



Patricia Seybold Group

E-Business Consultants & Thought Leaders

How to Succeed @ e-business

IBM's Prescription for Comprehensive and Scalable E-commerce

*By Mitchell I. Kramer
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Prepared for IBM

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How to Succeed @ e-business

IBM's Prescription for Comprehensive and Scalable E-commerce

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Netting It Out

Electronic business (e-business) on the Internet has become a requirement for business entities of all sizes and in every industry segment. The potential for increased sales, improved customer satisfaction, and reduced marketing and sales costs are the key business drivers.

e-business systems are complex, large-scale systems with demanding requirements for performance, scalability, and availability. Success at e-business requires far more than a Web server, a storefront and transaction processor, or a database. Success at e-business requires a comprehensive and formal systems approach.

IBM believes that there are many factors that must be addressed for success at e-business. These success factors map exactly to the framework that we at Patricia Seybold Group developed for evaluating and comparing e-business systems. Integrating the two approaches, we've developed a prescription for "How to Succeed @ e-business." Within this prescription, we've found that functionality, integration, and scalability are the most important success factors. What makes them most critical are their ability to differentiate alternative products and technological approaches and the risks associated with "getting them right."

IBM fills the prescription for "How to Succeed @ e-business" extremely well, especially for the most significant success factors. The functionality of its WebSphere Commerce Suite e-commerce offering is comparable to that for any product at any price on the market today. IBM's connector technology greatly simplifies the effort to integrate business systems and the back-office systems that support them. And IBM is pioneering best practices in scalability, addressing requirements to support tens of millions of hits and millions of transactions per day.

In addition to these key differentiators of functionality, integration, and scalability, IBM also provides the consulting services to organize e-business resources into coherent e-business systems and the hardware, infrastructure, and administrative systems to support those e-business systems. IBM delivers comprehensive solutions for e-business implementations.

A Prescription for Success

A Prescription for Success in e-business

This white paper offers an approach to simplify e-business system selection. First, it presents a framework that has been used effectively to evaluate and compare e-business products, reducing the time, cost, and risk in making e-business selection decisions. Next, it describes and evaluates IBM's e-business offerings against three of the most important elements in that framework: functionality, integration, and scalability. Taken together, the three make up a prescription for how to succeed at e-business.

IBM fills this prescription as well as any e-business vendor. Its e-commerce functionality has improved to the point where it has become comparable to that of any of the e-commerce server boutiques. For integration, the company has developed integration technologies designed to make a company's new online channel work seamlessly with more traditional marketing, sales, and service channels. And it has enlisted partners to leverage these technologies to broaden the reach of integration. For scalability, IBM has massed its experience and expertise in distributed, online systems and has begun to apply them to e-business systems, pioneering best practices in e-business scalability.

IBM's Framework for Success

Because electronic business systems are complex, large-scale, mission-critical, operational systems, IBM believes that there are many factors that must be addressed for companies to be successful at e-businesses. The following critical success factors are IBM's prescription for success at e-business:

- Web applications
- Business systems
- Component-based tools
- End-to-end management
- Security
- Proven deployment architecture
- Reliability, availability, serviceability
- Connector technology
- Scalability
- Solution services

The key point here is that success at e-business requires far more than simply a Web server, a storefront and transaction processor, or a database. Success at e-business requires a systems approach. It starts with new Web technologies and e-commerce functionality and combines them with the design, development, implementation, and management disciplines and practices that have been widely proven for other types of large-scale, complex, mission-critical systems.

Patricia Seybold Group's Framework for Success

The success factors of IBM's prescription for "what it really takes to run an e-business" map exactly to the framework that we at Patricia Seybold Group developed for evaluating and comparing e-commerce systems. We don't think that

this is a coincidence. In fact, it's one of the major reasons that we're writing this white paper. Our framework was developed through our consulting experience with organizations that have implemented e-commerce systems and through our long-time analysis of this space from the perspectives of both business and technology. Our framework has four elements:

- Functionality
- Administration
- Architecture
- Product marketing

Our in-depth research report, "A Comparison of the Leading Electronic Commerce Servers," presents a technology view. *Customers.com*, Patty Seybold's book published in November 1998, presents the business-level view. The frameworks map to each other exactly. Both reflect the requirements of the companies that have implemented production level e-commerce systems, and both reflect the experience and expertise of two organizations that have a strategic focus on e-business.

A Synthesized Framework

Our framework has fewer but higher-level elements than IBM's framework, allowing IBM's framework to fit quite nicely within ours and forming a hierarchical structure. We'll discuss and analyze IBM's approach within ours, concentrating our analysis in the areas in which IBM delivers the most value. Table 1 shows the synthesized framework for success in e-business.

A Synthesized Framework		
IBM	Patricia Seybold Group	Synthesized Framework
Web applications	Functionality	E-commerce functionality
Business systems	Administration	<ul style="list-style-type: none"> • Web applications • Business systems • Component-based tools
Component-based tools	Architecture	Management and administration
End-to-end management	Product marketing	<ul style="list-style-type: none"> • End-to-end management • Security
Security		Architecture
Proven deployment architecture		<ul style="list-style-type: none"> • Proven deployment architecture • Reliability, availability, serviceability • Connector technology • Scalability
Reliability, availability, serviceability		
Connector technology		
Scalability		
Solution services		

Table 1. The IBM framework, the Patricia Seybold Group framework, and a synthesized framework created by combining the two.

Services are critical to all aspects of successful e-business implementations. However, solution services have not been included in this synthesized framework because this element doesn't fit well within the hierarchy; solution services apply to every level of the hierarchy, not at any single level.

Also, one element of the Patricia Seybold Group's framework has not been included: product marketing. This element focuses on the viability of the e-business solution and of the company providing it. We don't feel that there are any viability issues regarding IBM's e-business offerings or about the company itself. Therefore this report will not include a discussion of product marketing.

Differentiation and Risk

While we believe that all the elements of the synthesized framework are success factors for e-business systems, our experience has shown that some are more critical than others. What makes them more critical is their ability to differentiate alternative products and technologies and the risks associated with getting them right.

For example, under the high-level element functionality, the business systems success factor doesn't differentiate and doesn't carry a high level of risk. Business systems are the applications, such as inventory control and order management, that support e-business applications. In all companies except the newest dotcoms, these business systems most likely already exist to support non-online channels for marketing, sales, and service. Companies have already made investments in these systems. Their functionality, administration, and architecture have already been implemented.

On the other hand, connector technology (one of the three success factors within architecture) can yield significant differentiation, and there's a very high risk in getting connector technology right. Connector technology integrates the Web applications that implement e-business with the business systems that provide supporting functionality. This integration is the most complex and difficult aspect of implementing e-business systems. There are a broad range of approaches to integration and a variety of technologies and products that reflect those approaches. The alternatives differ in complexity, cost, effort, and expertise required for implementation and time for implementation. Getting it right in integration carries a very high level of risk. The right approach to integration can make e-business systems more responsive and more consistent across all business channels. Getting it right can shorten the implementation time and cost for e-business systems. Most significantly, getting it right can affect customer loyalty and satisfaction.

The Most Significant Success Factors

The examples of business systems and connector technology prove the point that some success factors are more critical than others. Our experience in working with and analyzing organizations that are implementing e-business systems consistently show three success factors to be the most significant:

- **E-COMMERCE FUNCTIONALITY.** E-commerce functionality is the set of marketing, shopping, buying, fulfillment, and customer service capabilities packaged by an e-commerce product. We call these products e-commerce servers.
- **INTEGRATION.** Integration, or connector technology in IBM's terminology, is the set of technologies, products, and services that integrate the Web applications that implement e-commerce business processes with the business systems that support them.

- **SCALABILITY.** Scalability is the ability of an e-business system to respond to increasing workloads while maintaining acceptable levels of performance. As more and more business gets done on the Web, e-business must scale to ensure customer satisfaction and loyalty.

The risks and differentiators of these most significant success factors are listed in Table 2. The following sections of this white paper examine each of them. In each section we discuss the “prescription” for each in detail and analyze how IBM’s offerings fill that prescription.

Risks and Differentiators		
Success Factor	Risks	Differentiators
Functionality	Time to implement Cost to implement Cost of ownership	Comprehensiveness of packaged capabilities ISV extensions B-to-B and B-to-C coverage
Integration	360-degree view of the customer Business channel consistency Time/cost to implement	Transparency and flexibility Packaged capabilities ISV extensions
Scalability	Customer satisfaction and loyalty e-business growth e-business viability	Breadth/depth of scalability experience/expertise Systems perspective Platform and distributed processing support

Table 2. The top risks and differentiators of the three most significant success factors involved in the implementation of e-business systems.

E-commerce Functionality

Prescription

What Do E-commerce Systems Do?

Web applications implement the functions of electronic commerce: the customer touching marketing, shopping, ordering, fulfillment, and customer service business processes for B-to-B and B-to-C applications. These business processes are listed and described in Table 3 and shown in Illustration 1.

Business-to-Consumer

Business-to-consumer (B-to-C) electronic commerce is online retailing or e-tailing. It involves consumers shopping for and buying personal and household products. It involves merchants using electronic marketing and merchandising techniques to attract and retain customers as well as to promote products and services to them.

Business-to-Business

Business-to-business (B-to-B) electronic commerce covers a broad range of business activities. For example, B-to-B systems exchange business documents, such as purchase orders and invoices, between pairs of partners in a supply chain. They may implement a virtual marketplace (e-marketplaces or exchanges), wherein a single large manufacturer can consolidate the purchase of the goods that are the input to its manufacturing process from many smaller companies. Such a marketplace may enable a large retailer to purchase the goods that it sells in its stores. Or, marketplaces can become trading marts or exchanges for commodity products or the range of products of a given type or associated with a particular industry segment. B-to-B systems also automate the purchase of goods that support businesses' maintenance, repair, and operation (MRO).

The Prescription for e-business Functionality	
Business Process	Description
Marketing	The objectives for marketing in e-business systems are the same as they are for other channels: acquire new customers, retain existing customers, promote products, cross-sell products, and up-sell products. Customer acquisition and retention are customer relationship management activities. Promoting, cross-selling, and up-selling are merchandising activities. An e-commerce system, especially a B-to-C system, should implement or integrate CRM capabilities. It should package rich and flexible merchandising capabilities for both B-to-B and B-to-C.
Shopping	The objective of the shopping process is to help the shopper find products to buy. Typically, this means browsing and searching a catalog. Catalogs should support flexible hierarchies of categories and subcategories. Both B-to-B and B-to-C applications should offer a range of methods for navigating catalogs and finding products. B-to-B applications should support the ability to create catalogs for each customer account or each customer contract. In addition, product information should be rich in structure and content.
Ordering	In the course of the shopping process, after shoppers or customers find the products that they'd like to buy, they order these products. Ordering steps consist of the collection of billing and shipping information, allocation of inventory, calculation of prices, calculation of taxes, calculation of shipping and handling charges, determination of payment method, authorization of payment, generation of orders, and acknowledgement of orders. E-commerce systems should perform all these steps. B-to-C systems should support credit and debit card payment. B-to-B systems must support purchase order payment.
Fulfillment	The fulfillment process settles payment, takes the orders generated as output of the ordering process, and manages the orders through the steps of picking, packing, shipping, and delivery. e-business systems don't actually perform these steps. Typically, both B-to-B and B-to-C systems integrate external fulfillment systems to perform them while keeping track of order status.
Customer service	The customer service process comprises the activities that occur after an order is generated. Within e-business systems, these activities include checking on order status, inquiring about order histories, and returning goods. e-business systems should support these activities through customer self-service.

Table 3. The business processes involved in electronic commerce and the functionality that should be implemented by e-business systems.

Comprehensive Functionality Is the Key

Whether a system implements B-to-B or B-to-C e-commerce, comprehensive functionality is the key to filling this prescription. The broader and deeper the capabilities that a product offers out of the box, the better it fills the functionality prescription. Comprehensive functionality reduces the need for custom code. Less custom code means shorter and less costly implementations and simpler and less costly maintenance. B-to-B and B-to-C applications have similar but differing functionality requirements. A great B-to-B e-commerce system may be just as good for B-to-C applications.

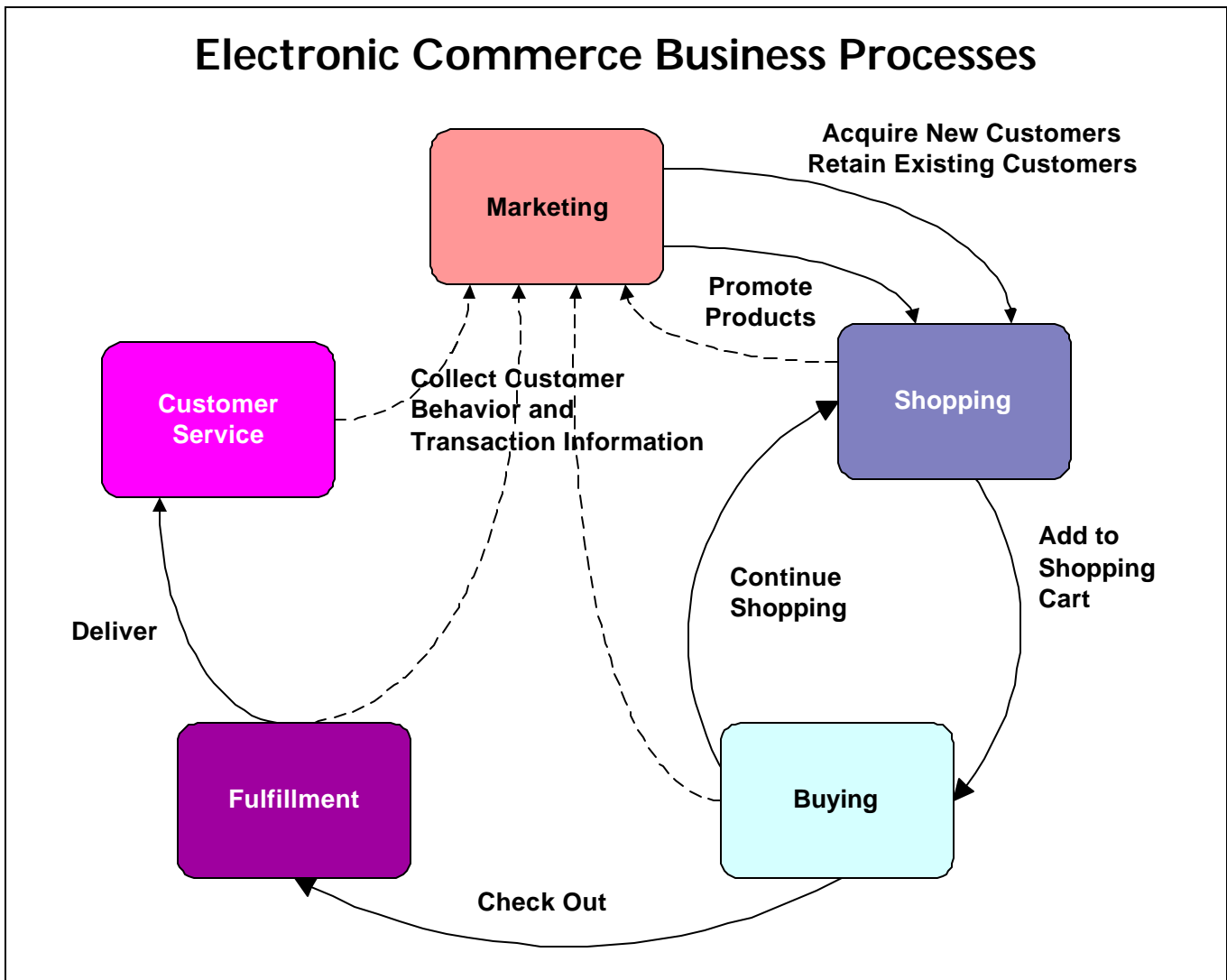


Illustration 1. E-commerce business processes and the events that integrate them.

How IBM Fills the Prescription for Functionality

Strong and Improved e-business Functionality

IBM fills the prescription for e-business functionality with its WebSphere Commerce Suite. This product is IBM's Web application. Formerly called Net.Commerce, this offering was originally introduced in November 1996 and is now in its fourth major version. It's among the most widely implemented Web applications in the industry. As of January 2000, IBM claimed that it had sold more than 4,500 enterprise licenses of WebSphere Commerce Suite and its Net.Commerce predecessor.

WebSphere Commerce Suite has evolved significantly across its four versions. It now provides rich and flexible electronic commerce functionality for both B-to-B and B-to-C applications, but especially for B-to-C applications. Shopping capabilities have always been strong. They really differentiate WebSphere Commerce Suite from other

approaches. In addition, the current version dramatically improves marketing and ordering capabilities.

Significant Differentiation and Price Performance

WebSphere Commerce Suite is a real price performer. On the one hand, the product delivers better value through richer functionality and e-business components (e.g., the DB2 relational database, LDAP directory, and integrated Web application server) among comparably priced products, such as Microsoft Site Server Commerce Edition and Oracle iStore. On the other hand, WebSphere Commerce Suite delivers better value through lower prices compared with such higher priced products as BroadVision One-To-One Commerce and Intershop infinity, products that are priced from three to five times higher than WebSphere Commerce Suite. While we expect both pricing and functionality changes among these vendors, today WebSphere delivers the most for the money.

Improved Marketing

Within marketing, the new features of WebSphere Commerce Suite Version 4.1 improve customer relationship management and merchandising capabilities. The most significant new features are an integrated personalization framework and a richer product structure. The specifics are:

- **PERSONALIZATION FRAMEWORK.** WebSphere Commerce Suite packages a rules-based personalization framework. The framework includes a powerful and flexible rules processor that can evaluate rule sets via inferencing as well as the performing of rule-at-a-time evaluation of simpler declarative rules.
- **PRODUCT STRUCTURE.** The product data structure of WebSphere Commerce Suite has improved considerably. This structure includes an arbitrary number of attributes and a set of product templates (for display). In addition, product prices may be specified for each shopping group defined for a site. New in version 4.1, the product structure also includes associations, through which cross-sells and up-sells may be specified. Also new in version 4.1, products may be grouped into bundles and packages. A bundle is a group of products with an associated quantity that are combined together for merchandising or convenience. All products must be ordered separately. Packages are made up of items that may or may not be sold separately. A package is an orderable unit that cannot be broken up. These are features that add significant functionality and can shorten implementation time by reducing the requirement for customization.

BroadVision One-To-One Commerce has been the e-commerce leader in personalization. This product has always packaged the tools for building rules and rule sets that are executed at runtime whenever content is to be selected, creating a personalized experience for markets of one. IBM's personalization framework, while new, offers advantages over BroadVision's approach. First, the rules and the rules engine are more powerful, supporting more flexible and powerful rule specifications and rule evaluation. Second, IBM packages a rule set for product recommendations that can be reused or can serve as an example.

The rich, new product structure is also a differentiator. While newer e-commerce products—such as InterWorld Commerce Exchange—also provide rich product structures, older products—such as Microsoft Site Server Commerce Edition and Oracle iStore—do not. These products require customization to provide comparable capabilities.

Ordering

WebSphere Commerce Suite Version 4.1 adds four advanced ordering methods:

- **QUICK ORDER.** Customers and registered shoppers can click on a “Quick Order” button on catalog and/or product pages and be transferred to an order confirmation page or, knowing the SKU for the product(s) that they want to buy, they can go from any page directly to an order form.
- **MULTIPLE LISTS.** Multiple Lists is a feature (especially attractive in B-to-B applications) that enables purchasing agents to create, store, and access shopping lists of the products that they purchase regularly and frequently. Multiple Lists can also be useful in B-to-C applications such as grocery ordering.
- **REORDER.** Reorder enables shoppers and customers to reuse previously completed orders to purchase the same sets of products repeatedly.
- **SCHEDULED ORDERS.** Scheduled Orders is a feature especially well suited to B-to-B applications that lets purchasing agents set up and automatically process frequent repeat orders.

There’s not much room for differentiation within the ordering process. Processing is straightforward. Business tasks are pretty much the same for all companies. In fact, most competing e-commerce server products offer capabilities analogous to Quick Order, Multiple Lists, and Reorder. For the most part, these new ordering features close the gap between WebSphere Commerce Suite and alternative approaches. Scheduled Orders, however, is a differentiator. It’s a useful capability that is not packaged by most e-commerce servers, including BroadVision One-To-One Commerce, Microsoft Site Server Commerce Edition, and Oracle iStore.

Shopping

WebSphere Commerce Suite provides exceptionally strong shopping capabilities. Shopping is a key strength of Commerce Suite that differentiates the product from most competing approaches. Innovative shopping methods and the new, rich catalog and product structure are the key differentiators.

SHOPPING METHODS. Shopping methods include helping shoppers find products by the common browsing, parametric search, and full-text search approaches. They also include the advanced and innovative capabilities of Product Advisor, a powerful shopping feature of the Pro Edition of WebSphere Commerce Suite which provides three innovative shopping metaphors:


- **PRODUCT EXPLORATION.** The Product Exploration metaphor supports shopping by product features. This aids shoppers who are familiar with the

features and feature values for the category of products that they want to buy. Product Advisor displays the products that have those features and feature values.


- **PRODUCT COMPARISON.** The Product Comparison metaphor enables shoppers to compare similar products based on their features. It displays related products side by side, allowing shoppers to identify the similarities and differences between them. Product comparisons can be made at any time or as a next step from either the Product Exploration or Sales Assistance metaphors.
- **SALES ASSISTANCE.** The Sales Assistance metaphor is targeted at shoppers who need considerable sales help to determine what product they want to buy. The metaphor follows a predefined and automated decision tree of questions and answers that is similar to a telemarketing script. Illustration 2 shows an example of a Sales Assistance display question-and-answer set.

Sales Assistance Metaphor

18
Products




Product
Comparison



Product
Exploration

Sales Assistance - Thinkpads



Will you keep a lot of programs and images on the computer?

- [Yes.](#)
- [No.](#)

Question & Answer History

[How will you use the computer?](#)

- *I write programs and create some graphics.*

[What are you looking for in a computer?](#)

- *Power and performance.*

Illustration 2. The Sales Assistance metaphor of Product Advisor leads shoppers through a series of questions and answers that result in selection of the best product for their needs.

BUILT-IN AUCTION SUPPORT. New in Version 4.1, merchants can offer shoppers their products through three types of auctions:

- **OPEN CRY.** Open-cry auctions have bidder names and bids that are published during the auction. Prices for products and services start low and are bid up.
- **SEALED BID.** Sealed-bid auctions have bidder names and bids that are confidential to bidders but are viewable by seller.
- **DUTCH.** Dutch auctions have published bidder name and bids. Prices for products and services start high and are bid down.

The product packages samples to help marketers implement these advanced shopping methods. Auctions can support B-to-B e-commerce applications very well. For example, the responses to RFPs (requests for proposals) of formal procurements are nicely implemented by sealed-bid auctions. An e-commerce implementation enables more companies to bid on RFPs more easily. More bids means potentially better solutions for RFP issuers.

Among competing e-commerce servers, product search and product comparison features are quite common. BroadVision One-To-One Commerce and Oracle iStore both have them, for example. However, the Sales Assistance metaphor of Product Advisor and the new, packaged auction capabilities are WebSphere Commerce Suite's key differentiators. No other product offers anything comparable to the Sales Assistant. And packaged auction capabilities have been promised, but not yet delivered.

WebSphere Commerce Suite Tools

WebSphere Commerce Studio is a large and comprehensive array of tools that IBM packages with WebSphere Commerce Suite. These tools provide all the capabilities required for the personnel involved in an e-business site—administrative, technical, business, and creative—to perform all the tasks required for the design, development, deployment, and maintenance of all the site's resources. The tools are:

- **Page Designer**, used to create and maintain the Web pages of an e-business system
- **Applet Designer**, used to create and manage Java Applets
- **IBM HotMedia**, used to add media (such as streaming audio, 360-degree views, or zoomable, multiresolution images) to Web pages
- **IBM PerfectPhoto**, used by creative staff to enhance and manipulate digital images
- **Store Creator & Editor**, used by administrators for creating and editing store
- **Business Rules Advisor**, used by business managers and marketers to specify the rules by which an e-business system is personalized
- **VisualAge for Java**, an integrated development environment for creating Web-enabled enterprise applications

The first four tools listed are for creative and technical development personnel. They handle the overall structure of both HTML and JSP (Java Server Pages) Web pages as well as the multimedia and program logic that the pages contain.

The other tools are used by administrative, management, and marketing personnel for the creation and management of a site's e-business resources (i.e., its store(s), the store's products, customers, and orders, and its customer relationship management and merchandising). In addition to these WebSphere Studio Extensions, WebSphere Commerce Suite Professional Developer also packages a tool called Catalog Architect. Administrators and business managers use Catalog Architect to organize and manage catalog and product information.

WebSphere Commerce Suite also packages a set of tools for systems administrators to do performance monitoring and tuning, workload management and balancing, application/content staging and testing, and caching and file management.

TOOLS STRENGTHEN IBM'S e-business OFFERING. IBM's approach to tools strengthens the WebSphere Commerce Suite offering. The tool sets are comprehensive in their breadth and depth. There's no need to purchase and implement additional tools and integrate them into the e-business environment. For example, competing approaches (like BroadVision One-To-One Commerce) do not package capabilities such as those found in WebSphere Studio. Also, the tool sets are appropriate for the skills of the types of personnel that use them. Sites don't need to involve their most skilled technical staff to perform nontechnical tasks, thus making e-business systems less costly and faster to create and maintain. For example, business managers will have no difficulty using the Business Rules Advisor to specify the business rules for defining and targeting promotions.

ISVs Add Functionality

IBM has established partnerships with ISVs. These partnerships have resulted in extending the functionality of WebSphere Commerce Suite through the integration of ISV products. For example, just in the area of content management, IBM has established these partnerships:

- Vality offers the Integrity Data Re-engineering Environment, a product suite for the preparation and compilation of unstructured product information in heterogeneous legacy databases by matching, cleaning, and standardizing data.
- Desknet's Automated Publishing Systems (APS) product transforms and imports product information from multiple sources, including Quark Xpress.
- OnDisplay's CenterStage eContent product exports content from the WebSphere Commerce Suite catalog to aggregate content in batch or real time for vertical portals and supply chains.
- Interwoven's TeamSite product provides comprehensive management, development, testing, and deployment of Web site and catalog content. It's

designed for large, complex sites with multiple technical and nontechnical teams working in parallel.

- Versifi's v-Business Manager product converts documents into HTML and manages the flow of text, graphics, ads, and other content into appropriate catalog and Web site templates at a scheduled release date or in real time.

IBM's ISV partnerships are not unique among e-commerce server vendors. Most competitors also have partnerships with taxation software, logistics, payment, personalization, and content management vendors. What differentiates IBM is the number of ISV partners, the tightness of their integration with WebSphere Commerce Suite, and the breadth of additional functionality that their products provide. Only Microsoft approaches IBM in this area.

Integration

Prescription

Integration with External Applications

e-business systems implement the Web channel for an organization's marketing and business transaction processes. They must integrate with the business systems that implement a company's market, sales, and service business processes for its other channels. These business systems provide the back-office support for these online customer touchpoints. It's critical that business systems present a single, unified view of customer, product, and order information. As a result, it's critical that Web applications leverage and integrate existing systems for marketing, customer management, inventory, and order management. Illustration 3 shows, for each business process of an e-business system, the back-office systems with which it might integrate.

Considerable additional work is required to achieve that integration. In fact, integration requires connectivity, communication, data exchange, and business process synchronization for both the electronic commerce system and the external application. Integration is collaboration between applications. It's always complex and difficult to accomplish. We've said before that it's the hard task in implementing an electronic commerce system.

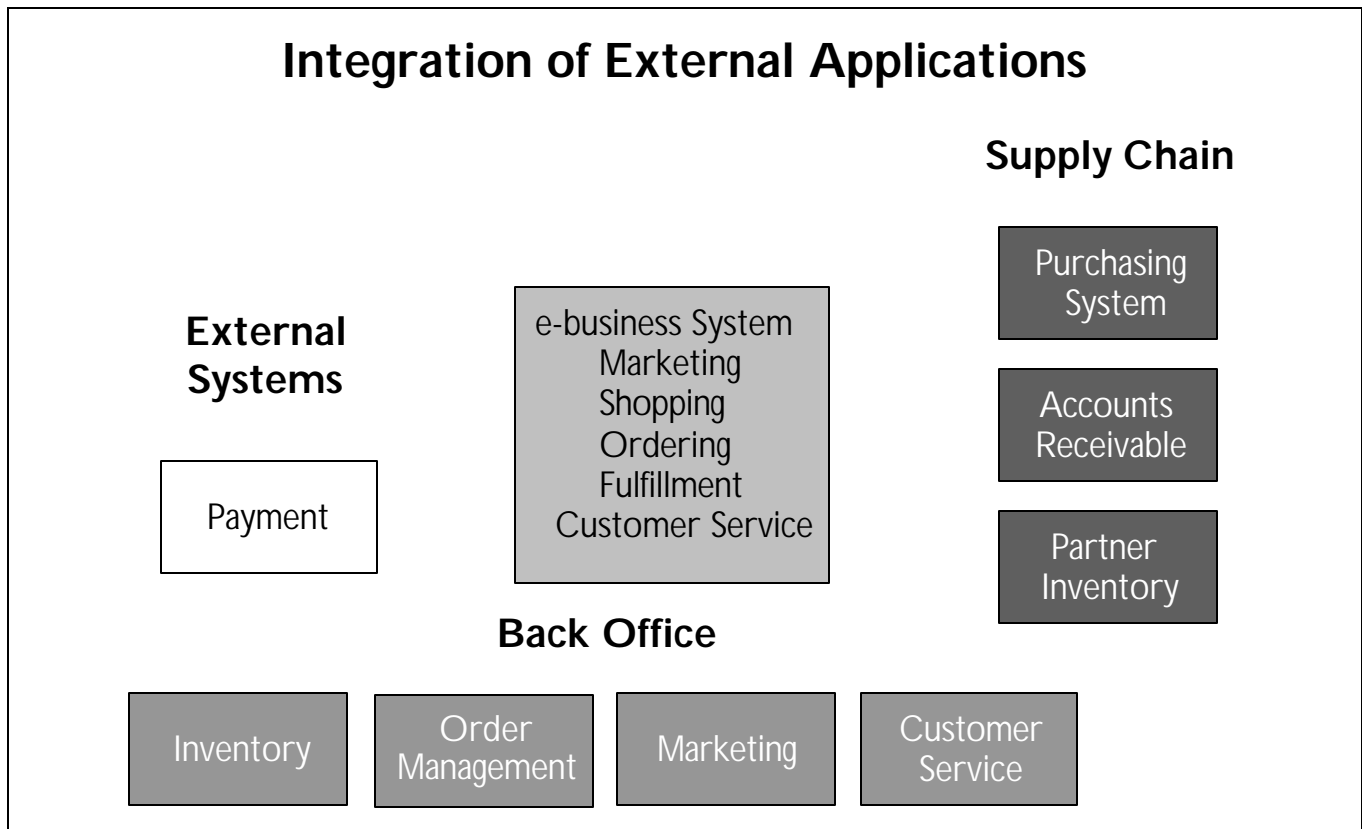


Illustration 3. e-business systems must integrate with external applications to provide supporting functionality and to organize all of a company's marketing, sales, and service channels. This illustration shows the external applications that integrate with the business processes of e-business systems.

Requirements

There are two key requirements for filling the prescription for integration:

- **TRANSPARENCY.** Ideally, integration requires no modifications to either the e-commerce system or the external system. That is, the integration approach leverages the systems' existing interfaces.
- **FLEXIBILITY.** E-commerce systems communicate with external systems in any of several ways, including real-time, transactional, synchronous, asynchronous, file transfer-based, and message-based communication. For example, checking on inventory may require high-performance, real-time, synchronous communication, while the insertion of orders into an external order management system can be handled through asynchronous communication using program-to-program messaging or even file transfer. The integration approach should support as many of these communication characteristics as possible.

How IBM Fills the Prescription for Integration

Connector Technology

IBM calls its facilities that enable the integration of e-business systems with external applications connector technology. WebSphere Commerce Suite implements the company's connector technology as does a WebSphere Commerce Suite add-on product called Commerce Integrator. The integration approach is not simply a set of APIs (some competing electronic commerce vendors think APIs are all you need for integration). Rather, connector technology is better described as a set of integration kits. These kits include the code (appropriate commands, tasks, and overrideable functions) that must be added to WebSphere Commerce Suite, the data structures that must be added to its database, and the step-by-step instructions for the tasks required to accomplish integration.

IBM fills the prescription for integration extremely well. Transparency is achieved by using the published interfaces of external applications and by building integration into the structure of WebSphere Commerce Suite through APIs, database tables, and process architecture. In addition, options for synchronous and asynchronous communication are offered, as well as those for transactional communication.

Competition

Among competing products, we've seen a range of integration approaches among e-commerce servers and other e-business systems. The best approaches bundle and integrate enterprise application integration (EAI) products that package integration between the e-commerce products and a set of external applications, as implemented by specific ISVs. InterWorld Commerce Exchange takes this approach by OEM-ing the ActiveWorks EAI product from Active Software and packaging it as a set of adapters to integrate packaged external software. Others, such as BroadVision One-To-One Commerce and Microsoft Site Server Commerce Edition, simply publish a set of APIs and leave it to their customers to purchase integration technology and products and the consulting services to implement them. Remember that the purchase and implementation of EAI products can add at least \$200,000 to the cost of e-business implementation. And also, integration is the most difficult and complex task in e-business implementation.

WebSphere Commerce Suite bundles transparent and flexible integration capabilities. Additional integration can be accomplished with the Commerce Integrator add-on product. It's the best approach to integration that we've seen. The following paragraphs take a closer look at IBM's connector technology.

WebSphere Commerce Suite Integration

WebSphere Commerce Suite packages such integration kits for:

- CICS
- IMS
- MQSeries
- EDI
- SAP R/3

This integration approach delivers excellent value. These interfaces address integration requirements for marketing, sales, service, or supply chain applications for both B-to-B and B-to-C applications. They're transparent both to WebSphere Commerce Suite and to the external applications. They're flexible enough to support synchronous, asynchronous, transactional, and message based communication. They're bundled with WebSphere Commerce Suite Pro Edition. So, they don't increase the cost of e-business implementation. As a result, WebSphere Commerce Suite can integrate more easily with more types of external systems than any other e-commerce system that we've reviewed. Table 4 describes WebSphere Commerce Suite's integration kits in more detail.

WebSphere Commerce Suite Integration	
Target Environment	Description
CICS	WebSphere Commerce Suite provides sample code that developers can modify to implement WebSphere Commerce Suite as a front end to CICS systems. Packaged sample code uses the WebSphere Commerce Suite Demo Mall sample and the CICS sample transaction called MENU.
IMS	The approach to Information Management System (IMS) integration is similar to CICS integration. It's a sample that uses the WebSphere Commerce Suite Demo Mall and takes advantage of an application that can be found in every IMS system called the telephone directory transaction.
MQSeries	The MQSeries Adapter offers excellent integration potential. On the WebSphere Commerce Suite side of the integration interface, its implementation is an administrative configuration task. The Adapter packages a set of predefined messages, each to perform a different integration task. And—new in the current version of the product—these messages may be implemented in XML. Packaged messages are order create, order status update, product quantity update, new customer, customer update, and product price update. On the external system side, development is required but message format, structure, and content are predefined. Several ISVs have done this development for their packaged software products, including NEON, JDA, SSA, Lawson, J.D. Edwards, and IMI.
EDI	Commerce Suite's EDI support automates the generation and transfer of EDI 850-compliant purchase orders from trading partners on a WebSphere Commerce Suite system. This EDI implementation requires that both trading partners use the facilities of IBM Global Service (IGS) as their value-added network for purchase order transfer. Implementation of EDI integration is easy; it's a set of configuration tasks. No programming is required.
SAP R/3	WebSphere Commerce Suite supports real-time, synchronous integration with SAP R/3. The integration approach is to transform WebSphere Commerce Suite into a Web-based shopping/purchasing and ordering front end for SAP/R3 applications. In other words, WebSphere Commerce Suite becomes a real-time Internet channel for SAP R/3-based sales and ordering.

Table 4. This table discusses the interfaces of IBM's Commerce Integrator product and their approaches to integration of e-business systems with external business systems.

ISV Integration

Commerce Integrator extends Commerce Suite's integration through a set of development tools that support both packaged and custom systems. Many ISVs have made their packaged software products integratable with WebSphere Commerce Suite through Commerce Integrator's tools. ISVs that have integrated their packaged software with WebSphere Commerce Suite include:

- JBA International System 21
- JDA Merchandise Management Systems (MMS)
- JD Edwards OneWorld, World
- Lawson INSIGHT
- System Software Associates eBPCS

The integration approach through Commerce Integrator takes the same approach as Commerce Suite—integration through configuration, not coding. The ISVs have done the hard work. And IBM is working with ISVs to extend this list.

Scalability

Prescription

Revolutionary Growth

e-business is growing explosively. For B-to-C applications the first sign of real growth was the Christmas selling season of 1998. At that time, the potential for online retailing became a reality, as several billion dollars in sales were transacted on the Web. For the Christmas 1999 season, online business volumes increased by two orders of magnitude and e-tailers began to compete effectively for the business that had been owned by bricks-and-mortar retailers.

For B-to-B applications Web-based e-business gives even the smallest companies the potential for automating their supply chains, improving their relationships with the largest companies, and participating in online marketplaces. The potential for B-to-B e-commerce is acknowledged to be even larger than that for B-to-C, approaching tens of trillions of dollars within the next several years. Unfortunately, B-to-B adoption has lagged due to the lack of suitable products.

For Web-based information systems, sites built for sporting events (such as the 1998 Nagano Winter Olympics and the 1999 Wimbledon tennis tournament) have demonstrated the voracious appetites of tens of millions of fans for up-to-the-minute, online information. These fanatics are too impatient to wait for tomorrow's newspaper or this evening's broadcast news.

We think that e-business growth will continue to grow explosively for some time. In many ways, e-business is revolutionary. Its impact on the late 20th century and early 21st century will be as great as the industrial revolution was to the late 19th century and early 20th century. e-business is changing our society.

e-business Systems Must Scale

Even if the grand predictions don't come true and growth continues even just exponentially, the impact of business expansion on e-business systems will be, to say the least, quite significant. Needless to say, e-business systems must scale to accommodate this growth. Your customers experience the impact of increased workloads directly because they are the system's users. Maintaining excellent performance across growing workloads is imperative. Your competition is only one click away and there is no greater customer dissatisfier than a poor, unpredictable response.

It has always been the case that new architectures, systems, and applications have encountered performance and scalability problems when first deployed. The reasons for these problems have consistently included a developer focus on functionality, a lack of expertise and experience in understanding new technology, and an inability to test the new technologies at the workloads that cause the problems. We've seen these phenomena with the first online systems of the early 1970s and the client/server systems of the early 1990s. Now, at the beginning of the new millennium, we're seeing them with the e-business systems as well.

The requirement for scalability goes beyond the ability to use more powerful servers, to distribute workloads across a few server platforms, or to balance communications traffic across multiple Web servers. e-business systems need a level of scalability that does not come out of the box, at least not out of the boxes of today's e-commerce servers. New, pioneering approaches to system architecture, software structure, and workload distribution are needed.

How IBM Fills the Prescription for Scalability

Pioneering Scalability of Online Systems

Historically, IBM has been a pioneer and a leader in the performance and scalability of online systems. It has had to be. Its customers have usually been among the first to use its hardware and software to support the first and the largest online systems in every generation of computing technology and usage. The company frequently learned how to scale these systems the hard way—under pressure of customer expectation and scrutiny as these mission-critical systems were loaded and stressed at unanticipated levels.

Of all the competing e-commerce vendors, only Microsoft has the breadth and depth of resources to address scalability in the manner of IBM. In fact, Microsoft has been working quite successfully to scale its NT platform and the applications that run on it. Microsoft understands what needs to be done to make a system scale, but NT's top end is somewhat limited relative to massively parallel Unix servers and mainframe systems. The other vendors (BroadVision, for example) have a narrower scalability focus. They can fill small segments of the scalability prescription but don't have the scope of experience or expertise to address the entire prescription.

Pioneering Scalability of e-business Systems

IBM has become a pioneer in the performance and scalability of electronic business systems, too. The company first experienced these problems with its informational sites for the Olympics and Wimbledon. Within e-business systems, the e-Christmas season of 1998 manifested performance and scalability problems in many sites of IBM customers. Given its experience, IBM recognized the problems quickly. After addressing critical customer situations, the company has begun developing a more general approach to addressing performance and scalability in high-volume Web sites. The approach has followed the following steps:

- **ORGANIZATION.** IBM has built a cross-functional organization called High Volume Web Sites (HVWS) to address performance and scalability, drawing on expertise and experience from hardware R&D, Web application, database and infrastructure software R&D, research, and consulting services.
- **WORKLOAD CLASSIFICATION.** The HVWS group has classified Web site workloads into four types: publish-and-subscribe, online shopping, online trading/banking, and business-to-business. Illustration 4 shows these classifications and associated IBM customers for whom scalability issues were addressed.

Workload Classification	
<p>Publish-and-Subscribe</p> <p>Web sites for major sports events, such as the Olympics or Wimbledon, are based on IBM systems.</p>	<p>Online Shopping</p> <p>Fortune 100 retailers (such as macys .com), catalog retailers, and dotcom retailers all count on IBM systems to handle peak loads.</p>
<p>Online Trading/Banking</p> <p>Top brokerages, such as T. Rowe Price, as well as banks and financial consortia rely on the scalability and integrity of IBM technology.</p>	<p>Business-to-Business</p> <p>Major supply-chain users, such as DaimlerChrysler , bet their business on IBM reliability and availability.</p>

Illustration 4. The four classes of online workloads and examples of the IBM customers for whom scalability issues were addressed in each of them.

- **WORKLOAD PROFILING.** A profile of workload characteristics has been identified for each of the four workload types. Profiles describe each workload in terms including content access and dynamism, security, searching characteristics, data volatility, transaction rates, integration, and number of page views per unit time.
- **IDENTIFICATION OF POTENTIAL SOLUTIONS.** Based on workload profiles, the HVWS group has identified potential performance and scalability solutions for each workload class. These solutions include customized combinations of faster processors, replicated machines, specialized machines, segmented workloads, request batching, user data aggregation, connection management, and caching.
- **IMPLEMENTATION OF POTENTIAL SOLUTIONS.** The potential solutions have been implemented within live sites of each workload type. Results have been measured and systems have been tuned iteratively. In every case the performance and scalability issues have been addressed effectively.
- **BEST PRACTICES.** The work done in implementing and tuning potential solutions has evolved to become a set of best practices for the performance and scalability of high-volume Web sites. These best practices can be applied (and refined) when sites anticipate or first encounter performance and scalability problems due to high volumes. For example, Illustration 5 shows the best practices approach for an online shopping architecture.

Going forward, IBM is now working on institutionalizing its experience and expertise. It is developing training programs to deliver techniques and tools to its consulting organization. Ultimately, these approaches to managing performance and scalability will be integrated within the company's e-business product offerings.

A Unique Ability

IBM is unique in its ability to address the performance and scalability of e-business systems. No other company has the breadth and depth of experience and expertise to deal with performance and scalability issues as expeditiously, systematically, and comprehensively. The HVWS approach exemplifies the ideal in identifying, isolating, addressing, and institutionalizing performance. It has resulted in addressing the performance and scalability problems of e-business pioneers and in preventing performance and scalability problems for all companies that follow their lead.

Best Practices for Online Shopping Architecture

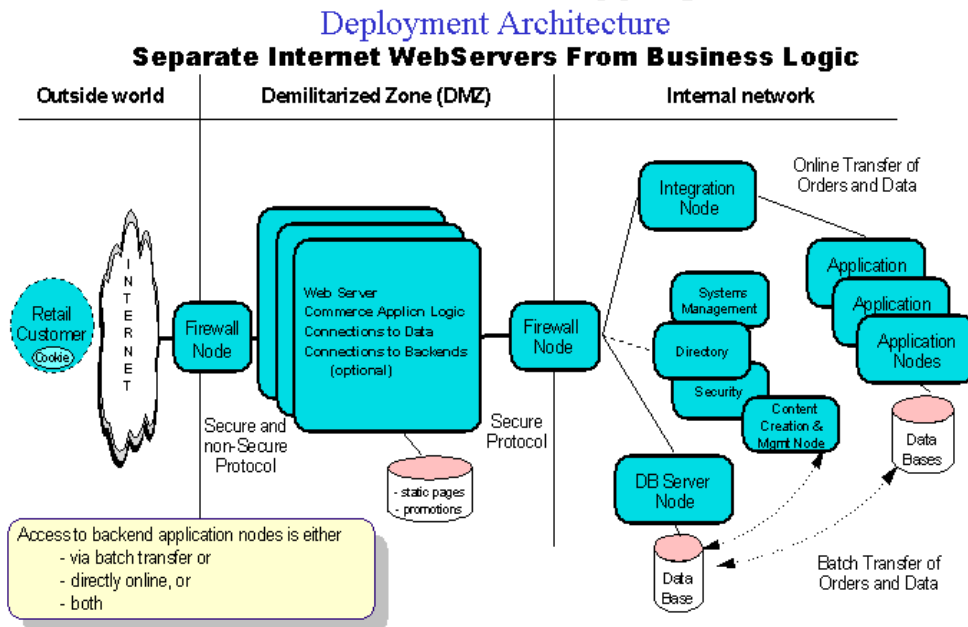


Illustration 5. IBM's best practices architecture and organization for supporting high-volume online shopping sites.

Conclusion

Follow the Prescription

In the next few years most of your companies will implement e-business systems. As you approach the implementation of these systems, your probability for success can be increased by following the prescription presented in this document. e-business systems are complex, large-scale systems with demanding requirements for functionality and scalability. Their effectiveness requires their integration with existing business systems.

IBM Fills the Prescription for How to Succeed @ e-business

IBM fills the prescription for "How to Succeed @ e-business" extremely well. In addition to the software products, technologies, and techniques described in this document, the company also provides the hardware, infrastructure, and administrative systems that support e-business systems and the consulting services necessary to organize e-business resources into reliable, scalable, high-performing e-business solutions. IBM has demonstrated its desire and ability to mass all its resources to ensure e-business success. Its e-business offerings and approaches should be considered strongly by any company approaching the implementation of e-business.