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# ELECTRONIC COMMERCE: THE NEW FOUNDATION FOR TRADE



## Abstract

The incorporation of electronic communication technologies in commercial activities is fundamentally altering the competitive environment for business around the world. In particular, technologies that facilitate commercial exchanges (e.g., electronic securities markets, electronic data interchange, computerized reservation systems, point-of-sale systems, debit cards, etc.) are altering the economic and financial possibilities for profit making and customer satisfaction. This white paper, drawing on a number of real-world examples, reviews the effects of conducting commerce via an electronic infrastructure. It proposes a definition of electronic commerce, a framework for analyzing the market for electronic commerce technologies and services, and a market research program that will enable vendors and users of electronic commerce technologies to better understand their competitive situation and alternatives. The paper is 48 pages in length and contains 18 exhibits. A quantitative market sizing is included as well as an index of companies and organizations.

the 1990s, the number of people with a mental health problem has increased by 50% (Mental Health Foundation 2000). The prevalence of mental health problems has increased in the general population, and the incidence of mental health problems has increased in the prison population.

There is a growing awareness of the need to address the mental health needs of prisoners. The Department of Health (2000) has published a strategy for mental health services, which includes a commitment to improve the mental health of prisoners. The Department of Health (2000) has also published a strategy for mental health services, which includes a commitment to improve the mental health of prisoners.

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**Electronic Data Interchange Program (EDIP)**

***Electronic Commerce: The New Foundation for Trade***

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the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1999. The public sector has grown from 10% of the economy to 15% of the economy.

There are a number of reasons for this increase. One of the main reasons is the increasing demand for public services. The population of the UK is increasing, and the demand for public services is increasing. This is particularly true of the health service, which is facing a major challenge in the 21st century. The demand for public services is also increasing because of the increasing demand for social services. The demand for social services is increasing because of the increasing demand for care for the elderly and the disabled.

Another reason for the increase in the public sector is the increasing demand for public services. The population of the UK is increasing, and the demand for public services is increasing. This is particularly true of the health service, which is facing a major challenge in the 21st century. The demand for public services is also increasing because of the increasing demand for social services. The demand for social services is increasing because of the increasing demand for care for the elderly and the disabled.

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the 1990s, the number of people in the world who are under 15 years of age has increased from 1.1 billion to 1.5 billion, and the number of people aged 65 and over has increased from 0.2 billion to 0.5 billion (United Nations 1999).

There is a growing awareness of the need to address the needs of the young and the old. The United Nations (1999) has identified the need to address the needs of the young and the old as one of the eight Millennium Development Goals. The United Nations (1999) has also identified the need to address the needs of the young and the old as one of the eight Millennium Development Goals.

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the 1990s, the number of people in the UK who are aged 65 and over has increased from 10.5 million to 12.5 million, and the number of people aged 75 and over has increased from 4.5 million to 6.5 million (Office for National Statistics 2000). The number of people aged 85 and over has increased from 1.5 million to 2.5 million.

There is a growing awareness of the need to develop services to meet the needs of older people. The Department of Health (1999) has published a strategy for older people, which sets out the government's commitment to improve the lives of older people. The strategy is based on the following principles:

- Older people should be able to live independently and actively in their own homes.
- Older people should be able to participate in the community and in the life of the country.
- Older people should be able to access the services and facilities they need.
- Older people should be able to live in a safe and secure environment.

The strategy also sets out a number of key objectives, including:

- To improve the health and well-being of older people.
- To improve the quality of life of older people.
- To improve the financial security of older people.
- To improve the housing of older people.
- To improve the transport of older people.

The strategy also sets out a number of key actions, including:

- To improve the health and well-being of older people by promoting healthy living and preventing illness.
- To improve the quality of life of older people by providing opportunities for social and community participation.
- To improve the financial security of older people by providing financial advice and support.
- To improve the housing of older people by providing housing advice and support.
- To improve the transport of older people by providing transport advice and support.

The strategy also sets out a number of key targets, including:

- To reduce the number of older people who are in poor health.
- To reduce the number of older people who are in poor housing.
- To reduce the number of older people who are in poor financial security.
- To reduce the number of older people who are in poor transport.



## Introduction

As business moves from being conducted in a paper-based to an electronic-based environment, profit opportunities change. Electronic, computer-telecommunication systems—particularly where software, services and intellectual property play a large value-adding role—bring about new distributions of costs, revenues and competition within an organization, within an industry, and within an entire economy.

Electronic systems allow for the introduction of new products and services to business and consumer markets. Furthermore, users and vendors of information services and technologies are finding that their respective business operations and strategies are becoming increasingly intertwined, with the user relying on the vendor for maintenance and upgrades and the vendor relying on the user to increase its market share and enhance its ongoing technical competence.

Moreover, because information systems are often equivalent/identical to the value-adding function of the user's business itself, the user of information technologies may opt to sell its system (particularly software and services) and, in a way, replicate its business or a portion of its business for a profit. In this way, an information service user becomes an information service vendor.

The shifting profit opportunities and the intertwined, dual identities of market participants makes for a very dynamic competitive environment, one increasingly difficult for executives, managers and entrepreneurs to make strategic decisions about how to apply information technologies and where to look for new commercial opportunities and risks.

Besides the difficulty in assessing competitive opportunities and risks, the emerging electronic environment in which commerce is conducted is changing the nature of the economy. According to some estimates, "information work" accounts for as much as 70% of the GNP. Since





information work is the domain of electronic, information technologies, applying these technologies to economic activity portends a major reconfiguration of work, business organization, and productive resources.

## A

### Objective of This Report

To describe this fluid techno-business environment, INPUT proposes the term "Electronic Commerce™." While this term has been used casually by others in the information technology industry (and in particular, by the Department of Defense as the name of a recent program to automate defense procurement), INPUT has decided to make it a formal distinction classification and the basis for a commercial product: INPUT's market research and strategic planning services.

This paper and future reports intend to:

- Give the term Electronic Commerce™ real-world definition
- Examine the competitive implications and opportunities of Electronic Commerce™
- Identify a strategic framework for businesses to compete in an Electronic Commerce™ environment
- Spell out the markets of Electronic Commerce™ products and services
- Bring clarity to a rapidly evolving and sometimes confusing historical trend

## B

### Electronic Commerce: Examples

Examples of electronic commerce technologies can be found across all industries, such as the following, described by Peter Keen:

- Retailing: point-of-sale (POS) and on-line purchasing systems to manage stock levels and pricing
- Distribution: electronic data interchange (EDI) and trade management systems that handle letters of credit, trade documentation, payments, shipping, and so forth to reduce delays and paperwork
- Banking: ATMs and cash management systems to facilitate fast, cheap, reliable payment and to reduce the costs of brick and mortar branches
- Insurance: sales force automation and image technology for the management of paperwork and policy issues

the 1990s, the number of people with a mental health problem has increased by 50% (Mental Health Foundation 2000). The prevalence of mental health problems in the UK is estimated to be 10% (Mental Health Foundation 2000).

There is a growing awareness of the need to address the needs of people with mental health problems. The Department of Health (2000) has set out a strategy for mental health care, which aims to improve the lives of people with mental health problems and to reduce the burden of mental illness on society. The strategy is based on three main principles: (1) to promote the recovery of people with mental health problems; (2) to provide a range of services to meet the needs of people with mental health problems; and (3) to ensure that people with mental health problems are treated with respect and dignity.

The strategy is based on the following assumptions: (1) that people with mental health problems are individuals with unique experiences and needs; (2) that people with mental health problems are capable of recovery; (3) that people with mental health problems should be treated with respect and dignity; and (4) that people with mental health problems should be given the opportunity to participate in decisions about their care and treatment.

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- Airlines: reservation systems and on-line yield management and pricing systems that manage seat inventory to maximize yield and facilitate access by travel agents
- Manufacturing: purchasing systems, computer-integrated manufacturing, and electronic data interchange to track unit costs and quality and to manage just-in-time inventories
- Magazine and newspaper publishing: satellite distribution to ensure timeliness

Moreover, within a single company, electronic commerce technologies are many. Sears, Roebuck & Company is an excellent example. Some of its electronic commerce technologies include:

- On the income side:
  - Consumer electronic bill payment and Prodigy banking
  - The collection of rent payments from commercial real estate tenants
  - Direct debit of insurance premiums
  - Direct debit of maintenance agreement fees
- On the operations side:
  - Cash concentration
  - Direct deposit of payroll
  - Direct deposit of travel expense compensation
  - Discover™ card merchant settlement
- On the expense side:
  - Credit line fee payments
  - Real estate rent payments
  - Utility payments
  - Payment of pension benefits
  - Annuity payments
  - Tax payments
  - Financial EDI to merchandise sources

Whether from an industry or an individual company viewpoint, electronic commerce is how corporations and consumers participate in market exchange using electronic communication technologies.



**C**

**Electronic Commerce:** Commerce, by definition, is an act of communication (see Exhibit I-1).  
**Definition**

EXHIBIT I-1

**Webster's Definition of Commerce**

- Commerce (1) social intercourse: dealings between individuals or groups in society: interchange of ideas, opinions, or sentiments: interrelationship, connection, or communication. (2) the exchange or buying and selling of commodities especially on a large scale and involving transportation from place to place.

Electronic commerce is the augmentation of human communication with electronic information technologies. It can be defined as the end-to-end digital exchange of all information needed to conduct business. INPUT is interested in communication acts whose purposes are productive enterprise and the enactment of exchange or trade. In this context, INPUT's definition of electronic commerce is listed in Exhibit I-2.

EXHIBIT I-2

**Definition of Electronic Commerce**

- Electronic commerce is the electronic, network-based coordination of materiel, people, and processes that facilitates commercial exchange.



The market for electronic commerce services is measured by counting all expenditures by consumers or corporations for products or services that facilitate a commercial exchange transaction where the product or service is delivered or conducted electronically, possibly but not exclusively over an electronic network. For example, the telephone charge for the person ordering pizza from the local pizzeria is counted as an electronic commerce service expenditure, but the value of the purchase is not. The charge to use an airline reservation system is an electronic commerce charge, but the cost of the tickets is not.

It is important to note that commerce, as communication among people, happens among employees of the same organization as well as among employees of different organizations. In a generalized concept, all enterprises are chains of customers. Within a single enterprise, for example, the shipping department's customers are manufacturing; manufacturing's customers are sales, and so on. The chain of customers within a corporation connects the corporation's suppliers to the corporation's customers—a connection that is part of a vertical industry "value chain" of customers that ultimately delivers a product to a final consumer.

Characterizing organizations in this way, we can say that electronic technologies are enabling electronic commerce to happen *within* as well as *among* firms. The inclusion of intra-organizational activity as commerce is important, because automating an organization often leads to outsourcing an operation that was formerly performed by in-house staff. To be the most comprehensive in identifying the opportunities and possibilities that information technology generates, INPUT chooses to characterize commercial activity as occurring within companies as well as among them.

## D

### Technologies of Electronic Commerce

Electronic commerce facilitates the coordination and communication that occurs between suppliers and their customers throughout chains of value-adding activities and processes. The emerging electronic infrastructure that supports this communication allows for a wide spectrum of technologies and applications that go by a variety of names today.

A more descriptive but not exhaustive list of electronic commerce technologies is shown in Exhibit I-3.





## EXHIBIT I-3

**Technologies of Electronic Commerce  
(Constitutive and Enabling)**

- Data Network Services
  - Electronic data interchange
  - Electronic mail
  - Data base and on-line information services including: price, financial, and statistical data bibliographic, news, and archival full-text data credit card authorization data and credit history product catalogs, directory services
  - Automatic vehicle location
  - Computer-aided dispatch
  - Electronic order entry
  - Electronic buy-sell bulletin boards
  - Electronic funds transfer
  - Home banking
  - Cash management
  - ATM and POS networks
- Image Network Services
  - Facsimile, including auto fax generation and group broadcast
  - Document transmission
  - Check clearing
  - Credit card processing

the 1990s, the number of people in the UK who are aged 65 and over has increased from 10.5 million to 12.5 million, and the number of people aged 75 and over has increased from 4.5 million to 6.5 million (Office for National Statistics 2000).

There is a growing awareness of the need to address the needs of older people in the community. The Department of Health (1999) has published a strategy for older people, which sets out a vision for the future of older people's health and care. The strategy is based on the principle of 'active ageing', which is the process of maintaining and enhancing the health, participation and security of older people. The strategy also sets out a number of key objectives, including: to improve the health and well-being of older people; to ensure that older people are able to participate in society; and to ensure that older people are able to live in their own homes and communities for as long as possible.

The strategy also sets out a number of key actions that need to be taken to achieve these objectives. These include: to improve the health and well-being of older people by promoting healthy living and preventing illness; to ensure that older people are able to participate in society by providing opportunities for social and community participation; and to ensure that older people are able to live in their own homes and communities for as long as possible by providing support and services that enable them to do so.

The strategy also sets out a number of key indicators that will be used to measure progress towards these objectives. These include: the number of older people who are healthy and active; the number of older people who are able to participate in society; and the number of older people who are able to live in their own homes and communities for as long as possible.

The strategy also sets out a number of key challenges that need to be addressed in order to achieve these objectives. These include: the need to improve the health and well-being of older people; the need to ensure that older people are able to participate in society; and the need to ensure that older people are able to live in their own homes and communities for as long as possible.

The strategy also sets out a number of key actions that need to be taken to address these challenges. These include: to improve the health and well-being of older people by promoting healthy living and preventing illness; to ensure that older people are able to participate in society by providing opportunities for social and community participation; and to ensure that older people are able to live in their own homes and communities for as long as possible by providing support and services that enable them to do so.

## EXHIBIT I-3 (Cont.)

**Technologies of Electronic Commerce  
(Constitutive and Enabling)**

- Voice Network Services
  - Voice mail networks
  - Interactive voice response
  - Third-party telemarketing
  - Third-party customer support
- Transaction Processing
  - Credit card processing
  - Reservation systems
  - Payroll processing
  - Freight-bill processing
  - Electronic securities trading
- Other Processing
  - Laser printing
  - Field sales support services
  - Microfiche publishing
  - Disaster recovery and backup
  - Data entry
- Data Capture
  - Point-of-sale data capture
  - EDI transaction data bases
  - Smart cards
  - Debit cards
  - Automatic identification (bar coding, radio transponders, etc.)

A possible classification scheme for these technologies is shown in Exhibit I-4.

the 1990s, the number of people in the UK who are aged 65 and over has increased by 1.5 million, and the number of people aged 75 and over has increased by 1.2 million (Office of National Statistics 2000). The number of people aged 65 and over is projected to increase to 10.5 million by 2026, and the number of people aged 75 and over to 6.5 million (Office of National Statistics 2000).

There is a growing awareness of the need to develop strategies to meet the needs of the ageing population. The Department of Health (1999) has published a strategy for ageing, which sets out the government's commitment to improve the lives of older people. The strategy is based on three main principles: (1) to ensure that older people have the opportunity to live independently and actively; (2) to ensure that older people have access to the services and support they need; and (3) to ensure that older people are treated with respect and dignity. The strategy is being implemented through a number of initiatives, including the development of new services and the improvement of existing services.

One of the key initiatives is the development of new services to meet the needs of older people. This includes the development of new housing schemes, new care homes, and new community centres. The government is also investing in the development of new services to support older people with health and social care needs. This includes the development of new services to support older people with mental health problems, new services to support older people with physical health problems, and new services to support older people with social care needs.

In addition to the development of new services, the government is also committed to improving existing services. This includes the improvement of housing schemes, care homes, and community centres. The government is also committed to improving the quality of health and social care services for older people. This includes the improvement of the quality of mental health services, physical health services, and social care services.

The government's commitment to improve the lives of older people is reflected in its funding of research into ageing. The government has funded a number of research projects in the area of ageing, including research into the health and social care needs of older people, research into the development of new services, and research into the improvement of existing services. The government is also committed to supporting research into ageing through the provision of grants and other forms of financial support.

The government's commitment to improve the lives of older people is also reflected in its commitment to ensure that older people have access to the services and support they need. The government is committed to ensuring that older people have access to housing, care, and community services. The government is also committed to ensuring that older people have access to health and social care services. The government is committed to ensuring that older people have access to the services and support they need to live independently and actively.

The government's commitment to improve the lives of older people is also reflected in its commitment to ensure that older people are treated with respect and dignity. The government is committed to ensuring that older people are treated with respect and dignity in all

## EXHIBIT I-4

Electronic Commerce Technologies	
	Real time      Store and Forward
One-to-many	<div> <div>Bulletin boards</div> <div> <div>Stock quotes</div> <div>Directories</div> <div>Credit card data</div> </div> <div> <div>News</div> <div>D&amp;B profiles</div> </div> <div> <div>Bibliographic data bases</div> <div>Legal data bases</div> <div>(Broadcast messaging)</div> </div> </div>
	<div> <div>OLTP</div> <div>Messaging</div> <div>E-mail</div> <div>Fax</div> <div>Voice mail</div> </div>

## E

Electronic Commerce:  
Activity Levels

INPUT estimates that fully \$714 billion of inter-industry trade in the United States is facilitated by some form of electronic commerce. This represents almost one-third of the total trade conducted among industries. Exhibit I-5 shows the various industries and dollar value of purchases facilitated by electronic commerce. The electronic commerce sector index indicates the proportion of procurement by the industry that is done electronically. Ten would represent 100%. As shown, the most intensive users of electronic commerce are the food and automotive industries, each with an electronic commerce index of 5. This means that 50% of their purchases make use of an EDI or on-line purchase order, invoice, shipping advice, etc. The dollar amount purchased by each industry is referred to as intermediate inputs. These amounts, taken from Bureau of Economic Analysis/Department of Commerce data, are the total procurement expenditures by the given industry. They are different from total sales of a given industry: sales include profit/loss. These inter-industry procurement and electronic commerce values correlate to Exhibit III-6 (the EDI input-output matrix) on page III-11.

the 1990s, the number of people in the UK with a mental health problem has increased by 50% (Mental Health Act 1983, 1993). The number of people with a mental health problem in the UK is estimated to be 5.5 million (Mental Health Act 1983, 1993).

There is a growing awareness of the need to improve the lives of people with mental health problems. The Mental Health Act 1983 (1993) was amended to give more power to the community. The Mental Health Act 1983 (1993) was amended to give more power to the community. The Mental Health Act 1983 (1993) was amended to give more power to the community.

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## EXHIBIT I-5

## Inter-Industry U.S. Trade Facilitated by Electronic Commerce

Industry	Total 1985 Intermediate Inputs (\$ Billions)*	Derived 1990 Intermediate Inputs (\$ Billions)**	Electronic Commerce Sector Index	1990 Dollar Value Facilitated by Electronic Commerce (\$ Billions)
Oil/gas	182	206	4	82
Chemical	86	97	3	29
Defense/ordnance	13	15	2	3
Food	222	251	5	126
Textile	36	41	2	8
Tobacco	10	11	3	3
Apparel	34	38	3	12
Paper	58	66	1	7
Print/publishing	58	66	2	13
Steel/metals	140	158	3	48
Machinery	60	68	2	14
Office equip./supplies	54	61	2	12
Hardlines	17	19	2	4
Automotive	131	148	5	74
Aircraft	36	41	3	12
Other trans. equipment	16	18	2	4
Transportation services	106	120	4	48
Wholesale/retail distribution	251	284	3	85
Finance/insurance	144	163	3	49
Real estate	120	136	1	14
Hotels/amusement	59	67	3	20
Auto repair	45	51	1	5
Health/education	156	176	2	35
Federal government	24	27	1	3
State/local government	38	43	1	4
Total	2,096	2,371		714

\* Based on Bureau of Economic Analysis' 1985 input-output data

\*\* Based on annual GNP growth of 2.5%





**F****INPUT's Plan for Studying Electronic Commerce**

This white paper sets the stage for ongoing research in electronic commerce. The next phase of the research will be case studies of trading communities and how electronic commerce is impacting these communities. Communities are similar to vertical markets but have a wider scope because a given company may trade "horizontally" to a given vertical market (for example, Monsanto trades with companies in the pharmaceutical, paper, plastics and many other vertical industries).

INPUT will provide electronic commerce case studies of the following trading communities:

- Health care (including the pharmaceutical and medical supplies manufacturing and health insurance industries)
- Retail, apparel, and textile trading community
- Publishing, communications and education
- Transportation and international trade
- Government
- Grocery industry
- Oil and chemical industries

Each case study examines the current institutions, markets, and competitive environment of the given community and its subsectors. Each study analyzes:

- How electronic technologies impact the number and efficiency of transactions among participants in the community
- How the structure of the community changes with electronic commerce
- The dollar amount of user gain from and expenditure on electronic commerce technology
- The issues and trends concerning the adoption of electronic commerce technologies (e.g., standardization, financing, changes in business practices, etc.).

In addition to the case studies, INPUT will continue to develop the concept of electronic commerce, identifying the critical issues and distinctions that allow managers to make effective decisions within an electronic commerce competitive environment.





## Effects of Electronic Commerce

The networked economy is producing new commercial phenomena such as global manufacturing, global financial markets, and frequent buyer programs. There are many ways of bringing some kind of cognitive order/classification to the multifarious phenomena. We can look at how electronic commerce helps companies compete on cost and product differentiation (Porter's distinctions); how it helps markets clear and efficiently allocates resources (traditional economics approach); how it changes the business game—the playing field, the players, the rules, the strategies (a game theory approach).

To keep it simple INPUT will examine the phenomenon of electronic commerce in terms of how it:

- Redefines organizational and industrial structures and the roles of employees
- Allows organizations to make new offers in the marketplace
- Helps organizations reach new customers and block competition
- Helps organizations satisfy existing customers

### A

#### Redefines Organizational and Industrial Structures and the Roles of Employees

Electronic commerce will be realized by a movement from a discrete paper-based economy to a fully integrated electronic network- and computer-based economy. This seemingly straightforward migration has profound and far-reaching implications about how businesses and industries (including public-sector institutions) organize themselves to accomplish work.

Applying information technology to customer chains—intra- and inter-organizational—often eliminates the need for intermediaries within the chain. Elimination of intermediaries is where the inherent efficiency of information technology is fully exploited. The extra supplier-customer



handoffs—transactions—that were required in a paper-based commercial environment are no longer needed with electronics. (This is also where the greatest resistance to change and reluctance to implement occurs, because eliminating intermediaries means eliminating jobs.)

Generally, electronic commerce:

- Enables trading partners and whole value chains to tighten up their inter-organizational linkages
- Reduces the number of transactions between work groups, departments and organizations
- Allows companies to take advantage of vertical integration efficiencies without requiring them to own supply chain vendors
- Allows for entirely new organizational and industrial structures to emerge

Understanding the effects of electronic commerce enables users and vendors of information technologies to better compete in their traditional markets and to bring innovative new products and services into new markets. Moreover, the adoption of electronic commerce by public and private enterprises results in a blurring of the distinction between “user” and “vendor” (consider, for example, GM, which, through EDS, is one of the largest systems integrators; or Sears, which now offers value-added network services and software).

### **1. Industrial and Organizational Restructuring**

Incorporating electronic and automated procedures in a value chain or chain of customers allows for the removal of many intermediaries within the chain. Within a single organization, back-office systems handle much rote, repetitive data processing that formerly required armies of clerks. Within a value chain (for example, the textile/apparel manufacturing/retail chain) whole businesses can be eliminated (for example, certain warehousing functions) because communication and coordination between the key value-adding agents is better. Mervyn's and Hills Department Stores, Inc. are two retailers that have reduced reliance on distribution intermediaries and have direct deliveries made to stores from manufacturers. EDI has been responsible for this more efficient communication.

A specific example of how electronic commerce can fundamentally restructure an industry is the library subscription business.



A business niche exists to facilitate the communication between magazine publishers and their library (corporate, university, and public) subscriber-customers. Subscription agencies (such as Faxon and Ebsco) handle the detail-packed, one-to-many relationships that libraries have with publishers, and, in turn, that publishers have with libraries. Librarians spend a lot of time ordering, cancelling, and inquiring about missing issues of magazine subscriptions. Likewise, publishers spend a lot of time responding to these customer queries. The amount of work is large because libraries often manage several thousand subscriptions. The liaison function between publisher and library-subscriber is what subscription agencies offer to handle.

A library standards group, with representatives from subscription agencies, libraries, and publishers, is developing standardized electronic data interchange (EDI) data formats that would allow librarians to order from, pay, and query any given publisher. Making a standard interface between magazine buyers and publishers to streamline or merge the procurement functions of libraries and the sales and support functions of publishers possibly threatens the need for a subscription agency.

If subscription buyers at libraries can communicate with any publisher through a single workstation, why use an agency? Potentially, the same amount of work for ordering and filing claims for missing issues is required of libraries as before EDI; now all these message types can, in a keystroke, be sent to multiple publishers. In filing a claim for a missing issue of a magazine, for example, a librarian will have to fill out the publisher's address details, its purchase order number, the title of the periodical, etc.—whether the librarian is sending the claim to the agency or directly to the publisher (or to a third-party network provider/clearinghouse).

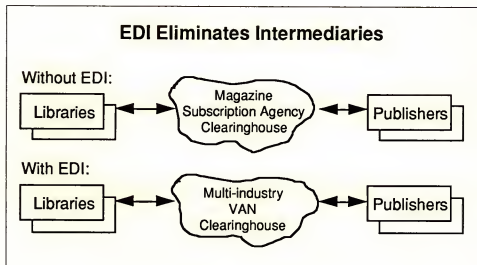
The subscription agency provides a service to libraries by consolidating a library's many subscription orders and claims. The agency is the library's single point of contact for subscriptions from multiple publishers. Libraries can save processing hassles by dealing with just one source. The agency provides added value in that it performs a variety of sorting, consolidating, and routing procedures related to ordering, billing, and claims monitoring that otherwise cause headaches to librarians who are responsible for hundreds, sometimes thousands, of subscriptions.

But all these sorting, consolidating, and routing procedures potentially can be automated. Using standardized, structured electronic messages—EDI—software and networks can perform these procedures instead of clearinghouse clerks (See Exhibit II-1).





## EXHIBIT II-1



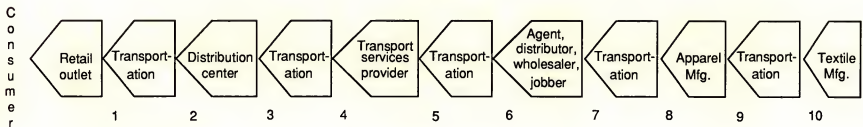
The initial data entry that a librarian performs (for a subscription order, an invoice payment or a claim submission)—data entry that the librarian would have to perform with or without EDI—is all that is really needed to set in motion the kinds of services that agencies provide. The librarian fills out subscription orders and claims complaints, pushes a button, and the translator looks up addresses and routes communications. With EDI, the library's single point of contact with its many publishers becomes the library's EDI software platform. There is no need for a clearinghouse/subscription agency. The clearinghouse is part of the system: its function has become a service of software routines built into the electronic network.

It is estimated that it takes 66 weeks from the time a piece of cotton is harvested to the time a shirt, fabricated from that cotton, is purchased by a consumer in a retail store. Ninety-eight percent of the time during that 66-week period, the product, at whatever stage of production it is in, is sitting idle—no transformative work is being performed on it; it is sitting in a queue, warehouse, on a store shelf, etc. Electronic commerce aims to reduce this idle time so that working stock is continually being converted to a valuable final product in one uninterrupted value-adding series of processes. Exhibit II-2 depicts how the value chain of textiles, apparel manufacturers and retailers could reduce the number of transactions in the value chain through the adoption of electronic commerce.



## Paper-Based versus Electronic-Based Industry Structure

### Using Paper:



10 handoffs; 66 weeks

### Using Electronics:



4 handoffs; 3 weeks

The number of players and transactions is reduced



Another way electronic commerce reshapes an industry is that it allows companies—even competitors—to share market information where all participants benefit. For example, many pharmaceutical distributors and hospital buying agents have formed EDI consortia. A consortium contracts with a network processor to create aggregate sales reports from EDI traffic that flows through the network. The consortium is better able to manage its sales and hospital buying contracts.

Electronic commerce allows companies to restructure functional groups such as accounting or purchasing within the business. Many multi-divisional companies, for example Hewlett-Packard, use EDI to centralize their purchasing. Centralized purchasing is desirable because of potential volume discounts, more leverage with vendors and reduced company purchasing department costs through the elimination of unnecessary organizational redundancy.

By receiving EDI invoices from couriers, Pizza Hut can allocate courier expenses directly to specific franchises. Before, when processing paper invoices, it could not achieve this accounting exactitude.

Exhibit II-3 depicts how the Ford Motor Company restructured its accounts payable department when it converted its paper invoices and warehouse receipt documents into digital, electronic messages.

Electronic information technology provides new commercial opportunities that can lead to businesses changing their focus. Over time, this change of focus shows up as commercial evolution. Sears, the retailer, builds a huge data network infrastructure with its trading partners and stores. Eventually, Sears realizes that it can leverage its investment in this network by selling to any company that wants to use it. Sears shifts its business focus from retailing to offering network services. AT&T shifts focus from network services to credit card services. Nike doesn't manufacture shoes; it manages the manufacture and distribution of shoes. All manufacturing and distribution is done by third-party contractors. In addition to fostering evolution, information technology allows a company to focus on what it does best. Instead of getting caught up in the details of managing its data center, Kodak outsourced its management to IBM.

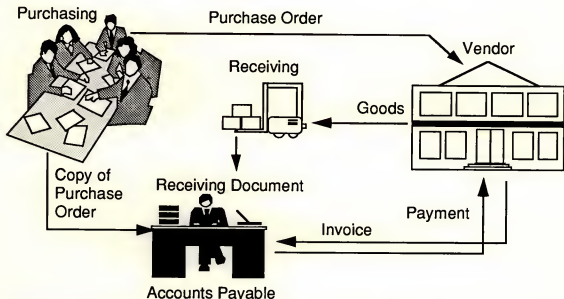
Exhibit II-4 depicts the combined effects of vertical integration within a value chain and organizational consolidation of business departments, which can shift the focus of a company and its competitive environment.



## EXHIBIT II-3

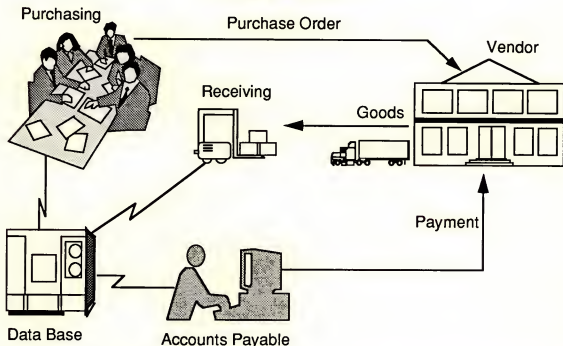
## Paper-Based versus Electronic-Based Organization Structure

### Using Paper:



More than 500 accounts payable clerks matched purchase orders, received documents and invoices, and issued payments. Mismatches were common.

### Using Electronic:



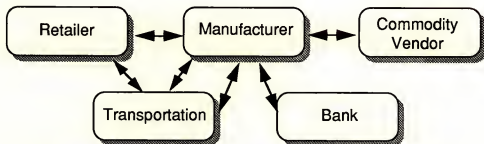
The new process cuts head count in accounts payable by 75%, eliminates invoices, and improves accuracy. Matching is computerized.

Source: Michael Hammer, *Harvard Business Review*, July-August 1990.

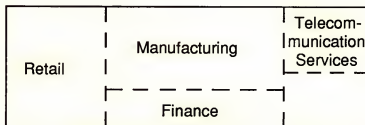




## EXHIBIT II-4

**Paper versus Electronic Commerce****Paper:**

- Separate corporations, each containing identical functional groups (accounting, operations, sales, etc.), focus on delivering single product
- Activity focused on disseminating/moving information

**Electronic:**

- Activity focused on satisfying the customer. Many functions (accounting, manufacturing, marketing, etc.) are outsourced.
- Examples: Sears, AT&T

Companies can get into different lines of businesses when adopting electronic commerce technologies, sometimes abandoning their original line of business. Baxter Travenol is now becoming a network provider for competing hospital supply vendors, including office supplies and medical supplies. American Airlines earns more from its SABRE reservation system than it does selling passenger airline seats. Sears is now a



value-added network provider—the result of building a huge network for its own internal purposes, including linking Sears to its key suppliers. Small customs brokering houses and transportation companies are becoming information clearinghouses and software system resellers and integrators rather than just offering their original services. AT&T is now a credit card/finance company.

## **2. Reduced Transactions**

Another way of looking at the industrial and organizational restructuring that takes place as a result of electronic commerce (EC) is how EC reduces the number of transactions associated with a commercial exchange. Transactions arise as a result of one person (or agency) transferring to another person or agency part of the work that goes into the delivery of the product or service. Costs are directly proportional to number of transactions. Whether it is taking out a mortgage, purchasing supplies, or transporting freight to a foreign destination, electronic technologies can reduce the number of transfers, and thereby, transaction costs.

As pointed out above, reducing transactions can fundamentally alter the way work is accomplished not only in organizations but also in whole industries or value chains. Some industries (for example, agenting and distribution) exist merely to handle differentials in transaction costs. With electronics, these industries, as collections of people, have no need to exist.

Eliminating the superfluous, secondary transactions of a targeted commercial transaction is one of the goals of electronic commerce systems.

In 1990, the New York Stock Exchange's market share of American equity trading, measured by the average daily volume of shares traded, fell below half for the first time ever. NASDAQ, just 20 years old, had achieved a 41% share. One big reason for NASDAQ's success is cost. Run by the National Association of Securities Dealers, which made an early bet that the future would be electronic and so created a market by hooking up the computers of member brokers, NASDAQ eliminates many of the floor expenses that weigh down any equity deal.

## **3. Redistributed Resource Usage**

Telecommuting—people working at home using a computer connected to a network—illustrates how electronic commerce shifts resource use. The potential implications of telecommuting on traffic, the auto industry, office real estate prices, home real estate prices, city tax bases, urban and rural land usage, etc. are vast. Exhibit II-5 illustrates this point.

the 1990s, the number of people with a mental health problem has increased by 50% (Mental Health Foundation 2000). The prevalence of mental health problems has increased in the general population, and the incidence of mental health problems has increased in the prison population.

There is a growing awareness of the need to address the mental health needs of prisoners. The Department of Health (2000) has published a strategy for mental health services, which includes a commitment to improve the mental health of prisoners. The Department of Health (2000) has also published a strategy for mental health services, which includes a commitment to improve the mental health of prisoners.

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## EXHIBIT II-5

**Electronically Redistributing Resources**

- Telecommunications allows companies to:

Bring the work to the worker  
not  
Bring the worker to the work

A recent study by the United States Telephone Association found that rural communities can use advanced telecom systems to overcome certain barriers to growth associated with economies of scale, distance from centers of finance or manufacturing, and limited access to information. For instance, in Kansas, advanced telecom facilities are playing a role in attracting new business to rural areas and in disseminating educational programs to rural areas.

In general, advanced fiber-optic telephone networks are giving the rural midwestern states of America a new opportunity in the rapidly growing market of telemarketing services. Telemarketing has emerged as the most sought-after industry in these states because it allows midwestern states to capitalize on their central time zone and plentiful, low-cost, accent-neutral labor force.

A broad range of telemarketing opportunities exist for states to pursue, including: direct mail merchandising operations, travel industry reservation centers, toll-free 800-number customer service centers, consumer credit processing centers, catalog sales operations, and insurance policy service centers. Companies such as American Express, Sears, GE Capital, J.C. Penney, US Sprint, Student Loan Marketing Association, and Best Western operate various service bureaus in Kansas and Nebraska.

**4. Variable-Cost Manufacturing versus Fixed-Cost Manufacturing**

Our industrial apparatus and economic system is becoming more and more reliant on network technologies. We are seeing the corporation's cost structure (and industry cost structure) become more and more one of fixed overhead costs rather than variable, labor-based costs as companies invest in more capital-intensive, technology-based systems. Electronic commerce is intrinsically a highly capital-intensive organization of the economy.



Information technology eliminates the many intermediaries within organizations, and within value-chains, goods and services can be moved from producer to consumer with fewer transactions. Fewer people are needed to accomplish the same results. Like agriculture's transition from being the principal employer at the turn of the century, many of today's industries are providing greater output with far fewer people (particularly banking, as noted in the recent book, *Technology in Banking*).

Consolidation is occurring in one industry after another—banking, airlines, autos, oil, retail, utilities. Information technology is spurring this consolidation because it allows a company to increase the scale of operations without necessarily increasing its labor component. With companies increasing their volume of service, the market soon has a production overcapacity. The surviving companies of an industry consolidation resemble utilities, or administrative monopolies. The cost structures of utilities are carefully regulated and optimized. Investments in the utility infrastructure are recouped by setting consumer prices based on fair rates of return. This same kind of product pricing may apply to companies advanced in EDI or other electronic commerce markets.

## 5. Changing Employee Roles

One of the chief impacts of information technology is the reduction of clerical labor. Also, the portion of managers' and professionals' work that is devoted to clerical functions can be greatly reduced.

For example, Frito-Lay delivery truck drivers spent almost an entire day per week accounting for inventories and reporting back to distribution points regarding their deliveries. By making this inventory process electronic (including EDI exchanges of data at the supermarket), Frito-Lay has reduced the amount of time spent by drivers to less than two hours per week.

Sales representatives and procurement officers—the two sides of the commercial transaction between typical large companies—are freed of the bureaucratic chores of paperwork and can concentrate on relationship building. Buyers at Digital Equipment's Augusta plant act as liaisons between suppliers and DEC design and manufacturing engineers. One buyer discovered that if DEC modified the specification on one component, the supplier of the component could promise much more punctual and better quality deliveries (because the modification would make the component easier to build). The buyer relayed this message to the product and manufacturing engineers who, eventually, redesigned the product and its manufacturing process. The overall flow of product from supplier to customer was improved as a result of the buyer having more "quality" time to work with the supplier and members of his own organization.





Margaritaville, a chain of restaurant/bars in Northern California, centralized its bookkeeping for all four restaurants through a network of PCs. Each night, a central PC polls each site's PC for the day's POS transactions. The data is fed into a central general ledger program. Formerly, without the network, each site had to rely on a low-wage bookkeeper to perform certain accounting operations and make decisions during the week. Professional accountants, trained and fully competent for such performance, would have been preferred but they weren't affordable. With the network bringing the dispersed data into a single repository, the controller of the entire organization can perform all the accountant-level operations herself at her workstation. The low-paid personnel at each site are no longer a weak link in the chain of reporting and decision-making.

## B

### Allows Organizations to Make New Offers in the Marketplace

In addition to allowing a company to spin off entirely new products (as mentioned above), electronic commerce allows a company to "fine tune" its offerings of existing products through product-feature and price differentiation.

#### 1. Product Differentiation

Electronic commerce systems support flexible, customized manufacturing because of the better coordination of productive resources that EC engenders. For example, the National Bicycle Company of Japan can make a bicycle for a customer in literally millions of different product configurations, options, colors, etc.

Thus, EC supports absolutely unique product manufacture: no two products are the same.

Another aspect of product differentiation is when a company that develops information technology (software or a data center utility) for its own internal purposes decides to commercialize the development and sell it externally. This is another way of characterizing the restructuring of business as mentioned above. Specific examples of organizations that have launched new products by developing them first in-house for internal purposes include the University of Southern California (the TOADS fourth-generation application generator), Bechtel Group, Inc. (computer-aided engineering and AI software), Mrs. Field's Cookies (retail store management software), Weyerhaeuser Co. (systems integration, disaster recovery, radio services) and Spencer Gifts (SIRIS retail system).



## 2. Price Differentiation

Electronic commerce also supports the "customization" of price. Frequent buyer programs, first introduced by airlines and now being used in grocery stores for consumer goods, may lead to a situation in which all prices are unique. The customer (who identifies him/herself at the point of sale with an electronic identification card or number) is given price discounts on products depending on how much of the product he/she has purchased in the past.

Frequent buyer (also known as yield management) programs rely heavily on discounting prices, changing them—in the case of the airlines—millions of times per day. As Peter Keen describes airline yield management systems, the aim is to ensure that (1) when a plane takes off it carries the highest profit, (2) that there are no empty seats that could have been sold at another discount, and (3) no seats are filled by passengers who paid a low fare while full-fare travelers were turned away. Only information technology, where purchasing activity can be monitored and prices can be updated by the second, makes yield management possible.

Frequent buyer/yield management programs are being introduced by credit card companies (namely, Citibank). Thus, purchases of any product entitle the purchaser to certain discounts as long as he/she uses the same credit card or payment facility.

Frequent buyer technology is being applied for corporate purchases. Hospitals have agents purchase pharmaceutical supplies for hospitals. Agent buying allows hospitals to get bulk purchase discounts. Pharmaceutical manufacturers like selling in bulk because it is more reliable and costs less per transaction. Nevertheless, to purchase in this way is information intensive. The administration of complex contracts that spell out which products, over what period of time are available from which suppliers and available to which hospitals must be managed. With electronic commerce they can be. Only electronic commerce systems permit this to happen.

In the commercial transactions between manufacturers and distributors (especially in grocery and pharmaceuticals), the distributor/buyer is often given a 2% (or some percentage) discount if it pays the invoice within 10 (or some other number) of days. Distributors negotiate these terms individually. Often it is these terms and the cash flow/float that derives from the payment timing that is a critical profit maker. A 2% price discount is an important benefit that offsets the foregone interest when a company acquires inventory.

Price differentiation, however, is tricky and companies must be careful to distinguish it from price discrimination. The Patman-Robinson Act is a section of law dealing with unfair pricing and competition.

the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995. The public sector has also become an important employer of women, with 5.5 million women employed in the public sector in 1995, compared with 4.5 million in 1980.

There are a number of reasons why the public sector has become an important employer of women. One reason is that the public sector has a high proportion of women in its workforce. In 1995, 88% of the public sector workforce were women, compared with 78% in 1980. This is due to a number of factors, including the fact that the public sector has a high proportion of jobs that are traditionally held by women, such as teaching, nursing, and social work. Another reason is that the public sector has a high proportion of jobs that are part-time or flexible, which are more attractive to women.

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### 3. Market Clearing (Supply Equaling Demand)

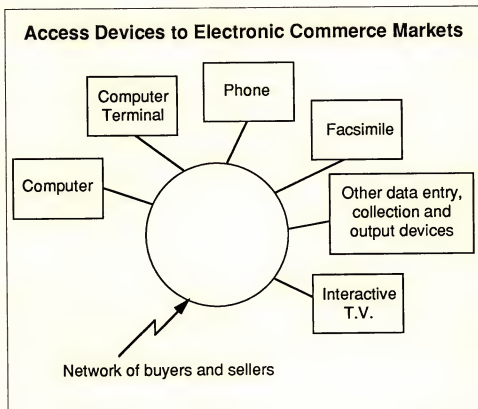
Another way of looking at price differentiation (as mentioned above) is that electronic commercial systems help to clear markets. Whether for programmed securities trading or airline reservations, computers can help buyers and sellers agree on price. Critics argue that programmed trading may introduce greater instability to already reactive marketplaces, and an investigation by the Securities and Exchange Commission is examining the issue. San Francisco-based Marketel International Inc. has software that makes it possible for each airline flight to have an infinite number of fares. The electronic marketplace can be extended to any relatively standard commodity.

## C

### Helps Organizations Reach New Customers and Block Competition

All markets are confined one way or another by physical constraints. Geographic distance (between buyers and sellers) has traditionally been the leading constraint. The constraint of electronic commerce is the requirement that any participant must have some kind of hardware device that connects him/her to the general commercial network. These devices are listed in Exhibit II-6.

EXHIBIT II-6





Investing in hardware, although a necessary condition for participation in an electronic marketplace, is usually not sufficient. Technical compatibility of the devices must be worked out, a process that has competitive consequences. Authorization and promises to pay access fees to be on the network are other important issues. The technical-political domain of the marketplace—who is permitted to participate—is a central competitive issue. Below are some aspects of this issue.

### **1. Locking In Customers, Locking Out Competition**

Electronic commerce systems, because they rely on a networked, technical platform, usually have some entry costs for the market participants. These costs include system components, terminals, network charges, and the integration of terminals with existing applications. SABRE and on-line hospital ordering systems for medical supplies are well-known examples.

Also, large network-based markets can be dominated by a single vendor which implements its own standard for communication (often referred to as a proprietary EDI system). Some examples are McKesson's Economost pharmaceuticals ordering system, Bergen Brunswick, even the UCS standard which was largely promulgated by Super Valu Stores—all could be considered proprietary.

When a company first offers an electronic ordering system, it wants to keep it proprietary, thus preventing its competitors from selling to its customer base. After a certain point, however, the company's customer base wants all of the market's suppliers to be reachable through a single, uniform system. The original vendor of the proprietary system can opt to allow its competitors into its own proprietary pipeline or to migrate its system to a standardized one. Standardized systems, in the end, are less costly for the vendor because the customers and competitors in the market can directly pick up the cost of building and maintaining the equipment and software infrastructure that maintains the electronic market.

### **2. Access and Flexibility**

Electronic commerce systems allow greater flexibility in that they deliver more options to buyers and sellers.

The federal government (General Services Administration and the Defense Logistics Agency) is devising a system that would broadcast all government request for quotations to a central data base repository. Any vendor throughout the country would be able to access the data base to make a response. By broadcasting the RFQs over a network, more vendors can respond than if it were broadcast by other means. International trade leads, gathered throughout the world by foreign embassy business attaches, are also broadcast over bulletin boards.





### 3. Standardization

Integrated, interorganizational systems of production typically require the coordination and operation of many complementary constituent parts. Industries that provide the parts for these systems will adopt standards to allow many vendors to provide compatibility among their respective products and allow users to assemble the necessary systems. Multi-component, multi-agent industries can be called networked industries; historical examples include railroads, electric power utilities, and telephone industries. All such industries utilize increasing-returns technologies that link their users—physically or otherwise—in a network. The dynamics of networked industries, which have strategic competitive implications for both users and vendors of network technologies, are highly relevant to electronic data interchange and other electronic commerce markets.

World commerce is being transformed from a paper standard to an electronic standard for business communication. The standardization of the new electronic environment has competitive and efficiency implications. Locking in on a certain standard (such as UNIX, or SPARC chips, or X12 rather than EDIFACT) determines the subsequent path of commercial development and opportunity. A standard may prove to be imperfect (such as the QWERTY keyboard) and a better one may be devised (the Dvorak keyboard) but, because the installed base of the sub-optimal standard is large, the costs of retrofitting are too high. In many cases the better standard is never implemented.

Setting standards involves anticipating and designing the future. These undertakings are often bound to fail to some extent. Capturing installed base, making products to accommodate sub-optimal standards, moving from old standards to new ones—all these activities are part of today's competitive electronic commerce environment.

### 4. Increasing Returns to Scale/Leveraged Recurrence

EDI systems initially cost more (in software, network services, and systems integration) than using traditional paper-based systems. Also, an EDI system will probably never entirely replace a paper-based system. Thus, for an EDI system to pay for itself, it must process a large volume of transactions. This is characteristic of all electronic commerce systems. Electronic commerce has an initial high investment and overhead cost that is justified only by the system being used in a great number of recurrent operations.



Like the telephone specifically, electronic commerce in general requires a certain critical mass of users before it becomes a useful medium. The first telephone subscriber has a useless system on his hands: there is nobody else to call. As the number of subscribers on the network expands, the usefulness of the network expands at an exponential rate, as is graphically demonstrated in Exhibit II-7.

There is an industrywide phenomenon associated with electronic commerce. Electronic payment services of all U.S. banks operate at the level of effectiveness of the least efficient bank. Because commerce takes place between the companies of all banks, all banks must have a common, standardized electronic payment format that they can all send to each other and process. Today, there are various formats for electronic payments. Only a handful of banks have the capacity to originate and process the most efficient formats. But their ability to do so is not exploitable because very few other banks can use this format. The payment system as a whole is diminished because not all banks have equal capacity. The more banks that can process the more-efficient formats (i.e., the greater the scale of optimal-format processing capacity), the greater the overall economic return of the payment system as a whole.

This can be called a “weakest link” or “lowest common denominator” syndrome/effect.

## D

### Helps Organizations Satisfy Existing Customers

Electronic commerce facilitates the making, negotiating and consummating of commercial exchanges. The goal is to make the operation of a given business not a barrier between the customer request (for service or product) and customer satisfaction. Historically, the time and cost for a company to fulfill a customer request has led to dissatisfaction. Appropriately installed, electronic commerce systems overcome these barriers to customer satisfaction.

The just-in-time (JIT) and quick-response (QR) strategies in manufacturing and distribution are well known. These strategies rely on more than just electronic information technologies. However, computers and telecommunication lines are critical components of the strategies. The objectives of JIT and QR strategies are to improve response time between supplier and customer and to continually reduce price. Examples of these strategies are many and further mention is not necessary.

### 1. Monetary Redefinition: Electronic Bartering

An interesting phenomenon that might be included in the category of customer satisfaction is how money and finance can be changed by information technology. Money and information technology are both tools that facilitate commercial exchange and, as such, are not different

the 1990s, the number of people in the UK who are aged 65 and over has increased by 1.5 million (1990–2000) and is projected to increase by a further 1.5 million by 2020 (Office for National Statistics 2001). The number of people aged 65 and over is projected to increase from 10.5 million in 1990 to 12.5 million in 2020, with the number of people aged 75 and over increasing from 4.5 million to 6.5 million in the same period.

There is a growing awareness of the need to develop strategies to meet the needs of the ageing population. The Department of Health (2000) has published a strategy for ageing, which sets out the government's commitment to improve the lives of older people. The strategy is based on three main principles: (1) to ensure that older people have the opportunity to live independently and actively; (2) to ensure that older people have access to the services and support they need; and (3) to ensure that older people are treated with respect and dignity.

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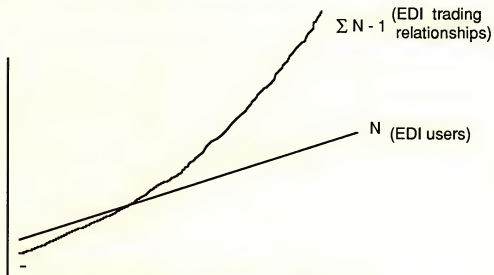
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## EXHIBIT II-7

**EDI Users versus EDI Trading Relationships****Relationship between Total EDI User Population and Potential EDI Trading Relationships**

$$\sum_{i=1, n-1} n - 1 = i$$

$n$  = total number of EDI-using companies

$i$  = total number of EDI trading relationships

$n$	$n - 1$	$\sum n - 1$
2	1	1
3	2	3
4	3	6
5	4	10
.	.	.
.	.	.
.	.	.



phenomena but different aspects of the same phenomenon. Money, in the words of John Reed, chairman of Citicorp, is "information on the move." As a "medium of exchange," information technology can be identical to money and can itself play the role of money.

Large companies that buy from each other (e.g., Motorola buys workstations from DEC; DEC buys semiconductors from Motorola) and use EDI to do so are finding that they can revert to "electronic bartering." Computers keep track of the transactions between the two companies. At the end of a period, the net owed amount is determined and a single payment is made. This reduces the costs of cutting checks for each individual transaction. Alcoa also practices electronic bartering.

Widespread use of electronic bartering would reduce the payment-services business that banks provide.

The use of smart cards and debit cards could also potentially erode banks' control of the payment franchise. A Japanese department store, vending machine operators, public transit companies and telephone companies are issuing cards to consumers for prepaid amounts (the consumer pays a specified amount up front; the card is credited with this amount; every time the card is used it is debited). The money that these cards represent is outside of the traditional banking system of a country (there is no central bank control).

Merrill Lynch's cash management account is another example of information technology allowing the creation of a new kind of financial instrument. To savers, the cash account is a high-yield savings account with complete liquidity. But the money is actually invested in a broad variety of financial instruments.

The use of information systems to supplant money creates challenges to government bodies. In addition to encroachments on central bank control, information technologies could potentially make more difficult the collection of taxes by tax authorities if electronic bartering arrangements are established among companies.

Funds represent promises to produce action in the future. In this sense, money is no different than the majority of other communications that constitute electronic commerce. Electronic commerce is people making promises to each other (to deliver goods, services, or cash) over electronic networks. Viewing money as a particular kind of promise is useful in determining how a company should take advantage of electronic commerce possibilities.

the 1990s, the number of people in the UK who are aged 65 and over has increased from 10.5 million to 12.5 million, and the number of people aged 75 and over has increased from 4.5 million to 6.5 million (Office for National Statistics 2000).

There is a growing awareness of the need to address the needs of older people in the community. The Department of Health (1999) has published a strategy for older people, which sets out a vision for the future of older people's services. The strategy is based on the principle of 'active ageing', which is the process of maintaining and enhancing the health, participation and security of older people. The strategy also sets out a number of key objectives, including: to improve the health and well-being of older people; to increase the participation of older people in society; and to ensure that older people are secure and safe.

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## Assessing Opportunities for Electronic Commerce

We have seen what electronic commerce is and what has happened historically. Now the question is, what is a manager supposed to do given this new environment?

This chapter presents three analytical frameworks that allow the manager to focus on applying information technology to his/her business.

Despite the extensive and expensive application of information technology during the eighties, there is no clear evidence that these new technologies have raised productivity or profitability. The quest to cost-justify IT investments has been elusive. IT is a capital-equipment, infrastructure type of investment. Evaluating the costs and benefits of infrastructure projects is prone to distortions because of the element of time. Costs of the project are borne immediately while the benefits come later. As time elapses, values of investment alternatives change for the funds invested in the given project. Information technologies, because they are an infrastructure investment, are subject to this evaluation conundrum.

Today's accounting and economics methods are failing to give managers, executives, and entrepreneurs the distinctions of assessment that lead to effective, profit-generating decisions and actions.

Value-adding activity in advanced economies is increasingly consummated within infrastructure that has taken many years and many dollars to build. Individual companies are finding that the majority of costs are fixed and the variable components of labor are increasingly trivial relative to a company's overall cost structure. The costs of highly automated, flexible-manufacturing factories, for example, are largely associated with capital equipment. The economics and accounting of today's value-adding activities face a new challenge as the world economy's productive and distributive capacity becomes primarily capital (equipment/infrastructure) intensive.



The three frameworks presented in this chapter are not lists of hard-and-fast tips and principles. They point to a new way of looking at the question: "When and how is information technology appropriate to the business at hand?"

The frameworks draw heavily from the work done by:

- Fernando Flores, a business consultant and founder of Action Technologies, Inc. (Alameda, CA), a maker of messaging software;
- R.H. Coase, an economist at the University of Chicago Law School, who has done pioneering work on the notion of transactions; and
- Wassily Leontieff, Nobel prize-winning economist and inventor of the input-output matrix, a way to characterize industrial organization.

## A

### The Communication Is the Business

It is becoming clear that the application of information technology to business will radically restructure individual businesses as well as entire industries. Applying information technology to isolated business functions (such as accounts payable, order entry, manufacturing resource planning) often doesn't take advantage of the inherent efficiencies of IT other than speed and misses the greater efficiencies that could potentially be gained by integrating the single process with a number of other processes.

Incorporating computer networks into companies and industries has occurred piecemeal and gradually for the most part. With any gradual change, only specific parts of the overall structure are analyzed and changed in relation to narrowly focused objectives. Because most businesses processes cross departmental lines, they must be viewed at a more global level in order to redesign the company's value-adding activity and its constitutive information system.

For example, manufacturing resource planning (figuring out the necessary supplies, machine time, and labor to complete a given production run) becomes much more efficient when real-time sales information is electronically fed directly into the planning process than when it is not. Such an integration of sales systems with manufacturing systems, however, is often overlooked in the current systems analysis techniques of building information systems.

In the words of Michael Hammer (business consultant), the challenge is to reengineer work and this calls us not to automate but to obliterate. Heavy investments in information technology have had disappointing results because companies tend to use technology to mechanize old ways of doing business. They leave the existing processes intact and use computers simply to speed them up. What is required is to invent an



entirely new playing field, where information and communication are no longer delivered on paper exclusively and where the efficiencies and wealth-producing possibilities (infinitely greater than pre-electronic commerce) of electronic commerce are fully realized.

Understanding when, where and how to effectively apply information technology to a business ultimately begins with understanding how businesses operate—both internally (how workers and managers accomplish their work) and in relation to the outside world (with suppliers, customers, competitors, regulators, and alliances).

The common thread by which businesses operate as a collection of people within a larger market environment, is that business is based on human-to-human communication in language. People coordinate action through language. Human action makes business happen. And people coordinate their action through conversations. Furthermore, as seen in Section I-C above, commerce is communication and electronic commerce technologies serve the purpose of augmenting this communication. Thus, understanding the relationship between language and action lays the groundwork for designing electronic commerce systems.

People engage in a variety of conversations—speculative, interrogative, romantic, etc. The conversations that take place in business—those that initiate and coordinate action of people—have a finite number of conversational moves. All conversations for action begin with either a request or an offer. All end either with a statement by the requestor/offer taker that he/she is satisfied, dissatisfied or is otherwise finished with the conversation (dissatisfaction, revocation of the original offer, or cancellation of the request are possible ways the conversation can come to completion). All the possible conversational moves in conversations for action are listed in Exhibit III-1.

Table 1. Mean (SD) age, height, weight, and body mass index (BMI) of the 100 children in the study, by sex and age group

Age group	Sex	Age (years)	Height (cm)	Weight (kg)	BMI (kg m <sup>-2</sup> )
5-6	Male	5.6 (0.3)	115.2 (6.1)	20.1 (5.2)	15.3 (2.8)
	Female	5.6 (0.3)	114.5 (6.0)	19.8 (5.1)	15.2 (2.7)
7-8	Male	7.4 (0.4)	128.1 (6.2)	28.1 (6.5)	17.3 (3.0)
	Female	7.4 (0.4)	127.5 (6.1)	27.5 (6.4)	17.2 (2.9)
9-10	Male	9.4 (0.4)	141.2 (6.3)	38.1 (8.1)	19.2 (3.2)
	Female	9.4 (0.4)	140.5 (6.2)	37.5 (7.9)	19.1 (3.1)

children were given a verbal explanation of the procedure and then asked to give their consent. The children's parents were also given a verbal explanation of the procedure and asked to give their consent.

The children were then asked to perform a series of tasks designed to measure their ability to discriminate between different types of stimuli. The tasks were presented in a random order and the children were asked to perform each task as accurately as possible.

The first task was a simple discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The second task was a more complex discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The third task was a simple discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The fourth task was a more complex discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The fifth task was a simple discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The sixth task was a more complex discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The seventh task was a simple discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The eighth task was a more complex discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The ninth task was a simple discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

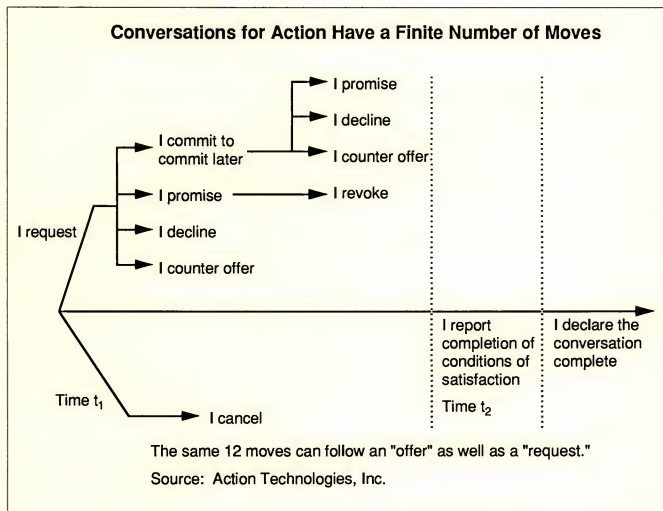
The tenth task was a more complex discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The eleventh task was a simple discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.

The twelfth task was a more complex discrimination task in which the children were asked to identify the stimulus that was different from the others. The stimuli were presented in a random order and the children were asked to perform each task as accurately as possible.



## EXHIBIT III-1



Requests elicit promises, and promises shape our actions and the future action we invent together in our speaking. The future action we bring forth with promises also brings forth the conditions of satisfaction of the promises. In business, what are typically called products or services are the conditions of satisfaction we promise or offer to provide to others. It is important to note that the coordination of action of human beings is through promises.

The way in which two or more people coordinate action with requests and promises is depicted in Exhibit III-2.

the 1990s, the number of people in the world who are under 15 years of age has increased from 1.1 billion to 1.5 billion, and the number of people aged 65 and over has increased from 0.2 billion to 0.5 billion (United Nations 1999).

There is a growing awareness of the need to address the needs of the young and the old. The United Nations (1999) has identified the need to address the needs of the young and the old as one of the major challenges of the 21st century. The United Nations (1999) has identified the need to address the needs of the young and the old as one of the major challenges of the 21st century.

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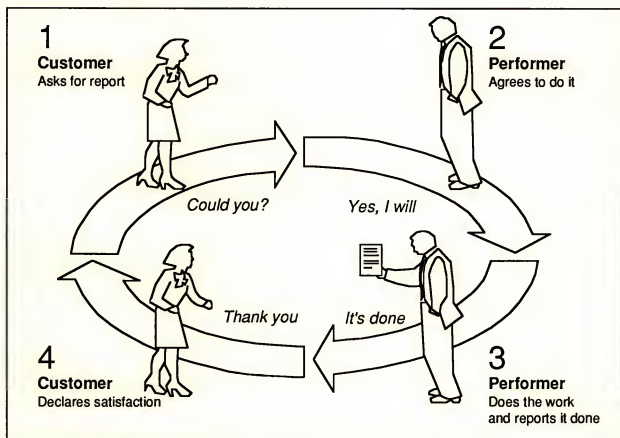
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## EXHIBIT III-2

## The Basic Action Workflow



Source: Action Technologies, Inc.

A commercial trade is the exchange of two promises. A buyer and a seller make promises to each other. Usually, one party promises a good or service, the other party promises cash. Each party is the customer for the promise of the other. Given this understanding, a purchase order can be considered a request and an implicit promise to pay. Its acknowledgment is a promise to provide the requested product or service. Each business in an exchange has a production system (even if the business offers a service). A production system is the coordination of action composed of the requests and promises among the people in a business which allow the business to make, receive, and fulfill the promises it makes to its trading partners.

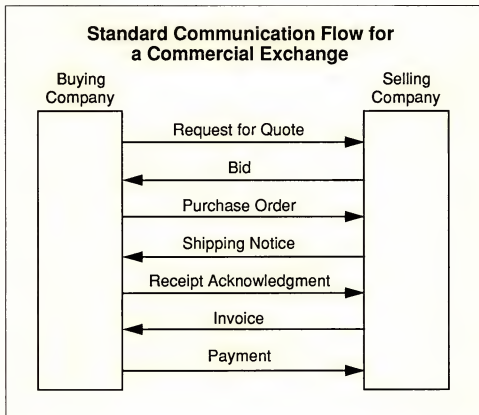


Coordination—bringing together the right offers and promises at the right time, repeatedly—is crucial for enabling commerce to occur. The machinery of coordination includes the traditional urban infrastructure—roads, bridges, harbors, and airports. Other coordination tools include Federal Express, automatic teller machines, credit cards, and financial services and markets. Even standards—metric versus English, USDA grades of beef, cuts of lumber, etc.—are tools that facilitate commercial coordination.

Today, the most important coordination tools are networked, digital computers, the focus of this study. How to apply these tools requires us to see that we are attempting to better coordinate the requests, offers, and promises of people.

Communication for a commercial transaction, which the EDI community has specified with some technical detail, is that for commercial transactions between two companies. These general communication moves are depicted in Exhibit III-3.

EXHIBIT III-3



the 1990s, the number of people in the UK who are aged 65 and over has increased by 1.5 million, and the number of people aged 75 and over has increased by 1 million (Office for National Statistics 2000). The number of people aged 65 and over is projected to increase to 10.5 million by 2020, and the number of people aged 75 and over to 5.5 million (Office for National Statistics 2000).

There is a growing awareness of the need to develop strategies to meet the needs of the ageing population. The Department of Health (1999) has published a strategy for ageing, which sets out the government's commitment to improve the health and well-being of older people. The strategy is based on three main principles: (1) to improve the health and well-being of older people; (2) to ensure that older people are able to live independently; and (3) to ensure that older people are able to participate in society.

The strategy is based on three main principles: (1) to improve the health and well-being of older people; (2) to ensure that older people are able to live independently; and (3) to ensure that older people are able to participate in society. The strategy is based on three main principles: (1) to improve the health and well-being of older people; (2) to ensure that older people are able to live independently; and (3) to ensure that older people are able to participate in society.

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**B****The Transaction as  
the Key Unit of  
Measurement**

As pointed out in Chapter II, electronic commerce eliminates intermediaries in the communication of requests and promises. This elimination can be confined simply within a single work group, among a collection of company divisions, across the entire company, or across a vertical industry. Planning for and implementing electronic commerce systems requires the executive, manager or entrepreneur to survey his/her company and competitive environment to see what elimination of intermediary steps will be the most profitable and effective business strategy. In many cases, this is tantamount to rethinking the entire business operation and strategy. Applying and acting within an electronic commerce environment requires, therefore, strategic thinking at the highest level of business.

The work of the economist R.H. Coase (University of Chicago School of Law) is particularly relevant to understanding the potential and dynamics of electronic commerce. Coase has pioneered the concept of transaction costs.

In order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on. These are the costs of carrying out a transaction by means of an exchange on the open market, the costs of using the price mechanism. These costs are always compared with the costs of administering activity through the means of internal management.

Transaction costs determine the range of activities that a company will undertake. They determine what will be outsourced and what will be performed in house. Coase's principle of the organizational range of activities is summed up in Exhibit III-4.

**EXHIBIT III-4****Transactions and the In-House/  
Outsourcing Decision**

- The limit to the size of the firm is set where its costs of organizing a transaction become equal to the cost of carrying it out through the market. This determines what the firm buys, produces, and sells.

—R.H. Coase  
Univ. of Chicago





Transactions, whether performed in a market among contracting private parties or within a company among employees, determine the costs of commerce. The reason electronic commerce technologies exist is to reduce the transaction costs of market exchange. Measuring the effectiveness of electronic commerce is equal to determining how much a given technology (e.g., EDI, interactive voice response ordering, electronic bulletin boards, electronic securities trading, etc.) reduces transaction costs.

There are three general kinds of transaction costs as listed in Exhibit III-5.

EXHIBIT III-5

### Three Kinds of Transaction Costs

- Search and Information Costs
- Bargaining and Decision Costs
- Policing and Enforcement Costs

Electronic commerce technologies are reducing all three kinds of costs. Some technologies perform cost reduction in a single category (e.g., electronic bulletin boards that reduce search and information costs). Others can be applied in all three categories (e.g., electronic mail).

Key to deciding if an electronic commerce technology is worth the investment is comparing the benefits of transaction-cost reduction with the costs of the system. This cost-benefit procedure is asymmetrical, which makes it tricky to perform. The benefits of transaction-cost reduction are variable, determined by the volume of discrete transactions performed in a given time period. The costs of the electronic commerce platform are largely fixed, with an ongoing maintenance cost. Adding to the asymmetry is that the costs of the system are usually realized immediately, in the beginning of the implementation, while the benefits come later and continuously over time.

For management to determine the company's offers (of products and services) and requests (for electronic commerce services, other capital equipment, and supplies) in the marketplace, management must anticipate the existence of its company into the future.



**C****Preparing for the  
Obliteration of Your  
Company**

Strategic thinking and continuous monitoring of the technical-competitive environment is absolutely required of the executive acting in electronic commerce market environments. An example of the required strategic thinking comes from the executive of the library subscription service, Faxon, mentioned in Section II-A above.

Faxon's business niche, as an intermediary between libraries and publishers, potentially could be entirely eliminated by electronic data interchange and other electronic technologies. The value of Faxon's current business is handling the information intensive many-to-many relationships that occur when libraries buy periodical subscriptions from thousands of publishers and, conversely, when publishers sell subscriptions to thousands of libraries. This information-communication service can, for the most part, be automated and performed at minimal cost by a full-service, telecommunications carrier or third-party value-added network (given that the buyers and sellers in the market are equipped with personal computers).

The president of Faxon recognizes the risk that electronic technologies—particularly EDI—represent to his company. In fact, he sees that information technology, in time, may go a step further and allow direct electronic delivery of text material from publisher (or author) to reader, where magazines and books become obsolete. Faxon's president, however, has defined his company's strategy in expansive enough terms to allow for the existence of his company even if these future possibilities come to pass. His strategic objective is: to play a role in the information exchange between users and creators of knowledge. With this strategy, whatever new technical possibilities emerge, his company will still have an offer to make to the marketplace.

Faxon illustrates how the value a business provides to its customers is directly linked to the conversational roles that the business plays in the marketplace. It also illustrates how effective reengineering of work leads to obliteration of workflows (in this case, obliteration of an entire industry niche).

As the Faxon example demonstrates, an entire business niche risks obliteration by electronic commerce technologies. How does one prepare for this? How does the executive or entrepreneur see how his/her company could become obsolete due to electronic technologies?

A useful diagram for observing the position of one's company in the competitive environment that exists and how this environment will be impacted by electronic commerce technologies, is the EDI input-output matrix. Originally developed by INPUT to identify EDI activity in the U.S. economy, the matrix can be used to depict any form of electronic commerce technology. In short, the matrix focuses on the communication

the 1990s, the number of people in the UK who are aged 65 and over has increased by 1.5 million, and the number of people aged 75 and over has increased by 1.1 million (Office of National Statistics 2000). The number of people aged 65 and over is projected to increase to 6.5 million by 2020, and the number of people aged 75 and over to 4.5 million (Office of National Statistics 2000).

There is a growing awareness of the need to develop services to meet the needs of older people, and a number of initiatives have been launched to address this need. The Department of Health has launched the 'Age Friendly' initiative, which aims to ensure that services are designed to meet the needs of older people. The initiative includes a number of measures, such as ensuring that services are accessible to older people, and that staff are trained to meet the needs of older people (Department of Health 2000).

The 'Age Friendly' initiative is a key part of the government's strategy for addressing the needs of older people. It is a multi-agency initiative, involving the Department of Health, the Department of Social Security, and other government departments. The initiative is designed to ensure that services are designed to meet the needs of older people, and that staff are trained to meet the needs of older people (Department of Health 2000).

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that occurs between a company's or an industry's suppliers and customers. These communication areas are where electronic commerce technologies show up and where they can obliterate whole companies and industries, as noted above. Exhibit III-6 is a partial input-output matrix showing EDI activity in the U.S. economy. (A full EDI input-output matrix can be seen in the INPUT report, *The Electronic Data Interchange Market, 1990-1995*.)

The matrix can help the company strategically reposition its offer in the marketplace. It can help identify new customers and new suppliers. It can help a company see what conversational linkages it can provide to the marketplace: with what suppliers and what customers. The input-output matrix can also be applied to a single company, showing the kinds of promises, requests, etc. between different functional groups within a company (marketing, finance, production, research, etc.).



# EDI INPUT - OUTPUT MATRIX

## INDUSTRIES AS BUYERS

Cells contain: • Significant EDI projects • Dominant uses of EDI  
• The degree of EDI standards development (low, medium, high)

INDUSTRIES AS SELLERS

Discrete Manufacturing

Process Manufacturing

Distribution (Retail/Wholesale)

Transportation

Utilities

Communications

Banking (Financial EDI Services)

Insurance

Government

Agriculture

Construction

Education

Health care

Services

Discrete Manufacturing

Process Manufacturing

Distribution (Retail/Wholesale)

Transportation

Utilities

Communications

Banking (Financial EDI Services)

Insurance

Government

Agriculture

Construction

Education

Health care

Services

Discrete Manufacturing

Process Manufacturing

Distribution (Retail/Wholesale)

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## Conclusions

Electronic commerce is emerging throughout the world as the way people conduct market exchange. Due to the efficiency and vast scale of electronic communication technologies, commercial opportunities are expanding faster than ever before in history. Users and vendors of electronic commerce are not separable into two distinct camps but are on a single continuum of service providers. INPUT is committed to measuring and identifying commercial opportunities for the vendor/user in this emerging era of electronic commerce.

### A

#### An Economy Based on Software, Education, and Intellectual Property

Much of the organization of an economy is predicated on communication technology. It was the development of writing by Sumerian culture that allowed for the development of agriculture and the domestication of animals (because people could make ownership titles to land and goods). The Japanese, at the turn of this century, invented not one but two alphabets so that they could "import" Western technological and scientific words and concepts and incorporate them into economic practices. The businesses of distribution, arbitrage, customs brokering, and many other service businesses exist because there is a differential of knowledge between the business and its client-customers. Communication is the name of the game.

Electronic network and computer technologies today are rapidly and profoundly impacting people's ability to communicate and therefore their economic organization. Organizations as well as whole industries are undergoing profound and far-reaching restructuring—and in some cases, total obliteration.

the 1990s, the number of people in the UK who are aged 65 and over has increased from 10.5 million to 12.5 million, and the number of people aged 75 and over has increased from 4.5 million to 6.5 million (Office for National Statistics 2000).

There is a growing awareness of the need to address the needs of older people in the community. The Department of Health (1999) has published a strategy for older people, which sets out a vision for the future of older people's services. The strategy is based on the principle of 'active ageing', which is the process of enabling older people to live a life of health, independence and participation in society. The strategy also sets out a number of key objectives for the future of older people's services, including: to improve the health and well-being of older people; to enable older people to live independently in their own homes; to provide a range of services and support to meet the needs of older people; and to ensure that older people are fully included in society.

The strategy also sets out a number of key principles for the future of older people's services, including: to be people-centred; to be evidence-based; to be cost-effective; to be accessible; to be inclusive; and to be sustainable. The strategy also sets out a number of key actions for the future of older people's services, including: to improve the health and well-being of older people; to enable older people to live independently in their own homes; to provide a range of services and support to meet the needs of older people; and to ensure that older people are fully included in society.

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Enterprise is organized around communication. Capitalism is a process of education. Civilization progressively develops more intelligent ways to take care of itself through better political, managerial, and technological practices. This education process relies critically upon communication and technologies that support communication. The driving force behind capitalism (especially when it is seen as an educational phenomenon) is communication.

Electronic communication technologies play a definitive, constitutive, constructive role in capitalism. Electronic commerce—becoming increasingly a redundant phrase—underscores the identification of commerce and trade with communication. Commerce has long relied on paper documents as the basis (including the auditable/legal basis) for trade. Electronic commerce signifies the replacement of paper-based business communication with electronic-based communication. Increasing the capacity of communication systems is a key to increasing the capacity of our economic system.

In the computer industry, software and services have overtaken hardware as the sectors that bring vendors the greatest profit margins. This is representative of the shift going on in the global economy as a whole. Material products are increasingly low-margin, commodity-style products where little differentiation is possible and fierce competition reduces margins. Intangible services are where the long-term, profit-making opportunities lie.

As a global society, we are approaching a new era in our industrial history in which we will have perfected (i.e., made the marginal cost almost zero) the ability for people to coordinate value-producing activity through commercial exchange conversations. The basic worldwide infrastructure for human conversation and coordination will be in place by the year 2000. (Enhancement will certainly follow, but the basic infrastructure will soon exist whereby every combination of persons in conversation anywhere on the globe will be possible.)

The production, distribution, deployment, depreciation, and consumption of physical things will remain a focus of economic activity for as long as there is human life on earth. Yet with the emergence of a global communication infrastructure, non-material wealth production will be the predominant focus of human activity and will bring the greatest marginal value to human needs and concerns. Non-material wealth production is currently referred to as “information work”—bringing expertise to human endeavor. In more proactive terms it can be called conversational design, the ever more effective configuration and coordination of people and tools.

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There is a growing awareness of the need to address the needs of older people in the community. The Department of Health (1999) has published a strategy for older people, which sets out the government's commitment to improve the lives of older people. The strategy is based on the following principles:

- Older people should be able to live independently and actively in the community.
- Older people should be able to access the services and facilities they need.
- Older people should be able to participate in the decisions that affect their lives.
- Older people should be able to live in a safe and secure environment.

The strategy also sets out a number of key objectives, including:

- To improve the health and well-being of older people.
- To improve the housing and living conditions of older people.
- To improve the transport and travel facilities for older people.
- To improve the social and cultural life of older people.

The strategy is a key document in the development of policy for older people in the UK. It provides a framework for the development of services and facilities for older people, and sets out the government's commitment to improve the lives of older people.

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**B****Future INPUT  
Research**

The creation of a global communications infrastructure and the migration of commercial exchange away from paper-oriented practices to practices using electronic, digital networks represents one of the great chapters of world history. Those who understand the commercial dynamics and implications of this great migration can gain power. INPUT's research program is committed to understanding this historical shift by identifying the business opportunities and risks, measuring the costs and benefits, and characterizing the new organizational structures and commercial landscape resulting from this paper-to-electronics migration.

This white paper defines and delimits the scope of electronic commerce. Future reports will examine the empirical impacts of electronic commerce on specific trading communities. These reports will consist of case studies of many companies that are interconnected in a chain of trading partnerships. The impact of electronic commerce on the entire chain will be examined in terms of how electronic commerce changes the productivity and overall value-adding capacity of the chain.

Additionally, through collaboration with economists, systems integrators, users, and vendors, INPUT will continue to develop its analytical framework for assessing electronic commerce. The objective of this effort is to create a method for interpreting the competitive environment of electronic commerce that allows users and vendors of electronic commerce technologies to act more strategically, profitably, and effectively.







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The strategy also sets out a number of key objectives for the future of older people's health and care. These include: to improve the health and well-being of older people; to ensure that older people have access to the services they need; to ensure that older people are able to live independently and actively; and to ensure that older people are able to participate in decisions about their care.

The strategy also sets out a number of key actions to be taken to achieve these objectives. These include: to improve the health and well-being of older people; to ensure that older people have access to the services they need; to ensure that older people are able to live independently and actively; and to ensure that older people are able to participate in decisions about their care.

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