REMARKS TO THE JOINT HEARINGS

OF THE

SUBCOMMITTEE ON

TRANSPORTATION, AVIATION & COMMUNICATIONS

AND THE

SUBCOMMITTEE ON

SCIENCE, RESEARCH AND TECHNOLOGY

by

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My name is Paul A. Strassmann. I am Vice President of Planning for the Information Products Group, Xerox Corporation. Prior to my current position, I have spent my entire career in managing office automation activities, and supervising the design, installation and operation of large scale computer and telecommunications networks.

Commerce Department studies have shown that, over the past four decades, the proportion of U.S. workers engaged in information handling occupations has risen dramatically, and now represents close to 50% of the labor force. We are entering the era of a post-industrial society in which information is the key to economic progress. Efficiency in information handling tasks will represent an increasingly important component of our productivity in the years to come. The ability to use information handling is becoming a path to advancement for many clerical workers, and is likely to become a minimum requirement for employment for more and more jobs. Both the rate and the direction of progress in applying information handling technologies have extremely important economic and social consequences.

The information technologies include products and techniques which have their origins in the fields of telecommunications, data processing, office equipment, printing and duplication, and image storage and retrieval. These technologies are rapidly changing and converging in such a way that their traditional boundaries are disappearing. Single function devices such as teletype machines, copiers, facsimile machines, computer terminals and microfilm readers, are giving way to a variety of multi-purpose equipment which do the job of several of these existing machines. The support capabilities required by a clerk -- or an executive -- can thus increasingly be provided through a single device tailored to that user's needs -- what we call an "electronic workstation". These workstations will be linked by flexible telecommunications facilities for exchanging information within the building or around the world.

I believe that the so-called "Office of the Future" will have arrived when half of all the tasks of more than half of the office workers are aided by electronics. I am submitting for the record a copy of my recent article which appeared in Technology Review in January, 1980, entitled "The Office of the Future: Information Management for the New Age", which further develops this point.

At the present time, while about 44 million workers are employed in handling information, only about one tenth of this work force is aided by electronic workstations. National expenditures for office automation are running at about $1,800 per capita per year. Current projections show that in

1990, there will be 55 million U.S. information workers, with an average office worker salary, at inflated wage rates, of about $45,000 per year. Our most optimistic forecast is that we will manage to increase our average annual expenditures for office automation to less than $10,000 per capita by 1990. At this rate, it is unlikely that more than half of our office work force will enjoy the productivity benefits of electronic workstations by that time. The "Office of the Future" in the U.S. will arrive some time after 1990.

The transition to the office of the future involves much more than the acquisition of electronic devices and systems. It requires a restructuring of the office, changing job content, skill requirements, interpersonal relationships, work habits, and paths to personal advancement. Obviously, there are many sources of resistance to the changes which must occur to obtain the productivity benefits which are available in this large and growing sector of our economy. Many organizations lack the incentives and the management and technical skills required to take a leadership role in this transition.

The Federal government has a unique capability and responsibility to encourage the application of information handling technology along constructive lines. It certainly represents the largest employer of information workers in the United States. The technical and professional resources available to the Federal government are second to none. Continued pressures to hold down Federal employment, coupled with demands for public responsiveness and coordination among government programs, create strong incentives to increase the productivity of the government work force.

Finally, government leaders can hardly be indifferent to the economic importance of improving productivity in both the public and private sectors.

It is essential for the Congress to seek the removal of obstacles to a more widespread use of information technology in the workplace, and to support programs which will improve Federal government productivity and thus show the way for others to follow. Here are my specific recommendations toward this end:

1. Create strong incentives for Federal agencies to demonstrate improved productivity by means of effective office automation.

The budget development and review process should include stronger incentives for aggressive application of information technology.

At present, public sector information technology costs are not traceable to end delivery missions or tasks. Technology budgets are generally retained as centrally administered overhead expense. The federal accounting system handles capital purchases differently than current expense. Cumbersome procurement practices focus more attention on the method of acquiring the hardware than is given to the strategy for achieving the desired program objective. Consequently, retention of old technology is attractive. The budgeting system does not facilitate labor/capital tradeoffs and does not foster productivity measurement. These are all influences that prevent a more widespread use of information technology. Research that would capture

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case studies where success and innovation has overcome existing institutional limitations is perhaps of greater importance at present than any other investment Congress could make in this area.

2. Encourage the application of information technology in support of management and professional tasks.

For the past 25 years the Federal government, as well as private industry, has spent the bulk of its office automation expenditures on mechanizing routine operations. In 1979, about 70% of all U.S. office technology purchases were devoted to supporting routine clerical jobs which account for only 22% of the total expense. The primary challenge before us for the balance of this century is not how to improve the output of clerks, but how to change the poorly structured work of 78% of the office labor costs represented by managers, professionals and administrators.

The Federal government lags behind industry in moving office automation equipment into the hands of non-clerical people. I am basing this opinion on my work with the Federal Data Processing Reorganization Study. I have read several thousand pages of interim and final reports from each of the ten study teams and have personally participated in drafting the final summary report.

One important ingredient for success in supporting management and professional workers is an appropriate focus on communication. Exchanging information is an important function at these levels -- much more so than for

clerical tasks -- and there are numerous obstacles to effective information exchange. These range from the difficulty of "getting through" on the telephone to the various impediments which fall under the heading of "bureaucracy". The difficulty of obtaining and exchanging information results in more and more time being spent in meetings and memo writing, and less and less time spent in tasks which directly serve the public. A flexible, government-wide electronic message system is one example of a capability which could not only improve agency operations, but which could also help to reduce bureaucratic obstacles to inter-agency cooperation and coordination.

I also want to stress the importance of focusing attention on the application of the technology -- not on the technology itself. Purely technologically driven efforts to install advanced office information systems are liable to fail because non-technological variables, such as work structure and work organization are more important as conditions of success than any other influence in office automation projects.

Therefore, when you consider fostering new legislation, new research grants or sponsoring new technology initiatives you may wish to bear in mind that the achievement of improved effectiveness from the "Office of the Future" will almost certainly arise from other influences than technology. From now on we should be able to take low-cost technology and telecommunications for granted because the highly competitive private sector will deliver a continued stream of improvement in hardware cost/performance ratios.

Congress should focus first and foremost on assuring itself that state-of-the-art office equipment is properly used by governmental office workers; that per capita investment for office equipment equals or exceeds private sector performance; that the results achieved from governmental office automation match results realized by private industry and that any incremental research investments by the Congress into information technology research in this area should be chiefly aimed at practical ways for organizing existing technologies in the service of the public sector.

3. Sponsor R & D to improve the rate of acceptance of office automation in the public sector.

A. Human Factors Research.

There are a number of human and institutional factors that act as strong inhibitors to Federal office automation. Some of these are similar to factors faced by industry, while others are unique to government. The conflicting pressures for privacy and freedom of information, the sensitivity of controversial public policy issues, and the subtlety of inter-agency relationships and operating modes are examples of factors which are felt much more strongly in a public setting. A better understanding of these factors as they operate in a government setting could avoid costly failures in government office automation programs.

B. Natural Language Research.

If electronic workstations are to substitute in part for other forms of communications, the procedures and forms of interaction must

serve functions now handled by special language and customs. Information exchanges which take place through the medium of a computer file often require extensive standardization of language. Yet, there are many nuances of meaning which must be accommodated if computer-based systems are to serve professional and management personnel. For example, I consider especially important the role of graphics in coping with existing forms and document formats. Since the composition of Federal employment cannot be expected to change significantly, it will be important that electronic technologies represent paperwork in ways which are analogous to the presently accepted ways of handling information. Finally, systems must communicate with the user on familiar terms, and must have the flexibility to allow changes in procedures without requiring the services of technical experts.

In conclusion, let me sum up:

1. "Office of the Future" enables productivity gains by making it possible to do work differently, rather than speeding it up.

2. The potential for installing electronic workstations in the U.S. economy is vast. It must satisfy the needs of managerial, administrative and professional personnel in addition to clerical people.

3. The greatest contribution that could be made by Congress is to use its influence to make the public sector a leader in the use of information technology and thus achieve much needed productivity improvements.

4. Limited federal funds for technology research and development can be invested best by facilitating a rapid transition of federal employees towards a more widespread use of individual electronic workstations.

5. If the public sector can harness that technology more effectively, then benefits will flow to the public and to the private sector in the form of lower costs and through improved acceptance of governmental missions.

6. There are strong, traditional, inhibitory forces operating in the public sector that make it a laggard in the use of proven technology. The Committee on Science and Technology as well as its distinguished sub-committees could help to overcome some of these influences by channeling efforts, reforms and funds into projects that would help to remove specific institutional obstacles.

Thank you.