INPUT

STRATEGIC MARKET PERSPECTIVE

Integrated Electronic Messaging

Trends, Issues, Opportunities

EDI / Electronic Commerce Program

INTEGRATED ELECTRONIC MESSAGING

TRENDS, ISSUES, OPPORTUNITIES

INPUT ®

Published by
INPUT
1280 Villa Street
Mountain View, CA 94041-1194
U.S.A.

EDI/Electronic Commerce Program
(EDI)

Integrated Electronic Messaging—Trends, Issues, Opportunities

Abstract

"Integrated electronic messaging" refers to having multiple file types (EDI, E-mail, facsimile, large binary file, voice messages, digitized video) accessible through a single system and interface, with each data file containing a single message type. (Integrated messaging is not multimedia, where multiple data types are available simultaneously through a single interface.) This report examines why and how companies are bringing together different messaging media. The report quantifies the installed bases of facsimile, EDI, E-mail, voice, and other messaging platforms; summarizes the results of two user surveys addressing corporate use of and plans for integrating their messaging systems; reviews the marketplace of the several messaging products and their vendors; discusses the trends and issues involved in building a ubiquitous message infrastructure that handles all message types; draws conclusions on where it is all headed; and makes recommendations to users and vendors of messaging systems on how they can effectively implement message systems.

The report is 68 pages in length and contains 14 exhibits.

ABOUT INPUT

Since 1974, information technology (IT) users and vendors throughout the world have relied on INPUT for data, objective analysis, and insightful opinions to support their plans, market assessments, and technology directions, particularly in computer software and services. Clients make informed decisions more quickly and save on the cost of internal research by using INPUT's services.

Call us today to learn how your company can use INPUT's knowledge and experience to grow and profit in the revolutionary IT world of the 1990s.

ANNUAL SUBSCRIPTION PROGRAMS

NORTH AMERICAN AND EUROPEAN MARKET ANALYSIS

Analysis of Information Services, Software, and Systems Maintenance Markets
5-year Forecasts, Competitive and Trend Analysis

- 15 Vertical Markets
- 9 Categories of Software and Services
- 7 Cross-Industry Markets
- The Worldwide Market (30 countries)

U.S.

- Outsourcing
- Client/Server
- Systems Integration
- EDI/Electronic Commerce
- IT Vendor Analysis
- U.S. Federal Government IT Procurements

EUROPEAN

- Outsourcing
- Systems Integration
- Customer Services

CUSTOM CONSULTING

Many vendors leverage INPUT's proprietary data and industry knowledge by contracting for custom consulting projects to address questions about their specific market strategies, new product/service ideas, customer satisfaction levels, competitive positions, and merger/acquisition options.

INPUT advises users on a variety of IT planning and implementation issues. Clients retain INPUT to assess the effectiveness of outsourcing their IT operations, assist in the vendor selection process and in contract negotiation/implementation. INPUT has also evaluated users' plans for systems and applications downsizing.

INPUT WORLDWIDE

San Francisco — 1280 Villa Street
Mountain View, CA 94041-1194
Tel. (415) 961-3300 Fax (415) 961-3966

New York — 400 Frank W. Burr Blvd.
Teaneck, NJ 07666
Tel. (201) 801-0050 Fax (201) 801-0441

Washington, D.C. — 1953 Gallows Rd., Ste. 560
Vienna, VA 22182
Tel. (703) 847-6870 Fax (703) 847-6872

London — 17 Hill Street
London W1X 7FB, England
Tel. +71 493-9335 Fax +71 629-0179

Paris — 24, avenue du Recteur Poincaré
75016 Paris, France
Tel. +1 46 47 65 65 Fax +1 46 47 69 50

Frankfurt — Sudetenstrasse 9
W-6306 Langgöns-Niederkleen, Germany
Tel. + 6447-7229 Fax +6447-7327

Tokyo — Saida Building, 4-6
Kanda Sakuma-cho, Chiyoda-ku
Tokyo 101, Japan
Tel. +3 3864-0531 Fax +3 3864-4114

Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)

Exhibits

Introduction

A

Issues Facing Vendors and Users

Businesses today are realizing that messaging technologies—including facsimile, E-mail, EDI, voice response, other binary file transfers, and videoconferencing—are operating requirements for the 1990s.

A wide variety of vendors is offering a plethora of messaging products and services. Competition and technological innovation are driving prices down while increasing the number of options.

Businesses and systems vendors are asking the question:

- *Is it reasonable for an organization to establish a single software/ hardware platform to handle its messaging needs for all media: voice, data, image, and video?*

Even if the answer to this question is "yes," another problematic question arises:

- *How does the organization move from its heterogeneous messaging environment of standalone facsimile systems, voice mail systems, LAN E-mail systems, host-based E-mail systems, and MIS-controlled EDI of today to an integrated platform for tomorrow?*

Such a migration will require the hard work and coordinated efforts of users as well as their system vendors. Both users and vendors face choices of messaging and connectivity standards such as X.400, MHS, MAPI, VIM, OCE, SMF, CAS, TR.29, SMPT, TCP/IP, and others, many of which are aimed at specific message data types or processes and do not address all of a user's requirements.

B

Scope of the Report

There are three important distinctions to make that clarify the nature of integrated electronic messaging and, therefore, establish the scope of this report.

1. Integrated messaging versus multimedia

This report focuses on "integrated electronic messaging" which is defined as:

• Different message/file types (EDI, E-mail, facsimile, large binary file, voice file, digitized video file) accessible through a single system and interface, with each message type delivered separately and in a single data file type (data, image, voice, video). From a workstation/PC, or equivalent device, a user can access several forms of message types.

Integrated electronic messaging is depicted graphically in Exhibit I-1.

EXHIBIT I-1

Integrated Messaging

"You have:
5 new voice messages,
3 new fax messages,
2 new info. messages"

User Mailbox

Voice mail
Computer
Data bases
Fax
Audiotext
E-mail
Pagers
Video
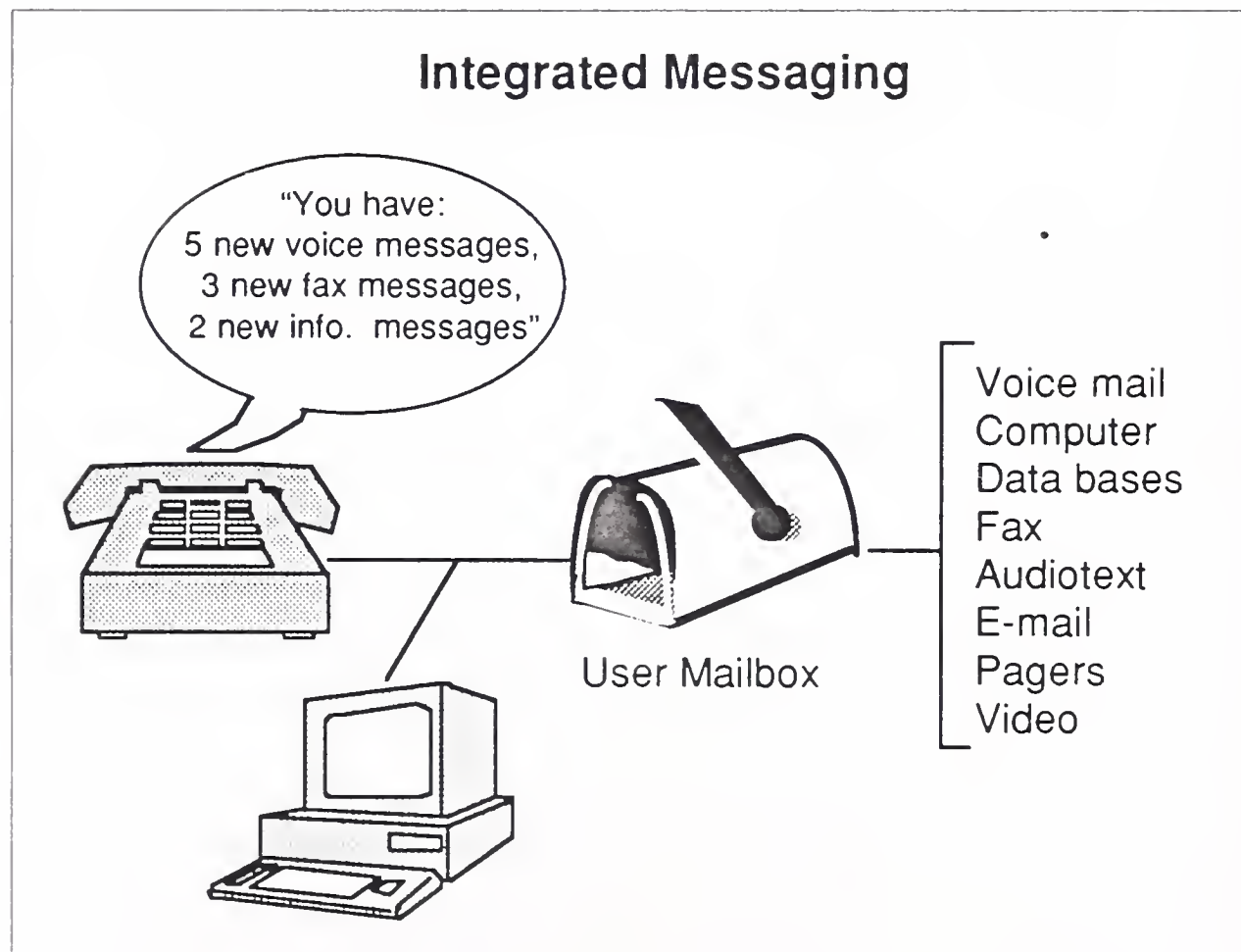
This definition is different from "multimedia" messaging (or simply, "multimedia"), which can be defined as multiple data types (data, image, voice, video) encapsulated and manipulatable in a single message or file so that the viewer receives information in multiple modes at the same time.

2. Real-Time versus Store-and-Forward

These two fundamental data transmission technologies divide the market into two areas.

Real time refers to data transmissions between an originator and a receiver that are instantaneous. Examples include such things as ticker tape messages, television broadcasts, videoconferencing, reservation system transactions, and telephone conversations.

Store-and-forward transmissions refer to data that does not reach the receiver until some time after the sender has sent it and therefore is stored in some intermediary location. Examples include electronic mail, voice mail, video-on-demand (e.g., cable TV movies that are started whenever the viewer wants), distribution of video materials (for example, television commercials) via a network.

Video messaging will refer to the store-and-forwarding of video materials. Videoconferencing or video arcade multimedia is not video messaging.

3. Intra- Versus Inter-Company Messaging

This report also is more concerned about integrated messaging among organizations (inter-company messaging) than within a single organization (intra-company messaging).

The real challenge in integrating data, image, voice and video is economic, not technological. Providing multiple data types on a message platform can be accomplished today, but does it serve a real need? For what business functions and industries is an integrated messaging system worth its cost? Customer service? Advertising? Education?

Also, as in all messaging technologies, the question of critical mass and acceptance as a standard practice is important. When will there be enough users of integrated messages so that those who have it can communicate with a wide number of people and those who don't yet have it perceive themselves lacking in an important capability?

The telephone answering machine was available to the general public in the 1960s, but didn't become an accepted resource until the 1980s. Facsimile technology was invented and available in the late 1800s but didn't become widely accepted until the late 1900s.

This report provides the user data, trend analysis, and competitive analysis that is relevant to answering the questions of "how do I implement integrated messaging and how soon must I do it?"

Exhibit I-2 shows the convergence of data types in messaging. This report examines the factors influencing this convergence.

EXHIBIT I-2

How Big Will Integrated Messaging Become?

Today

Voice   Image

Static: bit map

Intersection is integrated messaging

Data

Dynamic: video

How Soon?

Intersection is integrated and multimedia messaging
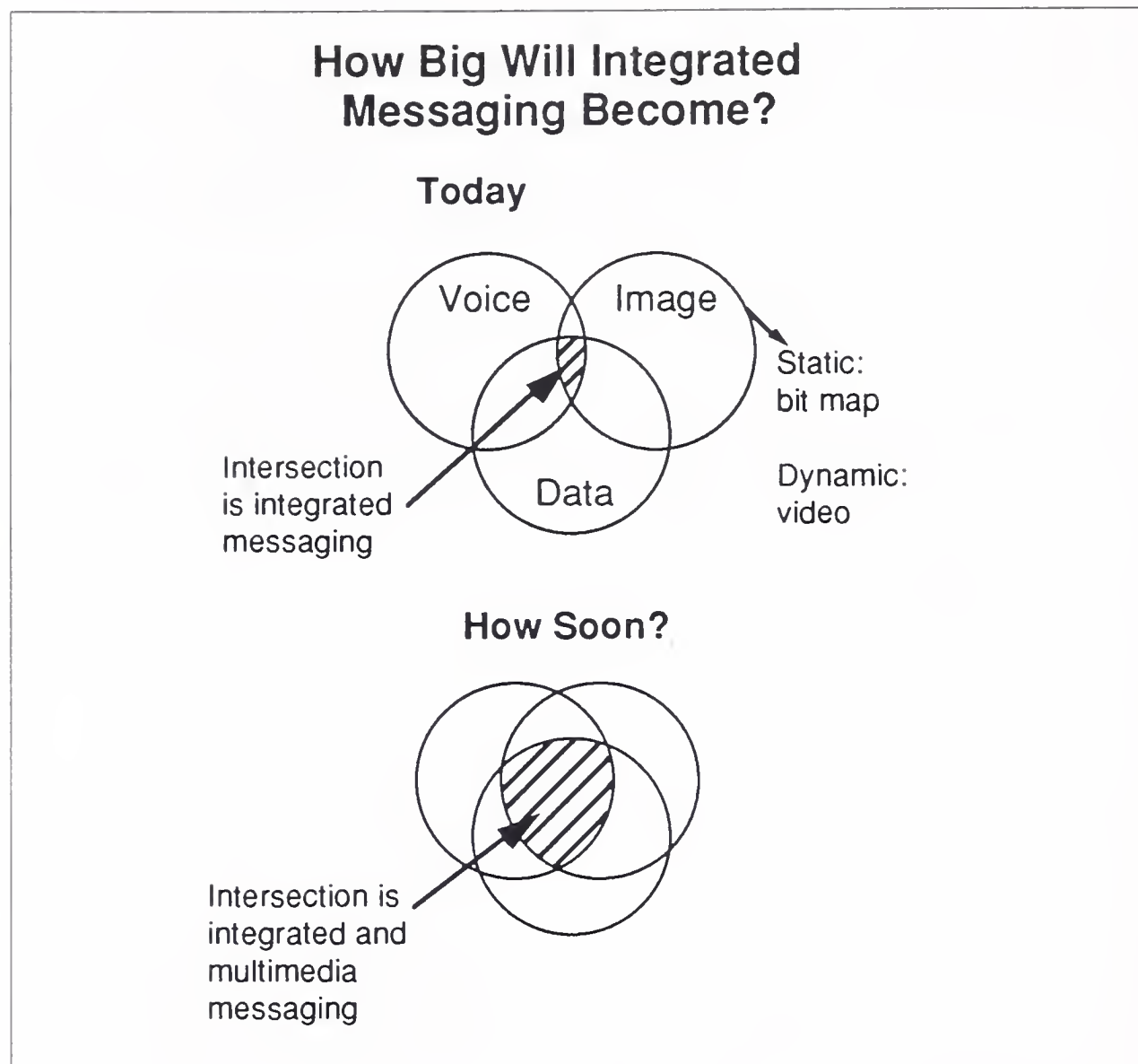
The intersection of the different data types is the domain of integrated, and ultimately, multimedia messaging. The intersection in the chart corresponds to a number of key market components, all of which this report discusses: the market size for integrated messaging products and services, the applications, the key messaging technologies (facsimile, network services, workflow, etc.), and the key vendors.

C
Report Methodology

This report is based upon a number of data sources:

- A primary survey was conducted of 26 companies that used EDI and E-mail. They were queried on the extent to which they used other messaging technologies (namely voice and facsimile) and how willing they were to integrate the technologies into a single platform. The questionnaire for this primary survey is in the appendix.

- A secondary survey of 20 users was also conducted as a part of another INPUT study on integrated messaging. This survey was also directed at the way in which companies are organizing and integrating different messaging technologies.

- Three companies were interviewed in depth, and in two cases they sent INPUT collateral material describing their messaging systems. These cases are presented in chapter IV.

- Eleven vendor interviews were conducted specifically for this report. In addition, INPUT is continuously interviewing information systems vendors in the course of its ongoing research activities. These interviews provide data that is incorporated into reports such as this one.

- Other INPUT reports, particularly those on EDI, downsizing, Unix, and some other custom studies, were used to provide context and specific statistical quantities.

D
Related INPUT Reports

This report is part of INPUT's EDI/Electronic Commerce Program. The program provides decision makers with strategic guidance and market intelligence on how companies are moving from a paper-based to an electronic network-based environment in which to conduct trade.

Other reports in the EDI/Electronic Commerce Program include:

- *Electronic Commerce: The New Foundation for Trade*
- *Electronic Commerce in the Media Industry*
- *Electronic Commerce in U.S. Health Care*
- *Electronic Commerce in Trade and Transportation*
- *Electronic Commerce in Travel and Tourism*

- *Electronic Commerce in Grocery Production and Distribution*
- *Electronic Commerce in Apparel Production and Distribution*
- *Electronic Commerce in the U.S. Federal Government*
- *Electronic Commerce: Comprehensive Market Assessment*
- *Opportunities in Electronic Payments*
- *International EDI Markets, 1992-1997*
- *The U.S. Electronic Data Interchange Market, 1992-1997*
- *EDI in Europe, 1990*
- *The EDI Market in Japan, 1992-1997*
- *Developments in Corporate Electronic Trade Payments*
- *EDI Business Integration Issues*

Contact any INPUT office or call our California office at 415-961-3300 for more details (8 a.m. to 5 p.m. Pacific Daylight Time) on any of these reports.
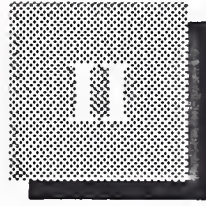
Executive Overview

A
Definition

"Integrated electronic messaging" refers to the sending and receiving of multiple message types (voice, data, image, video) through a common system/platform/interface, where the message-types remain in separate files.

Integrated messaging is different from multimedia, which is multiple data types (text, image, audio, video) in a single file or simultaneously accessible through the same interface.

B
Market Origins

Integrated messaging is finding the greatest acceptance in inter-company applications. As companies implement EDI, facsimile, inter-company E-mail, and interactive voice response with fax-on-demand capabilities, a critical mass is forming where companies want all these services integrated to some degree. But while users appear receptive to the idea of an integrated messaging platform, their buying behavior reflects a much more pragmatic approach.

The integration of different message types is occurring for the most part in couplets. EDI and E-mail, facsimile and voice, facsimile and E-mail, and so on, are representative of a pattern where two different message types are first combined with each other. Users are not attempting to combine all message types at once.

C

Vendor Environment/Existing Infrastructure

The messaging infrastructure today is a diverse "ecosystem" of evolving technological species. Starting with the older vendor species first, there are the commercial services: BT North America, MCI, Sprint, Compuserve, AT&T, and IBM (Advantis and Prodigy). These services are divided into consumer and corporate segments. Inter- and intra-company E-mail are also separated.

There are the personal computer and local-area network software providers. These principally include Microsoft, Apple, Lotus, Novell, Borland, WordPerfect, and Autodesk. These companies are trying to move their product focus up from the end-user, through the office workgroup, to become providers of enterprise-wide systems.

They will then be competing with the older, host-based messaging and environment suppliers: IBM, Digital, Dun & Bradstreet, Computer Associates, and other mainframe software vendors.

Also in the competitive arena are the "specialty" messaging vendors: voice mail and processing companies and the facsimile software companies. These companies are, somewhat like the PC/LAN software companies, expanding the functionality of their formerly single-function products to become more integrated into the messaging infrastructure of an organization.

D

Market is Price-Sensitive

These groups of messaging vendor species are converging at and beginning to drink from the integrated messaging pond. Who survives, and the kinds of interbreeding of products that occurs, depends on how much water there is in the pond. In other words, it depends on the degree to which users have a need for integrated messaging and how much they are willing to spend.

At this time, the pond appears to be smaller than expected due to the current worldwide business drought. The result: users are very sensitive to price/performance issues. They want inexpensive solutions but they won't settle for poor quality. The price/performance trade-off curve is very elastic.

E

A "Macro" Client-Server Architecture Coming?

Local area network software and facsimile software appear to be very promising solutions for these price-sensitive shoppers. These resources are inexpensive. They have enormous functionality. New developments in software suggest that local area networks and facsimile-capable PCs could become the universal platform on which multiple message types will be sent. They are the fastest-growing areas of user adoption.

On the other hand, the commercial network service provider (VAN, telephone company or niche clearinghouse) brings a different kind of offering to the end user. Its real strength comes from its ability to address all the disparate organizations of a trading community that need to be connected on a network. Trading communities that truly require specialized "information clearinghouses" are health care, retail, distribution, travel, and government.

Only these service organizations can provide integration and other value-added services that bring efficiencies to the trading community which the individual software vendors cannot provide. Such services include: network interconnection services, file conversion services (text to fax, etc.), directory services, and application-specific services (sales force automation, etc.).

There may be a natural separation of messaging functions (that attains an equilibrium of sorts) between user-premise software and third-party commercial network services. While the software companies provide the mass installation of end-user platforms, the commercial networks provide services that all users need, but that only make sense for a single source to provide. In this sense, a "macro" client-server architecture is emerging where networks provide server functions (directories, data bases, trading community network management functions) to their customer clients. Customer clients receive the necessary client software from the specific software vendors.

F

Two Markets for Integrated Electronic Messaging

The distribution of messaging functions between customer site software and network services, including trading community facilitation services, suggests that there are two marketing approaches to the integrated electronic messaging market:

- The trading community approach, which is more appropriate to those network service vendors who can provide messaging services to all players in a given trading community.

- The mass market approach, which is appropriate to the vendor of a particular messaging component (e.g., facsimile server software, LAN E-mail software, etc.).

G

Facsimile May be the Biggest Winner

Facsimile technology has the most promise of all messaging modes today to grow to the largest number of users and become the "platform of choice," or, at least, a central component for multimedia messaging. In other words, facsimile has greater possibilities to become central to multimedia than E-mail, videomail, EDI, or voice mail systems, given the way these other systems are constituted today.

Facsimile capabilities will grow beyond the conventional facsimile today and, indeed, will include/enable some of these other message types, especially E-mail and videomail, to be sent over it.

Facsimile has advantages over the others because it:

- Has a large and more rapidly growing installed base of users.

- Is simple to use and simple to administer (as a corporate asset).

- Is always "on" and able to accept incoming messages 24 hours per day.

- Is inexpensive—affordable even to households.

- Is scalable and expandable in volume and range of messaging through additions in software, modular hardware (boards, memory-expansion chips), and telecommunication services (on-network fax storage, routing services, etc.). It gives users the ability to incrementally and inexpensively build an integrated messaging platform.

Facsimile server and facsimile cards will grow rapidly and, in so doing, usher in advanced facsimile messaging. Advanced facsimile messaging is no longer sending bit-map images. Instead, it is sending binary files between points that can be re-inserted into applications and other systems for further processing and user manipulation.

Facsimile evolution began in the late seventies with standalone turnkey facsimile machines. It is now at the stage where single PCs act as facsimile machines. In the next 12 to 24 months there will be rapid growth in facsimile servers, where many PCs on a network use a facsimile server as a fax communications port. Finally, with the adoption of TR.29 and other binary file standards, facsimile servers will be used to send E-mail, EDI, video, and other digital files. At this point, it may be incorrect to call this technology "facsimile." It will be multimedia.

Facsimile is a real product serving real business (and consumer) needs today. And it is rightfully the focus—by vendor and user alike—for building new messaging capabilities and platforms.

Integrated electronic messaging presents a huge market potential in terms of software and services. Whether there will be a common, ubiquitous multimedia telephone service or whether message types will be integrated on an applications and vertical market basis only, it is still too early to tell. The potential is huge and the opportunity is great for several kinds of information service/software providers. Users of integrated messaging have a great number of applications possibilities to explore to make their businesses more efficient and effective. It is difficult to say where integrated electronic messaging is headed but it is certain that, wherever it goes, it will profoundly impact organizations, industries, and the greater economic community.

(Blank)
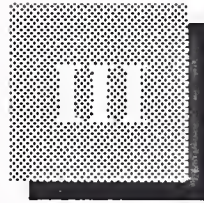
The Messaging Environment Today

Installed bases of machines and systems are important parameters when considering how messaging systems might be integrated or unified. The de facto infrastructure base is the starting point: it constrains the technical and business-process possibilities of the future.

As this section will indicate, messaging technologies vary by orders of magnitude in terms of total sales or installed base figures suggesting that some messaging processes have mass appeal while others serve very specific communication purposes.

Facsimile systems—first the standalone devices and now increasingly the fax board and fax server devices—are showing some of the most phenomenal growth and penetration relative to other messaging technologies.

A

Facsimile Installations

There are two types of facsimile: the more traditional, and as yet more ubiquitous, standalone facsimile machines, and the newer facsimile cards (which are a combination of integrated circuitry and software that plugs into the mother board of a personal computer and gives the PC user the ability to send and receive facsimile transmissions). Exhibit III-1 shows the installed base and growth rates for facsimile.

Facsimile growth overall has slowed since its late 1980s explosion, where growth of standalone machines was 100% annually for a few years in a row. Facsimile installations continue at an above industry-average growth clip of 26%. However, the hot new growth area is the facsimile card market, which is growing (albeit from a small base) at annual rates that standalone machines experienced a few years ago (currently, 129%).

Facsimile Installations

Item	1991 Total Installs (Millions)	1994 Total Installs (Millions)	CAGR (Percent)
Stand Alone Fax	10.0	15	14
Fax Card	0.5	6	129
Total	10.5	21	26

Source: INPUT, CBEMA, Vision 2000

B

Electronic Mail Users

Electronic mail usage (shown in Exhibit III-2) is based on total number of E-mail boxes. E-mail boxes are established in two general ways: on a local-area network or on a (typically, large) host-based machine. Host-based architectures, themselves, can again be divided into two types: those where the host is privately owned by the company of the E-mail users and those where the host is owned by a commercial E-mail service provider (and the users dial into the host through dial-up or dedicated lines). Most of the host-based E-mail boxes through a commercial provider are for consumers or individuals.

Electronic Mail Users

Mail Box Location	1991 Total Installs (Millions)	Percent	1994 Total Installs (Millions)	Percent	CAGR (Percent)
Decentralized (LAN-based)	5.0	29	25	60	71
Centralized(Host-based) Internal to Company Public Mail Services*	9.0 3.0	53 18	12 4.5	29 11	10 14
Total	17.0	100	41.5	100	35

*Approximately 90% used by consumers
Source: INPUT, Electronic Mail Association, Information Industry Bulletin

The number of E-mail users does not linearly correspond to E-mail network traffic, software sales, or service revenues. Recently, many networks switched to fixed-fee pricing.

The highest growth in E-mail users is coming from those users who are linking their PCs and workstations to other colleagues in their places of work via a local-area network. This is a result of the massive installation of PCs in the workplace over the past ten years. We are now in a phase of linking all these machines together in networks. Hence, the high growth rate (71%) of LAN-based E-mail boxes.

How this high growth rate correlates to revenue growth of E-mail is complicated. Suffice it to say, LANs and PCs are commodity products with very thin margins. Growth in E-mail revenues stemming from LAN-based E-mail will reflect mass use but will not contain wide margins.

C

Electronic Data Interchange Users

Electronic data interchange is the computer-to-computer exchange of business documents in standardized data formats. Exhibit III-3 shows the number of users and their expenditures on software and services in North America for 1991 and 1994.

EXHIBIT III-3

EDI Users and Market Size

Item	1991	1994	CAGR (Percent)
EDI User Companies	26,500	40,000	15
Market Value ($ Million)	231	520	31

D

Voice System Installations

Voice mail and voice processing systems are those systems that provide voice mailboxes for employees in a company. They are also used by telephone companies who, in turn, base a service offering to the public on them. Besides voice messaging, voice processing systems also allow the newer innovations of interactive voice response and other access to computer data bases through a touch-tone telephone.

Exhibit III-4 shows the number of voice processing and voice mail systems installed in North America from 1991 to 1994. The numbers account for systems in both corporations and telephone companies.

Voice System Installations

Item	1991 Total Installations	1994 Total Installations	CAGR (Percent)
Installed Voice Mail Systems*	35,000	86,000	35

* Counting corporate and telephone-company based systems; not counting standalone answering machines .

Source: Octel, INPUT

E

Other Messaging Indicators

The potential of integrated messaging, in addition to the above key messaging technologies, is also indicated by usage levels of:

• Pagers

• Cellular telephones

• Handheld devices

• Various kinds of large binary file transfers (CAD/CAM data, Internet activities, etc.)

• Forms and image management systems

These technologies are part of the overall integrated messaging market of applications.

IV
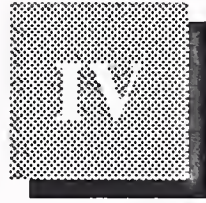
User Activities in Inter-Corporate Messaging

This chapter reviews the extent to which companies are using messaging systems today and the extent to which different message types are integrated in a single system or composite of linked systems. The evidence gathered is the result of two surveys and three case studies.

A

Primary Survey Results

The user survey (questionnaire included in the appendix) addressed the following questions:

- To what extent and for what purposes are EDI users also using electronic mail (E-mail) and other file transfer mechanisms with their trading partners?

- Are they using an integrated messaging platform and, if not, would they like to?

- To what extent are workstations given facsimile capability?

- How are the incumbent messaging services, particularly directory services, being administered?

- Is the Internet being used for inter-company messaging and file transfer?

1. E-mail Usage in EDI Relationships

The following findings highlight key points from the survey responses concerning E-mail usage.

- Twenty out of 26 (77%) respondents claimed to be using E-mail with their EDI trading partners (the remainder claimed not to be). Normalizing the data (to account for those respondents who equate EDI messaging with E-mail), brings the proportion to between 30% and 50% of those interviewed who use E-mail in addition to EDI.

- The most frequently cited reasons for people using E-mail with EDI trading partners was to aid in resolving technical issues concerning EDI and to be more accessible and have better communication with customers.

- E-mail volume is growing at a strong pace. Most (14 out of 20) of the E-mail users estimated their E-mail traffic with the outside was growing in the 1% to 40% range, with the greatest single growth rate range cited being 10%-40% per year (8 out of 20).

- One company, a tire manufacturer, claimed to have a 500% per year increase in E-mail volume and said it had approximately 100,000 customers worldwide conducting E-mail with it.

2. The Use of an Integrated Messaging Platform

- Most (12 out of 20) of those users claiming to do E-mail and other file transfers with EDI trading partners claimed to have an integrated messaging platform. "Integrated" here meant a single system by which you send E-mail, EDI, facsimile, and other kinds of digital files.

- Despite the vagueness in exactly what constituted an integrated platform, people generally expected to have all messaging taken care of through a single platform and pipeline. Only one respondent did not want nor expect to have all messaging functions taken care of through a single platform and pipeline.

- Although respondents claimed to have integrated messaging systems, very few (2 out of 20) were using the X.400 messaging standard. More than expected (11 out of 20) had no plans to use it. Three said that they will probably adopt it in the next two years. One said that their third-party service provider handled their X.400 enveloping needs. For those respondents who were not conducting E-mail with trading partners, three said that they would probably adopt X.400 in two years and three said that they had no plans to adopt it.

3. Facsimile Workstations

- One out of five respondents used either a facsimile card or facsimile server enabling users to send and receive faxes on a personal computer/ workstation.

- Half of the respondents, however, had no plans to ever use these devices.

- Those who used them generally rated them "very useful" (the highest possible rating) and cited their convenience, excellent transmission quality, and money savings. Only one respondent rated its usefulness average and claimed that it was difficult to receive a facsimile transmission.

4. Directory and Related Messaging Services

- Half of the respondents (12 out of 24) held that their messaging with trading partners (E-mail, EDI, etc.) used a directory of addresses that was maintained in an enterprise-wide directory. The next largest method was having individuals maintain the directory (8 out of 24). Only 3 had third-party service providers maintain the directory.

- People were not planning to change the way they maintained their directories (by whatever method). Sixteen out of 21 responding held that no change was coming.

- Two respondents held that a general-purpose directory of E-mail addresses would be useful (such as an X.500 directory would provide). Another respondent felt that a facsimile-to-ASCII file service would be useful.

5. The Use of the Internet

- Six out of twenty-five respondents (24%) used the Internet to send files to trading partners.

B
Secondary Survey Results

In a related study, INPUT interviewed 20 organizations about their messaging activities and plans. The survey focused on two questions:

- What are the company's needs for integrated messaging, particularly with trading partners?

- How are messaging systems purchased, implemented, and maintained?

The following findings highlight key points from the survey.

- Message services are not integrated across media (voice, video, E-mail, EDI, fax).

- All messaging is used extensively but voice mail has the largest volume.

- Voice mail and video conferencing are provided and maintained by a telecommunications group (separate from the MIS group) at the corporate level.

- E-mail and EDI are provided by a departmental or corporate MIS group.

- Facsimile is highly decentralized with the purchase responsibility in the hands of local departments or work groups.

- PC facsimile capability is being adopted or considered. Those who have adopted it are expanding its use.

- The priority in enhancing E-mail capability is in providing for extended support of graphics and fonts. Voice and video integration are not seen as worth it.

- Graphic file exchange between trading partners is taking place particularly in manufacturing environments where many outside contractors are used (such as autos, semiconductors, or aerospace). TCP/IP and SMPT are used as protocols in addition to specific proprietary CAD/CAM graphical syntaxes.

- E-mail often happens on LANs at the local department level and is not always integrated in enterprise-wide systems, but the trend is to do this.

- SoftSwitch is used frequently for interconnecting E-mail systems throughout the corporation.

C

Case Studies

The following case studies provide an operational sense of how companies—of different sizes and in different industries—are using various messaging modes and the extent to which they are integrating the modes. The three companies profiled include a large manufacturer (Ford Motor Company), a distributor (National Office Supply) and a transportation services company (The Harper Group). The following case studies were not part of the above surveys.

1. National Office Supply

Headquarters: South Hackensack, NJ
Principal Business: Distributor of office supplies to large corporate accounts
1992 revenues: unknown (privately held company)
Employees: 450

Platforms:

EDI: Sterling Software GENTRAN and GEIS.

Additionally, an electronic product catalog is written in C+ language and is distributed to customers on a single floppy disk to run on a PC. It contains 10,000 office and computer supply products and is able to generate purchase orders. Customers can place purchase orders in real time via direct links to the National Office Supply database.

30% of the daily sales volume goes through EDI.

E-mail: Wizard Mail. Trading partners dial directly into National Office Supply's mainframe to leave and pick up messages.

Objectives of E-mail usage by customers: Buyers in customer organizations use E-mail to contact their sales reps with technical, procurement, status update kinds of questions.

Number of internal E-mail users: 450 (every employee)
Number of trading partner E-mail users: Hundreds, but all customers are eligible (1,000s of customers).

Facsimile: Many orders come in via facsimile. National Office Supply would like to have automatic, intelligent scanning of incoming POs.

Managing the messaging systems: EDI is managed directly by the 12-person MIS group. Setting up EDI with trading partners is managed by MIS. Setting up E-mail with trading partners is managed by the 4-person New Account Installation Group. The New Account Installation Group assigns E-mail addresses and passwords to customers.

EDI and E-mail messages go through separate communication and software channels. The people who install them are different, as well.

Hardware: IBM 4381 mainframe (to be upgraded to a larger mainframe); multiple PCs; eight distribution centers around the U.S.

2. The Harper Group

Headquarters: San Francisco, CA
Principal Business: freight forwarding, customs brokering, transport services
1991 Revenues: $113 million

Platforms:

E-mail: Runs Sysm software for internal E-mail on an IBM 3084 main-frame. The system connects to the IBM Information Network (Advantis). Uses DISOSS link to IBM IN, which costs a monthly license fee.

For trading partners already on the IBM IN, they exchange Inter-Exchange Addresses and/or use Cross Terminal Access. For trading partners on other VANs/networks, they go through IBM IN's X.400 interconnection to the other trading partner's network. IBM IN gives the X.400 address. Harper's IS administrators have to manually register trading partners' IEA addresses in an address directory on their Sysm system (from H&W Computing). IBM IN also has the IEAs registered on a restricted direc-tory. To send messages to trading partners, Harper employees use the same addressing scheme as they do for colleagues internally—the address-ing and routing of messages is transparent to the Harper E-mail user.

Cross Terminal Access allows Harper's and their trading partners' termi-nals to interact with each other's mainframes in a CICS mode. Their trading partners' terminals and printers can interact with Harper's proces-sors.

DISOSS costs a monthly fee (a couple thousand per month, depends on CPU size). Steve Olson, Harper's MIS director, is thinking of switching to a SoftSwitch connection (at about $25,000) but it is not a high priority.

Internally on the E-mail network, Harper has 3,000 E-mail users spread over 384 office sites. Externally, approximately 40 companies are inter-connected to Harper's E-mail system with approximately 800-1000 IDs on the system. (Additionally, Harper has 1,500-2,000 telex IDs on its direc-tory and many facsimile machines.) E-mail with trading partners began about two years ago and is growing rapidly. Many employees found using E-mail difficult at first, but once they used it they could not do without it. Approximately ten new user IDs are assigned per month at Harper for external E-mail users.

Purposes of inter-organizational E-mail: The MIS director says inter-organizational E-mail serves two basic purposes: (1) it is an all around aid for completing administrative functions (so that people from different organizations can talk with each other) (2) it is a substitute for EDI, because many customers are not EDI-capable but they still need ship notices, tracking messages and other messages from Harper. The MIS director says he is trying to get all of the trading partners to switch over to E-mail because from the standpoint of transmission costs, it is the cheap-est; sending fax or telex is more expensive because these methods take up more bandwidth and more transmission time for a given quantity of data sent than E-mail (or EDI). (E-mail and EDI have equal transmission costs but overall, EDI will become cheaper because data need not be re-keyed

into an application at the other end as does data from E-mail). However, EDI is difficult because it represents a programming project at both companies (Harper's and its trading partners'). To get E-mail up and running with a trading partner is a simple administrative function: registering the user ID in the address directory.

EDI: uses Sterling Software's GENTRAN and Interbridge.

Other messaging services: telex, fax

Hardware: IBM 3084, 10 AS/400s,

Network service providers: IBM IN in US (and one other country); SITA; Sprint; BT Tymnet for dial up terminal connections.

Average transmission costs by message mode:

EDI	$0.55
E-mail	$0.55
Telex	$3.75
Facsimile	$6.25

Uses EDIFACT internally between AS/400s to send ship notices. Olson says there is no need to develop another format when the IFTAM has already been developed.

3. Ford Motor Company

Headquarters: Dearborn, MI
Principal Business: Automobile Manufacturer
1992 Revenues: $100 billion

Overview of Inter-organizational Messaging Systems: Ford has four basic messaging systems with its trading partners: EDI, E-mail, CAD data exchange, and direct access to Ford data bases. Facsimile and voice mail systems are also part of the messaging environment. EDI is used primarily for the purchase of production inventories on a repetitive basis.

Number of Trading Partners: 4,000-4,500

Platforms:

All messaging software at Ford is internally developed and runs on IBM mainframes. Trading partners typically dial directly to Ford. Users on other VANs can access the network as well; there are interconnections with networks.

EDI: for production-inventory purchasing, transportation, finance, and some non-production inventory. All X12 with even JIT formats 830, 862, 866. Internally developed software for EDI except in Europe where Ford uses Sterling Software but under its own label. All materials management and shipping notices functions are done via EDI with all 4,000 to 4,500 trading partners. Only about 100 leading trading partners are paid electronically. Many non-production suppliers use facsimile to communicate with Ford.

E-mail: The 75,000 worldwide employees of Ford use E-mail on a PROFS system (and a Wang system in Europe). The system is connected to the IBM IN (Advantis) through which trading partners will send E-mail messages. Large trading partners (Goodyear...) connect directly to Ford. A few others interconnect to the IBM IN through a gateway from their own VAN. E-mail is not a supplement to EDI. It is people-to-people, whereas EDI is machine-to-machine. EDI is used mostly in the production inventory materials management function. E-mail with trading partners is three years old and has been very rapidly adopted. Groups that talk with each other are sales to purchasing, engineering to engineering, engineering to purchasing, and materials to distribution.

Direct Access: Suppliers are directly online with Ford through DDL. They can check production schedules, inventories, and updates on shipping notices. They can check warranty information and activity. Engineering departments of suppliers can use the DDL direct access to get design releases and changes.

CAD Data Exchange: Used among engineering groups of Ford and suppliers.

Facsimile: Happens a lot. Ford has computer-to-fax capability.

Telecommunications services: BT Tymnet for direct access links; IBM IN (Advantis) for E-mail; AT&T and Ameritech for basic lines and packet switching.

Volume: millions of characters daily.
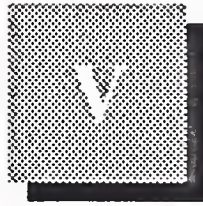
Issues and Trends

There is what is possible and then there is what is profitable. There are many possibilities in building integrated messaging systems but only a few of these possibilities are really sensible to build.

This chapter examines the issues and trends facing users of integrated messaging. It looks at the business environment issues, the technological issues, and the applications issues that are impacting messaging.

Section D summarizes the three areas and puts an historical perspective on the evolution of messaging.

A

Business Trends Impacting Messaging

Two important business trends are impacting how companies are using integrated messaging:

- Downsizing and decentralizing of large organizations
- Consolidation of industries

These trends are themselves the results of numerous factors commonly related to the globalization of competition. The falling price of information technology is enabling companies to organize themselves with global reach and lean staffs. It is allowing greater productivity in the sense of fewer companies providing rising levels of output for a given industry.

In organizations, the trend is away from mainframe-based, centralized and integrated technologies, toward client/server platforms.

These newer, "downsized" environments are not being driven by technology (although client/server technology makes downsizing much more feasible). Instead, downsizing in the U.S. is being driven by functional units seizing control of applications.

- The trend is for these units to become increasingly independent in contracting for their systems and computing needs.

- Activities supported by central IS groups have slowed to under 5%.

- Not just computer systems but core telecommunications network systems are also being starved of resources.

These developments are part of a larger-term process where both applications and operations responsibility are being transferred from central (and integrated) areas to dispersed user areas.

Similar to the changes impacting organizations, many vertical markets, particularly in the service industries, are experiencing a consolidation that is, in part, made possible by information technology. Airlines, distribution, retail, brokering, and banking are some of the industries being affected.

Downsized organizations and downsized industries have largely negative implications for integrated electronic messaging.

- The topology of users on a communication network is changing too rapidly for advanced, complex, integrated systems to be built. Rapidly changing organizations and industries make it difficult to build messaging networks that have capabilities above simple messaging, such as integrated messaging and workflow-based integration. It is similar to the dilemma of the telephone directory publisher: because people move so frequently, 25% of the directory is inaccurate when it finally is printed. Similarly, by the time advanced E-mail systems are designed and installed, too much of an organization or a trading community has changed to adequately fit the original architecture. All that can be built are simple systems as defined by the lowest common denominator (such as standalone facsimile, simple E-mail, and standalone voice mail).

- No single authority can buy and integrate messaging functions inside a company or inside an industry.

B
Technology Trends Impacting Messaging

The following general technology trends are impacting the integration of different messaging modes:

- Improving price/performance of microprocessors
- New user terminals/devices
- Wireless transmission
- Standards
- New system architectures and tools

1. Improving price/performance of microprocessors

Less expensive, more powerful microprocessors are fostering the creation of facsimile boards (turning a microcomputer into a facsimile machine), network routers, processors that can handle the enormous processing requirements of video, and handheld devices (see below).

Intel Corporation has created a strong market for its processors and other semiconductors to be used in facsimile boards.

2. New user terminals and devices

Access to computing and information systems has progressed outward from a large central host processor to local area networks to include users in ever-widening circles.

Mass access to a common network by every individual is becoming a reality with handheld devices, personal digital assistants (PDAs), palmtop computers/communicators, screen telephones, and interactive television consoles.

3. Wireless transmissions

Wireless transmission capabilities first started in a mass way with cellular phones. Now radio data transmission technologies are expanding the possibilities of wireless, and therefore mobile, messaging.

4. Standards

Standards efforts are taking place in several areas of messaging. Standards are important to messaging, since messaging inherently connects systems—and the users of systems—together.

The following are key standards related to messaging:

EDI standards: Three EDI standards families have emerged out of the proprietary primordial soup:

• American National Standards Institute (ANSI) X12. This U.S.-originated standard has finally come to encompass all the major standards families that grew up in the U.S. (TDCC, UCC, WINS and others). It is used abroad as well, particularly in Australia, Canada, and Mexico. It will probably continue to be the dominant standard within the U.S.

• EDI For Administration, Commerce, and Trade (EDIFACT). Developed through United Nations committees, EDIFACT is intended to be the world's universal EDI standard. Inflexible syntax and a lack of customizing features make it difficult for users to adapt it to specific business settings. Nevertheless EDIFACT—still relatively young and with only a

handful of operational message formats—will be used in international trade (even by companies using regional EDI standards with local trading partners). EDIFACT is more vocally supported in Europe, even though there appear to be more actual users of it in the U.S.

- Center for Informatization of Industry (CII). Coming onto the scene in 1992, the CII standard is a Japanese invention designed to address the specific needs of Japanese trading procedures (the Japanese 16-bit character set). It will not be used outside of Japan. Japanese companies trading with the outside world will use EDIFACT and, to some extent, ANSI X12 for these connections.

E-mail standards. As the networking of desktop computers becomes a number one priority, messaging standards have been proposed (besides the long-standing X.400 standard and the existing de facto MHS standard for local area networks). Standards are necessary here because they allow software developers to build applications (particularly those that are collaborative or workflow-oriented) around a common set of messaging procedures.

- X.400. Part of the Open Systems Interconnection and possibly the long-term winner in E-mail standard, it is rich in features and overhead procedures (e.g., message auditing, security, and billing) which make it more attractive to large commercial network providers than individual organizations. To date, only the large network operators have implemented X.400 in any conspicuous way. Survey respondents report little interest in nor use of it.

- NetWare Global Messaging and SMF. Put forth by Novell and based on Novell's MHS standard for E-mail over local area networks, MHS is the de facto LAN standard for E-mail, and its descendents certainly will be adopted widely.

- Messaging Application Programming Interface (MAPI). Microsoft's proposed E-mail standard.

- Open Collaborative Environment (OCE). Apple Computer's proposal.

- Vendor Independent Messaging (VIM). E-mail messaging standard proposed by a consortium of Borland, Apple, Lotus, Novell, and IBM.

Facsimile standards. There are many facsimile standards. The most important ones relative to messaging are the standard programming interfaces between facsimile cards and PC operating systems and the standard ways to send binary (ASCII) files via fax (as opposed to bit maps). Both of these have come together in the TR.29 standard.

- TR.29 is a protocol standard which allows facsimile functions to be controlled by applications software. TR.29 was produced by a committee of the Electronic Industries Association (EIA). The TR.29 standard is aimed at helping program developers incorporate facsimile functions into local area network software. Such functions include queueing, scheduling, storing, transmitting, creating an audit trail of transmissions, ASCII-to-facsimile and file-to-facsimile conversions, and others.

- The TR.29 standard is a collection of command sets that have been subdivided into three classes of complexity. (The classes have no connection to the CCITT Group 1, 2, 3, and 4 specifications.) Class 1 defines six commands a PC can use to send a FAX. Examples are: Transmit or Receive at 300 baud for parameter negotiations; Transmit or Receive at 9.6K bits per second for actual transmission.

- Class 2 provides for 40 more commands. The Class 3 standard allows ASCII-to-FAX and file-to-FAX conversion by modems and the transmission of binary files. Class 1 has been officially approved by CCITT and Class 2 is becoming the de facto standard of the marketplace and will probably be officially approved as well. Only Class 3 is questionable. Many people knowledgeable in this technology believe that the functions provided for by Class 3 are not appropriate to include in data communications equipment, but that they should be left to the applications software.

In addition to the above standards, there are also standards related to voice.

5. New system architectures and tools

An issue related to standards is the use of new systems architecture and development tools in the creation of integrated messaging systems. These are:

- Open systems and client-server architectures
- Object-oriented programming

Such architectures and tools are needed to design and build systems that move and process information through a heterogeneous environment of multi-component, multi-vendor, highly complex communication infrastructures.

The principal architectural guidelines are biased by open systems, client server, and distributed processing requirements. Here, processing takes place at many points in a network of processors. An application's processing is conducted by multiple processors that are specialized to take

care of specific kinds of processing. The "division of labor" occurs at the operating system level (e.g., screen drivers, disk management, printer drivers) and at the application level (e.g., client-server processing for manipulation of a data base).

An important development tool coming into greater use is object-oriented programming, which allows for recombining existing software products into more complex software products. This is called "encapsulating."

These architectural and tool developments raise the ongoing debate of how to distribute the processing between a shared resource (which can be a large host processor, a network, or a specific device on the network—e.g., a printer) and a resource wholly devoted to a single user (at least a work-station or a handheld device but possibly a printer and other devices).

They also raise the management issue of who controls the information technology functions and services in the organization—end users or a central MIS authority.

C

Applications Trends Impacting Messaging

This section shows that combining two or more kinds of messages (image, data, voice, video) typically happens through bilateral linkages. That is, two messaging types come together first rather than all messaging types coming together at once.

The following sections review the leading bilateral linkings of messaging modes. Whether they will eventually converge on a multi-lateral union of messaging—to form robust, integrated messaging or even true multimedia messaging—is discussed in Section D.

1. Integrated EDI and E-mail Messaging

Inter-company E-mail by companies that are already conducting EDI is taking off. In retail and other distribution industries particularly, combining E-mail and EDI with trading partners is taking place.

A good business relationship between two companies requires that groups within each company be in communication with each other. Personnel and their respective topics for communication are shown in Exhibit V-1.

EXHIBIT V-1

Topics for Intercompany Cross-Functional Flow Team Review

• **Merchandising/Marketing**	• **MIS**
- Sales forecast reviews	- EDI standard reviews
- Promotions, deals, specials	- System changes/enhancements
- End-of-season sales	- Others
- New products	• **Finance/Accounting**
- Others	- Billing issues
• **Buying/Logistics/Manufacturing**	- Payment issues
- Modes of transport to be used	- Receiving issues
- Types of pallets to be used	- Shorts (credits/debits)
- Lead-time reviews	• **Performance measures**
- Receiving capacity planning	- Service levels achieved
- Transportation capacity planning	- Inventory turns achieved
- Manufacturing capacity issues	- Safety stock reviews
- Others	

Source: *Distribution Resource Planning,* Oliver Wright Publications, Inc.

This may be the beginning of the inter-company E-mail market. E-mail linkages between companies help the companies do business with each other, help MIS departments coordinate their EDI and other IS systems, and help accounting departments talk with each other.

Hub and spoke phenomenon applies to this inter-company messaging. A large company, such as a General Motors or a Wal-Mart, froms the hub around which its customer and suppliers act as spokes.

Two products today illustrate a combined EDI/E-mail product and service offering.

a.   Product Example: Sterling Software's Electronic Commerce Connection

Sterling Software's Electronic Commerce Connection is a software/ service offering that is aimed initially at providing E-mail services to EDI users. The functionality of the offering is much greater, however, and the product/service combination is intended to be the platform for many kinds of network-based communications between companies, including EDI, E-mail, file transfer, and distributed data bases.

Electronic Commerce Connection is delivered to the customer in the form of (1) a software package that runs on an individual's workstation and interfaces with (2) network services that include E-mail boxes, network administration services, catalog/library services and file transfer services.

One way of looking at the new offering is to consider it merely a new communication software package, an enhanced version of SuperTracs or DocuLink (Sterling's current communications software products that are used with its EDI translation software). It has all the bells and whistles for users to set up the parameters of communicating with network hosts through their modems. It does no EDI translation; it merely controls communication sessions, permits users to send free-text messages (E-mail), helps to administer network addresses, and helps the user organize received messages in a practical way. And it only costs $240.

But this perspective misses the salient advantages of the software package. The greatest advantage comes when this software is used in conjunction with the new services that Sterling provides on its network. Among a number of new services, the key one in relation to this product is Sterling's "Library" services. Through library services, EDI trading partners can send, point-to-point or in a broadcast manner, files to their trading partners. Using this facility, a hub company, for example, could disseminate new EDI transaction set templates, E-mail addresses, product catalogs and product listings, policies and procedures, and otherwise administer its electronic connections with its trading partners.

It has a graphical user interface with icons and windows, but runs in MS-DOS environments. Sterling promises a Windows version late in the year, and following that a Unix version. The library services work only when the user is connected to Sterling's network. The package can be used to connect with other networks but only as network interconnect communication software.

b. Product Example: GEIS' BusinessTalk and Integrated Messaging Engine

GEIS offers BusinessTalk, a suite of network services including EDI, E-mail, and on-line data bases. BusinessTalk is customized for particular trading communities, such as the apparel/retail community, the wholesale pharmaceutical community, the trade and transportation community, or the book publishing and retail community.

GEIS is building an integrated messaging system that makes available all the tools of BusinessTalk through a single workstation with an easy-to-use interface.

The first version of the integrated messaging engine is due out by the end of 1993. It builds on top of GEIS' BusinessTalk product of today that incorporates E-mail, bulletin boards, text data bases, EDI, special applications (such as sales force automation, or trading community-specific applications), X.500 directories and X.400 messaging capability.

GEIS intends to build its messaging engine into existing LAN E-mail packages (such as cc:Mail, Network Courier, and 3+Mail), into host-based mail systems (PROFS, DISOSS, DEC), to interface with facsimile machines, to have a forms capability, to have a spell checker, to have workflow capabilities, to have APIs ready to link to specific applications, to have security features, and to have automated support (help menus).

GEIS is taking an object-oriented programming approach which allows its software to encapsulate other software and technology. Currently GEIS has encapsulated 5 pieces of third-party software. It will eventually encapsulate 20 when its integrated messaging engine is finished in two years.

By the end of 1993, GEIS wants to have a product that will incorporate EDI, E-mail, and an interface that allows for interactive (real time) exchange with a network data base or bulletin board. Additionally, the product will allow for a directory service that will be distributed and therefore have some kind of synchronization involved (to keep the data consistent in the dispersed directories). Also, by the end of the year, the product will allow for local area networks to interconnect via GEIS' network.

In 1994, GEIS wants to incorporate workflow, multimedia messaging, and extensive client-server capabilities to allow for distributed data bases and distributed processing (including EDI processing). In 1995, the product is expected to incorporate "intelligent user agents" that route, filter, and process messages automatically.

2. Integrated Data and Image Messaging

Using the TR.29 Binary File Transfer standard, facsimile machines can send and receive ASCII files. These ASCII files can be downloaded from the fax server to a computer application (such as a word processor, internal E-mail network, spreadsheet, or higher-end application such as order entry). In other words, with the Binary File Transfer (BFT) standard, facsimile machines can be turned into E-mail and EDI gateways between companies.

a. E-mail and facsimile

With the fax card and fax network server, people can send word processing files from their workstations to facsimile machines for output. If the facsimile machine on the receiving end has BFT capability, the word processing file can be downloaded into the receiver's word processing system. The file can be worked upon with that receiver's system, as though it were an internal file and not an unalterable bit map file.

b. EDI and Facsimile

There are two general areas and a third minor application:

(1) EDI-to-fax in an EDI setting. The hub company sends all purchase orders by EDI, but some of its suppliers cannot receive EDI. The value added network converts EDI messages into a fax message.

(2) Sending EDI messages via fax machines—again in an EDI setting or, from the fax software vendor's standpoint, the inter-company forms routing setting. Companies use the BFT format to send ASCII files back and forth to each other via their fax machines.

(3) Sending a bar code on a document (say a purchase order) to the supplier via facsimile. The supplier uses the facsimile document as a pick slip to gather the order. The supplier places the purchase order with the shipment. When the shipment arrives at the customer's company, the customer verifies the contents of the shipment against the document and scans the bar code on the document. The customer matches the bar code with the purchase order record and, without further data entry, reconciles the received shipment with the original order.

c. Product Example: Delrina Technologies/Green Tree Software

Green Tree Software (NY, NY) is a value added reseller of Delrina Technologies Inc. (Toronto, Ontario, Canada) facsimile and forms software. It is using Delrina's technology to create purchasing software that allows users to send the purchase order to suppliers. The company is teaming with MCI to provide the communication service which is part of the product. The purchase order can be sent in various formats: X12, fac-

simile, data file, or a pre-designed form. The price of the software is approximately $400 per copy (single copy price), $35 per year for the MCI mailbox and per character charges for each transmission (paid by the sender only).

Corporations such as Sony, New York Life, and Toys R Us are building production purchasing systems with this software for thousands of their trading partners. Many of these companies are already using the conventional EDI translation software with their key trading partners. They are using Green Tree's package for the many smaller trading partners that constitute a smaller portion of dollar business but most of the paper clutter and administrative effort in the procurement department.

Green Tree is a small software developer and value-added reseller that is successfully selling a forms-based purchasing software product called CAP (computer aided purchasing). The product allows users in an office environment to route requisition slips for supplies. The product is based on forms software from Toronto-based Delrina Technology.

In a joint effort with MCI, Green Tree built CapLink, a communication module (with a store-and-forward component on MCI) that allows users to send the forms out of the company to another company. CapLink allows for the efficient transmission of data that can then be reassembled into a form on the receiving end, as long as the receiving end has CAP software. If there is no CAP software, the transmission is made via a flat file or to a facsimile machine. All transmissions go through MCI.

Green Tree's product—coupled with its service alliance with MCI—is effectively going after the low end, mass market for electronic commerce applications. Green Tree offers two highly valuable features to customers: (1) low price and (2) easy integration with applications. While it may not be standard EDI, it can have application-to-application integration, as long as the receiving company has Green Tree's software. The requirement to have the software at both ends may seem preposterous, but the price is right.

Green Tree's approach to integrating purchasing can be much less expensive than installing conventional EDI software and integrating it with the existing purchasing application, especially when all installation and integration costs of all trading companies are considered. Green Tree's product has the capacity to grow into other EDI applications, such as shipping notices and invoicing. And that ability to grow fits the way EDI programs are implemented. They don't happen overnight, they grow one trading partner and one application/message type at a time.

Green Tree, with its pricing in the $100 to $200 range, is well positioned to pursue the small business mass market for EDI and electronic commerce. TSI International, Supply Tech, DNS, and Harbinger are some EDI software vendors that are targeting this mass market with packages costing less than $500.

3. Integrated Data, Voice and E-mail Messaging

Integrating data and voice is coming to be known as "computer-telephone integration" (CTI). CTI is the functional integration of human agents and: telephone network capabilities; voice and data switching; computers, their applications and databases; voice processing; and other information media.

Applications include:

- Interactive voice response (where a caller can interact with a computer data base using the touch-tone keypad of a telephone),

- Information on demand (where information is sent via facsimile after a caller has keypunched in his/her facsimile number),

- E-mail notification (where an E-mail box is interconnected to a user's voice mail box so that when the user checks voice mail, he/she will be informed that E-mail messages have arrived in the E-mail box),

- Call routing (where a customer representative interacts with a customer on the telephone and at the same time through his/her workstation calls up a computer file related to the customer's call; when the call needs to be transferred to another representative in the company the data and the voice connections are routed simultaneously).

Text-to-voice systems (so that, for example, a voice mail box could include the full text of an E-mail message after it has been "read" into the voice system) is not yet being offered. It doesn't look like a viable market at this time, according to voice system vendors. Picking up E-mail in a voice mail box may be too tedious. The messages would be too long to listen through all the way and difficult if not impossible to understand for specially formatted data such as charts, spreadsheets, and various type faces that have informational content.

Exhibit V-2 shows the various information technologies that are integrated through CTI.

EXHIBIT V-2

The Components of Computer-Telephone Integration

Voice mail	Telephone	Facsimile	Video images
Voice response	Voice processing	Voice/data integration	Multimedia integration
Voice input	Computer data	E-mail	Desktop

Source: Vanguard Communications Corporation
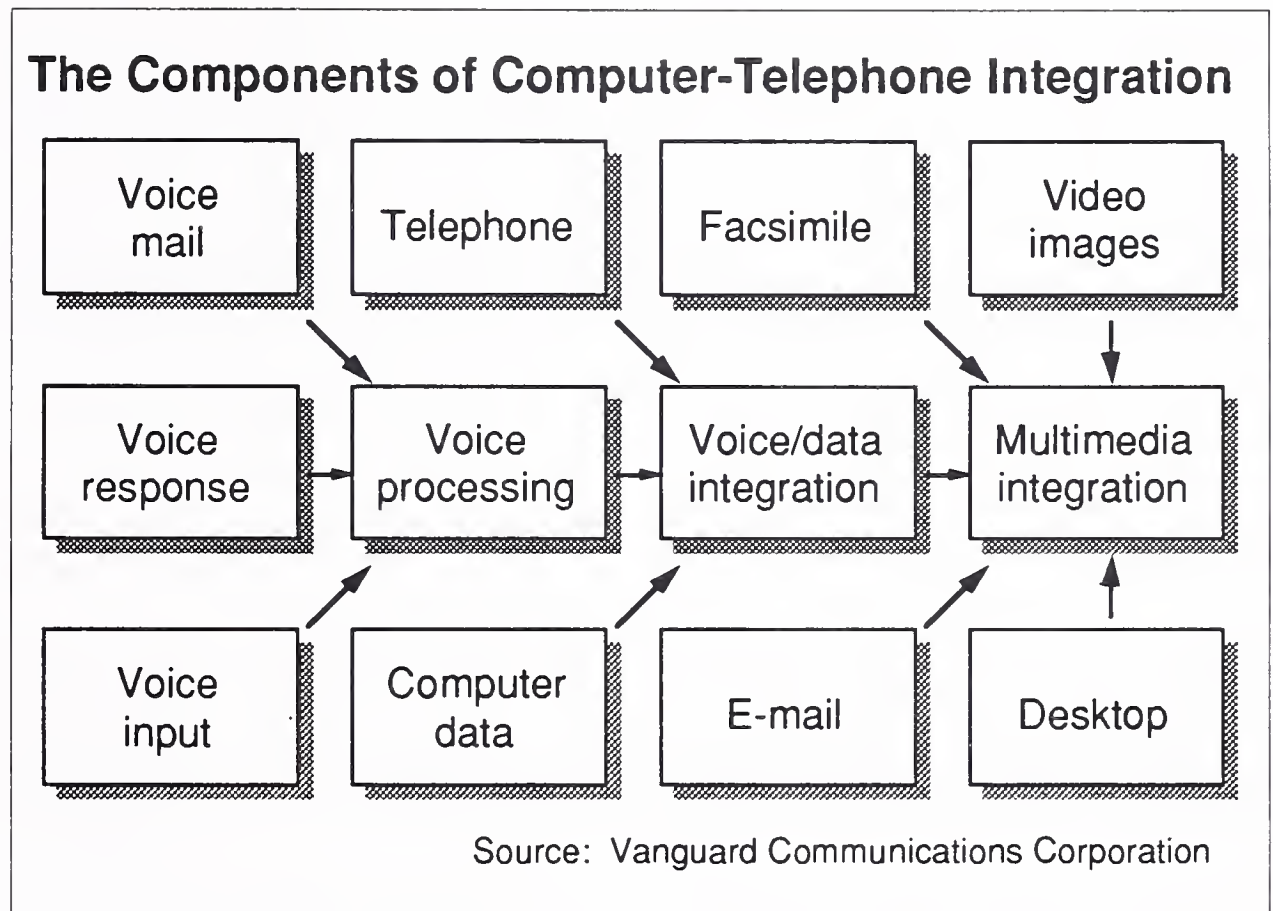
Computer-telephone integration allows for (1) easily switching calls and corresponding computer screens within an organization (for example a customer support department), (2) integrating voice, data, and human interaction in a single call, and (3) delivery of information or access to information, with the information able to be delivered by voice or hard copy.

Some of the applications of computer-telephone integration are listed in Exhibit V-3.

Industries that are adopting computer-telephone integration technologies at this time to support commercial activities are insurance, distribution, banks, and transportation companies.

CTI, by definition, links voice communications into a company's computer applications, such as order entry, inventory, or accounting.

EXHIBIT V-3

Applications of Computer-Telephone Integration

- Advertising/Promotion
  - Product information/catalogs
- Financial Services
  - Credit authorization
  - Credit collection
- Customer Service
  - Help Desks
  - Order/shipment updates
  - Maintenance services
- Marketing/sales
  - Order entry
  - Data base marketing

a. E-mail and voice mail

An example is Octel's PowerCall product. From a touch-tone telephone, the user can see if E-mail messages have been received—an all-in-one message notification center. E-mail messages cannot be retrieved through phone, however. This requires some kind of speech-to-text technology that is still not foolproof, but moreover, is not viable in this context.

b. EDI and Voice Mail

Computer-telephone integration trends, including voice response data base access systems, are potentially allies with EDI systems. Many EDI users today also employ voice response systems to facilitate communications with trading partners. Many transportation companies, for example, allow customers to check shipment status or tariff schedules either through a computer or telephone access to the same computer data base. At least one EDI translation software vendor, St. **Paul Software**, has begun developing a product that incorporates voice technologies.

Nevertheless, full integration of EDI and voice processing systems is another two or three years away. INPUT believes that computer-telephone integration is an important trend to watch.

Telephone interfaces among companies are more convenient to end users than EDI interfaces, although EDI, when fully integrated, provides a more efficient end-to-end data processing capacity. Due to its ease of use, computer-telephone integration is similar to enhanced facsimile services: on top of a basic, easy-to-use, widely installed platform base, more sophisticated functionality can be incrementally added.

CTI is integrating the same applications that EDI has been integrating, such as order entry, inventory, or accounting.

William Gill, of systems integrator **Bridgestone Software U.S.** (Foster City, CA), says EDI and voice response systems complement each other. Mr. Gill has helped set up phone-accessible tariff data bases for trucking companies. The same companies also receive bills of lading from shippers via EDI.

A basic configuration of CTI and EDI components in a company is shown in exhibit V-4.

EXHIBIT V-4

CTI and EDI Integration

Agents

| Trading partner | Voice-line communi-cations | Telephone switch | Switch-to-computer link | Computer application/ data base | EDI translator |

Voice processing unit

Fax communication

EDI communication
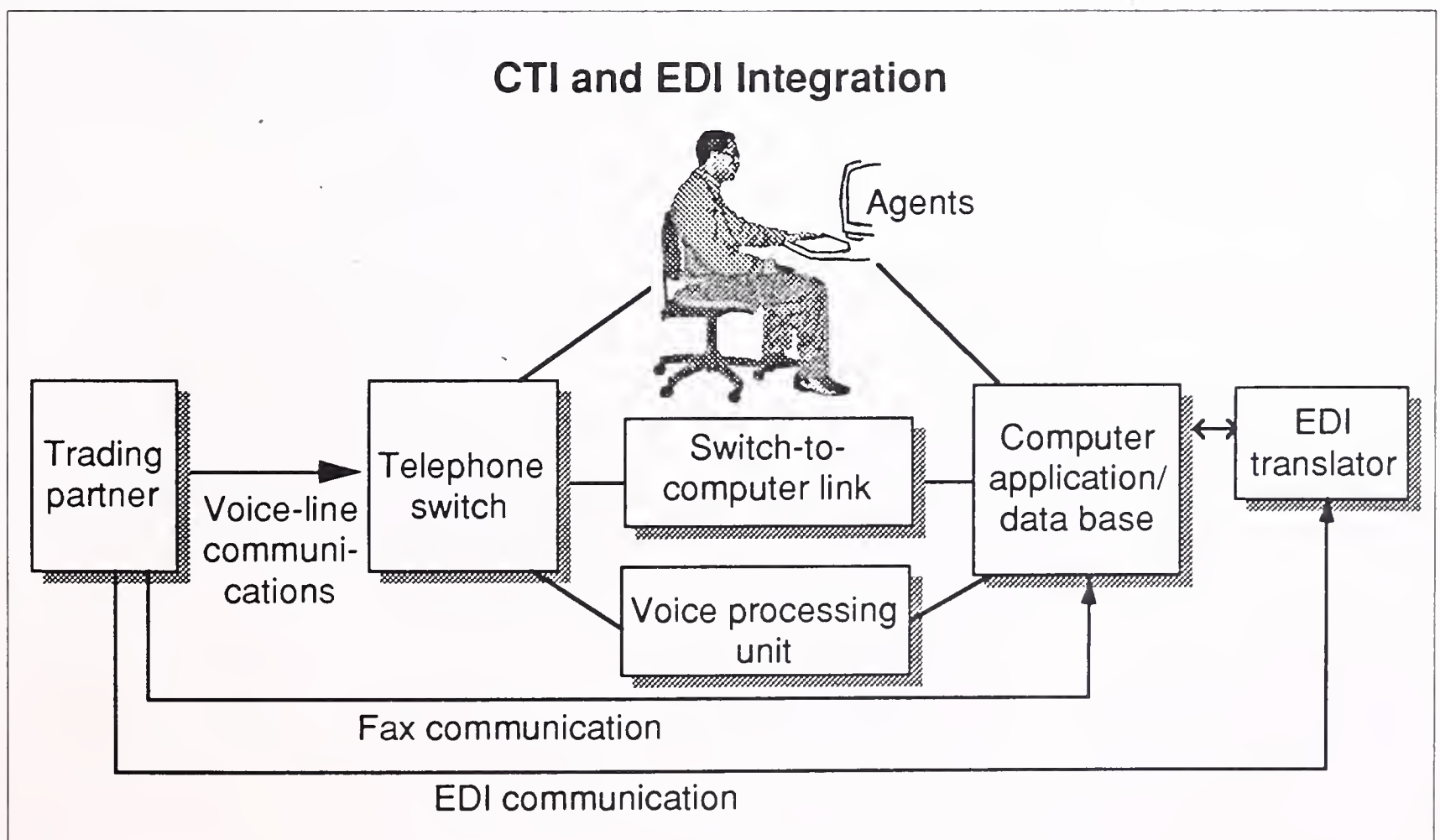
Integration of voice and data through CTI, EDI, and other integrated systems will allow more productive sales efforts and a linking of sales directly into the delivery of the company's products.

Companies that are integrating EDI and CTI include **Ingram Micro** (Santa Ana, CA), **Aetna** (Hartford, CT), **The Prudential** (Roseland, NJ), **Quantum Health** (Orange, CA), and **Maxtor Corporation** (San Jose, CA).

c. Product Example: Octel's PowerCall/Sierra

With the introduction of the PowerCall product in mid-1991, Octel moved beyond just providing voice messaging products and started offering users the ability to access and manage fax and data messaging. Traditionally, Octel's voice products handled such applications as voice mail, telephone answering, automated attendant, and information center. PowerCall adds two new messaging types:

(1) *IMAGE*, which includes the applications of fax on demand (the user, through a push-button telephone, can request information to be faxed to them), fax store and forward (where the user can have faxes that have been sent to them stored in mail box to be later routed to a specific fax machine for output), fax broadcast (multiple transmissions for a single fax) and fax overflow (to keep all faxes in memory until printed out);

(2) *DATA*, which includes interactive voice response (where the user, through a push button phone, retrieves data from a computer data base) and E-mail notification (where the user, when checking their voice mail box, will be told that they have E-mail waiting in their E-mail box).

Exhibit V-5 shows Octel's Sierra product architecture.

While Octel is moving into the data and image side of messaging, it is moving according to what its customers want and what the general marketplace wants. It is not offering text-to-voice technologies and it is not offering image-to-text technologies. It is aware of some companies who are developing these advanced technologies but it does not have any relationships with them. It does not have a strategy to develop these technologies. Most importantly, as an Octel manager pointed out, text-to-speech and image-to-text technologies would probably not be valuable features in a product.

EXHIBIT V-5

Octel's Sierra Product Architecture

Sierra accesses host data base to retrieve E-mail notifications using simple terminal emulation protocol.

PBX

Sierra

Host Computer

Terminals

LAN

Fax machine

Disk drives that store voice messages and fax transmission (incoming)

Host computer on which the company's E-mail system runs
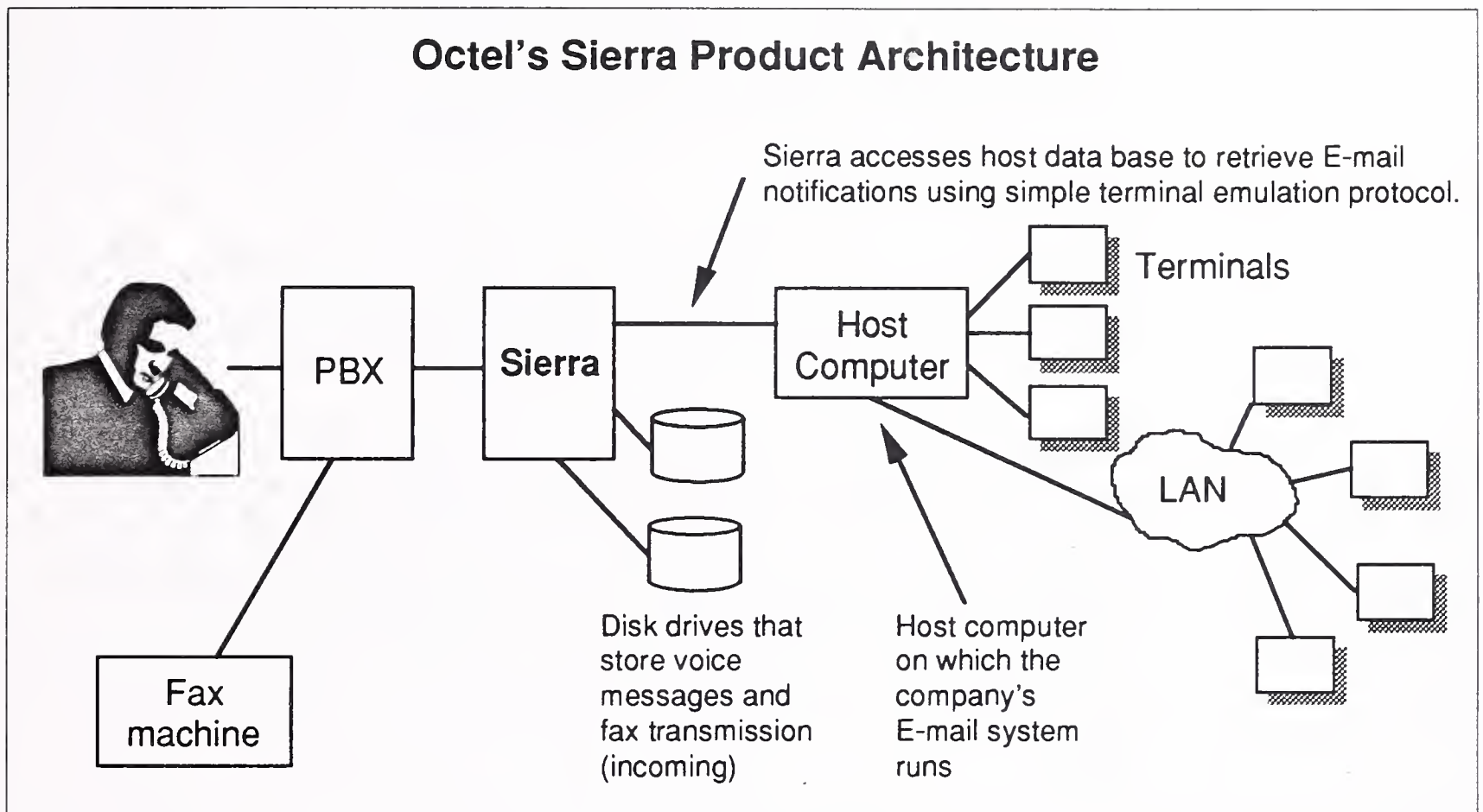
E-mail notification in a voice mail box makes sense to have. But to have the capability where the system (using text-to-speech technology) "reads" your E-mail to you over the phone does not make sense, as pointed out on page V.-12. According to the manager, Octel's strategy is to only provide E-mail notification services and not text-to-voice services. A typical E-mail notification might sound like: "you have five E-mail messages waiting for you."

Octel has only sold "a handful" of its PowerCall product (after 18 months on the market).

Octel pointed out that one of the problems that it has encountered in selling the new PowerCall/Sierra product is that the product bridges two distinctive departmental groups inside organizations: (1) the telecommunications department (in charge of the phones) and (2) the management information systems department (in charge of the computers). Each group is focused on its particular speciality. Neither one by itself can make a decision to buy on a product such as Octel's. According to the Octel manager, this situation is beginning to change as many large companies are merging their respective telecommunication and MIS departments into a single division.

4. Video and messaging

For point-to-point communication in a video mode there are two basic transmission architectures: real-time transmission (whether transmitted via wireless or cable, broad- or narrow-cast) and store-and-forward (where the video segment is contained in a file to be watched at a time after the transmission of the file).

Real time video transmission is rapidly evolving on many fronts: compression technologies, fiber-to-the-home, bandwidth expansions, expanding cable television markets, interactive television, picture telephones and others are driving real time video transmissions.

Store-and-forward transmission of video files is not widely recognized as an exciting technology, but there are good reasons why this method of transmission will be widely adopted. Store-and-forward of video files can be called "video messaging." For the same reasons that store-and-forward style of messaging in general will always remain viable (e.g., non-interruptable, etc.), so too is the viability of video messaging.

Specifically, there are application areas where video messaging makes sense:

• Pay-per-view television, where the viewer selects the program and when it is to be viewed.

• Industries where videotapes are routinely distributed via courier (advertising, media, health care, scientific/engineering research, etc.).

• Corporate communications/advertising (where consumers or corporations can request product promotional videos to be sent to them for viewing).

• Videomail machines (in the event that videophones become commonplace—not anytime soon).

In addition to the transmission of video in a store-and-forward mode, there is another aspect of multi-mode messaging related to video. It is the sending of data files related to a video transmission. The video transmission may be in real time or store-and-forward. For example, home television shopping may involve a real-time video feed, but the billing and other documentation related to cable television usage is sent in a store-and-forward mode (e.g., EDI).

Much video mail will probably be used in internal intra-company communications when one user on a local area network sends a video file to another user on the network.

Videomail will not be a part of general communications until the year 2000.

Before this time, it will be useful to the following industries:

- Advertising/media/entertainment
- Education
- Health Care
- Engineering/construction
- Scientific community
- Some consumer industries, especially home shopping
- Retail (video kiosks)

Videomail will not be a pervasive, mass market communication feature.

To date, QuickTime from Apple is the only commercial videomail product on the market.

The technology that brings videomail into common use is probably operating systems for single machines and networks of machines (servers on a network). Operating Systems (particularly Macintosh, Windows, NT, and NetWare) are coming from their vendors with the capability to send video files. Basic handling and transmission of video files is becoming a standard feature of the latest operating systems.

Facsimile server software could send video files given that the files are sent in a standardized binary file format. Transmission of video files via facsimile is not occurring today and will not occur in any standard way for at least another three years.

5. Mobile Messaging

Other than sales force automation and some transportation applications, there is no focused market for personal digital assistants.

Instead, there are separate markets for cellular phones, pagers, personal assistants (such as the popular Wizard product from Sharp), portable computers, and mobile facsimile machines.

The way these systems are used today resembles "dumb" terminals attached to a host system rather than devices communicating peer-to-peer. In order for integrated, peer-to-peer communication of PDA users, the host systems must be integrated first.

For the next two to five years, PDA applications will largely be interfaces to fixed systems. Applications will be limited to specific vertical industries:

- Sales professionals (including small businesses)
- Transportation
- Some executives
- Health Care
- Construction

6. Workflow and Groupware

Workflow (or groupware) software, like spreadsheet or data base software, is a development tool from which users build applications. Workflow, however, is different from the other tools because:

- It integrates several applications (sales with order entry with shipping, etc.).
- Messaging is inherent to it.
- Multiple data types (image, data, voice, video) can be accommodated by it.

Workflow software and architecture can be the integrative, catalytic element that brings together various messaging systems.

For example, internal E-mail or forms routing and external EDI can be integrated effectively through workflow. Exhibit V-6 depicts this integration.

The challenge of workflow is to have people in the organization re-engineer their work patterns.

For more information, see INPUT's research paper, *Workflow and EDI: Coordinating Inter-Company Business Processes.*

EXHIBIT V-6

Components of a Purchase Order Business Process

External data bases
(Credit authorization, UPC catalog, community EDI system, trading partner profiles)
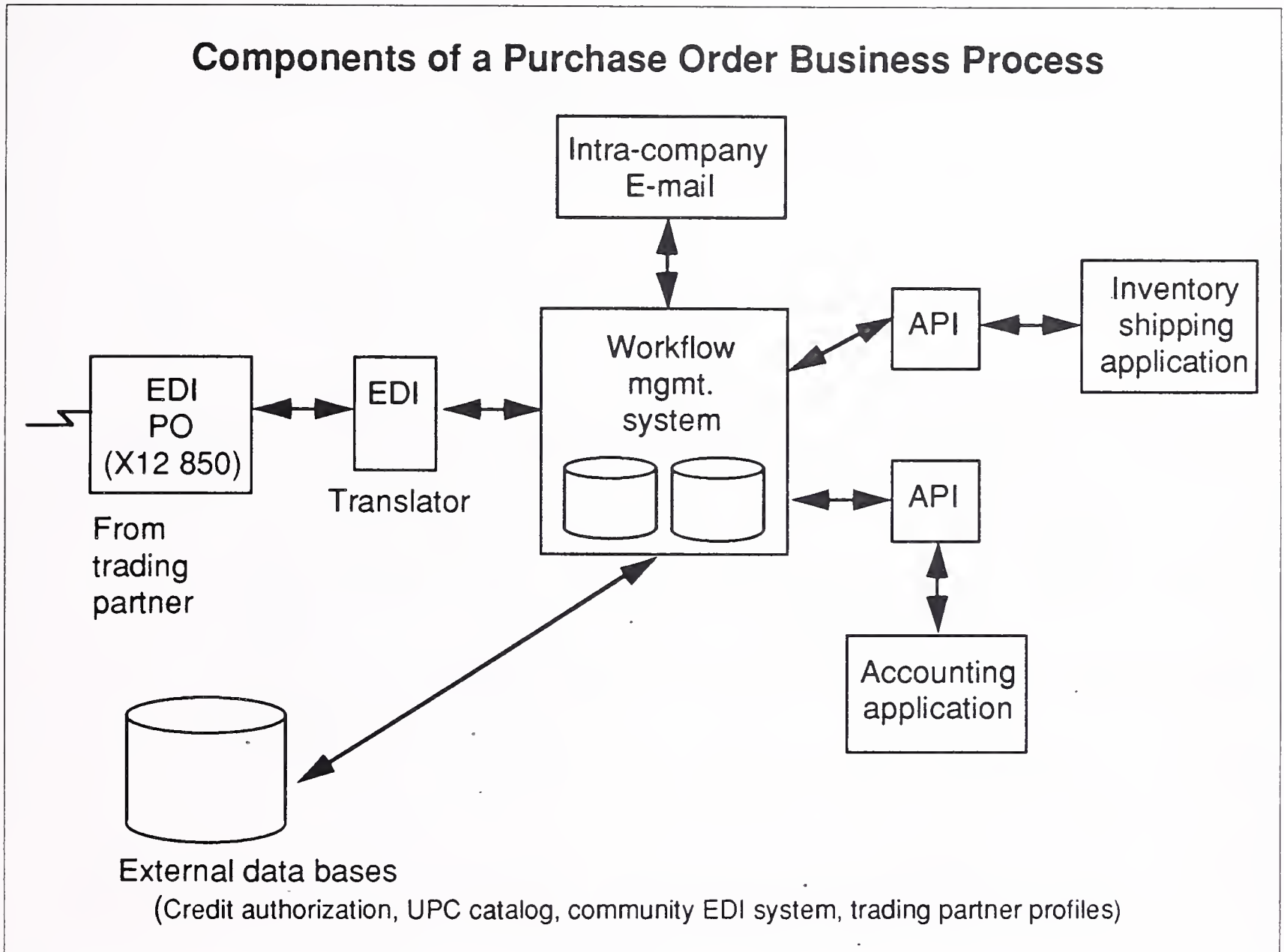
D

Prospects for Integrated and Multimedia Messaging

Exhibit V-7 shows the technologies that are laying the groundwork for integrated and multimedia messaging. The timeline shows when the markets for certain technologies began to take off.

Many modes of messaging are used today in an unintegrated way: voice mail, E-mail, facsimile, EDI, and file transfer. There is little video mail (as defined in Chapter I) in use.

There is partial integration of facsimile and text via fax boards. Fax board installations are growing the most rapidly of the basic messaging platforms (as shown in Chapter III).

EXHIBIT V-7

Market Take-Off Dates for Messaging Technologies
(Actual and Forecast)
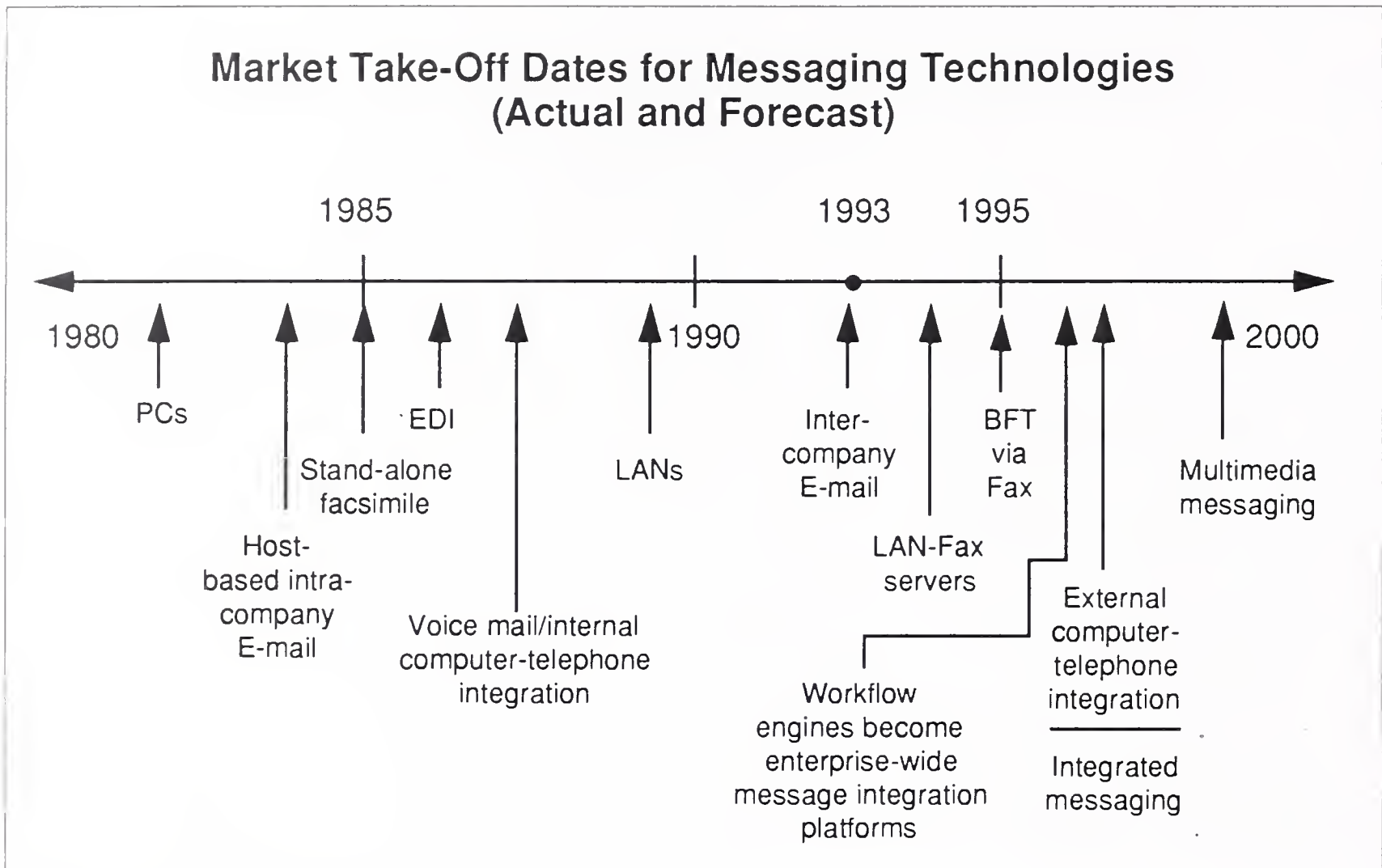
A key factor in opening or closing the possibilities of integrated messaging technologies is the extent to which messaging services inside companies are centralized or decentralized.

Centralized messaging services are those that, at the least, utilize a common architecture and, often, use a central computer or switch to manage messaging for large parts of the organization. IBM's Profs or DEC's DecMail are examples of these centralized systems.

Centralized messaging provides a stable, consistent technical environment where there are often uniform hardware, operating system and communications standards or, at the least, well-established gateways.

Centralized messaging also means centralized authority and control. This organizational control is important for enabling an organization to establish a common organizational approach to IEM.

Decentralized messaging is generally decentralized in two ways:

• There is organizational decentralization, where a department, division, or geographical unit is responsible for its own communications, computing, and messaging services.

This organizational decentralization is closely linked to technical decentralization using LANs and client-server architecture.

Decentralized E-mail is growing much faster than centralized E-mail.

In the U.S. there are no accepted standards for LAN-based client-server architecture. There are many competing, partly incompatible environments.

It is possible to establish gateways for data exchange. However, the gateways are often "fragile" due to changes in hardware/software/communications platforms.

Gateways also exist for messaging (e.g., for different communication protocols supported by products like cc:Mail). However, mail software vendors have little incentive to set up and maintain gateways with competitors' products.

Taken altogether, where a function is decentralized, it is far more difficult to plan or implement any type of integrated service.

This is the difficulty of developing integrated messaging platforms. It is an organizational issue.

Voice mail is predominantly operated on a centralized basis, as are many telephone/private branch exchange systems.

Videoconferencing (the precursor to video messaging), to the extent that it is being used, is operated on a centralized basis.

E-mail is split between the centralized (host-based) and decentralized (LAN-based) operations, but the decentralized is growing much more rapidly.

The facsimile function in an organization is entirely decentralized.

Decentralization and separate operations within individual functional units are very important factors when determining the future of integrated electronic messaging.

- Decentralized business units adopt unique computer and communications environments

- Technical integration across units becomes very difficult

- Integrated electronic messaging therefore often is only an option within a functional unit.

(Blank)

VI
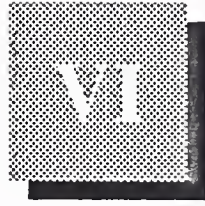
Competitive Environment

Integrated messaging environments are composed of many components: network-operating system software, host-based and LAN-based E-mail software, gateway software, facsimile hardware, facsimile software, third-party network services, voice processing software and equipment (typically sold as a turnkey system), and so on.

This chapter reviews the leading vendors of these various components with an eye to which one or ones might emerge into the forefront with a comprehensive, integrated messaging platform. Also, the focus of the chapter is on which technologies may be key in shifting today's fragmented messaging infrastructure to a more integrated one (for example, workflow and facsimile software).

A
Electronic Mail and Groupware Software Vendors

E-mail and groupware overlap. E-mail has the basic functionality of sending and receive messages. Groupware enhances this basic message transport capability with additional communication services to the end users: message routing, filtering, functional process orientation, access to specialized data bases, etc.

1. Local-Area Network (LAN) E-Mail Software

LAN-based E-mail can be delivered in two ways. One way is a separate E-mail client-server package, where each workstation has E-mail installed. The other way is having the E-mail built into the operating system of the network (this is done in Novell NetWare and in AppleTalk).

Here, the leading vendors in both styles are:

• cc:Mail (a division of Lotus Development Corporation), Mountain View, CA. The product name is cc:Mail.

- CE Software, Inc., West Des Moines, IA. Product name is QuickMail.

- Da Vinci Systems Corp., Raleigh, NC. Product name: Da Vinci eMail.

- Microsoft Corp., Redmond, WA. Product name: Microsoft Mail for PC Networks.

- Novell, Inc., Provo, UT. Product name: NetWare MHS.

- Banyan. Product names: Banyan Vines, Banyan Mail.

- Apple Computer Corporation, Cupertino, CA. Product name: AppleTalk

- Retix Corp., Santa Monica, CA. Product name: Retix Open Server 400.

- WordPerfect Corp., Orem, UT. Product name: WordPerfect Office.

- Beyond, Inc., Cambridge, MA.

- Reach Software Corp., Sunnyvale, CA.

- Futurus Corp., Atlanta, GA.

- Ventana Corp., Tucson, AZ.

2. Groupware Software Vendors

Again, this category overlaps some with the other E-mail categories. The leading vendors of purely groupware software are:

- Lotus Development Corporation. Product name: Notes.

- Ventana Corp. Product name: GroupSystems V.

- Beyond, Inc. Product name: Beyond Mail.

- Futurus Corp., Atlanta, GA.

- Fischer International Systems Corp., Naples, FL.

- Action Technologies, Inc., Alameda, CA. Product names: Workflow by ATI, The Coordinator.

The leader in this category is Lotus with its Notes product that has become the archetype groupware product. Action Technologies' groupware architecture is licensed and incorporated into Lotus' products (Notes, cc:Mail), da Vinci, and other E-mail software (Verimation).

Groupware concepts have also been incorporated in many products from vendors of image processing software products.

3. Host-Based E-mail Software Vendors

The following are vendors of host-based E-mail software packages. The packages run on either mainframe or mid-range computers.

- Computer Associates. Product name: CA Mail.

- Digital Equipment Corporation, Marlboro, MA. Product name: All-in-One

- International Business Machines Corporation, White Plains, NY. Product names: Professional Office System (PROFs), OfficeVision.

- Wang. Product name: Wang Office.

- Verimation, Inc., Rockleigh, NJ.

- Premenos, Concord, CA. Product name: Q-Mail

4. E-mail Integration Server Vendors

This category is also called E-mail "switch" or "gateway" software. Products allow multiple E-mail software systems to pass messages among themselves. A principal application of integration servers is to connect an older, host-based, E-mail system with a newer, LAN-based system. Also, servers are used to connect a company's internal E-mail system with an external commercial network provider (such as MCI or Sprint).

Integration server software performs such functions as protocol conversion (including X.400, Simple Mail Transfer Protocol, Systems Network Architecture Distribution Services and other protocols), file format conversion, directory synchronization, gateways to commercial E-mail networks, program interfaces, network administration tools, and others.

Leaders in this product category are:

- Soft-Switch, Inc. Product name: Central and EMX.

- Digital Equipment Corporation. Product name: MailBus.

- Hewlett-Packard Co. Product name: OpenMail.

- Alisa Systems, Inc. Product name: AlisaMail.

- The Boston Software Works, Inc. Product name: Interoffice Message Exchange.

- Isocor. Product name: Isoplex Message Server

- NCR Corp. Product name: StarPro Enterprise Messaging.

- Novell, Inc. Product names: NetWare, Global MHS.

- Retix. Product name: OpenServer.

The top three on this list represent the top three providers, with Soft-Switch being the dominant provider in this product category. Their packages are priced from $30,000 to $300,000, including hardware.

B
Network Service Providers

These companies provide some or all of the following network services: E-mail services, EDI network services, on-line data base services, and enhanced facsimile services. Many have divided their service offerings into those directed at corporate customers and those at consumer (household) customers.

Leading providers in this category are:

- GE Information Services
- AT&T EasyLink
- Advantis
- Sprint
- MCI
- BT North America
- America Online
- INFONET
- Sterling Software
- Internet (and affiliated networks)
- Prodigy (consumer only)
- CompuServe (consumer only)
- Regional Bell Operating Companies, GTE.

The largest providers of network services (listed above) are a mixture of telephone companies (AT&T, MCI, Sprint, and BT), network companies that have their own dedicated telecommunication circuits (CompuServe, GE Information Services, and Advantis) companies that have no network

and could be considered a remote processing service provider (Sterling Software), and the Internet, which is a decentralized amalgamation of mostly university and government computer centers that are interconnected and allow their respective user constituencies to send computer files to each other.

These various networks are taking different approaches in selling integrated messaging services. The telephone companies MCI, Sprint, BT, and to some extent AT&T are selling enhanced facsimile, voice, E-mail, and EDI to single large companies to support the various messaging requirements within the company.

The service focus is primarily on intra-company messaging. The offerings, however, do support inter-company messaging (especially EDI) and other business divisions of these particular network companies support other kinds of services that potentially have inter-company applications (e.g., video conferencing). Nevertheless, the market focus of these companies is largely a traditional phone company focus of supporting the large client with all telecommunication service needs.

In contrast to the telephone companies, GE Information Services, Advantis, and Sterling Software are focusing directly on the inter-company messaging needs of customers. These three are offering facsimile, E-mail, EDI, and data base services to allow companies to inter-connect with their trading partners. The focuses of these companies are distinctly on trading communities. They are not offering voice or video connection (which the phone companies offer through separate divisions).

This focus on inter-company integrated messaging marks the first time that service companies have recognized and are devoting resources to the inter-company marketplace. The focus was inaugurated in the 1991 to 1993 time frame with GEIS' BusinessTalk, Sterling's EDI-to-fax, and later E-mail offering, and Advantis' Electronic Trade suite of products (including inter-company E-mail, EDI, bulletin boards, Store, and other services).

Some of the others on the list—Compuserve, Prodigy, Internet—cater to specific audiences that are generally not corporate, let alone inter-corporate. Compuserve and Prodigy are largely consumer services. Internet is a university and research network. To what degree it will support commercial messaging traffic is still uncertain. Most of the commercial networks are interconnected to Internet so that message traffic—even commercial message traffic—could potentially flow on the Internet.

There are many smaller network service providers (not listed above) that focus on specific vertical market niches, such as Kleinschmidt, Railinc, Transnet, Shipnet, Encompass, the Automated Clearinghouse, EDI Able, etc. Many of these service providers could conceivably broaden their focus to become "general purpose" network service providers. But, for the most part, this probably won't happen. If anything, they will be acquired by the larger networks.

A number of the network service providers have teamed with LAN-based network software providers to build a bridging service linking geographically separated office networks. Users on one local-area network can send and receive messages with others on another network. AT&T EasyLink has teamed with Microsoft, Advantis has teamed with cc:Mail, . Compuserve with Novell and Action Technologies Inc.

This is an important development because (1) LAN-to-LAN connections allow companies to interconnect E-mail networks and use the commercial networks for only transport functions, not value added functions such as directory maintenance, (2) LAN-to-LAN connections allow companies to inexpensively interconnect E-mail systems, (3) relationships with commercial networks give the PC software companies namely Lotus, Microsoft and Novell, a toehold in the intercompany messaging market and the chance to grow their product offerings into enterprise-wide messaging platforms (rather than the smaller single office LAN platform in which they originated).

LAN-to-LAN interconnects highlight the on-going issue: how much will user-controlled software displace value-added network services offered by a commercial network provider?

C

Facsimile Software and Equipment Vendors

1. Software Vendors

Leading vendors here are:

- Delrina Technology Inc.
- Caere Corp.
- Alien Computing.
- Software Ventures.
- Softnet.
- Zsoft (a division of WordStar).
- Alcom Corp.
- Optus Software.

- Intel Corporation. Intel developed an application programmers interface for its fax chip. The fax chip/board set turns a PC into a sending and receiving fax machine. The API and command language of INTEL (called CAS), is a publicly available software standard.

2. Equipment Vendors

Leading equipment vendors are:

- Canon
- Sharp
- Xerox
- Ricoh
- Toshiba

D

Voice Processing/Information Service Vendors

These companies provide systems that are used by corporate end-users as well as telephone companies that then offer services based on the platform.

Leaders are:

- Octel
- AT&T
- Northern Telecom
- Rolm
- VMX
- Centigram
- Boston Technology
- Digital Sound
- AVT
- Active Voice
- Unisys
- Comverse

Octel and Centigram are two voice processing system vendors that have pioneered integrated messaging products. Here the integration consists of mixing data with voice.

E

Video Messaging

1. Vendors of Video Processing Software (or software that has video processing functionality) for microcomputers

- Microsoft
- Apple Computer
- IBM
- Lotus
- Novell (video product under development)
- Go

2. Vendors of Network System Software

- Compression Labs Inc.
- PictureTel Corp.
- Video Telecom Corp.

3. Network Service Providers
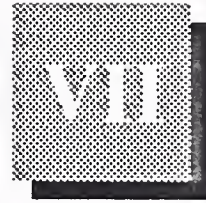
Telephone companies
Cable Television Operators

F.

Mobile Messaging

1. Device/Software Manufacturers

These include such devices as Personal Digital Assistants (PDAs), pagers, handheld devices, notebook computers, cellular phones.

Sharp
Apple
Hewlett-Packard
General Magic

2. Service Providers

Motorola
Cellular Data
RAM Mobile Data

VII

Conclusions and Recommendations

It is in the 1990s that intercompany messaging on a large scale has arrived, in particular EDI, E-mail, facsimile, and large file transfer (such as CAD/CAM drawings, some of which may be as large as a megabyte or greater). All of these kinds of messaging are 20 to 30 years old, so it isn't new technology. What's new is the critical mass of users and that each user uses all the message types to some degree.

A

Conclusions

The components of an integrated messaging infrastructure are now inexpensive enough to allow all end-users to be connected on a multiple-media electronic network.

The challenge is in building the interface that integrates all messaging types and all vehicles—networks, applications, systems—that convey and interact with messages. While users may say that they want an integrated solution, their buying behavior reflects a much more pragmatic approach.

Users in this study showed fragmentary plans to integrate messaging platforms. The rapid acceptance of products and services such as PCs in the early 1980s, voice mail in the mid-1980s, facsimile in the late 1980s and LAN-based E-mail in the 1990s shows that technology is rapidly accepted where it fills a need.

While users are receptive to the idea of an integrated messaging platform, their implementation behavior shows that they want to incrementally build an all-inclusive messaging capability. This means linking two different modes of messaging—EDI and E-mail, fax and E-mail—at a time. Users want the interface that is simplest and fits with existing systems and communication patterns.

Integrated electronic messaging presents a huge market potential in terms of software and services. Whether there will be a common, ubiquitous multimedia telephone service or whether message types will be integrated on an applications and vertical market basis only, it is still too early to tell. The potential is huge and the opportunity is great to several kinds of information service/software providers. Users of integrated messaging have a great deal of applications possibilities to explore to make their businesses more efficient and effective. It is difficult to say where integrated electronic messaging is headed but it is certain that, wherever it goes, it will profoundly impact organizations, industries, and the greater economic community.

1. Applications and User Activity

Integrated electronic messaging refers to the sending and receiving of multiple message types (voice, data, image, and video) through a common system/platform/interface, but where the message-types remain in separate files.

Integrated messaging is different from multimedia, which is multiple data types (text, image, audio, video) in a single file or simultaneously accessible through the same interface. E-mail, facsimile, voice processing, EDI, mobile communication applications, and data base applications are the elements of integrated messaging. It is these individual message types that are coming together to create integrated messaging.

Integrated messaging lays the groundwork for acceptance of multimedia outside the narrow applications of education and entertainment.

The integration of different message types is occurring for the most part in couplets. That is, EDI and E-mail, facsimile and voice, facsimile and E-mail, and so on is the pattern that the different message types are first combined with each other. Users are not attempting to combine all message types at once. Workflow software has the potential to do this, however.

Integrated messaging is taking place at the low-end, where the platform is inexpensive for the user. Facsimile cards, forms routing, LAN-based E-mail, an interface between a voice mail system and a E-mail system. Users are not looking for grand solutions, but to solutions that solve specific business workflows/applications.

Integrated messaging finds its most likely home with the inter-company user base. As EDI, facsimile, and inter-company E-mail establish electronic links between companies, a critical mass now is forming where companies want all these services integrated to some degree. This may

take some years before a lot of companies do this but it has begun. It requires integration of applications within companies. Again, workflow and client-server architectures are promising design guidelines for integration and any messaging software or service vendor should have some offering or expertise with workflow.

The inter-connection of workstations and desktop computers is now going beyond the boundaries of the organization. Nevertheless, the commodity-style products that allowed LAN-based messaging to occur must continue to be used for inter-company messaging to occur. Inter-company messaging is the first place where integrated messaging will be of use. Inter-company messaging and integrated messaging are interconnected applications.

Video messaging, which is the store-and-forward (i.e., non-real-time) transmission of video files, is still a year or two away. The immediate uses of video messaging are in on-demand television programming and the distribution of video promotional material (e.g., television commercial videos between ad agencies and broadcast stations).

2. Competitive Environment

The messaging infrastructure today is a diverse "ecosystem" of evolving technological species. Starting with the older species first, there are the commercial services: BT North America, MCI, Sprint, Compuserve, AT&T, and IBM (Advantis and Prodigy). These are divided into consumer and corporate segments and also into inter- and intra-company E-mail.

The personal computer and local-area network software providers include Microsoft, Apple, Lotus, Novell, Borland, WordPerfect, and Autodesk, principally. These companies are trying to move their product focus up from the end-user, through the office workgroup, to become providers of enterprise-wide systems.

They will then be competing with the older, host-based messaging and environment suppliers: IBM, Digital, Dun & Bradstreet, Computer Associates, and other mainframe-software vendors.

Also in the competitive arena are the "speciality" messaging vendors: voice mail and processing companies and the facsimile software companies. These companies are, somewhat like the PC/LAN software companies, expanding the functionality of their formerly single-function products to become more integrated into the messaging infrastructure of an organization.

These groups of messaging vendor species are converging at and beginning to drink from the integrated messaging pond. Who survives, what kinds of interbreeding of products depends on how much water there is in the pond. In other words, it depends on to what degree users have a need for integrated messaging and how much they are willing to spend.

The pond, at this time, appears to be smaller than expected due to current worldwide business drought. The global economy is very weak. In some regions—for example, the U.K.—there is a recession. In still others, there is a depression and virtual economic breakdown—e.g., Russia, the Balkans, and Africa.

The result: users are very sensitive to price-performance. They want inexpensive solutions but they won't settle for poor quality. The price/performance tradeoff curve is very elastic.

The X.400 messaging standard and the Internet illustrate the trade-offs.

X.400 is a grand solution nobody is willing to pay for. It is rich in features, but too expensive and cumbersome to operate. Its use is relegated to the commercial network providers and largest Fortune 1000 corporations where the scale of usage is large enough to warrant the expense. Besides, it was developed before a de facto infrastructure for integrated electronic messaging existed and is now difficult to retrofit into today's real environment (confer, for example, with the difficulty users are having with the X.435 standard for EDI body types).

Internet is inexpensive but unsafe, the service is poor, and its legality for commercial use is unclear. Internet usage is growing rapidly but, most likely, will never be used as an official corporate message pipeline.

Users are looking for solutions in-between these two technological possibilities.

Local area network software and facsimile software appear to be a very promising in-between solution. They are inexpensive. They have enormous functionality. New developments in software suggest that local area networks and facsimile-capable PCs could become the universal platform on which multiple message types will be sent. They are the fastest growing areas of user adoption.

On the other hand, the commercial network service provider (VAN, telephone company or niche clearinghouse) brings a different kind of offering to the end user. Its real strength comes from its ability to address all the several, disparate organizations of a trading community that need to be connected on a network. Trading communities that truly require specialized "information clearinghouses" are health care, retail, distribution, travel, and government.

Only these service organizations can provide integration and other value-added services that bring efficiencies to the trading community which the individual software vendors cannot provide. Such services include: network interconnection services, file conversion services (text to fax, etc.), directory services, and application-specific services (sale force automation, etc.).

There may be a natural separation of messaging functions (that attains an equilibrium of sorts) between user-premise software and third-party commercial network services. While the software companies provide the mass installation of end-user platforms, the commercial networks provide services that all users need but only make sense for a single source to provide. In this sense, a "macro" client-server architecture is emerging where networks provide server functions (directories, data bases, trading community network management functions) to their customer clients. Customer clients receive the necessary client software from the specific software vendors.

3. The Facsimile Opportunity

Facsimile technology has the most promise of all messaging modes today to grow to the largest number of users and become the "platform of choice", or, at least, a central component for multimedia messaging. In other words, facsimile has greater possibilities to become central to multimedia than E-mail, video mail, EDI, and voice mail systems, given the way these other systems are constituted today.

Facsimile capabilities will grow beyond the conventional facsimile today and, indeed, will include or enable some of these other message types, especially E-mail and video mail, to be sent over it.

Facsimile has advantages over the others because it:

• Has a large and more rapidly growing installed base of users.

• Is simple to use and simple to administer (as a corporate asset).

• Is always "on" and able to accept incoming messages 24 hours per day.

• Is inexpensive—affordable even to households.

• Is scalable and expandable in volume and range of messaging through additions in software, modular hardware (boards, memory-expansion chips), and telecommunication services (on-network fax storage, routing services, etc.). It gives users the ability to incrementally and inexpensively build an integrated messaging platform.

Facsimile server and facsimile cards will grow rapidly and, in doing, usher in advanced facsimile messaging. Advanced facsimile messaging is no

longer sending bit-map images. Instead, it is sending binary files between points that can be re-inserted into applications and other systems for further processing and user manipulation.

Facsimile evolution began in the late seventies with standalone turnkey facsimile machines. It is now at the stage of single PCs acting as facsimile machines. In the next 12 to 24 months there will be rapid growth in facsimile servers, where many PCs on a network use a facsimile server as a fax communications port. Finally, with the adoption of TR.29 and other binary file standards, facsimile servers will be used to send E-mail, EDI, video and other digital files. At this point, it may be incorrect to call this technology "facsimile." It will be multimedia.

Facsimile is a real product serving real business (and consumer) needs today. And it is rightfully the focus—by vendor and user alike—for building new messaging capabilities and platforms.

B

User Recommendations

Use facsimile technology as a cornerstone in your messaging architecture. PC-to-fax links are inexpensive and easy to use. Facsimile equipment (whether board level or standalone) is inexpensive and the prices are dropping while the performance is increasing. Facsimile transmission costs will come down as the new BFT/TR.29 standard becomes implemented.

Use E-mail with your EDI trading partners.

Pay attention to the pricing schedules of network service providers (such as AT&T, MCI, Sprint, and Advantis). There is a price war. Assiduously shop around for the best service pricings.

Rely on network service providers for interconnection services (such as X.400 and other network interconnects) until it is cost effective to install and manage your own network interconnection software. Prices are falling on this software.

If you need comprehensive integrated messaging services, ask the network service providers. Some will be able to provide you with E-mail, EDI, enhanced facsimile, voice, data base, and even videoconferencing or video messaging. This will preclude you from having to invest in and operate your own equipment.

If you are serious about re-designing your work processes and applications in your company using information technologies and messaging in particular, consider the workflow/groupware products on the market today.

Only through workflow and groupware will companies effectively combine information technologies and work.

C

Vendor Recommendations

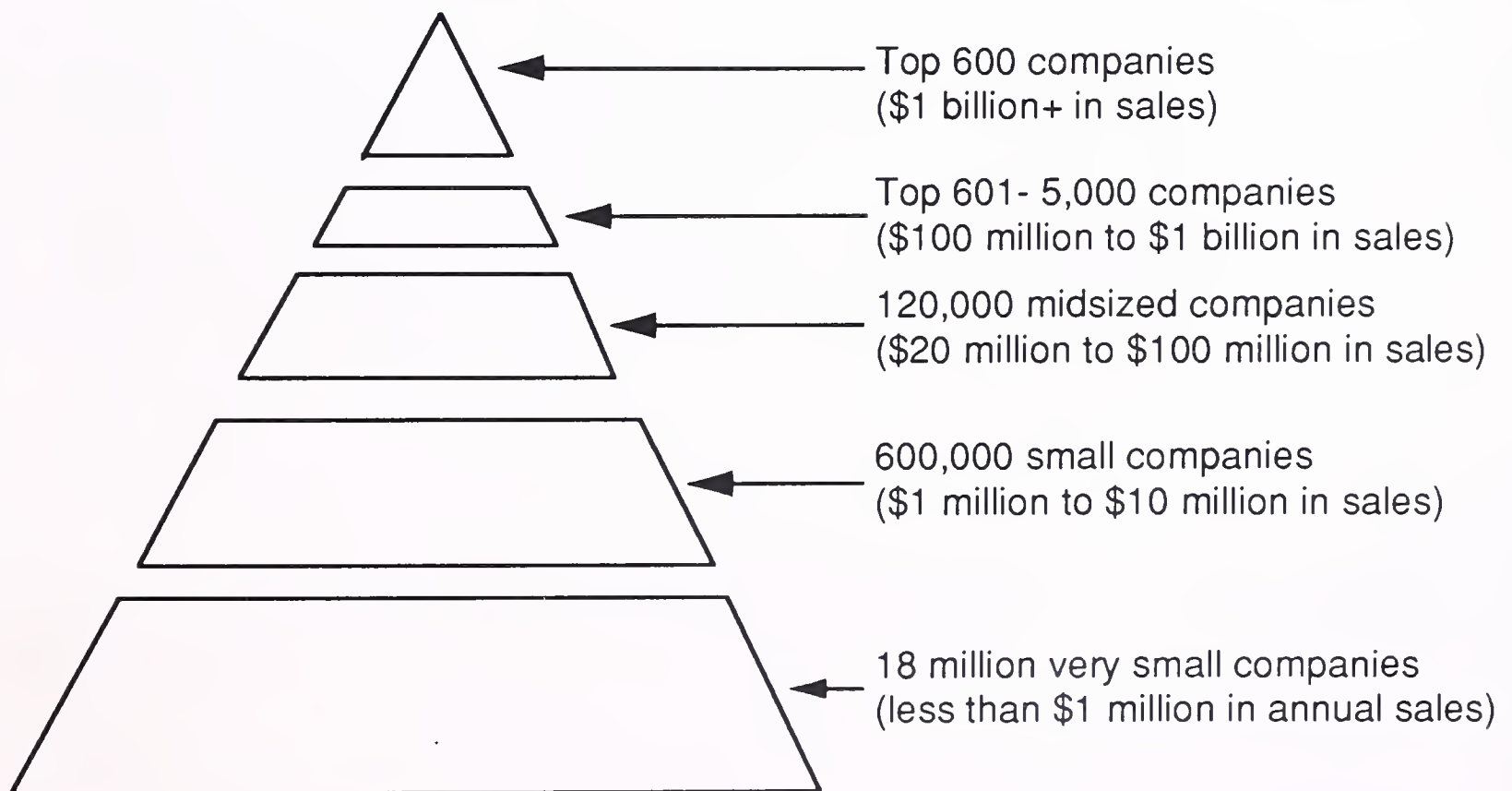There are two ways to view the integrated inter-company messaging market:

(1) It consists of many trading communities (health care, retail, transportation, automotive, finance, etc.) that require comprehensive messaging solutions. Targeted hub-and-spoke marketing is important in this view.

(2) It is a mass market where vendors of the messaging components need only build effective channels, turn on the shrink-wrap machine and fill the pipeline.

The two views are not mutually exclusive. U.S. companies can be grouped according to size as shown in Exhibit VII-1.

EXHIBIT VII-1

Size and Distribution of U.S. Businesses
(Corporations, Partnerships, and Proprietorships)

Top 600 companies
($1 billion+ in sales)

Top 601- 5,000 companies
($100 million to $1 billion in sales)

120,000 midsized companies
($20 million to $100 million in sales)

600,000 small companies
($1 million to $10 million in sales)

18 million very small companies
(less than $1 million in annual sales)

Sources: Internal Revenue Service, *Forbes, Fortune,* INPUT

As the exhibit shows, most of the income earned by corporations is earned by the top 5,000 while the millions of other corporations, partnerships and proprietorships make less than a million dollars per year.

The two views of the integrated electronic messaging market approach the pyramid from two different angles: the trading community approach is from the top down; the mass market approach is from the bottom up.

1. Trading Community Orientation

The service-provider value-added network clearinghouse can play an instrumental and central role in integrating trading communities and vertical markets. Such companies become trading community facilitators. It is a role above the telecommunication line provider. The agent provides application integration and communication services between multiple parties in specific trading communities (communities of interest, value chains, vertical industries, and others are synonymous with trading community). The agent has industry expertise as well as the wherewithal to put together information systems for communities of companies. The agent is a systems integrator, network and processing service provider, software manufacturer, and/or reseller. Hub and spoke marketing is important here.

2. Mass Market Orientation

One of the channels to create for the mass marketer is those vendors that are selling to trading communities as outlined above.

Another important channel to build when taking the mass market approach is the "large customer channel." Large customers want their customers and suppliers to be equipped with the same messaging capabilities as themselves so that they can communicate in the various modes of messaging. Working with a Wal-Mart or General Motors to install messaging platforms at these companies' trading partners is a good channel. TSI International (Wilton, CT) is an EDI software vendor that is successfully pursuing this kind of end-user-as-channel approach.
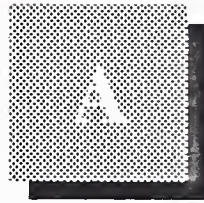
Questionnaire

I am calling from INPUT, a research and consulting firm in Teaneck, New Jersey. We are conducting a study on integrated messaging and its trends, issues and opportunities. The information that you provide will be confidential and neither your name nor your company's name will be connected with any of the information in this study. In return for your assistance, we will provide you with a summary of the study's findings at no charge.

1. Do you do E-mail with trading partners and/or people outside of your organization?

    Yes _____   No _____

2. If so, who? What benefits are you deriving?

    _____

    _____

    _____

3. How rapidly would you say your E-mail traffic with the outside is growing?

    Less than 10%   _____
    10% - 40%   _____
    41% - 60%   _____
    Greater than 60%   _____

4. Is the system by which you send E-mail to your trading partners also the system that supports sending facsimiles, EDI, sends other kinds of digital files and otherwise messages with your trading partners?

    Different systems completely   _____
    Single end-user interface to multiple systems _____
    Completely integrated systems   _____

5. If you don't have a completely integrated system, would you like to have one?

    Yes _____   No _____

    Do you expect to have all messaging functions taken care of through a single platform and pipeline?

    Yes _____   No _____

6. Are you or will you use X.400 capabilities in your messaging systems?

    Already using it   _____
    The service provider that we use provides it for us   _____
    Will probably use it in the next two years   _____
    Have no plans to use it   _____

7. Do you use the Internet to send messages of any kind?

    Yes _____   No _____

8. Do you have any plans for using facsimile cards and facsimile LAN-servers, both of which turn a personal computer into a facsimile machine?

    Already using them   _____
    Plan to use them in the next two years   _____
    No plans   _____

9. If you use facsimile cards or servers, on a scale of 1 of 5 (five being very useful), how useful would you say they are compared to standard facsimile machines?

    _____

10. Why? _____

    _____

    _____

11. For the messaging (whether E-mail, EDI, facsimile, binary file transfer) that you do with your trading partners, how do you manage the directories of addresses?

    Maintained by individuals   _____

    Maintained in an enterprise-wide   _____
    directory that is on-line

    Maintained by a third party network service   _____

12. Will this approach to directory maintenance change in the next 12 to 18 months?

Yes _____   No _____   If so, in what way(s):

_____   A-3

_____

_____

13. Are their any other administrative services that facilitate messaging that you wish you could have in your software or at least make available to you in a commercial network?

_____

_____

_____

14. Do you have any other comments?

_____

_____

_____

Thank you for participating in our survey.

(Blank)