as well as business processing automation.

4.15.1   The Business Imperative

The information base is the most valuable asset of the corporation, and making more effective use of the corporate information base is a very high management priority.

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Management needs to access, understand, and control relationships with strategic partners, suppliers, and distributors. To meet this need businesses must integrate customer and supply chain data beyond the boundaries of the enterprise with the enterprise's own data.

The diversity and complexity of the typical enterprise-computing environment vastly compounds the enterprise data infrastructure integration problem. Solutions must be able to deal effectively with the enormous heterogeneity embodied in software platforms, mainframe and distributed hardware, programming languages, and applications packages.

A vast array of custom legacy business applications co-exist with packaged applications – an enterprise may have as many as 500 internal and external applications to be integrated. Enterprises must be able to exchange data between applications without compromising the integrity of the existing applications.

The enterprise system is the stronghold of the information that is the legal backbone of the organization. The ultimate responsibility for protecting the integrity of data lies with the audit committee of the board of directors.

The enterprise's data integrity cannot be compromised; consequently, robust manual and automated information security and protection systems are in place at all levels of the enterprise to protect its data.

New software to integrate applications must meet the need of business stakeholders to insure mission critical data integrity. Table 4-10 illustrates the strategic goals of enterprise integration.

TABLE 4-10
STRATEGIC GOALS OF ENTERPRISE INTEGRATION

- **Manage relationship with strategic partners, suppliers, and distributors**

- **Provide mission critical integration**

- **Integrate legacy systems and packaged applications across platforms**

- **Automate the integration process**

- **Accommodate global business expansion, mergers, and acquisitions**

Source: WinterGreen Research, Inc.

Change is a constant in the business environment. Continuous market driving forces embodying change mean that stasis is never going to happen. Systems will always be in a state of change. AI applications are the first infrastructure development that effectively addresses the concept of continuous change in business environments and responds to it effectively.

Application Integration Technology

Information systems infrastructures risk collapse due to the dual factors of complexity and change. The range of enterprise platforms is ever more complicated. Custom integration solutions developed over the years have solved particular problems with particular sets of static connectivity systems. These have long since evolved into complex sets of interconnected computing systems that work neither very well or very efficiently and provide little if any flexibility.

Companies have lashed together architectures, designs, devices, standards, servers, operating systems, database management systems, legacy systems, and application packages in a mishmash of complexity. This is a strategy that teeters on the brink of disaster. The potential for companies to continue adding on and patching in new information system components has been exhausted.

A very tantalizing aspect of AI applications is its promise, in addition to its other virtues, of alleviating labor shortages. Adoption of applications integration software can help IT departments alleviate their chronic shortage of qualified labor. The acute programmer shortage is a main contributor to the crying need for automated integration systems.

Enterprises are feeling pain at all levels and in all departments as they grapple with the deepening morass of trying to integrate data. The benefits of AI applications systems are so extensive they provide compelling motivation for IT departments to implement them. Packaged AI applications solutions virtues are illustrated in Table 4-11 following.

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TABLE 4-11

ADVANTAGES OF AI APPLICATIONS INTEGRATION SOLUTIONS

- They solve particular business problems

- They permit companies to achieve competitive advantage

- They can be put in place in weeks or months, not years

- They do not close off future expansion; they provide a pathway for future expansion

Source: WinterGreen Research, Inc.

For all these reasons, this new class of software provides a robust infrastructure to the enterprise's information assets that has been sorely lacking.

4.16   Customer Needs Cry Out For Solutions

Specific problems confront IT managers as shown in Table 4-12 following.

TABLE 4-12

PROBLEMS CONFRONTING IT MANAGERS

- Rescuing data stranded on islands of computing

- Implementing e-business exchanges

- Sharing data with IT departments of strategic partners

- Realizing Internet/Intranet opportunities

- Expanding B to C electronic commerce initiatives

- Maximizing use of corporate computing resources

- Maximizing use of corporate network resources

- Moiling information from SCADA and other remote devices

Source: WinterGreen Research, Inc.

Taken together with the overall IT management function, these could be seen as cause for tearing out of hair. AI applications, like Superman, offer a strong hope that the damsel in distress, the corporate IT function, may be rescued from the jaws of corporate computer infrastructure disaster.

The departmental extensions of legacy software depend on application integration. Companies implement islands of computing in departments throughout the enterprise by purchasing server applications software built to be customized into unique systems. These then need to be interconnected.

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Application Integration Technology

Configuration of the network and management of the network with all these systems in place has become a singularly difficult and sometimes seemingly impossible task. As the number of application packages increases, managers struggle to find out what is going on in the departments, to gain some modicum of control over the network, and to capture the data being collected in the islands of computing. AI applications are the only solution to these needs.

Electronic commerce represents yet another aspect of this dynamic. Now that people can buy stocks, cars, airline tickets, and books over the Internet, everyone that offers goods and services for sale is eyeing the new commercial channel and seeking determinations about how to leverage strategic advantage.

AI applications, because they permit users to exchange data between packaged applications and evolve new applications and analyses, poses an attractive solution. Thus IT managers have started to look at applications integration to solve the problem.

The Internet has come along, allowing companies to reach out in new ways to customers, suppliers, and strategic partners. Thousands of new Internet/Intranet servers have been added – the Internet is growing faster than any technology ever grew in history. Now that the technology is in place and growth has been initiated, there is a race to see what companies benefit the most. AI applications promise to help manage the complexity the Internet adds to the corporate computing environment.

4.17   AI Applications To The Rescue

AI applications used for applications integration must meet many goals, but two very important ones are to:

- Accommodate the growth of the enterprise

- Leverage existing resources

- Support process analysis

- Interconnect the enterprise to its partners and suppliers

Enterprise integration systems need to scale to handle the ever-expanding universe of networked systems in or connected to the enterprise. Data must be gathered from a large number of departments and distributed locations. Solutions must also support use of resources already deployed. The computing power of workstation and desktop computers far exceeds that of the mainframe. This ratio will tilt ever more in favor of the smaller computers as processing power increases; software solutions must accommodate this ratio.

AI applications for applications integration is attractive because it takes what it finds already in the enterprise computing environment and permits data access to implement new solutions without changing existing programs. The solutions eliminate the manual coding required with custom middleware solutions. As a result, the economics of connecting computing systems are changed dramatically in favor of providing benefit to the enterprise versus adding cost to the IT department.

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Application Integration Technology

The business focus of the application integration engines permits a continuous cycle of leverage of the engines after they are put in place to add business solutions as needed. Applications integration solutions employ rules, formatting, routing, and transformation engines to layer added functionality on cross platform messaging. They expand the intelligence of middleware. These new layers of infrastructure add functions to integrate the enterprise and solve business problems.

A key benefit of AI application integration is its ability to work in the business language of the person using it. It is easy for AI applications to adapt to its user. The rules implemented by AI applications create a meta layer of infrastructure that can be personalized to a particular business language, e.g., accounting, financial planning, and job scheduling. The infrastructure package takes on the job personality of the business analyst because it uses the specific language with which the analyst is familiar.

AI applications infrastructure is essential to achieving applications and enterprise integration. Applications integration is the sweet spot driving the market today, due to demand for immediate solutions.

Leveraging infrastructure to support future solutions to enterprise application integration is the Big Bertha of sweet spots. Informed IT customers are spending their money to put in place a AI applications infrastructure that will achieve applications integration now and in the future as well.

Providing scalability and connectivity is a central task of enterprise integration infrastructure. Applications integration infrastructure provides an extendible solution in which adapters provide connection to different applications and database environments. The packages provide scalability and network connectivity. Tools and applications do not do this job; only the infrastructure provided by AI applications does.

4.18   Application Integration Functionality

AI applications leverage existing and legacy system integration. Its real value is in enhancing existing application functionality.

AI applications implement a mission critical, enterprise-wide, distributed infrastructure that supports the business process. Event analysis and event management become open and available to the ordinary business analyst outside the application. The analyst needs not be a programmer to access and configure data from a range of applications and databases.

Applications integration engines function as building blocks. Modeling, cataloging, simulating all occur on top of the application, as a result of the application data being accessible as messages.

Engines and rules provide automated, packaged connectivity. The advantage of engines and rules is that they are defined and manageable. Packaged functionality means improvement costs are spread across and supported by a large customer base so that more functions can be added at a low cost per feature.

Products can become feature rich. Engines can be optimized so that speed and scalability are supported. Template libraries can be built, expanded, and optimized.

Several different types of engines are evolving. Routing engines provide if and compare logic. If data in a message matches certain specified business conditions, e.g., above $100,000, one message route is chosen; if equal to or less than $100,000, a different route is chosen.

Formatting engines are generally combined with transformation engines and provide universal normalized data attributes, e.g., round decimal numbers to two digits, abbreviate states in the same manner, and create universal part numbers or patient numbers. Transformation engines provide pointers to messages containing data so that data can be changed outside an application before it is passed to another application. Data within the actual application remains unchanged.

Transformation engines, routing engines, formatting engines, adapters, connectors, agents, and rules engines control the system infrastructure information flow and content.

A broker engine is a combination of several types of process that manages the state of the other engines and coordinates process management. Table 4-13 illustrates application integration engine functions.

TABLE 4-13

APPLICATION INTEGRATION ENGINES

- Rules - Look at header and/or message content to make decisions or target destinations

- Routing - Send messages to multiple different destinations

- Adapters - Act like an electric plug to connect different applications at each end of an application connection

- Transformation - Make all information similar, e.g. data 10/6/00, 6/10/00, June 10, 2000 all are put in the same format

- Publish / Subscribe - One to one, one to many, many to many routing based on header in a packer or information in the contents of the packet

- Process Workflow - Permit exception handling by real people

- File transfer - Move files via FTP and similar means

- Business Process Analysis - Permit gathering of information from several locations and applications and evolving it with an Excel or spreadsheet format

Source: WinterGreen Research, Inc.

The purpose of AI software is to permit modeling the business, any business. The purpose of technology is to create business opportunity. AI applications and storage area networks (SANs) do both of these. New systems permit management of business processes outside applications using a familiar Excel or spreadsheet format.

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Managers can invest in homegrown programming staffs that use programming tools to build more applications, and then use spreadsheet systems to provide access to the data outside the application to meet the demands of the new business environment.

The essence of AI applications is the capture of a collection of business events as a message or formulation of a task. The formulation is parsed to recognize components or adapters. It is passed to another application, a database, or report. All this is done without programming and without applications development tools. The main asset offered by AI applications is that it implements business rules separate from application logic and programs.

Managers can use AI applications to leverage cooperation and collaboration throughout the business. AI applications help preserve the autonomy of the decentralized business unit.

AI applications support the design of systems that are physical architecture independent as well as language and operating system independent. Decoupling of data via infrastructure permits the maintenance of legacy code and supports addition of enabling applications in days or weeks, not years. AI applications support location transparency.

Dynamic application data analysis using AI applications supports the event driven enterprise. While programmers use tools and objects to develop applications, business analysts use rules to analyze application data. The rules used by AI applications can be accessed in a range of well-known ways.

Access includes graphical user interfaces (GUIs), icons accessed from a screen, menu driven tree branch structures, and spreadsheet based control of formulas based on logical rules as well as computational systems.

AI application strategic and tactical components permit both a top-down and bottom up analytical approach. Strategic AI applications are used for modeling, configuring, and specifying the business processes. Tactical AI applications are used for integrating business applications.

AI applications result from the marketplace convergence of several driving forces. An event driven structural evolution supports a range of functions and productivity improvements. AI applications have evolved sufficiently to be entering its second generation. Companies are expanding the functionality of their products to serve additional enterprise integration needs.

4.18.1   Role Of Messaging

A typical IT department may have client/server computing running in combination with a legacy CICS and other custom systems and have some Sun and HP systems in combination with IBM Unix and NT systems. Departments of the enterprise and its suppliers may have Microsoft, SAP, Lotus, Sybase, Powersoft, and PeopleSoft application systems, all with data that needs to be integrated into transactional and summary processes of the enterprise.

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4.18.2   Role Of Routing

Point- to- point connections have a finite number of combinations that can be interconnected. A situation where hundreds of feeder systems must be interconnected into a central location and to each other require a packaged infrastructure solution. If business managers wait for programmers to perform the integration process on a custom-programming basis, integration may take up to four years and will never be current. Costs are high, ranging between $5 and $200 million, and the work ties up scarce IT staff.

4.18.3   Role Of Transformation Engines

Packaged middleware has solved the programmers' dilemma of having to write applications without becoming embroiled in undue efforts to manage transport complexity. The attributes of middleware are a major underlying force driving the move to applications integration and AI applications.

Without transformation engines, there would be no applications integration or AI applications. Transformation creates similarity of data in different applications. Transformation capability helps make information independent of the application. It is this attribute of independence, the ability to access data without having a programmer that makes enterprise integration, applications integration, and AI applications possible and useful. Once data is independent of the application, the data is accessible to the business analyst.

4.18.4   Role Of Point Solutions

The proliferation of point-to-point solutions and islands of automation created the need for application integration point solutions. Desires for decentralization and local empowerment while maintaining the central control needed in global enterprises drive companies to find ways to marshal worldwide strategic information resources. Point solutions still drive AI markets.

An applications integration server is comprised of hardware and software that function as a switch. The switch combines data from different applications and routes it to achieve data transport between heterogeneous applications environments.

Integration infrastructure permits applications developers to draw information from other applications. Infrastructure transport functions include message queuing, publish and subscribe communications, once and only once delivery, and reliable delivery.

4.18.5   Role Of Distributed Computing Brokers And Publish/Subscribe

Publish/subscribe supports reliable delivery in distributed environments, from one to many, many to one, and many to many distributed points of computing presence. Middleware manages external communications and security for the data transport. Communications consist of the exchange of messages. Functionality is typically layered.

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The technology supports fast, reliable information exchange between systems permitting the enterprise to leverage computing resources to achieve competitive advantage in a new space called the event driven enterprise. Systems deliver specific information to a subscriber. By making data independent of the application, new event driven systems provide reliable, secure data transport across the enterprise and across the business. Strings of data such as stock ticker reports are also publish/subscribe systems. The same information may be sent to many trading desks at the same time. Subscribers can be either individual users or other applications.

Mission critical broker systems offer a range of business benefits that go beyond custom point to point systems. AI products automatically send, or publish, a message from one sever to another server. Typically a rules engine defines threshold triggers transmission of a message.

4.19   Competitive Advantage

New opportunities to harness broker integration systems permit the enterprise to achieve competitive advantage. Custom built, single purpose imbedded middleware has been characterized by inflexibility, generally because connections are point to point and solutions cannot be rebuilt to create system optimization. Linking events within a computing system creates unique business interactions.

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Application Integration Technology

AI infrastructure is used to build optimized networks for application data exchange via messages. Open, scaleable products and services can be targeted to customers. B to B and B to C integration systems reduce the complexity of accessing and managing data from a range of locations within the enterprise. Cross platform queuing systems are becoming more efficient, providing the mission critical data transport between hardware and software platforms.

Connectivity to a broad range of computers is essential. Massively parallel, clustered, symmetrical multi-processing, minicomputers, workstations, personal computers, Internet servers, host systems, file servers, and laptop computers. Software that performs these functions is immensely valuable to enterprises.

AI systems provide the enterprise with connectivity, security, scalability, reliability, and management. The implementation of AI as a scaleable, adaptable platform provides a layer below automated cross enterprise application integration.

AI represents the middle layer of the three tiers of application integration, and AI applications. These layers repeat the processes essential to infrastructure. In addition, the layers overlap in functionality.

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As the enterprise migrates to the use of packaged application products, IT departments are supplementing and gradually replacing homegrown applications. Packaged infrastructure is needed to complement the functionality of the packaged applications. Infrastructure speeds and simplifies the integration of popular packaged applications, including PeopleSoft and SAP applications, and DB2, Oracle, Sybase, and Informix databases.

4.19.1　Role Of Objects

Only an estimated 3,000 highly specialized programmers use objects to develop application programs. AI applications open information within the enterprise for use by thousands of business analysts. Objects are used to create application programs.

Custom object types, methods, wrapping, and object views have evolved. They are complex programmer tools. In contrast, applications integration engines are targeted to providing infrastructure. Using objects have to meet rigorous standards. Components have to know a lot about each other.

4.19.2　Role Of AI For Storage Area Networks

Cross platform, cross application functionality is being added to data base systems and storage area networks. Performance and reliability are increasingly factors users look for in choosing to support mission-critical data processing applications. A store area network is designed to store large amounts of historical or reference data that typically is used to support the decision-making and information needs of an enterprise.

Because data facilitates decision making, application development is widely used in mid-range and low-end transaction processing environments to provide information to mid level managers.

Storage area networks and data repositories are distinguished in part by their inability to keep data current and the difficulties of eliminating redundancy. The concept of centralizing all the data of an enterprise is flawed by the technical difficulty of building a facility that can store all the data being used in a format that is useful. Storage networks are evolving platform independent, application independent functionality.

Applications industry infrastructure provides a complement to data warehouses and storage area networks. Conceptually the ability to store data in its original form and access it as a record from disparate places is more manageable. The data stored in its original form is more likely to be up to date and coherent.

An example of accessing disparate data as one record comes from an emergency ward that permits a person to type in a patient ID number as the patient comes in the door or is picked up in an ambulance. Within 30 seconds, the computing system has accessed the physician system, the hospital patient record system, the laboratory, the pharmacy system, and the radiology system to create one automated record about the patient shown on the emergency ward computing system screen. The implementation of broadband communications systems is what is in part driving the infrastructure for such systems.

4.19.3   Change Drives AI Markets

Change in markets drives the need to implement new ways of data capture. Tracking changes to the application (i.e. log files, date/time stamp, etc.) are shifting. Traditional approaches are being modified. The Internet has changed traditional markets so that users must be able to link into the systems in a real-time fashion Supply chain economies of scale mean that every company must implement the existing systems or be left in a non-competitive situation.

Input rules can be re-coded using AI rules engines. Data can be routed and rerouted using switches. Interface programs are designed to read a source and populate a target. With an AI broker approach there are typically many data systems to populate programs with information.

The traditional approach for getting information out of the production systems and into the data warehouse relies upon writing query programs to retrieve the information, sort, merge, split, and populate programs.

More programs mean more maintenance. A query and populate of systems generates up to 16 or more programs. Population tools generate many, many programs and intermediate files. AI provides a better approach that is more flexible, offers more up to data information, and is easier to use.

4.19.4   Business Process Management Services

Application integration requirements are delivered as a set of services. These include connectivity, network, interaction, interface, format, transformation, and data flow. Together these represent the way to facilitate data flow in the context of infrastructure.

Process models are designed to match enterprise requirements. Services enable multi-parameter definition of interdependent processes for exchanging data. System architecture supports a flexible information model. End to end data integration is supported by connectors or adapters that manage access to the different application environments.

4.19.5   Business Process Management End-To-End Solutions

AI applications support business process management. Management provides an end-to-end solution that permits users to see the broker integration process. It provides strategic advantage that evolves from using an infrastructure solution to create a new view of data. Infrastructure permits business analysts to look for event triggers, achieve decision support, and recognize a change in patterns.

Event integration represents an evolution beyond applications programming and outside AI applications. When programmers take the business analyst's rules and engines and create programming tools that are then used to create more complex event management, this is not an application. It is an event integration that occurs within a spreadsheet, icon based screen manager, or menu driven system.

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4.19.6   Intelligent Infrastructures

Applications integration rules engines support event messaging and event management that can be initiated and understood by business analysts. This capability vastly expands the scope of enterprise computing, bringing the event driven enterprise to every desktop.

Just as digital telephone switches move voice traffic across geographical boundaries, so also application integration infrastructure is evolving to connect applications and database data. Connections run from one business unit to another, from a division to the headquarters to the enterprise, or from the enterprise to a strategic partner.

4.19.7   Role Of Switching

Applications integration software acts as an end-to-end data infrastructure switch. Various engines provide functionality within the switch. Market participants in applications integration generally have diagrams and describe their products as providing a hub and router function, but in fact, the range and complexity of offerings suggest a switch.

Applications integration implements a software switch. The number of connections is decreased significantly. This is important in a static sense when the connections are made initially. It is more important as the systems change and more connections need to be made for the future.

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Applications integration infrastructure can act as a switch because software provides decoupling of data from the application. The intelligence of the infrastructure is located outside the application. The applications integration infrastructure provides business benefit to the business analyst who is able to leverage rules and transformation engines in new ways to support an enterprise integration format that is called AI applications.

With applications integration engines, the analyst does not have to go into a program to make changes. The analysts can look at field or message content at very high speed to get just the information needed. If only some portion of a file is needed, then the desired data can be sent from the application as a message; there is no need for a complete file transfer to extract some data from the file. The integration systems are intuitive to use.

4.19.8   Business Event Integration

Routing, formatting, and transformation engines provide an integration platform built on a business events foundation. Using rules, formatting, transformation, and routing engines, the business analyst transfers data from areas such as accounting, scheduling, and sales to another application or spreadsheet. The application integration system provides the business language of the business analyst.

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4.19.9   Role Of SANs

Storage area networks (SANs) are evolving cross platform, cross application capability, thereby emulating AI systems. Market participants provide intelligent storage systems based on arrays of small, commodity hard disk drives targeted to the mainframe market. Products permit businesses to access information more rapidly and reliably.

SAN and ESN systems support the strategic use of information as a competitive advantage. RAID systems are redundant arrays of independent disks. RAID technology is widely accepted as the industry standard for storage systems.

Enterprise storage service reliability is evolving to offer different levels of dependability. Storage management software requirements range from backup to offsite redundant system mirroring. Information protection, movement, and management represent sophisticated requirements that have been introduced by network computing systems.

Advanced the storage area network (SAN) state of the art is achieving higher levels of mission critical functionality. SAN is giving IT organizations the means to gain competitive edge. Efficient implementations of e-business include a network storage strategy.

Fiber channel solutions include the implementation of hardware, software, and services. SAN fundamentally alters the IT infrastructure, letting businesses compete in the fast paced, fast growth Internet era.

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Elite solutions partner programs provide the products, expertise, and skills that allow companies to successfully market and implement e-business strategies. E-business solutions depend on having highly available SANs. They can deliver value to their end-user customers with fully tested solutions and ensure shorter time-to-implementation of a range of e-services.

4.20 Uses And Benefits Of AI Applications

Adopters of event driven computing are achieving a compelling portfolio of business benefits. AI applications are used to monitor events and apply business rules. They are linked to the business modeling process.

AI applications are used to determine how a business is really running, what the analyst can do about it, and how to optimize management plans. This information is useful after the business models have been generated by business modeling tools.

The new software meets several pressing needs illustrated in Table 4-14 following.

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TABLE 4-14

AI ASSISTANCE WITH OPTIMIZING MANAGEMENT PLANS

- Integrate disparate systems

- Scale business-critical applications

- Manage distributed systems

- Increase productivity

Source: WinterGreen Research, Inc.

The applications integration infrastructure provides a common cross application platform that transforms an enterprise computing resource base into a strategic asset. Productivity is enhanced with the new systems.

4.21   The Event Driven Enterprise

Increased demand for worldwide data gathering drives corporate enterprise implementation of event driven adaptive computing infrastructure models. Response to significant changes in business events demands technology that is up to the job. AI applications create the opportunity to replace custom built programs with packaged infrastructure that provides decision support to the global enterprise.

The event driven enterprise represents an evolution of systems automation. Once business people can capture events and access information related to them in language that is familiar, productivity enhancements are achievable.

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Business people understand events. They talk about events. They do not talk in software terminology such as objects. Business people may not understand objects -- and should not need to. Programmers understand and use objects. Business people talk about event transactions and processes.

Combinations of interacting business events define a business process. Events captured by computing systems denote a transaction, define a task, or automate transaction processing. Benefits achieved with AI applications range from allowing customers to design new classes of applications to realigning fundamental elements of business applications design.

Event driven network-computing promises to bring redefinition of computing infrastructure. Networks depend on infrastructure. New infrastructure technologies allow organizations to share information across applications and databases and eliminate the constraints of distance and time.

4.21.1   The Business Payoff

Manifold business benefits flow from software that is linked to business process reengineering and that integrates previously independent applications across the global enterprise. Electronic commerce is evolving. Infrastructure integrates electronic commerce applications across the enterprise without imposing proprietary systems on the organization. Heterogeneous applications located in different business units or added as a result of acquisitions can be part of an overall enterprise electronic commerce initiative.

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Applications integration software permits the business to realize Internet opportunities. Information is made available to the user in the language of the particular business area, e.g., accounting, financial, human resources, billing, insurance, represent a dramatic technological breakthrough. Once the information generated by systems is accessible to business people AI applications engines can be configured by a business analyst. Flexibility is enhanced so companies can adopt new business practices as needed. The AI applications engines automate business processes that were previously manual. Enterprise integration via AI applications is an elegant solution to the effort to achieve network computing by integrating a myriad of applications both large and small.

4.21.2   Enterprise Process Executive

Enterprise process executives are comprehensive business process automation and workflow systems.

They track the intermediate activities in a defined process. Much more than a document management or workflow system, the integration brokers provide a tool for modeling and monitoring business processes across complex organization. Process flows can be directed anywhere in the enterprise, based on the results of defined required activities.

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MQIntegrator™ uses core functionality to provide event management capabilities, with an unlimited number of defined events that may be discrete, associated, related, or collective. MQIntegrator has the ability to handle high message volumes, provide guaranteed delivery of messages without duplicates, and route messages. MQIntegrator also provides the tools to integrate the event management engine with user applications using the MQIntegrator formatter to transform messages to the target system's format.

A diverse range of applications are designed to help e-businesses do everything from converting data from legacy systems to providing a customer relationship management system, saving companies valuable time, manpower, and of course, capital.

4.21.3   Automation Of Installation

The major shift in EAI software will come with the automation of installation and the increase in ease of use. As systems become more intuitive to use, they will be installed with less customization.

This is where competitive edge will be achieved in the next five years, in the ability to install integration systems simply and easily.

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4.22 Mission Critical Messaging As A Base For Application Integration

Mission critical messaging is a base for application connectivity. Mission critical messaging provides access to cross platform applications and a transport mechanism that is secure. Secure once and only once delivery is central to integration infrastructure.

Customers need accurate information. Once information exchange is automated, the introduction of error by the infrastructure creates enormous complexity, because it is never possible to tell if information is corrupted or not, and where the corruption exists. Issues arise relative to which set of information is correct. Table 4-15 illustrates mission critical messaging as a base for integration software. Table 4-16 illustrates mission critical messaging integration functions.

TABLE 4-15

MISSION CRITICAL MESSAGING AS A BASE FOR INTEGRATION SOFTWARE PROVIDES A BASE FOR APPLICATION CONNECTIVITY

- Provides access to cross platform applications

- Provides a secure transport mechanism

- Provides once and only once delivery of messages

- Provides guaranteed delivery of messages

Source: WinterGreen Research, Inc.

TABLE 4-16

MISSION CRITICAL MESSAGING INTEGRATION FUNCTIONS

- **Central to integration infrastructure**

- **Supports transfer of information accurately**

- **Automates information exchange**

- **Eliminates introduction of error by the infrastructure**

- **Reduces enormous complexity in management of transactions**

Source: WinterGreen Research, Inc.

4.22.1 IBM WebSphere MQ

IBM WebSphere MQ products provide a base for business process management. Through its process, information and data flow capabilities enable integration at both the business and IT level. IBM WebSphere MQ provides a business with the agility to compete in e-business through rapid development. Deployment of business solutions is through IBM WebSphere MQ Integrator.

IBM WebSphere MQ provides a base for management of business services, making the business visible, auditable and measurable. IBM WebSphere MQ manages and leverages information wherever it is. However information is stored, it can be moved to other applications through IBM WebSphere MQ Integrator and products by other AI vendors.

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IBM WebSphere MQ is an open system, available to all vendors providing integration infrastructure. It is the most widely used message oriented middleware in the market, enabling IT and organizational resources to exchange information across more than 35 different platforms, from mainframes to PCs. IBM's IBM WebSphere MQ software is a comprehensive business integration solution.

5. Application Integration Company Profiles

5.1 BEA

BEA Systems is a leading e-business infrastructure software company specializing in application servers. BEA has 10,000 customers worldwide.   The Fortune global 500 comprises a target market.

BEA WebLogic products support e-business. BEA WebLogic e-business platform is positioned as a reliable, highly scalable system. The company works harder than most to be sure that there are no software bugs in a new system when it is shipped. BEA's e-business products are used as a development platform by 2,100 system integrators, independent software vendors (ISVs), and application service providers (ASPs).

BEA has recently made an investment in distribution channels. Expansion of the indirect distribution was network through stronger relationships with systems integrators, ISVs, application service providers, and system platform companies.

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BEA application infrastructure software extends investments in existing computer systems and provide the foundation for running an integrated e-business. Products are marketed worldwide through a direct sales force and through systems integrators.

Independent software vendors and hardware vendors are strategic allies and distributors.

Products have been adopted in the telecommunications, commercial banking, investment banking, securities trading, software, airlines, services, retail, manufacturing, package delivery, insurance, and government market sectors.

BEA WebLogic E-Business Platform

The BEA WebLogic E-Business platform provides application infrastructure for building an integrated e-business, allowing customers to integrate private client/server networks, the Internet, intranets, extranets, and mainframe and legacy systems as system components. Products serve as a platform, integration tool or portal framework for applications such as billing, provisioning, customer service, electronic funds transfers, ATM networks, securities trading, Web-based banking, Internet sales, supply chain management, scheduling and logistics, and hotel, airline and rental car reservations.

Licenses for distributed transaction software products are priced on a per-central processing unit basis. Licenses are also priced on a per-user basis.

BEA WebLogic e-business platform is designed to address the demand for Internet connectivity and transactions. Systems allow companies to quickly connect business processes, link enterprise partners, and implement e-commerce applications. Systems permit companies to share information across the enterprise and the Internet.

5.1.1 BEA Web Services

The BEA WebLogic e-business platform combines application server, Web services, integration, and portal technologies into a single, integrated, standards-based application infrastructure solution. The BEA WebLogic e-business platform is comprised of BEA WebLogic Server(TM), BEA WebLogic Integration(TM), and BEA WebLogic Portal(TM).

BEA WebLogic web application server provides J2EE services to Web-based applications. It supports Web services. Web Services are implemented as a set of software components that allow companies to share applications, business logic, and syndication services from multiple sources.

WebLogic Server bridges J2EE and Web services by enabling developers to deploy Enterprise JavaBeans (EJBs). BEA WebLogic server supports key Web Services standards. It supports Simple Object Access Protocol (SOA"), Web Services Description Language (WSDL) and Universal Description, Discovery and Integration (UDDI). BEA WebLogic Integration supports standards. These include J2EE Connection Architecture (J2EE CA), ebXML, RosettaNet, and Java messaging services.

5.1.2 BEA Core Business

BEA core business has been providing application infrastructure for e-business systems and high-volume transaction systems. Systems include Web-based retail sites, enterprise resource planning systems, inventory systems, telecommunications billing applications, and commercial bank ATM networks. Account management systems, credit card billing systems, and securities trading account management systems are supported.   Table 5-1 illustrates BEA core business.

TABLE 5-1
BEA CORE BUSINESS

- Application infrastructure
- Support for e-business systems
- Support for high-volume transaction systems
- Web-based retail sites
- Enterprise resource planning systems
- Inventory systems
- Telecommunications billing applications
- Commercial bank ATM networks
- Account management systems
- Credit card billing systems
- Securities trading account management systems

Source: WinterGreen Research Inc.

Web-based and distributed systems must be highly available, scale to process high transaction volumes, and accommodate large numbers of users. As the Internet and e-business continue to develop and become more richly integrated, systems that historically had been internal are being extended to the Internet. ERP, inventory, and sales force automation systems are interconnected.

5.1.3 BEA WebLogic Portal

BEA WebLogic Portal includes portal technologies, user tools, and partner applications. E-business portals are positioned to serve employees, customers, partners and suppliers. The product is a framework technology that makes it possible for an enterprise to deploy applications with a common, personalized interface for customers, partners and employees, simplifying and improving their experience while lowering administrative costs and centralizing customer utilization information.

BEA WebLogic Portal features and enabling technologies include portal configuration tools, a rules-based entitlement engine, reusable presentation software components, and a standards-based framework that supports J2EE CA and Web Services.

5.1.4 BEA Customer Base

BEA customer base is transitioning to mission-critical applications based on Java, EJB, and CORBA programming models.

Application Integration Company Profiles

Customers and consultants did not have sufficient numbers of system architects and application developers experienced in building large, reliable systems based on these programming models. BEA long-term strategy was to partner with SIs to provide these services to customers and to train customer information technology departments.

SI application development relates to BEA training 9,000 developers. The customer base has increased the number of developers skilled in Java, EJB and CORBA technologies.

Recent key customer and partner deals for BEA include BMW, China Construction Bank, Cingular Wireless, Citicorp, Corporate Express, Credit Suisse Private Banking, Edward Jones, Equilend LLC, Financial Times, GE Information Services, McKesson HBOC, Motorola, NCS Pearson, NTT Docomo, Pfizer, Rentenanstalt, Royal Bank of Scotland, SA Telkom, Skandia, Sovereign Bank, Szechuan Mobile Communications Company, Telia Mobile, and UK Inland Revenue.

BEA added more than 770 new customers during the last quarter of 2002. New or expanded relationships were entered into with hardware, systems integrator, ASP, and ISV vendors. Partners include Accenture, Amdocs, AutoDesk, Cap Gemini Ernst & Young, divine, DST Innovis, E.piphany, Frontera, i2 Technologies, Informatica, KPMG, Logical, MRO Software, MSA, Real-Time Center AG, Stellent, and TelesensKSCL AG.

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5.1.5 BEA Systems and Novell

Novell Inc. and BEA Systems Inc. announced an agreement to jointly build solutions that leverage Novell's security and access talents with BEA's application infrastructure software.

What Novell gets from the deal is clear: It gets a partnership with one of the leading Java development companies. In a Computerworld interview, Chris Stone, Novell's vice chairman in the office of the CEO, made no bones about Novell's late entry in the Java world.

5.1.6 BEA Product Development

BEA product development relates to the areas of integration, portal, Web services, development tools, and new features.

5.1.7 BEA Revenue

The growth for 2001 (Fiscal year ends in January 2002) is a result of continued increases in sales of WebLogic(R) products. BEA revenue reached $975 million in 2001, achieving 19% growth in a year whne many companies had decreased revenue. Growth for 2000 was a result of significant increases in sales of WebLogic(R) products and growth in customer support revenues. BEA revenue reached $819 million in 2000, achieving 76.5% growth that year.

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BEA Fiscal Year Revenue

Fiscal Year Ending January 31

(in thousands)

2002 (E)	2001	% Change	2000	% Change
$975,000 (E)	$ 819,760	19%	$ 464,410	76.5 %

In the quarter ended October 31, 2001 license revenues decreased 1.2 percent to $126.6 million from $128.2 million in the same quarter of the prior fiscal year. License revenues increased 44.8 percent to $460.0 million in the nine months ended October 31, 2001 from $317.6 million in the same period of the prior fiscal year.

The quarter on quarter decrease is due to the economic downturn and the effects of the terrorist activities. The increase over the nine-month period was due to the continued adoption of BEA WebLogic Server. Expansion of the direct sales force, introduction of new products, introduction of new versions of existing products, and expansion of partner programs were growth factors as well.

License revenues as a percentage of total revenues increased from 57.2 percent in the third quarter of fiscal 2001 to 57.7 percent in the third quarter of fiscal 2002 and increased from 56.3 percent in the nine months ended October 31, 2000 to 61.8 percent in the nine months ended October 31, 2001.

In the quarter a very challenging economic environment was encountered. BEA completed 2,838 deals in the third quarter, roughly the same number as in Q2. Customers continued to invest in new applications, and continued to choose the platform.

BEA Systems Revenue Third Quarter 2001 vs Third Quarter 2000
(in thousands)

	Three months ended October 31,		Nine months ended October 31,	
	2001	2000	2001	2000
Revenues:				
License fees.............................	$126,625	$128,202	$460,029	$317,636
Services.................	92,998	95,812	284,521	246,081
Total revenues........................	219,623	224,014	744,550	563,717

5.2 Borland

Borland is a leading provider of high performance e-business platform solutions designed to increase developer productivity and reduce time to market for enterprise software projects. E-business platform solutions consist of software products that allow businesses to develop, deploy and manage e-business applications.

Products are designed to address phases of the process of implementing solutions: development, deployment, and management. For the development phase, Borland offers JBuilder,™ C++Builder,™ Delphi,™ and Kylix.™. Deployment products include Borland® AppServer,™ InterBase® and VisiBroker.®

To manage these systems, Borland offers Borland® AppCenter,™ a visual distributed application management solution. Borland® TeamSource,™ is a hosted collaborative development platform for distributed teams.

Borland supports major computing platforms as well as the open standards of the Internet.

BORLAND SOFTWARE CORPORATION REVENUE

(In Thousands)

	Three MonthsEnded		Nine MonthsEnded	
	2001	2000	2001	2000
Licenses				
revenues	$ 46,985	$ 40,926	$136,931	$120,700

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5.3 Bowstreet

Bowstreet provides XML infrastructure for plug-and-play e-commerce. Bowstreet's business Web factory and businessweb.com use change automation technology to create business webs. Fluid, interconnected collections of web services are implemented dynamically over the Internet to create business models.

Bowstreet solutions enable companies to sell products and services. Systems are used to create new channels of distribution and develop new business initiatives. The Business Web Factory enables Fortune 500 enterprises to form dynamic, distributed networks that leverage the strengths of the entire value chain while providing rich, streamlined Web experiences for their employees, partners, and customers.

5.4 Cape Clear

Cape Clear Software is a provider of Web Services technology. Web services are implemented as products CapeConnect and CapeStudio. Extensive functionality gives the products wide platform support, enhanced development tools, and full UDDI functionality.

CapeConnect Three is a Web services platform that provides tools for building Web sites. Services support communication via e-mail, a UDDI registry, and improved ease-of-use in deploying Web services.

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CapeConnect Three supports Web services built on diverse platforms, including leading J2EE application servers, Microsoft .NET, and CORBA.

CapeConnect Three is supported by an upgraded version of CapeStudio, the rapid Web services development tool. It includes a UDDI browser, support for CORBA, support for security services, and a tight integration with Microsoft .NET. CapeConnect is positioned to integrate Microsoft .net and Java technologies. By exposing Java and CORBA systems as Web Services, they can be accessed from .NET clients. Cape Clear products enable Java clients to access .NET servers. This integration method is designed to work across corporate firewalls, making it a solution for linking ASP-based web sites to Java-based enterprise systems.

Web Services implement a design center for applications. Web Services use a UDDI registry for management. CapeConnect provides a solution that addresses the challenge of integrating a Microsoft COM-based Web site with a Java-based customer management system.

5.4.1 CapeConnect Features

CapeConnect Three includes full support for Web services standards, including SOAP, WSDL, and UDDI. It is also extensively tested for SOAP compatibility with products from other vendors, including Microsoft, BEA, iPlanet, and IBM.

CapeConnect provides a complete SOAP implementation and UDDI registry, providing all the runtime services required to deploy Web Services. EJB

and Java class components can be hosted as Web Services within CapeConnect, without the need for a separate application server. CapeConnect automatically generates WSDL for Web Services.

The CapeConnect UDDI registry is a complete implementation including a full Web interface for publishing and searching for Web Services. The look and feel of the interface can easily be modified through style sheets, allowing companies to host their own personalized UDDI registries on the Internet.

SMTP is supported as a SOAP transport, in addition to HTTP and HTTPS, allowing Web services to communicate via e-mail. Asynchronous Web services open up a world of loosely coupled, peer-to-peer communications.

CapeConnect generates XML schema representations of all parameters and data-types associated with Web Services, even complex object graphs using arrays, collections, and inheritance.

CapeConnect Three includes the ability to generate Web Services from Java classes, EJB components, and CORBA Interface Definition Language (IDL). CapeConnect is fully compatible with Microsoft .NET clients and servers. Supported J2EE platforms include BEA WebLogic Server, IBM WebSphere, and iPlanet. Supported CORBA platforms include WebLogic Enterprise, Orbix, and Visibroker. CapeConnect unites Microsoft, Java, and CORBA around open Web Services standards.

CapeStudio provides support for CapeConnect Three security and session management facilities.

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5.5 Casablanca

Casablanca Software Limited is a subsidiary of London Stock Exchange-quoted Gresham Computing plc. It is targeting energy, utility, manufacturing, and financial services companies.   Application integration and business-to-business e-trading are offered to the market.

The company embeds the e-business messaging server Progress SonicMQ™ into its portfolio of enterprise integration tools.   and has signed the first OEM deal for SonicMQ in Europe.

Cost advantages are achieved by inter-linking business functions over the Internet and participating in e-commerce exchanges.   Secure, reliable messaging is a function of making business exchanges work.   Businesses must be absolutely 100 per cent certain that every message – whether it is a business-critical order, stock price change, invoice, delivery advice, CAD drawing or bid in an web auction gets through to its correct destination.

The Casablanca EAI framework is an open architecture, Java-based solution for combining messaging middleware, transformation and workflow functionality into a single, flexible framework for integrating an end-to-end commerce chain in complex enterprise IT and Internet infrastructure environments.

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The Casablanca EAI Framework is comprised of the following.

Casablanca Design Studio – a GUI-based development tool for point-and-click, drag-and-drop style creation of transformation and workflow rules

Casablanca Transformation Engine – repository-based runtime server that provides high performance, robust transformation functionality for application-to-application (A2A), business-to-business (B2B) and business-to-consumer (B2C) environments

Casablanca Developers Toolkit – a framework of Design Studio and Transformation Engine Java™ componentry that enables the rapid deployment of enterprise application integration (EAI) projects

Casablanca Messaging – a Java Messaging Services™ (JMS) that provides full-function e-business messaging infrastructure for reliable transport and exchange of business-critical data over the Internet and between different applications.

The Casablanca EAI Framework comprises three layers of Java™ software componentry, comprising messaging, transformation and workflow functionality. Horizontal and Vertical Adapters provide pre-built connectivity to industry standard platforms and applications, including IBM MQSeries™, Oracle7™, Oracle8™, IBM 3270™, IBM 5250™, ICL 7561™, Compaq Himalaya MessageBroker™ and a broad range of industry-leading applications and devices.

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The Casablanca transformation engine and workflow engine componentry is based upon the fundamental building blocks described in the Developers Toolkit Technical Overview. These layers also include an Adapter Toolkit for customizing application and device adapters to suit specific industry or business requirements.

The Casablanca Messaging componentry is based on a robust e-business messaging infrastructure for the reliable transport and exchange of business-critical data over the Internet and between applications. e-business applications require scalable, reliable messaging that can ensure integrity and reliability for application-to-application (A2A), business-to-business (B2B) and business-to-consumer (B2C) environments.

The advantages of Casablanca messaging include the following.

Massive scalability – enabling thousands of Casablanca Messaging servers to participate in Internet-based global environments measured in millions of transactions per day

7x24 Availability – through clustering Casablanca Messaging Servers to enable in-built fault tolerance and failover functionality – including load balancing and message-sensitive re-routing

End-to-End Security – provided by channel and message payload encryption. Firewall tunneling allows users to leverage existing IT security investments.

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Guaranteed Messaging – through durable subscriptions and persistent message storage

Real-time Performance – benchmark results showing world-class scalability and reliability versus all other messaging middleware platforms

Native support is provided for XML, HTTP, SSL. There is full support of the Java Messaging Services™ (JMS™) specification.

5.6 Celcorp

Celcorp is a developer of B2B-integration software. Celcorp's core product is Celware, a solution to use intelligent systems to integrate business processes within enterprises and across trading networks. Celware optimizes the value chain by dynamically generating processes and associated data integration.

Celware powers end-to-end integration more efficiently than traditional approaches.   Adaptability supports changing environments. Celcorp products include Celware embedded intelligence, a tool suite for independent software vendors (ISVs) to incorporate intelligent systems into their software.

Celcorp is positioned to serve global 2000 companies. Industries targeted include telecommunications, financial services, healthcare, and hospitality.

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5.7 Covast

Covast provides integration broker software that enables connectivity. The Covast eCommunity Builder suite of products simplifies the complexity of transforming and sharing information with customers, supply chain, and internal systems.

Covast specializes in solving complex integration challenges. Data transformation, content-based routing, and trading partner management are enabled. Covast has 70 customers worldwide including ABN AMRO, ADC, Ahrend, KLM, and ING.

5.8 Cysive

Cysive is a multi-channel software solutions builder. Cysive Cymbio™ is a multi-channel enterprise platform that allows business enterprises to communicate with customers, employees, and other audiences through multiple channels. Channels include Web, wireless, and voice-activated systems. This multi-channel, enterprise-class product enables web services.

It eliminates the need to deploy multiple systems for the delivery of content to disparate channels or devices. Cysive Cymbio makes a customer system efficient while dramatically reducing the costs of system changes or the addition of channels.

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Each channel requires the deployment of a separate system to handle the unique content delivery and rendering. Cysive Cymbio means companies no longer need separate systems for each channel.

Devices and technologies use the technology to reach customers, employees, partners, and investors. Authentication is enabled. Cysive Cymbio implements JAAS security for assignment of permissions. A manager can authenticate an employee time sheet using a mobile device.

Cysive Cymbio enables business applications to accept electronic signatures. Workflow and rules engines are used for building and executing applications on top of enterprise data systems. Seamless integration allows enterprises to leverage existing investment. The product enables integration outside the firewall. It can prioritize B2B transactions as a separate channel into the enterprise.

Supported technologies and open standards include XML, Java, J2EE, HTTP, WML, and others. Systems ensure seamless interoperability between channel access via Web, wireless, voice, database and application.

5.9 Envoy Technologies

Envoy Technologies is positioned to provide core infrastructure software solutions. Solutions enable companies to integrate and interoperate business processes seamlessly.   Internet and transactional messaging solutions are offered.

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Envoy is pioneering the next generation transactional messaging solutions that will leverage the Internet protocols and simplify access to secure and transactional messaging.

5.9.1 Envoy Installed Base

Envoy Technologies provides message oriented middleware solutions. The company's message queuing software is used by more than 100 of the Global 2000 customers and partners for mission critical applications. Envoy solutions provide the infrastructure that provides guaranteed message delivery across heterogeneous platforms.

Envoy product line includes Envoy XIPC and Envoy MQ both of which fall under the category of message oriented middleware applications. Envoy MQ provides developers a reliable and cost effective solution for connecting Microsoft MSMQ and non-Microsoft enterprise applications. Envoy XIPC provides message queuing and is positioned to address real-time communications.

5.9.2 Level 8 System Sold Geneva Messaging to Envoy Technologies

Envoy Technologies acquired Level 8 assets related to the Envoy XIPC and Geneva message queuing products. Envoy Technologies assumed responsibility for license, maintenance and support for the existing customer base.

Application Integration Company Profiles

Envoy Technologies is a leading provider of messaging technologies and employs some of the original architects of the Level 8 messaging product family. Envoy Technologies is enhancing the products.

Envoy XIPC is a stand-alone, high-performance messaging system that provides guaranteed delivery of information between applications. Geneva message queuing is a reliable enterprise connectivity product for Microsoft and non-Microsoft applications. It offers message-based connectivity of Windows-based applications to back-end information resources such as mainframes and other legacy systems.

Envoy XIPC permits the developer to conceptualize the programming environment as a virtual multitasking environment where processes communicate and interact with each other. Using a high-level programming model, independent of the physical location of the processes means programmers have more control of messaging directions. Envoy XIPC is a solution when the integration problem requires high performance, flexibility, and reliability in synchronizing applications and delivering messages.

Envoy XIPC gives four components facilitating inter-process communication between enterprise applications. Message queuing provides guaranteed store-and-forward message delivery between all types of user applications, regardless of operating system or platform.

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Real-time memory-based message queuing can move thousands of messages per second between executing processes. Envoy XIPC memory queues support a high-performance "burst" mode with which it is possible to send messages between machines at extremely high rates.

Memory sharing between processes of an application means processes are able to share memory-resident data with each other. Semaphores are used for supporting the event synchronization and resource management occurring among processes of a distributed application. Semaphores are useful for expressing inter process synchronization relationships in a concise manner.

5.10   Esicon

Esicon specializes in EAI tools for integration of heterogeneous IT infrastructures. Esicon directs the first German EAI Research Center. It is located in Schönberg/ Bavarian Forest, situated between Passau and Deggendorf. The EAI center develops methods for data integration projects in cooperation with universities and companies.

Esicon FKS II integration suite provides mass data processing and rapid response times. Performance is increased by a distributed integration processes system and optimized load balancing. The improved graphical user interface facilitates customizing of integration scenarios.

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Brokers map API integration processes to ERP systems such as SAP® R/3, Navision® Financials, and Oracle® applications. They also map B2B scenarios with an XML broker. Esicon introduces concepts for management in handling EAI projects.

The emphasis is on an EAI phase plan including strategic and design concepts, EAI cost calculation, EAI implementation as well as EAI operation. Esicon offers a seamless EAI consulting program for mid-size and industrial companies

Systems extract output from existing back-end applications and put it in a format that is suitable for the portable device. Data from customer relationship management (CRM), enterprise resource planning (ERP), supply chain management (SCM), knowledge management (KM), and email systems is reformatted to be viewed and updated on a PDA.

Mobile professionals need access to a variety of sources of information. Back-end applications are integrated.   Additional integration helps mobile workers.

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5.11   Fiorano

Fiorano Software is a leading provider of enterprise-level technology platforms for application integration, messaging, and e-commerce needs. Fiorano offers high-performance and scalable enterprise products.

Customers include Alcatel, AT&T Wireless, Ericsson, FedEx, JP Morgan, KPMG, Morgan Stanley, Motorola, Prebon Yamane, Qwest Communication, UI Networks and several other companies. 00 Fiorano offers an enterprise integration and business process management platform.

Fiorano offers a content router that examines the content inside of an XML message and routes the message to the appropriate set of consumers requesting that content. Fiorano content router uses the XML path language (XPath) for defining the selection criteria, which is to be received by the consumers.

Message consumers can signal their interest in certain messages by registering content-based message selectors with the content routing server. Registering takes the form of one or more identifiers using an SQL like syntax.

Reliable and guaranteed delivery are provided by Fiorano.   Guaranteed QoS (Quality of Service) delivery options depend on application requirements. Fiorano's guaranteed message delivery ensures business-critical information is delivered even when networks fail or systems are unavailable.

5.11.1   Fiorano Tifosi

Tifosi has a services palette that allows developers to create XSLT transformations and reuse instances of any transformation within multiple applications across the network.

Tifosi is designed to ease the deployment of distributed business processes, allowing customers to dynamically change and extend business processes without incurring downtime. It offers integrated platform-level support for distributed monitoring, tracing and logging, together with tools for distributed run-time debugging and deployment.

Developers can visually design and test XSLT style sheets used to transform XML documents to other XML dialects.

5.11.2   Message Content Routing Solution

All Internet and IT solutions face the challenge of delivering the right information to the right people in a timely fashion. Fiorano content router is a message content routing solution that combines high-performance publish/subscribe messaging with intelligent XML content-based routing.

Personalized information is delivered between business systems. It is delivered to large audiences of subscribers in real-time. A fast predicate parser, efficient message evaluation, consumer matching, and an immediate notification system are cornerstones of the Fiorano content router solution.

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Application Integration Company Profiles

Fiorano content router empowers financial institutions by automating typical business processes. It efficiently matches buyers and sellers of securities both within and between organizations. Through XML content-based routing, security pricing and availability information flows instantaneously from the seller to the specific buyer who has requested that information based on unique selection criteria.

This one-to-one matching of time-sensitive trading information allows financial institutions to achieve a competitive advantage by increasing sales and lowering overall costs. Intelligent XML content-based routing represents a major new industry thrust.

Existing content-based routing system use slow methods to match consumer preferences against the content of a message resulting in slow performance and high latency. Fiorano content router combines a fast predicate parser, efficient message evaluation, and consumer matching.

An immediate notification system is used to deliver message content with 'zero latency' to thousands of concurrent consumers. XML and XPath message selection gives organizations the flexibility to describe an unlimited range of information as structured text. With the proliferation and acceptance of XML as the standard for data definition and transmission between applications, the ability of a system to route messages based on XML content becomes an extremely valuable asset.

5.12   GE Global eXchange Services (GXS)

GE Global eXchange Services (GXS) operates one of the largest B2B e-commerce networks in the world, with more than 100,000 trading partners. The network is used to conduct one billion annual transactions, which account for $1 trillion in goods and services. GE Global eXchange Services is a part of the General Electric.

The company has a presence in 58 countries. GXS has engineering teams in the US, Ireland, the UK, India and the Philippines; as well as Electronic Commerce Service Centers in the US, the Netherlands and Hong Kong. GXS applies six sigma quality processes to provide e-commerce solutions that help businesses around the globe remove costs from their supply chains. GE Global eXchange Services is a part of the General Electric Company, U.S.A..

GE Integration Solutions (EAI) provides software that permits any business application to send and receive business information to other business applications in a secure and reliable manner. GE Interchange Solutions (EDI and XML) automate paper, fax, telephone, and email transactions to improve quality and efficiency in a supply chain.

GE marketplace solutions (exchanges) provide the business applications and technology infrastructure to enable the development, integration and service of high-volume, one-to-many and many-to-many B2B electronic marketplaces.

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5.12.1   GXS Integration Solutions

GXS integration solutions offer software and services that enable information sharing, including e-procurement data. Systems work across internal applications and support information exchange between external business partners. Systems integrate information into existing ERP, CRM, proprietary, and legacy environments. The company is the market leader in providing information transformation.

5.12.2   GE Interchange Solutions

GE interchange solutions allow B2B e-commerce implementation. Systems communicate electronically. Connectivity is facilitated with business partners, maximizing liquidity, and improving quality and efficiency in the supply chain.

GXS has positioned to reduce costs through Web-based data management and back-office integration. GE Global eXchange Services has added new capabilities to its data exchange industries. The capabilities include Web-based data management and back-office integration components that enable companies to reduce costs and increase profitability through improved supply chain efficiency.

Exchanges are operated and hosted by GE Global eXchange Services (GXS). It helps companies manage information associated with the shipment and delivery of products. Exchanges handle in excess of 50 million transactions annually.

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Capabilities help companies simplify transactions, enhance customer service, and automate labor-intensive processes. Companies use the Web to more efficiently collaborate on the direct exchange of products, thereby reducing time-consuming error corrections and eliminating the need for costly in-house reconciliation systems.

Products may pass through several suppliers or marketers before reaching the final customer. This Web-based service enables companies to reduce time to market by authorizing the entire chain of recipients in advance.

Back-office integration enable the transfer of data directly to an exchange from enterprise systems using Internet protocols such as file transfer protocol (FTP) and simple object access protocol (SOAP).

5.13　Gresham Computing

Gresham Computing and Cable & Wireless (C&W) have come to the market with a real time Nostro solution. The collaboration involves a revenue sharing agreement between the two firms.

Cable & Wireless Real Time Nostro enables banks to access transactional information across countries and continents in real time, greatly improving liquidity management. Nostro account data is integrated by Gresham Enterprise Solutions at the Nostro provider's site.

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Balance and transactional data in the Nostro account is then reformatted using a XML-based shema designed by Gresham in conjunction with correspondent banks into a common SwiftNet compatible data format.

This data is then aggregated within a data warehouse at C&W's Digital Island hosting facility subsidiary for distribution to real time Nostro users. The solution is designed as a single, secure network business function that is global and runs right to the desktop.

Each authenticated bank user registered to the service is permitted to access any Nostro data related to the accounts with a registered real time Nostro correspondent bank. Authentication and data transfers are secured by PKI and encryption technologies.

5.14   Hewlett Packard

Hewlett Packard is a leading computer server and printer peripheral company. It has positioned to achieve growth in e-services markets. Hewlett Packard has positioned to expand Netaction e-services middleware and OpenView software network management products.

HP is building its middleware initiative on a base of XML and Java. Technologies from Bluestone Software and Netaction products position HP with application server middleware. The company has a deal with Tibco to address high performance and high availability for integration and Web services.

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HP formed the Netaction division to fill its product lines through partnerships. Bluestone application server technology is being expanded. Netaction includes e-speak Web services integration technology, Virtual vault security, and the Changengine business process management and workflow product. These are packaged as HP process manager. Bluestone brought Java-based transaction processing software from Arjuna Solutions, a UK company.

5.15　Hummingbird

Hummingbird enterprise information management system helps organizations manage the entire lifecycle of business content with a 360° view of knowledge assets. The suite includes The Hummingbird Portal, Hummingbird DM, Hummingbird BI, Hummingbird ETL, Hummingbird KM, Hummingbird RM, Hummingbird Imaging, Hummingbird Web Publishing, Hummingbird DM Workflow, and Hummingbird Collaboration.

The strategy is to provide an enterprise-wide virtual work environment with seamless interoperability. Building blocks provide portal access, enterprise data connectivity, document management, records management, knowledge discovery, collaboration, and business analysis tools.

The product architecture is designed so that each building block may be used individually or in combination with other building blocks. Hummingbird Enterprise is designed to allow organizations to realize tangible and rapid returns on investment.

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Enhanced productivity provides management of structured and unstructured content, integrated document management, collaborative, content management, and ad hoc query and reporting capabilities. Streamlined business processes provide consistent, modular, and scalable platform for end-to-end document and content life cycle management.

Extensibility provides seamless application integration with mission critical business solutions. Hummingbird Enterprise supports plug-ins for ERP vendor SAP, ERM vendor Siebel, groupware environments including Lotus Notes, content provider Westlaw, content management vendors Interwoven, and supply chain management vendors J.D. Edwards.

5.16 International Business Machines (IBM)

IBM is positioning to respond to a major shift underway in customer buying patterns. Customers appear to desire powerful, fully integrated servers, software, and services. IBM is meeting this market shift by strengthening the company's product, services and technology portfolio.

Even though customers have slowed their investment in information technology (IT) in this economic environment, they remain focused on this shift towards integration. This customer shift is helping the company even, in terms of revenue growth in key segments.

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5.16.1   IBM Revenue

(Dollars in millions)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2001	2000	2001	2000
Global Services	$ 8,682	$ 8,230	$ 25,895	$ 23,966
Hardware	7,479	9,451	24,678	26,314
Software	3,201	2,918	9,155	9,027
Global Financing	822	859	2,499	2,494
Enterprise Investments/Other	244	323	813	979
Total revenue	20,428	21,781	63,040	62,780

The IBM third quarter financial results continued to demonstrate the strong resilience of the company as services, high-end servers and software revenue grew. The company benefited from the strength of its broad portfolio and its business model with its core of annuity-like businesses.

Revenue for the three months ended September 30, 2001 decreased 6.2 percent versus the same period in 2000. Revenue from Global Services grew 5.4 percent.

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Hardware revenue declined 20.9 percent from the third quarter of 2000. Revenue from z900 mainframe servers grew strongly. Revenue from the iSeries mid-market servers increased in all geographies, while pSeries revenue declined. Personal computer revenue declined significantly.

Revenue from IBM high-end storage product family (Shark) increased year over year. Microelectronics revenue decreased substantially due to the cyclical downturn that is affecting the worldwide semiconductor and original equipment manufacturer (OEM) markets.

IBM software revenue grew 9.7 percent compared to the 2000 third quarter. Middleware revenue, which comprises 80 percent of the software revenue, grew 14 percent. Operating systems revenue declined 1 percent year over year.

5.16.2   IBM Fourth-Quarter and Total Year 2001 Revenue

IBM fourth- quarter 2001 revenues totaled $22.8 billion, down 11 percent compared with the fourth quarter of 2000. IBM continued to gain market share in high- priority segments of software, storage and server businesses. Regatta UNIX servers did well. Mainframe revenues grew for the first time since 1989.

The services business had over $15 billion in new signings, although many of these signings also came very late in the quarter, reflecting the business environment.

In the Americas, fourth-quarter revenues were $9.8 billion, a decrease of 9 percent from the 2000 period. Revenues from Europe/Middle East/Africa were $6.9 billion, down 6 percent. Asia-Pacific revenues declined 10 percent to $4.5 billion. OEM revenues decreased 34 percent to $1.6 billion compared with the fourth quarter of 2000.

Revenues from Global Services declined 1 percent in the fourth quarter to $9.1 billion.

Software revenues increased 6 percent to $3.8 billion compared to the prior year's fourth quarter. Overall, IBM's middleware software revenues grew 10 percent at constant currency. IBM data management and WebSphere products grew 48 percent and 43 percent. Operating system revenues fell 2 percent. The total gross profit margin in software improved 1.8 points, to 85.2 percent.

For the year 2001, IBM revenues from Global Services totaled $35.0 billion, an increase of 5 percent. Hardware revenues in 2001 were $33.4 billion, a decrease of 12 percent. Software revenues totaled $12.9 billion, an increase of 3 percent.

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International Business Machines Corporation

(Dollars in millions)

	Three Months Ended December 31,			Twelve Months Ended December 31,		
REVENUE	2001	2000	Change	2001	2000	Change
Global Services	$9,061	$9,186	-1.4%	$34,956	$33,152	5.4%
Hardware	8,714	11,463	-24.0%	33,392	37,777	-11.6%
Software	3,784	3,571	6.0%	12,939	12,598	2.7%
Global Financing	927	971	4.6%	3,426	3,465	-1.1%
Enterprise Investments/ Other	340	425	-20.0%	1,153	1,404	-17.9%
Total Revenue	22,826	25,616	-10.9%	85,866	88,396	-2.9%

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5.16.3 Websphere MQ Product Family

Websphere MQ family provides a versatile platform for e-business. It consists of five key elements illustrated in Table 5-1.

TABLE 5-1

BASE MISSION CRITICAL MESSAGING FUNCTIONS

- WebSphere Adapters

- WebSphere MQ Integrator

- MQSeries Workflow

- MQSeries Everyplace

Source: WinterGreen Research Inc.

WebSphere MQ is the core of the MQ family. It integrates over 35 platforms. Providing the base messaging functions for servers and clients, and assuring once only message delivery. it can be used alone or with other integration tools.

WebSphere Integrator is the base for application integration. Integrator provides strong message broker capability that permits companies to share information between applications, creating telephone numbers for data in effect. This is a very powerful technology at the beginning of a market acceptance curve.

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In the same manner that voice calls provide connectivity and communication, Integrator has the breadth of functionality to connect data in different computers and different locations. The process is comples, but the outcome is simple.

5.16.4   IBM Middleware

Middleware is the sophisticated, complex software that helps various systems and platforms work together. IBM is the largest middleware company.

IBM defines middleware as a transition layer that allows for interoperability between components of information services infrastructure. Socket-like development simplicity, powerful tools, and a realistic way to cut coding time by as much as 80%, middleware is the key to overcoming integration challenges.

Hardware devices or software applications work together using middleware that acts as the interpreter that enables communication. Middleware works for applications on different platforms or from different vendors. Middleware is a crucial element in the overall success of an integrated e-business.

5.16.5   IBM Middleware Products

IBM middleware solutions are shown in Table 5-2 following.

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TABLE 5-2

IBM MIDDLEWARE SOLUTIONS

- WebSphere® software platform—Used by over 35,000 companies, WebSphere is now the fastest-growing Web software platform. MQSeries, an integral WebSphere application, is a leading middleware solution, allowing applications on over 35 commercially available platforms (such as UNIX, Windows, Linux and Netware to interoperate quickly and seamlessly.

- Tivoli® SANergy®—Tivoli SANergy allows you to leverage new SAN and storage technologies in existing infrastructure, across platforms.

- Lotus® Domino® is standards-based and offers comprehensive support for internet messaging standards, with internet addressing, SMTP routing and MIME content support all native. Plus full support for E/SMTP, S/MIME, SSL, POP3, IMAP4, LDAP, HTTP, HTML, SNMP. Domino delivers interoperability with current tools and systems.

- IBM DB2 Universal Database provides the power to access, manage and analyze data, audio, and video across an enterprise. It supports leading standards such as Java and XML. It works across 23 platforms, including Windows, Unix and Linux and in 14 languages and is robust as a rock. DB2 leverages information by delivering the performance, scalability, reliability and availability needed for e-business applications.

Source: WinterGreen Research Inc.

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E-business interoperability is facilitated by open standards. Open standards are the source code that function as the universal language of integrated e-businesses, bringing disparate systems and platforms together. Open technologies include Linux®, Java®, and XML.

IBM e-business infrastructure supports Linux open source platform. IBM has invested over $1billion in Linux applications, hardware and services to ensure that e-businesses around the world can take advantage of the flexibility, reliability and cost savings that Linux can provide. Linux servers and Linux software help take advantage of open-source flexibility, scalability and security.

Linux and total infrastructure integration is popular. Over 22,000 copies of WebSphere are downloaded from te Web site. Over 35,000 companies are using it now in hundreds of ways. It is the fastest-growing Web software platform. IBM has 60,000 e-business specialists, with experience on over 20,000 e-business projects.

5.16.6   IBM / Nortel

Nortel contact center is being based on IBM's Web services software. IBM has said that Nortel Networks will build its next generation customer contact center products based on IBM's WebSphere e-business infrastructure software and DB2 database software.

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5.17 Information Builders / iWay Software

Information Builders provides its customers with robust business intelligence, specializing in real-time information delivery over the Web. Information Builders helps companies and government organizations improve mission-critical operations by transforming data into usable information and delivering it to employees, managers, partners, and customers through the Internet.

WebFocus solution delivers information for more than 11,000 global customer sites, including most of the Fortune 100 and all U.S. federal government agencies. The company employs 1900 people worldwide and generated revenues exceeding $300 million in 2001.

5.17.1 iWay Software

iWay Software is an Information Builders company. It is a market leader in middleware that accelerates business integration. With facilities to integrate systems in real time, near-real time, or on a scheduled basis, iWay provides a complete reusable infrastructure for EAI, B2B, e-commerce, and mobile business.

iWay's experience with complex information systems led to the development of prepackaged intelligent adapters to connect to more than 140 packaged applications, transaction systems, legacy data, relational databases, and e-business formats, without writing custom code. iWay Software integration

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solutions significantly reduce the time, cost, effort, and risk of integration projects throughout the enterprise.

iWay Software accelerates business integration by simplifying it dramatically.   Assembly and configuration of off-the-shelf components are enabled. iWay's Enterprise integration suite provides real-time, near-real-time, or batch integration. The range of capabilities, ease of use, and reusability make it powerful. Its price makes it cost-effective. It mitigates risk by using open standards and by creating new functionality without tearing out and replacing existing production systems.

Integration hub products control integration. These products control the way information systems interact among themselves and with people. iWay XML transformation engine is a Java-based solution for real-time integration.   XML replaces costly custom coding to effect integration.

iWay enterprise integration broker provides more robust capabilities for complex message-based integration. It is useful for assembling complex integration processes that involve multiple disparate information resources that were not originally designed to collaborate.

iWay ETL manager provides a simple way to select, correlate, and aggregate information to achieve data consistency. It can load applications, data warehouses, operational data stores, online catalogs.

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5.17.2   iWay Software OEM Agreement With Ascential™ Software

iWay Software has an OEM agreement with Ascential™ Software, a provider of Information Asset Management (IAM) solutions. Ascential bundles iWay technology into Ascential DataStage® to further broaden its ability to draw data from multiple, disparate sources throughout any enterprise.

The iWay technology within DataStage provides integration access to additional separate data sources, including a broad set of legacy systems. Ascential's DataStage family of data integration products allows corporations to comprehensively integrate data from all corporate information sources – including customer relationship management (CRM), business-to-business, e-business, enterprise applications, and mainframe and data warehouse environments – within a single, company-wide business integration framework. iWay Software expands its customer reach by partnering with Ascential. DataStage product uses iWay.

5.17.3   iWay Adapters Synchronize With Microsoft Web Services

iWay Software has expanded its support of Microsoft integration initiatives. It is providing 200 adapters for BizTalk. iWay's adapters harness Microsoft's Web services initiative to provide, code-free access to applications and data on over 35 platforms.

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5.17.4   XML Transformation Server (XTS)

Developed in conjunction with XML Global Technologies, Inc., XTS is a lightweight, low-cost integration server that enables businesses to link B2B or A2A systems together in real time utilizing XML for message transport and enhancement between systems. XTS's transformation workbench enables implementers to create sophisticated message transformations to enable systems to collaborate through iWay Intelligent Adapters, without custom code, Java™ Components, or proprietary scripting languages.

The XTS transformation workbench provides over 3,000 predefined templates that accelerate the ability of implementers to link EDI feeds, HIPAA exchanges, e-business exchanges, and packaged applications with each other and other enterprise information assets.

Integration problems include enabling a MySAP.com e-commerce implementation to collaborate with a Siebel call center application and a CICS inventory system.

Integration brokers solve such problems, but are expensive and typically require a lot of complex, custom code. XTS is positioned to solve this problem quickly and easily at less than half the cost of an integration broker.   They eliminate the need for custom code.

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5.17.5   Enterprise Integration Broker (EIB)

Integration scenarios that require systems to collaborate in a specific sequence or involve intelligent routing of messages between systems can utilize iWay enterprise integration broker for straight-through processing integration. The foundation combines the flow design and intelligent routing power of IBM WebSphere MQ and MQ Integrator®.

iWay XML transformation server and new iWay flow design tools reduce the integration of EDI, e-business exchanges, packaged applications, or transaction systems to a simple point-and-click process. It enables integration implementers to construct complex integration scenarios between internal and external application systems. Custom transformations developed utilizing XTS transformation workbench and the prefabricated integration templates are reusable within any EIB-based integration environment.

Data consistency processes require scheduled delivery of data – called ETL, or extraction, transformation, and load to synchronize information on a periodic basis.

iWay Software's ETL Manager automates scheduled processes such as a weekly loading of a data warehouse or nightly reconciliation among ERP systems. Capabilities for data profiling and cleansing have been added to ensure that information is correct and complete before it is used for synchronizing other applications.

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5.17.6   iWay Intelligent Adapter Suite

Intelligent adapters provide connectivity to disparate information resources. They contain vendor-maintained logic for manipulating information resources without customized code.

5.17.7   iWay's Suite Of Intelligent Adapters

iWay's Suite of intelligent adapters expands to over 140 disparate information resources, including 15 major packaged application systems such as SAP, Oracle Financials 11i, BroadVision, Siebel Systems, Vantive CRM, Ariba, and i2 Technologies; American, European, and HIPAA EDI; SWIFT and FIX financial exchanges. E-business exchanges supported include Covisint, CommerceOne, and RosettaNet; BEA Tuxedo transaction systems. Technologies supported include Tibco Rendezvous and Oracle AQ.

5.18   IONA

IONA is a leading e-business platform provider for Web Services Integration.   The company has 5,000 customers worldwide including a majority of the Global Fortune 500 and leaders in the aerospace, financial, ISV, manufacturing, retail and telecommunications industries.

IONA Orbix E2A™ product consists of a Web services integration platform and application server platform. It enables the flow of information across disparate systems.

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IONA is headquartered in Dublin, Ireland, with U.S. headquarters in Waltham, Massachusetts.   The company had revenues of $153 million in 2000 and employs more than 850 people in 30 offices worldwide. Iona Technologies has reorganized around Web services integration. Orbix E2A Web services integration platform standards-based product includes business-to-business, enterprise integration, and application development functionality.

IONA Suite has added integration technology from Software AG. The integration solution is based on a Java/XML infrastructure.

IONA supports a full diversity of languages, including Java and C++, and distributed computing technologies, including SOAP, XML, EJB, J2EE, CORBA, Microsoft's Windows DNA 2000 and IBM OS/390, CICS and IMS.

5.18.1   IONA Revenue

IONA(R) third quarter 2001 revenues were $41.0 million, a 3% increase over the $39.9 million reported in 2000. IONA has 4,500 customers. Iona solutions are open, standards-based, technologically advanced, and comprehensive.

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IONA Technologies Revenue

(U.S. dollars in thousands)

Sept. 30,

	Three Months Ended		Nine Months Ended	
	2001	2000	2001	2000
Product revenue	$ 25,371	$ 27,236	$ 88,656	$ 72,436
Service revenue	15,672	12,625	46,576	32,761
Total revenue	**41,043**	**39,861**	**135,232**	**105,197**

5.18.2   IONA Partnership Agreements

IONA global alliances partnership agreements are with PwC Consulting and SAIC. These companies use the IONA e-business platform in their corporate integration engagements. Iona partners include Nordstrom.com, Zurich Insurance, BroadVision, HotJobs.com, PricewaterhouseCoopers Consulting, IT integrator Science Applications International (SAIC), Gartner, and Microsoft.

5.18.3   IONA Customers

IONA customers include Verizon, Cisco Systems, NTT DoCoMo, Boeing and HotJobs.com.

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5.18.4 IONA Products

IONA key products include IONA XMLBus, Orbix/E, Orbix 2000, IONA Enterprise Integrator and IONA Mainframe Integrator.

IONA has a commitment to industry standards. It is a member of the RosettaNet solution provider board, which is made up of industry-leading enterprise application and middleware developers, systems integrators and e-service providers. The company also joined the RosettaNet Ready(TM) program.

An IONA executive is chairman of the ebXML standards committee. The company joined the UCCnet "Partners In Sync" Alliance Program and committed to delivering UCCnet-compliant business applications and services with the IONA e-Business Platform.

5.18.5 IONA Acquires Integration from Software AG

IONA acquired non-exclusive license rights to certain portions of Software AG enterprise application integration technology to extend the existing integration capabilities of the IONA Suite. IONA hired a substantial portion of the Software AG engineering team responsible for the development of the technology. These engineers are members of IONA's engineering team focused on advanced integration technology.

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The functionality is integrated into the iPortal IntegratorTM. The iPortal Integrator is IONA's J2EE and XML-based solution for automating business processes, integrating heterogeneous business systems and exposing that functionality as Web services via the Internet.

Software AG offers XML-focused data management and electronic business integration tools. The acquired technology from Software AG is also used in the Sagavista application integration product suite and includes an easy-to-use graphical interface, an integration broker, a transformation engine and a host of application adapters for packaged, custom-developed or legacy applications including Peoplesoft, SAP, and Siebel.

It has been incorporated into the iPortal Integrator. IONA technology acquisition from Suplicity Corporation brought business process automation capabilities to the iPortal Integrator.

5.19   ItemField

ItemField provides a gateway to XML. The key functionality is anything to XML translator. Serialization functionality means that XML can be converted to Microsoft Word. Systems feature ease of use, a two hour learning curve. Scalability is also an feature.

ItemField ContentMaster ParserStudio and ParserEngine are leading-edge data extraction and conversion software solutions. They are used for transforming complex, unstructured data formats into XML for enterprise application integration (EAI).

Application Integration Company Profiles

ContentMaster provides companies with a quantifiable ROI by significantly reducing the time to integration and cost for extracting data from proprietary formats. ContentMaster ParserStudio is an integrated design environment for the creation of parser scripts, using example-based parsing. ContentMaster ParserEngine is a robust server solution to automatically execute parser scripts to convert unstructured data from files and web applications into XML. The ParserEngine seamlessly integrates into enterprise applications. Using ContentMaster, users can parse complex formats in a matter of hours. ContentMaster supports the conversion of binary files, Cobol, HTML, RTF, HL7, EDI, Proprietary EDI, Word, Excel, and PDF.

ContentMaster File Parsing Features include the following. Extensive file parsing capabilities are offered. The system supports the ability to parse complex file structures, including multi-level record hierarchies, dynamic records, and complex document delimiters.

Dynamic records manage varying information such as number of subrecords or field length embedded inside document data. Complex document delimiters manage several levels of delimiters and subdelimiters. Several structure variations are available for one record. Any custom document structure can be defined and parsed.

Built-in document structure definitions are available for EDI, RTF, HTML (And SGML), HL7 and other standard document formats. The XSD schema import function change enables working with existing metadata definitions.

5.20   LEVEL 8

Level 8 Systems product suite includes Geneva, Geneva Integration Suite, Geneva Enterprise Integrator, Geneva business process automator, Geneva Integration Broker, and Geneva AppBuilder. The e-business integration software enables organizations to integrate new and existing information and processes with the Internet to create new business value.

5.20.1   Level 8 to Focus on Cicero

Level 8 is devoting resources to its e-business integration and application consolidation solutions Cicero product. Cicero enables enterprises to rapidly integrate business applications and legacy systems. Cicero accelerates the integration and maximizes the value of multiple business solutions.

Higher customer satisfaction, increased efficiencies, and greater profitability are offered. Cicero software enables tasks to be completed by providing users with a task-centric user interface that can be tailored to specific job functions.

5.20.2   Geneva Business Process Automator

Geneva BPA is a server-based system that provides a drag and drop GUI to design business processes. It enables companies to define and coordinate processes that span new systems, legacy systems, and packaged applications.

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Geneva BPA reduces the time and cost of delivering and maintaining application functionality. It extends the investment in legacy systems. It delivers enterprise-wide views of critical business processes and information. The assembly of best-of-breed computing environments is facilitated.

Level 8 core strength e-Business integration solutions include Geneva enterprise integrator and Geneva business process automator software. These products deliver real-time, high-performance integration request and response features to integrate front-end technologies to back-office systems. Underlying workflow capabilities are found in the Geneva software.

5.20.3   France Telecom Deploys Level 8 Software

Geneva Business Process Automation Offers Rapid Implementation, Reduces Time-to-Market and Enhances Customer Service

France Télécom has deployed Level 8's Geneva business process platform to automate the roll out of ADSL services across France. Geneva BPA is a component in France Télécom IT arsenal. By providing rapid implementation, streamlining business processes, decreasing time-to-market for new services, and enhancing its customer service the product is proving its versatility. The powerful, flexible, and scalable business process automation platform enhances the ADSL service delivery to customers. It rapidly integrates existing software applications to advance the efficiency of internal processes.

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France Télécom is using Geneva BPA as the workflow engine behind its ADSL products. France Télécom leveraged Level 8 expertise to rapidly integrate its existing software applications to improve the efficiency of internal processes. Geneva BPA maximizes efficiency by letting workers view tasks that correspond to their area of responsibility. Tasks allocated to other groups with other skill sets are viewed separately.

5.20.4   Level 8 Customers

Level 8 customers include Enron, France Telecom, Merrill Lynch, and United Health Care. Level 8 has partnerships with Siebel, Cisco, Computer Horizons, Pyramid Consulting, Fusive, and others,"

5.20.5   Level 8 Systems Revenue

Level 8 Systems financial results for the quarter ended September 30, 2001 revenues were $5.9 million. Third quarter revenues represent a 17 percent decline from the previous quarter and a decrease of ($16.4) million or 74 percent over the same quarter of the previous year. This was a direct result of the continued slowdown in the economy, particularly in the financial services industry.

For the nine months ended September 30, 2001, the company reported revenues of $21 million, which represent a decrease of 66 percent or $42 million over the same period of 2000.

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Software license revenue for the quarter amounted to $772,000, which is an increase of $390,000 over the previous quarter and down from $14.4 million from the same period in 2000. The company has continued to transition from its legacy products to its newer solutions such as Cicero® software.

Revenue from maintenance and services amounted to $5.1 million, which is down from both the previous quarter and the prior year. The decline in service revenues results from underutilization of Level 8's consulting staff. The decline in maintenance is due to a delay in notification of renewals.

On October 1, 2001, Level 8 concluded the sale of its AppBuilder product line to BluePhoenix Solutions for $20 million. Level 8 utilized $12 million of the proceeds to reduce its short-term borrowings and extended the maturity on the remaining balance of $3 million to November 2003. In addition, Level 8 retired another $10 million in long-term debt, liquidating $22 million of liabilities.

Cicero Technologies became a Siebel Premier Software Provider and has successfully validated the integration of Cicero 4 with Siebel 6. Pyramid Consulting Services will co-market Cicero software to its existing client base comprised of Fortune 1000 companies in the securities, banking, insurance, and pharmaceutical sectors.

New World Agency focused on serving the commercial insurance marketplace is licensing Cicero and plans to license Geneva. They will target the more than 35,000 independent agencies in the industry.

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5.21   Mercator Software

Mercator Software provides business integration software solutions to global enterprises. Business integration solutions help customers link technologies and transactions throughout the extended enterprise and with external business partners in order to achieve improved speed, flexibility, efficiency, and return on investment in existing technology.

Solutions allow customers to integrate disparate enterprise technologies, Enterprise Resource Planning, Customer Relations Management, and supply chain management applications, to allow for efficient transactions of business information in the form of electronic data within an enterprise and externally among its customers, suppliers and business partners.

Mercator integration broker software provides a single, model-based and event-driven integration platform for designing, implementing and managing application-to-application (A2A) and business-to-business (B2B) interfaces.

It integrates complex business processes that cross organizational or corporate boundaries. Products are positioned to reduce the time to market, cost, and effort to implement products.

Mercator integration broker software provides capabilities for managing and controlling the business-to-business operational environment, with comprehensive support for defining and managing partner relationships, establishing routing priorities, creating a secure internal messaging environment, and archiving and auditing transactions.

Mercator integration broker software provides embedded security based on Internet standards, dynamic monitoring of extended business processes, and the ability to scale integration solutions across diverse, distributed computing environments.

For A2A business requirements, Mercator integration broker software creates durable, easily maintained application-to-application interfaces to support any integration requirement. It delivers technology for integrating packaged applications, legacy systems, databases and data warehouses across the enterprise. It provides advanced capabilities for automating the complex and time-consuming tasks of application integration in diverse business settings, particularly in environments where scalability, high-performance and interface maintainability are critical issues.

5.21.1   **Mercator Strategy**

Mercator is positioned as a premier provider of enterprise-wide integration software and solutions. Strategies include providing enterprise-wide integration software and solutions.

Software technology and product development strategies relate to deploying enterprise-wide business integration and specific industry solutions in selected verticals. Products are positioned to permit companies to maximize return from existing information technology investments. Products and technology focus on solutions directed toward the enterprise.

Solutions deployed at the enterprise level require more complex functionality and greater product scope. Enterprise-level deployments that command premium pricing and involve relationships with more senior client decision-makers are sought. Mercator GSS for GSTPA is a strategic product offering to the global securities services industry providing an integration package for Global Straight Through Processing. Mercator GSS Manager for GSTPA is designed to substantially reduce the time, cost, and effort required to integrate financial transactions with both front office and back office applications across the GSTP landscape.

Vertical focus on manufacturing, retail, and distribution includes providing supply chain integration/B2B solutions. Support for electronic data interchange (EDI) and processes that support trading partner management, as well as integration solutions for connecting SAP, Siebel, PeopleSoft, and other leading applications are provided.

5.21.2   Mercator Revenue

Mercator Revenues

(In thousands)
Year Ended December 31,

	2001	2000	1999	1998	1997
Software licensing	$ 59,004	$ 78,825	$ 56,820	$ 29,105	$ 14,603
Services	33,358	32,883	23,208	6,371	3,746
Maintenance	33,911	26,582	18,597	9,840	8,321
Total revenues	126,273	138,290	98,625	45,316	26,670

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Mercator targets vertical markets in which it has domain expertise. Vertical markets targeted are those in which the company has significant industry expertise and established customer relationships. The company has developed vertical integration software packages for targeted industry sectors.

Domain expertise enables providing solutions that address industry-specific integration issues. To support vertical solutions, Mercator has aligned its direct sales force by targeting identified accounts within selected industry verticals within each geographic region.

By offering business integration solutions that help customers realize competitive advantage and return on investment, Mercator seeks to command higher average sales prices for solutions.

In financial services, Mercartor targets global banking institutions, brokerage houses and mutual fund companies. These groups use software for application-to-application integration and straight-through processing of transactions between financial institutions processed over both the Internet and private financial networks.

A wide range of application integration requirements are addressed including transaction validation, reporting and management to facilitate straight through processing and integration with all major financial networks such as SWIFT, providing a competitive advantage in international banking and brokerage markets.

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In manufacturing, retail and distribution Mercator helps coordinate ERP systems by integrating purchase order applications and inventory systems; CRM applications that handle critical information and transactions, fulfillment and billing requirements, and SCM products and services used to achieve faster distribution of goods and supplies.

In healthcare Mercator targets United States markets impacted by government mandates that health plans, health care providers, health care clearing houses/intermediaries, and self-insured employers comply with new regulations associated with the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"). HIPAA establishes a broad set of regulations that lays out requirements for maintaining and exchanging patient healthcare data.

Mercator software makes it possible for healthcare companies to achieve compliance by managing communications between organizations that must exchange HIPAA-compliant transactions, validating information to ensure compliance, transforming HIPAA transactions to and from legacy applications and data stores, and ensuring the confidentiality of patient data in accordance with HIPAA regulations.

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5.21.3   Mercator Strategic Alliances

Mercator seeks to expand strategic alliances with business partners. Relationships with business partners are being expanded to penetrate vertical markets. Technology partners include Compaq Computer Corporation, Lawson Software, KPMG Consulting, IBM Global Services, Mitsui Ltd., and TCA Consulting. Systems integrators are also partners.

5.22   Microsoft

Microsoft is the worldwide leader in software, services and Internet technologies for personal and business computing. The company offers a wide range of products and services designed to empower people on any device.

Microsoft has positioned to participate in application integration markets with BizTalk Server 2002, BizTalk accelerators, and BizTalk adapters. BizTalk Server 2002 is used to integrate internal applications, securely connect with business partners over the Internet, and rapidly automate business processes.

BizTalk Server 2002 is positioned to lowering the cost of integration projects. BizTalk Server 2002 integrates with Microsoft application center to decrease development costs and timelines by streamlining the deployment of integration projects and making it easier to scale them to meet capacity demands.

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Application Integration Company Profiles

A comprehensive library of over 300 adapters ensures users to integrate products and technologies. Application deployment and replication are supported. Tight integration with Microsoft application center takes developers through the development life cycle and permits them to scale across production server farms.

Support for standards such as XML, SOAP, Secure/Multipurpose Internet Mail Extensions (S/MIME), and public key infrastructure (PKI) is provided through partmetns. Microsoft BizTalk accelerator for HIPAA is a new platform to develop and deploy HIPAA transaction solutions.

The BizTalk accelerator for HIPAA allows medical facilities to very quickly implement and continually maintains HIPAA transaction standards using a scalable, reliable and available enterprise-class server platform designed to support rapid return on investment.

The Microsoft .NET Platform and the BizTalk Accelerator for HIPAA reduce the cost and complexity of delivering healthcare with the goal of real return on investment.

The BizTalk accelerator for HIPAA enables healthcare organizations of all sizes to interoperate and integrate between multiple platforms, interfaces and business processes to quickly implement and continually maintain HIPAA standards, and helps organizations reduce the amount of time and money they need to spend to comply with HIPAA regulations.

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Microsoft BizTalk Adapter for SAP and Microsoft BizTalk adapter for MQSeries enhance the connectivity support of BizTalk server to enable simple installation, deployment, and configuration of "no-code" connectivity solutions. Microsoft BizTalk Adapter for SAP provides a comprehensive messaging solution for SAP infrastructure. With the BizTalk Server suite of messaging and orchestration tools and services, users can XML-enable an existing SAP investment, making it possible to securely and reliably integrate disparate applications throughout an organization.

5.22.1   Microsoft.Net

The transition to .NET is happening. Microsoft has announced the first parts of the .NET Platform—the .NET Framework, Microsoft Visual Studio® .NET, and several building block services—and the first .NET experiences. Microsoft will develop more tools and services in 2002 and 2003. Early adopters have been building and using XML Web services to serve their customers and employees.

Microsoft® .NET fundamentally changes the way users think of and use computing devices. Microsoft .NET expands the computing model to a rich, distributed-computing paradigm of loosely coupled services.

Instead of the traditional distinction between desktop and server, processing occurs wherever it makes the most sense, whether that is on a server, PC, handheld, or other smart device. This is smart computing for a new generation of smart devices.

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The next generation of distributed computing builds on the current generation. Microsoft .NET is not a wholesale replacement of software applications as we know it, but rather a natural evolution that will bring the benefits of collaboration and interoperability to the isolated technology islands.

The basic element of NET is the Microsoft platform for XML Web services. XML enables data-sharing among disparate applications and devices. The Microsoft .NET platform is comprised of four elements: clients, services, servers, and tools.

XML Web services are small, reusable component applications that can be connected like building blocks to perform tasks on behalf of users. Microsoft and others are developing a core set of these building block services. .NET My Services are based on the Microsoft Passport user authentication system.

5.22.2   Microsoft BizTalk Server

BizTalk Server 2002 is based on XML and SOAP. It unites enterprise application integration (EAI), business-to-business integration, and business process automation technology to allow companies to orchestrate XML Web services. Dynamic business processes span applications, platforms, and businesses.

BizTalk server has one of the largest libraries of adapters in the industry. BizTalk server adapters allow BizTalk server customers to reduce the time spent on integration implementations by simplifying the connection to disparate data and services.

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5.23   M2 Systems

M2 Systems Corporation has a charter to provide software engineering to companies that need assistance in building realtime applications. It specializes in the knowledge and implementation of many different platforms, delivery products, database management systems, and teleprocessing monitors.

5.23.1   M2 Systems Approach

M2 Systems customer relations approach delivers adaptability in the context of next generation technology. M2 Systems is positioned to provide the flexibility to analyze and quickly implement solutions.

It delivers a foundation for enabling clients to have dependable gateways. The M2 platform provides a robust transaction-processing infrastructure that links content providers and vendors via independent client based technology. Client relationships are implemented by individualized ongoing implementation, training and support.

5.24   Optio

Optio Software provides infrastructure that enables organizations to communicate and connect with their e-commerce constituents. Optio's software improves the quality of an organization's communications with customers, suppliers, partners and employees by customizing, delivering and exchanging information over a global network of digital destinations.

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Optio Software allows information to be transferred as XML, EDI, HTML, and customized documents according to individual requirements. Optio solutions are non-intrusive and can be deployed without modifying the software or the business processes that created the original information.

5.24.1　Optio / Muscato / Translink

Optio Software is an Atlanta-based maker of e-commerce software, bought Muscato Corp. and its affiliate Translink Solutions for $25 million in cash and $8 million in promissory notes. Muscato manufactures e-commerce infrastructure products, and Translink is an application service provider.

5.24.2　Optio Software Customer Base

Over 4,000 customers to integrate diverse applications are using Optio products. Systems are used in applications requiring high availability and throughput. They provide infrastructure for B2B commerce. Information from enterprise, e-business, and legacy applications can be tailored for delivery and exchange.

Optio has customers in manufacturing, healthcare, retail, distribution and financial industries. Optio clients include Dell Computer Corporation, The Home Depot, Schlumberger, Avery Dennison, and Toys 'R Us.

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5.24.3   Optio / JP Mobile Alliance

The JP Mobile alliance enables Optio clients to access data from their enterprise resource applications, such as JD Edwards, Oracle, McKesson and legacy systems, via mobile devices like Palm, Handspring, RIM/BlackBerry, and iPaq.

Optio software interfaces with JP Mobile's SureWave mobile server with no additional custom programming to ERP and legacy applications. This server facilitates wireless access to Microsoft Exchange and Lotus Notes e-mail. Personal information management (PIM) tools, such as contacts, calendar and tasks are supported. SureWave technology includes a robust synchronization engine that enables Optio clients to automatically reconcile the data between their mobile devices and the corporate server.

With this alliance, Optio enters the wireless domain and advances mission-critical output to clients.

5.25   Oracle

Oracle database market share is being challenged by the economic slowdown and renewed competition from IBM and Microsoft, which sell their databases at much lower prices than Oracle. A new pricing arrangement brought Oracle software pricing in line with pricing models from IBM and Microsoft.

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Application Integration Company Profiles

Oracle 9i database is faster, better performing, more secure and easier to manage than previous products. Database-management software is used by businesses and Web sites to store, manage, and retrieve vast amounts of data.

Clustering technology make the databases perform more reliably than before. Clustering lets businesses harness multiple servers to run a very large database, allowing servers to share work or take over from each other if one fails.

Clustering technology is a way to reduce costs because companies can buy smaller and cheaper servers to run their databases, rather than having to buy one huge, expensive server. Hardware and software makers announcing support for 9i included Compaq Computer, Dell Computer, Hewlett-Packard, EMC and Sun Microsystems.

The 9i product also includes built-in analysis tools designed to help managers and executives make better business decisions. The built-in tools for data warehousing let companies examine business information, seek out patterns and trends, and predict the future.

Oracle Corporation Revenue

(amounts in thousands)

February 28,	Three Months Ended		Nine Months Ended	
	2002	2001	2002	2001
Licenses and other	$789,578	$1,125,083	$2,340,334	$3,050,559
Services	1,439,765	1,549,284	4,488,389	4,545,229
Total revenues	2,229,343	2,674,367	6,828,723	7,595,788

5.26   Peregrine

Peregrine provides solutions that enable companies to manage infrastructure, as well as extend next generation e-Business capabilities inside the enterprise and across the firewall. Peregrine solutions reduce costs, improve profitability, and release capital, generating a lasting and measurable impact on the productivity of assets.

Peregrine delivers Infrastructure management solutions.   The lifecycle of an organization's assets are managed, from IT equipment and fleets of vehicles to telecom and facility assets.

Peregrine self-service solutions facilitate proactive management and empower employees with anytime/anywhere access to these enterprise resources, services and knowledge, and improve productivity, asset utilization, and real-time business intelligence.

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Peregrine's business relationship management solutions help companies establish a digital dialog for conducting e-business by automating and integrating the flow of information and business processes among buyers, suppliers, and e-Marketplaces.

5.26.1   Peregrine / Extricity

Extricity and Peregrine offer Power Enterprise!™ data transformation and integration technology. Extricity offers the B2B™ business process software platform. Strategic positioning provides a product suite that supports customer collaboration. Customers can establish end-to-end synchronization of internal business processes with those of their e-Commerce-connected buyers and suppliers.

Integrated offerings leverage Extricity's B2B process management capabilities. Get2Connect.net is an e-Business platform that leverages Extricity's strong presence in RosettaNet to create a comprehensive service-oriented solution. End-to-end connectivity, integration, and business process-based collaboration tools are supported.

E-Business enabling, data transformation, and business partner rollout offerings are supported.

Systems are based on the premise that EDI is alive and well. It is designed to bridge the gap between traditional batch EDI and real-time XML-based transactions.

5.26.2   Peregrine Systems Advanced Business Integration Suite

Peregrine Systems offers an integration broker. Business integration suite is a platform software package. Integration to trading partners over a global Get2ConnectSM network is provided.

Peregrine business integration suite includes a wide variety of integration adapters for use with back-end systems (i.e., ERP applications, databases, mainframes), standards-based mechanisms for data transport between systems and trading partners, system monitoring capabilities, advanced data transformation, and an intuitive application/workflow development environment. The solution also provides a powerful data transformation engine that enables real-time, any-to-any conversions between disparate data formats, including various forms of XML, X12, EDIFACT, SAP IDOCs and industry standards such as RosettaNet, CIDX and OAG.

5.26.3   Peregrine Systems Revenue

Peregrine Systems fiscal 2002 third quarter ended Dec. 31. Total revenues for the quarter were $175.2 million, an increase of 12 percent from the $156.6 million in revenues reported in the third quarter of fiscal 2001.

For the nine month period ended Dec. 31, total revenues were $522.2 million, compared with $393.6 million in the same period of fiscal 2001.

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5.27   Progress Software

Progress Software offers SonicMQ. SonicMQ is a de facto e-business messaging standard. Commerce One, Hewlett Packard, Iona, Bluestone and many others use the messaging. SonicMQ is embedded into Casablanca. It enables concentration on core enterprise application integration solutions to help customers benefit from e-business opportunities.

5.27.1   Sonic Software

Sonic Software is a provider of e-business messaging software and services. The SonicMQ E-business messaging server provides highly scalable, standards-based Internet middleware that enables the guaranteed and secure delivery of business data between applications across the distributed enterprise.

Messaging between companies is used for B2B exchange. Sonic Software Corporation is a wholly owned operating company of Progress Software.

5.28   RosettaNet

RosettaNet is an independent, non-profit consortium dedicated to the collaborative development and rapid deployment of open Internet-based business standards that align processes within the global high-technology trading network.

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More than 400 companies representing over $1 trillion in annual information technology, electronic components and semiconductor manufacturing revenues participate in RosettaNet's standards development, strategy and implementation activities.

Companies work in the RosettaNet consortium to create, implement and promote open e-business process standards. Consortium participants continue to collaborate and provide resources that actively support the continued success of RosettaNet standards development.

5.29   Sagent

Sagent has teamed with Satyam to provide enhanced BI.   Satyam Computer Services is end-to-end IT solutions provider.   Sagent will leverage Satyam's application development expertise by using its application connectors to rapidly deliver scalable, high performance analytics for ERP, CRM, and SCM systems including PeopleSoft, Oracle Financials, Siebel and i2.

5.29.1   Sagent Customers

1,500 companies have selected Sagent software to organize disparate data and support thousands of users as they pursue reduced costs, increased profitability, improved customer retention, and competitive advantage.

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Customers include: 7-Eleven-Mexico, AT&T, Boeing Employees Credit Union, Bristol Meyers, British Telecom, California State Automobile Association, Citibank, GlaxoSmithKline, GPU Energy, Jiffy Lube, Johnson & Johnson (UK), Kemper National Insurance, Mentor Graphics, Peoplefirst.com, Provident Central CreditUnion, and Siemens.

Sagent partners with leading regional and global systems integrators, OEMs and independent software vendors to leverage third-party business expertise and presence in the global marketplace. Strategic relationships include Advent Software, CapGemini Ernst & Young, Hyperion Solutions, IBM, KPMG, Microsoft, SAS, Satyam, and Sun Microsystems.

5.30   SAP

SAP Portals is a leading provider of open-enterprise portal and business intelligence products. It is a wholly owned subsidiary of SAP AG.

Features of the enterprise portal include automatic content synchronization, an open knowledge management platform and a set of business packages. The SAP Portals enterprise portal transcends the basic information aggregation and Web-enabled access to applications provided by other portal solutions. It unifies business processes across the enterprise.

This enables organizations seeking to leverage vital enterprise information assets for strategic advantage and profitability to improve productivity, promote collaboration and swiftly resolve business events.

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The SAP Portals enhanced open unification platform provides appropriate information delivered to the right person at the right time, intelligent decision support, and business throughput acceleration. Users work seamlessly through a dynamic user interface to gain tangible increases in efficiency, quality and value through the unification of critical information sources including applications, data warehouses, unstructured documents, the Internet and Web services.

5.31   SeeBeyond Technology

SeeBeyond Technology provides business integration software that enables the real-time flow of information within the enterprise and among customers, suppliers and partners. A comprehensive business integration solution is architected from a single, internally-developed software code base.

The solution encompasses application-to-application integration, business-to-business integration, and business process management. Business Integration Suite offers business integration solutions to 1,650 customers worldwide.

5.31.1   SeeBeyond Solution

SeeBeyond solution for business integration enables the seamless flows of information across systems, applications and enterprises in real-time on a global basis. The business integration suite provides companies with a flexible and easily configurable software platform to connect applications and systems within an organization and among geographically dispersed enterprises.

Systems support continuous and reliable information exchange. SeeBeyond is positioned as a provider of a comprehensive solution for business integration. Key integration technologies provided include application-to-application, business-to-business, and business process management. These are seamlessly integrated.

SeeBeyond has architected products from a single, internally-developed code base. Solutions are fully integrated to deliver faster time-to-market, improved performance and higher reliability for customers. The fourth generation of our core product, e*Gate Integrator, is a comprehensive and centrally managed solution that addresses the need for a distributed, scalable and global business integration infrastructure.

5.31.2   SeeBeyond Business Integration Suite

The SeeBeyond business integration suite is comprised of specialized product offerings that meet specific integration needs. e*Gate Integrator is a robust business integration platform. Performance and extensibility permit integrating information across disparate applications and systems within and among enterprises.

e*Gate provides a component-based integration architecture that is network-optimized to provide significant extensibility, scalability and high availability. The e*Gate software distributed architecture avoids processing bottlenecks and the single point of failure found in hub-and-spoke and point-to-point solutions.

Application Integration Company Profiles

The software delivers robust security to validate and protect application data throughout both public and private networks.

e*Way intelligent adapters are combined with e*Gate's open architecture. They accelerate business integration by providing connectivity to a wide variety of packaged applications, databases, communication protocols, systems, and technologies for trading partner and application integration.

Specific business logic and data validation, built-in messaging, and non-invasive connectivity are provided. 70 e*Way intelligent adapters include adapters for packaged applications, SAP, PeopleSoft, Siebel, direct database access, such as Oracle, Sybase, eCommerce applications, such as Ariba, Commerce One, web server/portal access, such as iPlanet, Websphere, communications applications, such as HTTP/HTTPS, FTP, e-mail, and legacy applications and data stores, such as CICS, IMS, ADABAS, VSAM.

A generic e*Way extension kit is available for rapid development of custom e*Way adapters.

e*Xchange Partner Manager is built on the e*Gate Integrator platform, and is a web-based trading partner management solution for automating and securely managing business partner relationships for real-time interaction between the enterprise and its partners, suppliers and customers.

The SeeBeyond e*Xchange Partner Manager accelerates the creation of business partner relationships through flexible trading partner profile management, rapid and secure connectivity and extensive protocol support.

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Protocol support includes pre-defined logic for enveloping, validating and handling leading e-Business protocols, such as X12, EDIFACT, HIPAA, RosettaNet, BizTalk and CIDX, including the public or shared processes between companies, such as acknowledgments, negative acknowledgements, responses and control messages.

e*Insight business process manager provides process-driven business integration. It allows key automated and manual business processes to be modeled, implemented, monitored, managed and optimized. e*Insight primary components provide automation services.

e*Insight process manager allows business technical analysts to collaborate and accelerate the creation of business processes. The business analyst can to graphically monitor, manage, and optimize business processes.

The e*Insight repository acts as a process warehouse storing templates as well as data. e*Insight process engine implements business rules configured in each process model. e*Insight is built on e*Gate Integrator. The software acts as a visual representation of business processes. It generates the components of the underlying integration solution within the e*Gate software.

e*Index Global identifier identifies customers across disparate systems. It builds a cross-index of the many different local identifiers used to represent the same customer. This cross-index enables the SeeBeyond Business Integration Suite to seamlessly share customer information among these systems without requiring changes to every system.

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e*Xpressway Integrator addresses business-to-business marketplaces by connecting business partners to fully automate cross-enterprise processes in a cost-effective, rapid and repeatable manner. e*Xpressway Integrator is a web-based, trading partner solution that enables rapid business partner connectivity and integration through a comprehensive business-to-business implementation process, graphical configuration wizards and partner-downloadable connectivity software.

Business partners follow an intuitive, step-by-step process to register their partner profile, configure connectivity and integration software, and then install their personalized software. The result is that business partners can securely connect their systems to their trading partners in a matter of days.

The core software product is e*Gate software. The company is continually enhancing its business integration suite.   It is focusing on extending a distributed integration strategy by focusing on continued and enhanced support for core infrastructure standards, such as J2EE and .Net. SeeBeyond has positioned to provide support for web services standards. e*Way adapters are being evolved for emerging packaged applications, web technologies, and data formats to provide enhanced application and system connectivity.

5.31.3   SeeBeyond Customers

SeeBeyond has licensed products to over 1,600 customers globally. The following is a representative list of customers by industry as shown in Table 5-3.

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TABLE 5-3

SEEBEYOND CUSTOMERS

Financial Services/Insurance

- American General Financial Group

- AXA

- Banca Intermediazione Mobiliare S.p.A.

- Clearstream

- Korea First Bank

- Pacific Life Insurance

- Sumitomo Shoji

- Visa International

Healthcare

- Horizon Blue Cross Blue Shield of New Jersey

- Kindred Healthcare

- Magellan Behavioral Health

- MedPlus/Quest Diagnostics

- New South Wales Health

- Queensland Health

- United Health Group

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TABLE 5-3 (CONTINUED)

SEEBEYOND CUSTOMERS

Retail

- Barnes & Noble.com

- FNAC

- Sainsbury's

- Target Corporation

Government

- Die Schweizerische Post

- DSS Accord—UK

Manufacturing

- ABB Global Processes

- Avery Dennison

- Conoco Inc.

- DuPont Corporate eBusiness

- Goodrich Corporation

- General Motors Corporation

- Haworth Inc.

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TABLE 5-3 (CONTINUED

SEEBEYOND CUSTOMERS

Manufacturing (Continued)

- Heidelberger Druckmaschinen AG

- Syngenta

- United Technologies Corporation

Telecommunications/Energy/Utilities

- Air Liquide SA

- Florida Power & Light

- Pacific Gas & Electric

- Potomac Electric Corporation

- Transco

- TXU

Other

- Autodesk

- DIRECTV

- Eagle Global Logistics

- EDS

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TABLE **5-3 (C**ONTINUED

SEE**B**EYOND **C**USTOMERS

- Fluor Corporation

- RR Donnelley

- Ryder

Source: WinterGreen Research, Inc.

5.31.4   SeeBeyond Alliances with Leading Systems Integrators

SeeBeyond has Alliances with Leading Systems Integrators. The company has strategic alliances with Accenture, Computer Sciences Corporation ("CSC"), Electronic Data Systems Corporation (EDS) and PricewaterhouseCoopers (PwC). Alliances with these systems integrators position SeeBeyond as a preferred business integration software provider. Relationships with other systems integrators include Booz-Allen & Hamilton, Cap Gemini Ernst & Young and KPMG.

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5.31.5   SeeBeyond Revenue

Year Ended December 31,

(in thousands)

	2001	2000	1999	1998	1997
License	$ 109,628	$ 65,403	$ 24,051	$ 18,142	$ 10,911
Services	47,013	33,144	20,268	10,853	10,149
Maintenance	29,302	16,205	9,055	5,142	2,919
Other	—	—	1,797	3,324	2,720
Total revenues	185,943	114,752	55,171	37,461	26,699

5.32   SilverStream

SilverStream provides comprehensive integrated services environment for delivering advanced, Web services-oriented applications. The SilverStream eXtend™ product suite makes a company's information assets accessible.

SilverStream Software provides a comprehensive, integrated services environment that simplifies and accelerates the creation and delivery of Web services-oriented business applications. SilverStream technology is based on Java, XML, and Web Services.

It enables organizations to rapidly deliver business applications to the Web. The flagship product suite is the SilverStream eXtend™. It gives customers a competitive advantage by unlocking the business value of existing systems and delivering relevant information to those who need it when they need it.

SilverStream has a base of 1,500 customers worldwide. Customers include Amerisure Insurance, Home Depot, the Chicago Stock Exchange, Samsung Electronics, Sears and US Cellular.

SilverStream's partner network includes system integrators, independent software vendors, application service providers and other strategic partners. Partners include Cap Gemini Ernst & Young, Compaq, Deloitte & Touche, Hewlett Packard, IBM, Intel, Mercury Interactive, Microsoft, Oracle and Sun Microsystems.

5.33   Sopra / Viewlocity

Sopra Group has a staff of more than 6,000. It offers IT and systems integration services throughout Europe. The company's wholly owned subsidiary Axway is solely dedicated to EAI solutions and currently serves 4,000 customers. Axway continues to enhance Viewlocity's AMTrix and TSIB integration products, which complement Axway's existing offerings.

Sopra Group has a leadership position in consulting services and systems integration, based on in-depth knowledge of customer business practices. The track record for managing complex information systems projects from initial strategy planning through successful implementation.

Axway, EAI subsidiary of Sopra Group acquired EAI activity of Viewlocity. Sopra Group acquired the EAI activity of Viewlocity Inc. This acquisition increases its presence in Europe and opens up the American and Asian markets to the Group.

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The acquisition completes the Axway offering and reinforces Axway positioning in the Manufacturing and Retail sectors. Axway reaffirms its leadership position in Europe.

Axway and Viewlocity agreed upon a dual partnership as follows : exclusive distribution of the product line AMTrix/TSIB by Viewlocity Inc. in the Americas and in Asia. OEM integration of the product line AMTrix/TSIB is offered in the SCM solution (Supply Chain Management) of Viewlocity.

5.33.1   Sopra / Axway / Viewlocity

Axway has acquired Viewlocity EAI operations. Sopra subsidiary Axway has taken over European operations. The acquisition positions Viewlocity to capitalize on the value of its EAI operations as the company remains tightly focused on delivering best-in-class supply chain products.

Viewlocity has a strategic relationship with Sopra Group, a consulting services and systems integration company. Sopra / Axway acquired Viewlocity's EAI products and European EAI sales, service, and support operations. Viewlocity continues to bundle the integration products globally as part of its TradeSync SCEM software suite. It has exclusive distribution rights for the products in Asia and the Americas.

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5.34   Software AG

Software AG is a wholly owned subsidiary of Software AG, Europe's largest system software provider. With about 3,500 employees and representatives in over 70 countries, Software AG expects revenues around 600 million euros in 2001. Its distribution and technology partners include IBM, Microsoft and Hewlett-Packard. Extensibility, Softquad and Citrix are also technology partners.

Software AG's products control the central IT processes of thousands of renowned companies worldwide to include Lufthansa, ZDF, Dresdner Bank AG, Daimler Chrysler, Deutsche Bahn AG (German Rail), BP and VIAG Interkom. XML Platform for E-Business.

5.34.1   XML-Based Integration Technology.

Software AG's Tamino XML server enables enterprise customers to search for relevant data with greater speed and efficiency. Software AG, Inc., the U.S. subsidiary of Software AG and Semio, the leading provider of categorization and indexing software, have a strategic alliance that enables customers to discover and manage both structured and unstructured data across the enterprise using XML technology.

The alliance calls for Semio's flagship categorization engine, SemioTagger, to be used with the Software AG's Tamino server to dynamically

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categorize and store unstructured and structured data contained within multiple data sources.

Together, these two products provide customers with a centralized and highly leveraged means of storing and retrieving both structured and unstructured data enterprise-wide.

5.34.2   Software AG / Altio

Software AG Tamino and EntireX XML products provide dynamic XML applications solutions. The alliance is positioned to deliver a complete solution for browser-based XML applications. AltioLive platform provides XML application development and delivery with Software AG's TaminoTM native XML server and EntireXTM enterprise application integration products.

5.34.3   Software AG Revenue 2001 ·

Software AG had 41 percent total revenue growth to 588.5 million euros ($521.4 million US). Growth was spurred by the US acquisition. ·

Software AG, the U.S. subsidiary of Software AG, fourth-quarter 2001 revenue growth was 36 percent. Revenue rose to 159.6 (2000: 117.4) million euros [141.4 million USD (2000: 110.6)].

Total fourth-quarter 2001 revenue was posted at 159.6 million euros [141.4 million USD]. At 52.5 (2000: 32.9) million euros [46.5 million USD (2000: 30.99)], maintenance again proved to be a very reliable business. It grew 59 percent and was the second-largest contributor to total revenue.

The focus of Software AG's professional services on higher-margin businesses was intensified, and revenue from this division went up 17 percent to 50.4 (2000: 43.1) million euros [44.7 million USD (2000: 40.6)].

Licensing accounted for the largest percentage of revenue, up 34 percent to 55.5 (2000: 41.3) million euros [49.2 million USD (2000: 38.9)]. Mainframe-based enterprise transaction technology - the company's traditional product line - generated 36.2 (2000: 23.5) million euros [32.1 million USD (2000: 22.1)].

5.34.4   Software AG / Red Oak Software

Software AG's Tamino XML server and Red Oak's Web integrator provide customers with quick, cost-effective XML solutions for Web content. Software AG and Red Oak Software have an alliance offering customers automated, programmatic access to data on any web browser via Web Integrator, and easy integration and processing in Tamino.

The benefit of the Software AG - Red Oak alliance is that users can capture and integrate content offered on the Internet with Red Oak's Web Integrator and then store and process data using Tamino. This provides a quick, inexpensive XML enhancement to the enterprise's IT environment.

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5.34.5   Software AG EntireX

Software AG EntireX communications broker includes SSL-based, automatic generation of WSDL descriptions, as well as other new capabilities. EntireX combines the features of message brokers and integration servers.

It is able to route Java, CORBA, DCOM and XML messages across the network. Messages can be grouped into work units corresponding to complete transactions, allowing servers to commit or roll back entire message groups depending on the state of transactions.

The broker has enhanced support for XML and related specifications. The EntireX XML adapter is capable of processing SOAP-based requests. The server can generate WSDL files and XML templates.

5.35   Sun Microsystems / iPlanet

Sun Microsystems has embraced a singular vision -- "The Network Is The Computer".   Sun Microsystems is a leading provider of industrial-strength hardware, software, and services that power the Internet.

Sun ONE represents an initiative to achieve the integration of a portfolio of software products. Sun One is an implementation of vision, architecture, platform, and expertise that enables the development and delivery of services on demand.

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Through its open, integratable architecture, Sun ONE extends enterprise systems to help reduce costs and complexity while improving organizations' return on assets. SunONE represents a significant initiative in Sun's evolution to providing an open end-to-end architecture building on the company's offerings across systems and development environments.

5.35.1   Sun Application Server Framework

Sun drives Web services innovation and extends the power of J2EE™ technology. Sun Microsystems iPlanet™ application server features an application framework that provides developers prebuilt Java™ components based on best design practices that can be assembled to form the infrastructure of Java™ 2 platform, enterprise edition (J2EE™) applications up to 10 times faster than previously possible.

iPlanet application server 6.5 enables developers to expose business processes as Web services. Enhanced services on demand products support tight integration with Sun's Forte™ for Java™ integrated development environment (IDE). IDEs offer developers a broad range of new tools and resources for services on demand development.

5.35.2   Sun Microsystems Java

Sun Microsystems Java 2 Enterprise Edition platform includes a specification for Enterprise JavaBeans, XML integration, and a Java message service API. Application server vendors include support for J2EE.   Java 2 is key to the Sun Web services initiative, Sun ONE.

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Sun is one of 24 companies in the Java Community Process program, which is driving the development of Java technology. JMS API and message driven beans enable applications to create, send, and receive messages without the send or receive being available at the same time and provide a component model for messaging.

The message beans enable tighter integration of EJB with JMS.

A key part of the Sun Web services drive is the enhanced XML (Extensible Markup Language) integration through the Java API for XML processing, or JAXP, and the ability to write JavaServer pages technology in XML.

5.35.3   Sun Microsystems / iPlanet

After three years of being part of an alliance with AOL Time Warner Inc./Netscape Communications Corp., Sun Microsystems Inc. has officially taken the iPlanet infrastructure and e-commerce applications division fully under its corporate wing. Sun has positioned iPlanet as a core component of the company's Sun Open Net Environment software platform.

IPlanet e-commerce solutions provide a software platform for the creation and delivery of Web services. Sun and AOL concluded their original Alliance agreement on 17 March 2002. Sun Microsystems collaborated with AOL Time Warner in a business venture known as iPlanet E-commerce solutions. The goal of the Alliance was to form a world-class organization to develop an infrastructure software platform to enable the creation and delivery of web services. The alliance between Sun and AOL is gone.

iPlanet is now a division of Sun and a core component of Sun Open Net Environment (Sun ONE) offering. Sun employees staff product engineering and support organizations. Sun professional services, tech support, engineering, sales and marketing teams support iPlanet products.

Users are invited to join the Sun ONE Inner Circle program. News and information are combined with becoming involved in a member community where technologists and technology executives share best practices for using Sun ONE and the iPlanet portfolio. Sun has positioned iPlanet as its infrastructure software division.

5.36   SunGard / Mint

SunGard offers business integration backed by XML.

Integration of XML and legacy applications is supported. SunGard business integration XML solution facilitates integration at several levels of integration. Business, data, and transport are supported. By automatically converting between different XML standards without writing any program code or XSL scripts, ease of use is achieved. This includes transformations between XML elements and attributes.

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5.36.1   SunGard Integrated IT Solutions

SunGard offers integrated IT solutions for financial services. SunGard is a provider of information availability services. Annual revenues are $2 billion. SunGard serves more than 20,000 clients in over 50 countries, including 47 of the world's 50 largest financial services companies.

5.36.2   SunGard Vision

SunGard vision is for T+0.com = Web-enabled, real-time processing to be achieved. Information technology is transforming the markets. Clients need to adopt entirely new business models, strategies and processes. They demand around-the-clock, real-time processing, seamless business-to-business integration and personalized customer interaction.

Real-time - transactions are initiated on the Web any time, anywhere, and are executed and recorded in real-time. To operate their business-critical applications on a T+0.com basis, clients require 24/7, high-availability infrastructure. End-to-end - connectivity is needed.

Processes need to be automated and integrated within companies and across businesses and time zones. Integration increases efficiencies, reduces costs and eliminates operational errors. One-to-one systems preserve customer loyalty and high margins. Companies offer customers more choices. They permit the personalization of the selection and delivery of products and services.

Clients require software solutions to enable customers to personalize access individually. The goal is to remain the premier supplier of integrated financial software solutions and technology infrastructure.

SunGard develops and implements integrated financial software solutions for investors, institutional investors, mutual funds, pension funds, and insurance companies. Related organizations include custodians, trustees, and transfer agents. Financial intermediaries include brokers, dealers, traders, market makers, distributors, clearing agencies, and payment and credit facilitators.

Non-profit and public sector organizations, federal, state, and municipal governments are customers. SunGard provides information availability services for business-critical processing. It manages large multi-platform data processing centers and technology infrastructure and provides high availability and end-to-end business continuity.

Outsourcing and hosting is an aspect of SunGard business. SunGard provides information processing and network services on an outsourced basis. It is a facilities manager providing Internet access, co-location, and Web hosting services. SunGard acts as an application service provider, offering turnkey access to third party applications and for its own financial software solutions.

5.36.3   SunGard Strategy

In excess of 3 million trades per day are processed by financial intermediaries on SunGard systems. 70% of NASDAQ trades flow through SunGard systems.

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5.36.4 Mint

The Mint Knowledge family provides seamless integration of XML and non-XML based business applications across the enterprise. It enables any product, customer, or risk data residing in back end systems to be connected to new e-commerce opportunities. This flexible, fully integrated environment "future-proofs" the organization against ever-changing demands of the virtual business environment.

MINT offers post trade solutions for T + 1. MINT has a global SWIFT interface solution (GSI). MINT SWIFTNet Solutions depend on XML Knowledge Sets. MINT ISO 15022 is a transformation solution. Mint offers e-banking solutions.

MINT knowledge manager is XML-enabled to ensure the smooth flow of messages between XML and non-XML based applications. MINT knowledge manager can validate, map and translate between any known XML standard and non-XML (or other XML) standards.

As a SWIFT ready gold label branded vendor, this includes transformation of any SWIFT message type to a XML-based format. Vocabularies of financial XML standards such as FIXML and Infinity's NTM, are supported (e.g. SWIFT to FIXML). MINT XML adapter provides a simple way of connecting XML-based applications to the MINT Knowledge family

5.36.5   FIXML

The entire FIXML message suite and corresponding DTD have been imported to the MINT's Knowledge Base. Using MINT Knowledge Manager, clients can easily define transformations and integrate FIXML-based applications with any other financial standards or applications without any coding.

5.36.6   Infinity/Network Trade Model

SunGard Business Integration works closely with Infinity on its Network Trade Model (NTM). NTM is a logical model of the trades, trade details and life-cycle events of derivatives, securities, equities and foreign exchange instruments expressed in XML.

SunGard Business Integration develops NTM adapters to translate messages from source systems and reliably transport NTM messages across local and wide area networks while providing data validation and enrichment.

5.37   Sybase

Sybase provides enterprise-class software solutions that fuel e-Business and enable access to information anytime, anyplace. With its industry leading Enterprise Portal (EP), mobile and wireless, and vertical market solutions, Sybase is one of the largest global independent software companies in the world.

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Sybase products are positioned to provide a platform for delivering the integrated business solutions. Systems leverage existing strengths in enterprise data management and focus on delivering end-to-end solutions.

Mobile and embedded computing, data warehousing, and Web Computing environments are targeted in addition to traditional IT environments. Sybase customers represent the industries leading the global economy, with strong concentrations in financial services, government, telecommunications and media, and health care.

5.37.1   Sybase Third Quarter Revenue

Sybase revenues for the third quarter 2001 were $226.3 million, compared to revenues for the third quarter last year of $239.1 million. The company attributed softer than expected year- over-year revenues to weaker economic conditions, principally in the United States and Europe.

Sybase ended the third quarter with approximately $330.3 million in cash and cash investments, including restricted cash of $9.4 million.

Sybase Revenue

(In thousands)	Three Months Ended September 30		Nine Months Ended September 30	
	2001	2000	2001	2000
License fees	$ 90,613	$114,370	$ 284,146	$335,911
Services	135,700	124,733	405,640	364,012
Total revenues	226,313	239,103	689,786	699,923

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5.37.2   Sybase Customers

Sybase customers include Bank of America, Barings Asset Management, ChinaEagle Securities, China Unicom, Korea Life, Citicorp, Cisco, CNET Networks, E*Trade Bank, Lowe's, NEC Infrontia, Novell, Samsung Insurance, SK Telecom Co., Ltd., Veritas, the states of Michigan and Pennsylvania, and Department of Defense. New customers include companies in Asia, China Unicom, China Eagle Securities, and Korea Life.

5.37.3   Sybase Products

The availability of the New Era of Networks® EDI Server and Adapter for EDI V2.8, a solution that makes it easier and less expensive for customers to integrate their backend systems and middleware to exchange business documents with their partners.

5.38   Tibco Software

Tibco Software is a leading provider of total business integration solutions delivering infrastructure software that enables businesses to seamlessly integrate business systems in real-time. Tibco technology digitizes Wall Street. Financial services, telecommunications, electronic commerce, transportation, logistics, manufacturing, and energy represent target markets.

As a leader in publish-subscribe technology, which is an essential component of the needs of Web services target markets, Tibco struggles with once and only once, guaranteed delivery. The distributed engine that forms the base for Tibco publish-subscribe technology is excellent for fast message transport to a lot of ports that subscribe to a topic on the network. This same engine does not support mission critical once and only once, guaranteed delivery functionality as well as some other architectures.

When Tibco goes to scale, the difficulties become apparent. Accurate delivery of messages can be done in a well-controlled environment; it is more difficult as the use grows.

Tibco's great strength is the ability to locate a client, analyze the client integration needs, and deliver a full product suite to that client. The business model relates to having a very broad product suite. The product suite is comprised of modules. Tibco sells an integration solution that promises to adapt different technologies to different integration tasks.

5.38.1   Tibco Software 2001 Revenue

Tibco Software fourth fiscal quarter and year ended November 30, 2001. Total revenues for the fourth quarter were $78 million, an increase of 4 percent over $75 million in the prior quarter. Fiscal year 2001 revenues were $319 million, up from $ 252 million, a 27 percent increase over fiscal 2000.

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5.38.2   Tibco Strategic Partners

TIBCO's global customer base includes 1,400 customers.   Intel, NEC, Dynegy, BP, eBay, US Bank, The Limited, Delta Air Lines, Philips, AT&T and Pirelli are custromers.

Tibco added 84 new customers during the last quarter of 2001. New customers include Union Pacific, US Bank, Allstate Insurance, Société Générale, Federated Insurance, American Electric Power, Virgin Mobile, and Novartis.

Tibco has 1,400 customers. eBay, Intel, Delta Air Lines, Siemens, Belgacom, Hutchison 3G, Mirant, BP International, McGraw Hill and FedEx are customers. Tibco leveraged and expanded its relationships with Siemens PTD, Accenture and Parametric Technology. More than 250 companies are now members of the Tibco alliance program.

Tibco has relationships with, HP, KPMG, Deloitte, CG/EY, i2 Technologies, Cisco, and Yahoo!. Tibco is working with partners, such as Accenture and Deloitte, to train consultants and develop vertical market solutions based on the Tibco infrastructure. Tibco Extensibility customers and partners include Arbortext, BroadVision, Commerce One, Microsoft, Pricewaterhouse Coopers, and Software AG.

5.38.3   Tibco Strategic Alliances

Tibco has a strategic alliance with Bowstreet. The technology is based in XML. Bowstreet is a leader in enabling companies to dynamically assemble web services. Bowstreet has positioned with the next generation of intuitive and inter-connective capacities providing customers competitive advantage.

5.38.4   Tibco Products

Tibco product lines support comprehensive integration solutions. Tibco ActiveEnterpriseTM and TIBCO ActivePortalTM. ActiveEnterprise integration product includes support for J2EE, XML and mainframe integration. ActivePortal includes a range of capabilities.

For the year 2001, Tibco released 66 new products or product enhancements and expanded its offerings. Tibco supports XML standards and EDI.   Tibco has a leadership position in supporting RosettaNet standards.

Tibco has an initiative to make business integration more widely accessible. Tibco BusinessWorksTM is a comprehensive, packaged, platform that gives companies the ability to solve integration challenges incremetnally. Tibco BusinessWorks enables comprehensive, cross-platform Web Services for new and legacy systems, including internal application and business process integration.   Real-time monitoring and management are supported.

5.38.5   Tibco Revenue

(in thousands)

Ended November 30, 2001

Three Months	Twelve Months
$ 78,244	$ 319,251

Tibco Revenue

(in thousands)

License Revenue:					
Non-related parties	$ 63,550	$160,700	$ 42,542	$ 45,857	$ 197,334
Related parties	4,496	20,901	5,049	4,717	19,423
Total license revenue	68,046	181,601	47,591	50,574	216,757
Service and maintenance revenue:					
Non-related parties	19,510	66,841	25,092	24,633	93,074
Related parties	1,018	3,355	2,536	3,037	9,420
Total service and maintenance revenue	20,528	70,196	27,628	27,670	102,494
Total revenue	88,574	251,797	75,219	78,244	319,251

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Tibco Revenue

(in thousands)

Three Months Ended February 28

	2002	2001
License Revenue:		
Non-related parties	$43,066	$53,872
Related parties	3,800	4,391
Total license revenue	46,866	58,263
Service and maintenance revenue:		
Non-related parties	23,908	21,516
Related parties	3,259	2,323
Total service and maintenance revenue	**27,167**	**23,839**
Total revenue	74,033	82,102

Tibco positions in vertical markets, including communications, wireless, energy, manufacturing, financial services, logistics, transportation, healthcare and retail. Tibco continues to enhance its product lines to ensure the most comprehensive integration solutions in the marketplace.

Tibco BusinessWorks is a highly packaged, easy-to-use integration platform that enables comprehensive, cross-platform Web Services for new and legacy systems. Using TIBCO BusinessWorks, companies can reduce the cost of transacting business, speed time-to-market, increase flexibility and improve efficiency.

5.38.6   Hewlett-Packard and Tibco

Hewlett-Packard and Tibco are jointly developing business integration products for the service provider and telecommunications markets. The companies have a three-year agreement. The focus is on supporting high-volume online transactions and improving the speed and reliability of middleware.

Tibco has positioned to expand Netaction e-services middleware and OpenView management products.   HP is building on a base of XML and Java. Technologies from Bluestone Software and Netaction products position HP with middleware. The deal with TIBCO addresses high performance and high availability.

When HP formed the Netaction division back in February, it hinted that it intended to fill out its product lines through partnerships. In addition to Bluestone's application server technology, Netaction includes e-speak Web services integration technology, Virtualvault security and the Changengine business process management and workflow product, now known as HP Process Manager.

Bluestone brought with it some Java-based transaction processing software from Arjuna Solutions, a UK company it had previously acquired. HP consulting division will recommend Tibco as the preferred technology for the telecommunications and service provider sectors.

5.38.7   Tibco Acquires Talarian

The Talalrian acquisition expands Tibco real-time messaging integration. The Talalrian acquisition extends Tibco's leadership in messaging. Solutions address the business integration market. Real-time data flow supports high transaction volumes. Messaging solutions are positioned to increase productivity and competitiveness.

Talarian brings world-class technology and a blue-chip customer base. Through the acquisition, Tibco gains access to Talarian 300 customers focused in the financial services, telecommunications, and aerospace industries. Talarian customers include VISA, American Stock Exchange, Lockheed Martin, Raytheon, New York Stock Exchange, Nortel Networks, and MicroMuse.

5.38.8   Talarian

Talarian provides leading infrastructure software solutions that deliver data and content in real-time over any network to any device. Innovative technology is called adaptive multicast. Talarian software can select data delivery mechanisms on-the-fly based on application needs and network capabilities.

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Talarian high performance, scalable products are deployed by hundreds of large organizations in demanding applications.

5.38.9   Talarian SmartSockets

SmartSockets facilitates selective information delivery by enabling messages to be delivered automatically only to interested applications, called "subscribers." SmartSockets supports publish-subscribe, request-reply, and peer-to-peer messaging. SmartSockets uses both the networking protocols of the Internet and reliable multicast to provide highly efficient one-to-one, one-to-many, and many-to-many communications. SmartSockets can operate over virtually any network type, including the Internet and wireless networks.

This product also offers a variety of services that complement the messaging function, such as fault tolerance, guaranteed message delivery, data encryption, authentication, load balancing, and data translation. SmartSockets provides efficient networking and high scalability, and can be embedded in the products of independent software vendors as well as an organization's existing information system.

5.38.10   Tibco Customers

Tibco has over 1,400 customers. Tibco customer base includes NEC, Dynegy, SWIFT, BP, eBay, US Bank, The Limited, Delta Air Lines, Philips, AT&T, Pirelli, Yahoo! and Cisco Systems.

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TIBCO customers include as well Qwest, Sogecable, Hutchison 3G, Verizon Wireless, Bonneville Power Administration, Xcel Energy, Wells Fargo Mortgage, Nova Information Systems, Alcon Labs, US Filter, Agilent, Union Pacific, Deutsche Post, The Limited, and Adidas. Customer deals from integrators include Anadarko, Duke Energy, Thomas Cook, and others. Table 5-4 illustrates selected Tibco customers.

TABLE 5-4

SELECTED TIBCO CUSTOMERS

- NEC
- Dynegy
- SWIFT
- BP
- EBay
- US Bank
- The Limited
- Delta Air Lines
- Philips
- AT&T

<div align="center">

TABLE 5-4 (CONTINUED)

SELECTED TIBCO CUSTOMERS

</div>

- Pirelli

- Yahoo!

- Cisco Systems

<div align="center">

Source: WinterGreen Research, Inc.

</div>

Tibco key partners include Accenture and Deloitte. Tibco serves more than 50 energy customers with robust, business integration solutions. Tibco real-time customer service for utilities is now bringing business integration benefits to a broad segment of the energy industry by solving their integration challenges with a more simplified approach.

Tibco shares many marquee energy customers with Siebel Systems - including British Gas, ChevronTexaco, e.On, Essent, Gas de Portugal, National Power, Powergen, Reliant, RWE, Shell Energy Services, TXU Europe and Williams Energy.

5.38.11　Talarian Software Customers

Talarian customers include Credit Suisse First Boston, Hewlett Packard, Lockheed Martin, MCI WorldCom, the New York Stock Exchange, Nortel Networks, Novell, Philadelphia Stock Exchange and Southwest Airlines.

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Application Integration Company Profiles

Talarian software is powering systems in the world. Customers have chosen Talarian's real-time infrastructure software solutions in their most critical applications. Industries using Talarian software include aerospace, computer-related manufacturing, e-business, education, energy, financial exchanges, financial services, global communications, and independent software vendors.

Aerospace customers include Aerojet, Altair Aerospace, Boeing, Daimler Chrysler, Fermilab, Hughes Aircraft, ISX Corporation, Jet Propulsion Laboratory, Korea Aerospace Research, Lockheed Martin, Loral, NASA, Raytheon, Rockwell, TRW, and the United States Air Force.

Computer-related manufacturing customers include Advantier, Compaq, ICLKMT Semiconductor, and Seagate Technology. E-business customers include CCI/TRIAD, Digital Bees, EarthLink, Found, GoFreight, HostProLocate Networks Telenisus, Visto, and Yahoo!

Education customers include Berkeley, California Institute of Technology, Ohio State University, Stanford University, U.S. Naval Academy, University of California, University of Connecticut, and University of Hong Kong.

Energy customers include ABB, California ISO, Natural Gas Pipeline, and PG&E. Financial exchange customers include Alternative Trading Systems, American Stock Exchange, CBOE, LIMI Trader, Liquidnet, NASDAQ, New York Stock Exchange, Philadelphia Stock Exchange, Primex Trading, S.W.I.F.T., and Toronto Stock Exchange.

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Application Integration Company Profiles

Financial services customers include ABN, Amro Bank of Montreal, Bear Stearns, CMT, Capital Markets, coolsavings.com, Credit Agricole Indosuez, Cheuvreux, Credit Suisse, First Boston, DE Shaw & Company, FinTechFund, SERVFutureSource, ICor Brokerage, ING Barings, ITG Jardine Fleming, LatentZero, Lehman Brothers, Midland Communications, MM Squared, PAX Clearing, QUICK, CorpQV Trading Systems, Rothschild Asset Management, Salomon Smith Barney, Swapstream, Swiss Bank, Tradescape.com, and Wolverine Trading LP.

Global Communications customers include ADC Telecommunications, AT&T, bell Mobility, British Telecom, Clear Communications, General Electric, Harmonic Data, Hewlett-Packard, L-3 Communications, MACH, Motorola, Noochee Solutions, Open Port, Real Networks, Sitara Networks, SkyStream Networks, Sprint, and WorldCom.

Independent software vendor customers include Aspect Communications, Micromuse, NextSet, Novell, Scientific Computers, SIAC, and Starbase. Networking customers include 3Com,Alcatel, Bell, Cisco Systems, Ericsson, Neustar, Nortel Networks, Powerlan, and TeraBridge.

Transportation customers include Caltrans, Florida DoT, Georgia DoT, Oregon DoT, Southwest Airlines, andUtah DoT.

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5.39   TTM

Total Transaction Management develops, markets, supports, and sells mission-critical messaging and transaction-based solutions to organizations that rely on the highest levels of scalability, performance and availability. TTM is focused on providing products and professional services that integrate Java and middleware technologies.

Total Transaction Management is a privately held company with offices in Berlin, London, San Diego, Singapore, Seattle, and Sydney. TTM is a source code license holder for BEA TOP END® middleware. It provides Java and EJB integration products for both BEA Tuxedo and TOP END.

5.40   Vitria Technology

Vitria Technology is a leading collaboration platform and collaborative applications provider. Vitria BusinessWare integrates applications and automates mission-critical business processes within and across the extended enterprise.

Products are positioned to reduce time to market, shorten lead times, lower operating costs, and increase customer satisfaction. Vitria is a global software company.   It has 25 offices in North America plus international offices in Australia, Canada, France, Germany, Italy, Japan, Korea, United Kingdom, Singapore, Spain, Switzerland and Taiwan.

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Application Integration Company Profiles

Vitria Technology supports the use of business process management. The integration solution addresses integration challenges through collaborative applications. Vitria has 35 offices around the world. Vitria BusinessWare integrates applications and automates mission-critical business processes within and across the extended enterprise, reducing time to market, shortening lead times, lowering operating costs, and increasing customer satisfaction.

Vitria collaborative applications are targeted to financial markets, manufacturing, utilities, healthcare/insurance, and horizontal applications. The business process for manufacturing is targeted to provide demand management. Utility business process solutions relate to outage management. Healthcare/insurance issues can be addressed with BPM that helps configure HIPAA data formatting and exchange.

Synchronization is implemented as a business process to interconnect horizontal enterprise applications. Healthcare constituted 20% of Vitria orders in 2001, up from virtually 0% at the beginning of the year. 75% of Vitria's customers were Global 2000 and more than 50% of orders were repeat business.

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5.40.1   Vitria RosettaNet

Vitria participates in the RosettaNet consortium. Vitria has been a leading member of the RosettaNet consortium since it was founded in 1998. Vitria products and services are designed to help companies deploy business process management solutions. Vitria participates in RosettaNet Ready™ subscribing to the developer tools, testing kit, and software compliance badging program.

5.40.2   Vitria Web Services

Vitria leverages its RosettaNet membership to deliver supply chain integration solutions. Vitria addresses industry-specific integration challenges through collaborative applications. Collaborative applications allow Vitria to leverage industry standards and frequently seen customer problems to provide 80% of a solution as an out-of-the-box application.

The successful B2B implementations achieved by members of the RosettaNet community demonstrate the business value of a collaborative application approach to supply chain integration problems. In addition to offering a premier comprehensive RosettaNet solution, Vitria released support for the RosettaNet Basics & Express initiative, enabling companies to quickly achieve a state of "readiness" for RosettaNet production implementations using their existing systems.

5.40.3   Vitria Customers

Vitria's BusinessWare solutions for RosettaNet are in use at supply chain companies including E2open, BT, Acer Sertek, and Schneider Logistics.In the fourth quarter 2001, Vitria added 33 new customers and partners. Customers include AT&T, Bell Canada, Cardinal Health, Inc., Fujitsu Limited, Goodman Manufacturing, Humana, Inc., Kemper Insurance, Mizuho Financial Group, NTT Comware Corp., Orange Communications SA, PacifiCare Health Systems, Inc., Sprint, Suntory Limited, Toronto Hydro Corp., and US Department of Veterans Affairs.

Vitria customer base includes Bell South, The Blue Cross Blue Shield Association, BP, DaimlerChrysler Bank, Dana, Generali, The Goodyear Tire & Rubber Company, PacifiCare Health Systems, Reynolds and Reynolds, Schneider Logistics, Sprint, Trane, and Trans Union, and The United States' Departments of Defense and Veteran's Affairs.

5.40.4   Vitria Customers and Partners

Vitria strategic relationships with key partners inclued a five-year agreement with the Blue Cross and Blue Shield Association (BCBSA) under which BCBSA will promote Vitria's products to its 43 member Blue Cross and Blue Shield Plans. The BCBSA and locally operated plans collectively provide health care coverage to 81 million -- one in four -- Americans.

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Systems integrators play a significant role in generating sales leads and closing new business for Vitria. Vertical market participation depends on integrator need for industry specific healthcare and financial services expertise and domain specific integration packages. KPMG Consulting expanded the strategic alliance relationship with Vitria to jointly provide straight-through-processing (STP) solutions to the domestic and international financial services communities.

Reynolds & Reynolds currently utilizes BusinessWare® in four product/application solutions, and has many other projects planned for development over the next two years. The customer base includes American Airlines, Jefferson Pilot Financial, and Sprint.

The following Table 5-5 illustrates companies that are some of Vitria customers.

TABLE 5-5

SELECTED VITRIA CUSTOMERS

Business Services

- BrassRing Inc.
- Ceridian
- Fieldglass, Inc.
- Getty Images
- Rainmaker Systems

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TABLE 5-5 (CONTINUED)

SELECTED VITRIA CUSTOMERS

- Trans Union

- Yclip

Energy and Utilities

- BP International Ltd.

- Cal-ISO

- Enbridge

- Enmax

- Origin Energy

- Southern California Edison Company

- United Energy

- Wellogix

Financial Services

- American Century

- Conseco Finance

- DaimlerChrysler Bank

- Deutsche Bank

- Dresdner Bank AG

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TABLE 5-5   (CONTINUED)

SELECTED VITRIA CUSTOMERS

- DTC

- HOLTvalue Associates

- Kemper Technology

- Lend Lease

- Mizuho International plc

- myCFO.com

- RHB

- Union Investment

Health Products and Services

- Aventis

- BCBS Association

- Cardinal Health

- HealthNexis

- MediBuy.com

- PacifiCare Health Systems

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TABLE 5-5 (CONTINUED)

SELECTED VITRIA CUSTOMERS

Insurance

- Assicurazioni Generali SpA

- CCC Information Services

- Generali Group

- Jefferson Pilot Financial

- Manulife Financial

- XL Global Services, Inc.

Manufacturing

- 2 Wire

- 3Com

- Agile Software

- Apple Computer

- Dana Corporation

- DMC Stratex Networks

- Draka Holding N.V.

- e2open

- ECNet

- ENX Inc.

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TABLE 5-5   (CONTINUED)

SELECTED VITRIA CUSTOMERS

- Federal Express

- Fedex Logistics

- General Motors

- GetSilicon.net

- Goodman Manufacturing

- Goodyear Tire & Rubber Company

- Hub Group

- KLA-Tencor

- Rainmaker

- Reynolds and Reynolds

- Tradec

- Tradiant

- Trane

- Transora

- UMC

- World Chain

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TABLE 5-5   (CONTINUED)

SELECTED VITRIA CUSTOMERS

Media

- ec-Content

- XM Satellite Radio

Public Sector/Government

- Department of Veterans Affairs

- US Department of Defense

- Los Angeles County Sheriffs Department

Retail

- H.E. Butt Grocery Company

Software and Services

- 180 Commerce

- 7C Holdings Ltd

- Acer Inc.

- Agilera

- Bluetrain.com

- Click Commerce

- Convergys

- Danet GmbH

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TABLE 5-5   (CONTINUED)

SELECTED VITRIA CUSTOMERS

- Ejasent

- Epicentric, Inc.

- Genuity

- Jamcracker

- KT-Net

- Netcel360

- NetWorkOSS

- Nightfire

- Reynolds & Reynolds

- Transentric

- World Chain

- WorldPort

Communications

- @ Link

- 2Wire

- Accenture

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TABLE 5-5 (CONTINUED)

SELECTED VITRIA CUSTOMERS

- Allied Riser Communications

- Alltel Information Services

- Axxent Corp

- Bell Canada

- Bell Intrigna

- Bell South

- Brasil Telecom

- BroadRiver Communications

- Cablevision

- Call-Net

- Caprock Communications

- Cbeyond Communications

- Citizens Communications

- Concentric Network Corp

- CoreComm Limited

- CoreExpress

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TABLE 5-5 (CONTINUED)

SELECTED VITRIA CUSTOMERS

- Cox Communications

- Cypress Communications

- DIRECTV Latin America, LLC

- Dishnet DSL

- DMC Stratex Networks

- Edisontel

- Fareastone Telecommunications

- Fastweb SpA

- First World

- Focal Communications

- Globo Cabo

- Group Telecom

- GVT

- HarvardNet

- Intermedia

- IONEX Telecom

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TABLE 5-5   (CONTINUED)

SELECTED VITRIA CUSTOMERS

- KPN Belgium

- LDMI

- Media Sourcery, Inc.

- Mpower

- Motorola

- MVX.com

- NB Tel

- OmniSky

- Progress teleCOM

- Sigma Networks

- Singapore Telecom

- Sprint

- TDC Schweitz

- Tele Norte

- Teleglobe

- Telocity

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TABLE 5-5   (CONTINUED)

SELECTED VITRIA CUSTOMERS

- Telstra

- Terabeam

- Transact

- TXU Communications

- United Pan-European Communications NV

- US LEC Communications

- Verio

- Verizon Communications

- Viag Interkom GmbH & Co

- Western Integrated Networks

- XO Communications

- XSpedia Corporation

TABLE 5-5 (CONTINUED)

SELECTED VITRIA CUSTOMERS

Transportation

- GT Nexus, Inc.

- Schneider Logistics

- Shiplogix.com

- Trimac

Source: WinterGreen Research Inc.

5.40.5   Viitria Revenue

Vitria's business for fiscal 2001 was driven by a diverse set of vertical and geographic markets. In 2001, healthcare represented approximately 20% of total orders, financial services, energy and utilities, and manufacturing each represented between 10% and 15%, and telecommunications represented approximately 40%.

International customers from Europe, Asia, Canada and Latin America accounted for approximately one third of total orders for the year. In addition, 2001 saw strong repeat business from some of the world's largest companies. More than two thirds of the company's 2001 orders came from Global 2000 companies, and more than half came from existing customers.

Application Integration Company Profiles

Vitria license revenues for the fourth quarter of 2001 increased to $35.2 million, up 17% from $30.1 million in the third quarter of 2001 as license revenues grew to $21.0 million from $15.8 million, a 33% increase over the third quarter. For the year ended December 31, 2001, revenues were $135.0 million compared to $134.7 million for the year ended December 31, 2000.

Vitria offers business process management integration systems to selected vertical and geographic markets. The company has added a family of collaborative applications.

Vitria Technology Revenue
(in thousands)

	December 31 Three Months Ended		Twelve Months Ended	
	2001	2000	2000	2001
Revenues				
License	$ 20,952	$ 28,020	$ 77,518	$ 102,287
Service and other	14,206	12,810	57,466	32,442
Total revenues	35,158	40,830	134,984	134,729

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2001	2000	2001	2000
License	$ 15,763	$ 32,676	$ 56,566	$ 74,267
Service and other	14,324	8,935	43,260	19,632
Total revenues	30,087	41,611	99,826	93,899
License	52%	79%	57%	79%
Service and other	48%	21%	43%	21%
Total revenues	100%	100%	100%	100%

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Vitria license revenues decreased 52% to $15.8 million in the three months ended September 30, 2001 from $32.7 million in the three months ended September 30, 2000. License revenues decreased 24% to $56.6 million in the nine months ended September 30, 2001 from $74.3 million in the nine months ended September 30, 2000.

These decreases were the result of a decrease in the number of licenses and to an average transaction size on the lower end of the $500,000 to $700,000 range. The sales decline was primarily due to a deterioration in the macroeconomic climate which has resulted in a general slowdown in IT spending in vertical markets.

5.40.6   Vitria BusinessWare Product

Vitria is a leading provider of integration and collaboration solutions. The product is the BusinessWare(TM) integration server. It provides the infrastructure that enables incompatible information technology, or IT, systems to exchange information automatically, without human intervention, over corporate networks and the Internet.

This eliminates manual entry of information into multiple IT systems and eliminates the need to manually exchange information with customers and business partners. Collaborative solutions are provided for organizations in the telecommunications, manufacturing, financial services, energy, insurance and healthcare industries.

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Solutions automate mission critical business processes, integrate existing infrastructure and manage information flow between internal systems and external trading partners.

BusinessWare combines in a single solution the four elements that are essential for ebusiness infrastructure software. These are illustrated in Table 5-6.

TABLE 5-6

VITRIA EBUSINESS INFRASTRUCTURE SOFTWARE ELEMENTS

- Business Process Management (BPM): BPM provides control and coordination of business processes spanning a wide combination of systems, people and corporate boundaries. It uses graphical process models to seamlessly define, automate and manage transactions and the exchange of information between internal business applications, people and external trading partner systems.

- Business-to-Business Integration (B2Bi): B2Bi enables the secure and reliable completion of transactions and the exchange of business information between customers and partners over the Internet to support collaborative processes. B2Bi helps companies manage their value chain interactions end to end.

- Enterprise Application Integration (EAI): EAI enables secure and reliable movement of information in and out of internal business applications. By enabling internal applications to communicate with each other, EAI helps unify and improve extended enterprise processes.

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TABLE 5-6 (CONTINUED)

VITRIA EBUSINESS INFRASTRUCTURE SOFTWARE ELEMENTS

- Real-Time Analysis (RTA): RTA provides real-time monitoring and analysis of running business processes thereby enabling optimization of operational efficiency. Our two key RTA components - Process Analyzer and Business Cockpit(TM) - continuously gather working business process data, analyze and visualize it in real time, and enable process owners to proactively identify and respond to problems or opportunities as they occur.

Source: WinterGreen Research Inc.

5.41   webMethods

webMethods is a leading provider of integration software and services for automating business processes across the extended enterprise. The integration platform allows customers to achieve quantifiable return on investment by linking business processes, enterprise and legacy applications, databases and workflows for global business.

By deploying the webMethods integration platform, companies can reduce costs, create new revenue opportunities, strengthen relationships with customers, substantially increase supply chain efficiencies, and streamline internal business processes.

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webMethods is a leading provider of integration software with particular expertise in XML and adapters. The webMethods integration platform allows customers to achieve quantifiable R.O.I. by linking business processes, enterprise and legacy applications, databases and workflows both within and across enterprises.

webMethods integration platform is positioned to reduce costs, create new revenue opportunities, strengthen relationships with customers, substantially increase supply chain efficiencies, and streamline internal business processes.

5.41.1   WebMethods Customers and Strategic Partners

webMethods is headquartered in Fairfax, Va., with offices throughout the U.S., Europe and Asia Pacific. webMethods has more than 750 customers worldwide including global 2000 leaders Citibank, Dell, Eastman Chemical, The Ford Motor Company, Grainger, and Motorola.

webMethods strategic partners include Accenture, AMS, BMC, BroadVision, Cap Gemini Ernst & Young, Deloitte Consulting, EDS, Hewlett-Packard, i2 Technologies, J.D. Edwards, KPMG Consulting, Microsoft, Oracle Corp., SAP AG and Siebel Systems.

Early adopters of webMethods Web services include Dun and Bradstreet and FedEx. These companies are using the integration platform to extend business processes to trading partners over the Internet.

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WebMethods Revenue
 (in thousands)
September 30

	Three Months Ended		Six Months Ended	
	2001	2000	2001	2000
License	$ 21,742	$ 32,424	$ 58,546	$ 56,410
Professional services	9,401	8,441	19,092	16,184
Maintenance	9,594	4,873	18,496	8,209
Total revenue	**40,737**	**45,738**	**96,134**	**80,803**

License revenue increased by approximately $2.1 million, or 3.8%, to $58.5 million for the six months ended September 30, 2001 from $56.4 million for the six months ended September 30, 2000. During the three-month period ending September 30, 2001, total license revenue decreased $10.7 million, or 32.9%, to $21.7 million from $32.4 million for the three-month period ending September 30, 2000.

License revenue as a percentage of total revenue was 60.9% and 69.8% for the six months ending September 30, 2001 and 2000. License revenue as a percentage of total revenue was 53.4% and 70.9% for the quarters ended September 30, 2001 and 2000, respectively.

The increase in license revenue for the six months ended September 30, 2001 compared to the six months ended September 30, 2000, was due to increased demand for products in the three months ended June 30, 2001 over the same period in the prior year.

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Application Integration Company Profiles

The decrease in license revenue for the quarter ended September 30, 2001 compared to the quarter ended September 30, 2000 was primarily attributable to a global economic slowdown, extended sales cycles to prospective customers and a reduction in information technology spending by our customers and prospects.

WebMethods Regional Revenue

(in thousands)
September 30

	Three Months Ended		Six Months Ended	
	2001	2000	2001	2000
North America	$ 29,946	$ 43,488	$ 70,312	$ 77,305
Europe	7,007	2,139	17,817	3,387
Asia Pacific	3,784	111	8,005	111
Total	$ 40,737	$ 45,738	$ 96,134	$ 80,803

During the second quarter of fiscal 2002, the Company recorded a restructuring charge of $7.2 million, consisting of $2.5 million for headcount reductions, $4.0 million for consolidation of facilities, and $700,000 of other related restructuring charges. These restructuring charges were taken to align the Company's cost structure with changing market conditions.

The restructuring plan resulted in headcount reduction of approximately 150 employees or 15% of the workforce. WebMethods reduced the number of facilities by closing excess field offices and consolidating several California facilities into two locations.

5.41.2   webMethods Workflow

webMethods workflow produces process-based workflows without coding. Integration software automates the most critical business processes. Many of these processes require integral human involvement, whether for review, approval, data validation, or to handle processing exceptions. A complete business process management solution seamlessly incorporates these human interactions into the end-to-end process flows.

WebMethods Workflow is built into its integration platform. webMethods workflow capabilities enable non-programmers to model, prototype, and deploy sophisticated human workflows within a business process.

Workflow is fundamentally an integration problem. People cannot make accurate decisions within a business process without the relevant data contained in back-end systems. By incorporating workflow as native functionality within the webMethods integration platform, webMethods has positioned to optimize the integration of people into business processes and underlying resources, providing businesses with the functionality for complete business process management.

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webMethods enables dynamic routing and task delegation, role-based organizational hierarchies and rules processing, multi-level authorizations, automatic changes to task priorities, sophisticated security policies, time-based events, absence conditions, and priorities.

Non-technical business analysts manage the complete lifecycle of a business process that includes sophisticated workflow steps - from definition to execution to monitoring. Role-based, end-user interfaces can be browser or Java-based. They are built dynamically from workflow definitions.

The graphical interface capability allows businesses to have real-time visibility into every system connected into the integration backbone. Views of the enterprise can be dynamically tailored to a user's role and made available from anywhere on the network.

5.42   WebEx Communications

WebEx Communications offers Internet infrastructure for real-time business communications. WebEx provides Web-based carrier-class communication services using its multimedia-switching platform deployed over a global network.

WebEx services enable end-users to share presentations, documents, applications, voice, and video spontaneously in a seamless environment. WebEx services are used across the enterprise in sales, support, training, marketing, engineering, and various other functions.

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Modular framework and standards-based APIs are provided. WebEx real-time communications platform is similar to dial-tone for meetings on the Web.

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