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When the phone was invented, everyone thought it would serve businessmen first. No one expected this business tool to revolutionize the way people - from remote farmers to teenagers in the city - lead their social lives. Technological innovation has more effects than most people realize, and the same applies to the computer. What many managers see only as a tool for storing and transmitting information has social implications that may be more important in the long run. Because computers break hierarchies and cut boundaries of norms and organizations, people behave differently when using them. And as soon as the social context changes, the organization changes. Because of these consequences, managers should be careful when designing systems, but they also need to see the potential for greater social benefits in their organizations. Computers were once a province of scientists and engineers. Today, as computers become more powerful, versatile and less expensive, more people are using them. People usually perceive computers as special-purpose tools for calculating and storing data. But where we've studied computers in companies and educational organizations, people tend to use them as a general purpose tool to gather and disseminate information and talk to other people. As computers become a common technology, they affect the organization of work, as well as the work and enter the sphere of management. Accordingly, managers ask many questions about the impact of computers on the workplace: does the computer network of managers make it more efficient? When you introduce computer mail into an organization, do managers spend less time making decisions? Which computer conference system is best for long-distance management? What changes make technology most important to people? The new technology has three order effects. First, there are the supposed technical implications - planned efficiency gains that justify investment in new technologies. Secondly, these are temporary consequences - very important organizational adjustments made when introducing technology, but ultimately disappearing. Thirdly, these are unintended social consequences - constant changes in the way social and work activities are organized. Smart managers try to make decisions about technologies that win at the first level, minimize losses on the second, and keep flexibility and options on the third. While the computer is today the most visible new technology, it has much to do with past technical innovations such as the phone and typewriter, which have had a great social impact. We can and learn from the history of these other innovations. The elevator is a technology that aims to make better use of energy and space. If it wasn't for the elevator, we wouldn't be able to Skyscrapers. The elevator also produced a second level of transition effects. When the elevator was introduced, people were afraid to join in a dangling cage. In the end, regular inspections of elevators, the placement of inspection forms in elevators, and, of course, their ubiquity and good safety record have allayed such fears. The permanent third effect of the elevators appeared unintentionally and indirectly over a longer period of time. The elevator made it possible to build structures that increased the number of people who lived or worked in close proximity, but did not know each other. People have become neighbors geographically, but not in a personal sense; social contacts have become more superficial. And now that more people live and work surrounded by strangers, they feel more alienated and alienated from each other than before the skyscraper. When the phone was introduced, it had to improve business communication. One hundred years ago, Pittsburgh's phone catalog

was 6 pages long, and all but 6 of the 300 listings were business numbers. Even six residential phones were used for business purposes by their owners, who felt that it was necessary to keep in constant contact with their workplaces. The phone is really improving the business: it has given managers the opportunity to leave the factory area, for sellers to change orders in a quick response to customer demands, for customers to order products directly, for companies to set up branches. The phone also had temporary consequences. Because of party lines and central operators, people using the phone had no privacy. Another problem was telephony, which used the anonymity of the phone to trick people into fake business deals. It is clear that people have become concerned about whether to trust subscribers they did not know. In the end, however, the social consequences of the phone were even more striking than the technical and temporal results. Today, people use the phone more for social and personal purposes than for business. At the beginning of the century, farms and ranches were gloomy, lonely and even dangerous places. The phone allowed people to maintain friendships and help each other quickly and easily. In urban and suburban areas, the telephone had become used as a nanny and, like household appliances, it had increased women's independence. Because it encouraged sustained interaction outside of school, the phone also made teenage peer groups socially important. The social consequences of this tool are also felt in the workplace. When it was introduced, many managers thought they would use the phone to increase their control; they believe that when they are physically absent, they can use the phone as a broadcasting device to transmit orders and information to their employees. But the phone performs even better as than as a means of broadcasting. So it gave employees the opportunity to talk to their supervisors, share information, and send it up the hierarchy, and get it. The phone did not militarize the workplace, but democratized it. By telling this story, I mean two things in common. First, it is difficult to foresee the social consequences of new technologies. We therefore tend to exaggerate the technological changes and the importance of transitional issues, and we underestimate the social implications. Secondly, the long-term social consequences of new technology are not intended, but are more related to the indirect requirements of technology to our time and attention, as well as to how it changes our working habits and our interpersonal relationships. Changing the social arena forever In this broad area of technology and social impact, I especially want to discuss communication in organizations. Judging by current research, the impact of computers on communication is an important new area for managers to understand and use. In the organizations we've reviewed, computer communication changes the kind of information people get and distribute. First, people use the computer as their own as a general purpose tool for communication. They overcome temporary and geographical barriers to information sharing. But more importantly, computer communication can break down hierarchical and departmental barriers, standard operating procedures, and organizational norms. Computers crossing borders. All organizations control communication through structures and norms. Increasing the information burden on people contributes to the organization's effectiveness, but separating people from important information can be an obstacle to efficiency. It is clear that the costs of the lack of important information are the costs of repairing the damage caused by the absence. But too much information can mean expensive attention to things that don't need it. Because computer networks reach so many people so quickly, the informational effects are increasing. Changing the nature of information or disseminating it in this environment can be very costly. That's why managers can make important decisions by implementing computers and computer networks. One of the amazing properties of computing is that it is a social activity. Where I work, the most common computer network program is one called Where or Finger, which finds other people who have entered the computer network. The most intensively used program is a text editor for the preparation of documents, memos and letters. Other popular programs are e-mail and message boards - ways to communicate informally with each other. a typical day at one Pittsburgh company, a general electronic bulletin board announced where the company's lone company was located (on the floor at the back of one secretary's office) and reminded someone's friends of a Chinese dinner. On the management board, professionals and managers argued about the technical directions of the company. More than 15 years ago, the Ministry of Defense created a large ARPANET computer network to allow research computers in many places to share computing resources located at only a few sites. Soon most of the traffic on ARPANET was not the computer to the computer, but the researcher researcher. ARPANET has helped build entire communities of people who share reports, ideas, computer programs, gossip, and travel plans. Universities, government agencies and corporations are now establishing networks. In 1963, the Manufacturers Hanover Trust had more than 3,000 users, with 100 users added each month. The digital equipment network has more than 6,000 users. IBM has two networks; one connects researchers in 65 cities in 12 countries, the other sends 6,800 reports of ordering and other applications per minute during peak periods. These computer networks can be canning technology, making life a little easier, or they can be something more than technologies that are changing organizations. The most widely used computer communication technology is computer mail, often referred to as e-mail. The e-mail system uses computer text editing and communication tools to provide high-speed information sharing. Anyone with a computer account can use the terminal to compile a message or document and send it to any inbox of that computer network or to any other computer connected to that network. Computer communication can be in the same building and connected by a local network or in different states, countries or continents and connected by long-distance communication. The defining characteristic of technology is its combination of text, speed, asynchrony and potential audience coverage. Computer mail is a written environment, but it is more universal than paper memorandums and mail. People can exchange any text messages, documents, data files, even computer conferences that consist of many people's conversations. Computer mail can be transmitted instantly, down the corridor or across the continent. (Computer enthusiasts where I work will ask you if you want emails sent by computer mail or snail mail, by which they are referred to by the Postal Service.) Computer mail is sent at a convenient time for the sender and read at a convenient time for the recipient. Frustrations when planning telephone and face-talking disappear. Managers can send messages to a thousand people just as easily, and one person, and automatically, within a few seconds, all specified recipients can receive copies. It is clear that computer mail is attractive for organizations. Three other features features Mail is also organizationally important: senders and recipients usually process their own email; computer messages should not pass through the intermediary that processes them. There are no material artifacts. Messages are composed and read from video terminals (rather than teletype machines) without any hard copy. You can store messages on computer files and create them in hard copies, but most messages never stick out on paper; and if they are stored, they are stored electronically. Senders can send their emails in any format they choose: a corporate newsletter, an interagency note, a notice of a bulletin board, or a random note. And it can be a greeting of two words or a double word soliloquy. People who design and sell computer technology argue that because e-mail produces more timely and convenient information, managers and employees make better decisions. Everyone understands that information can be irrelevant, misinterpreted or manipulated. But the first-order effect is supposed to be adding more timely and convenient information. Hidden effects. Unnoticed by technologists, however, is the effect of the third order, that is, computer mail limits the information that communicators receive about the social context. Consider, first of all, the lack of dynamic personal information. Senders are unable to link the content or tone of messages to the recipients' responses so they can assess how their messages are received. Similarly, without non-verbal tools, the sender cannot easily change the mood of the message, communicate a sense of individuality, or exercise dominance or charisma. When there is no dynamic personal information in communication, people focus on the message, not on each other. Communication people feel a greater sense of anonymity and find less individuality in others than they do on the phone or face to face. They feel less empathy, less guilt, less anxiety about how they compare to others, and less dependence on norms. Consider the lack of static personal information that relates to the place, position and person in the computer mail. When a person sends a computer mail message, the transmission is instantaneous. Since there is no hard copy and little delay between writing a message and sending, the sender has little incentive to think about the message. In addition, a large and easily accessible audience is a social hedgepodge. All computer mail looks almost the same. The only sender tip has to the identity and situation of the receiver can be his or her name and style. there are no signs of position, status, departmental affiliation, gender, race, appearance and behavior of the recipient. There is also no information on the person's origin, personality, style and intentions. Similarly, the person receiving the message is learning very very about the sender's social status, even the information that the form or signature conveys. In addition, e-mail contains scant information about the rules of the situation. Reminders of the sender's settings are not available. Of course, people may have relevant information from other sources, but the computer itself provides very few signals to trigger that knowledge. Why is this effect important? When social definitions are weak or non-existent, communication becomes unregulated. People are less bound by convention, less influenced by status, and indifferent to creating a good appearance. Their behavior becomes more extreme, impulsive and self-centered. In a sense, they become more free people. To a certain extent, all communication technologies weaken control over the dissemination of information that people have in their relationship with each other face to face. For example, the phone not only reduces distance restrictions, but also eliminates direct access to visual signals. Thus, the phone reduces a person's ability to clearly identify another person or understand the situation. On the phone, however, one receives significant information about the social context in non-visual ways- from a secretary who answers or places calls, from variations to standard ways of greeting, and especially from the other person's pauses and tone of voice. Because computer mail provides neither static nor dynamic signals, users have less information about the social context than with other communication devices, including paper. Paper communication still reminds people of the social context through signals such as secrets, secretaries, forms, names, handwriting variance, and sending and receiving procedures. True, the standard interagency memorandum does not contain much social information, but inter-offensive memorandums are usually used as broadcasting devices rather than as conversational devices. Computer mail is unique in that, like a phone, it is used for personal interaction, but, like a memo, it lacks information about the social context. A new communications network is moving forward - automatically sending files, emails and mailing lists, computer conferences and message boards - allowing people to do things faster. Managers who are now beginning to deploy these technologies can realize the intended technical implications, such as cost savings. But if we look beyond efficiency, at behavioral and organizational responses, we'll see where the real gain is likely to be. These technologies overcome communication barriers and reduce the social context of information more than any other communication technology. The real wins, as well as social issues, will come from how loosen the connection. How Arena will change these technologies will have at least three important social effects. One of the effects is the addition of new information. In some organizations, computers send production statistics, personnel data, or marketing analysis to managers, whether they request them. In one large Fortune 500 company that has used email for 15 years, administrators receive about 23 messages a day, most of them from mailing lists. Of these reports, about 60 per cent would not have been received in any other way. The second social effect is the creation of new groups. A distribution list is a list of people who will automatically receive messages sent to an electronic group. With the company just mentioned, there are distribution lists for people located in the same block, as well as for people interested in specific technical projects: Chinese cuisine, science fiction, or using a new computer. Many of these groups consist of staff who are geographically or organizationally removed from each other and who have never had or have never had the opportunity to meet. However, with the help of these electronic groups they can explore common interests, share information, and sometimes get to know each other very well. The third social effect is new forms of social interaction. In one company, a product developer sent a message asking for suggestions on how to add a feature to a product in mailing lists that reached hundreds of people. Within two weeks, he had received more than 150 communications, cut between geographical, departmental, departmental and hierarchical boundaries. Some of these messages quite directly told the manager why it was a bad idea to add this feature. Electronic group communication allows managers to create design teams around a topic, regardless of the other work they do. In both Digital Equipment and ATT, message boards and computer conferences form electronic projects or decision-making groups whose members are chosen with greater respect for their experience or importance for making a decision than for their location, organizational unit, or place in the hierarchy. Most of these groups deal with normal organizational issues, but some use the electronic environment because they can respond to serious problems in a short time. The dynamics of electronic groups differ from that of the face groups. In four decision-making experiments, the latter of which used university administrators and corporate managers as subjects, these differences became apparent. We asked managers, both individuals and members of the three-person group, to make decisions about some investments. Managers have made half of the decisions face-to-face, and half of them are using a computer communication program that allows people to speak simultaneously, each using a single window on a computer screen. In this experiment, the choice we gave the groups was one that was of great interest to researchers of science solutions: suppose you have a choice between safe investments that are guaranteed \$20,000 for two years and investments that have a 50% chance to return \$40,000 and a 50% chance to return anything. What would you choose? Researchers have found that most people are not prone to risk and choose a safe alternative. When weighing one loss against another, however, and choosing between a sure bet loss of \$20,000 and the chance of losing anything or \$40,000, they run the risk of looking and choosing the last option. Groups that met face-to-face were not risk-averse for choice and risked finding a choice of losses. However, when the same groups met with a computer, they risked looking a little no matter what choice they had. In other words, face-mes meetings made regular decisions while computer discussions made unexpected decisions (at least they were surprising to us). We learned that much of this effect came from risky group members who initiated this move to break precedent. After that, managers who used the computer for communication were under the same influence of the majority as in the oblique situation. And they were just as confident in the decisions they made with the computer as they were in the decisions they made in person. In that experiment found unconventional decision-making side by side with strong confidence in decisions, these findings are consistent with the notion that computer-mediated communication reduces the social context of information and increases self-centeredness. In our experiments, we carefully studied other types of performances in groups and asked, for example, how much you can do with the least wasted effort? While it took longer for management groups to reach consensus on the computer, they also said less during that time. In conversation, people take more time to express their concerns and enter discrete but important information, so redundancy can be an important factor in effectiveness. Computer groups were effective because participants told others that they preferred in a few words and continued to make unconventional decisions. In all of our experiments, team members spoke uninhibitedly when they used a computer, dealing with a name call or making personal comments to others (computer buffs call it fiery). On ARPANET, the designated person regularly checks messages for certain message boards to prevent inappropriate messages from being posted. When IBM VNET was introduced, some managers used it to complain about the company's policy, which would have renamed the network GRIPENET. Flames are the effect of the third order of computer communication; this is because senders and receivers flame when they are unaware of the social context and feel free to express themselves. Finally, members of computer groups tend to join more readily, to the face. In a typical group of three people, one person can 45% of the time, while the other person can only speak 20% of the time. Typically, the person who speaks the most is the person who has the highest social status or the most authority in the organization. In computer groups where there are no visible reminders of status differences, communication appears to be less closely regulated. Increasing the information pool while mitigating status can enhance organizational power. It can also contribute to organizational instability. What is effective design? What can managers do when managing the implementation of computer systems to assist in organizational communication? First, let's look at efficiency. How effective is the manager who dictates the memo that the secretary will type, return for correction, and send through an interagency email, compared to the manager who uses the computer keyboard to enter a memo that will be sent immediately and informally? At a video conference at Westinghouse Electric, one person in charge of monitoring the use of technology at the company told me: I can measure how much this video teleconference equipment costs and guess how much we save in travel costs when we apply it, but I have no idea how good the solutions that our people achieve when they use it. While we know that effective communication leads to acceptable outcomes and actions that meet people's goals, we do not have a clear understanding of how to measure the effectiveness of communication. Second, let's take a look at some design issues. Managers can do what 50 years ago they would have thought fantastic. Long-distance management, electronic design teams and computer surveys of customer opinions are the result of the gradual development of the system. But how do you design a system to do things that have never been done? You can't anticipate all the things that might happen, so you design according to the principles. You design according to the effects levels and hope that you will meet your goals. Participation is a principle that has become more popular. Many companies, some of them in imitation of Japanese practices, have formed quality circles and other employee engagement plans. It is possible to develop computer communication systems and develop open access policies that will increase participation. At a higher level, however, organizational effects should be foreseen. Because the computer network connects employees with the entire organization, attention tends to shift more toward mutual interest. You have to decide, however, if you want this attention. Increased organizational participation can lead to more contributions, and to more complaining, more junk mail. The third question is how computer communication technologies can be developed so that they compatible with how people actually think and treat their partners. How, for example, can computer communication systems provide social support or leadership in an organization? The group interaction study gives us some clues about how people in groups relate to each other. Suppose I ask random gathering of people to read a criminal court case and declare the defendant guilty or innocent. Let's say six out of ten people will be found guilty and four will be found guilty. If you form them into a group or jury and ask them to reach a consensus on the same case, they will almost always agree to justify themselves unanimously. Groups tend to follow the majority. During the discussion, the majority exerts social pressure that reinforces its wishes and reduces the influence of the minority. The same seems to be the case in difficult organizational situations. People negotiate and follow procedures and rules for decision-making. Technologists often talk about developing a system to prevent information from being underloaded or overloaded. I believe that the real challenge is to create electronic means of communication so that it is easy for people to negotiate and implement procedures and norms, in other words, to develop systems that somehow return the social context that negates computer mediation. One suggestion: computer emails should be easy to edit, store, receive, shorten and lengthen, so that people can use words to convey personal impact and social meaning. Another suggestion: to please the formation and implementation of electronic groups by listing the distribution. Unlike the computer message boards that are formed around topics and tend to attract marginalized group attachments, distribution lists are formed around groups and receive more loyalty and more attention to group norms and priorities. A consequence of the design. Now I want to expand design and discuss four issues: efficiency, control, social life in organization and decision-making policy - and conclude the discussion of how we should think about new technologies in organizations. First, think again about efficiency. I recently spoke to some people at ATT, where the team is engaged in the introduction of internal communications. The question of how far it should go in implementing electronic communications depends in part on whether managers can be expected to work on special projects and committees using the computer and, if so, how to develop a computer conference system that would actually improve the manager's effectiveness. If you just add technology to the office, you can end up having more communication to monitor, more things to dial, and more Started that don't get completed you can't improve performance. Because it is so expensive to implement the system and wait to see what happens, smart managers will consider the effects of a higher level. Level. what you want to control achieve. One of the main tasks of the manager is to stand at the junction of the organization and its environment, feeling the external problems that his or her group must solve. The organization cannot adapt to changes in the external environment because managers are isolated from external information or because the filtering mechanisms for them are too good. The information collected determines what data managers use when choosing and also indicates which issues the organization considers important. Consider a company such as Sears, which regularly collects information about morale and employee opinions. Managers who receive this information inevitably realize that top management considers employee morale to be important and more likely than managers who do not receive such information to take account of employees when making decisions. Communicating through computer networks can help managers reach organizational boundaries. These networks collect new informants, as well as really new or previously unprocessed information. The question is whether the organization should be aware of all this information. The cost is that more and more people will spend their efforts on participation in external forces and coordinating responses to external interests. The advantage is that the organization's capacity to probe problems is increasing. The second issue concerns managerial discretion and organizational control. The more information managers receive, the more they need the tools to respond to that information. Computer networks move information from a computer account to a computer account, but management makes policy decisions about who has access to that information and who can act on it. Will the systems allow group communication? Who will have access to group accounts? Who can create electronic mailing lists or message boards? Who can send computer mail to whom? How closely will messages be monitored? And who transmits or responds to the information contained in these messages? An easy policing policy that provides open access to the system will enhance governance initiative and the importance of local experience. It may also require managers to coordinate and monitor these initiatives and monitor their implementation. The social life of organizations is the third issue. How far does management want to go towards creating electronic communities? In one of our studies, people reported that they receive a lot of work-related messages on a computer they wouldn't have received in any other way. Consequently, they feel addicted to technology and connected to other people online. They also get a lot of messages that don't have to have to work with. People like to be sociable and will use technology that makes it easy. Also, as we've seen, the computer is mediated by a computer-mediated weakens cultural restrictions (e.g. against wasting time) by reducing reminders a person gets norms. Eliminating the consequences and social feedback, like laughing or frowning, reduces any embarrassment about being considered stupid and eliminates the sense of duty to react in a certain way. Therefore, even busy, shy or unpleasant people can communicate comfortably. Thus, an important issue for managers is the extent to which the sociability of computer-brokered communication creates a sense of belonging and commitment to the organization. Therefore, by restricting access to systems for monitoring reasons, managers can also limit important social benefits. The fourth issue is decision-making policy. Computer communication allows you to get a wide information search. Because it promotes confrontation with minority opinions, it can be a biased buster: for example, people from disparate departments or places can mobilize to get things changed. When implementing a computer network, the company needs to address certain issues. Do we want to make important decisions on the computer? What decision-making processes are simply inappropriate to leave computer messages? It would be reasonable to think that important collective decisions should be made face to face. But as we have seen in the case of six or four jurors who always vote for consent, decisions arising from group action can be narrow, ineffective and biased against minority opinion. On the other hand, when decisions are important, such as when employee safety, public life, large investments, or jobs are affected, one might want decision makers to be sensitive to all social and organizational information accessible and personify this sensitivity in face-to-face discussions. Managers must recognize that computer communication and information systems can never replace personal conversations. Computer as a symbol This contrast between computer-mediated decision-making and traditional decision-making brings me to a final observation. The choice of using computer communication to assist any organizational function can be influenced both by the symbolic value of computers to people, and other organizational consequences of machines. To a large extent, the positive symbolic value of computers dominates their implementation and use in organizations, and this may be true for some time. A group of students concerned about their small college's large investment in computers asked the president, What about the new student union we need? it makes sense to understand that the development, acquisition and implementation of computer technologies in organizations usually affect each other. In one organization, it became obvious that the increasing use of computers would increase the legitimacy of the organization and the power of the market, and managers decided to develop a new computer network. The technical network development team has made a detailed plan of what the new one will look like. It took a few people more than a year to come up with a plan that required them to make a number of technical decisions and be very deep about each of them. One member of the group asked a technical colleague, How can I appreciate this system? The Panel took this decision without any intervention from management and without considering the higher impact of the pricing restrictions. Managers sometimes make decisions in such a random way, not realizing that their actions lead to a technological system that will have some import management. When making technological decisions, smart managers are aware of the three orders of technological effects and their whole range of organizational consequences. New computer communication technologies are growing that will change the way information is disseminated in organizations. In a computerized organization, more people will have information that has always existed, and some people will have new information. Computer networks will change existing groups and create new electronic groups. People will treat each other differently, and the dynamics of decision-making may change. The effects can be potentially very interesting for technology developers and decision makers, but managers need to think more broadly. Today we can do more and more technical miracles with computers, but the real management levers will come from the question of what social wonders we do with them. A version of this article appeared in the January 1986 issue of Harvard Business Review. Reviews. computer network management book pdf

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