An eCommerce Primer for Technical Communicators

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The burgeoning eCommerce industry has redefined not only traditional business processes, but the technology required to impart them. Roles are being created or redefined, where programmers, systems analysts, and engineers now have to have almost as much knowledge of business process development as they do of their technical specialty. The same can be said for technical communicators. Technical communicators involved in eCommerce today need to have an understanding of the major issues involved in eCommerce. This paper addresses five of these major eCommerce areas: the statistics behind eCommerce issues, eCommerce infrastructure providers, managed electronic commerce, business object technology, and data mining.

INTRODUCTION

Electronic commerce (eCommerce) represented 37 percent of U.S. mail-order catalog shopping and three percent of credit- and debit-card purchases in the 1995-1997 time frame[1]. Predictions for eCommerce revenues vary among marketing research firms, but have been stated to be as high as $330 billion in the near term (2001-2003) and as high as $1 trillion in the future (2003-2005)[1]. A contributing factor to such optimistic projections for eCommerce is tied to the Internet's use of existing infrastructure that requires minimal levels of new investment. With the help of widespread reform of regulated communication systems, the Internet possesses two significant characteristics that have contributed to its exponential growth and made it very attractive to all users:

- The low cost of Internet access compared to proprietary networks
- The combination of technologies (Internet, World Wide Web, and browsers) enables interactive media that facilitates one-to-many communication

Universal connectivity forces associated technologies (TCP/IP, XML, Java) to remain open and nonproprietary in nature. Such an absence of proprietary protocols promotes the continued growth of the industry it supports, which is one reason Internet-enabled eCommerce has generated such interest and enthusiasm for its incredible potential. Despite the optimistic predictions, eCommerce problems do exist.

Ecommerce: The Good and the Bad

These statistics reveal the opportunities and challenges companies face when seeking an eCommerce initiative:

- 67 percent of all eCommerce transactions fail (*USA Today*, June 9, 1999)
- 50 percent of the privately held Fortune 500 companies do not have a Web presence (*Fortune Magazine*)
- Lack of confidence and/or trust in security, financial transaction integrity, and network “fail-safe” measures (*Fortune Magazine*)
- More than 42 percent of business-to-business eCommerce Web sites that have been online three or more years stated their Web site is currently profitable (*ActivMedia Research*)
- 27 percent of sites that have been online for less than one year stated they are already realizing profits from their eCommerce activity (*ActivMedia Research)*
- In 1998, the average income for all first-year business-to-business eCommerce web sites actually seeking revenue was just under $94,000 (*ActivMedia Research*)
- Those business-to-business programs seeking eCommerce revenues in their third year or better took in nearly $30 million dollars on average
- Three largest single-day gains in stock market history were Internet companies
- EBay site down for 22 hours on 6/9/99 resulted in:
  - $5 billion loss of market capitalization
  - $5 million in refunds
  - 10 percent loss of 3Q99 revenue
- 46 percent of Internet customers exit a preferred site due to site-related technical/performance issues
- 65 percent of companies don't have any eCommerce strategy at all (*Cutter Communications*)
- Most companies with at least $15 billion in revenue were spending more on eCommerce but not changing business processes to address it (*AnswerThink Consulting*)

While there are many eCommerce technologies and methodologies with their associated terminology, this paper focuses on a few areas that are key to a successful enterprise eCommerce initiative.

ISSUES BEHIND THE STATISTICS

Companies involved with business-to-business are looking for solutions that can address such key issues as

- *Reliable transactions*: safe, secure, round-trip transactions using encryption algorithms
- *Transaction integrity*: consistent, complete transaction-pair communication (adjacent links in the eCommerce transaction chain) and round-trip transactions (A to Z back to A)

- *Transaction optimization*: having the safest, quickest, most secure transaction round-trip route
- *Flexible transaction-pair processing*: having more than one option in the next step of the transaction process
- *Known states in the transaction process*: having the ability to know where a transaction is in the process at all times
- *Scalable solutions*: having the ability to grow an eCommerce solution as business grows

A managed electronic commerce business model shows the most promise for addressing these issues. First, let's examine a standard eCommerce model.

A Standard eCommerce Model

A successful eCommerce solution is more than a virtual storefront. Companies get into trouble when they treat an eCommerce initiative as simply a "bolt-on" project and try to fund it by siphoning off capital from other "mainstream" projects. An eCommerce business integrates with front-end (Web site/portal), back-end (databases), and corporate-office systems (records management, inventory, security, contact/vendor management, order entry, etc.) that facilitates real-time marketing, customer service, transaction processing, and supply-chain management. Figure 1 is a simple eCommerce architecture model.

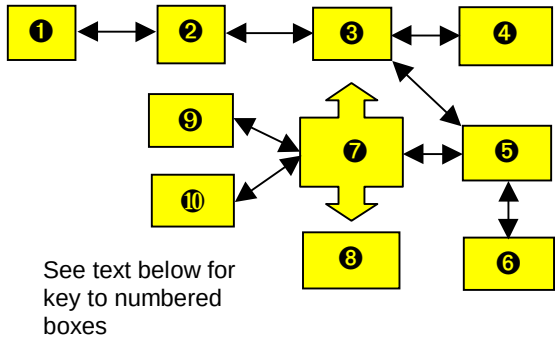


Figure 1. Basic eBusiness Architecture Model.

Development tools for the *user interface* ① include those for creating Web applications, multimedia GUI design or point-of-sale software applications as used by a shopper, an employee or others. For the *Web server* ②, tools for diagnostics, performance measurement, load balancing, routing, and service-level control would be used to manage security/firewall access and bandwidth. User authentication occurs at the Web server for secure access to information and secure eCommerce connections, or for encryption and creating virtual private networks (VPNs).

Development tools for the *enterprise eBusiness application server* ③ include those for building, deploying, and managing eBusiness applications or for deploying enterprise applications to a business-to-business extranet.

An *eBusiness content server* ④ will use development tools to help deploy and manage all types of electronic documents, multimedia content, or collaborative documentation projects.

The components for *eBusiness services* ⑤ include integration of multiple sales channels (fax, phone, Web, email); creating, revising, and managing product information; Web-site workflow; online incentive/reward/loyalty programs; online auctions; deploying and managing portals to content and commerce transactions.

The *commerce/payment server* ⑥ deals with such activities as real-time credit-card authorization, customer authentication, online payment processing, order tracking, and secure electronic payment processing.

Application integration ⑦ deals with a variety of processes, including the integration of front-office, back-office, and corporate (legacy) applications; online transaction management; electronic messaging; integration of internal and external IT systems to extend enterprise business processes to the Web, and business-to-business real-time transaction processing.

External systems ⑧ address the integration of supply chain management or extranets with businesses/ vendors.

Front-office systems ⑨ include such components as call centers, customer service, lead/contact management, and operations supporting retail point-of-sale transactions.

Back-office systems ⑩ include inventory control, order fulfillment, merchandise receiving, distribution, shipping, vendor/supplier contact management, customer information management, purchase-order management, sales-reporting management, etc.

eCOMMERCE INFRASTRUCTURE PROVIDERS

Revenues from eCommerce can be divided into two major categories: those coming from *business-to-business transactions*, and those derived from *business-to-consumer transactions* (books, groceries, CDs, travel, toys, consumer stock brokerage, pornography, miscellaneous merchandise, and online gambling are the largest markets). Business-to-business eCommerce revenues accounted for more than $23.9 billion between 1995-1997, according to a variety of sources[1]. During that same time, business-to-consumer

eCommerce revenues totaled just $2.6 billion, even though the bulk of media attention and speculation focuses on this segment. However, expenditures on Internet-related infrastructure during this same two-year period are estimated to have exceeded $40 billion[1]. As eCommerce transactions become more reliable and secure (and the wait-and-see shopper gains confidence), this gap between business-to-business eCommerce and business-to-consumer eCommerce will decrease in the coming years.

It appears that currently the best opportunities for technical communicators lie with the development and deployment of eCommerce infrastructure and business-to-business eCommerce segment (including intranets and extranets). The largest growth in the business-to-business segment is occurring in small to mid-size companies as most large companies already have some electronic data interchange (EDI) systems in place (EDI is complex and expensive to set up and maintain).

With eCommerce, it's easy to draw a parallel with the 1840s California gold rush. The real winners were not the miners, but the purveyors of food, clothing, mining equipment, and other goods and services–the business-to-business commerce segment.

Using the most conservative classification, eCommerce infrastructure can be divided into four areas: hardware (servers, routers, computers), software, Internet service providers (ISPs), and enabling services (e-payment, authentication/certification services, credit-card clearinghouses, advertising, etc.), with hardware providing the bulk of those revenues.

eCommerce Players and Assets

Software, Hardware, and Network Components

Table 1 presents an overview of the companies and technologies involved in eCommerce.

Software Components	Software Players
Web tools, database development, server tools, Encryption/security, credit Card clearing/authorization, Transaction processing	Microsoft, Oracle, Sun, ICI, Sybase, NCR, IBM
Hardware Components	**Hardware Players**
Servers, satellite hardware, cables/routers/ hubs	Ericsson, Nortel, SW Bell, Sun, IBM, Cisco, Compaq, Dell, Motorola, Lucent, IBM
Network Components	**Network Players**
Internet, satellite transmission, LAN/WAN, wireless	Ericsson, Nortel, GTE, IXC, Sprint, AT&T, MCI, many small players

Table 1. Example of Software, Hardware, and Network Players and Assets in eCommerce.

MANAGED ELECTRONIC COMMERCE

The Missing Link in eBusiness

The current state of practice for eBusiness transactions focuses almost exclusively on optimizing individual transactions, from one link in the eBusiness chain to the next. While such a focus does improve the efficiency and reliability of such A⇔B, B⇔C, C⇔D transactions, the overall end-to-end, roundtrip transaction efficiency (A⇔Z) receives less attention.

The challenge, therefore, is providing full roundtrip optimization and process management for all components and links in the transaction processing chain. Managed electronic commerce is one answer.

Managed electronic commerce is defined as the integration of Internet computing technologies and event-management technologies to provide efficient, highly available, reliable, dependable, secure execution status visibility and recovery of self-optimizing eCommerce transactions. In other words, the paradigm of managed electronic commerce means faster fulfillment and increased assurance that the transaction processes are more reliable, visible, well-defined, have a known state, and can be trusted (security).

In Figure 2, a user initiates a transaction through a Web portal. Using a managed electronic commerce framework (a monitored environment), that transaction seeks out the quickest, safest, most secured route through the available Web portal, authentication services, clearinghouse, and financial institution, and back again—all in a matter of a few seconds. Managed electronic commerce monitors the overall “health” of

process execution (from one transaction pair to the next, and between transaction pairs themselves) by

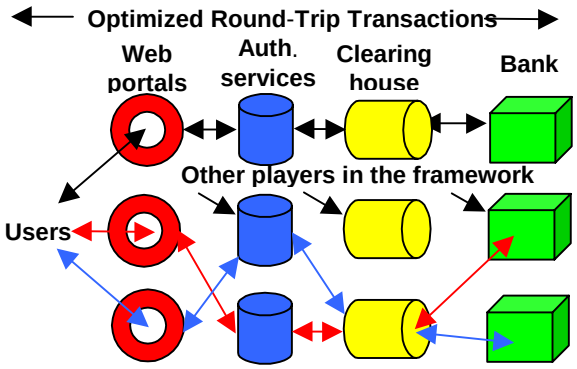


Figure 2. Representation of Performance Optimization of Other Players and Transaction Pairs in a Roundtrip Transaction.

providing state information (you'll always know the state of the transaction in the process) on systems, networks, subscribers, users, components, etc. Whenever an interruption occurs or traffic conditions dictate, the process recovers by seeking alternate pathways through the framework to complete the transaction safely and reliably.

Benefits of Managed Electronic Commerce

True managed electronic commerce is not yet available, but will be within a year or so as many of the components for the framework are available today. Managed electronic commerce represents a different direction across the well-traveled internetscape to one that offers many paths for optimum traversal for eCommerce transactions.

The Internet, and managed electronic commerce in particular, has a great effect on creating a level playing field in terms of an unrestricted presence to virtual storefront owners, where company size no longer matters, nor is it apparent. A managed electronic commerce framework is a highly flexible, noninvasive infrastructure designed to leverage a customer's existing resources to create targeted eCommerce solutions.

BUSINESS OBJECT TECHNOLOGY

Changing How Businesses Interact

Until recently, there was very little incentive to reduce software costs by leveraging its development across several applications. Enter the idea of creating business computing systems out of reusable, self-contained components, or *objects*. A business object can be a customer, inventory item, account number, salesperson, employee, a place, event, process or concept. Business objects represent real-world business things.

Business object technology only requires an understanding of object orientation and business system development. Object-oriented programming knowledge is not required.

In traditional business systems, no single computing entity contains a description of both the information and the behavior of a business entity; therefore, each new program must laboriously reconstruct that relationship for itself. This is illustrated in Figure 3. In short, behavior resides in maze of code, while the related information resides in files or databases.

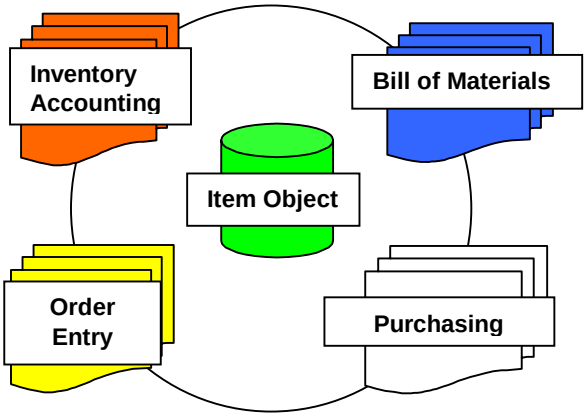


Figure 3. Illustration Showing Applications Having Separate Cost Calculations.

Objects display *behavior* that lets them act independently and in “intelligent” ways. Objects can have many behaviors and these separate pieces of object behavior are called *methods* and can be written in code (see Figure 4). These methods are named (usually two or three words squeezed together without any spaces between them, such as *MethodName*) in a way that hints at their behavior. When an object's method is “called” by another object, the object behaviors are set in motion. If you know the names of

all the methods of an object, you know the object's *interface*.

If you know an object's interface, you have a good idea about the possible behaviors of that object as well as *different* objects that contain the *same* methods (see Figure 4). In Figure 4, if you know Object X's interface, you know about all its possible behaviors. But you also know quite a bit about Object Z because it contains the same methods as Object X because it has the same interface.

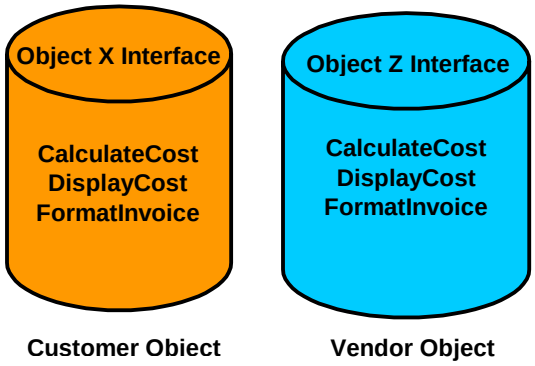


Figure 4. Object Interfaces Help You Know About Other Objects.

Objects grouped together based on common behaviors and states are called *classes*. And object classes have important ramifications for business object technology. Developers now focus on defining, implementing, creating, and reusing object classes instead of concentrating on tens of thousands of lines of code, subroutines, or database structures.

What It All Means

With some data and a few well-chosen collections of methods can be combined into dozens of different collections of objects that can change their specific behavior in response to changing business conditions *without any changes to the software environment that creates and supports the objects* (see Figure 5).

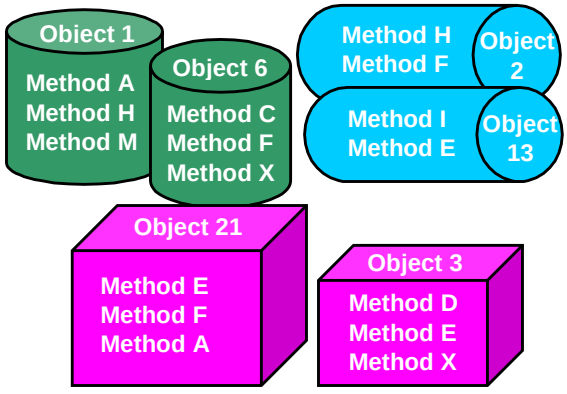


Figure 5. Mixing Object Methods.

Imagine a class of objects called *items* that compute their own cost and automatically display it. Whenever you want to know the cost of an item, you just ask the item itself because all the appropriate rules about costs, inventory, or materials are either encapsulated in each item-object or are available to it. Anyone can make such a request anytime from any application.

In the new, improved object-oriented system, all the rules about item inventory costs are located in one place for all item-objects, as Figure 6 illustrates.

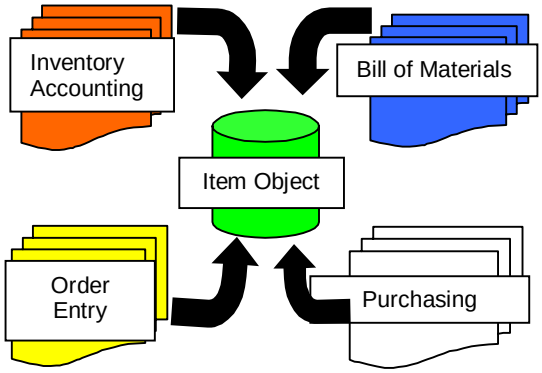


Figure 6. Item-Objects Know How to Calculate Their Cost.

The Bottom Line for Business Object Technology

Understanding business object technology will allow your organization to quickly respond to changing eBusiness conditions. You only have to change the business rules in one place--the place where the item class is described--and cost-computing method (or whatever method you define) will automatically change for all relevant applications. As business rules change, only a few of your business classes are likely to be affected--the remainder of your systems can continue as before. As you add new systems, all the rules associated with objects they use will be followed because none of the rules is external to the objects themselves.

DATA MINING IN eCOMMERCE

Measuring, Managing, and Improving the Process

Almost every single event, data, process, interaction, and communication needed to support eCommerce can be measured and managed, and the results used to improve the process. Data mining techniques can support optimization of eCommerce performance and

can identify and design new capabilities to do the following:

- Study database schemas to learn about hotspots and efficiencies
- Identify performance of actual operations, limitations, and use of the eCommerce database systems
- Perform due diligence on the data itself to identify any inconsistencies
- Perform analysis on the data to ensure its reliability, validity, and completeness
- Examine the temporal patterns associated with purchasing goods/products
- Detect, analyze, and mitigate fraud
- Examine the connection times required to pass between different nodes on a network
- Investigate alternative routing strategies, database replication costs, and throughput; all of these factors can help establish improved system throughput, reduced latencies, and higher effective use of network bandwidth
- Examine performance metrics regarding credit-card transaction processing at each task node with eCommerce processes

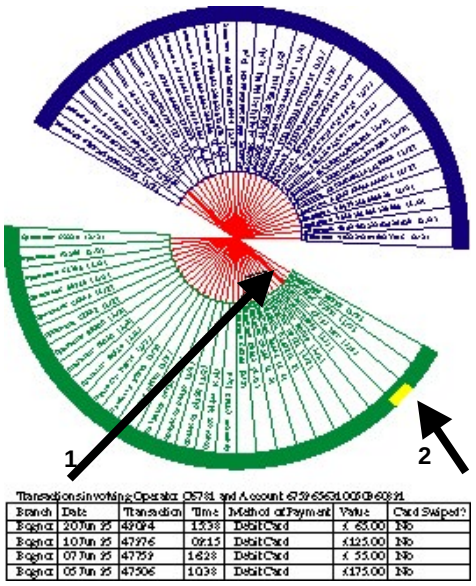
Fraud and Financial Abuse Detection

The application of data mining to a back-office eCommerce product can provide an organization with a range of information related to its sales, inventory, and purchase-order-related data sources. Specifically, data mining can be used to better understand how the actual merchandise moves through a store, which can help account for peak periods of consumption, throughput (operator capability), best-selling merchandise, and a range of other patterns. In addition, the data mining/back-office application can also help detect fraudulent activities within the system. The application of data-mining principles will help retailers by focusing on identifying fraudulent transactions made through point-of-sale (POS) systems. Data mining can also help resolve patterns involving refunds, discounts, price overrides, credit cards, store cards, staff discounts, voids, reversals, overages and shortages, and product movement.

Example: Refunds Given to the Same Account

There are only a few viable avenues in which to commit fraud within any POS system. One such case involves refunds to a particular account, whether it belongs to the employee or an associate. Figure 7 is an example of such activity, where the top band represents the accounts, and the bottom band, employees operating POS terminals. The thickness of the links between the two circle halves shows the relative number of transactions for each POS terminal/employee to the respective accounts. The base data used to generate this diagram required at least three transactions per POS terminal and account before presenting the results.

Figure 7. Example of Fraudulent Transaction Using Data Mining (Refunds Given to Same Account).



Because the POS terminal can provide a range of information regarding the nature of the transaction, the "status" of the POS terminal/employee is indicated in top outer band represented in the diagram. Note the 4:00 position of the thick line in the inner circle where Arrow 1 is pointing. The light-colored box in the outer band (arrow 2) has flagged a possible problem area. This POS terminal/employee represents a manager of a local store branch. Based on the thickness of the line that connects the POS terminal/employee to the accounts being used, the evidence shows a predominance of refunds being credited into the employee's personal account.

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Donn directs the information development efforts at Integrated Concepts, Inc., an eCommerce software development company in Austin, Texas. He has more than 20 years' experience in academia, government, and private industry. When he's not writing articles and books, Donn records and tours with his band, *SnakeByte*.