EDP ANALYZER

APRIL, 1977
VOL. 15, NO. 4

COMPUTER MESSAGE SYSTEMS

Computer message systems (CMS) represent a relatively new development that uses computer technology to aid human communications. Already these new systems are beginning to replace inter-office memorandums, telephone calls, tele-typewriter messages, and face-to-face meetings in some business, governmental, and research organizations. In some instances, they are being tied in with word processing systems, which we discussed in the past two issues. Moreover, these CMS already appear to be cost competitive with the older means of communication, and they promise to become even more so in the next few years. Here is an overview of what is happening in this emerging area.

Computer message systems use computer technology in a network environment to aid human communicatons. Their goal is to make certain types of human communications easier, faster, less wasteful, and more effective. If that sounds like another example of over-selling that has been so rampant in the computer field—well, there just may be less over-selling than one might first think.

In brief, we think that the accomplishments of computer message systems already are impressive. It is a subject area that data processing management should know about.

Perhaps the first point to make is: computer message systems are *not* basically message switching systems, or store-and-forward systems. Yes, they do message switching with a form of store-and-forward discipline. But they do so much more that it will give the wrong impression to think of them in terms of conventional message switching systems. This type of comparison is quite similar to the comparison made in the early days of computers, where computers were claimed by some to be "just high-speed adding machines."

If CMS are not message switching systems, then what are they? We see them as consisting of the following major components. First, they have *a variety of message creation services.* For instance, they have text editing services, to aid in composing, correcting, formatting, etc. of new messages. They have *a variety of message distribution services.* They can deliver messages to specified individuals (who make use of the CMS network), or to groups, or to a combination of individuals and groups. Users can access a network from almost any place in the world where there are telephones—assuming that the users have portable terminals with acoustic couplers (and even this requirement may prove illusory). Also, these systems can interface with public communication services, such as mailgram services and with TWX/Telex services. CMS offer *a variety of message recipient services.* These services aid the recipient of a message in replying to it, forwarding it to others (with or without comments added), and filing it. A retrieval system is provided along with the filing system. The user can have a num-

ber of "files" in which messages are stored, including "action file for self," and "action file for John (a subordinate)." Also, these systems provide for communications in *a variety of enrivornments.* Messages can be sent from person to person, or from an individual to a group (the broadcast feature), or among members of a group. This last function has been given the name "teleconferencing" and it promises to be a major use of CMS.

These, then, are the main characteristics of computer message systems. The remainder of this report will be devoted to filling in this rather sketchy picture with more details, to give a better idea of what they do and some indication of how they do it.

We will also make the point that CMS, like word processing, is one aspect of an organization's overall information handling capabilities. We are beginning to hear discussions that indicate that some organizations will soon begin bringing many or all of these information handling capabilities under one executive. Instead of "top computer executives," we may soon be seeing some "top information executives."

Typical use of a CMS

Vezza and Broos (Reference 1) describe how computer message services are being used *today* on the ARPA Net—many times per day at many locations. These services are being used by engineers, programmers, researchers, managers, network operations people and others. The point to keep in mind in the following discussion is that all of the actions take place with the user sitting at a typewriter-like or CRT terminal.

At a time convenient to him or her, the user sits down at the terminal. This is important; the user uses the CMS when he or she is ready to read and handle the messages. The user signs on and asks the message service for a summary of all messages in the user's "in-box" file. This summary is a one-line listing of each message, showing the sender and the subject. The user selects the message that appears most important and asks to have it displayed. In most cases, say Vezza and Broos, an immediate, short reply is called for; the user creates it then and there. Text editing facilities help the user correct typing mistakes, insert lines, etc.; other facilities do all of the addressing of the message, if it is a reply to a message received.

In some instances, the user will want to forward a message to one or more colleagues. The forwarding facility helps the user to do this; a comment may be added to the message, if desired. If the message is to be sent to a defined distribution list, the list is identified and the system does the rest.

In addition, a copy of the message is normally filed in one or more of the user's on-line subject files.

Of course, if the message is of no further interest, it can be destroyed.

Note that all of these transmissions take place immediately; there is no long delay in putting the messages into the recipients' in-boxes.

For replies that require more thought and preparation, the user may want to first retrieve prior messages from one or more on-line files. After reading these messages, the user drafts a reply. The user might store the reply in an action file, or may send it to colleagues (along with all of the back-up messages that were used in the preparation of the draft) for their opinions. When the message has been developed, the user may send it to his manager's in-box. After the manager has read the message and either changed it or has indicated approval (by an appended comment), the user sends the message.

A system of this type can have a large data base of on-line message files, say Vezza and Broos, with both individual user files and common files. The system can retrieve messages from these files, subject to authorization, based on the originators of the messages, the recipients, general subject matter, keywords, and dates. A user's current files include his in-box, his hold-for-action files, an in-composition file, and a discard file (comparable to a waste basket, in that something can be retrieved before it is finally destroyed).

So this is how computer message services are being used on the ARPA Net. Let us now consider how they are being used in some commercial and other environments.

Computer Corporation of America

Computer Corporation of America is a software and research and development firm with headquarters in Cambridge, Massachusetts. A good amount of its work deals with the application of advanced computer technology for agencies of the federal government. In addition,

CCA markets software products that it has developed. Annual sales are over $2 million.

CCA has had a computer message system, which they call TDA, under development since 1975. TDA has been designed to run on a DEC PDP-11 mini-computer, and can thus operate as a stand-alone in-house system. Also, it currently can be accessed via Telenet for test purposes. CCA is considering offering TDA as a public subscription service over public networks such as Telenet and Tymnet. For more information on TDA, see Reference 9.

We talked to Dr. Thomas Marill, President of CCA, about his personal use of TDA. Dr. Marill began using TDA on a rather small scale in early 1976, for administrative and management uses. His use of the system grew slowly until the late summer of 1976, when he suddenly found that he was using it more and more. It is proving to be such a help to him in his executive duties that he foresees his continued increase of use.

Dr. Marill has hard copy terminals both at his desk at the office as well as at his home (although, he says, these could just as well be CRT terminals). He uses both of these terminals himself; in general, his secretary is not involved in the process. Only occasionally does he keep a hard copy printout.

The process starts, Dr. Marill told us, when he has a lull in his work and it is convenient for him to look at his messages. He signs on the system and asks to see what is in his in-box. A one-line summary of each message is listed; typically, there are 3 or 4 messages in the in-box, he said. If a message on the list appears urgent, he asks that the whole message be printed out. If a reply is called for, he prepares it then and there. Using the ANSWER command, the system does all of the addressing of the reply.

If no answer is needed, Dr. Marill may instruct the system to put the message into a designated file. He has set up about 12 files for his personal use—his action file, an action file for each of his immediate subordinates, and so on.

Periodically, he reviews the contents of each of these files, to keep himself up to date on what has been happening, to see if actions have taken place, and to see what actions should now take place.

He illustrated the simplicity and effectiveness of the system by something he had done shortly before we talked to him. He had been talking on the telephone with an important customer and had set a date for himself and four other CCA people to visit the customer in another city. He then took a few minutes to select plane flights in both directions and to call for reservations. Next, using TDA, he created and sent a short message that was addressed to each of the other four people in CCA, telling them about the visit and the plane schedules. The whole arrangement was made and the people notified in a few minutes of time. He had no worry about trying to reach each person by phone or the delays involved in sending an inter-office memorandum. The recipients, in turn, would be replying in a short time and telling him of any problems they might have in meeting the schedule.

With TDA, Dr. Marill finds that if he is away from his office but has access to a terminal, he can do a much better job of keeping up on important developments. Because of this, he says he is more relaxed about being away from the office. So TDA is helping him do his job and at the same time stay more relaxed.

Telenet Communications Corporation

Telenet Communications Corporation, with headquarters in Washington, D.C., is a common carrier offering packet switched data communications services. The company was organized in late 1972; the switching centers were in place in seven cities and tariffs became effective in August 1975. Telenet now serves 43 cities in the U.S. plus three in Canada and one in Mexico. By the end of this year, about 70 cities will be served.

When Dr. Lawrence Roberts came to Telenet as its president, from his position at the Advanced Research Projects Agency (ARPA), he brought with him his experiences with the ARPA Net message services. Dr. Roberts was responsible for the overall ARPA Net project, as well as for a number of sub-projects. He found the message services on the ARPA Net to be very valuable to him, for managing these projects. These services allowed him to more easily keep up with events, as well as for sending out directions and recommendations to others.

So when he arrived at Telenet, Dr. Roberts decided that a computer message service would be installed for in-house use and that all Telenet executives and professional staff members would

have terminals. Telenet uses a version of the Hermes message system, developed by Bolt Beranek & Newman, Inc., to operate under the TENEX operating system for DEC PDP-10 computers.

We talked to Mr. Stuart Mathison, Vice President of Telenet, about his personal use of Hermes. He first began using a message service on the ARPA Net in the fall of 1972, so when the system was installed at Telenet, he was already accustomed to it. Mr. Mathison has access to a 1200 bits per second terminal at his office and a 300 bps terminal is installed at his home.

The way Mr. Mathison uses the system is as follows. (He makes the point that each person seems to have personal preferences in methods of use, and the following are his preferences.) Because some received messages are lengthy and because the terminal at the office is four times faster than his terminal at home, he prefers to get his received messages at the office. He scans the message list (one line per message, showing sender, subject, length, and date) and calls up anything that looks like it might be urgent; there usually are from 5 to 10 messages in his in-box each day, he told us. If an immediate reply is required, he prepares it then and there. Some messages are forwarded to colleagues through the use of simple commands. For lengthy messages, he directs that they be printed out on the 1200 bps terminal and takes the copy home.

At home in the evening, he does most of his message sending. He can create replies to messages received that day. Also, as ideas strike him, he can create new messages to other people in Telenet. Total time at a terminal per day, he said, is in the order of one hour.

The Hermes message service allows for a variety of dispositions of received messages. Replies can be sent, with the system providing the address of the recipient. Messages can be forwarded, with or without comments attached. Messages can be stored in on-line subject files, or they can be left in the in-box for a time, using the in-box as a tickler file. Or the messages can be destroyed. For more information on Hermes, see Reference 10.

In general, Mr. Mathison uses the terminal himself. If pressed for time, he may ask his secretary to send a short message from time to time. But not all "users" want to use terminals themselves, he pointed out. People who are not facile in using a keyboard may ask someone else (generally their secretaries) to handle the terminals. Such users prefer to work from hard copy printouts of the received messages.

Telenet has sales, system engineering, and operations people spread across the U.S., Canada, and Mexico. The company is finding the Hermes system invaluable for keeping people at all locations informed and up-to-date, said Mr. Mathison. As an example, the company has set up a central prospect/customer file on the system. When anyone gets a lead on a prospective new customer, the message is sent not only to the appropriate persons but also a copy is sent to this file. Prospects are often large companies with offices in numerous cities, and they may be contacted by several Telenet representatives. Messages about all of the actions and results flow into the prospect file. Sales management can review the file to make sure that appropriate steps are being taken in each case.

So Telenet is using the Hermes message system for managing and controlling a rapidly expanding enterprise that covers a wide geographic area. The people at remote locations are just as accessible, via the system, as people in the same building. The only delays involved are the times that messages are in a user's in-box, waiting until the user has a convenient time to handle them.

Montgomery Ward

Montgomery Ward, with headquarters in Chicago, Illinois, is the huge retail department store and catalog sales office arm of Mobil Corp. Ward's annual sales are about $4 billion.

We discussed Montgomery Ward's new distributed data communications network in our July 1976 report. The company recognized the need to improve the management and control of its rapidly expanding total communications environment. The data communications utility (DCU) concept and system specifications were formulated and submitted to various vendors. The NCR proposal was selected on a competitive basis and the system is being installed on a phased plan. The initial needs were for transaction communications features, for serving point of sale devices, credit authorizations, catalog orders, and remote job entry transactions. But the system specifications also provided for an administrative message switching capability, and this feature is being developed.

We checked back with Montgomery Ward to find out what had happened since our last contact with them. The DCU network is in operation as planned, we learned, for transaction processing. In addition, plans were being formulated for installing the message system, with a target installation date for the initial functions in the middle of this year.

The initial Montgomery Ward message system will be somewhat different from the message systems described above. Eventually, though, the people at Montgomery Ward think it will have the capabilities we have discussed plus some others. So this case is an example of a different path to the same end result. One of the main reasons for their approach is economics and another is traffic load. With its large number of locations (stores, catalog offices, buying offices, and so on), the company could be faced with requests for a huge number of terminals for a message system. Further, transactions must have priority on the DCU network; if message traffic grew rapidly, it could interfere with transaction traffic. So NCR is adding the types of message handling and message switching capabilities to the DCU network that Montgomery Ward needs.

For the past eight years, the company has had the Western Union Infocom message system installed at 30 company locations. Also, each catalog sales office (including those at stores) has a Teletype terminal, for catalog sales order entry and other uses. Further, Montgomery Ward has installed a number of word processing systems at its central and remote offices. It is these teletypewriter and word processing systems that will be tied into the message system at the outset.

So, for input, two main options will be provided. Messages can be entered by conventional teletypewriter operation. Or a message sender can use the word processing facilities. He or she can dictate or handwrite a message and send it to the word processing center. The message is entered and a hard copy draft is sent back to the sender for review and approval. The sender makes any corrections and releases the message for transmission. It is then put onto the network by the word processing center.

Several options will be available for distribution. The message can be sent to a particular site, addressed to a named individual. Also, a broadcast facility will be provided. The system will have a library of distribution lists, accessible by anyone on the system. A message can thus be sent to all recipients listed on a specified distribution list. In addition, the company has hopes of tying the network into the Western Union message switching system, for delivering messages to points not served by the DCU network, and for handling mailgram traffic.

At first, output will be hard copy. Eventually CRT terminals will be added, it is expected.

The people at Montgomery Ward find it very hard to estimate the type and amount of use of the message system; only time will tell. But the advantages over existing methods may encourage a rapid buildup of use. For instance, when the price of a specific merchandise item must be changed to meet competition, the responsible buyer can quickly and easily communicate with all stores in the affected area by means of the broadcast facility. To achieve the same result today takes much more effort.

For the future, Montgomery Ward expects to add more terminals to the system if the response is good and where such terminals are cost justified. Some of these will be CRT-type terminals. A decentralized printing facility may be expanded via the message switching application, to take the load off the high speed printer and report distribution systems. And it looks likely that some or most message creation and message disposition functions of the new computer message systems will be added.

U.S. Army Materiel Command

Martin et al (Reference 2) have described the experiences at the U.S. Army Materiel Development and Readiness Command, with headquarters in Alexandria, Virginia, with using a computer message system. It was originally installed in the fall of 1974 in the offices of five managers at Command headquarters and in the offices of two managers about 200 and 700 miles distant from headquarters. In the fall of 1975, 12 more managers were added to the system. The system used was developed by Stanford Research Institute and accessed via the ARPA Net.

The method of use of the system was quite similar to the CMS cases described above. Some managers worked at their terminals while others did not want to operate a terminal and assigned the function to someone else.

Benefits. The Command experienced a number of benefits from the use of the system. A CMS avoids "busy" and "unavailable" situations. This is important because the managers involved are very busy and it is hard for them to be available simultaneously. Recipients of messages can access their in-boxes from a wide variety of locations. Recipients tend to use the system when they are in a receptive frame of mind, ready to handle messages. The managers tend to be very candid in their remarks, more so than in other forms of communication, partially because of the informal way in which the system is treated. It is now much easier to send copies of messages to groups of people than with previous methods of communication. The messages are now much better organized for retrieval and analysis; previously, many were handwritten notes, typed notes, etc. that became scattered or lost. Travel has been reduced because of the improved effectiveness of communications. When travel has been necessary, the managers have found that they are better prepared to discuss the issues involved. And the incremental costs for the messages appear to be quite low.

Problems. There have been some problems. The users have not always known what to do when the network "disappears." Even more general is the problem of helping the user in distress. (Some systems provide help automatically when the user types in ? or HELP.) Training in the use of the system has continued to be a problem. And the Command has found a need for more entry points to the network. Locations not near an ARPA Net node have had some problems accessing the network.

Changes in procedures. The Command made some changes in procedures which they are not yet sure should be classified as benefits or problems. One of these procedures has been to routinely send a copy to the top managers. This meant that the top managers have been more aware of problems and proposed actions than with previous communication methods. But it has also meant that the managers down the line have been more in the spotlight. The Command is not yet sure whether some of these changes in procedures should be retained or not.

Unsuccessful experiment. One test was made of teleconferencing. The subject selected was the future directions for their CMS. A group of managers was assembled at the outset, to discuss the project and set up a methodology. They were then asked, "Think about this problem when you can; when you get some ideas, send them to others in this group via the CMS." The CMS dialog started out slowly—and got worse. Consensus was that the project was unsuccessful.

Those involved feel that this was not a good test of tele-conferencing. However, an important lesson learned was that conduct of a conference in this mode removed the "pressure vessel" feeling that occurs by putting a group of people together in a room with a limited amount of time to solve a specific problem. Busy managers may be too easily distracted by day-to-day events to use a teleconferencing system—at least, until some mechanism is added to perform the "pressure vessel" function.

What is the problem?

Vezza and Broos (Reference 1) cite a 1975 study by the Dartnell Corporation on the average cost of preparing a business letter. The average cost of the writer's time was $1.45, the secretary's time cost $1.76, and postage, materials, etc. cost 59¢, for a total of $3.80.

Dr. Raymond Panko, of Stanford Research Institute, in an unpublished communication, has cited a number of studies dealing with the human communications question. A 1968 study by the President's Commission on Postal Organization determined that of a total of about 90 billion pieces of mail per year in the U.S., about 10% (9 billion) were writer-to-reader correspondence, and of these almost half (4 billion) were business correspondence. (Some 26 billion were organization or business mail, but most of these were financial transaction documents such as invoices, checks, and so on; another big category was advertising matter.) In addition, there are about 250 billion telephone calls per year in the U.S., plus some 50 million Twx/Telex messages. No estimate was given on the percentage of telephone calls that are business calls, but it probably is a relatively large percentage.

Panko was unable to find reliable statistics on the ratio of inter-office correspondence to correspondence that used the postal service. His estimate of the ratio was 3 to 1.

Several studies dealt with the length of messages. One study showed that 58% of managers' messages were one page or less in length, another

28% were two to four pages long, and the remaining 14% were five or more pages in length. A study made on a CMS showed that 73% of the messages transmitted were less than 1000 characters in length. Of the total messages sent, 45% were to one individual, 35% to more than one individual, 18% were sent to groups (distribution lists), and the remainder went to a combination of groups and individuals.

Panko reported that several studies have indicated that 12% to 35% of a manager's time is spent on writing and reading. The percentages for clerical people are probably higher than this, Panko feels.

Poppel (Reference 3) reports that his studies indicate that about 40% of the middle and upper levels of managers time is spent on mail, telephone, and business travel activities.

What these figures seem to say is that there may be something like 20 billion pieces of business correspondence (letters, memos, etc.) transmitted in the U.S. per year. The cost in writers' and secretaries' time is by far the largest element of cost. And there may be something in the order of 100 billion business telephone calls per year, many of which go through a telephone operator, then a secretary, and then to the recipient. In addition, there is some unknown number (undoubtedly many millions) of business trips per year that consume time, travel, and living expenses.

Not only are these numbers very large and the costs significant, but also these conventional communications methods are not always as effective as desired. An inter-office memo might be dictated and the writer gets it back the next day (in routine cases; urgent cases could be done much faster, of course). Perhaps some corrections are needed; another iteration and another day may be consumed. If a copy is being sent to a distant office, it may take another day or two in the mail. So, for the routine case, an inter-office memo might require the better part of one week to reach its destination.

The telephone is not fully effective, either. Not only are several people involved in handling the call but also there are two other main shortcomings. For one thing, the other party may not be available at the time of the call. For another, even if he or she is available, the call represents an interruption of whatever the person is doing. The recipient may take the call when not in a receptive frame of mind.

Conventional teletypewriter message systems also have their shortcomings. One is the lack of privacy. A message most likely is seen by the originator, the originating operator, the receiving operator, the recipient's secretary, and the recipient. No facilities are easily available for replying, forwarding, filing, creating messages, and so on.

Face-to-face meetings, of individuals of groups, provide a good setting for a dialog and concentration on a subject. But they may involve travel time and costs.

We are *not* saying that these conventional communication methods can be or should be eliminated. Each one still has its strong points. What we are pointing out is that each involves a certain amount of waste, delay, ineffectiveness, and perhaps lack of privacy. To some extent, at least, they can be replaced by a more effective communications method.

One such solution for more effective human communications is the computer message service.

An overview of CMS

Panko, in his unpublished communication, described the history of CMS. During the 1960s, an early form of computer messaging occurred on time sharing services. Two terminals might be "linked" via the TSS, or a message might be sent from one terminal to the on-line storage area of another terminal. Then in the early 1970s, serious efforts began for studying tele-conferencing—dialogs within a group of people via a CMS. These efforts occurred at the U.S. Office of Emergency Preparedness and at a number of research institutes and universities. In 1974, three existing CMS were made commercially available via time sharing networks, but the market reception for all three appears to have been moderate at best. It was in 1974 that a number of other organizations began developing CMS, some on an in-house basis—so, says Panko, there is really no way to judge how widely CMS are being used. Some word processing systems have incorporated some CMS facilities, he says, making it harder to define what is and what is not a CMS.

Myer and Dodds (Reference 4) list four CMS properties, not found together in any other communications medium, which they suspect have

accounted for the success of these systems. These properties are: (1) electronic speed, (2) decoupling between sender and receiver so that there is no need for both to be "present," (3) the use of computer technology to aid in message composition, reading, storage, and retrieval, and (4) geographic independence, meaning that one can both send and receive from any station on the network.

CMS can operate in three main types of environments. One of these is the message environment, where messages are sent between identified individuals. Copies of a message may be sent to more than one individual. Another environment is the broadcast situation, where messages are sent from an individual to a distribution list. And the third case is the exchange of messages among members of a group, commonly called teleconferencing.

Vallee et al (Reference 5a) discuss studies of tele-conferencing made at the Institute of the Future. They have identified five styles of group use of CMS. One is the unstructured group with multiple topics; for instance, astronomers at various locations might use a CMS to exchange findings, ideas, questions, and so on. Another style of group use involves a small, specific group that addresses a specific topic. A third style involves a large, specific group that deals with a set agenda covering a group of subjects. A fourth style involves problem solving in a crisis situation, where the group jointly works on the solution. And the fifth style is a form of "automated Delphi" questioning, where the group responds to a set of questions dealing with likely future developments.

Turoff (Reference 5c) describes an example of a so-called "synchronous" or "parallel" teleconference. In this type of conference, each participant might be creating a message at the same time; in a sense, they are all trying to "talk" at one time. The system assigns sequence numbers in the sequence with which it receives the messages, and then sends the messages to all members of the group. The result is that there can be a number of messages between one that asks a question of one or more members of the group and the reply (or replies) to that question. Parallel conferencing takes a bit of sorting out, it would seem. Asynchronous or serial conferencing requires that only one participant be providing input at a time. Research is under way for determining effective ways of tele-conferencing.

So computer message systems and tele-conferencing are rather recent developments that address the question of more effective human communications.

What of the future?

As interesting as the CMS and tele-conferencing developments are, we may be seeing just the tip of an iceberg. There are other forms of electronic message handling that will both work with and compete with CMS.

Naomi Seligman of McCaffery, Seligman & von Simson, Inc., New York City, described to us a major client study made by her firm in this subject area in late 1976. Yes, computer message systems are in the offing—but more limited "electronic mail" systems may occur first. These are systems that will deliver messages to whatever destinations the *recipients* direct, without the need for the recipients to carry along portable terminals.

As an example, voice store-and-forward capability is being developed for use on the telephone network. The sender directs a verbal message to the recipient's "in-box." The recipient can call his in-box from any telephone and get his messages. As another instance, hotels might provide a means of coupling the telephone and the TV set within a guest room to provide terminal capabilities, for receiving and sending "mail."

In fact, the study considered a variety of alternatives that will be available in the future—such as a combination of store-and-forward voice, text, and graphics, as well as video-conferencing. It is still too early to say which of these will get the most usage.

Also, a fair amount of experimenting will have to be done with these alternative communications methods, said Mrs. Seligman. Top management is not the proper group upon which to experiment. So middle management and professionals probably should make up the experimental groups.

T. H. Myer of Bolt Beranek and Newman, Inc., Cambridge, Mass., pointed out to us the importance of message exchange among separate CMS—that is, the importance of a distributed CMS facility. With such a facility, users would not be restricted to just their own systems but would have global message capability. Many problems must still be solved before such global capability can be

achieved, he said, some of which are still in the research stage. Also, there is a need for standard protocols to allow for message exchange between separate CMS.

We understand that the British Post Office is investigating the idea of electronic mail via home TV sets. If first class mail could be delivered by a public CMS, then so could third class matter, such as direct mail advertising. For someone not interested in such matter, it might easily be identified and destroyed during the review of messages in the in-box. If the recipient wants to see the material, it might be displayed in color on the color TV set.

So much for the future. Let us now get back to the present and consider the costs of today's CMS.

Costs of CMS

This is all very fine, you say; it is an interesting development. But is it really practical? Are not the costs of a CMS exhorbitant? Somewhat surprisingly, it looks like CMS are already cost-effective and will become even more so in the next few years.

Turoff (Reference 5b) reports on studies done at the New Jersey Institute of Technology. A research center has been set up there to study teleconferencing, and quite a bit of attention has been paid to the costs of a CMS to support conferencing. Turoff has based his figures on the costs of today's Interdata 7/32 mini-computer system, which could be dedicated to a conferencing application. He has identified what he considers to be the significant variables and has set up some cost models. Then, using reasonable figures for the variables, he has determined what hourly charges would have to be imposed (on terminal connect time) in order to at least break even.

Assuming that a system has 32 access lines (the minimum that Turoff believes is economically feasible) and that these lines are used 50% of the time, a minimum charge of $7.50 per hour for terminal connection time would have to be imposed to cover the cost of the system and the communications services. If the number of access lines is increased to 64 and the 50% usage factor still holds, the minimum charge drops to less than $6 per hour. And if the number of lines is increased to 128, the minimum charge would be in the order of $5 per hour.

Turoff also analyzed the costs of conferencing via the U.S. Postal Service versus the costs on a CMS. He concluded that if group messages exceeded private messages, if the group size was greater than 20, and if the number of access lines was 64 or more, then the costs of the CMS would be competitive with using the U.S. Postal Service.

Panko, in his unpublished communications, cited several cost studies of existing CMS. His figures are in terms of costs per message, for different message lengths. For each message length, there is a range of figures because of differences in hourly connection charges and time required to compose and send messages on the several systems. The connection time charges for composing and sending a 50-word message ranged from about 40¢ to $1.65 on these existing systems; the charges for 1000-word messages ranged from 63¢ to $2.60.

Panko conducted his own test, to validate the figures. He composed and sent 20 50-word messages on two existing systems, one of which had two charging rates. He found that the charges varied from 17¢ to 73¢ per message.

Note that these charges are for the CMS system and communication charges. They do not include charges for the terminal used by the user.

Panko also estimated the effects on CMS costs of technology improvements. He used the DEC PDP-10 computer family as the basis for his estimates. (Note that the PDP-10 is a medium size system, not a mini-computer.) He determined the computing cost reductions that have been realized in recent years and projected similar reductions for the future. For 1977, it appeared to him that CMS charges for a 50-word message might range from 12¢ to 88¢. By 1985, these charges might be reduced to somewhere between 8¢ and 48¢.

It has also been estimated that it will not be too long before the price of a first class postage stamp in the U.S. will be 23¢.

It is hard to be definitive about costs of a CMS. These systems are new and have been used mainly in research environments, so that cost figures in a commercial setting are rather sparse. We did get one rough estimate of $100 per user per month. Since this cost offsets some long distance telephone charges, some typing and mailing of interoffice memorandums, some filing and retrieval of messages and documents, and possibly some busi-

ness travel, it does not represent a net increase of cost. In fact, if everything is considered, the use of the CMS might well represent an actual decrease in costs, or at least an improvement in efficiency for about the same costs.

One thing we can say. Costs of a CMS need not be exhorbitant, assuming adequate usage. Moreover, the trend of CMS costs is down, while the trend in costs of the conventional communication methods is up.

Some benefits and problems

Several sessions were held at the 1976 National Computer Conference on computer message systems. While papers were presented, they often were not included in the proceedings of the conference; some are available from the authors, as we note in the references. In addition, there was a good amount of give-and-take discussion. In the following summary of benefits and problems, we will draw upon these discussions but in general will not be able to cite specific speakers.

Benefits. Ease of access and ease of use were singled out as major benefits of CMS. It is possible for a user to get access to his or her in-box from "almost any telephone in the world" by way of a terminal with an acoustic coupler. When a problem comes up, it is an easy matter to send a message to all appropriate people, describing the problem. Similarly, when actions at a number of sites must be coordinated, it is an easy matter to receive reports from and send recommendations to the various sites. Also, the use of a CMS may increase managers' (and other users') efficiency by up to 25%, increase secretaries' efficiency perhaps somewhat less, and to reduce the costs of present telecommunication services.

Problems. A CMS may not be effective if it is used by only some of the people who should be using it. So a CMS should probably be installed for a specific set of users who are directed by management to use the system; enthusiastic use of the CMS by top management itself is perhaps the best guarantee of usage by others. Some users are lazy and tend to send messages to complete distribution lists rather than to type in four or five individual names and addresses. This practice means that other users will find "junk messages" in their in-boxes. Similarly, a CMS makes it easy to send a message to, say, 50 people on the spur of the moment when further reflection would show that this was not really necessary. So a CMS does raise the problem of swamping a recipient with messages.

If a manager operates his or her own terminal, then that manager's secretary will not be as aware of what is going on as with other communication methods. The manager, of course, can send copies of appropriate messages to the secretary's in-box.

CMS will not eliminate phone calls and face-to-face meetings. CMS messages might not contain all needed information, or may create misunderstandings that can be cleared up only by a phone call or a meeting. If a matter is really urgent, a phone call assures that the other person is made aware of it immediately, whereas he might not look at his CMS in-box for some hours.

Further, CMS messages might tend to be discarded more readily than messages written on paper (letters, memos, and so on). Where paper records can provide an audit trail for an event and moreover tend to be saved, users may do more cleaning out of their CMS files.

The new FCC inquiry

Another potential problem area of computer message services is that of government regulation. If this seems like an unlikely happening to you, consider the new FCC inquiry.

In late 1966, the U.S. Federal Communications Commission initiated an inquiry into the inter-dependence between computers and communications. The goal of the inquiry was to see if communication common carriers should have new service offerings to meet computer needs, and to draw the boundary between regulated and unregulated services that used both computers and communications. In the final rulings, the principle of "hybrid" services was incorporated—that is, services involving both data processing and data communications in a single integrated service. A *hybrid data processing service* was defined as one where the message switching capability is incidental to the data processing function or purpose. Such a service would not be regulated, said the FCC. In a *hybrid communication service,* the data processing is incidental to the message switching function or purpose; this service *would* be regulated.

But the pace of technology has now required the FCC to reopen the question. With distributed systems, these definitions do not help much. Proc-

essors at the different nodes or levels of distributed systems perform both data processing and data communications functions. It is very hard to say which part is incidental to the other.

So on August 9, 1976, the FCC issued another Notice of Inquiry (Reference 7; also see Bigelow, Reference 8, for a discussion). The FCC proposes new definitions, removing the concept of hybrid systems in the process. Data processing is now (tentatively) defined explicitly as: incorporating arithmetic computations, logical computations, and (information) storage, retrieval, and transfer. Further, in data processing, the semantic content of the input data is changed by the processing (with a bit of fudging to cover the information storage and retrieval case).

In contrast, the underlying characteristic of the communications function is that the semantic content of the data is *not* changed. Activities which fall under the communications function would include message switching, circuit switching, packet switching, speed and code conversion, error detection and correction, automatic call forwarding, abbreviated dialing, and so on.

The intent of these new definitions is to be able to clearly separate the data processing function from the communications function, so as to determine which services will be regulated and which ones not.

Question: where does word processing fit in these definitions? We suspect that word processing will be considered to be an element of data processing, since semantic content can be changed. Words, sentences, and paragraphs can be added, deleted, or changed in word processing systems. Further, word processing systems need not use data communications.

But now consider *public service* CMS; where do they fit in these definitions? These would be publicly offered services, as opposed to in-house, private systems. Communications is an essential element of CMS. There are no arithmetic computations involved, but there may be some logical computations and some information storage and retrieval. Do the message creating and the message handling activities affect semantic content? (We think they can and do.) If so, should public CMS be unregulated? On the other hand, are these message creating and message handling activities just enhancements of traditional message services which *have* been regulated?

What difference does it make? If public CMS are not regulated, we foresee the rapid development of these systems. Costs may plunge rapidly. On the other hand, if public CMS are regulated, only the common carriers will offer such services. We suspect that costs will not drop so rapidly as in the unregulated case. At the same time, CMS to private homes, to partially replace mail services, seems more likely in a regulated environment.

Information resource management

In the past two reports on word processing, and in this report on computer message systems, we have made the point that these deal with only part of the information resources of an organization. In the not-distant future, companies will begin looking at their overall information resources and will start bringing these resources under an integrated management program.

Poppel (Reference 3) uses the term "information resource management" to apply to the more global management of information resources within an organization. He includes computers, business travel, correspondence and memos (and all other paper communications), telephone calls, and so on.

The point that Poppel makes is that electronic message handling will eventually replace most of the business-to-business use of the postal service and will reduce business travel and sizeable amounts of paper handling. The main pressures for this change include the rising costs of conventional information handling, the demands of government for more and more information, and the need to use capital more efficiently.

But the change to electronic message handling will not be easy, says Poppel. People are comfortable with things as they are. For instance, secretaries are not only helpful, they are status symbols. Developments like word processing, which tend to take away the private secretaries, will be resisted. Also, some amount of business travel helps break up job routine and is considered to be useful. Even "paper handling" has psychological benefits for some people.

Electronic mail systems have suddenly become a very "hot topic" at many companies, says Poppel. However, this is creating a potential problem for top management, unless something is done soon. Three groups of people are trying to take

control of these new systems—the telecommunications people, the office people, and the data processing people. Each group has its own viewpoint on electronic mail. In one organization he contacted, there were three different task forces working on plans for an electronic mail system—and it is not unusual for two task groups to be working concurrently in an organization. The question for top management to settle is: who is to control electronic mail systems?

Electronic mail is just a subset of the "office of the future," says Poppel. This office of the future may still be some years away but it is on the horizon. Companies might well start planning for the global management of information resources.

Strassmann (Reference 6) reaches the same conclusion as Poppel from a different point of view. He sees the need for a new position—the "top information executive" who oversees all of the organization's information resources. These resources sub-divide into three sectors, says Strassmann. One is the data processing sector, including equipment, services, suppliers, time sharing, data communications, and so on. The second sector is administrative processing, where the tools and facilities include typewriters, dictating equipment, telephones, copiers, filing equipment, and so on. Finally, the third sector is the office labor component. This includes secretaries, typists, switchboard operators, clerks, people who handle claims, orders, etc.

This office labor sector is the largest single occupational category in the U.S. work force, says Strassmann. It represented about 22% of the labor force and an expenditure of some $350 billion in 1973. Moreover, this "overhead" sector is growing, while the "direct labor" sector is decreasing.

Strassmann suggests a nine-step program for bringing the information resource costs under control. These steps are: identify costs; keep the score on units costs; establish standard costs; set up accountability centers; apply competitive pricing; plan on the long term; let the users control; deemphasize the technology; and use job enlargement.

So the concept of a "top information executive" is emerging. The role of this executive is substantially broader than that of the "top computer executive." Not all computer executives will desire to move into the information executive slot, when it becomes available. Those who do desire this new position might well find themselves as leading candidates.

To give some idea of what the information resources of an organization might encompass, following is a list of "compoments" of an organization's information handling system. Not all of these are the same type of "things"—some are pieces of equipment, some are services, some are systems, some are people, and so on. But the list may give some idea of what can constitute the information resources of an organization.

INFORMATION RESOURCE COMPONENTS

Computer-related resources
- Data processing systems
- Data entry and collection systems
- Remote computing services
- Word processing systems
- Graphics/image processing systems
- Computer message systems and electronic mail
- Information storage and retrieval systems
- Decision support systems
- Text editing systems
- Electronic funds transfer systems
- Monitoring and process control systems
- Operators for all of the above

Tele-communications resources
- Voice telephone
- Teletypewriter message services
- TWX/Telex services
- Mailgram services
- Facsimile
- Television/tele-conferencing systems
- Operators for all of the above

Paper-related resources
- Mail (public mail service; in-house service)
- Courier services; delivery services
- Secretarial and typing services
- Reproduction services (printing, duplicating, copying)
- Records management and filing
- In-house typesetting and publishing
- Microform production
- Clerical handling of paper records
- Operators for all of the above

Face-to-face information transfer
- Business travel
- Business conferences
- Business meetings

We are not implying that the "top information executive" would necessarily have control over all of these components. For instance, it would be quite impractical for this executive to "control" all business travel, conferences, and meetings. What we are saying is that these are information resource components and should be considered in the company's overall information resource man-

agement. Policies might be adopted which define when face-to-face discussions are called for and when electronic communications methods might be substituted for them. And it may be a good number of years before such policies are adopted and enforced, if at all—because no one yet knows just how effective these substitutes these will be. But the possibility of substitution will exist.

The list makes the point, we believe, that global information resource management extends far beyond the data processing department.

Conclusion

In our research for this issue, we did quite a bit of contacting of companies around the country to find out if they had heard of computer message systems and, if so, whether they had any plans yet to use such systems.

Typically, the answer we received was, "I haven't heard of those systems." Consequently, in such cases there were no plans to install a CMS. We did come across plans to install computer-based message switching systems, such as in-house teletypewriter services. Even here, though, we generally were not told that such systems would be tied in with word processing systems, to aid in message creation.

So it appears to us that computer message systems may come as a surprise to many data processing executives.

We hope that this report has pointed out some of the advantages and benefits of CMS, as well as some of the problems and costs. You may find your organization installing a CMS on a limited, pilot basis in the not-distant future.

We hope, too, that we have made the point about the overall management of information resources in an organization. As interesting as they are, CMS are just one aspect of an overall trend to use electronic information handling methods to improve the productivity of human activities.

REFERENCES AND ADDITIONAL INFORMATION

1. Vezza, A. and M. S. Broos, "An electronic message systems: where does it fit?" paper presented at 1976 National Computer Conference but not in proceedings; for a copy, write the authors, Laboratory for Computer Science, Massachusetts Institute of Technology, Cambridge, Mass. 02139.
2. Martin, S. M., E. S. Von Gehren, and R. P. Uhlig, "Practical experience in computer based message systems, pros and cons," paper presented at 1976 NCC but not in proceedings; for a copy, write authors at DRCMS-IS, U.S. Army Materiel Command, 5001 Eisenhower Avenue, Alexandria, Virginia 22333.
3. Poppel, H. L., "Information resource management," *Commentary* (Booz, Allen & Hamilton, 245 Park Avenue, New York, N.Y. 10017), August 1976.
4. Myer, T. H. and D. W. Dodds, "Notes on the development of message technology," *Proceedings of Berkeley workshop on distributed data and computer networks*, May, 1976. For a copy, write the authors at Bolt Beranek and Newman, Inc., 50 Moulton Street, Cambridge, Mass. 02138.
5. *Proceedings of International Council for Computer Communications* (P.O. Box 9745, Washington, D.C.):
   a) Vallee, J., R. Johansen, H. Lipinski, and T. Wilson, "Pragmatics and dynamics of computer conferencing: a summary of findings from the Forum project," ICCC 1976, pages 208-213.
   b) Turoff, M., "The cost and revenues of computerized conferencing," ICCC 1976, p. 214-221.
   c) Turnoff, M., "Party-Line and Discussion—computer-computerized conference systems," ICCC 1972,
6. Strassmann, P. A., "Managing the costs of information," *Harvard Business Review* (Soldiers Field, Boston, Massachusetts 02163), September-October 1976, p. 133-142; price $3.
7. "Computer Inquiry: Notice of Inquiry and Proposed Rule Making, Docket 20828," Federal Communications Commission (1919 M Street N.W., Washington, D.C. 20554), August 9, 1976.
8. Bigelow, R., "FCC begins new computer inquiry," *Computer Law and Tax Report* (210 South Street, Boston, Massachusetts 02111), September 1976, price $48 per year.
9. For more information on TDA, write Commercial Products Division, Computer Corporation of America, 575 Technology Square, Cambridge, Massachusetts 02139.
10. For more information on Hermes, write Bolt Beranek and Newman, Inc., 50 Moulton Street, Cambridge, Massachusetts 02138.
11. An electronic message system offered by Scientific Time Sharing Corp. was reportedly used by President Carter and Vice President Mondale during their recent campaign. For more information on the system, write the company at 7316 Wisconsin Avenue, Bethesda, Maryland 20014.
12. The Honeywell Multics system contains two separate facilities for communication among users—a message facility for long messages and a mail facility for brief exchange and immediate delivery. For more information, contact Honeywell Information Systems, Inc., 13430 N. Black Canyon Highway, Phoenix, Ariz. 85029.

We have heard numerous data processing executives express concern about the rapid build-up of mini-computer systems throughout their organizations. It is often the small, remote units such as regional offices, warehouses, feeder production plants, and so on, that are asking for their own computer systems. The question is: how best to provide computer services to these sites? We have talked to a number of users at small sites and next month we will report on their side of the story—in "Computer Services for Small Sites."

SUBJECTS COVERED BY EDP ANALYZER IN PRIOR YEARS

1974 (Volume 12)

Number

1. Protecting Valuable Data—Part 2
2. The Current Status of Data Management
3. Problem Areas in Data Management
4. Issues in Programming Management
5. The Search for Software Reliability
6. The Advent of Structured Programming
7. Charging for Computer Services
8. Structures for Future Systems
9. The Upgrading of Computer Operators
10. What's Happening with CODASYL-type DBMS?
11. The Data Dictionary/Directory Function
12. Improve the System Building Process

1975 (Volume 13)

Number

1. Progress Toward International Data Networks
2. Soon: Public Packet Switched Networks
3. The Internal Auditor and the Computer
4. Improvements in Man/Machine Interfacing
5. "Are We Doing the Right Things?"
6. "Are We Doing Things Right?"
7. "Do We Have the Right Resources?"
8. The Benefits of Standard Practices
9. Progress Toward Easier Programming
10. The New Interactive Search Systems
11. The Debate on Information Privacy: Part 1
12. The Debate on Information Privacy: Part 2

1976 (Volume 14)

Number

1. Planning for Multi-national Data Processing
2. Staff Training on the Multi-national Scene
3. Professionalism: Coming or Not?
4. Integrity and Security of Personal Data
5. APL and Decision Support Systems
6. Distributed Data Systems
7. Network Structures for Distributed Systems
8. Bringing Women into Computing Management
9. Project Management Systems
10. Distributed Systems and the End User
11. Recovery in Data Base Systems
12. Toward the Better Management of Data

1977 (Volume 15)

Number

1. The Arrival of Common Systems
2. Word Processing: Part 1
3. Word Processing: Part 2
4. Computer Message Systems

(List of subjects prior to 1974 sent upon request)

PRICE SCHEDULE

The annual subscription price for EDP ANALYZER is $48. The two year price is $88 and the three year price is $120; postpaid surface delivery to the U.S., Canada, and Mexico. (Optional air mail delivery to Canada and Mexico available at extra cost.)

Subscriptions to other countries are: One year $60, two years, $112, and three years $156. These prices include AIR MAIL postage. All prices in U.S. dollars.

Attractive binders for holding 12 issues of EDP ANALYZER are available at $4.75. Californians please add 29¢ sales tax.

Because of the continuing demand for back issues, all previous reports are available. Price: $6 each (for U.S., Canada, and Mexico), and $7 elsewhere; includes air mail postage.

Reduced rates are in effect for multiple subscriptions and for multiple copies of back issues. Please write for rates.

Subscription agency orders limited to single copy, one-, two-, and three-year subscriptions only.

Send your order and check to:
EDP ANALYZER
Subscription Office
925 Anza Avenue
Vista, California 92083
Phone: (714) 724-3233

Send editorial correspondence to:
EDP ANALYZER
Editorial Office
925 Anza Avenue
Vista, California 92083
Phone: (714) 724-5900

Name_____

Company_____

Address_____

City, State, ZIP Code_____