INPUT

STRATEGIC MARKET PERSPECTIVE

Electronic Commerce in U.S. Health Care

Electronic Commerce Program

JUNE 1994

Electronic Commerce in U.S. Health Care

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Abstract

Electronic Commerce products and services are being increasingly applied to the problem of cutting health care costs in the United States. This INPUT report describes in great detail the U.S. Health Care Trading Community and its players. Based on an earlier report, *Electronic Commerce in U.S. Health Care,* the reports brings the reader current on timely activity in this area including greatly expanded sets of vendor profiles. INPUT believes that activity in the health care area will lead the way for EDI's expected expansion over coming years.

The Health Trading Community has been impacted by the Clinton Health Care Proposal, 1993, and consists of hospitals, physicians, insurance providers, the dental community, public health programs and others. Activity which lends itself to Electronic Commerce (especially EDI) solutions, include claims processing, hospital supply procurement, patient record processing, cost containment reviews, some medical procedures and home health care. In addition are regular payment processes, now involving credit card payments, hospital and clinic inventory control and within-organization and between-organization communication.

This report describes how Electronic Commerce systems are being implemented or can be implemented. Twenty providers of such systems to the Health Care Trading Community are profiled.

The growth of this market is forecasted in a variety of ways: the volume of transactions being processed; savings potentials through insurance implementations; through electronic purchasing and others. The costs of EDI implementations are also forecasted.

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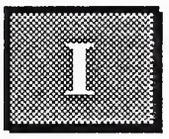

Introduction

A
Scope of the Report

Electronic commerce in health care refers to interorganizational networks that connect computer systems and allow health care community participants (including providers, insurance payers, suppliers and others) to coordinate data access, claims/purchases transactions, E-mail services, etc.

In particular, this report examines the four most critical areas where electronic network systems have been deployed and are undergoing expansion:

- *Medical Claims Processing*—from enrollment and eligibility confirmation to claims submission from hospitals, physicians' offices, dental offices and pharmacies
- *Medical Claims Payment*—from government and private payer to provider
- *Procurement*—of medical, surgical, pharmaceutical and dietary supplies for hospitals
- *Utilization review*—preferred provider organization management systems and other related information services involving networks

For these applications, this report reviews the issues, volumes of activity (including the number of claims made per year by each health care player and what percentage is electronically filed), volumes of activity growth by 1997, which companies provide information services and software needed to expand these applications. The report also describes user organizations that are leading the way and their experiences, particularly regarding

cost savings and standardized systems as opposed to proprietary systems, the background on some of the leading information service and software companies and possible successful vendor electronic commerce strategies.

Finally, this report also discusses the extent to which other related information systems are used in the health care community. Smart cards, E-mail, imaging systems, computerized patient records and voice recognition are some important technologies in the electronic environment of health care commerce. The extent to which these are deployed and what their roles will be in the overall electronic commerce infrastructure is assessed.

Emphasis is on the U.S. health care industry. Canadian, European and Japanese health care industries are mentioned at various points only for comparison.

This analysis of U.S. health care, of course, outlines initiatives, consortia and legislation that have taken place recently as the U.S. grapples with its health care crisis.

INPUT believes that it is helping resolve the health care crisis in the United States by providing participants—users of electronic information systems and vendors of such systems—concrete empirical data that quantifies and characterizes the economics of streamlining health care delivery through better information and communications. Only with a knowledge of the parameters of the situation can effective action be taken.

Hospitals, clinics, private physicians' offices, insurance companies and other health care players will see how EDI and other similar systems have saved hundreds of thousands of dollars in administrative expenses at certain hospitals.

They will learn why it is now advantageous to adopt standard medical claims and supply procurement systems rather than vendor-supplied proprietary systems.

Information services and software vendors (such as PCS, CyCare and many others) will have all the pertinent data they need to assess applications and market opportunities for their products and services.

Vendors will get a complete picture of the competitive environment for information services in the health care marketplace. Specifically, INPUT covers who won what recent contracts, what the capabilities are of specific vendors, what the governmental and quasi-governmental bodies are mandating and other points that show where the market needs and opportunities, as well as pitfalls, lie.

B
Structure of the Report

As in all of INPUT's electronic commerce reports (see section D of this chapter, Related INPUT Reports), Chapter III is an overview of the specific industry covered, in this case the health care community. The overview consists of identifying who the players are in the community, how many there are, who transacts with whom, what the respective volumes of these transactions are and what the current trends and issues in the community are (over and above those regarding specifically information systems).

Once this general "lay of the land" is established, Chapter IV examines in detail the specific electronic commerce application markets. This is a detailed look at how health community players are using EDI and other electronic network systems to communicate and transact with each other.

Once the community workflow and the electronic systems which enhance it have been examined, Chapter V profiles companies providing electronic systems.

Finally, Chapter VI summarizes INPUT's findings with conclusions and points out where the opportunities are for future development or market expansion.

For a quick overview of the whole report, see Chapter II, Executive Overview.

C
Methodology

A wide variety of sources was used for this report. For basic health care statistics, government and trade association publications were used. These included the Statistical Abstract, The U.S. Industrial Outlook, the Congressional Record, the Federal Register and publications of the Health Care Financing Administration (HCFA), the American Dental Association, the Health Industry Business Communications Council and the Electronic Mail Association.

The richest sources of data were telephone interviews with users and vendors of information services. For this report, INPUT interviewed IS, procurement and financial managers at five hospitals; two buying groups; two hospital supply manufacturers; representatives of HCFA, NEIC, WEDI and the Health Care EDI Corporation; health care industry representatives from 15 information services vendors; and representatives from three industry associations.

In addition to these interviews, INPUT drew on interview data from other health care research projects in which INPUT consultants have been involved during 1993 and 1994. These included interviews from a number of privately contracted custom research projects as well as interviews for our regular, syndicated research (see the next section, Related INPUT Reports).

INPUT attended several Health Care conferences where interviews with representatives of the many vendors of health care electronic commerce services were conducted.

Also, a wide variety of other printed and electronic information sources were used, including extensive press publications, company literature, CD-ROM full text and abstracted information as well as other miscellaneous documentation.

D
Related INPUT Reports

This report is one of a series of reports on electronic commerce. The series examines several vertical markets—or, more precisely, trading communities—where interorganizational electronic networks and information services are streamlining commercial transactions. INPUT maintains a research program on Electronic Commerce to which the leading EDI/Electronic Commerce vendors and users subscribe.

Listed below are recent reports that INPUT has published on Electronic Commerce, EDI and/or Health Care.

Open Systems and Electronic Commerce

Workflow and Electronic Commerce

Integrated Electronic Messaging: Trends, Issues, Opportunities

Opportunities in Electronic Payments

Electronic Commerce: Comprehensive Market Assessment

Electronic Commerce: The New Foundation for Trade

Electronic Commerce in the Media Industry

Electronic Commerce in Trade and Transportation

Electronic Commerce in Travel and Tourism

Electronic Commerce in Grocery Production and Distribution

Electronic Commerce in Apparel and Retail

Electronic Commerce in the U.S. Federal Government

The U.S. EDI and Electronic Commerce Markets, 1993-1998

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II

Executive Overview

A
Health Care and EDI—Timing *Now*

While growth has been rapid and long-term potential has never been in doubt, EDI (meaning *only* standard protocols) has never achieved the forecasts made by consultants and market analysts. In 1986, for example, EDI was forecast to be a $1.5 to 2.0 billion market opportunity in the 1993-1994 period—a 50%+ AAGR. But today, it is difficult to find user expenditures on EDI software, network and training/consulting exceeding $450 to $500 million.

Yet expenditures on proprietary EDI (nonstandards-based) such as electronic order entry systems, (EOE) have grown rapidly; while no one keeps track of the totals, expenditures on proprietary systems and services may equal the EDI market itself. GM's supplier network, which also has EDI/EFT features for vendor payment, is very large and may account for $100 million or more in annual expenditure by GM and its suppliers. In retail and distribution markets, stationery and hardware stores are active EOE users. And in health care—drugs/prescriptions, hospital supplies/food and electronic claims processing—there is an enthusiastic user base.

In fact, this report has been written because INPUT believes health care markets will lead the way for EDI over the balance of the 1990s. The reasons, summarized below from the body of the report, include the following:

- Industry Size—Health care expenditures total about 1/8, or 12% to 13% of the U.S. economy, with a smaller share, 8% to 11%, in most developed countries.

- Very significant Economies of Scale—large numbers of providers are giving similar care using similar procedures and materials.
- Significant EOE and similar systems are already operating successfully at high transaction levels.
- There is heavy outside pressure to use EDI.
  - The U.S. government is pressing to have EDI requirement for claims submission and procurement by mid- to late 1990s; progress in Medicare already more than 70% of claims.
  - Pressure comes from payers to implement cost containment procedures, using claims and treatment data to assess all types of medical costs.
  - Pressure from providers to achieve improved competitive position by lowering costs using EDI.
  - The Clinton Health Care Reform proposal of 1993 uses EDI as a key platform feature, validating and certifying the cost savings possible.

This is why INPUT is optimistic about EDI in Health Care.

B
Findings

Systems that support commercial transactions ("electronic commerce systems") in health care are economically useful in four business functions in the health care industry:

- Claims Processing and Payment
- Procurement
- Utilization review
- Related Information Service

The expansion of these basic electronic commerce applications is laying the groundwork for a nationwide health information

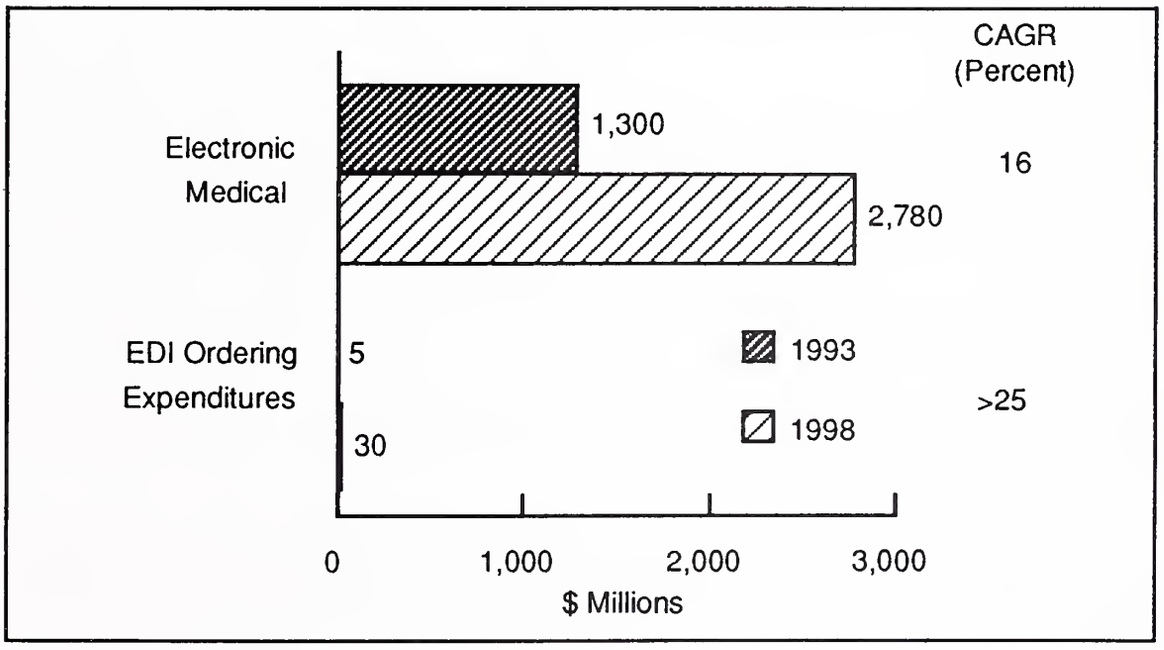
The expansion of these basic electronic commerce applications is laying the groundwork for a nationwide health information network that will support and streamline the delivery, financing and administration of health care. The goal is a less costly health care delivery system, restructured to provide better, faster and more appropriately targeted care.

Current developments are establishing the infrastructure required for such a system: emerging standards, EDI and other interorganizational applications and an increasing level of collaboration and communication among providers, payers, employers and government agencies.

Exhibit II-1 depicts forecasted growth in two key electronic commerce and EDI markets: EDI ordering and electronic medical claims.

Exhibit II-1

Key Health Care Electronic Commerce Market Forecasts



There are tremendous opportunities for users of electronic commerce systems and vendors of these systems over the next five years.

As the exhibit shows, health care providers are expected to spend a rapidly increasing amount on these systems over the next five years.

The greatest growth area is in payment of medical claims. In part, this rapid increase stems from the fact that only a small proportion—less than 15%—of today's insurance claims are paid electronically.

EDI procurement shows the next most rapid adoption, and this stems from the transition now underway from proprietary pharmaceutical ordering systems (such as Baxter's and ASAP) to standardized, typically X12-based, systems that cover all material procurement functions for hospitals, including medical-surgical supplies, grocery/dietary material and others, in addition to pharmaceuticals.

While INPUT is confident that electronic claims growth will proceed at the rate shown, it is less certain who will realize the economic benefits. In Exhibit II-1, the dollar amounts spent on claims processing are the revenues earned by claims processing service bureaus (assuming the industry-standard fee of 75 cents per claim processed).

Electronic filing of claims will certainly impact revenues for these intermediaries, but these intermediaries will be eliminated or consolidated, so exactly who retains the revenue growth shown in Exhibit II-1 is unclear. It may be the claims processor; the network service providers; the newly merged or consolidated entities; or, by using EDI software and communicating directly with insurers, it may be hospitals and other providers themselves. Health care providers may be the ultimate beneficiaries of these dollar values and realize them in terms of reduced costs.

Utilization review and other information services also show a substantial rate of growth. These services are typically used in conjunction with assessing medical claims and containing health costs.

C
Driving Market Forces

Cost pressures, demands from the electorate and from major health care payers, providers, plan sponsors and a growing awareness of the benefits of electronic commerce contribute to the

growth of EDI and other applications for electronic information exchange among health care organizations.

Exhibit II-2 lists the market forces driving the growth of electronic commerce in health care.

Exhibit II-2

Electronic Commerce in Health Care—Driving Forces

- Government programs encouraging electronic medical claims processing, including EDI/EFT use
- Financial incentives: Health care costs are skyrocketing; major containment efforts are needed
- Large employers and the health care community are pushing for changes
- Increasing collaboration among health care players
- Benefits are tangible; success stories are accumulating
- Reduced implementation costs on downsized platforms
- Patient care applications offer long-term prospects of major improvements to public welfare

These driving forces are explained in Chapter VI and in related sections of chapters III and IV.

D
Inhibiting Market Forces

Restraints to the growth of electronic commerce applications in health care stem largely from the complexity of the multilayered, multipayer, public-private, modified free enterprise health system that exists in the U.S. These combined forces make the reform of the health care system an enormous undertaking.

Exhibit II-3 lists the market forces inhibiting the growth of electronic commerce in health care.

Exhibit II-3

Electronic Commerce in Health Care—Inhibiting Factors

- Complexity of the U.S. health care system
- Lack of uniformity of health care information and the large number of proprietary designs already in use
- Costs of converting to EDI and lack of awareness of cost benefits
- Many provider sectors are not ready for EDI or electronic commerce
- Privacy and information security issues
- The magnitude of change required

Inhibiting factors are explained in Chapter VI and in related sections of Chapters III and IV.

The magnitude of change required is significant, but change is occurring in purchasing, claims and insurance-related areas, and will progress swiftly over the next five years. A commonly stated target for computerized patient record (CPR) standard-based systems is the year 2000, although legislation now in Congress (commonly known as the Health Insurance Reform Act of 1992) calls for the Health and Human Services Secretary to encourage adoption of CPR standards by 1995 and for hospitals providing Medicare services to have a CPR system in place by January 1996. The Clinton Administration's 1993 Health Care Reform proposal reaffirms and enhances these targets.

E
Market Opportunities

There is a need for electronic medical claims processing and other EDI software and services opportunities among physicians' practices and other provider groups.

"Other" groups include inpatient-outpatient labs, skilled nursing facilities (nursing homes) and home health care providers. These are the groups which have the lowest installed base of administrative computing technology—Medicare Electronic Medical Claims (EMC). Rates from these provider categories are all in the 50% or less range. Software and services should be user-oriented and perhaps bundled with nontechnology (business) services.

There are systems integration needs for large-scale EDI rollout within managed care, buying groups or other health care associations.

Development of in-house EDI order entry capabilities in hospitals and large clinics or physicians' practices promises to begin its take-off by 1994-95—the foundation is now being laid through initial success stories. Rollout of EDI capabilities into hospitals is a major undertaking and the level of effort required will vary considerably, depending on the platform selected and the readiness of the hospital staffs, administration systems and complete software to use EDI. In cases where the number of hospitals is high or the level of IS staff is relatively low, contracting with an outside services firm to plan, focus, implement and monitor the success of the rollout is a cost-effective approach.

Health care software and systems vendors need to shop their products as "EDI ready"—in 1994, few do.

Materials management needs to be re-engineered as standard EDI ordering systems are implemented.

Hospitals are moving to just-in-time ordering and warehousing, and have realized significant savings through reduction in inventory and required warehouse space. EDI ordering will spur a redesign of inventory management processes or vice versa.

New software and services are needed to support development of utilization review, claims analysis and other systems aimed at cost containment.

A number of players and projects are described in Chapter IV of this report. Insurance companies, self-insured employers, third-party administrators and managed-care organizations are major users of these systems.

There are medical imaging opportunities in patient care and claims-related applications.

Large-scale picture archiving, teleradiology and related image transmission projects are now under way in many large hospitals. These are typically major integration projects with many hardware, software and services players represented.

Image transmission opportunities in support of claims processing will begin to appear in 1995.

Human resources (HR) and employee benefits software products are needed to support electronic enrollments.

Employers' interest in this function stems from the reduction in costs they may realize in converting from one payer to another and electronically updating enrollments in the payer's office though a process that is less error-prone and more flexible and timely than magnetic tape submission. INPUT expects that employers who already have EDI capability will be the first to take advantage of EDI enrollment.

There is a need for interorganizational E-mail as a precursor or complement to EDI transaction processing.

Interorganizational E-mail is already widely used on the business side of health care, e.g., among insurance firms, materials vendors and pharmaceutical companies. It is used among managed care organizations that have a significant level of interaction among primary care providers and specialists, as well as in support of referrals and precertification of services. Hospitals and physicians' practices are relatively low users of E-mail. As interaction among the health care community grows, demand for E-mail will be driven by streamlined communication and as a precursor or complement to EDI (see Chapter IV). Vendors should monitor trends toward collaboration and EDI implementation among the less E-mail-intensive sectors and target those groups as they begin to focus on communications with trading partners and remote sites.

1. Strategic Vendor Opportunities

Vendors interested in growing and/or establishing significant competitive positions in U.S. and global information services markets may never experience a better time than now to make strategic actions.

An example of a big play might be for VISA or MasterCard to arrange with the new National Health Plan administration to have banks issue a cobranded health care services card that could be used to:

- Establish health care eligibility with care providers
- Automatically file and report claims data
- Charge the card members' accounts for any copayment amounts
- Arrange funds transfer and settlement

This would put local banks squarely in the middle of health care payments and financing, and give VISA and MasterCard a shot at leveraging their vast networks into a big share of the electronic claims processing business.

If VISA and/or MasterCard do not take the initiative here, surely Amex, AT&T, Discover, JCB or GE Credit will—further pushing banks out of EFT markets.

2. Acquisitions

This is the time for acquisitions in EDI and health care-related markets. Vendors such as FFMC, Equifax, First Data, Medstat, EDS, Sterling, McKesson/PCS and even telcos are making key acquisitions for market share and product/market expansion. Other long-term players will be active here, too.

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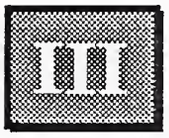

The U.S. Health Care Trading Community

A
Health Care Expenditures

In 1993, health care expenditures exceeded $910 billion, an increase of 11% to 12% over 1992. Average annual increases of at least 7% to 10% will occur from 1993 to 1998. 1993 expenditures accounted for approximately 11% to 13% of the GDP. (Sources: U.S. Department of Commerce, INPUT estimates.)

Several factors are key to the high cost of health care:

- The U.S. health care system tends to put a greater emphasis on expensive, high-technology treatments and specialists' care rather than basic, preventative medical care. Less than 30% of American physicians today train for work as primary care providers or general practitioners, in contrast to approximately 50% in Canada and 75% in Australia.

- The threat of malpractice suits has pressed many physicians to order expensive and sometimes unnecessary testing and/or procedures. Except under managed care systems, there is no financial incentive for doctors to limit testing.

- Consumers who are covered by medical insurance have little incentive to seek less costly health care, because the insurance company pays the bills.

- The vast network of players—consumers, providers, public and private insurers and financial institutions—through which health care is administered needs re-engineering.

The President's 1992 Heath Reform Program report estimated that 12.2% of 1991 health care expenditures (approximately $80

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III

The U.S. Health Care Trading Community

A
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The President's 1992 Heath Reform Program report estimated that 12.2% of 1991 health care expenditures (approximately $80

billion) was spent for public and private insurance administrative costs and provider billing costs. The complexity of the system through which health care is delivered and paid for is part of what makes it the most expensive care in the world.

Many proponents of U.S. health care reform advocate a national health insurance system to simplify the provider/payer relationship and allow a more common level of coverage for all citizens.

Certain indicators of health care quality suggest that Germany, Canada and Japan may be receiving more value for their health care expenditures. All three nations rank slightly to significantly higher than the U.S. in life expectancy and infant mortality rates, for example.

The high cost of medical care has become a competitive disadvantage for American businesses that face competition from other industrialized nations such as Germany or Japan. It now costs American auto makers more for insurance premiums for their workers than for steel. In a classic 1991 study by A. Foster Higgins & Co., health benefit costs amounted to 26% of corporate earnings in 1990.

The Foster Higgins survey found that, despite intense cost-containment efforts, corporate medical bills soared an average of 21.1% between 1989 and 1990 and 20.4% the previous year. Besides factors contributing to the overall rise in health care costs (averaging around 11% to 13% in annual increases), corporate sponsors of health benefits often end up footing the bill for underpayments by Federal Medicare and Medicaid programs. Hospitals and physicians often shift costs of services to Medicare/Medicaid patients by increasing charges to privately insured patients. With the burden to the private sector becoming unsupportable, demands for reform are more urgent and forceful.

This multipayer, combination public/private enterprise health system was created over many years and proposals to implement structural changes to the system must overcome numerous obstacles. The debate on private versus public control of the health system and the merits of a single payer versus a multiple payer system is continuing. Meanwhile, efforts to improve the efficiency of health care administration through the implementation of EDI and electronic commerce applications are moving ahead.

B
Impact of the Clinton Health Care Proposal—1993

In mid-1993, the Clinton Administration presented its health care reform proposal. Key components of the proposal included:

- Universal health care coverage for everyone.
- Employer-mandated health insurance—insurance to be provided by employers and partly charged to employees.
- Single payer coverage of claims.
- Group purchases of care services as well as drugs and other medical consumables.

In addition, several components of the proposal specifically addressed electronic commerce and health care covered in this report:

- Automated and electronic claims procedures mandated to cover 100% of claims by the end of the 1990s
- Increased use of electronic commerce systems (EDI) to purchase and deliver health care goods and services throughout the entire health care system
- Transaction information (claims and EDI activity) to support analytical and statistical utilization review procedures to help hold down costs of providing medical care

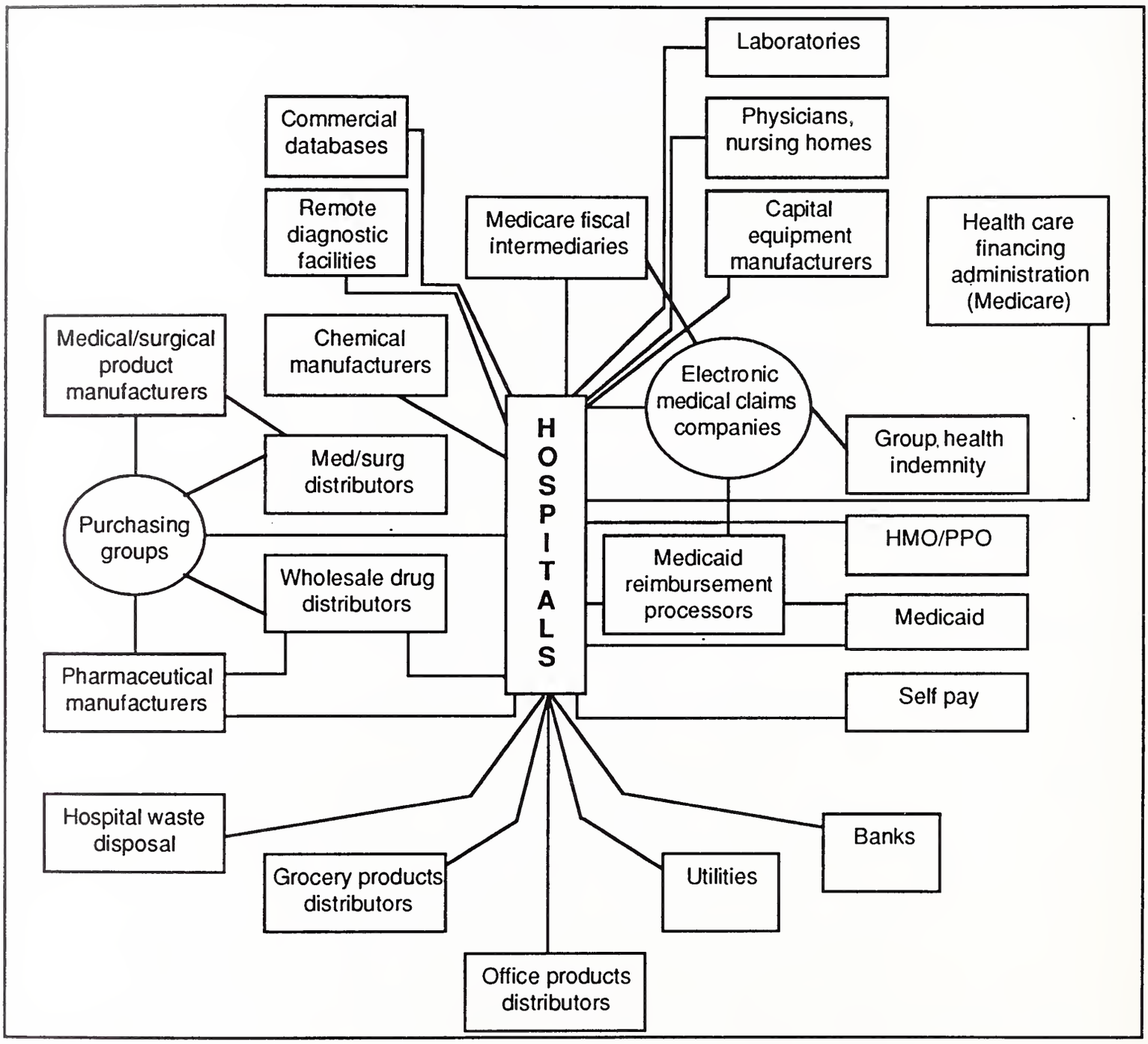
The Clinton health care proposal places great importance on automated electronic systems for improving and restructuring health care services in the United States in the next few years. This is a tremendous boost for the automated claims processing, EDI procurement and cost review/containment systems covered in this report.

C
Players in the Health Care Trading Community

Exhibit III-1 illustrates the health care trading community, with the hospital represented as the focal point of the network.

Exhibit III-1

The Health Care Trading Community



Physicians' offices, long-term care facilities and pharmacies play analogous roles in providing health services; each could be represented as a community with similar supplier, payer and other trading relationships.

There are three general categories of provider organizations: supply, service and funds. Exhibit III-2 breaks these three general categories into 30 types of players.

Exhibit III-2

Players in the Health Care Trading Community

- Supply Providers
  - Pharmaceuticals
  - Medical/surgical supplies
  - Grocery/food service/dietary products
  - Office supplies
  - Chemicals
  - Miscellaneous capital equipment (beds, lab equipment, office equipment, etc.)
  - Energy
  - Waste disposal
- Service Providers
  - Health care providers
    - Hospitals
    - Pharmacies
    - Health maintenance organizations/preferred provider organizations
    - Long-term care facilities
    - Doctors' offices/medical groups
  - Health care research and education
  - Laboratories
  - Remote diagnostic facilities
  - Universities
  - Publishers (including commercial database publishers)
- Service Providers
  - Distribution services
    - Pharmaceutical
    - Medical/surgical supplies
  - Transportation
  - Service providers (excluding banks, finance, utilities, transport)
    - Claims processors
    - VANs
  - Medicare fiscal intermediaries/government bodies
    - Buying groups
    - Managed care providers
- Funds Providers
  - Banks
  - Government
  - Commercial insurers
  - Employer self-insurance plans
  - Recipients of medical services (patients)

Exhibit III-3 shows the number of organizations in each player category. These numbers are based on the registered members of the Health Industry Number (HIN) system database maintained by the Health Industry Business Communications Council (HIBCC). HIBCC assigns unique identification numbers to member organizations, to facilitate EDI-based transactions between trading partners.

Exhibit III-3

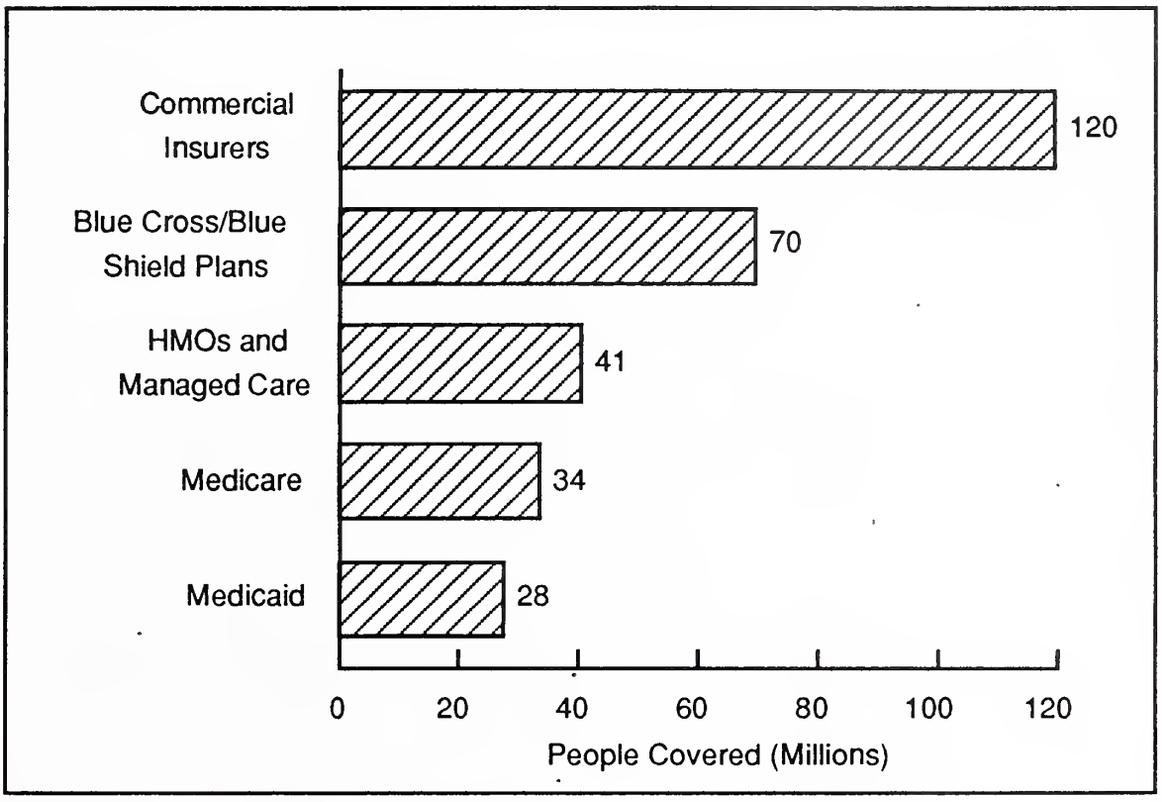
The Number of Companies/Locations in Health Care by Segment

Segment	Approximate Number of Sites
Retail Pharmacies	66,000
Nursing Homes	15,400
Hospitals (including Canada)	10,400
Dist./Wholesalers	1,400
Buying Groups	2,500
Clinics	2,400
Health Miscellaneous	2,200
Outpatient Surgery Centers	1,500
Home Health Corporations	800
Manufacturers	800
HMOs	700
PPOs	600
Nursing Home Chains	200

As shown in Exhibit III-4, several different financial mechanisms pay for most citizens' health care services. Commercial insurers cover about 120 million people, Blue Cross/Blue Shield plans serve approximately 70 million and Health Maintenance Organizations (HMOs) and other managed care plans are used by around 41 million people. Public funding serves 34 million through Medicare and 28 million through Medicaid.

Exhibit III-4

Paying for U.S. Health Care



D
Community Workflow

Interorganizational workflow in the health care community occurs within a network of conversations among the players for the exchange of requests, promises and other messages pertinent to commerce. These workflows are depicted in Exhibit III-2.

Interorganizational workflow among the different players has already been facilitated in several areas by electronic commerce technologies. Providers of medical, surgical and pharmaceutical products offer on-line electronic ordering and EDI systems for hospital purchasing. These systems are usually supplied by the vendor, typically a distributor.

On the funds provider side, a hospital typically submits health insurance claims to a third-party service bureau or fiscal intermediary. The bureau edits, sorts and sends the claims on to the appropriate payer organization: commercial or government.

If the claims are submitted electronically to the bureau, the hospital prepares them using software that it has purchased. Sometimes a claims processing bureau provides the software; other times the service uses software of other vendors.

E
Trade Volumes in the Health Care Community

Trade volumes among health care players are relevant to an analysis of electronic commerce, because they indicate where electronic commerce systems will provide the greatest utility. The higher the dollar value transacted between players, the more likely the need for electronic commerce systems between players.

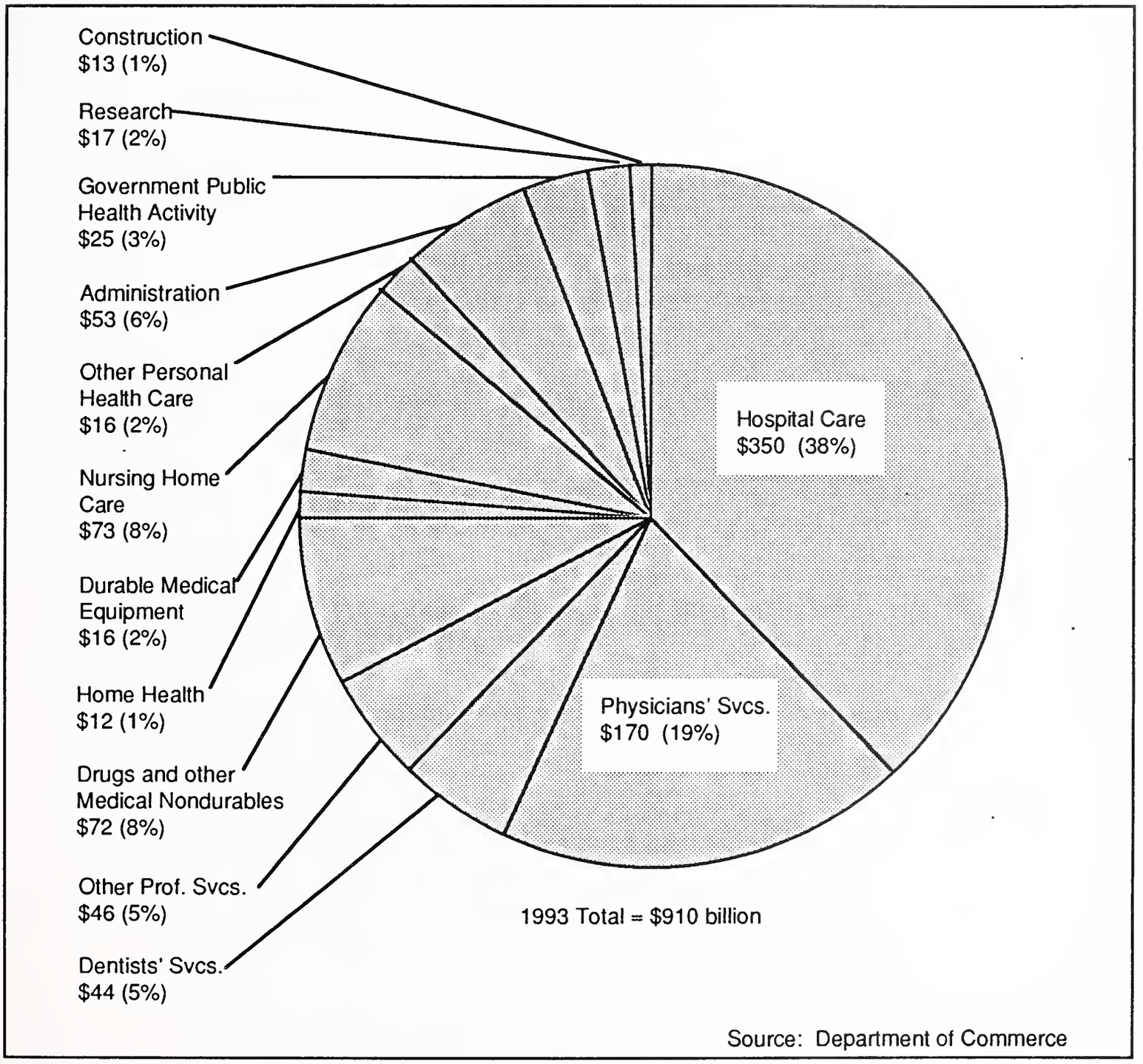
Exhibit III-5 breaks the $817 billion 1992 Department of Commerce estimate of total health care expenditures into its component categories. A preliminary review of the 1993 data shows a pattern consistent with 1992 data.

Hospital care is the dominant category of health care costs. Hospital care expenditures in 1992 were approximately $313 billion (38 percent of all health care costs). Physicians' services were the second largest category, at $155 billion; nursing home care was $66 billion; and combined expenditures for dental services, other professional services and other personal health services reached an estimated $95 billion.

To examine electronic commerce in health care, INPUT focuses on the trading community that surrounds the hospital.

Exhibit III-5

Health Care Cost Categories ($ B)



Note: Combined percentages do not total $910 due to rounding

1. U.S. Hospitals

There are approximately 6,800 hospitals and 1.2 million hospital beds in the U.S. Exhibit III-6 gives a regional breakdown of U.S. hospitals and hospital beds.

Exhibit III-6

U.S. Regional Hospitals and Hospital Beds

Region	No. of Hospitals	% of Total Hospitals	No. of Beds (Thousands)	% of Total Hospital Beds
Northeast	1,100	16	290	24
Northeastern Sector ME, NH, VT, MA, RI, CT	360		70	
Mid-Atlantic States NY, NJ, PA	740		220	
Midwest	1,840	27	320	26
Eastern Sector OH, IN, IL, MI, WI	980		210	
Western Sector MN, IA, MO, ND, SD, NE, KS	860		110	
South	2,590	38	420	34
South Atlantic DE, MD, DC, VA, WV, NC, SC, GA, FL	1,100		200	
East South Central KY, TN, AL, MS	540		90	
West South Central AR, LA, OK, TX	950		130	
West	1,280	19	200	16
Mountain States MT, ID, WY, CO, NM, AZ, UT, NV	480		60	
Pacific States WA, OR, CA, AK, HI	800		140	
U.S. (Only) Totals	6,810	100	1,230	100

Source: U.S. Department of Commerce, 1988

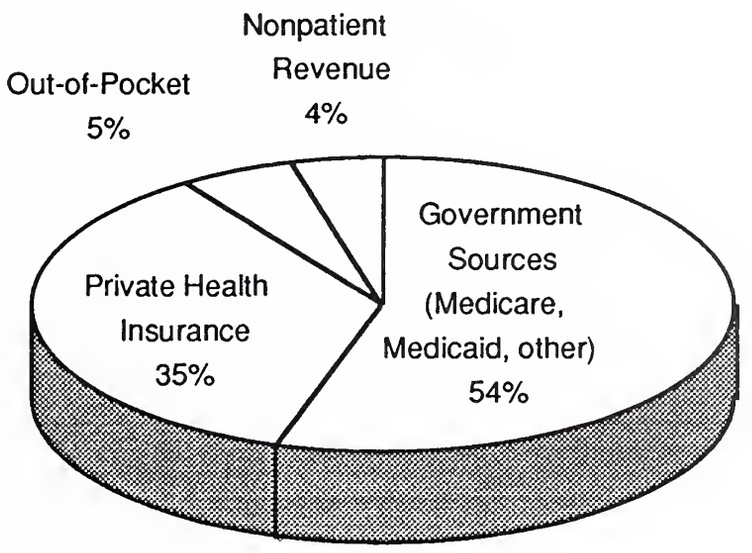
2. Hospital Revenues

Based on 1988 data from the Health Care Financing Administration (HCFA, the federal funding source for Medicaid

and Medicare), 55% of hospital revenues came from government sources and 45% came from the private sector (including private health insurance, out-of-pocket payments and nonpatient revenues). Exhibit III-7 shows revenue sources for health care.

Exhibit III-7

Health Care Revenue Sources



(Combined percentages not equal to 100 due to rounding)

Source: Department of Commerce

3. Hospital Inventory Expenditures

Electronic commerce among suppliers is most applicable to transactions that are numerous and recurrent. Inventory items such as medical/surgical products, pharmaceuticals and food products offer the greatest opportunities for electronic commerce, but noninventory purchases such as office supplies, capital expenditures and utility payments are also suitable for electronic commerce applications.

The largest single category of inventory expenditure by hospitals is for pharmaceuticals. U.S. drug industry shipments totaled about $59 billion in 1991—$49 billion (83%) was for pharmaceutical preparations, and the remainder was divided among the categories of diagnostics, biologicals and medicinals/botanicals.

INPUT estimates hospitals purchased approximately $26 billion or almost half of pharmaceutical products last year.

Of only slightly less value are hospital expenditures on food and dietary products, which INPUT estimates to be approximately $22 billion.

U.S. expenditures on medical/dental instruments and supplies was $29.6 billion, with half of this amount purchased by hospitals and the remainder purchased by solo physician practices, homes, nursing homes and independent ambulatory centers.

4. In-home Health Care

A new trend in health care is bringing services to the homes of patients. In-home health has grown more than 20% per year for the past four years, according to the Department of Commerce. This emerging market has important implications for providers of electronic mail, commercial databases, network services, laptop devices and other field-service support products and services.

F
Trends and Issues

Financing and delivery of adequate health care to the entire U.S. population continue to be major issues on the country's political agenda. Approximately 37 million Americans are without health insurance. The average cost per American to finance total health expenditures in the country is $2,100. A health care crisis has been declared and reform is called for at all political levels.

Factors which contributed to the rising cost of health care include:

- Increased use of advanced technologies, procedures and equipment used in research and treatment
- Rise in the average age of the U.S. population
- Effects of the growth of malpractice suits (physicians practicing "defensive medicine" and repeating tests or procedures)

- Costs of settlements and swiftly increasing malpractice insurance premiums

While the government, providers and insurers are making efforts to reduce or control these costs, a prime target of reform also is the organizational and legal process for financing health care. Health care financing is administered through a labyrinth of commercial and governmental organizations. For insured patients, providers send insurance claims to any number of state agencies, third-party processing service bureaus, commercial insurers or processing bureaus set up by these insurers.

In addition, "unbundling" health care services, emerging managed care and preferred provider organizations (PPOs) and arrangements have required providers to increase record-keeping, verification and auditing procedures.

Insurance enrollment, eligibility checking, claims submission, claims payment and remittance reporting constitute an area that is ripe and ready for major overhaul, re-engineering and streamlining.

Below are some key trends and developments:

- National health care expenditures will cross the trillion-dollar mark by 1994-95, growing to approximately $1.4 trillion in 1997-98, according to forecasts by the Department of Commerce.

- Home health care, a source of transactions among different health care providers, will grow as a proportion of the overall health care market. When patients stayed in hospitals, most health care services (e.g., laboratory tests, X-rays, CAT scans and other specialized equipment uses) were provided under a single roof and were consolidated in a single bill. Now, each service is outsourced to an individual third-party provider. Each provider generates a separate bill.

- Health care services are becoming "unbundled"—rendered by multiple, independent providers instead of a single hospital or clinic. This is creating a need for managed health care systems and services. Many large vendors in the health care market have organized to address this trend. EDS created the InterPractice System, and GTE Health Systems Incorporated has a business unit called Systems Choice.

- As a result of the Omnibus Reconciliation Act of 1989, HCFA was required to provide physicians with technical information necessary for electronic claims submission, and to encourage their movement toward this. Recently, HCFA announced that it saved approximately $110 million in administrative costs in its fiscal year 1991, a result of the 44% of Medicare physicians' claims that were processed electronically.

- An industry-led workgroup, known as Workgroup for Electronic Data Interchange (WEDI), was created in November 1991 at the direction of the Secretary of Health and Human Services, Louis B. Sullivan. WEDI is cochaired by the presidents of Travelers Insurance Company and the Blue Cross and Blue Shield Association, to analyze the potential for uniform electronic billing and claims processing. WEDI released its first six-month report in July 1992, setting forth aggressive goals to move the health care industry toward EDI in insurance-related transactions.

- WEDI followed its 1992 report with a larger, more comprehensive analysis in 1993. This report added six additional procurement transaction types that would yield substantial savings. This, together with the original five claims-oriented transactions identified in 1992, was estimated to yield between $12.9 and $26.0 billion savings annually in administrative costs. (See Exhibit III-8.)

Specific WEDI recommendations are shown in Exhibit III-9. Unquestionably, there is a substantial belief and commitment that EDI can "save the day" when it comes to reducing medical and health care administrative costs in the areas of claims handling/payment and procurement.

Exhibit III-8

WEDI Transport Savings Annually from Use of EDI, 1993 Report

Type of Core Transmission

	Range ($)	
Claims	Low	High
Claims submission	4.5	13.1
Enrollment	2.2	4.3
Payment/Remittance	1.1	1.3
Coordination of Benefits	.5	.7
Eligibility verification	.2	.5
Claim inquiry	.3	.4
Procurement		
Materials Management	3.0	4.5
Payment/Remittance	1.1	1.3
Prescription Orders	.7	.7
Test Order/Results	.3	.3
Referrals/Authorizations	.1	.2
Appointing/Scheduling	<.1	<.2
Totals	12.9	26.0

Source: WEDI

Exhibit III-9

WEDI Recommendations

- Federal regulation should mandate ANSI ASC X.12 standards.
- All health care payers, providers and employers should implement approved ANSI ASC X.12 standards by the fourth quarter of 1995.
- The industry should adopt unique identifiers, including:
  - Social Security Number (SSN) for patients
  - SSN and Tax Identification Number for providers
  - A two-part code modeled after the NEIC company code for payers
- Pre-emptive legislation establishing uniform privacy and confidentiality standards should be enacted.
- The industry should conform to ANSI ASC X.I2 standards for voluntary issuance of health ID cards.
- Coordination of benefits should be simplified and payers should electronically send claims using ANSI ASC X.12 standards.
- EDI implementation guides, education programs and financial incentives for EDI implementation should be developed.

- An even more comprehensive form of EDI was conceived by the Hartford Foundation and is now commonly referred to as a Community Health Management Information System (CHMIS). A CHMIS combines an electronic claims processing network with central databases that can be used to measure issues of cost, appropriateness, effectiveness, satisfaction and overall quality of health care. Other EDI networks focus primarily on financial transactions and are often somewhat limited in terms of the on-line interaction between payers, providers and patients.

- A CHMIS promises to be an integrated system that provides for interaction between all participants within a community, in addition to providing the community network with access to other regional and national networks. Accordingly, the central goal of a CHMIS also goes well beyond efficient claims processing and envisions using information collected within (and external to) the networks to measure the cost of the system and to monitor and improve upon the delivery of care. There are already a number of communities that are developing and testing community networks. The typical CHMIS elements are identified:

- Transaction Processing
- Electronic Patient Records
- Information Management
- Reporting
- Network

- The creation and/or adoption of standardized EDI data formats for hospital procurement and insurance transaction processing is opening up the market to multivendor solutions. In the claims arena, for example, there are now more than 400 different proprietary designs used. However, a consensus for ANSI X12 is emerging across applications. Three major players are now backing ANSI X12: WEDI, Medicare (which announced in March that it would standardize on X12) and NEIC (which is building its new HCIN network to X12 standards as well).

- Distribution and logistics vendors are offering new services to hospitals for materials management, including just-in-time inventory techniques, multiple-vendor electronic buying systems and integrated supplier management programs for single-source/consolidated billing.

- Information technology to improve the quality and delivery of patient care is spurring a movement to develop industry-wide standards for computerized patient records. Health care organizations need to provide caregivers with bedside and remote access to patients' records and to allow for communication of patient care information (including image transfer) between health care facilities, departments and treatment sites.

The driving forces for electronic commerce in health care are summarized in Exhibit III-10.

Exhibit III-10

Driving Forces for Electronic Commerce in Health Care

- The need to control skyrocketing health care costs
- Unbundling of health care services among multiple providers
- Moves toward adoption of industry-wide EDI standards for purchasing and claims submission
- Government and industry partnerships aimed at reducing administrative costs
- Moves toward development of industry standards for computerized patient records

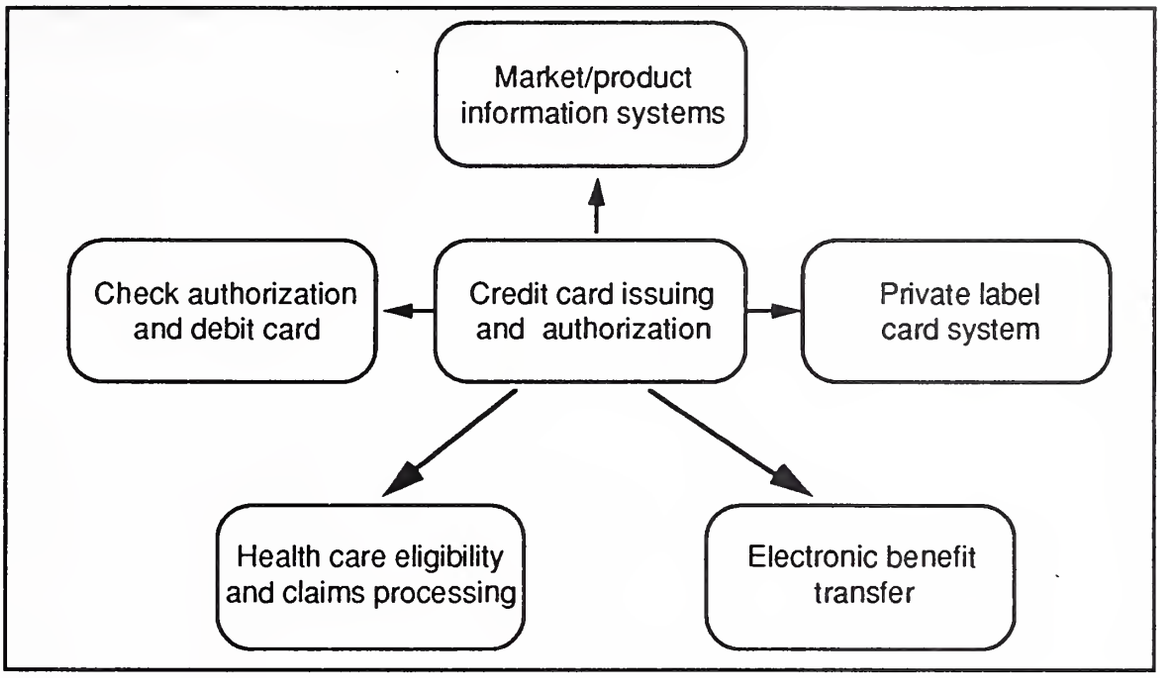
G

Strategic Market Expansion Opportunities in Health Care Claims for Credit Card Information Services Vendors

Credit card information services vendors, who process credit card accounts and perform authorizations or credit card transactions, are in a position to become leading vendors in health care claims processing. The credit card system represents a base of processing that is needed to serve several other information service and transaction markets. Exhibit III-11 shows several EFT markets that are natural expansions of credit card business systems.

Exhibit III-11

EFT Potential from Credit Card Business Systems



For example, the systems design for the health care eligibility and claims processing system is similar to the credit card system. The key difference is more processing for claims adjudication by one or more payers, including calculation of possible patent copayments. On the other hand, authorizations for credit card transactions are straightforward and relatively standard.

The credit card system can also expand to include other markets such as check authorizations, debit card processing, private label card services and electronic benefit transfer.

At least three credit card services vendors have already made the leap to health care claims processing, including National Data and Envoy. Actually, this kind of market expansion may be required by leading vendors in order to maintain transaction volumes in the face of competitively declining transaction prices in more mature market sectors. Only through adding transaction volumes and leveraging the basic system can the required costs of maintenance and enhancement be accommodated, along with the required tightening of margins due to price reduction, thereby spreading the costs over an ever-increasing base of transaction volumes.

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Electronic Commerce Applications

Electronic commerce in the health care trading community consists of an electronic infrastructure through which the different players in the community coordinate their recurring commercial transactions.

There are many areas where transactions occur that lend themselves to electronic network solutions. Exhibit IV-1 lists an inventory of health care technologies and shows which are potential electronic commerce applications.

This chapter covers key existing and emerging electronic commerce applications—those with the most market potential, those with the greatest industry-wide impact and those that will serve the largest number of patients and health care players.

Exhibit IV-1

Inventory of Health Care Technologies and Applications

Technology Application	Comm. Networks	Ext'l. Links	Electronic Messaging	Image Proc.	On-line Proc.	Batch Proc.	Expert System	Interface Equip.
Enrollment	(X)				X	X		X
Eligibility	(X)		(X)		X	X	X	X
Authorization	(X)		(X)		X	X	X	X
Referral	(X)		(X)		X	X		X
Claim Submission	(X)			X	X	X		X
Claim Adjudication	(X)				X	X	X	
Managed Care Utilization Review	(X)		(X)	X	X	X	X	X
Coordination of Benefits	(X)		(X)			X	X	
Explanation of Benefits	(X)		(X)					
Remittance Advice	(X)		(X)			X		
Funds Transfer	(X)	(X)				X		
Credit/Debit Card Transactions	(X)	(X)			X			X
Service Audits	(X)		(X)	X		X		
Appointment/ Admission	(X)		(X)		X		X	X
Laboratory Tests	(X)		(X)		X		X	X
Prescriptions	(X)		(X)				X	X
Supplies	(X)	(X)	(X)		X	X		X
Patient Survey	(X)		(X)			X		
Medical Library	(X)	(X)			X			X
Patient Records	(X)		(X)	X		X	X	
Laboratory Results	(X)		(X)	X		X	X	
Reporting	(X)		(X)			X	X	

Note: Items with (X) indicate potential electronic commerce applications *Source: WEDI*

A
Electronic Claims Processing

The health care community recognizes the benefits of automating the claims processing function, because automation will streamline a key part of health care administration. But industry-wide electronic claims processing has broader implications: It is the first step in building the infrastructure for a national health care information network.

The Workgroup for Electronic Data Interchange (WEDI), counted more than 400 different proprietary designs used in health care for the exchange of claims information. However, a consensus for ANSI X12 is emerging.

In prior chapters of this report, the many similarities between credit card authorizations/transaction processing and health care claims eligibility verification/claims processing were identified as strategic bases for market expansion by credit card service vendors. However, one of the differences between credit cards and health care claims transactions is the issue of standards.

In the case of credit cards, the two major card associations, MasterCard and VISA, *began* operations with standards. Once a credit card transaction reached INET (the MasterCard network) or VISANET (the VISA network), the data contained in each transaction was the same and all individual banks' EDD systems were immediately able to process the verification inquiries as well as collect transaction data. In contrast, the health care industry has many hundreds of payers, each of whom, over time, has identified mostly different processes and protocols for submitting claims, manual and electronic; so, too, with the clearinghouses and, in some cases, with the larger providers such as hospitals, HMOs, PPOs, etc.

There is no question that the lack of standards has and will slow development of industry-wide claims processing systems. However, the motivation is clearly there, due to the economics of scale and potential for improved efficiencies as well as the requirements of various government agencies who are in charge of reimbursement to providers.

The movement toward developing computerized patient record standards (discussed in more detail later in this chapter) is in the organizational stage. Its goal is to develop standards for transmitting patient care information, which could be used to support medical claims, but even more importantly, to save lives by providing medical information wherever it is needed.

For now, the focus in claims processing is on developing industry-wide standards for claim information and in increasing the percentage of claims processed electronically.

Exhibit IV-2 shows INPUT's estimates of the health care claims volumes for 1992 and 1997. Penetration of electronic medical claims (EMC) processing varies by type of provider and type of payer. Each major payer-provider category is discussed below.

Exhibit IV-2

Health Care Claims Transaction Volumes (Figures in Millions)

Item	1993			1998			EMC 1993-1998 CAGR (%)
	No. of Claims	No. of EMC	Percent EMC	No. of Claims	No. of EMC	Percent EMC	
Medical Gov't. payer-provider-to-intermediary transactions							
Medicare hospital	130	100	80	160	160	100	10
Medicare physician	660	300	45	840	760	90	20
Medicaid hospital	80	60	75	100	100	100	11
Medicaid physician	400	100	25	531	450	85	35
Total gov't medical claims	1,300	600	46	1,600	1,470	92	20
Private payer							
Blues hospital	180	100	56	220	190	86	14
Blues physician	1,200	200	17	1,500	880	59	34
Non-Blue hospital	360	10	3	460	10	2	0
Non-Blue physician	1,400	10	1	1,800	20	1	15
Total private medical claims	3,140	400	13	4,000	1,100	28	22
Total medical (Gov't. and private)	4,440	1,000	23	5,600	2,600	46	21
Pharmacy Private payer, Medicaid claims	900	700	78	1,100	1,00	91	7
Dental Private payer claims	300	100	33	400	180	45	12
Claims Totals	5,100	1,800	32	7,100	3,750	53	16

Data may not add to totals due to rounding

Source: INPUT estimates

1. Government-Sponsored Insurance

Our government is a major force in establishing standards for claims and in forcing the graphic conversion of manual claims to electronic. As the payer for a large number of the total claims, government can demand that the claims be submitted in electronic format and has, in fact, set dates for most government agencies including federal as well as state agencies such as Workers' Compensation Administrations. Over the past several years, standard claims forms have been established for

submission of government medical claims. These forms will be the basis for establishing commercial medical claims standards. In 1992, approximately 1 billion claims were filed with government insurers, with just more than half of these filed electronically. Government payers have moved ahead more quickly than private payers because of their size, coverage, clout and a long-term focus on electronic processing.

Medicare and Medicaid established electronic medical claims (EMC) systems as early as the 1970s; today, they process nearly all of their hospital claims and a significant portion of physician claims electronically. In the 1970s, emphasis was on claims submitted via electronic tape; but since the early 1980s, more than 1,000 hospitals have installed EDI hardware and software, now transmitting on-line EDI transactions using their regional fiscal intermediary's proprietary format in most cases. In physicians' offices, electronic claims are typically submitted via direct dial-up EDI.

The HCFA, which administers Medicare, plans to increase electronic claims filings to 100% of hospital claims and 75% of all other claims by 1995.

Approximate government-insured claims volumes were arrived at as follows: HCFA provided its 1992 total claims processed and EMC rates (based on 4th quarter 1992 figures and 1993 budgeted workload) to INPUT. These were used to update WEDI's EMC rates for Medicare. WEDI also published current EMC rates for Medicaid. Overall claim volume for Medicaid was derived based on the relative proportion of Medicare and Medicaid payments and enrollments, published by the Department of Commerce in 1980 and 1989.

2. Fiscal Intermediaries

Regional insurance carrier organizations serve as the local administrators for Medicare and Medicaid. Often, the intermediary is a Blue Cross/Blue Shield organization, or, sometimes, it is a private carrier such as Aetna or Travelers Insurance. In any case, these intermediary organizations receive and process the electronic claims submitted by providers.

Blue Cross/Blue Shield ("the Blues") helped to develop the government standards for electronic claims and has also been

aggressive in promoting electronic processing of its private insurance claims, though they have not achieved the same level of penetration for their private claims as for government-insured claims.

3. Hospitals versus Physicians' Offices

There is a major difference between hospitals developing EDI capability and making such a switch in physicians' offices and other less information technology-intensive environments. While hospitals are, by comparison, well-equipped with information technology hardware, software and IS personnel, physicians' offices are far less automated.

A 1992 American Medical Association Report, "Electronic Data Interchange in Medical and Dental Practices," found that only about 41% of physicians had the capability to submit at least some portion of their claims electronically. While somewhere between 60% and 70% of physicians' practices and doctors' offices have some degree of automation, the level of sophistication of these systems varies widely.

The market for physician practice management software, the most common type of computerization among private physicians, is fragmented. Greater than 1,000 physician practice management products are available, most of which are concentrated in regional markets. Now these product vendors are happy to capitalize on the trend toward electronic claims processing by adapting their products to support EMC. In some cases, clearinghouses supply standard software or computer chips to the vendors, as well.

4. Commercial Indemnity Plans

In 1992, there were approximately 2.8 billion claims filed to private insurers, with approximately 289 million (or 10%) filed electronically. The problem faced by private insurers is that each individual carrier typically makes up only a small part of each provider's practice, so proprietary systems from individual carriers are unacceptable in most practices.

As mentioned earlier, their role as fiscal intermediaries has helped many of the Blue Cross/Blue Shield organizations to achieve high levels of electronic claims processing, but many

other large national carriers do not have the same kind of regional influence as a large "Blue" organization that administers government insurance programs and, in areas where there is a high concentration of military personnel, possibly a CHAMPUS program.

Due to the lack of an industry-wide standard, the intermediaries developed their EDI networks to proprietary transaction formats. This has been an inhibiting factor in the growth of national claims clearinghouses, which large, private insurers lacking regional concentrations of plan members typically use.

Claims clearinghouses are the result of private carriers joining together to develop a system that accepts claims transactions directed to different payers using a common transaction format, translates the transaction to the format for each payer, then routes them to the payers for which they are intended.

Using the clearinghouse approach, commercial insurers process approximately 10% of all claims electronically. The larger insurance firms with aggressive EMC programs process claims electronically at approximately twice the industry average, or 20% of all claims.

INPUT's estimates of claims and EMC volumes are based on the known volume of NEIC claims processed in 1992, as well as EMC rates for private coverage under Blue Cross/Blue Shield plans ("Blues").

Total claim volumes were derived by taking total enrollment in private plans (per the U.S. Department of Commerce, 1988) and assuming an average of 14 claims per enrollee per year. This is slightly lower than the government insurance claim rate used, due to the higher proportion in government plans of elderly enrollees who are likely to need more medical care.

a. National Electronic Information Corporation (NEIC)

The first and largest multipayer clearinghouse is NEIC, which began in 1981 and serves payers, providers and intermediaries. Seventy-two NEIC member-payers receive electronic claim filings from more than 650 provider organizations. NEIC plans to expand its communications network to support eligibility, referral, authorization, encounter and free-form message

transactions via an open system that will support real-time information exchange 24 hours a day, 7 days a week.

The new on-line NEIC system, called HCIN (Health Care Information Network) was developed by PCS, Inc., a subsidiary of McKesson Corporation and the nation's largest processor of prescription drug claims. It is operating in early 1994. PCS beat out many large players from various sectors of the information technology services industry, including EDS, AMR Corp., AT&T, DEC, Advantis and American Express.

b. Other Consortia, Clearinghouses and Joint Initiatives

Various regional payers and providers have joined together to promote EMC and other EDI transaction processing:

- In New Jersey, Aetna and Prudential are working with Health Information Technologies, a vendor of point-of-service devices, to implement electronic eligibility checking and claims submission in approximately 500 physician facilities targeted for this program. The system is to be linked to NEIC to include additional payers.

- Blue Cross and Blue Shield of Missouri have developed a regional joint-venture clearinghouse with General American Life, Healthlink and Healthnet to offer electronic claims services for any payer in the region, with the purpose of encouraging more hospitals and physicians to use EDI. The organizations together process about 60% of their claims electronically and plan to increase participation levels significantly over the next two years.

c. Estimate of 1993 Vendor Claims Handling Volumes

The Automated Medical Payments News, December 8, 1993 issue, contained estimated volumes and rankings of third-party claims handling vendors. This is shown in Exhibit IV-3. EDS and Computer Sciences are included in the top five as a result of their heavy government Medicare claims handling volumes. They also have a high percentage of electronic claims. National Data and Envoy are also included in the top five, and perform 100% electronic claims handling.

Exhibit IV-3

Largest Third-Party Claims Processors

Processor	Monthly Volume 1993	Electronic 1993 (Percent)
Electronic Data Systems Corp.	55	65
National Data Corp.	30	100
ENVOY Corp.	16	100
First Health Services Corp.	14	75
Computer Sciences Crop.	13	82
PCS Health Systems Corp.	12	98
Consultec Inc.	10	74
General Computers Corp.	8	100
GTE Data Services	7	69
Health Communications Services	3	100
Admina Star, Inc.	3	65
CYDATA	3	50
National Electronic Info. Corp.	3	100
Comparison Technologies	3	51
First Health Strategies	2	2
CIS Technologies Ic.	2	74
BC of California	2	69
BC & BS of Kausas Inc.	2	53
Advacare Inc.	1	55
Medical Management Resources	1	100

Care should be taken in evaluating these volumes and rankings, because of possible double-counting. For example, Envoy and National Data actually collect claims and perform clearinghouse functions, but ultimately forward these claims onto PCS which performs the actual claims processing. Nonetheless, the names of vendors identified in Exhibit IV-3 reasonably represent the vendors who are most active in claims processing at the present time in the U.S. markets.

5. Managed Care Plans

The information required by managed care plans is greater than in traditional insurance plans because of the higher level of interaction between payer and provider. Besides claims processing, other required provider-payer transactions include eligibility information, preauthorization of services, referral processing and utilization review. Some managed care plans report EMC rates as high as 80%. Most systems now in place are proprietary, single-payer systems, but a second generation of systems that support multipayer capabilities is emerging.

6. Pharmacy Claims

The total pharmacy claims volume in 1992 was approximately 800 million, of which 625 million (more than 75%) was electronically processed. Prescription claims have moved swiftly to EMC, with a key driving factor being the relative simplicity of the claims compared to claims for medical services, which can cover a much broader spectrum of services, providers and price levels.

PCS, the largest processor of electronic point-of-sale pharmacy claims, processed approximately 125 million pharmacy EMCs and the remaining 500 million were processed by various other private point-of-sale systems, usually included as part of private medical plans.

INPUT's estimates of total pharmacy claims volume was derived from U.S. Department of Commerce published figures of enrollment in Medicaid and private medical insurance plans (i.e., plans that provide prescription coverage), based on claim levels of four pharmacy claims per enrollee.

7. Dental Claims

Like pharmacy claims, a high proportion of dental claims are relatively straightforward (i.e. routine check-ups, dental cleaning, fillings) and come from a fairly similar group of providers.

Americans visited their dentists 590 million times in 1992, generating 266 million claims (the difference between visits and claims is based on claims covering multiple visits and the portion of dental services provided which is not covered by insurance). At

a 30% EMC rate, close to 80 million dental visits were processed electronically.

INPUT's estimate of dental visits is based on American Dental Association figures on dental visits in 1979 and 1986: 354.4 million and 466.8 million, respectively.

8. Expanding EMC Capabilities: Other Transactions

EMC processing is the most extensive application of health care EDI, but claims submission is not the only type of transaction between payer and provider. Other transactions are gradually added to broaden the scope of payer-provider electronic commerce. These include eligibility checking, claim inquiries, claim payment and plan enrollment. EDI usage for these functions is just emerging, but increases benefits to users, and therefore increases the likelihood for providers and payers to make the investment to convert to EDI. Each of these types of transactions is discussed in more detail below.

The first WEDI report issued in July 1992 estimated likely savings in administrative costs which would result from EDI usage for these insurance-related transactions. Exhibit IV-4 lists these transaction types and WEDI's estimate of potential savings (note that the savings estimates are before deducting systems development costs).

Exhibit IV-4

Insurance-Related Transactions Administrative Saving Potential

	Savings To			
	Providers ($ M)	Payers ($ M)	Employers ($ M)	Total Savings ($ M)
Claims Processing	DNA	1,400		1,400
Payment and Remittance	1,120	130		1,250
Eligibility Checking	DNA	300		300
Claim Inquiry	DNA	50		50
Plan Enrollment	50-100	50	70-110	170-260
Total	1,170-1,220	1,930	70-110	3,170-3,260

a. Claims Payment and Remittance

Electronic payment and remittance of health insurance claims is still virtually nonexistent, but shows great promise, as the estimates of administrative savings in Exhibit IV-4 indicate.

An X12 standard EDI payment format for claims payment, transaction set number 835, the electronic remittance advice (ERA), has been approved by the American National Standards Institute's (ANSI) Accredited Standards Committee for X12. Medicare is now testing claims remittance and payment through its fiscal intermediaries. In 1993, several hundred providers, mostly hospitals, processed Medicare claims remittance and payments. Requirements for Medicare participating providers to receive claims payments were published in the Federal Register in November 1992. Physicians' offices must have electronic billing capabilities to participate.

Medicare expects electronic payment and remittance in hospitals to grow quickly—to 50% of claims by the end of 1994 and to 100% by 1997. Growth will be significantly slower for physicians' claims due to the lack of electronic sending and receiving capabilities among this group. Exhibit IV-5 indicates the level of ERA/EFT usage for transmissions between government payers and their participating providers for 1992 through 1997.

Exhibit IV-5

Claims Payment and Remittance Transaction Government Payers to Participating Providers

Type of Provider	1993			1998		
	Millions			Millions		
	No. of Txns	No. ERA/ EFT	Percent ERA/EFT	No. of Txns	No. ERA/ EFT	Percent ERA/EFT
Hospital	170	0.1	0.1	200	200	100.0
Physician	960	0.0	0.0	1,200	400	33
Total gov't medical payments*	1,125	0.1	0.0	1,400	600	43

* Medicare and Medicaid

Source: HCFA, INPUT, 1993

Private payers' implementation of ERA and EFT will be less swift, hindered by similar obstacles as those encountered to EMC implementation.

NEIC just began processing electronic remittance advice documents (ERAs) this spring for two large payers, but the total transactions processed in 1992 equaled only about 100,000 ERAs. This is far less than the 20 million total private insurer claims processed. NEIC processes ERAs at no charge; they are offered as a free service to encourage providers to process claims electronically. Only the ERA is processed by NEIC; electronic funds transfer (EFT) arrangements are made directly between the payer and the provider's banks if the actual payments are to be processed electronically, because NEIC is not a funds processor.

Ib. Eligibility Checking and Claim Inquiries

Eligibility checks and other on-line EDI inquiries are seen as transactions which will make claims-related EDI more robust and encourage providers to make the switch to EMC.

Eligibility transactions are used to determine a patient's benefit coverage under a plan (i.e. whether they are covered for a particular procedure). Many indemnity and managed care plans also require approval by a health care professional prior to treatment. This "precertification" practice is sometimes provided by organizations separate from the insurance providers, companies known as "utilization review" providers.

Claim inquiries include requests for claims-related information from either the patient, the benefit plan sponsors (employers) or the providers. These inquiries are usually one of several questions: Was a particular claim received? Has it been processed? How much of the submitted expenses were covered? When was payment made? To whom was the payment made (i.e., patient or provider)?

Eligibility and claim-specific inquiries are now processed largely by phone, but EDI can be applied to support the need for this information. Electronic mail and automated voice response systems would also be appropriate technologies for this function.

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c. Plan Enrollment

The process of enrolling Americans into public or private insurance plans is currently manual in most cases.

With employee benefit plans, the benefits or human resources department of the company offering the plan usually enters information from a plan selection enrollment form filled out by the employee. In a minority of companies, employees make their choices through an automated interface, such as:

- A PC in the company cafeteria, from which they turn in a diskette to the benefits department
- Touch-tone telephone that connects with a voice response system
- Or, perhaps, a touch-screen kiosk or terminal

Regardless of how the initial information is entered, the enrollment must first reside in the employer's benefits or human resource system, and then be communicated to the appropriate payers, carriers or plan administrators. Most large companies send enrollment information to carriers and administrators via magnetic tape, but this process is more error-prone, less flexible and less timely than a direct EDI connection.

The general information flow is similar with public insurance plans, with the need to communicate with local Medicare and Medicaid agencies, fiscal intermediaries and the Federal agency in Washington.

A standard format for enrollment information would allow for electronic communication between plan sponsor and payer or between payers. When computerized patient record standards are developed, payers should have controlled access to patient information, needed to certify the health status of enrollees.

There are at least 185 million individuals covered by private plans and 55 million in Medicare and Medicaid. Not all of these would

be separate enrollments (many of them are dependents), and a significant number of individuals also have multiple plan coverage. WEDI estimated the administrative savings for electronic enrollments based on provider time saved in responding to inquires about enrollee health status, efficiency and reduced errors in processing and reductions in telephone and postage costs.

INPUT expects that employers who already have EDI capability will be the first to take advantage of EDI enrollment (i.e. sectors where EDI usage is high such as transportation, grocery, financial sectors, health care and others).

d. Electronically Readable I.D. Cards

Health plans have long issued paper or embossed plastic cards as identification mechanisms for plan members. Massachusetts, New York and Arkansas issue magnetic stripe cards, similar to ATM or credit cards, to their local Medicaid recipients. The cards are used for utilization review and eligibility checking. Several private insurance plans use bar code cards for similar purposes. Smart cards containing integrated circuits are used for combination purposes in several states, to monitor Aid to Families with Dependent Children, food stamp and Medicare recipients.

- In July, 1992, WEDI recommended further study to determine whether a broad-based, machine-readable health care card system similar to the ATM banking networks would provide justifiable utility, reliability and pay back above and beyond the enormous costs of building the infrastructure for such a system. To ensure nationwide access to a health care card network, a uniform technical standard (i.e., magnetic stripe, bar code or smart card) would have to be selected.

- While other countries consider smart cards for the storage of patients' medical history or insurance coverage information, WEDI recommends against this option in the United States.

- If a broad-based health card system is implemented, WEDI recommends use of U.S. networks to access information (rather than storing the information on smart cards). This avoids the risk to encoded information in the event of loss or damage to smart cards.

B
Electronic Ordering and EDI for Hospital Procurement

EDI is now recognized as representing an administrative breakthrough for the medical industry. EDI is electronic data interchange or direct computer-to-computer communication for routine exchanges of formatted data for specific functions. Already, EDI is extensively used by medical supplies vendors to speed ordering, delivery, inventory management and billing of routinely ordered supplies—reducing costs to process a typical hospital's purchase order from $70 to $14, thus potentially saving such an institution administrative costs of $840,000 annually if used for the year's average 15,000 purchase orders. INPUT estimates that, in 1993, more than 50% of the dollar value in three categories—medical/surgical supplies, pharmaceuticals and food or dietary items—were ordered electronically; this should grow to more than 70% by 1997. Up-to-date implementations of EDI can link the hospital's inventory depletion of routinely used supplies down to a preset threshold, with software triggers for automatic EDI-based orders for items, thereby cutting purchasing costs and precluding shortages.

1. Overview: Hospital Suppliers

Of all suppliers to hospitals, those that need electronic commerce most are the ones that supply materials on a highly variable yet frequent basis. These suppliers provide medical and surgical products, pharmaceuticals and grocery/dietary products. More and more hospitals are moving toward just-in-time ordering strategies for these types of products.

Utility and waste disposal suppliers provide a steady, ongoing product to the hospital, but require relatively little purchasing overhead to warrant electronic commerce systems. EDI payment for these services has begun among hospitals as they have with

consumers, using preauthorized debits. Transaction volumes (single monthly payments) are inherently low in this application.

Office supplies are highly amenable to EDI purchasing, but vendor efforts are just beginning. The purchase of laboratory equipment, beds and bedding supplies, office equipment and construction services are capital expenditures that do not lend themselves to EDI or EDI-like purchasing. INPUT sees little promise in the immediate future for electronic commerce systems built for these areas in the health care community. However, vendors in these industries are adopting EDI-based commerce with trading partners in other industries (see INPUT's *The U.S. EDI and Electronic Commerce Markets, 1993-1998).*

2. Proprietary Electronic Order Entry (EOE) Systems

Today, more than 99% of electronic purchases are done using proprietary electronic order entry (EOE) systems provided to hospitals by their supplies vendors. These systems first appeared in hospitals in the first half of the 1980s, led by American Hospital Supplies (now Baxter) ASAP system, followed closely by similar systems from Abbott Labs, Johnson & Johnson and other suppliers, including drug wholesalers and food suppliers.

The EOE systems were designed to give their owners a competitive advantage by making it faster and easier to order supplies from the vendor that owned the system and to encourage hospitals to consolidate their vendor relationships.

The systems have since broadened their approach to become, in effect, "electronic catalogs," distributing supplies from multiple manufacturers and suppliers. Baxter's new EDI-based system serves as a distribution channel for more than 400 supplies manufacturers. Abbott Labs' system is jointly owned by Abbott, 3M and four other medical/surgical supplies providers.

Until recently, most hospitals saw little need to develop standard EDI ordering capabilities. Supplies vendors have traditionally charged only minimal monthly lease fees for the revenue-generating EOE systems; based on a high-level analysis of the situation, the financial incentives to stay with vendor-supplied systems have been strong.

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Exhibit IV-6 details the degree to which hospitals use EOE systems to purchase medical/surgical supplies, pharmaceuticals and food/dietary products.

Exhibit IV-6

Electronic Purchasing in Hospitals

Item	1993			1998			1993-1998 CAGR (%)
	Expenditures ($ B)	% Ordered Electronically	Value of Electronic Purchases ($ B)	Expenditures ($ B)	% Ordered Electronically	Value of Electronic Purchases ($ B)	
Med./surgical supplies	16	67.0	10.0	19.4	87	15.4	9.0
Pharmaceuticals	27	86.3	22.0	32.7	95	29.5	6.0
Food/dietary	27.2	12.5	2.8	33.1	31.3	13.5	37.0
Totals	68.3	4.3	35.4	81.5	70.2	53.0	8.4

Source: Department of Commerce, INPUT

a. Medical/Surgical Products

In 1992, approximately 62% of the $15 billion in medical/surgical supplies or $9.3 billion, was ordered electronically. Baxter Healthcare Corp. alone earns more than $2 billion per year in revenue from products ordered through its EOE systems.

Hospitals typically purchase products from a large number of medical/surgical manufacturers via EOE systems. For example, Vanderbilt University Medical Center in Nashville, a user of ValueLink, Baxter's new EDI ordering system, uses the system to order from 330 of the more than 400 different manufacturers they have product contracts with.

Medical/surgical supply ordering systems have been the most visible electronic channel of distribution, probably because this is a complex area involving a large number of vendor contract

relationships for most hospitals. While approximately 80% to 90% of U.S. hospitals are using electronic ordering for these purchases, they are ordering closer to barely more than 60% of their total medical/surgical expenditures electronically because of the number of vendors they deal with.

At the very least, a hospital requires a national distributor relationship (with Johnson & Johnson, Abbott Labs, Baxter, Owens & Minor, General Medical or one of their counterparts) and a regional distributor relationship for obtaining items not sold through national suppliers, but it is more difficult to consolidate vendor relationships for medical/surgical purchasing than for pharmaceuticals or food.

Most hospitals now obtain discounts by buying through national and regional buying groups. Premier Hospital Alliance, a large national consortium of research and teaching hospitals, acts as such a national buying group, in addition to playing an important role in coordinating national medical research. Premier has also been a leader in the development of standard EDI ordering capabilities in hospitals (discussed in more detail later in this section). Hospital buying groups that pool their members' buying power and information technology capabilities are emerging as an important factor in the development of electronic commerce in health care.

INPUT expects hospitals' 1997 electronic purchasing to reach the 90% level, primarily as a result of hospitals' further consolidating their vendor relationships and an increase in the number of vendors available through EOE systems.

b. Pharmaceuticals

INPUT estimates that approximately 82% of hospitals' $26 billion in 1992 pharmaceutical purchases (about $21 billion), were transmitted over proprietary EOE systems and that the percent penetration of electronic pharmacy orders will reach 90% by 1997. Pharmaceutical purchasing is, in many cases, a separate function of the hospital pharmacy. The issue of multiple vendor relationships is not commonly applicable here—most hospitals purchase 85% to 90% of their pharmaceuticals from a drug wholesaler. The remaining 10% to 15% are typically special orders phoned in directly to the manufacturer. Several drug wholesalers provide electronic ordering capabilities, and the

medical/surgical suppliers discussed above also provide links for pharmaceutical purchases.

c. Dietary/Food Products

The electronic purchase of food supplies for hospitals shows the greatest potential for growth of all hospital procurement categories. The level of electronic food ordering is very low today, but as with pharmaceuticals, hospitals typically purchase food from one or two primary suppliers, so coordinating trading partners is relatively simple.

INPUT found in a random sampling of three medium-sized hospitals that two of the three were using EOE systems for food purchasing. One of the hospitals orders 80% of its food and dietary supplies via Baxter's KraftLink. The other uses Michigan-based Gordon Food's system for 12% of its purchases and plans to link directly to Kraft, bringing its total electronic food purchases to 85%.

Although other evidence indicates that the incidence of hospitals' electronic food purchasing is much lower than in this sample—INPUT estimates that no more than 10% of total hospital dietary purchases are transmitted electronically today—dietary EOE purchasing will grow steadily over the next five years. INPUT expects the value of food EOE purchases will grow from about $2 billion in 1992 to $6.6 billion in 1997, at a compounded annual growth rate (CAGR) of 24.7%.

3. Movement from Proprietary to Standard EDI Systems

Hospitals are now beginning to recognize the advantages of integrating the electronic ordering function with materials management processes and in-house information systems. Costs of duplicate data entry (into the vendors' systems and the in-house materials system), and the fact that vendor-provided systems are not designed based on the functional needs of a hospital materials department, add to the cost of using these systems.

INPUT estimates that the total value of hospital purchases using standard EDI systems was approximately $16 million in 1992, or just about one-tenth of one percent of hospitals' total medical/surgical purchases of $15 billion. This compares to $9.3

billion in medical/surgical purchases using EOE systems (shown in Exhibit IV-6), or 62% of total medical/surgical purchases.

Health Care EDI Corporation (HEDIC) has agreements with Advantis and AT&T EasyLink to provide EDI network services for HEDIC members to serve the growing interest among hospitals and hospital buying groups to establish their own EDI capabilities. A primary application of EDI is order transmission linked to the hospital materials management system.

HEDIC allows member groups and associate members (including hospitals and suppliers) to purchase EDI services at a discounted rate, based on total usage for all HEDIC members.

The hospital groups negotiate with their supplies vendors to share in the EDI network services costs, with supplies vendors and hospital customers each bearing their portion of the charges.

Nonstandard EDI ordering is also used on a limited basis: Baxter's ValueLink service uses EDI, but Baxter says it is undesirable for them to require their customers to move to X12 and to jeopardize revenue-producing relationships. Enterprise Systems is a vendor of integrated hospital materials management systems which supports dial-up EDI links to supplies vendors. Children's Memorial Hospital in Chicago, IL, uses Enterprise Systems to order medical/surgical supplies from Baxter.

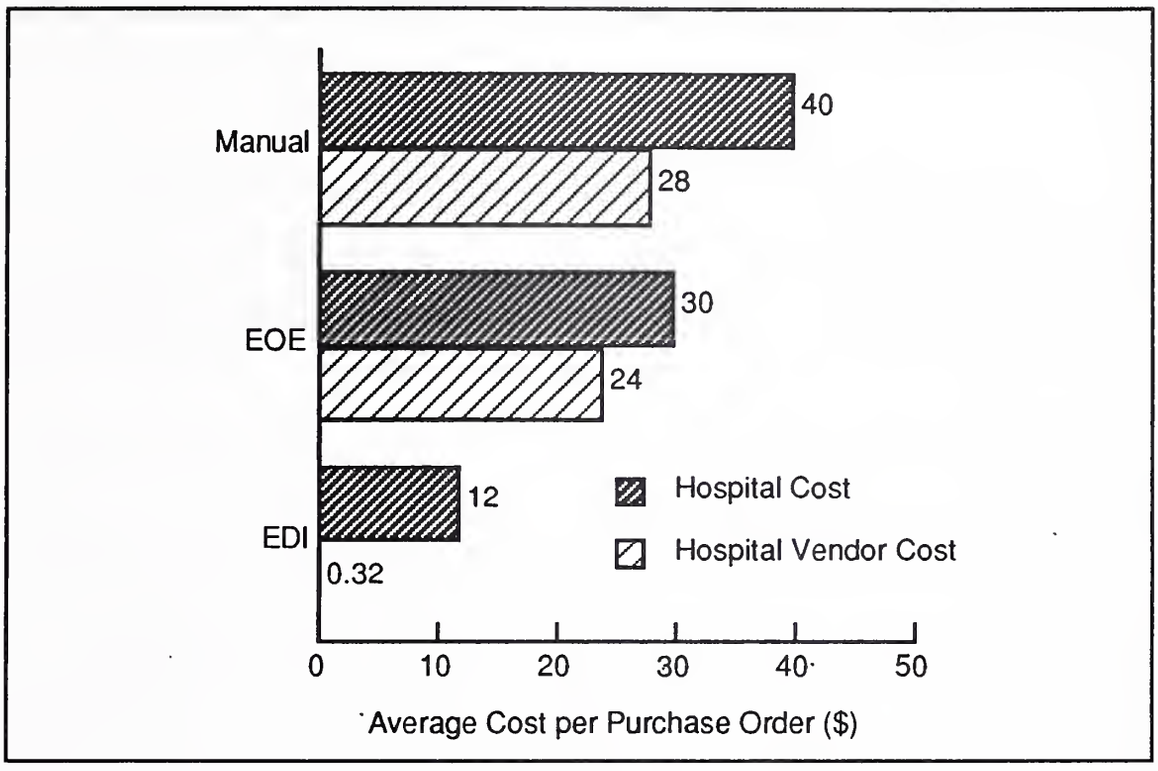
Standard EDI (using ANSI-X12 transaction sets) for hospital ordering is still extremely limited, but the cost benefits, not yet widely documented, but detailed in the next section, are certain to drive a surge in EDI ordering once a few more success stories have accumulated.

a. Savings to Hospitals and Vendors from EDI Ordering

An analysis of the total costs to the supplier/vendor and hospital/buyer of processing orders reveals that while EOE systems are less costly to operate than manual purchasing systems, EDI reduces costs even further for supplier and hospitals. In other words, EDI for purchasing is a win-win opportunity for hospitals and supplies vendors. Exhibit IV-7 compares the average costs of processing manual, EOE and EDI purchase orders. As can be seen, costs fall for hospitals and hospital vendors.

Exhibit IV-7

Average Processing Costs Per Purchase Order: Manual, EOE and EDI



Source: Health Industry Business Communications Council, 1992

The EDI Technical Committee of the Health Industry Business Communications Council found that hospital processing costs are $40 per manual order, $30.40 per EOE system order, but only $11.20 to $12.80 per EDI order. For a typical 500-bed hospital that places 15,000 orders per year, EDI saves from $27.20 to $28.80 per order transaction and as much as $432,000 per year.

The same analysis found that vendor costs per order were $28 with manual systems, $24 with EOE and 32 cents with EDI. Vendors encourage the transition from proprietary EOE systems to standard EDI, because it promises to alleviate the burden imposed by costly proprietary systems, whose value as revenue producers and customer relationship builders has been surpassed by their high maintenance and operational costs.

b. Hospital Expenditures on Hardware, Software and Services for EDI Ordering

Hospitals spent a total of approximately $2.2 million on EDI ordering implementations in 1992 (including hardware, software and outside or in-house implementation services). These

expenditures will reach $22.6 million in 1997. Exhibit IV-8 shows year-by-year hospital EDI implementation expenditures for 1992-1997 as estimated by INPUT.

Exhibit IV-8

Hardware, Software and Implementation Expenditures: EDI Ordering Applications in Hospitals

	1993	1994	1995	1996	1997	Total	CAGR 93-97 (%)
No. of Hospitals Implementing	40	50	100	200	200	590	50
Expenditures:	$ Millions						
Hardware (Workstations)	180	260	510	1,000	1,000	2,950	55
EDI Software	610	950	1,900	3,200	3,200	9,860	51
Implementation Services	2,780	4,400	8,700	18,380	18,380	52,640	60
Expenditure Totals	3,570	5,560	11,130	22,600	22,600	65,460	56

Source: INPUT

EDI implementation for hospitals is far more affordable on PC platforms than mainframe EDI. Required PC hardware and EDI software together would cost a hospital up to $16,000; the mainframe software alone costs more than $60,000.

Implementation costs on a PC platform (at $1,000 per day total in-house staff time plus overhead or the same figure billed by contract staff) would total approximately $30,000 for six weeks. Mainframe implementations, requiring up to 18 months of programmer time, cost an order of magnitude more. At the same rate ($1,000 per day), this totals $360,000 for a mainframe EDI implementation. Estimates in Exhibit IV-7 reflect the hardware, software and implementation services averages described above. Associated mainframe hardware upgrades or purchases are not included, because these would vary widely, based on the hospital's existing configuration, and some hospitals can be expected to implement mainframe EDI ordering using their existing mainframe capacity.

Assuming that a relatively small percentage of hospitals will still opt for mainframe EDI over the next five years, we based our estimates on an 85% to 15% split between PC and mainframe EDI implementations for 1992-95, moving to a 90% to 10% PC-to-mainframe split for 1996-97.

The future for EDI order entry applications integrated with hospital materials management systems is promising. Hospitals' operational cost savings, at an average of $432,000 per year, are impressive and are a fraction of the cost of a PC-based EDI implementation.

4. Slow Conversion to Standard EDI Ordering

With the outstanding benefits shown above for proprietary EOE, and especially standards-based EDI, over manual methods, it is not surprising that consultants forecast rapid conversions and almost overnight conversions on the part of hospitals and other medical facilities. However, none of these very optimistic forecasts have been achieved. Why?

Very simply, the explanation lies in the fact that EDI forces changes in the way hospitals carry out their functions. Most hospital accounting systems today are not equipped to interface directly with EDI systems; therefore, translation software that ultimately builds interfaces is required. Few vendors of hospital and other medical facility back office software release new versions with "EDI-ready" features.

Aside from systems implementation issues, the savings discussed above result from the elimination of jobs and of the reallocation of tasks to lower level functions. This causes upheavals in accounting department staffing which has to be worked out over time before benefits can really be achieved. Moreover, financial officers take seriously the automated aspect of ordering using EDI systems. An error can result in massive over-ordering or shortages that get in the way of providing hospital services. New EDI systems have to be worked into over time, and the risks and exposures require prudent management to perform extensive testing, even when the technical solution is clear. It takes time for the word to spread, as well. Conference agendas have to be put forward on EDI and discussions held. Operations people as well as financial people have to become involved and understand the full implications of EDI to obtain comfort levels sufficient to justify

and support the expenditures on new systems and software. Occasionally, consultants will even be brought in to design training and implementation programs. This could take months and years—nothing overnight—and this environment will probably continue for the next three to five years.

C
Other Network Services

1. Computerized Patient Records (CPR)

EDI has made the largest inroads in health care administrative areas, such as claims processing and procurement, but the health care community has also begun organizing network applications to expand access to patient care information. In addition, medical image, voice transmission and management systems are emerging that hold great promise.

One reason for the need to transmit patient information is the increasing number of places where patient care is provided. The widespread acceptance of managed care plans has created a growing need for integrating patient information across multiple delivery sites. Also, treatment at alternative health care delivery sites is increasing. Health care is delivered in locations as diverse as pharmacies in shopping centers, free-standing ambulatory clinics, at home, in physicians' offices, and long- and short-term care facilities. EDI is seen as a practical solution to the proliferation of alternative care sites, a trend towards specialization without compromising the information needed to deliver quality care.

The Computer-Based Patient Record Institute (CPRI), an association of providers, insurers, employers, health care systems vendors and government health care agencies, held its first meeting in July 1992. CPRI's goals include defining standards for computerized patient records to facilitate access to patients' medical histories from any provider site; for example, when a business traveler has a heart attack far from home.

The Department of Health and Human Services has also formed a public-private organization that will coordinate the roles HHS agencies will play in the development of computerized patient

records. Called the Task Force on Patient Information, this organization is chaired by Richard Davidson, president of the American Hospital Association. Legislation in Congress may provide a mandate for computerized patient records (CPR).

The expectations of CPRI and others promoting the development of computerized patient records are that these records will eventually be integrated into an EDI system to allow for electronic information exchange in support of health care administration, delivery and financing.

a. Image Transmission

U.S. health care extensively uses advanced medical imaging technology such as CAT scans, MRIs, X-rays and ultrasound for diagnoses and monitoring treatments. Diagnostic image management systems, also known as picture archiving and communication systems, are used by a hospital's radiology department to receive images from one or more types of imaging equipment and transmit them to other sites, including other hospital departments, remote clinics and physicians' offices. These systems fall into three general technology categories:

- Computed radiography systems, which digitize images by scanning phosphor plates instead of traditional photographic X-ray film.

- High-resolution film distribution systems that capture video images from digitized images.

- Low-resolution film distribution systems, also known as teleradiology systems, which consist of an image transmission and receiver unit that usually operate over telephone lines or network. Because the quality of images transmitted in this manner is not as high as other methods, teleradiology images are not used for final diagnoses, but are useful in on-call or emergency situations.

Current hospital image management implementations are primarily focused on internal systems integration (i.e., image transmission between departments or treatment locations within a hospital) or teleradiology transmission to remote sites to support diagnosis and consultation in emergency or trauma cases.

Other goals of emerging diagnostic imaging systems products and hospital or vendor-sponsored pilot and test projects include:

- Integrating voice (such as physicians' notes), image and data
- Connecting multiple modalities (i.e., CAT scans, MRIs and other forms of images)
- Improving the speed of image retrievals
- Developing links between image management systems and the hospital's patient information system

The ACR-NEMA standard for display and data interpretation is gaining acceptance among medical imaging vendors. Exhibit IV-9 lists several image management systems and imaging equipment vendors, all of whom are promoting the ACR-NEMA standard.

Exhibit IV-9

Suppliers of Medical Imaging Management Systems and Imaging Equipment

- Diagnostic Image Management Vendors
  - Advanced Video Products (Littleton, MA)
  - Dejarnette Research Systems (Towson, MD)
  - Vortech Data, Inc. (Reston, VA)
- Imaging Equipment Vendors
  - Siemens Medical Systems (Iselin, NJ)
  - Philips Medical Systems North America (Shelton, CT)
  - GE Medical Systems (Milwaukee, WI)

Examples of user and vendor-initiated medical imaging initiatives launched in the past several years include:

- The Jamaica Hospital Trauma Center at the New York Medical Center of Cornell University is implementing Evergreen Technologies, Inc.'s Medvision medical visualization software through a hospital-wide network. Trauma Center surgeons will use the application to view CAT scan images taken at remote locations prior to the patient's arrival. This will enable the surgeon in charge to make treatment decisions quickly, without waiting for the patient, saving valuable time in diagnosing and managing traumatic brain injuries.

- The same project is also initiating a national bulletin board system to enable access to CAT scan and trauma data. In conjunction with DataTech Consultants Inc. (Chatham, NJ), under a grant from New Medico Inc. (Lynn, MA), a head-injury rehabilitation hospital, Jamaica Hospital Trauma Center has developed a trauma-records database to store Medvision (CAT scan) data, which will go on-line as an electronic bulletin board early in 1993. The bulletin board will initially be free to any registered trauma center.

- Army hospitals are using a picture archive and communications system called the Medical Diagnostic Imaging Support system (MDIS) to transmit digitized X-rays and other images between medical facilities. The system uses the filmless computed radiography process, through which X-ray images are transmitted over networks after being digitized by computer tomography devices. The system was first tested during Operation Desert Storm. Two MDIS units close to combat lines transmitted images of injured soldiers to U.S. Army hospitals, where specialists viewed the images and provided diagnosis and treatment advice. MDIS is now installed in military hospitals throughout the U.S. under a $207 million Army Medical Research and Development Command mandate.

- In June 1992, BellSouth announced it would enter the remote medical diagnosis and imaging market by signing a marketing agreement with CAE-Link (Binghamton, NY), a subsidiary of CAE Industries (Toronto, Canada). CAE-Link develops and markets hardware, software and systems integration video teleconferencing packages. These systems will be jointly marketed with BellSouth's network-based private line and switched video and data services in the nine-state southeast U.S. service area covered by BellSouth. The joint market initiative is aimed at providing teleradiology services—transmission of X-rays and other image modalities over telephone lines, often to distant specialists providing radiology consultation and diagnosis.

- Sprint International, another network services vendor, also has targeted the medical imaging market. Sprint's medical services marketing organization provides medical image transmission services over its fiber optic network and via wireless transmission, often from remote sites to central treatment facilities or from ambulances en-route with trauma patients.

Medical image transmission, while still in early implementation stages, is receiving widespread interest and support from the medical community because it addresses primary needs and concerns—it saves precious time in injury cases where hours or minutes may mean the difference between life or death, full or partial recovery.

These efforts lay the groundwork for community-wide image transfer by developing standards and accumulating experience using these technologies.

b. Imaging Support for EMC

While the focus of medical image management systems development has been on providing faster and more flexible and responsive patient care, there is also a longer-term role for imaging in the claims process. X12 binary transaction formats offer a means for providing medical images in support of claims in cases where the payer requests additional information on the treatment or diagnosis.

An EDI manager from a large hospital buying group which has been a leader in hospital EDI commented that their biggest obstacle is the problem of getting the images through the EDI translation software. NEIC is currently considering future use of its E-mail system to transmit medical images, but image transmission in the EMC process is still more than four to five years away.

2. Cost Containment

a. Utilization review (UR) and PPO Networks

As reported in Chapter III, the high cost of medical care is severely impacting employers' bottom lines. According to A. Foster Higgins & Co.'s 1991 survey, health care benefit costs amounted to 26% of corporate earnings in 1990 and corporate medical bills soared an average of 21.1% between 1989 and 1990 and 20.4% the previous year.

Besides the factors contributing to the overall rise in health care costs (averaging 11% to 13% annual increases), corporate sponsors of health benefits often end up footing the bill for underpayments by Federal Medicare and Medicaid programs. Hospitals and physicians often shift the costs of services to Medicare/Medicaid patients by increasing charges to privately insured patients.

By 1990, 81% of 1,995 private and public sector employers surveyed by Foster and Higgins had utilization review (UR) programs in place, aimed at placing a financial and reasonability check on medical services. UR is a way of monitoring high-ticket or discretionary medical services for medical necessity: hospital precertification, continued stay review, second surgical opinions, etc. UR is growing by 10% per year.

UR information services coincides with the implementation of preferred provider organization (PPO) networks within employer-sponsored medical plans. PPO networks are comprised of doctors or hospitals that provide care at discount rates. UR with PPO management adds a measure of cost control along with the volume measures provided through UR programs.

Many large insurers have negotiated with providers to create regional PPO networks based on the combined buying power of

their subscriber base. Independent UR providers (for example, Health Care Compare, a large national UR services firm) have also entered the business of contracting with providers to join their PPO network. They in turn market these PPO networks to insurers or self-insured employers, based on a percentage of savings achieved, not the PPO providers' actual charges.

Health Care Compare's PPO services revenue is growing far faster than their UR revenues, which are now leveling off. Their PPO earnings grew 165% from 1989 to 1990, more than 200% from 1990 to 1991 and are projected to grow more than 50% annually into the mid to late 1990s.

UR and PPO programs in the private sector are similar to service precertification procedures and provider reimbursement limits long used in public insurance programs. They are important to the future of health care electronic commerce because they modify the information flows within the industry and are an attempt to shift the economics of the health care industry. The pressure on large employers to implement UR and PPO programs has been intense, because they have borne the weight of cost shifting by government health programs for some time.

However, as noted by Walter Maher, Chrysler's director of Federal relations, in a 1991 quote by the Wall Street Journal, "These programs are yet another way to shift costs. You end up playing a little bit of the government's game, shifting costs to the next weakest player," he commented. In other words, smaller businesses are now increasingly bearing the brunt of skyrocketing costs, and yet another type of administrative overhead has been added to the delivery of health care services.

b. UR and PPO-related Information

Cost containment programs such as UR and PPO services require extensive cost monitoring and measurement information systems to spot trends, identify problem areas and document cost improvements. Following are a few examples of UR and PPO-related information services and systems development activity:

- In a dramatic move in mid-1993, Merck, one of the world's largest drug companies, purchased Medco Containment Corp., the largest mail-order drug prescription fulfillment company and cost containment information supplier. Medco's mail-order prescription services are used by many large U.S. employers, including major corporations and government agencies. Merck's overall intent in this acquisition is to counter the movement toward drug price controls promoted in the Clinton health care proposal. This strategy is that, over time, Merck will offer an integrated product to its major customers that combines cost analysis and prescription fulfillment, which it can claim to be the most cost-effective alternative for obtaining prescription drugs. Merck's new thrust is likely to be duplicated by other large drug companies who will look at other cost containment information service suppliers as well as mail-order drug programs as possible acquisition candidates:

  - Medstat Systems (Ann Arbor, Michigan), Health Care Compare (Chicago)

  - Mail order prescription fulfillment— Diagnostek, Inc. Albuquerque, New Mexico

- Extending the Merck strategy even further, McKesson, one of the largest drug and medical product wholesalers and distributors acquired an equity stake in Integrated Medical Systems of Golden, Colorado. McKesson already owns PCS Health Systems, Inc., the nation's largest on-line processor of pharmacy claims. The capabilities of Integrated Medical Systems include clinical health care and electronic data interchange aimed at providing UR data cost containment information to insurers and physicians. With this action, McKesson becomes the first pharmaceutical care company to extend its information systems into physicians' offices, thus potentially combining clinical and financial transaction information for doctors, patients and payers.

- Medstat Systems (Ann Arbor, MI) is a health care information company with databases, software and consulting services aimed at controlling medical costs and measuring the health care market. Medstat's MarketScan database contains aggregate information on corporate health care expenditures, including national norms and Medstat client norms (based on detailed claims data collected from Medstat services subscribers). Large clients who signed up with Medstat in 1991 to use MarketScan and Medstat's software include Prudential Insurance Company of America (New York, NY), Blue Cross and Blue Shield of Massachusetts (Boston), Selectcare (Troy, MI), Coors Brewing Co. (Golden, CO) and Georgia Power Co. (Atlanta, GA).

- In 1992, Medstat acquired Systemetrics, a unit of McGraw-Hill. Systemetrics is a health care research firm that compiles quality of care data and analysis of Medicaid and Medicare claims. Systemetrics' annualized sales for 1991 were approximately $10 million. Combined with Medstat's 1991 revenues of $12.9 million, INPUT estimates that Medstat's total revenues will exceed $25 million in 1993.

- The Travelers Insurance company is using Value Health Sciences' (Santa Monica, CA) Medical Review system, which includes a comprehensive database of medical necessity and diagnostic information for more than 30 specific procedures. The Value Health Sciences (VHS) system is used in Travelers' Practice Review System (PRS), which is developed under contract by Perot Systems Corp. The system is now being tested with Travelers' Care Options plan, which encompasses 400,000 patients over a network of 1,000 hospitals and 70,000 physicians. The system automatically reviews providers' bills and will refuse payment for unsubstantiated charges.

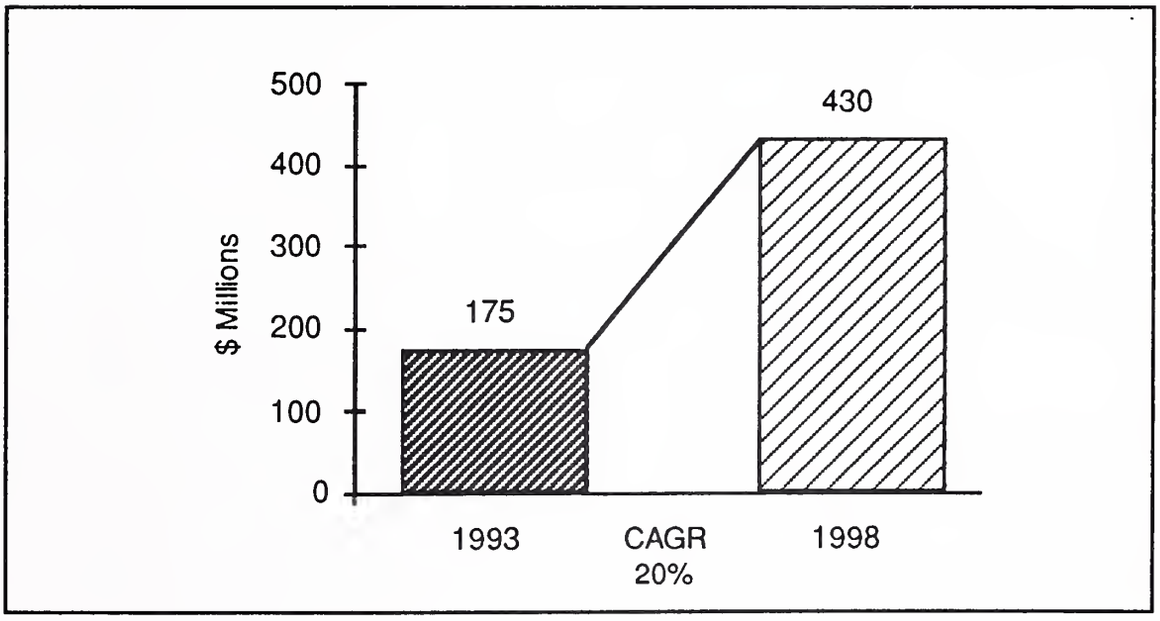
- The Value Health Sciences (VHS) medical necessity database was developed based on interviews conducted by the Rand Corporation. It compares the patient's condition with consensus standards of care. The complete VHS Medical Review system is a UNIX workstation-based product, with an annual lease price ranging from $50,000 to $400,000. VHS 1991 revenues were $4 million.

- Metropolitan Life Insurance Company is another insurer implementing a medical review application similar to the Travelers' system described above. Both insurers use the systems to create profiles of doctors, note which diagnostic tests are ordered and whether these tests comply with the health coverage of the insurer. One of the software vendors involved in these projects claims that 85% of the rejected claims are generated by 12% of the doctors monitored.

INPUT estimates that 1992 software and information services expenditures on health care cost monitoring and containment applications was $144 million and that spending on these applications will grow at a compounded annual growth rate of 20%, to $360 million in 1997. This is shown in Exhibit IV-10.

Exhibit IV-10

Revenue Growth in Utilization review Information Services, 1993-1998



3. Unstructured Communications: Voice and E-mail

a. Voice Recognition

In a hospital or health care setting, doctors and nurses work continually with their eyes and hands, so voice recognition systems show promise as a means of "documenting while doing," whereas E-mail fits the working style and environment of office workers, who are more likely to be computer literate and have workstations on their desks.

Exhibit IV-11 lists several vendors of clinical voice recognition systems. These systems allow health care professionals to enter information about their tasks, which can then be sorted by the system into multiple data formats. Current -386 and -486 workstation-based systems can recognize up to 30,000 words.

Exhibit IV-11

Vendors of Clinical Voice Recognition Systems

- Clinical Information Advantages, Inc. (Waltham, MA)
- Kurzweil Applied Intelligence (Waltham, MA)
- Lanier Voice Products Division (Atlanta, GA)
- Dragon Systems (Newton, MA)

These systems are used in departmental applications such as radiology, emergency medicine and intensive care nurse charting, but voice recognition will ultimately be part of the computerized patient record format, which will eventually support transmission of patient information outside the hospital, to physicians' offices, remote treatment facilities, payers and other distant locations.

b. Network Services E-mail

Even though electronic mail technology is here today and a significant body of large-scale implementation experience exists, E-mail is not widely used in the health care industry on an interorganizational basis. Banking, finance and aerospace are major industries that use network services E-mail extensively—these are industry sectors with a large number of desk workers and the need for "hub and spoke" type communications, typically between regional offices and headquarters.

INPUT found network services E-mail in insurance companies and hospital materials suppliers, often in conjunction with facsimile mail or postal connections to transmit documents to nonautomated offices, as well as a few examples of administrative electronic mail communications within managed care organizations. In insurance and health care suppliers, E-mail connects a widely dispersed sales force; for example, sales reporting from field reps to regional managers and regions to headquarters, or in the distribution of price lists.

E-mail is also used somewhat more extensively among managed care organizations or between health care providers that are linked administratively. For example, in investigating EDI ordering implementations among hospital buying groups, INPUT found that E-mail may be installed to facilitate efficient communications between sites during implementation.

Premier Hospital Alliance (Westchester, IL), a large buying group that is implementing EDI order entry, has E-mail installed in 150 locations where it is used in the pharmacy and materials departments. COHR-Connection (Los Angeles, CA) is installing E-mail in preparation for its EDI project.

As this implies, there is some functional overlap possible between E-mail and EDI:

- Network services E-mail can serve as a precursor to EDI, allowing electronic transmission of documents and applications output to trading partners or remote sites without having to develop standards or translation capabilities. Some users implement E-mail first while weighing the benefits of implementing EDI.

- Eligibility and claim inquiries (e.g., Does my plan cover physical therapy services? Has the office visit and lab claim for John Smith submitted on May 15 been received?) are well-suited for transmittal by E-mail (see "Eligibility Checking and Claim Inquiries" in Chapter III).

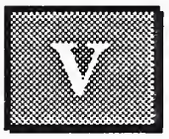
- NEIC uses facsimile mail to coordinate requests for additional information when the payer needs additional detail from the provider. The EDI claims processing system transmits a notice to the provider, requesting information and providing a routing number that corresponds to the specific claim office requesting the information. The provider faxes the information via NEIC's store-and-forward faxmail network, using the routing number to send the information to the correct claim office.

As a kind of broadcast E-mail service, Whittle Communications of Knoxville, Tennessee offers Medical News Network, a physicians' interactive medical news distribution system. Medical News Network has been a hit with many doctors who can have a computer-based system installed free on their office desks. The

network allows doctors to view daily medical news programs, order drug samples, request information from companies by fax or mail and view accredited and continuing medical education programs and news specials. The network is supported by advertising from medical equipment and product manufacturers and service suppliers. In early 1994, Whittle announced expansion of the Medical News Network to reach more physicians geographically, and also announced suspension of its Special Report Network. This laser disc service had high production costs and special players were required, so it did not seem cost-justified to doctors or supporters of the network.

In general, however, INPUT found low interorganization E-mail usage in the health care industry and expects EDI and other health care-specific applications and technologies (such as medical image transmission, voice processing and integration, multimedia systems combining voice, image and text) to receive the most emphasis over the next several years.

Of course, all of these efforts are aimed at increasing interorganizational communications and transactions in the health care community and as such, network services E-mail usage can be expected to increase, simply as a result of increased community-wide interaction.



Competitive Environment

This chapter profiles some of the principal players in delivering electronic commerce solutions to the health care community. Some of the players are information service vendors in the traditional sense, such as EDS or CyCare; others are leveraging their transition market positions such as McKesson.

A
AT&T/NCR

32 Avenue of the Americas
New York, NY 10013-2412
(212) 387-5400
1993 Revenues: $67 billion

AT&T, with its computer manufacturer subsidiary, is probably the most solidly positioned company to offer a complete electronic commerce solution to a company. It has the potential to be an EC juggernaut. It has complete and worldwide network services (for data, facsimile, video and voice), its NCR subsidiary offers open software and equipment products and it has a specialty in database machines and applications (its 3500 multiprocessor series includes the former Teradata database machines). Database machine applications will gain importance in electronic commerce as more and more transaction data is captured electronically. Such data has tremendous business/tactical value if analyzed properly and quickly. NCR is also the market leader in bank ATM machines and retail point-of-sale systems. AT&T's credit card is one of the world's leading cards. AT&T owns GO Corporation, a maker of handheld computers. AT&T is also

exploring business opportunities in media and interactive television.

In short, AT&T has the potential to be the premier supplier of the paperless/electronic economy. AT&T is pushing hard to provide EDI and EC services in health care. It is the official network of the Healthcare EDI Corporation, a nonprofit consortium of insurance companies and health care providers. Despite having the broadest offering of communication products and services, AT&T has yet to capture a significant share of the EDI/electronic commerce marketplace. Its single most glaring weakness is that it has no real professional service offering to make all of its technology offerings hang together in a single, coherent customer solution. Professional services is increasingly a key element for all electronic commerce providers.

B
Advantis

3405 W. Martin Luther King Blvd.
P.O. Box 30021
Tampa, FL 33630-3021

Advantis is a combination of IBM Information Network and the Sears Communication Company network created in the second half of 1992. Advantis, though a separate service entity, is owned by IBM's ISSC, IBM's outsourcing service business and Sears. 1992-1993 has been a period of consolidation and reorganization for what was formerly the IBM Information Network.

In terms of network services, Advantis sells EDI, E-mail, basic file transfer, electronic information and virtual private network services. In terms of software, it sells a complete line of EDI translation software, communication software and, through other IBM divisions, other software (including E-mail). The Advantis network primarily uses SNA and X.25 protocols. Advantis provides extensive customer support, documentation and third-party IBM software support through the network. There has been steady, if not spectacular, growth.

Nevertheless, Advantis is uniquely positioned relative to the other major EDI networks in that it is used for outsourcing jobs from ISSC. Also, Advantis is now freer than it formerly was (as IBM's

official network) to recommend non-IBM products to customers. Advantis has made alliances with Texas Instruments and others to resell its network in EDI and EC solutions.

Advantis also owns a minority stake in and is the exclusive network services supplier to QRS of Richmond, California. QRS is one of the smaller and newer, but very important, electronic commerce vendors. QRS provides a centralized product information database (a QRS catalog) to retailers and merchandise suppliers to automate their merchandise management. The QRS database uses the Uniform Product Code (UPC). In August, 1993, QRS publicly offered 3.5 million shares at $15.00 per share.

C
Baxter International

One Baxter Parkway
Deerfield, IL 60015
(708) 948-2000
1993 Revenues: $8.879 billion

Baxter conducts operations in four industry areas, including hospital products and services, medical systems and specialties, alternate site products and services and industrial products. In hospital products and services, the company manufactures and distributes products to hospitals and clinical labs. Products include catheters and flow control devices for intravenous therapy. In medical systems and specialties, Baxter manufactures and distributes specialized products for patient care, blood therapy, diagnostic procedures and cardiac care. For alternate site products and services, the company manufactures and distributes supplies, equipment and services used by home patients and alternate-site providers. Baxter also markets and delivers drugs to home patients and provides a women's health care network and customized patient-monitoring programs. In industrial products, the company manufactures and distributes products for educational and governmental labs, industrial research and development facilities and manufacturing facilities.

Baxter created the ACCESS program to provide large hospitals and multihospital systems with a single point of contact for all the

company's products, services and value-added programs. ACCESS also allows Baxter to provide customers with products and services from leading companies in related industries, including:

- Waste Management of America, Inc., for handling and disposing of medical waste
- Comdisco, Inc. for high technology asset management and contingency services
- Kraft Foodservice, a unit of Kraft General Foods, Inc. for hospital food service
- IBAX Healthcare Systems, an IBM-Baxter joint venture company that designs, develops and markets information management systems for hospitals and private medical practices

Baxter also maintains the ASAP automated purchasing system, which allows customers to order supplies directly, using a telephone-linked terminal; and ValueLink, a hospital inventory management service that is designed to deliver health care products in ready-to-use packaging to individual hospital departments on a just-in-time basis, allowing hospitals to reduce inventories and related warehousing costs.

D

C.I.S. Technologies, Inc.

One Warren Place
6100 South Yale Avenue, Suite 1900
Tulsa, OK 74136-9903
1993 Revenues: $30.5 million

Founded in 1985, C.I.S. Technologies (CIS) provides electronic claims processing and reimbursement management services to the health care industry. Approximately 56% of CIS' 1991 revenue derived from electronic claims processing and management services, 31% from on-site billing (systems operations) services and 13% from charge recovery and auditing services.

CIS' electronic claims processing (ECP) service allows hospitals to reduce the time between insurance claims submissions and payments. Health insurance claim data is downloaded electronically from the hospital's information system to an on-site microprocessor. The CIS software program, either MED-8000 or MED-7000, installed on the client's microprocessor then edits the claims against the 6,000 edits built into the system. Correct claims are stored for subsequent transmission to CIS and claims with errors are highlighted for billing office personnel to review and correct. Corrected claims are re-edited by the system.

Through The Electronic Highway™, hospitals then transmit all correct claims to the CIS host computer in Tulsa over toll-free phone lines. Editing and transmitting to CIS can be done 24 hours a day, seven days a week. Claims CIS receives are grouped by insurance payer, reconfigured into the format requested by each payer and transmitted via The Electronic Highway (or mail) to the payers. CIS edits and transmits more than one million claims each month, with an estimated dollar value of $2 billion.

CIS serves more than 475 hospitals in 32 states, including 15 in New York that are participating in a $7.1 million contract awarded in September 1991 for New York's Single Payer Demonstration Program. Under this pilot project, CIS provides reimbursement and professional consulting services to the New York hospitals to demonstrate the cost effectiveness of automating, coordinating and standardizing private third-party insurance payers in a voluntary system, rather than limiting health care to a single government payer.

Also in September 1991, CIS acquired Hospital Billing Analysis, Inc. (HBA) of Palm Springs, CA, for approximately $3.7 million in cash and CIS common stock. HBA assists health care providers with their third-party insurance reimbursement audits and services roughly 150 hospitals in 27 states. In 1991, HBA reported an annual revenue of approximately $8 million.

Currently, CIS is expanding its claims processing services to include electronic remittance posting, an expected payment calculator, enhanced electronic claims management, automated follow-up, electronic eligibility verification and electronic funds transfer. CIS Funding Corporation, a wholly-owned subsidiary of CIS formed in 1989, is developing services that will allow hospitals immediate funding of up to 90% of qualified receivables within 48

hours of processing patient claims. In the six months ending June 30, 1992, CIS reported revenues of $13.8 million.

E
Computer Sciences Corporation

2100 East Grand Avenue
El Segundo, CA 90245
1993 Revenues: $2.4 billion

Computer Sciences Corporation (CSC), founded in 1959, is the largest independent provider of information technology consulting systems development and integration and outsourcing.

Serving government and commercial clients, CSC provides strategy and management consulting, business re-engineering, information technology consulting, requirements analysis, software development, systems engineering and integration, turnkey computer/communications systems and systems operations (facilities management) services. The company also provides industry-specific proprietary products and services for credit reporting, claims processing, health maintenance organizations and income tax preparation.

CSC's strategy is to maintain its dominant position in the U.S. federal marketplace (which contributed 51% of fiscal 1993 revenue), while expanding its market share in nonfederal markets through internal growth and acquisitions. CSC management has set the objective of becoming one of the top two or three companies in the commercial markets, including Health Care Information Services.

The Industry Services Group serves vertical markets with outsourcing and industry-specific services, principally directed at the insurance, health care and consumer finance industries, through seven divisions.

The Health and Administrative Services Division, with 1,000 employees, provides large-scale medical claims processing, systems operations and related services for state and federal agencies.

In June 1991, CSC was awarded a $149 million contract with the New York State Department of Social Services to act as fiscal agent for the state's Medicaid program. The contract continues work the company has performed since 1986.

The division also provides IBM AS/400 and 3090-based applications software and turnkey systems for medical groups, managed health care organizations and private practices nationwide.

The products support various medical office functions, including user management, benefits coordination, claims adjudication, premium and fee-for-service billing, membership and general financial functions.

The products are installed in more than 800 physicians' offices and at more than 60 health maintenance organizations (HMOs).

Major competitors by primary service/product area include:

- *Commercial professional services:* Big Six, EDS, IBM, Booz Allen & Hamilton and McKinsey & Co.
- *Medicaid claims processing:* Blue Cross/Blue Shield and EDS
- *Health care systems:* Jergovan and Blair, Inc.

F
CyCare Systems Inc.

7001 North Scottsdale Road
Suite 1000
Scottsdale, AZ 85253-3628
1993 Revenues: $75.6 million

CyCare Systems, Inc. (CyCare) was incorporated in 1969 and provides processing services, turnkey systems, facilities management (systems operations) and professional services to more than 4,800 clients in the health care industry, physicians, dentists, medical group practices and medical schools. The company's 1991 financial performance was below expectations as a result of slower than anticipated revenue growth.

The late release of *Practice Maximizer*, CyCare's newest UNIX-based physician/dentist practice management system, and the new Living Software pricing strategy affected revenue growth adversely. Living Software, which took effect in the second half of 1991, shifts a portion of the up-front revenues into recurring software license renewal fees over the life of a five-year contract. This strategy lowered one-time sales revenue and profit by approximately $1 million. CyCare is currently organized into three corporate and three business units. The corporate units consolidate corporate support services, and include finance and administration, marketing and technical services and development. The business units include the Group Practice unit, the Practice Management unit and the Physician and Dental Services unit.

The Group Practice unit, headquartered in Scottsdale, provides processing services, turnkey systems and systems operations services to the 16-plus physician group practice and faculty practice market. This unit supports applications that include medical billing and insurance claim processing, patient information and registration, patient appointment scheduling, financial and administrative products, prepaid health care and third-party management. The most common delivery system within this unit's 180-plus client base is distributed processing. Clients perform processing on their own computers using CyCare software, whereas bills and insurance statements are processed and distributed by mail or electronically through CyCare's Corporate Information Center.

The Physician & Dental Services unit, headquartered in Scottsdale, provides processing systems and turnkey systems to medical practices with one to 15 physicians and dentists. The Software Publishing unit, a division of the Physician & Dental Services unit, provides applications software products for physician and dental groups of one to five practitioners. In fact, most of Physician & Dental's 4,800 clients are served through Software Publishing. Including the applications offered by the Group Practice unit, Physician & Dental markets the following systems: the UNIX-based Practice Maximizer, which is designed for small-to-intermediate size physician offices and includes:

- Electronic claims clearinghouse capabilities that run on HP 9000 hardware

- C150 Distributed Medical Computer System, which is based on IBM microcomputers or Bull XPS-100 Series minicomputers

C150 is designed to handle daily record processing in-house, while statement and insurance processing is generated at CyCare's data center. In December, 1991 CyCare and HP's Health Care Information Systems Division entered into an agreement for CyCare to remarket HP 9000 systems while HP helps generate sales leads and provide services for *Practice Maximizer*.

G
Electronic Data Systems

Health and Benefits Division
5400 Legacy Drive (A3-1D-11)
Plano, TX 75024
(214) 604-4398
1993 Revenues: $8.6 billion

Electronic Data Systems Corporation (EDS), founded in 1962, is a leading information and communications services company providing information processing, consulting, systems management, systems integration and communications services to the financial, insurance, commercial and communications industries and to state and federal government. EDS' markets include:

- Banking
- Credit unions
- Property, life, health and casualty insurance
- Distribution
- Manufacturing
- Transportation
- Retail
- Energy

EDS has 66,000 employees and more than 7,400 clients in 50 states and 28 countries. As a division of General Motors acquired in 1984, EDS operates as an independent subsidiary, with GM and its subsidiaries as the company's largest client.

In health care, EDS' Health and Benefits Division (EHBD) provides facilities management, processing services and turnkey systems to commercial insurance companies and Blue Cross/Blue Shield organizations (where state funds are not involved). During 1990, EDS processed more than 450 million life, health and casualty insurance claims. In the third quarter of 1992, EDS was selected by the California Department of Health Services to serve as the state's technology partner for the Medi-Cal program. Medi-Cal is the largest Medicaid program in the nation, providing health care services to 4.9 million people at an annual cost of nearly $13 billion. In the second quarter of 1992, EDS signed a systems management agreement contract with Health care Management Alternatives, Inc. (HMA) of Philadelphia. HMA is under contract with the Pennsylvania Department of Public Welfare to operate HealthPASS, a health maintenance organization that serves Medicaid clients in South and West Philadelphia. EDS will supply comprehensive information technology services, consulting and systems-engineering support to HMA. In the first quarter of 1992, EDS was awarded the largest contract ever in the health care and benefits area by Blue Cross/Blue Shield of Massachusetts. Under the 10-year systems management agreement, EDS assumes responsibility for all information technology services for the nation's fourth largest Blue Cross/Blue Shield Plan.

In the second quarter of 1991, EDS unveiled a new, integrated medical information system for HMOs and large group practices. The system was designed by InterPractice Systems, a joint venture between EDS and the Harvard Community Health Plan of Brookline, Massachusetts. And in March, 1990, EDS and American International Healthcare, Inc. (AIH), a subsidiary of American International Group, began jointly developing and marketing a managed-care information system for the health insurance marketplace.

The foundation of the joint effort was TOPPS, an IBM-based multi-option administrative system, initially developed by AIH, that processes insurance claims for health insurers, PPOs and HMOs.

In addition to claims processing, TOPPS' main functions include membership, provider management, billing, benefit administration, referral management and provider networking. In the nine months ending September 30, 1992, EDS reported overall revenues of $6.03 billion.

H

Envoy

15 Century Boulevard, Suite 600
Nashville, TN 37214
(615) 885-3700
1993 Revenues: $42.89 billion

Formed in the early 1980s, Envoy set out to provide terminal-based POS services to a specific kind of merchant—gasoline stations and their associated food stores. Envoy grew rapidly, but service and performance deteriorated. In 1989, the current management arrived and focused the company on enhanced quality service and to pursue additional POS market opportunities. Current specialty markets also include hospitality (hotels, restaurants), where it is the leader and health care claims. Envoy is headquartered in Nashville, TN.

Envoy's 1993 revenue was more than $40 million. It is in two EFT markets:

- Credit/debit card authorizations—about $30 million—a leading factor in hospitality and some debit card activity as well
- Growing business in providing health care eligibility/claims processing—more than $10 million—one of the top three companies in this market, handling more than 15 million electronic claims, submitted by pharmacies and doctors

Having gone public in 1992, Envoy is actively looking to leverage its common stock position into acquisitions and joint ventures. A real plus is its highly visible financial backing. This will no doubt come about as the result of planning activities to identify several new POS-related markets.

Being relatively small, independent and public, Envoy will need new sources of capital to pursue its investment and growth plans.

I

First Financial Management Corporation (FFMC)

3 Corporate Square, Suite 700
Atlanta, GA 30329
(404-321-0120
1993 Revenues: $1.7 billion

FFMC was formed in the early 1980s by combining the correspondent bank services division of a major Georgia bank with NaBanco, a credit card authorizer.

Throughout the 1980s, FFMC added to its base businesses with acquisitions and geographic expansion. In 1991, FFMC acquired Microbilt, a company that supplies terminals and dedicated software to users of credit reports and other niche markets, such as pharmacy claims processing. FFMC also began purchasing some of its bank card clients' portfolios of its client merchants authorized to accept credit cards to ensure continuity and expanding revenues. However, this put NaBanco in competition with some of its larger customers who had no intention of selling their merchant portfolio businesses. In late 1992, FFMC purchased the Telecheck organization and most of its independent franchises from McDonnell Douglas Corporation and franchise owners. Doing so firmly entrenched FFMC in the U.S. POS business.

In health care, through The Computer Company (TCC), acquired in 1989, FFMC provides medical claims processing and Medicaid physician administration programs for states. TCC is now called First Health Strategies Corp. and processes more than 120 million Medicaid claims annually. In early 1992, FFMC acquired Alta Health Strategies, Inc., one of the largest health care claims processing firms, placing a bet on future NIS market expansions in health care. Alta operates in 50 states and serves carriers as well as self-funded employers. In 1993, FFMC consolidated all of its health care-related businesses into First Health Strategies Corp. Two more acquisitions were announced in early 1994.

FFMC's total revenue in 1992 exceeded $1.4 billion. The EFT portion consists of about $335 million from the following markets.

- Credit card authorizations and related merchant portfolio management—$60 million—one of the top five companies in this market

- Check authorization and guarantee—$205 million—clearly the leader in the check guarantee business and many potential tie-ins to the credit card side, as well

- Miscellaneous other services, including POS terminal management—$70 million

Medicaid claims and administrative services plus other health care claims-related services, including Alta, are now running at an annual rate of more than $160 million and growing at 15% or more.

FFMC's management understands the full potential in NIS services and is making the kinds of acquisitions and internal development investments that will allow it to participate to a maximum extent.

Additionally, in late 1992, FFMC announced its intention to sell its majority ownership positions in a traditional correspondent banking company and its EDP processing services subsidiary. Originally, this bank was purchased by FFMC to give it full service capability to operate its credit card services activity. However, stock market analysts viewed this as a negative. FFMC received substantial cash which will be used to make EFT acquisitions.

FFMC has also targeted health care management services as a logical expansion of its POS authorizations business.

J

First Data Corporation

Health Systems Group
10101 Claude Freeman Drive
P.O. Box 1037
Charlotte, NC 28262-1037
(704) 549-6802
1993 Revenues: $1.2 billion

Formerly known as American Express Information Services Company, First Data Corporation's Health Systems Group (HSG) provides management information systems and services to health care institutions, including hospitals and medical facilities and physician groups in the U.S. and Puerto Rico. HSG offers a comprehensive range of computer-based services in a user-friendly format, including on-line patient file management, account billing, scheduling, accounting, payroll and insurance and claims processing. HSG's products contribute to improved cash flow and better financial and clinical administration for health care institutions.

In April 1989, HSG more than doubled its client base of domestic hospitals as a result of acquiring the McDonnell Douglas Health Systems Company for a cash purchase price of $77 million. The remote, on-line system emerging from the acquisition is currently known as Hospital Financial Control (HFC) and HFC EXPRESS, which operates on large-scale mainframe processors. The system provides more than 30 modules and 4,000 reports, including:

- Accounts receivable
- Census
- General ledger
- Payroll
- Physician statistics
- Registration
- Third-party billing

The Patient Care System (PCS) is a Tandem-based distributed system that manages all patient information and recordkeeping, including patient admissions and registrations, test and procedure ordering, result reporting, historical recordkeeping and nursing treatments. PCS is often used as a front end to HFC and there are currently more than 30 PCS installations.

HSG's in-house hospital information system, known as SAINT, is a data processing and management system designed for small to medium-sized hospitals. The system consists of computer hardware, which is installed on the client's premises and software, which HSG licenses to the customer and manages after installation. Currently, HSG has installed SAINT in approximately 300 hospitals. In 1991, the company introduced HSG Business Office Services, a data management program designed to improve a hospital's cash flows through more effective collection of the "self-pay" portion of fees due from patients. It is also designed to increase the accuracy and timeliness in processing claims submitted by the hospital to third-party payers such as insurance companies, Medicare and Medicaid. Also in 1991, HSG introduced a complete medical record imaging system which automates a hospital's medical records department and integrates it with other departments such as admitting. Currently, HSG also offers Claim Exchange, a claims processing service.

HSG serves approximately 600 acute care hospitals, ranging in size from less than 100 to more than 700 beds, as well as medical centers across the U.S. HSG's revenues derive primarily from customer fees based on transaction volume, and, to a lesser extent from the licensing and maintenance of software and revenues from the resale and maintenance of equipment. In the three months ending March 31, 1992, First Data Corporation reported overall revenues of $282.2 million.

K

GTE Health Systems Incorporated

10851 North Black Canyon Hwy.
Phoenix, AZ 85029
(800) 352-4483

GTE Health Systems is a leading supplier of information management software and services to hospitals, physicians, dentists, managed care plans, pharmacies, home health agencies, chiropractors and other medical professionals. Through its Network Systems Division, GTE provides electronic links from health care providers to suppliers and payers. The Network Systems Division manages a nationwide telecommunications network that provides an electronic link for document exchange. The principal product offerings on the network are Collect*Express and Gateway*Express.

Collect*Express is a network service that provides an electronic link from any health care or business institution to a collection agency for automated collection of delinquent accounts receivable. It uses third-party communication software that accepts collection data from the user's accounts receivable system and transmits "start," "stop" and "partial payment" notices to the collection agency. There is a low, flat-rate fee for each overdue account submitted for the collection service, rather than a percentage of the collection amount. Overdue payments are sent directly to the health care provider or business institution, not to the collection agency.

Gateway*Express is an EDI network service that facilitates the exchange of standard business documents, such as purchase orders, confirmations, inventory inquiries, invoices and payments, between health care providers and their medical, pharmaceutical and dietary suppliers and financial institutions. Gateway*Express is specifically designed for the health care community and offers a single network link to hundreds of health care suppliers.

The overall claims processing business at GTE went in multiple directions in 1993. Late in the year, NEIC awarded GTE Data Services Division the batch claims processing contract. This was a significant win and will position GTE well for the future. On the other hand, GTE sold its EMC express claims clearinghouse

business to StellarNet, Inc. of San Francisco, because its capabilities were rated as comparatively poor relative to the competition.

Other GTE product offerings include:

- MedSeries4, a comprehensive hospital information system with patient management and accounting, financial, clinical and administrative software packages
- Q/Care, a managed health software package for HMOs and PPOs with memberships of 25,000 or more
- Prescription Drug Management Service (PDMS), a pharmacy claim administration system that provides managed care and traditional indemnity insurance claims processors with links to point-of-sales devices in retail pharmacies

GTE plans additional network services for the health care industry. Managed care network services are expanded to include claims submission, enrollment forms, eligibility verification, benefits determination and referral authorization. The company also plans to develop network applications that will link physicians, hospitals and managed care plans to electronic medical record access, preadmissions, lab test results, census inquiry, billing and discharge information, physician referral and electronic mail.

L
GE Information Services (GEIS)

Bethesda, MD
1993 Revenues: $650 million

GEIS is the IT vendor with the largest revenues from electronic commerce services: $80 million in worldwide EDI network revenue ($52 million in North America alone), $103 million in intercompany messaging worldwide ($73 million in North America) and another $2 million in EDI software sales (these figures represent 1992 revenues). GEIS, a $650 million company, also has other electronic commerce-related businesses as part of its processing services activities.

GEIS's electronic commerce services and products often have been developed first to serve the 12 other divisions of General Electric. GEIS is not strong, however, in software. Of the EDI software it sells (it has offerings for PC, UNIX and mainframe platforms), its greatest sales come from packages developed by other vendors—namely American Business Computers—that it resells.

GEIS has its own packet-switched network and extensive processing facilities; some of this equipment dates back to the 1970s. It is embarking on a multiyear strategy to revamp its network infrastructure with open/UNIX-based equipment and software. GEIS anticipates greater acceptance of open/UNIX systems in general. With its own network regarded as highly open, it expects customers to tie more easily into its services and to offer services with greater value added as a result.

GEIS has been merging its Business Talk service (primarily an E-mail service aimed at the corporate user) with its EDI services to deliver an integrated electronic commerce solution to companies. Its chief competitors are Sterling Software, Advantis, BT North America and AT&T EasyLink.

In a significant move, GEIS formed joint venture with Ameritech, a major telco, to take over and operate GEIS and its network.

M

HealthCare COMPARE Corporation

3200 Highland Avenue
Downers Grove, IL 60515-1223
(708) 241-7900
1993 Revenue: $158 million (HCC estimate)

HealthCare COMPARE (HCCC) is the leading national medical cost management firm, providing medical user management services and PPO networks to such clients as large, self-insured employers, large multiemployer and union health benefit plans and group health and workers' compensation insurers and administrators. The company's strategy for controlling client health care costs focuses independently on managing volume and price. HCCC's COMPARE division controls costs by monitoring

the medical necessity and appropriateness of health care services provided and by reducing unnecessary hospital admissions and lengths of stay. Whenever possible, care is directed to the most cost-effective venue without compromising care quality.

HCCC has developed hospital PPO networks in 45 states that generate substantial cost savings for clients by using clients' aggregate buying power. It focuses on negotiating bundled and all-inclusive per-diem rates that minimize the clients' total cost. HCCC is paid in two different ways by clients that purchase the PPO network and the utilization review services. Utilization review is priced at a fixed amount per employee per month, with the total cost varying by the number of optional services desired. The total annual cost to the client per employee generally falls in the $20 to $35 range. The HCCC PPO network generates revenue based only on a percentage of savings achieved versus actual billed charges, with no other fees to the client.

HCCC is currently placing major emphasis on expanding its reach by developing outpatient care networks, including physician services, laboratory, radiology and home health in its markets to augment its existing inpatient network. The HCCC PPO network increased from 25 states at the end of 1990 to 47 states by the first quarter of 1994 and the outpatient network expanded from eight states to 25 in the same period.

HCCC also gained a more dominant presence in the worker's compensation market with the merger in February 1992 with Occupational-Urgent Care Health Systems (OUCH). In the merger, each outstanding share of OUCH common stock was converted into the right to receive 0.93 of a share of HCCC common stock; as a result, OUCH became a wholly-owned subsidiary of HCCC. Incorporated in 1982, OUCH also offers comprehensive medical cost management, but focuses primarily on worker's compensation. Its product integrates the benefits of a preferred provider network, bill review and user management into a single package to reduce medical costs and related administrative burdens.

Recent contract awards include an agreement made in October 1992 between HCCC and Employee Benefit Plans, Inc. (EBP) of Minneapolis to jointly market HCCC's Affordable preferred provider networks to the 2,800 employers, 650,000 employees and $2 billion in annual claims EBP represents nationally. In June

1992, HCCC and Alta Health Strategies, Inc. reached a similar agreement to market Affordable to the 900 employers, 3 million employees and $2.6 billion in annual claims that Alta represents.

N
IBAX Healthcare Systems

587 East Sanlando Springs Drive
Longwood, FL 32750-5187
(407) 831-8444
1993 Revenues: $63 million (INPUT estimate)

IBAX Healthcare Systems (IBAX) designs, develops and markets information management solutions for small, midrange and large hospitals, as well as systems for physician practice management. IBAX was formed in January 1990 under the name Spectrum Healthcare Solutions by a joint venture of IBM and Baxter International subsidiaries. Both parent companies have had a presence in the medical information systems industry since the 1970s. Spectrum, renamed IBAX in June 1991, quickly established itself in the market.

IBAX's current client base is comprised of more than 800 hospitals and 7,000 private physician practices worldwide. INPUT estimates that between 90% and 95% of IBAX's 1991 revenues derived from software products and related services. The remaining percentage derived from consulting services.

The company's products include Series 3000 financial and clinical applications for small community hospitals that run on IBM RISC System/6000 computers and covers:

- Patient accounting, medical records, accounts payable and general ledger
- Series 4000 financial applications for midsize hospitals that run on IBM AS/400 computers in more than 275 hospitals
- Series 5000 financial and clinical applications for large hospitals and complex medical centers which run on IBM mainframes

- Physician Series for communicating patient data to physicians, nurses and staff, which runs on IBM and compatible PCs and can communicate with any of the systems mentioned above

- Point of Care Clinical Series which supports nursing care documentation and access to the hospital system for IBM Clinical Workstations™ located at patient bedside.

The Point of Care products were introduced in 1991, and are IBAX's key additions beyond products offered by either parent company. Point of Care can encompass several departmental systems, including:

- Operating Room System for IBM S/36 or AS/400 computers

- Radiology Information Management system for IBM AS/400s or mainframes

- Pharmacy Management System, which can operate on a mainframe, AS/400 or IBM-compatible PC platforms.

In addition, IBAX's services include education and training, implementation assistance, 24-hour customer support and technical and operations consulting.

Within the last year, IBAX has acted on its announced intentions to move away from mainframes and minicomputers toward RISC-based platforms. As of January 1992, the company installed its second IBM RS/6000-based Series 3000 system at Doctors Hospital in Nelsonville, OH. In October 1992, IBAX signed an agreement with the University of Toronto's Sunnybrook Health Science Center to jointly market IBAX's Series 5000 to Canadian hospitals. Sunnybrook has been a Series 5000 and IBM System/9000 user for several years and will use its experience to tailor the system to accommodate Canadian requirements and develop new workstation processing and network systems technologies.

McKesson Corporation

Drug Distribution Group/McKesson Drug Company
One Post Street
San Francisco, CA 94104
(415) 983-8300
1993 Revenues: $10 billion

McKesson Drug Company is the nation's largest distributor of pharmaceuticals and health care products and lies at the core of McKesson's Drug Distribution Group. From 45 distribution centers, McKesson provides products to 16,500 customers across 50 states.

During 1991, McKesson Drug introduced its Econolink system, a comprehensive hospital linkage system and expanded its Valu-Rite system, a voluntary electronic drug distribution system with more than 3,300 members nationwide. McKesson's sales to Valu-Rite members have grown 23% per year since 1985, from $300 million per year to an annual rate of more than $1 billion. Valu-Rite is the fastest growing part of McKesson Drug's sales to independents and represents approximately one-third of this market segment. In November, 1991, McKesson announced that it would support the ANSI X12 standard for EDI and change from the proprietary systems it has used in its drug distribution systems since the 1970s. The company had resisted the X12 standard, but adopted it based on customer demand for a single standard in the pharmaceutical industry.

The company also continues to upgrade its distribution network and introduced a new generation of automated order-picking systems in 1991 to improve accuracy and speed order processing. MAPS, the McKesson Automated Picking System, is the company's latest effort to increase drug distribution efficiency. Installed at McKesson's St. Louis distribution center, the computer-controlled MAPS equipment can fill 1,200 orders per hour and handle nearly 70% of the center's prescription volume.

Excluding deliveries to customer warehouses, in 1991 McKesson Drug's sales to independent customers comprised 52% of revenues. Sales to chains and hospitals accounted for 29% and 19% of revenues respectively. McKesson strongly supports

independent customers, but has increasingly cultivated the hospital and chain markets.

P

Medstat Systems, Inc.

777 East Eisenhower Parkway
Ann Arbor, MI 48108
(313) 996-1180

Medstat Systems, Inc., founded in 1981, integrates and manages large-scale medical claims databases, develops database access and analysis software tools and assists clients with interpreting the information to manage group health insurance costs. In 1991, three important developments combined to establish Medstat's market leadership position in the health insurance market:

- First, IBM selected the company as a Business Partner and Industry Application Specialist, lending support to Medstat's insurance market strategy and product direction.
- Second, in the fourth quarter, Medstat released an IBM version of the company's DataScan software system and offered new and expanded applications for their Employer Systems and Services.
- Last, Medstat added four new insurance clients, including software licenses with The Prudential and CIGNA.

In 1992, Medstat signed Blue Cross/Blue Shield of Massachusetts, Selectcare of Troy, Michigan, Coors Brewing Company and Georgia Power Company to install software and use the National MarketScan Database described below.

Medstat derives approximately 60% of its revenue from electronic information services. The remainder comes from associated professional services. The company's professional service personnel assist clients in using company databases and other available resources to provide clients with complete customized solutions. Medstat divides its services into Client Databases, National MarketScan Database and Advanced Software.

For Client Databases, Medstat builds and maintains medical claims databases, standardizing and integrating traditional fee-for-service records, demographic data and managed care transactions. These databases are organized for rapid retrieval and interactive analysis. For large employers, Medstat frequently integrates data from multiple insurance carriers into custom-designed database structures. For insurance clients, Medstat assists with integrating data from multiple claims processing systems to create a single data platform to support key insurance operations areas. These include underwriting, actuarial services, managed care, provider networking, product development and customer reporting.

For Medstat's National MarketScan Database, contributed client databases are pooled together to create the broadest source of information on privately insured health care containing clinical, demographic, financial and provider data. In 1991, the MarketScan database grew 51% from 167 million to 252 million claims and covered $8.1 billion or 6% of total U.S. health expenditures.

In Advanced Software, Medstat's communications driver, System2, provides access to the company's centralized databases from client PCs, contains a wide variety of standard report formats and has the capability to generate custom queries and reports. Clients may run the software themselves, but many choose to contract Medstat personnel to generate their reports, analyze available information and recommend solutions.

In February 1992, Medstat broadened its health care systems offerings by acquiring Santa Barbara, California-based SysteMetrics. Formerly a subsidiary of McGraw-Hill, Inc., SysteMetrics is a leading health care policy research firm serving government and the pharmaceutical industry.

SysteMetrics' Disease Staging software, a proprietary package for evaluating medical practice and quality of care, adds to Medstat's core product base while SysteMetrics' strong track record in the management and analysis of large-scale Medicaid and Medicare claims databases accelerates Medstat's initiative into government-sponsored research. SysteMetrics reported revenues in 1991 of approximately $10 million, with offices in Washington, D.C., Lexington, Massachusetts and Santa Barbara.

In 1993, Medstat acquired Inforum National, the leading supplier of information resources and advanced decision support systems for hospital planning and marketing. The principle market is the hospital market, relatively new for Medstat. Inforum's revenues were approximately $10 million in 1992.

Q
National Data Corporation

One National Data Plaza, Corporate Square
Atlanta, GA 30329-2010
(404) 728-2000
1993 Revenues: $219.4 million

National Data Corporation (NDC) was incorporated in 1967 to provide specialized data processing and facilities management services. The company currently provides various processing systems, professional services, turnkey systems and systems operations services, primarily in credit and debit processing, cash management and information reporting and health care systems and claims processing.

The Healthcare Services Division provides turnkey systems for pharmacy and dental applications and claims processing services. Through NDC Federal Systems, Inc. (FSI) the company also provides professional services to federal government agencies for health care applications. As of fiscal year end in May 1991, Healthcare Services reported revenues of $39.2 million or 17% of NDC's overall revenue.

NDC's Healthcare Services products offer applications for office management and verification, authorization, data capture and funds transfer. DataStat™, introduced in 1983, is a turnkey pharmacy management system designed for independent retail pharmacies, pharmacy chains, nursing home pharmacies, government-operated pharmacies and pharmacies serving HMOs, clinics and hospitals. DataStat supports patient registration, drug recordkeeping, private and third-party billing, inventory control, internal reporting and drug database updates and it also detects clinical dispensing and prescribing errors. DataStat is available for minicomputers and PCs and is installed

in more than 3,700 locations. The DataStat Dental System is a PC-based dental office management product that supports:

- Managing and maintaining patient information
- Appointment calendars
- Insurance claims processing and follow-up tracking
- Patient treatment planning and tracking
- Customer billing and receivable tracking

NDC also provides electronic eligibility verification, real-time claims authorization, data capture and adjudication services to such markets as hospitals, HMOs, pharmacies and PPOs. These services allow the customer to speed claims collection and reconciliation, while eliminating paper processing, by sending claims to NDC electronically. NDC then processes the claims and transmits them to payers.

FSI, formed in 1984 with NDC's acquisition of Libra Group, provides professional services primarily to federal government agencies, including requirements analysis; facilities planning; site engineering; systems design, including distributed systems and database management systems; hardware and/or software selection, procurement and installation; and facilities management.

As of November 1991 NDC had installed more than 5,000 terminals and connected more than 40,000 additional health care provider locations to the company's health care processing network. In the second quarter of 1992, NDC signed a contract with Blue Cross/Blue Shield of Canada to process all of its dental claims.

R

National Electronic Information Corporation

500 Plaza Drive
Secaucus, NJ 07094

National Electronic Information Corporation (NEIC) is a carrier-owned national claims clearinghouse created to electronically

receive, edit and distribute commercial claims to participating carrier members. NEIC was established in 1981 and distributes hospital, physician and dental claims to more than 30 commercial carriers from more than 2,000 hospitals and 8,000 physicians in approximately 38 states. These carriers collectively account for more than 90% of the total commercial group claims paid nationwide. Aetna, CIGNA, John Hancock, Metropolitan Life, The Travelers, Equitable and McDonnell Douglas are among the carriers on the NEIC board.

NEIC's primary product, ACU-CLAIM, is a PC-based claims preparation and submission system that enables PCs to accept all health care claims. The system operates using a diskette containing downloaded claims data from the provider's computer system. Programming or rekeying is not required by the provider or the vendor. Once information is downloaded, patient accounts personnel use ACU-CLAIM to automatically sort and select the claims required for processing. Edits are performed immediately by the ACU-EDIT feature, which identifies errors and missing information. Inaccurate or incomplete claims are held for next-day correction. Once editing is completed, NEIC claims are electronically submitted in batch to NEIC while all others may be printed and mailed.

NEIC's most recent and ambitious project is the Health Care Information Network (HCIN). NEIC is jointly developing the network with PCS, Inc., the managed prescription care subsidiary of McKesson Corporation. The two companies plan to test HCIN at three or four locations by the first quarter of 1993. No current date has yet been set for commercial implementation.

When fully implemented, the HCIN will electronically transmit and receive information, within a proposed time limit of 15 seconds, regarding:

- Claims
- Eligibility
- Benefit determination
- Referrals to specialists
- Precertification/authorization for treatment

- Free-form messaging
- Medical records transfer
- EFT

However, a medical records transfer application may be difficult, as the federal government has yet to define the parameters of medical records confidentiality. The HCIN project has won the support of the NEIC board companies, PacifiCare Health Systems, Inc. and The Prudential.

S

PCS Health Systems, Inc.

9501 East Shea Boulevard
P.O. Box 52115
Phoenix, AZ 85072-2115
1993 Revenues: $103.3 million

PCS Health Systems, Inc. (PCS) is the nation's largest processor of prescription drug claims for insurers and employers. With its electronic links to approximately 52,000 pharmacies, PCS manages costs and monitors delivery of prescription drugs for more than 20 million individuals in the U.S. and Puerto Rico. PCS' customers include:

- 160 commercial health insurance carriers, including 23 of the largest in the U.S.
- Approximately 45 blue cross/blue shield organizations
- 70 HMOs and PPOs
- More than 190 third-party administrators
- More than 762 self-insured employers

In addition, PCS recently signed two large, five-year contracts to provide services for a Metropolitan Life Insurance Co. health care program, covering 3.6 million people, and for the Blue Cross/Blue Shield Federal Employee Program, which covers 3.1 million people. PCS has also teamed with National Electronic

Information Corporation (NEIC) to develop, test and eventually implement the Health Care Information Network (HCIN) described in the NEIC profile.

PCS' point-of-service managed care services are delivered through its Remote Electronic Claims Adjudication Process (RECAP[SM]) system, which links the 52,000 pharmacies to PCS headquarters. RECAP operates 24 hours a day and handles more than 100 million prescription claims transactions every year. The computers or RECAP terminals installed in participating independent and chain pharmacies instantly verify patient and drug eligibility, adjudicate claims in real time and display concurrent drug utilization review information. These managed prescription drug care services are designed to control the quality and costs in the pharmacy before prescriptions are dispensed.

In 1991, PCS introduced two new products, MajoRx[SM] and QUANTUM Alert[SM]. QUANTUM Alert is a new cost containment feature for RECAP and is the first nationwide retail point-of-sale drug utilization review (DUR) program. It is designed to alert pharmacists to potential drug interactions and other inappropriate drug therapies for more than two million people. MajoRx is a proprietary major medical drug program designed to manage costs and combine with traditional medical plan designs. It covers more than one million people.

T

Sterling Software, Inc.
Electronic Commerce Group

4600 Lakehurst Court
P.O. Box 7160
Dublin, OH 43017-0760
(614) 793-7000
1993 Revenues: $411.8 million

Sterling Software, Inc., founded in 1981, provides a range of professional services, systems and applications software products, systems operations, systems integration and processing/network services to commercial and government clients.

The company's strategy since its inception has been to choose target markets with growth and profit potential and to focus on acquiring and developing products and services for those specific markets. Since 1992, Sterling has made the following acquisitions that relate to health care:

- In June 1991, Sterling acquired Control Data's Redinet Services Division for $6.1 million. Redinet, with 1990 revenue of about $2 million, provides EDI network services and software. Its operations have been merged into Sterling's EDI Group.

- In December 1991, Sterling finalized the acquisition of National Systems Corporation (NSC) of New York (NY). NSC is a software and services firm that specializes in systems for money transfer, cash management and banking EDI.

- In 1993, Sterling completed its largest acquisition, the Systems Center, a $130 million supplier of systems software for IBM computers.

Although Sterling may be smaller in revenues than GEIS, its chief competitor, it has always been profitable in the EDI business (an accomplishment that GEIS has so far not achieved). Sterling doesn't own its network lines, but it has extensive mainframe and processing facilities which it is upgrading to UNIX platforms.

Sterling's EDI Group is now moving quickly to build a global EDI/electronic commerce service. The former president of Sterling's EDI business, Bill Plumb, has been named executive vice president of Sterling's International Division. It is expected that he will be key in building the international EDI business.

Sterling is strong in networks and software for electronic commerce. In late 1992, it broadened its strategic focus to concentrate on "electronic commerce" (not just EDI). In 1993, it launched one of its first products in its expanded product line, Commerce Connection, a software package that has associated network services. Commerce Connection primarily provides EDI users with E-mail, directory and library capabilities so that EDI coordinators of different companies can communicate and coordinate their EDI systems with each other.

Conclusions

A Findings

Systems that support commercial transactions ("electronic commerce systems") in health care are economically useful in four business functions in the health care industry:

- Procurement
- Claims Processing
- Claims Payment
- Utilization Review
- Related Information Service

Expanding these basic electronic commerce applications is the groundwork for a nationwide health information network that will streamline the delivery, financing and administration of health care. The goal is a less costly health care delivery system, restructured to provide better, faster and more appropriately targeted care.

A machine-readable health ID card (similar to bank ATM cards) carried by all citizens might one day be the means by which physicians will use this network to gain access to health information stored in each patient's primary care provider's system. Thus, if Mary Smith is hit by a bus while traveling far from home and lies unconscious in a strange hospital, the hospital's doctors could use her ID card to access her records on her primary care site's patient database and learn that she is allergic to certain medications.

The health ID card scenario is a dramatic illustration of some long-term potential benefits of a system for national exchange of health care-related information. Current developments are establishing the infrastructure required for such a system:

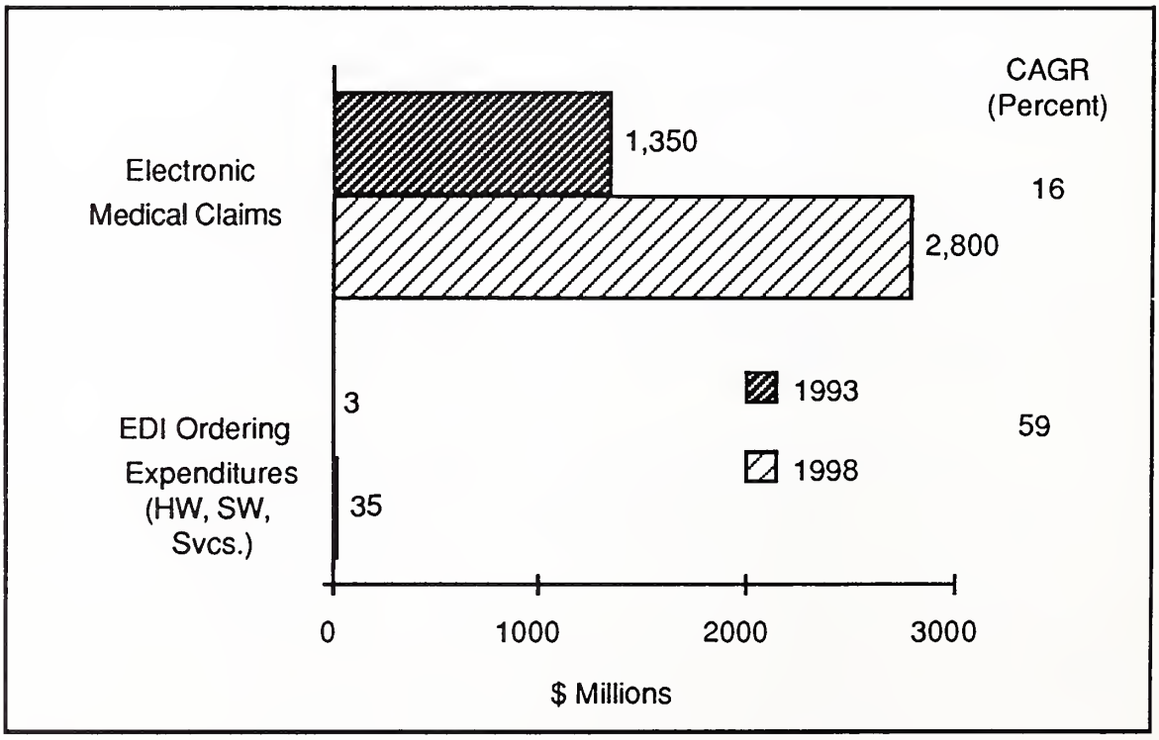
- emerging standards, EDI and other interorganizational applications
- Increasing level of collaboration and communication among providers, payers, employers and government agencies

Exhibit VI-1 depicts forecasted growth in the four key electronic commerce and EDI markets:

- EDI ordering
- Electronic medical claims
- Electronic payment and remittance
- Utilization review and PPO-related information services

Exhibit VI-1

Key Health Care Electronic Commerce Market Forecasts



INPUT believes there are tremendous opportunities for users of electronic commerce systems and vendors of these systems over the next five years.

As the exhibit shows, health care providers are expected to spend a rapidly increasing amount on such systems over the next five years.

The greatest growth area is in payments of medical claims. In part, this rapid adoption stems from the fact that a small proportion of today's insurance claims are paid electronically.

EDI procurement shows the next most rapid adoption, which stems from the transition now underway from proprietary pharmaceutical ordering systems (such as Baxter's ASAP, etc.) to standardized, typically X12-based systems that cover all material procurement functions for hospitals, including medical-surgical supplies, grocery/dietary material and others in addition to pharmaceuticals.

While INPUT is confident that electronic claims growth will proceed at the rate shown, it is less certain who will realize the economic benefits. In Exhibit VI-1, the dollar amounts spent on claims processing are the revenues earned by claims processing service bureaus (assuming the industry-standard fee of 75 cents per claim processed).

Electronic filing of claims will certainly impact revenues for these intermediaries, but the effect of eliminating or consolidating these intermediaries will also occur. So exactly who retains the revenue growth shown in Exhibit VI-1 is unclear. It may be the claims processor, network service providers, newly merged or consortium entities or indeed, by using EDI software and communicating directly with insurers, it may be hospitals and other providers themselves. Health care providers may be the ultimate beneficiaries of these dollar values and realize them in terms of reduced costs.

Utilization review and other information services also shows a substantial rate of growth. These services are typically used in conjunction with assessing medical claims and containing health costs.

B
Driving Market Forces

Cost pressures, demands from the electorate and from major health care payers, providers and plan sponsors and a growing awareness of the benefits of electronic commerce are contributing to the growth of EDI and other applications for electronic information exchange among health care organizations.

Exhibit VI-2 lists the market forces driving the growth of electronic commerce in health care.

Exhibit VI-2

Electronic Commerce in Health Care
Driving Market Forces

- Government programs encouraging electronic medical claims processing, including EDI/EFT use
- Financial incentives: health care costs are skyrocketing; major containment efforts are needed
- Large employers and the health care community are pushing for changes
- Increasing collaboration among health care players
- Benefits are tangible; success stories are accumulating
- Reduced implementation costs on downsized platforms
- Patient care applications offer long-term prospects of major improvements to public welfare

The federal government's Department of Health and Human Services (HHS) is promoting the development of a health information infrastructure, with electronic claims processing targeted as the first major application for nationwide standards development and implementation. HHS's Workgroup for Electronic Data Interchange (WEDI), a public-private task force, projects more than $3 billion in administrative savings to be gained from use of electronic claims, claims payments and other insurance-related applications.

Health care costs have now reached a point where major players are demanding change. According to A. Foster Higgins & Co.'s

1991 survey, health care benefit costs amounted to 26% of corporate earnings in 1990. The U.S. Department of Commerce estimates that 1992 health care expenditures will be $817 billion, an increase of 11% over 1991 expenditures of $738 billion. 1991 expenditures accounted for approximately 13% of the GNP.

Among members of the health care trading community, there is an increasing level of collaboration aimed at controlling the cost of care:

- More than 80% of medical insurance plans now include some aspect of managed care, resulting in a higher degree of interaction among health care providers and payers for referrals, precertifications and direct contracting.
- Hospital buying groups allow hospitals to pool their buying power to reduce costs.
- Claims clearinghouses and regional joint-payer claims networks continue to grow.
- EDI standards are developed to remove the barriers imposed by proprietary systems.

All of these developments contribute to the growth of community-wide information exchange.

Potential and already-achieved benefits of electronic commerce are receiving industry-wide attention. The WEDI report's estimates of potential savings from increased electronic claims and related transactions usage (see above) are well known. User and vendor savings from standard EDI hospital ordering (detailed in Chapter IV of this report) may amount to an average of $432,000 per year for a 500-bed hospital issuing 15,000 purchase orders per year.

The reduced cost of EDI implementation on workstation platforms also contributes to its growth. For example, PC hardware and software to support an EDI order entry system together costs up to $16,000; the mainframe software alone costs more than $60,000. Implementation costs on a PC platform at $1,000 per day would total approximately $30,000 for six weeks. Mainframe implementations, requiring up to 18 months of programmer time, cost an order of magnitude around $360,000.

Finally, the long-term development of a national patient care information system remains an underlying goal of electronic commerce infrastructure development. Providers are implementing electronic claims and purchasing with the knowledge that these applications develop the know-how and networks needed for transmitting computerized patient records.

C
Inhibiting Market Forces

Restraints to growth of electronic commerce applications in health care stem largely from the complexity of our multilayered, multipayer, public-private, modified free enterprise health system. These combined forces make the reform of our health care system an enormous undertaking.

Exhibit VI-3 lists the market factors inhibiting the growth of electronic commerce in health care.

Exhibit VI-3

Electronic Commerce in Health Care
Inhibiting Market Factors

- Complexity of the U.S. health care system
- Lack of uniformity of health care information and the large number of proprietary designs already in use
- Costs of converting to EDI and lack of awareness of cost benefits
- Many provider sectors are not ready for EDI or electronic commerce
- Privacy and information security issues
- The magnitude of change required

Our health care system is made up of a large number of sectors that each face different challenges in implementing electronic commerce. Chapter III examined many of these sectors in terms of their place in the health care trading community and Chapter IV looked at the various payer and provider sectors in terms of their level of electronic claims usage. The challenge for proponents of electronic information exchange is to develop

conversion approaches that address the needs of each key health care sector.

Today, there is a high degree of disparity among various players' and sectors' standards and procedures. The fact that there are more than 400 different proprietary standards in the claims arena speaks for the difficulty of converting to industry-wide standards. However, a consensus in support of ANSI X12 standards is emerging.

A recent American Medical Association Report, "Electronic Data Interchange in Medical and Dental Practices," found that only about 41% of physicians have the capability to submit at least some portion of their claims electronically. While somewhere between 60% and 70% of physicians' practices and doctors' offices have some degree of automation, the sophistication level of these systems varies widely.

Physicians' practices and certain other nonhospital providers—inpatient-outpatient labs, skilled nursing facilities (nursing homes) and home health care providers—have just begun converting to EDI in the past two years. But with downsizing reducing the cost of hardware, software and implementation and a growing awareness of the cost benefits of electronic purchasing and claims processing, conversion costs are presenting less of an obstacle.

Provider sectors that have lagged in EDI-readiness require products and services targeted to their needs, such as physicians' practice management software with electronic billing capabilities and user-oriented implementation services.

Privacy and security issues must be addressed in each EDI or electronic commerce implementation, but the difference in security measures required when converting from hard copy information to an electronic medium is the true obstacle in many cases. This barrier can be alleviated through training and efforts to increase users' understanding of the security advantages of EDI. For example, insurance claims analysts accustomed to detecting fraud by looking for white-out and other warning signs on claims forms must learn different signals of fraudulent claims. They may not realize that electronic claims transmission enhances security because claims pass directly from provider to payer. Concerns about security of patient information in future

transmission of computerized patient records have been much alleviated as a consensus has emerged in support of local control of patient records by each patient's primary care facility.

The magnitude of change required is significant, but change is occurring first in purchasing, claims and insurance-related areas, and will progress swiftly over the next five years. A commonly stated target for computerized patient record (CPR) standard-based systems is the year 2000, although legislation now in Congress (commonly known as the Health Insurance Reform Act of 1992) calls for the Health and Human Services Secretary to encourage adoption of CPR standards by 1995 and for hospitals providing Medicare services to have a CPR system in place by January 1996.

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Market Opportunities

There is a need for electronic medical claims processing and other EDI software and services opportunities among physicians' practices and other provider groups.

The other groups include inpatient-outpatient labs, skilled nursing facilities (nursing homes) and home health care providers. These are the groups which have the lowest installed base of administrative computing technology—Medicare EMC rates from these provider categories are all currently in the 50% or less range. Software and services should be user-oriented and perhaps bundled with nontechnology (business) services.

There are systems integration needs for large-scale EDI rollout within managed care, buying groups or other health care associations.

Development of in-house EDI order entry capabilities in hospitals and large clinics or physician's practices holds great promise and promises to begin its take-off by 1994—the foundation is now being laid through initial success stories. Rollout of EDI capabilities into hospitals is a major undertaking and the level of effort required will vary considerably depending on the platform selected and the readiness of the hospitals to use EDI. In cases where the number of hospitals is very large or the level of IS staff

is relatively low, contracting with an outside services firm to plan, focus, implement and monitor the success of the rollout is a cost-effective approach.

Materials management needs to be re-engineered as standard EDI ordering systems are implemented.

Hospitals are moving to just-in-time ordering and warehousing, and have realized significant savings through reduction in inventory and required warehouse space. EDI ordering may spur a redesign of inventory management processes or vice versa.

New software and services are needed to support development of utilization review, claims analysis and other systems aimed at cost containment.

A number of current players and projects are described in Chapter IV of this report. Insurance companies, self-insured employers, third party administrators and managed care organizations are major users of these systems.

There are medical imaging opportunities in patient care and claims-related applications.

Large-scale picture archiving, teleradiology and related image transmission projects are now underway in many large hospitals. These are typically major integration projects with a large number of hardware, software and services players represented. Image transmission opportunities in support of claims processing will begin to appear in 1995.

Human resources (HR) and employee benefits software products are needed to support electronic enrollments.

Employers' interest in this function stems from the reduction in costs they may realize in converting from one payer to another and electronically updating enrollments in the payer's office though a process that is less error-prone and more flexible and timely than magnetic tape submission. INPUT expects that employers who already have EDI capability will be the first to take advantage of EDI enrollment.

There is a need for interorganizational E-mail as a precursor or complement to EDI transaction processing.

Interorganizational E-mail is already widely used on the business side of health care (i.e. among insurance firms, materials vendors and pharmaceutical companies). It is used among managed care organizations that have a significant level of interaction among primary care providers and specialists and in support of referrals and precertification of services. Hospitals and physicians' practices are relatively low users of E-mail. As interaction among the health care community grows, demand for E-mail will be driven by its ability to streamline communication and as a precursor or complement to EDI (see Chapter IV). Vendors should monitor trends toward collaboration and EDI implementation among the less E-mail-intensive sectors and target those groups as they begin to focus on communications with trading partners and remote sites.