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Electronic mail

This book was originally published in 1995 by Artech House. This version only includes the chapters about social effects of CMC. This version has been extended with additions, which can also be found at http://www.dsv.su.se/~jpalme/e-mail-book/e-mail-book.html

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Contents

Preface

This book gives a broad survey of electronic mail. The book explains both the techniques and the uses of this medium. There are chapters about the effects on people and organizations, cost/benefit analysis, functions, standards, markets, ethics, legal aspects, and research. The book can be used as a textbook in education, for people working with or planning to use electronic mail, and for others interested in this area.

Uses, effects, and benefits of electronic mail are discussed in Chapters 1-5. Functions, techniques and standards are described in Chapters 6-8. The market is described in Chapter 9, ethics and law in Chapter 10, and an introduction to research is given in Chapter 11. Chapters are ordered in this way, so that those who want to read through the whole book will have read about techniques as a background for Chapter 9-11. Those who are less technically inclined can, if they find the text too technical in Chapter 6-8, skip directly to Chapter 9.

References to electronic documents are given in the URL format. To download such documents, use a network program that accepts URL as input and use the command *Open URL*.

The words “he” and “his” when used in this book, refer to both males and females.

Many people have helped me with ideas and checking of this book. I especially want to thank Hans Köhler (Universität Hohenheim, Germany), Carl-Uno Manros (Onsett International, Massachusetts), Markus Kuhn (University of Erlangen), Harald Tveit Alvestrand (SINTEF, Norway), and Sead Muftig (Stockholm University). I take personal responsibility for all errors which may occur in the book.

Chapter 1

Introduction

Many of the electronic mail systems today are already connected together in networks, so that users can send mail to each other, regardless of which mail system each of them is connected to. In the future, almost all systems will be connected in this way. This means that all the electronic mail systems, when connected, behave as one large system. This large system may eventually be comparable in size and complexity to the world-wide international telephone network, but will have more advanced technical functions, and will be more of a data-processing system than the telephone network.

Chapter 2

Electronic Mail and Other Media

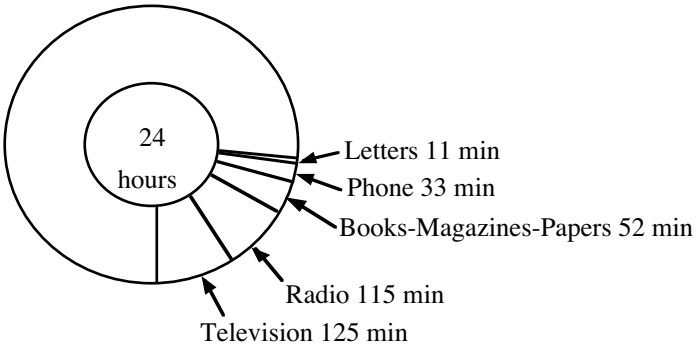

Figure 1 Use of technical communication modes.

If you compare the speed with the number of people reached, you get the diagram in Figure 1.

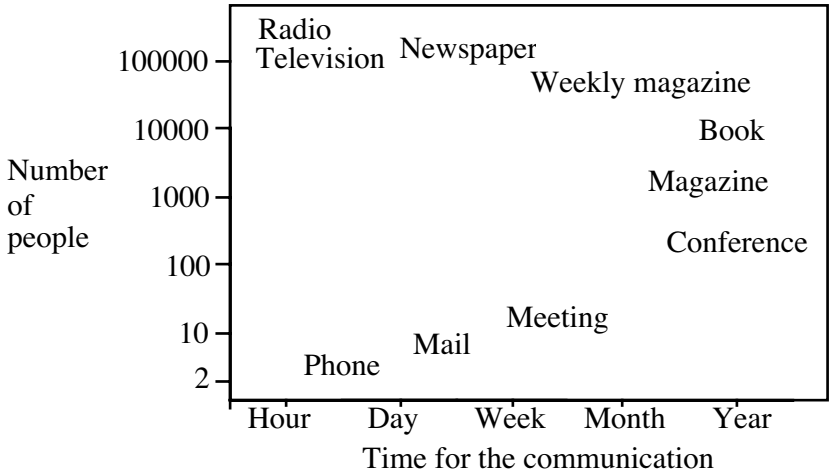

Figure 2 Speed and size of the user group in various media.

What is interesting about theFigure 2 is the large empty space in the middle. There are no good conventional media for communicating to groups of 8-1000 people in a day or less. Electronic mail and other computerized media makes such communication possible.

Figure 1 and Figure 2 only include well-known, traditional media. New media, whose use is not yet very prominent in statistics for the whole population of a country, include, for example:

- Telex and its more modern variant teletex;
- Fax,
- Group telephone calls (audio conferencing);
- Video conferencing;
- Databases and videotex systems;
- Electronic mail and voice mail systems; and
- Bulletin board systems and computer conferencing systems.

Electronic mail, as defined in this book, has the following properties

- The user produces, sends, and usually also receives mail at a computer screen, a terminal, or a personal computer.
- The messages sent have a data structure, which can be handled by a computer. This structure can be more or less advanced: it can, for example, allow the user to ask his computer to find the last received letter from person *N* about the subject *XYZ*, or to find the outgoing message, to which a certain incoming message replies.

Another common term for systems in this area is *CMC (computer-mediated communication)*. This term encompasses all computer systems whose primary aim is to relay information between persons. Electronic mail, bulletin board systems, and computer conferencing systems are most common for CMC. Since e-mail is more often embedded in other applications, the borderline between e-mail and other computer applications is not well defined.

Another term in this area is *groupware* or *CSCW (computer supported cooperative work)*. This is software for communication between groups of people. Johansen [1] proposes that different groupware applications can fit into different quadrants of Figure 3 [2].

	Same place	**Different place**
Same time	Ordinary *face-to-face* meetings, but may be supported by computer tools, for voting, producing records, pinpointing issues, etc.	*Video and audio conferences*, supported by computer tools similar to those for same time/same place but operating in a wide-area networked environment.
Different time	*Electronic mail, voice mail* and *computer conferencing* usually belong to this area. Such systems must be able to store messages and a structured organization of such message stores is often useful. The functionality for different time applications is usually similar for same place and different place usage.	

Figure 3 Time-place functions of different media. After [2].

Electronic mail and related applications are common tools in the *different time* half of Figure 3. The term electronic mail is not normally used to refer to *same-time* (see Section 6.3) text communication systems. Thus, electronic mail needs facilities to store messages.

Messages are usually stored in personal mailboxes for senders and recipients, but some systems for group communication employ storage areas shared by several users.

References

[1] Robert Johansen *Groupware—Computer Support for Business Teams*, The Free Press, New York, 1988.

[2] Robert Johansen *Leading Business Teams: How Teams can use Technology and Group Process Tools to Enhance Performance*. Addison-Wesley ISBM 0-201-52829-0, 1991.

Chapter 3

When is Electronic Mail Successful?

Everyone makes a personal choice of whether electronic mail is worth the cost just for him/her (It is seldom successful to try to force electronic mail on people who do not themselves feel the need for it).

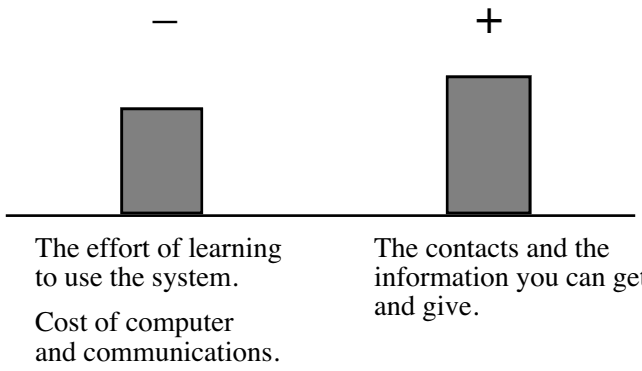

Figure 4 Factors in a personal decision to use or not to use electronic mail.

Figure 4 shows the most important pros and cons in this personal choice. These factors are important, if you want to predict whether the introduction of electronic mail in a group will be successful. If the people involved already use computers and if you can make the electronic mail application easy to use, then this will increase the probability of success. If the electronic mail application allows its users to reach many people and if they find it important to exchange information with these people, then the probability of success will again increase. Note that the pros are related to the volume of e-mail usage, while the cons are volume independent. Thus, higher volume increases the likelihood that the pros will outweigh the cons.

The following criteria are especially important to the success of electronic mail:

- The users should be accustomed to using computers. (Typing capability, however, is of less importance.)
- Each user should have a computer screen at his workplace and not need go to another area to use the electronic mail system.
- People who the users find it important to communicate with should be active users.

- The users should feel a real need to communicate with people who they can reach via electronic mail.
- users should feel a "solidarity" with other active users of electronic mail.
- The total amount of communication offered should be large enough to satisfy the user. This is often related to the number of people the user can reach via electronic mail.

As a consequence of the above factors, one can conclude that the introduction of electronic mail will often *not* be successful in two common cases

- The decision to use electronic mail has been made by people other than the actual users, simply because the decision makers believe that the use electronic mail is a high priority, even though the users themselves find other things more important.
- Electronic mail is introduced on a too small a scale, so that it does not reach the necessary critical mass (see Section 4.6) of users and/or communication volume.

Chapter 4

Value for People and Organizations

4.1 New Communication or Old Communication In a New Medium?

Much behavioral-science research has been done on electronic mail (See also chapters 3, 4, and 11). This research has resulted in a considerable amount of data about the effects of electronic mail on people and organizations. One important result is that electronic mail does more than just change the form of communication from other media to computers. The introduction of electronic mail changes communication patterns, so that people communicate with different people than before, more often and about other subjects than before.

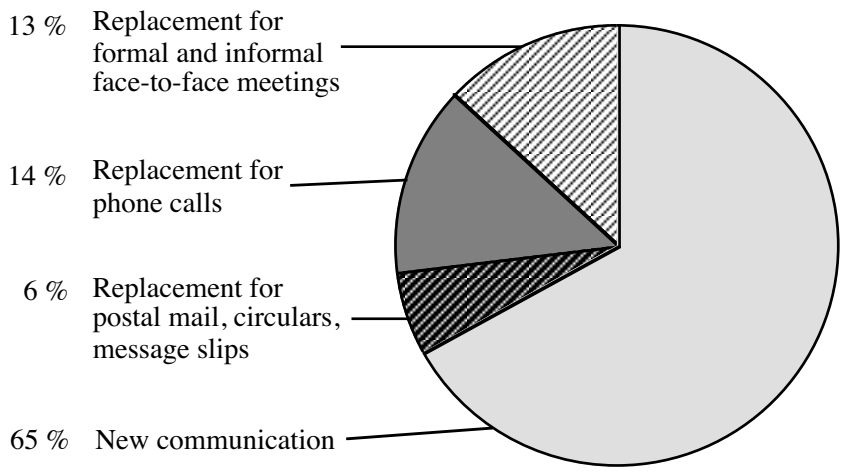

Figure 5 Is electronic mail a replacement for other media?

Figure 5 shows the result of an investigation [1] into the use of an e-mail system, a few years after its introduction. The percentages given show how much of the communication is new communication, that would not have occurred without e-mail and how much is communication that would have occurred with conventional media. The results may seem surprising but will not be so after some consideration. Look at other important media, such as print or telecommunication. If you look at all the communication via books, journals, newspapers, and the telephone, you would certainly conclude that most simply would not occur if these or

other similar media had not been available and thus that most of the actual communication, in the printed and phone media, is new communication. If a communication medium opens possibilities for new kinds of contacts that would not have been practical or economically possible without the new medium, then people will take advantage of the new possibilities and change their patterns of behavior.

4.2 Changes to Organizations

How, then, has the behavior of an organization changed? The investigation [1] this looked at how much communication was between people who were close to each other (employed in the same department) and how much was between different departments and with people outside the organization. The investigation compared personally addressed messages and group messages. A group message is a message in which the sender did not explicitly input the names of the recipients when sending the message. Instead, the sender gave only the group name, and the computer then sent the message to all the members of the group. Such a function is available in most electronic mail systems. The result of this investigation is shown in Figure 6.

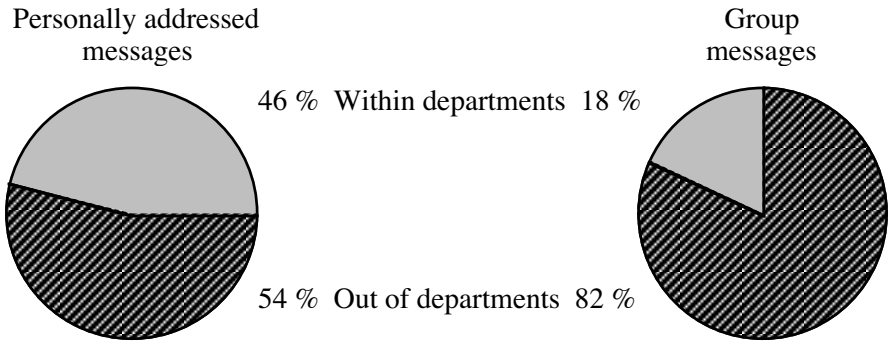

Figure 6 Use of e-mail to communicate to people who are close or far away.

Figure 6 shows an important effect of electronic mail: increased communication between people who are distant geographically or organizationally. Without CMC, [4] finds that a surprisingly large percentage of the contacts of company employees are with other people less than a 100 feet away. Other investigations [2] have shown similar results and also found that electronic mail increases the contacts which do not follow the hierarchical organizational charts, that is, contacts between people other than coworkers and between bosses and their subordinates. The change may not always be as radical as shown in Figure 7, which shows the tendencies of change in an organization when electronic mail is introduced.

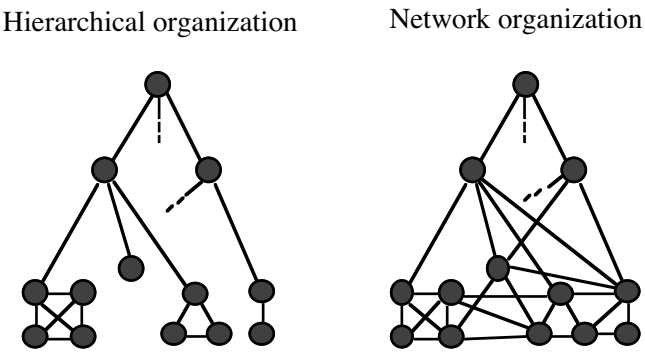

Figure 7 Organizational effects of electronic mail.

As an example [3] tells the story of a large American company, where an employee had an idea for a new product and told other people in an electronic communication group about it. Other employees in different locations jumped at the idea, and a smaller group of people with a special interest in the idea was formed to discuss the design of the new product. If you analyze this example, you will see that it only took a few days from the idea to the formation of a group of experts, with members from different parts of the company, to the development of the product. If the company had used traditional communication patterns, several months would have passed before the new idea had filtered up and down through the organization and caused such a geographically distributed group of experts to be formed.

4.3 Will Electronic Mail Improve Companies?

4.4 Exchange of Experience Using Electronic Mail

- Users of the same computer product;
- Researchers in the same area;
- Lawyers specializing in a particular legal field; and
- Doctors specializing in a certain area of medicine.

This has become a common application for electronic mail because it simply was not possible with any other medium to have contact every day for a reasonable cost between a geographically distributed group of experts. (See Section 5.5.) The cost with other media would have been prohibitive; electronic mail has a particularly low cost when compared to alternative media.

4.5 The Changing Roles of Supervisors and Managers

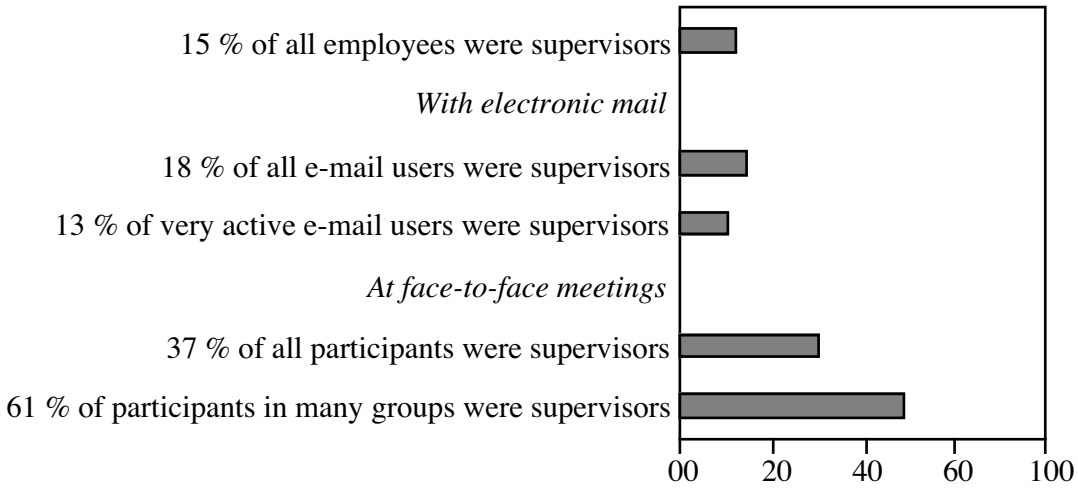

Figure 8 Percentage supervisors in e-mail as compared to face-to-face meetings in a large research agency [1].

The changes in the workings of an organization described above will also influence the role of supervisors. One role of a supervisor is to move information along the traditional channels of communication in an organization, for example, between subordinates and supervisors. Another role is to find the right person to perform a certain task. These roles are, to some extent, taken over by the computer when electronic mail is used.

Different supervisors have different reactions to the introduction of electronic mail. Many experience positive effects

- Supervisors are freed from mundane work, since the computer system will perform some tasks that they previously had to perform themselves. (Supervisors are often overwhelmed by such tasks.)
- Supervisors can use the computer to encourage discussion of an issue and collect the ideas of many employees, reducing the risk that some important aspect of the issue is forgotten.
- The computer helps supervisors monitor what is happening in his organization.

4.6 Group Size and the Critical-Mass Hypothesis

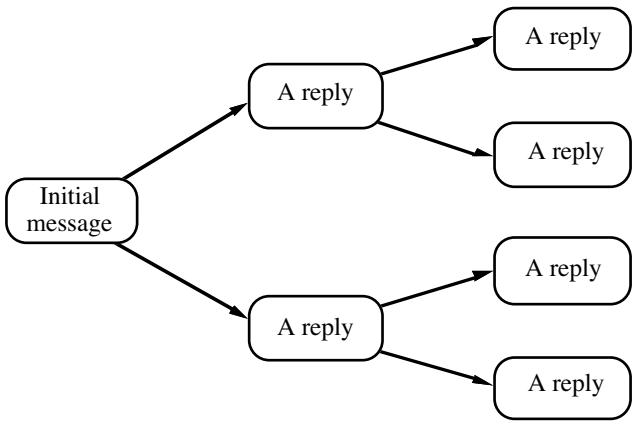

Figure 9 Chain reaction of group discussions in electronic mail.

Figure 9 shows how a chain reaction of messages can arise if each message on average causes more than one replying message.

The effects of group communication on group size is discussed further in Section 5.5.

4.7 Examples of Observed Effects of E-Mail/CMC

A salesman wants to sell the product ABC to a customer in the XYZ branch. He uses the CMC networks in his company to inquire about other customers in the XYZ branch who have bought the ABC product. This example shows how CMC networks are used to find information available in other parts of the company. Note that the information to be found was not found in a computer data base. The search was not done on information in the computer, but in the knowledge of other employees connected to the network.

As an alternative, the company could have a data base with this kind of information. However, this can be very costly compared to the usage of the data base. CMC networks can thus be more efficient than preestablished data bases when a company's information needs cannot be well defined in advance, such as to improve the capacity of the organization to cope with new, unanticipated problems.

In another example [6 as quoted in 5] Tandem computers installed a network of 8,000 personal computers for a large company. A serious problem occurred during the installation, a problem which could have stopped the whole installation process. Through use of CMC networks, it was easy to find a Tandem employee who could solve the problem, and it was resolved within 24 hours.

Unexpected problems often occur in routine work, and CMC is a valuable tool to quickly assemble the information needed to solve such problems. Note that this is very different from the communication provided by company newsletters. Such newsletters give the same information to everyone and only contain a small collection of all possible information. CMC networks, on the other hand, let people ask for information specific to their needs, which

means that they get the information relevant to their problems when the information is needed.

4.8 Coordination and Decision-Making

In preparing for decisions, it is important to assemble all facts, ideas, alternatives, and consequences before making the decision. CMC has been found to be more efficient than face-to-face meetings in assembling information, because more people can be reached more quickly and at reasonable costs [7]. CMC has also been found to be more efficient for at coordinating the work done at different places in an organization [8]. Traditional media, like travel, face-to-face meetings, courses, inventories, and company regulations, are not always very efficient in coping with such coordination problems. Travel may be too expensive. The main advantage of CMC is that it goes on all the time in parallel with other activities. Whenever you have a problem, you can immediately reach a group of people who can help you.

The lack of body language, voice inflection, etc. increases the risk of misunderstandings. Locked situations will more easily occur in CMC, where people stick with their initial opinions and are unable to agree. CMC may need to be combined with face-to-face or phone communication in such cases.

To reach an agreement, or at least to make a decision in order to go forward, it is important to get a feeling about the general view of the participants. This is not only a matter of the majority view, a strongly held minority view may succeed against a less strongly held majority view. Most messaging systems do not provide tools to get such a feeling of the general view, and this can seriously restrain progress. In most messaging systems, you only see the opinions of those who actively write messages, while in face-to-face meetings, also the opinions of other participants are felt by a good chairman through body language.

In face-to-face meetings, the limited time and desires of the participants to get results will often stop a discussion on an item when nothing more important is said and the discussion starts to repeat itself. In most messaging systems, there is no such tool to stop discussion, and this can cause discussions to be too longwinded. Experienced chairpersons in messaging groups have developed tools to at least partially alleviate these problems, by forcefully saying “no more discussion on this” and by trying to summarize the opinions.

Many messaging-based groups (mailing lists, newsgroups, bulletin boards, etc.) allow anyone to participate. Sometimes this causes serious clashes between different groups of people who want to discuss different things, and often the only resolution is to split the group or to exclude certain members from further participation. In face-to-face meetings, less drastic measures are often available.

Possible, future development of CSCW techniques will develop computerized tools which will help to solve these problems and be able to replace the face-to-face cues. But such tools are not commonly in use yet. Certainly, chairmen of messaging based groups need to learn new skills in order for the new medium to work well.

Some researchers [5] claim that electronic mail tends to favor something called “flaming”, by which is meant stormy debates of uncontrolled outbursts of anger. Other researchers do not agree that flaming is more common in e-mail than in other human

communications media or not. The word “flaming” is also sometimes meant to refer to sudden intensive bursts of lot of messages in e-mail distribution lists and conference systems, often on small specialised issues and with much repetition and long-worded contributions. The difficulty of reaching consensus in e-mail may be one reason why such flame bursts sometimes tend to be more long-lived than in other human discourse. Another reason is that there is usually no time limitations in e-mail as in face-to-face meetings. Sometimes etchical rules for e-mail try to discourage flaming by recommending that “if a message makes you angry, wait a day until your anger dies down before writing a reply”.

CMC can increase feelings of “togetherness” and understanding with other people in an organization. Without CMC, people tend to extend such feelings to only a few people with whom they interact daily. While employees are generally more loyal to their own branch office than to the whole company, CMC can integrate geographically distributed people more integrated into the activities of their company [9]. CMC usage increases the loyalty and positive feelings to the whole company [10].

For a merger between companies to be a success, it is important to integrate the employees into the whole new company, while preserving their individual knowledge and experience. Reference [5] reports that connecting all the employees to a common e-mail network was an important tool in this process.

Investigations show that CMC allows a person to participate simultaneously in more parallel group processes and have a more flexible range of contacts. Increasing the number of parallel group processes in this way has even been shown to increase the mental health [11].

CMC also increases the contacts with people outside a company [1, 2, 12]. This is important because people are surprisingly willing to help each other even if they work in different organizations. Such cooperation patterns make companies more able to follow trends and avoid getting stuck in old and inadequate ways of solving problems [4, 5].

CMC has also been found to be a useful tool for distance education [13-16].

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Chapter 5

Cost/efficiency Analysis

5.1 How Cost/Efficiency Analysis can be Used

- Whether and how to introduce electronic mail into a company;
- What kind of system to obtain;
- How to use an electronic mail system; and
- Changes in the organization of work as a result of the introduction of electronic mail.

5.2 Can the Productivity of Office Work Increase?

When techniques for word processing, electronic mail, etc., first began to be used, James Bair [1] analyzed the potential for improvement in the efficiency of office work. He noted that, during a ten-year period, productivity had risen much faster in industrial production than in office work, as shown in Figure 10. He then looked at the possible gains in starting to use word processing systems, which today is still the most common computer application. He looked at how much of the time is actually spent writing text. His results are shown in Figure 11.

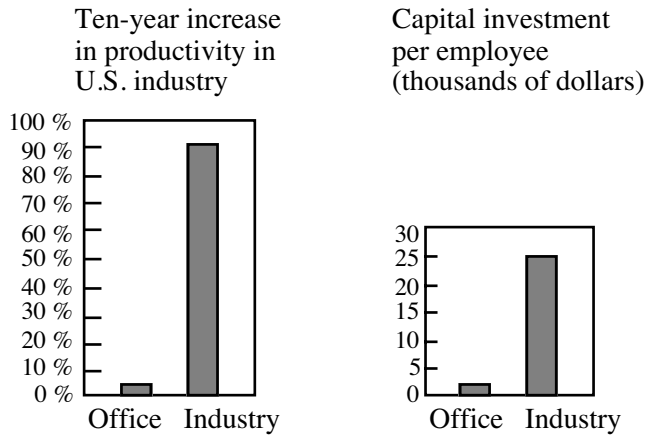

Figure 10 Comparison of productivity increase for clerical and industrial work. Source: [1].

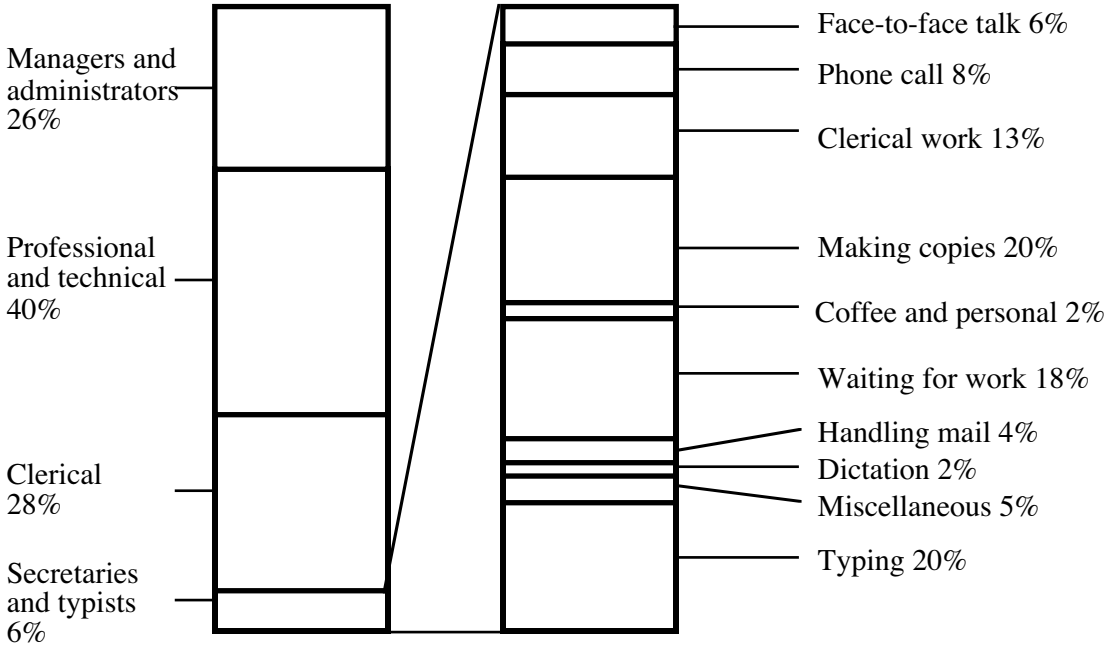

Figure 11 Percentage of personnel costs for different activities in office work. Source [1].

Figure 11 shows that typing was only 20 percent of the working time for 6 % of the personnel. In total, Bair said that typing represented 2 percent of the wage sum in an office. Bair concludes that the benefit from word processing systems is very low. Today, knowing how word processing has changed office organization, with people typing their own texts instead of using a typist, we might say that Bair's reasoning is faulty. He only looked at the possible improvement within an existing organization of work and did not take into account the improvements possible by changing the organization of work—having people typing who did not type before.

Still, Bair's reasoning is interesting, since he also looks at where real efficiency gains are possible. What kind of office work is so common , that improvements would really result in large savings? The work time of supervisors and administrators is distributed as shown in Figure 12.

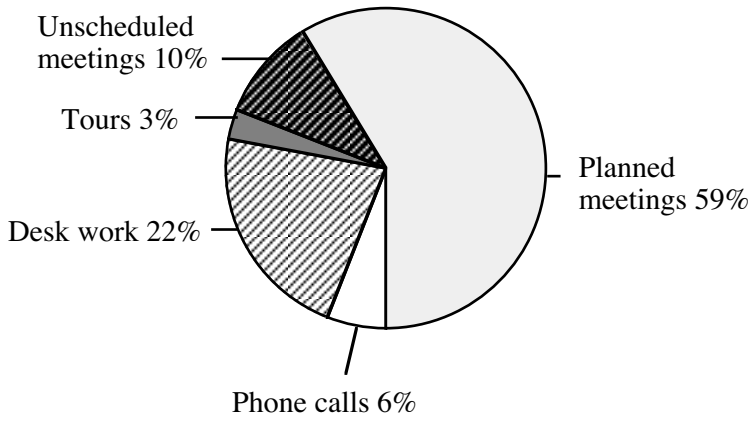

Figure 12 Fraction of the working time managers spend on different activities. Source [1]

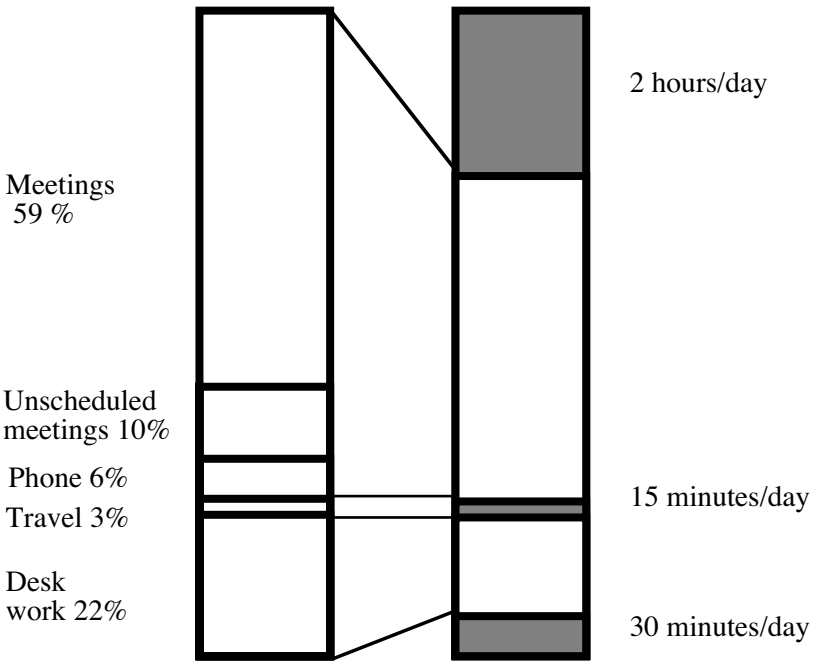

Figure 13 Comparison of productivity increase for clerical and industrial work. Source [1].

Bair's analysis shows the potential for improving office work, it does not measure how this potential can be realised. A restriction of Bair's method is that it only looks at cost savings for existing work patterns and does not show the gains from new organizations of work made possible by the new media. The introduction of word-processing systems

connected to common data bases has, for example, made possible a new way of working with texts that Bair's method cannot measure. But Bair's results are still interesting, however, and give us something to think about, even 15 years later.

5.3 Comparison with Telephone Calls

According to Bair, only every fourth phone call reaches the intended person: there are three unsuccessful attempts for each successful call. The total working time for the caller, the callee, and all other involved people (exchange operators, people taking messages, people answering coworkers phones) is shown in Figure 14. The time cost for each successful phone call is 20 minutes, compared to 4.7 minutes for an electronic mail message [1 and 2]. If four electronic mail messages can produce the same result as one phone call, then the electronic mail system is only slightly more efficient. If the task can be completed with less than four messages, then electronic mail is certainly more efficient. If more than five messages are necessary, then the phone will usually be more efficient. All this assumes that you only want to reach one single person. Since the high costs are for people, not for equipment, the comparison is not particularly sensitive to the technical costs of computers and phone calls.

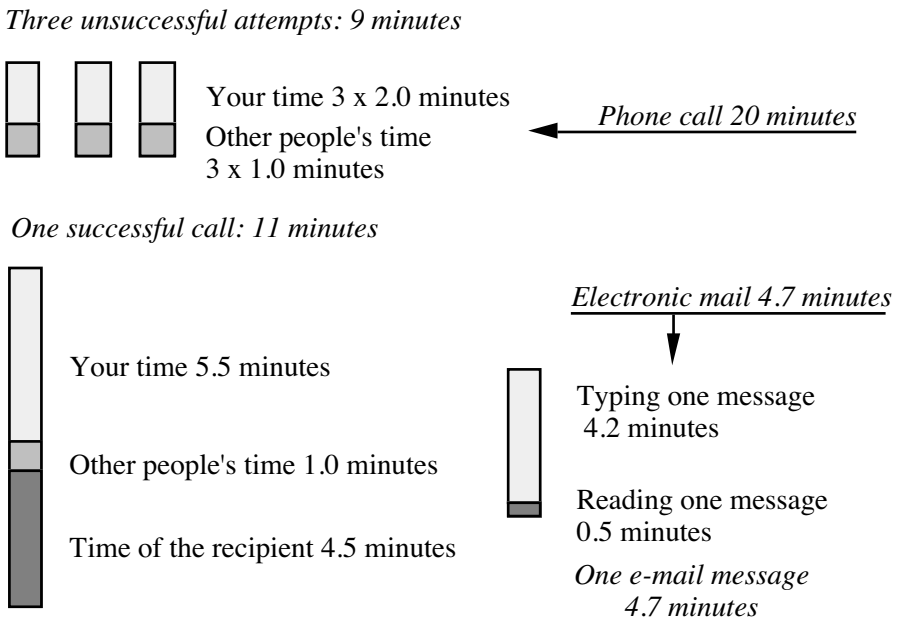

Figure 14 Total working time spent on one phone call versus one e-mail message.

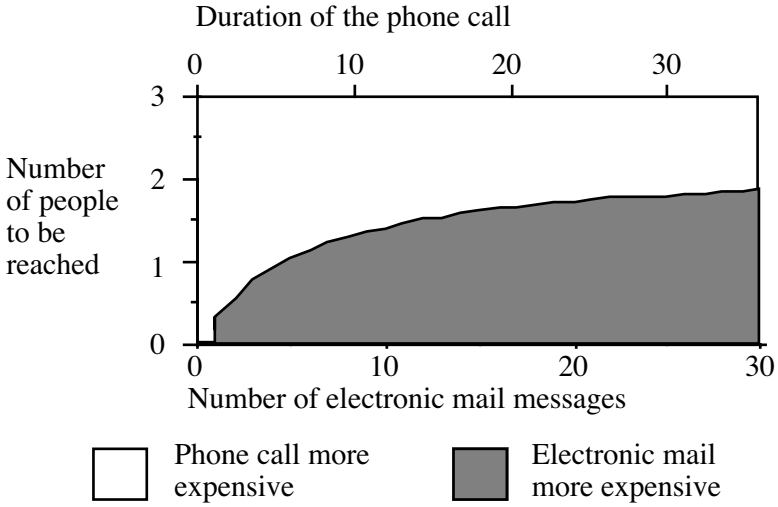

Figure 15 Comparison of the cost of phone calls versus electronic mail.

Figure 15 shows when phone calls or electronic mail are most efficient, assuming that each electronic mail message, taking 4.2 minutes to write and 0.5 minutes to read, replaces 1.2 minutes of the time for phone calls. The figure shows that phone calls are hardly ever the most efficient way to reach more than one person. Theoretically, two phone call might be more efficient than electronic mail if each phone call lasted more than one hour, but you very seldom want to discuss the same topic by phone for more than an hour each with two different people.

One can thus conclude that electronic mail is almost *always* more efficient in terms of time spent if you reach *more than one person*, or, when you only need to reach *only one person*, if the task can be completed with less than four or five messages.

5.4 Comparison with Postal Mail, Post-It Notes, Telex and FAX

Compared to an average of four minutes to write an electronic mail message, the average time to produce a postal letter is half an hour. Scraps of paper with messages on them are faster to produce, but still more time-consuming than electronic mail messages. This does not mean that electronic mail is always more efficient. Postal letters are used for formal communication with high demands on correctness and neatness, and this will, of course, be more costly to produce. Electronic mail is used for more informal communication, and it is in fact more of a replacement for phoning than for postal mail. An electronic message is also usually sent faster than a postal letter. Most electronic mail messages are available to the recipient only a few seconds or minutes after they were entered.

The cost of sending electronic mail is for short messages roughly similar to the cost of sending postal messages. Most electronic mail messages are short: the average length of a message in a system was about six lines (not including the message heading) [1].

Telex and fax functions similarly to, but faster than postal mail. They are as costly to produce as postal mail, except with some systems which support the sending of fax messages in a manner similar to electronic mail systems.

Telex and fax are also much less efficient than electronic mail when communicating with groups of people. Another advantage of electronic mail is that you can easily insert data produced by a computer, and the recipient can easily use this data on his computer. An advantage of fax is that you can send pictures and existing paper documents. Most electronic mail systems today do not yet support this. Most existing systems for electronic mail do not support the signing of letters as well as postal mail and fax do.

The large difference in quality between electronic mail, postal mail, and fax means that in reality they are not competitive systems. The choice of medium is usually obvious, and the different media support different communication needs.

5.5 Comparison with Face-to-Face Meetings

Electronic mail is used so often for group communication because it is particularly efficient for many types of group communication; this will be explained further below.

Group communication using electronic mail is very different from ordinary meetings. Even audio and video conferencing and group phone calls are more similar to face-to-face meetings than to electronic mail. The important difference is that, in ordinary meetings, all communication is concentrated to a short time period (usually one or two hours). All communication must be done in this short period, or it will have to wait for the next scheduled meeting, which might be a week or a month later. If you forget one aspect of an issue, have to look up a fact, or get an idea the next day, then it has to wait until the next meeting. With electronic mail, the process is not concentrated in a fixed meeting period. Participants enter the system when they have time, read what others have written, give their own views, and connect again at a later time.

Electronic mail is more efficient for some kinds of group communication for the following reasons

- You save the cost and effort of travelling and gathering everyone in the same place at the same time.
- Each participant has greater control over his own communication: what to read, when to read it, what to read carefully, what to skip, and when to write his own comments. If you prefer, you can think about an issue and reply the next day.
- Since you write slower but read faster than listening and talking in voice communication, written communication is more efficient if the size of the group is larger than about five people.

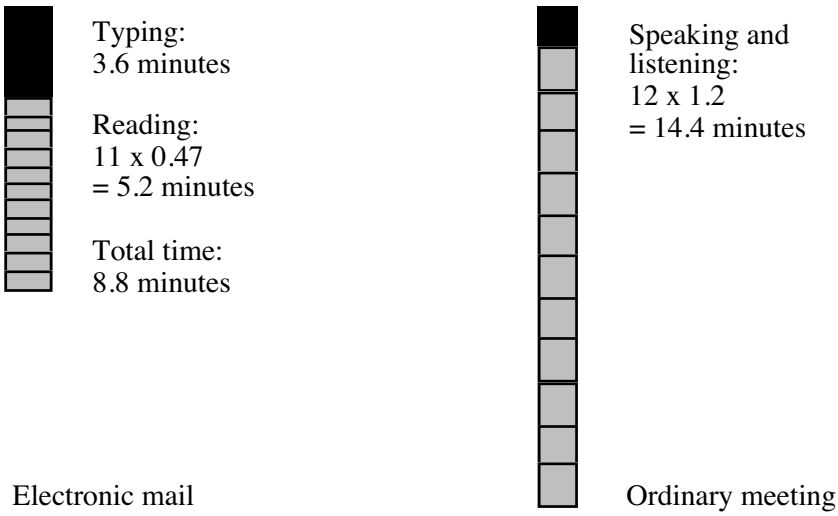

Figure 16 Comparison of the time spent giving and receiving information in written versus spoken communication in a group with 12 participants.

The shorter reading time with electronic mail is caused not only by the fact that you actually read faster than you listen, but also because you have more control over your own reading than over your listening: it is easier to spend less time on less-important texts and to read carefully what is most important to you.

The results described above are not only a matter of efficient use of time, they are also important psychologically. Everyone knows that it is difficult for face-to-face meetings to work well if the number of participants is larger than about 5 to 8 people. Typical problems of meetings with many participants are:

- The meeting takes more time than planned;
- Everyone does not have time to say what they want;
- There is not enough time to cover all items on the agenda as fully as needed; and
- Many people feel that too much of their time is spent in meetings, and within these meetings on discussion of issues they already know or are not interested in.

This result can also be understood by looking at Figure 16, and comparing the additional cost of including one more person in the communication process with electronic mail. This additional cost is less than half of the corresponding cost at a face-to-face meeting. Thus, with electronic mail, you can choose to include more people, at more reasonable additional cost than with face-to-face meetings.

Figure 16 only covers the time the participants actually participate in the meeting. Other costs (gathering everyone at the same time and place, travel, computer, etc.) are usually higher for face-to-face meetings than for electronic mail. The technical costs for simultaneous audio conferences are comparable to those of electronic mail, while video conferences are much more expensive.

Note, however, that the travel cost per meeting minute is smaller the longer a meeting lasts, for face-to-face meetings. As an example, I have estimated the cost of a meeting

assuming that two-thirds of the participants do not have to travel and that one-third must travel 150 kilometres. The estimate includes working time, computer time and travel costs. If more or fewer people have to travel, if the travel distances are larger or smaller, or if you use other prices, the result will differ. The result, with given assumptions, are shown in Figure 17.

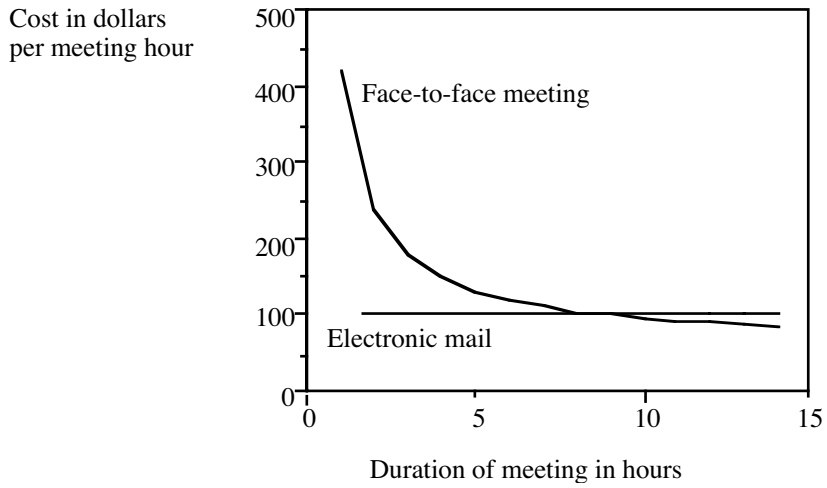

Figure 17 Comparison of cost for e-mail versus face-to-face meeting with five participants.

Figure 18 shows that a face-to-face meeting will cost more than electronic mail if the duration of the meeting is less than a whole day. This is, of course, the reason why face-to-face meetings where participants have to travel usually are held at large time intervals, and last for a longer time. It is obviously a disadvantage if you can only meet a few times a year. With electronic mail, an issue that needs 15 or 30 minutes of discussion can be taken up immediately, and there is no need to wait for the next scheduled meeting.

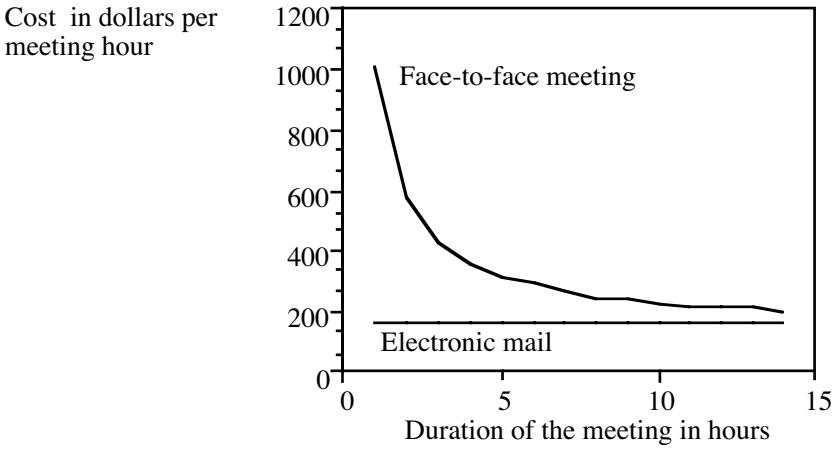

Figure 18 Comparison of cost for e-mail versus face-to-face meeting with twelve participants.

Figure 19 shows that, with twelve participants, electronic mail will be less expensive even if the duration of the meeting is two full days.

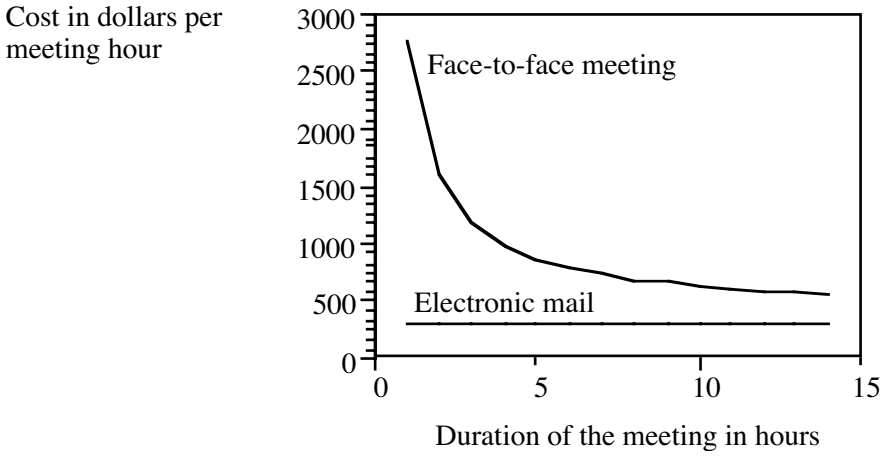

Figure 19 Comparison of cost for e-mail versus face-to-face meeting with 33 participants.

Figure 19 shows that, with 33 participants, face-to-face meetings will be so expensive that such meetings in fact are very seldom organized. Symposia, lectures, conferences, etc., are of course exceptions. My assumptions are not valid for such meetings, however, since I have assumed that all participants have roughly equal rights to speak. At symposia and lectures, this rule does not hold: the speakers have more opportunities to talk than the other participants. In this way, higher efficiency is achieved for larger group sizes. This is an important difference between electronic mail and face-to-face meetings: discussion with equal rights to "talk" is possible through CMC even with 33 or more participants.

Some may object that this is irrelevant, since large face-to-face meetings with equal speaking rights are seldom held, but the reason such meetings are so seldom held is that before electronic mail, there was no efficient medium for them. If electronic mail provides an efficient medium for large meetings, the result will be opportunities that simply could not be realised otherwise. The more people can participate in a discussion, the more people can be kept informed, the more people get a chance to have their say, the less is the risk of forgetting some important factor. A survey of users of an e-mail and computer conference system showed that a large majority of its users agreed with these statements [3].

An interesting factor to note is that, in a face-to-face meeting with 5 participants, each participant is allowed to talk for an average of 20 percent of the time. In an electronic mail meeting with 33 participants, each participant also spends 20 percent of the time giving information, writing messages, etc. See Figure 20.

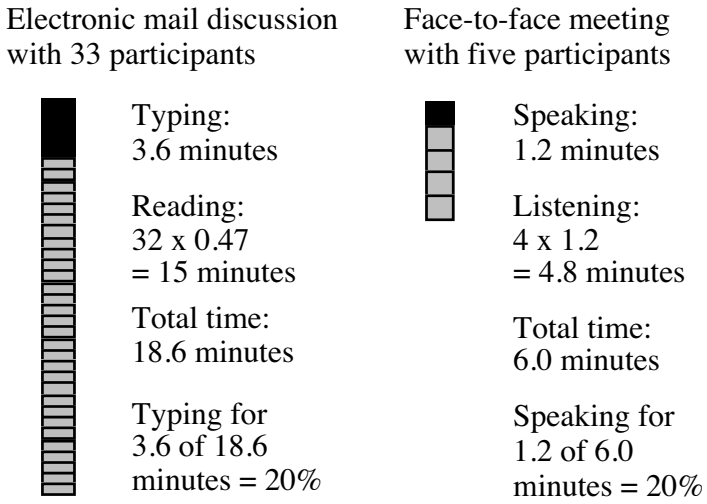

Figure 20 Number of participants to get roughly 20 percent giving and 80 percent receiving per participant.

Maybe human communication (with equal speaker rights) works best psychologically if the participants can be active and give information at least 20 percent of the time. This could be the reason why face-to-face meetings seem to be most efficient with group sizes of about 3-7 people, while group communication using electronic mail or computer conferencing systems seems to be efficient in groups of 20-100 people or more.

5.6 Comparison with Audio and Video Conferencing and Voice Mail Systems

Research on these media [4] shows that the difference in efficiency between audio and video conferencing is rather small. The much higher cost for video conferencing seldom gives a corresponding improvement in the quality of the communication. According to [4], audio conferencing is a suitable medium for routine meetings held to solve simple tasks.

Voice mail systems are functionally similar to electronic mail and are sometimes combined with electronic mail. Existing voice mail systems, however, do not usually provide facilities for organising and structuring information as that are as good as in more advanced electronic mail systems. The cost of storing information is also much higher for voice mail systems. Voice mail also seems psychologically inappropriate except for short messages to a small number of recipients. The advantage of voice mail systems is that they can be used from an ordinary voice phone, so no access to a computer is necessary. This can be of special value for people who travel a lot.

5.7 When is Electronic Mail the Best Medium?

- Electronic mail costs less than a phone call when you have to reach more than one person, or, when you only have to reach one person, if the issue can be concluded with a maximum of four messages averaging 6 lines/message.

- Electronic mail costs less than postal mail and messages on scraps of paper with notes on them, except for very long messages.
- Electronic mail costs less than face-to-face meetings for large groups, or if some participants have to travel to the meeting and the duration of the meeting is less than a full day.

Practical experience with the use of electronic mail shows that it is mostly used for resolving small, simple issues and for group communication. This shows that users have an intuitive understanding of when electronic mail is the most suitable medium, even though they have not made a formal comparisons this chapter has.

In addition to these conclusions, electronic mail is usually more efficient if the recipient processes the information in a computer, especially if the message is partly formatted with fixed fields (like a bill or a travel expense statement), which will be handled by a computer at the receiving end.

Much of this chapter has examined monetary and temporal costs of using electronic mail and other media. Of course, there is more to communication than money and time. However, as mentioned above, the amount of time a user spends using various media has important psychological impact on their social interactions. In addition, it is obvious that different media have different qualitative aspects. The difference between electronic mail and face-to-face meetings have been investigated in several studies [3, 5, 6]. These and other studies show that electronic mail has advantages and disadvantages compared to other media

+ You can give and take information when you have time. You do not have to interrupt other people as you do when calling. You can participate more easily in communication when you otherwise cannot be easily reached, as when you are travelling, on holiday, etc.
+ It is easier to give precise factual information.
+ The recipient gets the information in a written format which can be reused or archived.
+ Equality between people increases, more people are allowed to have their say, there is less risk of one single person dominating.

– It is more difficult to persuade others, and thus to reach consensus. With e-mail, difficult and controversial issues will more often lead to a war of positions which can only be resolved in a face-to-face meeting. The lack of body language, voice inflections and facial expressions help explain this effect. Thus, negotiations can be difficult to conduct via electronic mail.
– It is more difficult to conduct a formal decision process through electronic mail.

(1) Preparation: Collecting ideas, solutions and alternatives; examining the consequences;
(2) The decision making process; and

(3) Execution and realisation.

5.8 The Value of Changed Communication Patterns

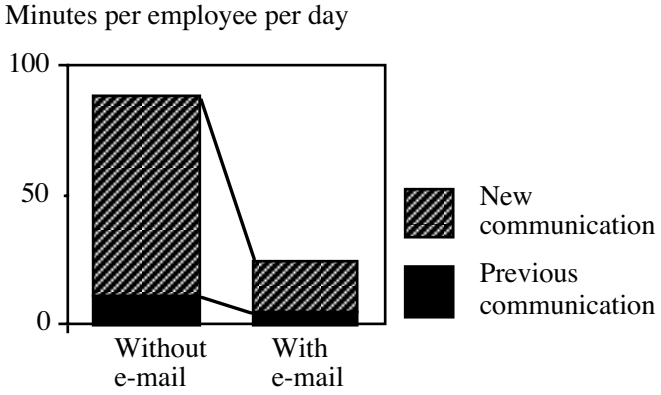

Figure 21 Comparison of time used for communication using e-mail and previous media.

The black bar in Figure 21 shows how much a previous communication could be done faster via electronic mail. Previously, this communication took 10 minutes a day, and it can now be done in 4 minutes, a saving of 6 minutes per employee per day. The lined part of the bar shows the new communication which took place only after electronic mail was introduced. An average employee spent 20 minutes per day on such communication, but if this communication had existed before then it would have taken 78 minutes. Thus, the left lined bar is hypothetical; it is the time that employees would have needed without electronic mail.

Assuming the organization and its employees choose to use media in an optimal way, the benefits for the organization by using electronic mail will at least be the time savings over older forms of communication, that is, 6 minutes per employee and day. The benefit of the new communication is less than the reduction of 78 minutes of work to 20 minutes, since if this communication had been worth 78 minutes, then it also would have occurred without electronic mail. This is the upper and a lower limit to the gain due to electronic mail—a gain of 64 minutes per employee per day and a gain of 6 minutes per employee per day, respectively. The difference is large, because most of the potential gain from electronic mail from new communication and from changed communication patterns, not simply using a new medium for old communication. The value of this new communication is more difficult to quantify.

The new communication may have the following kinds of benefits for the organization:

- More people can get information and give their ideas, issues will be more fully examined, and the risk of forgetting some important aspect will be reduced.
- Employees in different parts of the organization can work with each other more easily and feel more in solidarity with the common goal.

- A more decentralized organization of the company is possible. Everyone need not work at the same place in order to work together.
- Increased contact with the outside world makes it easier to accept new ideas and disseminate one's own views. The oganisation is less likely to act on old, outmoded views and methods.

The above discussion is based on the assumption that the employees of a company will intuitively choose to use the best medium in an optimal fashion. My experience is that electronic-mail users quickly learn when the new medium is suitable and use it appropriately. However, this may be based on what is best for the individual employee, rather than what is good for the company as a whole. For example, individual employees may put higher value on increasing their own competence than their employers do. The possibillity of efficiency loss because of private usage of office e-mail is discussed in Section 10.1.4.

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Chapter 10

Law and Order

An earlier version of this chapter has previously been published in [9].

10.1 Ethics and Etiquette

10.1.1 Is There a Need for Electronic Mail Ethics?

- Ethics, principles for suitable and unsuitable uses of the medium; and
- Etiquette, forms for handling communication so that users know that certain types of communication are handled in certain ways.

There are few laws, specifically controlling electronic mail. When the use of electronic mail is more widespread there may be more control of the medium through legislation. It is dangerous , however, to try to make laws controlling a technology under development—the laws will easily be antiquated and can even cause more harm than benefit.

Not everyone agrees on the proper ethics and etiquette in electronic mail. One community of users may have ethical rules which are in direct contradiction with those in another community. As an example, some electronic communities (for example EARN) forbid political discussions, while the constitution of many countries, allow unrestricted discussions of political issues.

When two communities with different written or unwritten views on ethics and etiquette are connected, cultural collisions sometimes occur. People from one community act according to their ethics, and people in the other community may then find that these people are, for example, nasty, ill-mannered, ruthless, arrogant, lofty, stupidly careless, muddled, and vague. Strong emotional reactions and serious misunderstandings sometimes occur. Each group may try to use social pressure to get the other group to change their behavior.

New users of electronic mail will often begin by trying to apply ethics and etiquette learned in other communication media like postal mail, telephone, or face-to-face meetings. The need for special ethical rules for electronic mail is especially important in cases where such ordinary ethics and etiquette are *not* suitable. The principles common to all human communication are often felt to be so obvious that they need not be included in the ethics of electronic mail.

The reason why different kinds of ethics and etiquette may be needed for electronic mail is that it works differently than other media, and this causes different kinds of communication problems. Important differences between electronic mail and other media are that electronic mail makes it so easy, fast, and relatively inexpensive to distribute information to many

recipients and that this information can be saved and forwarded in more ways than is possible with voice communication. Because of this, many ethical rules for electronic mail are primarily concerned with the use of electronic mail for group communication.

Different electronic mail systems are designed in different ways, and this influences the need for ethical rules. As an example, a common rule of etiquette is that you should not send the same message to more than one mailing list or newsgroup (even in cases where the message is appropriate for more than one list/group). This rule is needed, because otherwise people who are members of several lists will get the same message several times. However, good mail and news clients are capable of recognizing such duplicates so that their users will only see one of the duplicate messages, even though they get the messages via different routes. In such systems, it may sometimes be suitable to send a message to more than one group.

Another example is that some systems have a rule that says that you should delay sending a message, to see if someone else has already sent a message with similar content. Some systems even have a rule that you should not reply to everyone on a list, but only to the author of a message (this author is then expected to summarize the replies he gets for the whole list). These rules arise partly because of by delays in the distribution of messages, so that you cannot always be sure that you have seen all comments already written on an issue when you write your own entry. With shorter delays in the nets, these problems become less serious.

When you read collections of ethical rules for electronic mail, you sometimes wonder if these problems could not be solved by better design of the systems instead of by regulating their users. A rule saying that people should not write long messages can be avoided if the system makes it easy for recipients to easily skip reading the rest of one message. A rule, that discussions should not branch off outside their initial topic may be avoided if it is easy for participants to unsubscribe only from the branch of a discussion which they are not interested in.

Some people try to write ethical rules into the computer software, by designing electronic mail programs so that they stop users from behaving in ways the program designer finds unethical. Doing this, however, can be dangerous. It is difficult to teach a computer to judge correctly whether certain behavior is ethical or unethical. A behavior which in some cases may be unsuitable, may in other circumstances be necessary and suitable. It might be better to let the computer recommend and guide users towards good behavior but not to make it impossible for the users to knowingly break rules when necessary.

Another form of control is to have one or more people whose task is similar to the chairman at a meeting. Their special task is to control what is written in a computerized group discussion. Some systems are designed so that these moderators must read every contribution, before it is sent to the group (*premoderation*). In other systems, the moderators have the power to remove entries which are not suitable to the topic of a group, move them to another group, or start a new subgroup (*postmoderation*). If a system gives the moderator such facilities, it is important that moving an entry automatically moves the whole branch of the discussion tree to which the entry belongs—including future, not yet written entries. The administrator of a server also often has the right to delete any message in his server, this is

needed in order to remove illegal messages which the administrator according to the laws in some countries may otherwise become legally responsible for.

Premoderated groups, which require the moderator to read all messages before they are sent out, give the strongest control but slow down the interaction in the group. While the typical time between an entry and a reply is normally less than a day in groups which are not premoderated, it is usually about a week in premoderated groups.

There are several reasons why organizers make certain groups premoderated. The first is that you can avoid messages which have no relevance to the subjects which the group is to discuss. The second is that you can avoid duplicates, where the same idea is put forward by different people. The third reason occurs when recipients get the messages via distribution lists, which send the messages to the personal mailboxes of the recipients. With the premoderated lists, the moderator collects all messages on a certain topic once or twice a week, so that the recipients get these messages together and not mixed up with other messages. This problem does not occur with good systems, since such systems will automatically sort incoming messages by topic so that the recipient can read messages by topic. This is another example of how human rules can circumvent technical shortcomings in the design of some message systems.

My experience is that premoderation seems to be necessary for very large groups, with hundreds of participants, while postmoderation is more suitable for smaller groups.

10.1.2 Some Common Ethical Rules

One property of electronic mail is that it is so easy to disseminate a message to so many people. Many ethical rules try to avoid the problems which this may cause. Such rules say that you should *think* before you write, *keep to the topic* of a group discussion, *begin with the most important thing* you have to say (so that those not interested can skip the rest), *never write a message when you are angry,* etc. The fact that you can wait a few hours to calm down before you write a message is an advantage electronic mail compared to face-to-face meetings.

The more work an author puts into his message, the more time is saved for the recipients. This means that there is reason to spend more time writing a message if it is to be read by many people. Most people intuitively understand this principle. A problem with electronic mail is that you are not always aware of how many people are going to read what you write. A function which tells the authors of messages how many people will see their message might be useful. A person who writes a message usually sits alone in front of a computer screen. This intimate environment may tempt one to write something suitable for a group that is smaller than the group that will actually read the message. These kinds of experiences lead to ethical rules that personal assessments of other people should not be sent via electronic mail, or at least only to a very small closed group.

Electronic mail is more often used as a replacement for spoken than for written communication. An important difference is, however, that you do not have the same fast and direct interaction with electronic mail. This means that behavior patterns which are suitable in spoken communication may not work in electronic mail. An example of this is *booking time for a meeting*. People new to electronic mail try to do this the way you normally do in a face-

to-face situation: you propose one possible time, and if this is not acceptable, you propose another possible time until you have found a time acceptable to everyone. This method is not always suitable in electronic mail. A better method in electronic mail is to begin by indicating a series of possible times, and asking each participant which time they prefer. The participants then say which times are not suitable for each of them, so that a time suitable to all can be found.

General courtesy rules of *friendliness* and *consideration* may be more important in electronic mail than in face-to-face communication, since you cannot, for example, immediately see a negative reaction and correct and clarify what you mean.

A question can be answered by a message to the author only or to everyone who got the question. As an example, a question sent to a group of people asking at which time their flight will arrive is usually best answered personally to the author only. It is valuable if the electronic mail system allows the author to indicate where replies should be sent. However, many systems have a *reply-to* field but do not clarify what is meant by this field. It might mean:

- Always reply to this address,
- Use this address for personal replies to the author, or
- Use this address for replies meant for all who read the answered message.

In some messaging communities, there is more-or-less a rule that if someone asks a question to a group of people, the reply should be sent to the author, and the author is then expected to *summarize the answers* to the whole group, if he feels that they are of general interest. This is of special importance in nets with long time delays, because otherwise there is a risk that several people, independently of each other, will write the same reply.

Some systems even allow the recipient of a message to choose whether to see all replies to a question or only the summary of the replies composed by the author of the original question.

Now and then, it happens that a message written to a small group is forwarded without permission from the author to a much larger group. Sometimes, the author of the message does not like this. Because of this, a common ethical rule is that you *should not resend texts to larger and more open groups without permission from the author*. This, like most ethical rules, should not be absolute. It is easy to see that in a particular case, the forwarding of a message will not be controversial: or that there may be a large common interest in something which has occurred in a small group that should be known by a larger group. Copying texts written by others is also controlled by copyright laws: see Section 10.6.

The rules on *advertising* in electronic mail vary between nets. American nets usually have stronger restrictions against advertising than European nets, something which sometimes causes clashes when the two are connected. However, both European and American nets find it valuable that people representing hardware and software suppliers can participate in technical meetings on their product, and the border between desirable technical information and undesirable advertising is not always easy to define. One solution may be to have

separate discussion groups and distribution lists for information from the suppliers and for general discussion of hardware and software products.

By *spams* is meant obviously inappropriate message, usually of an advertisting kind, sent to multiple mailing lists or as personal mail. Spams became more used around 1995-1996, and many mailing list software contain methods to recognize spams (by recognizing the same message sent to many lists, and by recognizing certain elements in spams, like faked senders. A similar function is the cancelbots in Usenet News, see page 1.) Legal control to restrict spamming can be expected, since otherwise the recipients are forced to pay the cost of advertising they receive.

It is important that recipients should be allowed to control what lists they subscribe to, and be allowed to unsubscribe to lists when they want. This can be compared to the laws in some countries, that allow recipients to ask that their names be removed from direct-mail address lists (see Section 10.5).

10.1.3 Ethics and Language

There are also other special syntactical conventions used in electronic mail. Many electronic mail networks are not capable of forwarding underscored, **bold**, or *italic* text. Because of this, a common convention is to write one or more asterisks around a word you want to stress. Another common convention is to put "> " in front of quotations, usually at the beginning of a line. For example,

```
Andersen writes something very **important**:
> Body language can sometimes be replaced by special symbols,
> but sometimes people may overstep the mark.
```

BTW	by the way
IOW	in other words
FYI	for your information
IMHO	in my humble opinion
RSN	real soon now (which may be a long time coming)
FAQ	frequently asked question
OBO	our best offer
2	"to." For example, "F2F" or "face2face" as abbreviations for "face to face"
:-)	this is a joke, not to be taken seriously
:-(	I am unhappy
;-)	winking, teasing, flirting

10.1.4 Private Usage of Office Mail Systems

It is important to be aware that the borderline between private and official usage of electronic mail is not always easy to define. An important usage of electronic mail is to exchange information and learn. The borderline between what you are learning privately and what you are learning to be able to do your job better is also not easy to define. For example: if an employee of the defense research institute discusses computer security or nuclear power security, is this private communication or part of his job? Even if the employee is not at that

moment working on security issues in these areas, knowledge in such areas are important in defense planning.

There are not many statistics available on the extent of private usage of electronic mail. In the KOM system, I found that about 10 percent of the usage was obviously private, like Bridge playing or computer games.

These issues might be easier to solve if they are split into issues of *economics, ethics,* and *power/influence*.

- From an *economic* viewpoint, the benefits of electronic mail (see Chapter 5) are so large, that even if 10 percent of the usage of the system is private, it still benefits the employer. This is even more so if you take into account that phone and face-to-face communication in the office are sometimes used for private purposes.
  One should also note that computers, like electricity, cost very little during low usage times of day. Because of this, some companies have issued rules that their employees may use the electronic mail system privately, but only outside office hours.
- From a *moral* and *ethical* point of view, many people feel that private usage of an office electronic mail system is to be condemned even though the costs to the employer are not large.
- From a *power/influence* point of view, management may sometimes feel that the introduction of electronic mail reduces their ability to control what is happening in their company. They sometime try to rectify this by instituting ethical rules against private usage of the system.

10.1.5 Anonymous Messages

The real fact is however that anonymity exists, whether we like it or not and will continue to be available unless very stringent measures are used to stop it. Anyone, in any country, who believes in anonymity can set up an anonymous server, and stopping people from using such servers is not easy.

If an anonymous server was used to propagate information that was illegal according to the laws of the country in which the server resides, then police could probably be able to use legal means to break anonymity. No one can totally rely on being anonymous, because there are known ways of breaking the security of anonymous servers.

From an ethical viewpoint, an important facility of anonymous servers is that you can send messages to the person who wrote particular anonymous messages. Thus, it is possible to use social pressure on people who misuse anonymity.

10.2 Human Rights Issues

- that the rights of free speech is important;
- that the right of every citizen to inform himself of what other people have publicly said is important;

- that the government (and sometimes private persons or organizations) are forbidden from eavesdropping on private mail and phone calls unless special rules are followed (for example, permission by a court for certain police investigations); and
- that the rights of citizens to privacy is safeguarded.

10.3 Freedom of Information Acts

Some countries have laws that require documents produced by government agencies to be available for inspection by any citizen, except when certain secrecy rules are in effect. These laws are normally not applied to phone calls unless they are recorded, but in most cases they are applied to electronic mail, since it is a written and recorded medium. This means that electronic mail communication in government agencies may be open to inspection by the public. This may also mean that the government agencies are not allowed to delete electronic mail messages except as permitted by archiving laws.

10.4 Printed Matter

10.5 Computers and Privacy Legislation

Many countries have special legislation controlling computers and privacy. The goal of such legislation is to protect the privacy of individuals in relation to the processing of personal data in data files. Such national legislation is often based on some international agreements in this area:

- Guidelines on the protection of privacy and the cross-border flow of personal data, established by the organization for economic development (OECD) 23 September 1980.
- Convention of 28 January 1981 for the protection of individuals with regard to automatic processing of personal data, established by the Council of Europe.
- Proposal for a directive concerning the protection of individuals in relation to the processing of personal data, prepared by the European Community in 1990.
- Proposal for a directive concerning the protection of personal data and privacy in the context of public digital telecommunications networks, in particular the integrated services digital network (ISDN) and public digital mobile networks, prepared by the European Community in 1990.

The basic principle of these international agreements and national legislation is that people and organizations should not be allowed to store and process personal data about other people unless they do so according to special rules. Typical of such special rules are the following:

- A supervisory authority can control the use of computers for storing and processing of personal data.
- Those who wish to store or process personal data must either have permission from this supervisory authority or, in some cases, inform this supervisory authority. The

authority may then regulate what personal information is to be stored and how it may be processed.

- People, if they have personal information stored in computers, must be notified of this, and/or may request a copy of what is stored about them and then can request that incorrect information be corrected.
- In some cases, for example, individuals may have the right to be excluded from address files used for market research and advertising.
- The legislation often regards the storage of certain information as especially sensitive and as subject to special control. Such information is data revealing ethnic or racial origin, political opinions, religious or philosophical beliefs, trade-union membership, and data concerning health or sexual life.
- Moving personal information from one data base to another may be restricted by special rules.
- Electronic mail systems include directories of users and what they have written. These are typical of the kind of personal information for which the computers and privacy legislation was intended, and there is usually no problem in applying the legislation to such information.
- Information about electronic mail users, like directory information, and information about messages they are sending and receiving is often moved between different electronic mail systems, and often from country to country. Because of the international nature of electronic mail, this may cause problems, if, for example, the computers and privacy laws forbid moving such information to countries who have not signed the OECD convention. One might compare this to postal organizations being forbidden to send mail to and from such countries or to phone companies being forbidden to connect phone calls to and from such countries.
- The text in electronic mail messages will, of course, often contain personal information, often exactly the kind of information which such rules say should be controlled especially strictly. For example, in electronic mail discussion groups, many messages may contain information about political, religious, and philosophical beliefs and may reveal a person's racial or ethic origin. A love letter may contain data concerning a person's sex life. Personal messages may also, of course, contain information about health: for example, someone sending a message that they cannot come to a meeting because of illness or giving health advice to friends with health problems, etc.

This conflict between freedom of speech legislation and computer and privacy legislation is not easy to resolve. Usually, those who have encountered this problem resolve it by saying that storing personal information in word-processing documents, electronic mail messages, etc., should not to be controlled by the computer and privacy laws. These laws are should apply only to more structured ways of handling personal information.

However, there are still difficulties on where to draw the line between what is and is not permitted. Is it, for example, permitted to collect electronic mail messages so that you can

easily check what a certain politician has said on a certain issues in those messages or what opinions on a certain issue have been voiced by different people?

Is it permitted to send via electronic mail a list of references to journal articles? Such a list can be seen as a structured data base of personal information and so is probably covered by the computer and privacy laws even if such laws only apply to structured information bases.

As an example, Sweden, which was one of the first countries to establish computer and privacy legislation, has had severe difficulties in trying to solve conflicts in interpreting these laws as they apply to electronic mail systems. This has included forbidding the use of certain electronic mail systems and forbidding the discussion of political issues in certain electronic mail systems! The Swedish supervisory authority has had problems in clarifying how to resolve the conflict between freedom of speech and computers and privacy laws.

10.6 Copyright Laws

Copyright laws give authors the right to control the use of what they have written. In many countries, such laws can also apply to messages in electronic mail systems. The extent to which such laws are applicable to electronic mail may vary. Some providers of electronic mail services have notices in their contracts with customers that the customers are giving the providers a copyright license to use what the customers have written in the system, according to the normal principles used for distribution of messages in the system.

10.7 Unlawful Communication

Below are some examples of messages which may be illegal in many countries.

- Slander,
- Computer viruses,
- Military secret information,
- Privileged information supplied to lawyers, physicians, priests, etc.,
- Personal information not allowed according to privacy legislation,
- Copyrighted material, unless you have permission from the copyright holder,
- Sedition (incitement to rebellion),
- Racial agitation,
- Pornography/obscenity,
- Criminal conspiracy,
- Disloyalty against your employers, and
- Misconduct.

Electronic mail, like almost any other tool, can be used for various kinds of illegal acts which may not be specific to the electronic mail medium, just as the telephone and the postal system can be used illegally. Of course, this will become more common with the wider use of electronic mail. A well-known example of this is the electronic mail system in the White House, in which Oliver North and his associates sent messages to each other concerning illegal funding of the Contras in Nicaragua. In that case, the actual messages had been erased,

but not all backup copies were erased, and by court order, these backup copies were retrieved and used as evidence against North.

This example shows that a wise criminal would probably not choose to use electronic mail. A wise criminal uses the telephone carefully, since police may be listening. But, as the Oliver North example shows, police may be able to find what has been said in electronic mail, although the messages were not tapped when sent. This makes electronic mail even more dangerous than the telephone for the criminal.

In one case in Sweden in 1987, a person was sentenced to pay 15,000 kronor (about $ 2500) in damages for defamation of character. In a computer conferencing system he had distributed messages which implied that another person was a Russian spy. These messages had been read by about 100 people in the conference system. If this person had made the same statements by voice at a meeting, his risk of prosecution would probably have been lower because it would be more difficult to prove exactly what he said. A transcript of what he had written was given to the defamed person by a user of the conference system: this probably would not have been possible if his statement had been made by voice.

10.8 Agreements and Signatures

It is advantageous in disputes over contracts to be able to prove that a certain exchange of electronic mail messages, that result in a contract has occurred and to be able to prove who wrote the messages. There is thus a need for something corresponding to signatures on postal letters and contracts written on paper. There are also very secure methods for electronic signatures and seals (see Section 7.6.3). An electronic signature is actually more reliable than a signature on paper, since a signature on paper is very easy to forge. In one test, one-third of a group of people were not able to distinguish between their own signature and a forgery. Electronic mail might thus make contracts more secure. The main risk with electronic signatures is that the secret key for a person may be stolen. Advanced algorithms are employed to protect against this risk.

One way of getting even higher security would be to establish electronic archives, into which electronic messages and agreements could be sent and registered. If these archives were run by a third party, such as public notaries, they could provide very high security against falsification or false denials of computerized agreements.

10.9 Legal Recipients

How is this represented in electronic mail? One should first note that there is no rule that says that the recipient of an electronic mail must be a person. Even when a so-called interpersonal mail service is used, it is perfectly legal to address an electronic mail message to an organization, although all organizations may not be able to receive such messages. Many companies have a default mailbox with the name “Postmaster,” to which mail to the company that is not addressed to a given individual can be sent. For example, you might send a message to

`Postmaster@STANFORD.EDU` or
`Postmaster@SUMEX-AIM.STANFORD.EDU`

Note that the personal name component is not mandatory in X.400 electronic mail addresses. The following addresses are thus allowed, even though all organizations may not be able to handle incoming mail with such addresses:

`O=Stockholm University/ADMD=Sunet/C=SE` or
`OU1=Subscription department/O=Scientific American/A=CompuServe/C=US`

In ordinary postal mail, you sometimes indicate whether a message is to be delivered to an individual personally or to an individual as an employee of an organization, in the following way:

Format to indicate a personal letter	*Format to indicate a letter to the company*
`John Smith`	`Company XYZ`
`Company XYZ`	`Att: John Smith`
`Box 1234, Small Town`	`Box 1234, Small Town`

On the P1 envelope, X.400 has a field called *a*. This indicates whether someone other than the named recipient is allowed to open the message. If this field is not included in a message, it should not be delivered to an alternate recipient. If, for example, you send a message to an individual who is no longer employed at the company, this field indicates that someone else should then open the message.

In the P2 heading, X.400 has a field called with the allowed values *personal, private,* and *company-confidential*. The absence of this field means that the message is not sensitive in any of the three ways. The value *private* probably indicates that the message is not intended for the organization itself, but whether the absence of this field should be construed to mean that the message is legally intended for the whole company is not obvious.

10.10 Which Law is Applicable

When an illegal act causes damage, should the laws in the country of the sender be used? Or the laws of the country where a person was hurt by the illegal act?

10.11 Who is Legally Responsible

Who is responsible for illegal messages passed via anonymous servers (see Section 6.9)? Suppose a person in the United States sends a message via an anonymous server in Finland to recipients in the United States, and suppose that the message was illegal according to U.S. laws but not according to Finnish laws?

10.12 Law Enforcement Actions

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