CHAPTER 1

The Opportunities and Challenges of E-Business

E-business seeks to establish an inexpensive, ongoing, and revenue-producing dialog with profitable customers. A properly established e-business allows inexpensive, reliable, and highly dynamic supply chain relationships, which can reduce inventory levels and improve product quality. Many of these opportunities may already be on the strategic map—for example, enterprise resource planning (ERP), customer relationship management (CRM) and enterprise application integration (EAI). But each of these initiatives increases the need for effective data warehousing efforts, and early awareness of that fact is essential to achieving long-term success.

The combination of short-term capital and a "traffic count" mentality spawned the superstructure-without-infrastructure approach to e-business. (The expectation that a traditional information infrastructure was required only in traditional business models was quickly disproved.) The objective of this chapter is to address both the challenges and opportunities that e-business presents, and to demonstrate how data warehousing fits into this new schema.

From Physical to Electronic Markets

Life before e-business was full of opportunities and challenges that required complex solutions. The advent of e-business has provided new stimulus for investing in information technology; it has also presented a new context for business formation. By expanding our traditional approach to information technology—which emphasizes a layered approach to supporting daily processing and reporting—we can take greater advantage of these opportunities. Table 1.1 summarizes the traditional view of information technology as an enabler of the daily processing and reporting procedures. The target markets are all electronic, as is their infrastructure.

Consider, as an example, the process of analyzing customer profitability in a national bank. There, transactions are processed and summarized across product lines: checking, savings, credit cards, credit lines, and mortgages. Costs are assembled from geographic and product-based lines of business, some allocated directly from known account activity, others allocated indirectly based on volume and other models. Customers view their financial assets based on usage and timeliness; these views are not consistent, which creates disparities in the way customers

Table 1.1 Standard View of Information Technology

INFORMATION SOURCE	INFORMATION USE
Transaction Platforms (Legacy)	1. Process transactions. 2. Monitor activity and report.
Real-Time Specialized Systems (Client-Server, UNIX)	1. Process transactions. 2. Manage product metrics. 3. Monitor activity and report.
Groupware Document Management Imaging Multimedia	1. Support employee interactions. 2. Support external interactions. 3. Capture transactional evidence. 4. Catalog transactions & relationships. 5. Store binary large objects.
Contingency and High-Availability Systems	1. Ensure processing availability. 2. Provide failover systems. 3. Allow rapid application recovery. 4. Provide duplicate, near line stores.
Archival Systems	1. Provide worst-case data images. 2. Support time-based research.

use bank products. Many customer product selections are impacted by their holdings in other institutions, often comprising very different portfolios. Because these considerations are not apparent to the bank that is offering the products, and given the plethora of substitutes and the difficulty of factoring in unknown external holdings, analyzing customer profitability is extremely difficult for our example bank.

The Three Vs: Volume, Velocity, and Variety

Improvements to physical and electronic bandwidth brought with them challenges, most notably, how to deal with volume, velocity, and variety. At the heart of these challenges is the notion that all data is created (as well as stored and moved) equally. Merely digitizing a stream of analog data points cannot create a continuous stream of information. Moreover, since computers came into widespread use for transaction processing, each of these challenges has been presented in different ways, even though the underlying dilemma—of understanding the sources and use of data—remains unchanged.

Data Volumes

Volume is an indicator of popularity, of customer interest in a product. To accommodate growing customer volume, traditional retailers began to scale their physical infrastructures. Concomitant increases to retail volume likewise prompted businesses to ramp up inventories, staffing, and distribution. Retailers often elected to build more stores or expand existing ones in profitable markets. Necessarily, as increased customer traffic resulted in increased revenue, additional resources were required to support ongoing transaction processing and analysis.

Current growth trends indicate that the distributed storage environment is set to outstrip increases to conventional server processing. Lower-overhead storage alternatives enable faster growth with greater geographic dispersion in support of burgeoning data volumes. Logical management of additional data volumes presents an even greater challenge. E-business data comprises vastly expanded quantities of corporate information, as well as the new clickstream data formats, which will be covered in Chapter 2, “The Corporate Information Factory and E-Business.” Corporate information regarding products, customers, and procurement are often replicated into e-business systems in order to

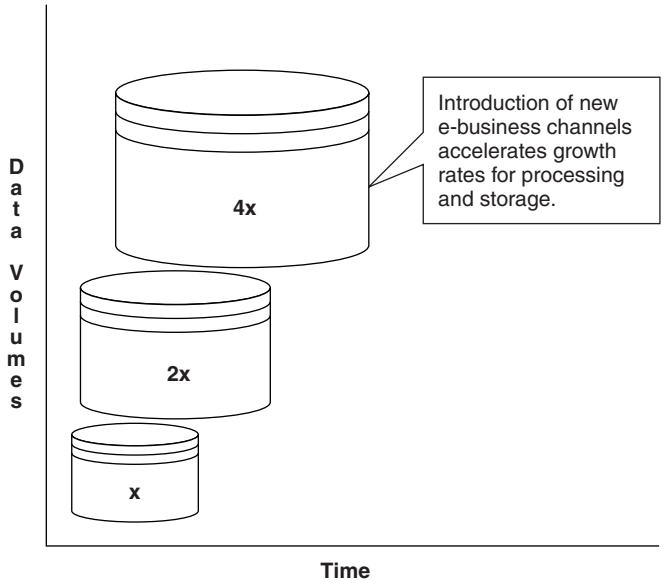

Figure 1.1 Expanding data volumes.

facilitate getting on the Web. Companies with successful data warehouse systems can leverage these systems to provide integrated customer and product information to Web applications. Companies that lack these resources and that have tried the virtual approach to directly connect disparate source systems to Web applications have often met with failure. Consequently, e-business infrastructure providers now emphasize a hybrid approach, one that utilizes data warehouses to provide integrated information and direct source system connections for limited transactional purposes. Figure 1.1 illustrates some data volume sources.

Data Velocity

Information velocity is a key determinant of overall business growth capacity, or scalability. In an environment of growing volume, velocity escalates as well. Velocity is a factor of time: increasing the amount of activity without increasing the time period necessary to complete that activity requires that the activity be done at higher speed. An increase in velocity is first felt in processing activities; whether at the checkout counter or the general ledger level, transactions have to be processed

faster in order to cope with the increased business volume. But today, velocity refers to much more than processing speed. Greater volumes of data must be exchanged and moved in shorter time frames.

Coping with velocity has been difficult for many local, metropolitan, regional, national, and international networked environments. Data warehousing can offer significant benefits in managing velocity requirements, by creating parallel sources for corporate information. Reporting and analysis components are fed by transactional systems; decision support activities are then offloaded from these sources.

Globalization, too, has dramatically increased the need for velocity, as data sets are often replicated across time zones to support enterprise needs. High-availability systems, disaster recovery planning, and related regulatory requirements have all driven recent expansion of replication and synchronization efforts. The demands of e-business for rapid data access and replication serve to validate the need for robust information architectures that have already been constructed to accommodate business requirements. Figure 1.2 illustrates the pressures leading to increases in data velocity.

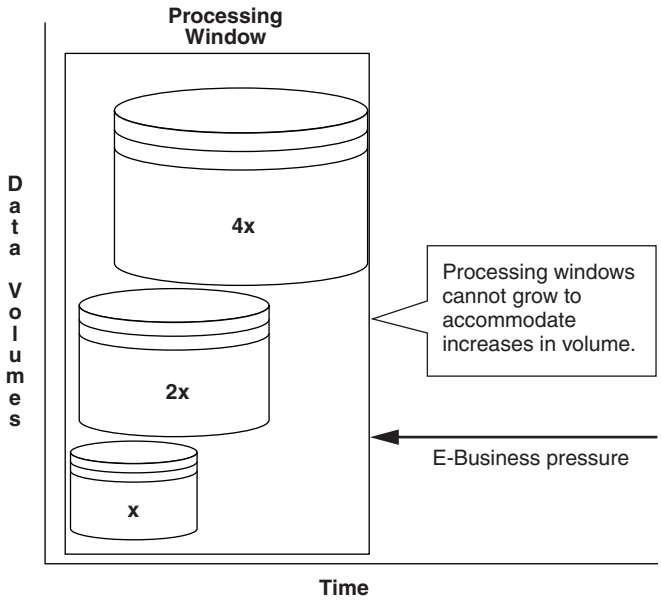

Figure 1.2 Increased data velocity.

Variety of Data Formats

To meet consumer demand for richness and depth in electronic exchange, e-businesses must offer variety. Consumers now require a variety of channels through which to gain access to products. Consequently, channels have evolved to support multiple forms of data exchange. Prior to the advent of e-business, the challenge of offering enough variety was met with various creative solutions: catalog retailers instituted customer support in the form of call centers; facsimile-based order submission became prevalent for just about everything, even lunch orders. Today, however, the bar has been raised higher than ever before. Consumers are not confined to a brick-and-mortar outlet, nor are they restricted by certain hours of service to get their needs met.

Any emerging channel of commerce requires physical- and information-based technologies to support its evolution. Managing media assets was a well-established business activity long before Internet-based selling appeared on the horizon. Previously, imaging and document technologies were most commonly used to manage media assets; soon, digitization and storage of multimedia assets were considered imperative. Hierarchical storage management techniques have been successfully employed in the management of image archives; similar techniques have aided in other archive activities. These techniques have not, however, provided significant success in data warehousing. Therefore, distributed data storage architectures, including near-line and other alternative designs, have merged to support massive data warehouse environments. Figure 1.3 illustrates the sources and uses of enhanced data formats.

Volume in and of itself is not the sole barometer of success. First-wave e-tailers that gained experience by providing electronic richness soon learned that digital richness did not support profitability. It did, however, support interest, and laid a foundation for loyalty. This so-called richness-reach compromise has been well documented, and the success stories, though varied, share consistent themes. Traditional retail firms that established a Web presence, new electronic storefronts, and hybrid models all have had some success in e-business. That success has been shared by business models that embrace and invest in infrastructure commensurate to the overall challenge. Recognizing that volume, velocity, and data variety will increase with success enables enterprise architects to design systems capable of supporting this growth. Of course, there are also success

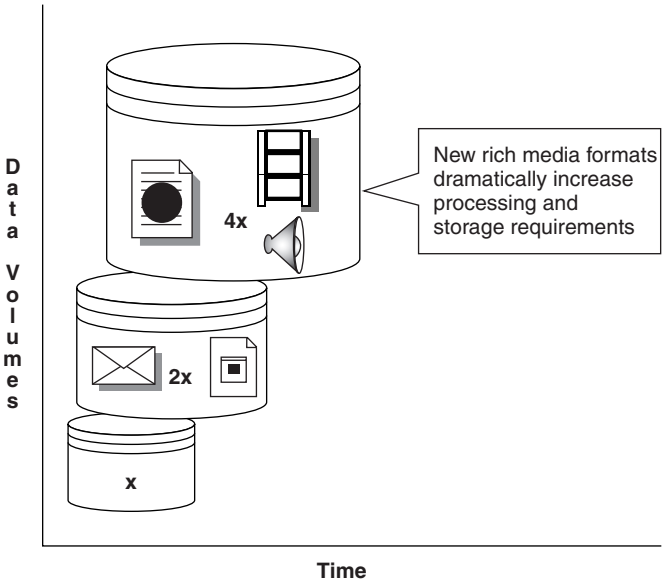

Figure 1.3 Enhanced varieties of data.

stories built on failure, for example, overstock.com, which sells liquidated inventories from specialized "dot-bombs."

E-Business Channels

To succeed, e-businesses must create, then support, electronic dialog. Business performance relies upon the consistency and tone of this dialog. As electronic pathways—that is, channels—have improved, different views of dialog partners, as well as the context for this dialog, have emerged. Therefore, aligning transactional and analytical systems to support these dialog channels has become a major technical imperative.

These channels have been assembled along relationship lines, including: business-to-business (B2B), which is directed toward commercial and industrial activity; business-to-consumer (B2C), which is the retail channel for marketing and sales; and business-to-employee (B2E), which is the expanded internal networks for human resources. Figure 1.4 illustrates the relationships between these entities and their respective channels.

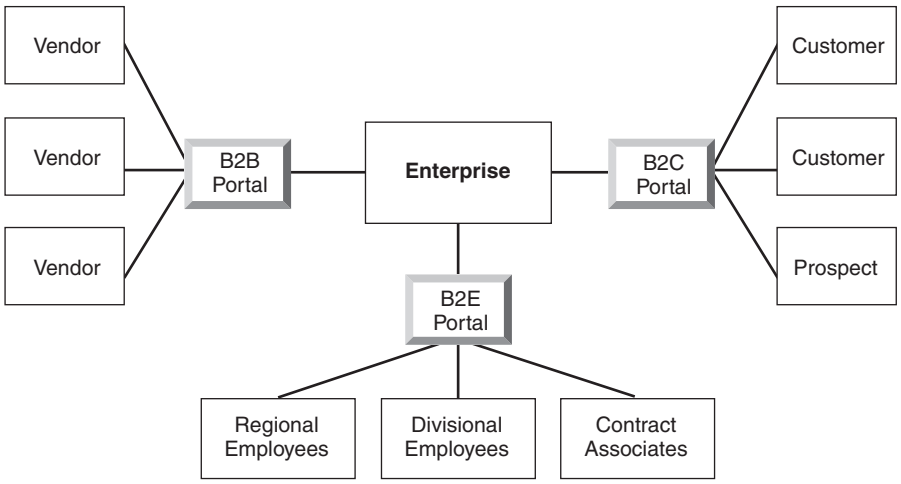

Figure 1.4 E-business channels.

Business-to-Business (B2B): Centralized Exchanges and Emerging Marketplaces

The business-to-business exchange rapidly emerged as a model for the electronic marketplace. B2B exchanges were founded in vertical industry segments, based on shared needs and semantics. Commodity-level goods and services were the first target for this new faceless interaction. But exchanges of any sort require membership, in this case, predicated on the desire of members to find trading partners and to secure consistent supplies. These exchanges were outgrowths of previously formalized trading relationships that utilized private networks. Within the context of a virtual marketplace, centralized exchanges serve to aggregate trading partners, and to act as intermediaries between sellers and buyers, by providing the tools and resources to facilitate complex electronic transactions.

Obstacles to Exchange- and Alliance-Based Models

An obstacle that emerged in response to such exchanges and other alliance-based models came in the form of claims of collusion. Though certainly there is a natural inclination toward price setting and fixing,

these were not the primary motivations behind these business models. Nevertheless, balancing the needs of the marketplace with the concerns of regulators became a major obstacle to B2B success. For example, financial services firms attempting to form global currency exchange alliances had to address many levels of concern about pricing, supply, and market control issues. The openness of the model and the willingness of an exchange's members to share information with governing entities are the key factors to assuaging these concerns.

Another obstacle to the success of these models was the result of a new economy precept, which presumed that establishing an online exchange mechanism was a guarantee of success. In practice, however, launching an e-business may have been rewarded with interest, but in many cases, very low levels of commitment from potential members. Locking in trading relationships based upon exchange membership proved unattractive because the exchange itself was not a complete value proposition. Trading partners need several layers of interface and structure to enable supply chain enhancements; they also need tremendous flexibility to support constant changes in economic and industry conditions.

In response to these obstacles, peer-to-peer networking began to emerge as a competing model for exchange-based marketplaces. The peer-to-peer model allows any business to bypass centralized exchanges to find like-minded trading partners. One advantage of peer-to-peer networking is the opportunity to efficiently, rapidly, and securely conduct transactions directly with chosen trading partners. Peer-to-peer networking excels at simple, transaction-oriented exchanges. *Peering portals* link internal inventories and production systems to provide accurate, up-to-date product availability and price listings. A complete approach to partnership management provides answers to each level of need in the supply chain.

Business-to-Consumer (B2C): The Context of Consumption

Categorizing consumers based upon their purchase behavior is nothing new, but doing so tells only part of the story about customers to retailers. Identifying consumer buying patterns within different product categories tells another part of the story—an equally important part. Consumers make choices about buying based upon the nature of the goods they are examining and how they intend to use them. Therefore,

for retailers, understanding the customer pattern of use is a necessary prerequisite when creating an electronic—that is, Web-based—shopping/buying experience for a specific product. Any asymmetries that exist between consumer types and product categories lead to failures in e-tailing, as recent dot-com experiences demonstrate. Symmetry means the products offered by category should align with customer demand by category.

Individual consumers require different degrees of information, as well as different types of experience when shopping online, based on the product being sold. Commodities—here to mean mass-produced or unspecialized products—are relatively easy for consumers to purchase electronically. The more commodity-like the product, the less rich the purchase experience needed to support its adoption. Paper clips are paper clips. Clothing is another matter, because size, quality, materials, brand, and other factors all become issues of concern for consumers. Hence, for more specialized products, gaining customer confidence becomes key to adoption. To consumers, confidence comes from being comfortable with the shopping experience, having brand knowledge, being assured of quality, as well as being informed and assured of fair shipping and return policies. To achieve that level of customer confidence, the product experience must be consistent and predictable, regardless of the delivery channel. Brick-and-mortar retailers have had years to figure out how to meet those goals, whereas e-tailers are still learning how to address these issues, in particular quality of delivery services. An otherwise sustained product quality can be diminished by damages in delivery, as well the dilutive impact of other logistical failures. An example of a logistics failure was when a major toy retailer took orders at Christmas but could not fulfill them in time. Consequently, consumer adoption is also heavily influenced by shipping charges and return policies.

Brand perception is as important to consumers shopping via electronic channels as in the brick-and-mortar world. In fact, in electronic channels that do not undermine brand and quality factors, consumers probably are more conscious of the brand and quality of the goods they are shopping for than of the channels they use to do so. The point is, predictable and reliable adoption experiences build consumer trust; thus, establishing trust is the foundation upon which customer loyalty is built and maintained.

Another factor important to consider when creating an online presence is the level of specialization of the provider. Certain products benefit from enhanced or exclusive utility, for example, banking and insurance. These types of products—and their consumers—benefit from regulatory provisions that ensure the security of their purchase. For example, banks—hence, their customers—can rely on federal insurance to enhance the security of such products as certificates of deposit. Over electronic channels, competition broadens; even large banks with a strong historical presence must now compete with smaller counterparts because all can offer similar security to customers.

Business-to-Employee (B2E)

Just as the Web has accelerated the business-to-business relationships, the nature of the business-to-employee relationship has also been redefined. This redefinition includes the automation of what was typically a painful paper-based function. An example of this is a firm by the name of Gelco, which provides automated Web-based expense reimbursement. The elapsed time from input to direct deposit in the employee's account is three days. This increased velocity from the old economy of three to twelve weeks to three days has a huge impact on employee satisfaction and productivity. Among the other areas of improvement that have seen immediate impact from the new e-channels are benefits, time and leave, internal education, as well as access to intellectual property within the firm. The entire definition of the business-to-employee relationship has moved from a paper-people–based process to a Web-based process in most large firms. Most employees perceived this as a vast improvement with the elimination of unnecessary gatekeepers between the employee and those things to which the employee is entitled. The result is faster velocity, greater satisfaction, and higher productivity.

The Impact of E-Tailing

E-tailing is that sector of the online economy directly responsive to customer needs. Until recently, it was the segment of the online economy most familiar to Internet users and the one that had commanded most corporate attention. Business-to-consumer innovations in e-tailing

marked the first-tier technologies in which businesses found it necessary to invest: Web sites, servers, and online transaction processing were the focal points for the B2C revolution. These technology tools represented the superstructure of e-business. Unfortunately, too often, the underlying infrastructure was not designed to support the weight of this superstructure. E-businesses soon found that learning to use these "power tools" and understanding how to control them was more challenging than acquiring and installing them. Quickly they discovered that producing Web pages was the simplest part of Web functionality—anyone with a PC or even laptop and some advanced software could create and launch entire Web sites in a matter of hours, though certainly, the resources for establishing a corporate presence on the Web were much more advanced.

The problem is that the connections between a Web site and its underlying source systems for processing transactions are tenuous at best. B2C sites are awash in detailed transaction data, so much so that the very definition of transaction has changed dramatically. So-called clickstream data indicates transactions taking place but often without resulting revenue. A Web site also makes it more difficult to identify granularity, periodicity, and relevance, in particular because the volume of this detailed data flow increases exponentially online.

Small wonder then that the language of e-tailing developed around volume: How many hits did a page or a site receive? How many unique visitors? How many clickthroughs? And for the very fortunate, how many dollars were spent? It seemed that supporting the Web-based volume of activity was the only important factor in achieving success with the B2C systems. This volume-based approach was not promulgated by information technology, but it was the focal point of entire business plans, which were aimed squarely at venture capitalists. The domestic funding capacity for technology startups was at an all-time high when Internet businesses started their funding cycles. After all, venture capitalists are not paid to fund established companies in need of incremental growth capitalization; rather, the venture capital formula is built around the 0-to-60 phenomenon—that is, immediate start with nearly immediate results, as measured by traffic counts and "eyeballs." Venture capitalists are not generally looking for long-term profitability and stability. The initial public market, particularly in times of economic expansion, rewards revenue growth with projected acceleration.

Connecting Customers with Their Transactions

In the physical world, forging links between transactions and customers is not a trivial matter. Big-box retailers struggle just to connect customers to their transactions, much less discover their shopping preferences. Look at the checkout counter at your grocery store: the cash register counts the items you're purchasing, and the credit card scanner processes the payment. See any wires connecting these two systems? The point is, making an after-the-fact connection between customers and their purchases is a difficult task. Even when the cash register is connected to the scanner, neither machine can tell you when the customer came in the door, which aisles the customer visited, or which items he or she might have considered and compared. In the best case, you know who bought what, when, where, and using what form of payment. If source systems don't capture critical connection points, connecting customers, products, and transactions can't be done in the data warehouse.

The Affinity Card

Enter the affinity, or club, card. This is not a specialty credit card; it is not a payment processing component. The affinity card gives customers special discounts on daily market items, and even on their total purchase. It is also used for ancillary services within the complex, for example, video rental. The customer is given an incentive to provide the retailer with basic profile information. The customer's card is scanned upon checkout to ensure discounts are applied. Cash register tapes indicate the discounts given based on the use of the card.

By instituting the affinity card, the retailer is able to immediately link customers to their purchases, payment method, and time of purchase, immediately and accurately. Subsequently, this quality capture technique enables successful warehousing of all related information. The transaction record begins with a unique customer identifier, which makes building the appropriate relationships in the warehouse comparatively simple. Trends—including time of visits, market-basket components, and payment methods—emerge very rapidly from this integrated data. Some elements, which could aid in analysis and marketing, are still missing, however. Physical retailers still can't learn how long their customer is in

the store, or which items he or she compared as part of the purchase decision. Neither can retailers know what the customer put into a shopping cart only to remove or replace it later in the visit. Retailers also can't know traffic patterns, the road map the customer followed, through the store.

Clearly, the ability to measure successful marketing campaigns is not limited to sales levels. For businesses that quantify sales at the square-foot level, determining customer attention to displays, specially designed aisles, and other physical marketing elements is essential. E-tailers have the advantage in this regard, because Web site activity is much easier to capture. Of course, what knowing what to do with that information presents new and unique challenges for e-businesses.

Economics of E-Business

The e-business challenge is to achieve enterprise profitability, one customer at a time—at least, that's the goal among the executive ranks. Closer to ground level, cost allocations and quality management obscure profit perceptions. While aggregating (often called rolling up) transactions by customer, or at least by account, is achievable, allocating profit to those accounts is something else altogether. Why? Profit allocation requires a difficult blend of cost accounting and revenue assignment. A banking example can shed some light on these difficulties. Long before overhauls to banking laws were made, financial services firms were eagerly testing various "online" banking products, including electronic bill pay, pay by phone, and others. Initially, these were seen as convenience features that extended basic banking services. But access limitations and presentation-layer disparities prevented mass adoption of these electronic alternatives. More recently, mandates for a "customer view" of business lines and products have come from newly merged superregional and national banking firms. And increased emphasis on asset management, rather than on traditional transaction processing and lending, add to these demands.

The early drive to create an electronic presence and reap anticipated instant sales rewards has been replaced with a more substantive goal: sustainable performance. Certainly, there is a strong incentive to become more competitive using the Web. E-business does offer distinct competitive advantages in cost structures, turnaround times, and enhanced customer service. On the other hand, it also requires greater

investment than most firms contemplated initially. The original goal of climbing the mountain of sales has been replaced by a keen interest in mining the depths of customer profitability. For example, while looking for a sales advantage, a major financial services firm brought its loan offering to the Web. First-quarter results indicated marginal revenue growth; however, data volumes grew 60 percent during the same period. Clearly, ongoing investment in a scalable infrastructure is required to convert that data volume into additional sales.

Old versus New Economy

In practice, the debate over old economy versus new economy companies has been resolved more by stock market indices than e-business success stories. The growth prospective used to tout these e-businesses to investors was rapidly replaced with metrics such as burn rate, for measuring the pace of cash flow exhaustion. Distinctions between the old and new economies are more about channels, segments, and specialization than they are about completely different business models. Investors now reward old economy companies for adding new economy functionality to their business.

Much attention has been focused on the so-called value of the network, primarily based upon the statistics of node growth and the resulting number of "conversations" that can occur between these nodes. A node is a point of presence (equipment) on the Web. Theoretically, the more nodes, the more robust the network presence. Examples from the physical world are often instructive in evaluating electronic counterparts. In this case, the real estate industry provides a meaningful paradigm. The adage everyone knows from the real estate industry is that land value is determined by three things: location, location, location. What they may not know is that it's not the location of the real estate in question; it's the *locational characteristics* of the real estate. As one very successful real estate developer explained, "People create value; real estate reflects the value of the people who use it." Retail properties are often valued by traffic count, or volume of passersby. Traffic count was an element in the model for e-commerce from the outset.

In the electronic world, too, volume of passersby equates to value, though e-tailers refer to passersby as eyeballs. The analogy is clear: people spend money where they spend time. Attention is the precursor of revenue. Physical traffic becomes revenue when the physical infrastructure satisfies

customer requirements—location, access, navigation, and customer service. Whereas physical infrastructure exists to satisfy these needs—it is *responsive* to changes in customer requirements—information infrastructure must be *proactive*. To achieve success with physical infrastructure now requires an integrated approach to information management; and corporate information is the glue that binds physical infrastructure to customer responsiveness. CRM is just one example of the reliance on information to adjust physical resources to customer demand.

The economics of e-business increases the reliance on information infrastructure as a means of satisfying customer needs. E-business relies on information processing and analysis to forge its customer connections. It complements and enhances traditional channels of business for established firms; it provides new economic playing fields for entire classes of e-business startups. As the reliance on corporate information increases, so too does the effectiveness of investments in information infrastructure—if they were made intelligently. Investment cycles are shortened by the coincidental acceleration of economic cycles.

Impact of E-Business on Economic Cycles

The Internet both enables economic change and is reflective of cultural change. Global connectedness is one result of a maturing telecommunications network; it is a natural outgrowth of centuries of increased global trade. Accumulating, integrating, and indexing information are all tasks undertaken in reaction to the previously identified challenges of volume, variety, and velocity.

Each new wave of connectedness brings with it the need for greater speed, extended business windows, and translation and interpretation. These are forces of acceleration:

- Rapid increases in the need for bandwidth
- Processing and storage capacities
- Development resources as forces of adoption

Forces of adoption are cyclic; they are at the leading edge of economic cycles. Forces of acceleration are continuous; they reflect pressures of growth and increased expectation from generation to generation. That said, adoption and acceleration forces wreak havoc with information

technology planning, causing changes in business and technology, usually simultaneously. Table 1.2 describes some of these consequences.

In summary, the Internet has impacted the three key relationships in business b2b, b2c, and b2e by increasing the quantity of information flow and the speed of that information flow. Once people receive a certain level of service, they are unwilling to return to the prior level of service, even when there is a substantial increment in cost. The changes caused by e-business are irrevocable and forever.

Table 1.2 Consequences of the Networked Economy

B2C	Product selection on the richest site, then mass comparisons based on price, availability, and logistical excellence. Aggregation of functionality (e.g., travelocity.com), "word of mouse" (e.g., Ihatex.com), interest groups and anonymous users (use of specialized e-mail and other identifiers by users and agents), establishment of the daily electronic routine.
B2B	Price-making aggregations (commodities), syndications and exchanges, peer-to-peer networks. Ongoing barriers to globalization, intellectual property rights protection, currency and other economic controls, and cultural impasse, all lead to specialized solutions, based on local market domain expertise. Next steps include relationship brokerage due to local contacts and expertise (similar to mutual fund managers). Continued emphasis on domain expertise and presentation. Brick-and-mortar businesses will succeed where they are able to convert domain expertise, brand power, and relationship skills into electronic presentation and execution. Organizational barriers are the biggest risks (fear of dilution of power leads to lack of business), and their information architecture, data warehouses.
B2E	Simultaneous information provision for employees, business partners, and customers. Increased use of knowledge mapping to provide access to knowledge sources, both structured and semistructured. Concurrent use of rich media sets to provide enhanced knowledge exchange (CBT). Evolution of live, interactive media for distance mentoring and training exercises. Increased reliance on wireless access for rapid updates and queries against collaboration support systems.
C2C	Creation and support of entire communities of users with shared interests. Massive support networks and resulting dialog for all types of specialized needs. This is where consumers worldwide will realize the "power of the network." Access and content providers will profit by virtue of the conversation level carried on their nodes; they will profit from their infrastructure investment for years to come. Integration will be realized through these communities. Accumulation, navigation, and exchange of the resulting information will require CIF infrastructures, particularly data warehouses.

1. **Partner discovery and selection.** The process by which new partners not previously known are found and qualified. A great example is the commercial illustrating a Japanese company finding an alternative vendor through the Web.
2. **Partner interaction and support.** The process of assuring a two-way flow of information between the partners to protect the flow of goods and services (i.e., direct access to inventories).
3. **Partner performance metrics.** An agreed-upon set of performance indicators that assure both parties that the partnership is working up to expectation and is mutually beneficial.

Distinguishing Transaction Cycles from Customer Life Cycles

First-wave customer relationship management (CRM) was focused on collecting pieces of information about customer activities. Call center data, sales force campaign and contact management, and transactional sales data were combined or linked to form a view of customer activity. This was a helpful step forward, but it could not support meaningful analysis.

Next-generation CRM applications and services emphasize a transactional approach to customer life cycle analysis. This is far more meaningful because it enables analysis of purchase considerations and repeat business factors. It also enables the construction of a longer-term view of the customer relationship. Understanding that each transaction cycle is a step in the customer life cycle is critical to constructing a life cycle road map. Using such road maps are not a new idea; they have been used in financial services for years, primarily motivated by regulatory requirements. Life cycle planning is an important tool for identifying suitable and appropriate investment selections. Customer information is analyzed and classified according to age, family status, and overall investment time horizons. Accordingly, for example, high-risk, limited-income investments are avoided for older customers nearing retirement, and who are in need of current income and principal security.

Enabling customer life cycle analysis is one of the priorities of data warehousing. Data warehousing serves as the integration and accumulation

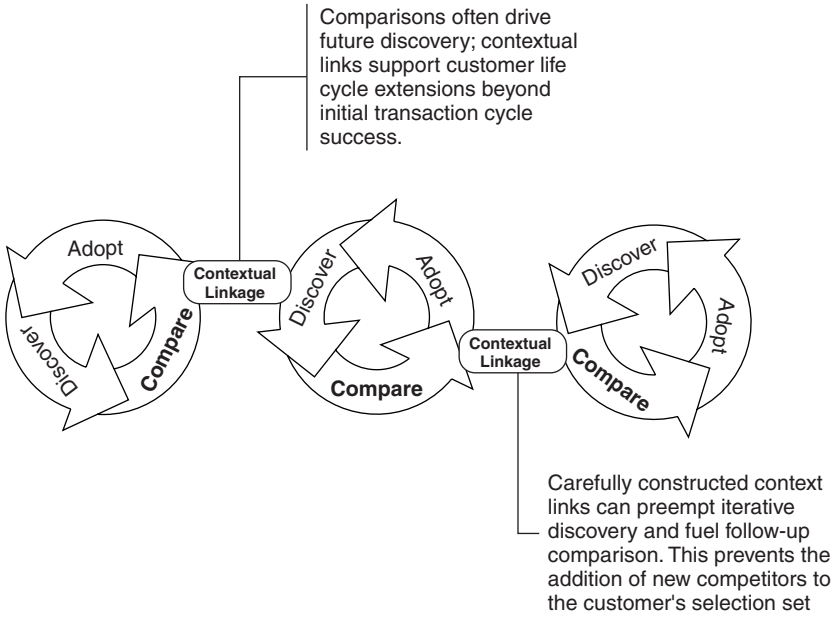

Figure 1.5 Customer life cycle as a series of transaction cycles.

point for customer data, making it the logical place to institute the pattern of customer interactions. Establishing a pattern supports all kinds of analysis of customer behavior and classification, thus supporting life cycle management. Figure 1.5 illustrates the chain of value that is derived over the life of a customer relationship. Trust, loyalty, and word-of-mouth advertising are all benefits accruing to the e-business that is cognizant of the need to ensure persistent value via its electronic channels.

Supporting Partner Relationship Management

Partnership is the process by which two business entities agree to a mutual benefit and risk relationship. Like a marriage, it requires care and nurture; this is partner relationship management (PRM). Prerequisites to PRM include:

- Partner discovery and selection
- Partner interaction support
- Partner performance metrics

The steps in this process are the same for any enterprise wishing to engage in e-business partnerships:

1. **Identify key criteria for selecting and retaining partners.** Is the partner continuing to supply the agreed-upon goods and services at the service levels (metrics) agreed upon prior to actual engagement in interaction.
2. **Define bilateral value components and metrics.** Value components include quality assurance of delivered product, continuous improvement plan, shared benefit from cost reduction, and mutual business practice acceptance.
3. **Identify key information infrastructure components.** These components include site accessibility, communications interchange, data interchange standards, and recovery strategies.
4. **Establish service levels and contingency plans.** This includes outage limitations, automatic failover time expectations, and alternative data delivery strategies (like bulk transfer of transactional data if real time is not possible).
5. **Drive shared understanding and agreement.** Essentially, this means that both organizations have a shared understanding and expectation of the value and limitations of the agreement.
6. **Conduct regular reappraisals of value delivery.** In any partnership, both organizations are in the process of dynamic change. The creation of a standardized expected reappraisal process moves the need for change from crisis to routine business.
7. **Do periodic environmental assessments to discover changing requirements.** Often an infrastructure design for a point in time will not scale in exponential business growth. The entire architectural framework right down the facility level (power, space, air conditioning) needs to be reexamined.

The critical tasks delineated in this list must be supported by the electronic interface chosen for developing peer-to-peer relationships. In the past, attempts to connect links in the supply chain were limited by the electronic interface available. Electronic Data Interchange (EDI) and related efforts to forge concrete links between partners emphasized customer source system interfaces and security. In contrast, the new paradigm emphasizes open standards for connecting source systems across

the Internet, which resembles a broadcast, rather than a dedicated, network model. This network model opens a much broader universe in which to discover and recruit business partners. The challenge, of course, is learning to navigate this huge universe of choices effectively. Doing so requires some standards for communicating interests. Enter the registry of potential partners.

Registries

Registries are a tried-and-true means of publicizing the availability of potential trading partners. Phone books, trade directories, and business registries abound, even in electronic form. The problem is that these electronic registries and directories conform to their own formats and content standards, making the search and retrieval of information virtually impossible. Standards bearers emerged to address this problem. Anxious to enable electronic dialog among trading partners, technology providers and users alike have banded together around a common focus: the formulation of standardized presentation and content for business-to-business registration. The presentation layer is constructed in the eXtensible Markup Language (XML); the content is under development. The idea is to present registry content (i.e., entries) in a standard format that categorizes potential partners.

This effort, known as the Uniform Discovery, Description, and Integration Project (UDDI), is supported by technology leaders, which include IBM, Ariba, and Microsoft. UDDI is a model for enabling discovery of business partners in an e-business environment. Figure 1.6 illustrates the directory approach taken by UDDI.

Meeting the Challenge of the Current E-Business Infrastructure

What is the best way for customers to relate to our businesses? Any way they want, be it to click, call, fax, write, or visit us. The apparent simplicity of these forms of communication enables comfortable, easy ways for customers and enterprises to relate to each other. The key word here is "apparent," because it is the illusion of simplicity that significantly raises expectations for customers and partners. Customers, employees, partners, and stakeholders all are demanding greater access to information

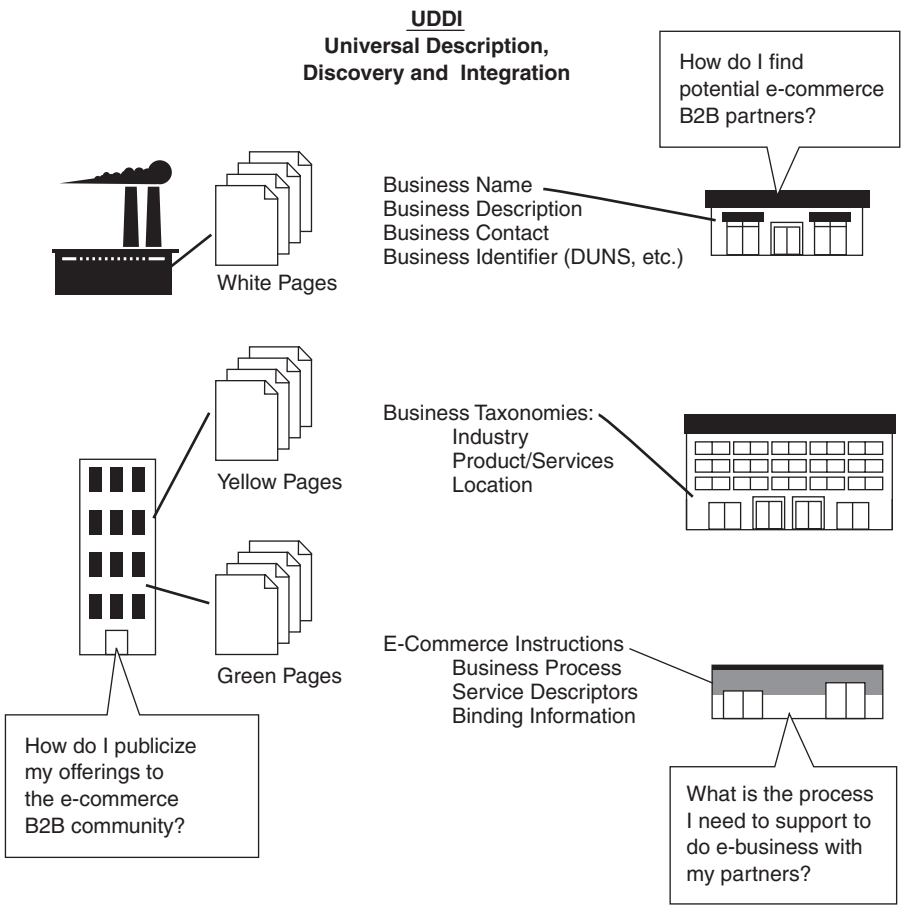

Figure 1.6 UDDI directory services.

that is relevant to their respective needs and interests. When effectively integrated with an existing infrastructure, enterprise portals can profoundly influence relationships with customers—consumers, employees, partners, and stakeholders—by providing more accurate, timely, and context-sensitive information to support understanding and decision making. Portals leave the information infrastructure open to escalating demands, and heighten the need for scalable infrastructure.

Recent developments in portal technologies are driving enterprises to place a premium on knowledge—knowledge of the many ways customers want to conduct business with them. Strategically integrating information about customers, products, and transactions to establish, track, under-

Table 1.3 E-Business Evolution

E-BUSINESS STAGE	CHARACTERISTICS
First Generation	Site created with as much content as possible. Branded convenience.
Second Generation	Enterprise Application Integration as a means to jump-start e-business. Business exchange participation.
Third Generation	Reinvestment in data warehouse technologies to support e-business data volumes and velocity. Adoption of scalable, distributed processing and storage networks.
Next Generation	Agent-based activity to increase data volume and support "daily electronic routine." Partner relationship management to prove its value. Information infrastructure viewed as enterprise asset.

stand, and develop relationships across time represents the opportunity as well as the challenge all corporations face in conducting e-business today. Strategic information integration is not a new challenge.

Initial efforts made by well-established companies entering the e-business arena often fall under the heading of Enterprise Application Integration (EAI). EAI promises fast, easy connectivity among the legacy source systems and their new Web-based counterparts. EAI is very much like a rapid application development effort, although it generally occurs in parallel processes. It is important to note, however, that the benefits of connecting disparate source systems with varying levels of detail and frequency rapidly dissipate when this virtual integration is relied upon for decision support. Certainly, EAI is a valuable tool for connecting source systems to Web-based applications, but it's essential to keep EAI in perspective as a source system function, to greatly reduce the likelihood of architectural failure. To that end, consider the evolution of e-business, some of whose characteristics are described in Table 1.3.

Infrastructure Opportunity: Warehouse to Web, and Back

Today, business revenue and profit growth potential are driven not just by physical presence, but by information infrastructure. Thus, businesses engaged in electronic commerce require the support of a robust and expandable infrastructure. Various channels require navigation to, and

exchanges with, the critical infrastructure components; therefore, global corporate growth is predicated on each layer of this infrastructure.

Once the power and scalability of a data warehouse-based Corporate Information Factory (CIF) are understood, further investments in this solution begin to yield tremendous results. Utilizing the data warehouse as a foundation for e-business success offers immediate and lasting benefits. When the data warehouse is utilized as the integrated source for customer, product, and transaction analysis, e-business initiatives can be implemented much more quickly. Moreover, the data warehouse is the best possible place to integrate newfound customer profile data to support logistical operations and Web-based transaction systems.

Infrastructure Challenge: Web to Warehouse

Monitoring and capturing outcomes of electronic information exchange is as important to e-businesses as extending information to the user. The rapidity of interactions in all e-business channels requires processing real-time information at the source level, and then analyzing those results in near real time. Finally, feedback must be supplied to the source systems, to support customer knowledge and contextually valid e-business interactions.

These requirements highlight the need for an architectural approach, one that is capable of supporting iterative enterprise growth. That architecture exists in the form of the CIF. The recent addition of mobility in the usage mix adds yet another dimension to the architectural burden. Supporting remotely connected users is not a simple matter of reformatting dynamic screens for different access devices; decisions must be made about how fast to capture, analyze, and update the profiles of e-business users in each layer of the information infrastructure. Usage patterns for Web-based applications are developed based upon both user preferences for delivery channels and content. This conduit distinction is already proving valuable in geographic regions and markets that rely heavily on wireless access.

An enterprise's capability to support these new forms of interaction depend on the maturity of its information infrastructure. "Reaching maturity" is often the result of the way an enterprise chooses to view its use of information technology. Those who view their information sys-

tems as an expenditure will lose ground to their competitors who treat their information systems and contents as corporate assets.

The Financial View of Information

Information asset management is the process of managing hardware, software, and intellectual property as if it were the equivalent of any other capital business asset. Information asset management is an outgrowth of various information-engineering efforts. Product-based functionality aids in the construction, management, and distribution of information. The asset level is generic to all corporate information. Vendors that dedicate themselves to this approach take the first step toward tying investments in their products and process to corporate performance. A more evolved understanding involves classifying information assets in a way that supports derivation of a return on these assets.

The key to understanding information asset value from a financial viewpoint is as a relationship between project-based spending and business impact. The problem with traditional project-based spending is that it seeks to quantify results as a direct result of the project, which is akin to saying that events equal consequences. There is always a translation or execution layer involved when events take place. Interpreting results requires inference and context; results are viewed against selected metrics and within a corporate or technical context. Projects are not completed serially; they are parallel in nature and often span changing economic and business cycles. These factors require a reconsideration of project impact evaluation.

Project Spending, Corporate Investment

Project-based spending contributes to corporate performance both locally and globally. Local contributions are the general focus for project approvals. There is an obstacle (a pain point) recognized by a project sponsor and addressed by technology and business analysis. E-business project dynamics are designed to alleviate this pain in a tactical manner. Information technology managers are constantly challenged to align these e-business projects with existing standards and planned investment patterns. Inevitably, compromises must be made, and often they

Table 1.4 Benefits of Treating Information Components as Assets

CIF COMPONENT	INFORMATION ASSET VALUE	RETURN ON INFORMATION ASSETS
Source Systems	Ensures operational efficiency. Reports in real time.	Accelerates revenue growth, operational excellence, customer loyalty.
Extract, Transform, and Load Tools	Connects disparate sources, and maps them for integrated use. Translates business rules and processes into working data models. Manages ongoing processes, including change data capture and business/data model maintenance.	Operational efficiency arises from single group of business and data analysts. Profitability increases due to enhanced ability to acquire and deliver new information sources, particularly merged and acquired businesses.
Operational Data Store	Updates customer profiles from DW. Supports Web applications with customer profile data. Provides extended applications data availability for operational reporting.	Rapid transit area for integrated data protects profit margins by supporting rapid operational decision making. Prevents redundant spending when adopting e-business initiatives.
Data Warehouse	Integrates disparate source data into a "single version of the truth." Accumulates historical data for trends analysis. Improves information quality.	Enhances profitability through reduced overall expenditures, increased availability, and improved information quality.
Data Marts	Breaks out line of business or other segmented information that is consistent with enterprise usage. Provides insightful decision support and strategic analytical support.	Improves revenue and profit margins through informed line-of-business decision-making and implementation. Accelerates customer acquisition through rapidly updated marketing effectiveness measures.

lead to improved views of technology adoption patterns. Recent introductions of distributed processing, storage, and access systems drive many of these compromises.

The core challenge in converting e-business project-based spending into a capital asset. It is only by taking this global viewpoint that a return on

information equity can be derived and compared across projects, business lines, and economic cycles. Table 1.4 identifies some of the benefits of this information asset viewpoint.

Summary

The Internet's capability to directly connect market forces to producers opens new delivery channels and introduces new exchange methods; but it raises some very old problems as well. E-business requires more than bandwidth; it requires infrastructure—physical, human, and technology-based capital investment. Physical connectivity has been improving nationally and internationally for decades, with the long-standing goal to reduce the distance barrier for consumers, who are more likely to visit a closer store. Easier connectivity and/or geographic convenience helps to increase retail volume.

Meeting the challenges posed by e-business requires a long-term approach. Expenditures in information and other technology must be viewed as investments in infrastructure. The vendors and service providers who build these infrastructures must be held accountable for their efforts, meaning that the infrastructure must work well in addition to looking good—an attractive interface is not enough to ensure e-business success. Real success in e-business is measured in terms of scalability, reliability, and sustainability.

The rest of this book examines how the CIF can successfully incorporate an infrastructure that comprises these essential components.