Mr. HARKIN. Our next witness is Mr. Paul A. Strassmann, vice president of the Information Products Group of Xerox Corp., who was given some short notice about our hearing.

Mr. Strassmann, we are delighted you are here on the short notice we gave you, and without objection your written statement will be made a part of the record.

Mr. HARKIN. If you would summarize your statement, we would appreciate it.

STATEMENT OF PAUL A. STRASSMANN, XEROX CORP.

Mr. STRASSMANN. Thank you, Mr. Chairman and committee members.

My remarks will focus on productivity that would accrue to our office sector of the U.S. information economy from the tremendous potential that is available through telecommunication and computer technology. My focus will be on the inhibitions that exist today to the increased use of the technologies which are presently available, and the technologies that will be coming from our private sector.

There is much talk these days in the press about what is called the office of the future. I would like to discuss what are the prospects of the office of the future arriving in the United States to enhance the productivity of our white collar labor force.

What are the prospects that about half of our 44 million office workers would benefit from information technology? At the present time our national expenditures for office automation are only running about $1,800 per capita per year. We have taken less than 10 percent of our labor wage and put capital behind it.

When we look into the 1990's when inflation most likely will bring average income for white collar information workers to about $45,000 per year, the prospects are not very good that we will achieve a high degree of penetration of telecommunication and electronic technology into our information sector because the capital that is necessary is truly prodigious. As we make the transition to the future, we find more and more that nontechnical problems, the nontechnological inhibitions dominate.

This is true because of transition as we see it for the next decade involves much more than the acquisition of electronic devices and systems.

Mr. HARKIN. May I interrupt for just a moment?

Mr. STRASSMANN. Yes.

Mr. HARKIN. It is not a technological barrier?

Mr. STRASSMANN. That is correct.

Mr. HARKIN. Are you going to elaborate on that?

Mr. STRASSMANN. Yes.

From the experience we have observed so far, we find that the productivity from electronics in the work environment only arises when you are able to change the way jobs are done. You cannot continue investing technology just behind clerical jobs where you can accelerate the speed with which the clerics do their job.

The bulk of the expense for the information sector of the economy, something like 78 percent, is in instructured jobs of professionals,

managers and administrators. These are unstructured jobs. These are jobs which are very difficult to harness to the electronic environment.

I would like to focus particularly on the largest single employer of information workers in the United States, which is the Federal Government. I think the major opportunity available today to increase productivity in the United States through the use of information technology, telecommunications, is to have the Federal Government take a leadership position in order to accelerate the way it makes it professional and administrative information workers more productive.

We believe that the Congress should seek the removal of obstacles to more widesperad use of information technology. Here are some specific recommendations. I would like to bring to your attention on page 4:

First, it seems to me much stronger incentives should be created for Federal agencies to demonstrate improved productivity programs. The public sector information technology cost and the budgeting process are not comparable to the kind of capital-labor tradeoff decisionmaking and job restructuring the way the private sector has so far achieved. I am basing these remarks, of course, on my review of the Federal data reorganization study that took place a year ago. Several thousands of pages of testimony and reports were gathered highlighting what are some of the institutional problems with moving automation aggressively into the Federal sector.

Most importantly, on page 5, I feel that the Federal Government and Congress, specifically, should focus on the encouragement of new applications that support the managerial and professional tasks and not just increase office automation at the clerical levels.

In my opinion, the Federal Government does lag behind industry in moving office automation equipment into the hands of nonclerical people.

One important ingredient to success in supporting management of professional people through electronics is to facilitate communication. When you look at the tasks managers, professionals and administratives do, they communicate most of their time. It is the shift from the verbal medium to enhancing those communications electronically, where productivity comes from.

All this means that I want to stress the importance of focusing on the applications of technology, research on the application, not just research in the technology area itself.

We have found that purely technologically driven efforts to install advanced office information systems are liable to failure despite very advanced techniques used because the nontechnological variables, such as work structure and work organization, are clearly more important as a condition of success than any other single influence. Success is here defined as improved productivity.

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. Let me just give you some illustration here.

I estimate that the Federal sector consumption per capita of information technology is not substantially greater than the national average. When you go into the private sector, you find that the leading edge companies are spending three to four times more money per capita as a way of increasing productivity, improving the efficiency and the quality of services being delivered to the customers.

I also suggest that the results achieved from governmental office automation should be matched and compared with the results realized by private industry, and that incremental research investment authorized by the Congress should be chiefly aimed at identifying practical ways for organizing the introduction of technologies in the services of the public sector.

Last, on page 7, I suggested that in your portfolio of R. & D. investments that you may wish to consider the investment in research such as in social factors research, which are unique to the Federal office automation problem. For instance, there are some unique governmental pressures with regard to privacy and freedom of information, and with regard to the sensitivity to controversial public policy issues. There is a whole host of questions on jurisdiction and interagency relationships which require perhaps a unique understanding to remove the inhibitors to the installation of advanced office automation equipment in the Federal sector.

Second, in the area of natural language research, I would like to suggest to you that the Federal sector has a whole set of special languages and customs which have to be translated into the electronic medium. Since we cannot expect the composition of the Federal employment to change significantly in the next decade, it is very important that the electronic devices that you install reasonably replicate the way people behave, the way people do their work today.

That means that you have to find unique adaptations that match the human factors so that the electronic medium becomes accepted as a way of doing work.

Let me then sum up. The "office of the future" movement, the "office of the future" designation, which is today receiving widespread attention, clearly enables huge productivity gains in that sector of the U.S. economy where today we are lagging.

In the nonclerical sector this is achieved not by speeding up work, but by doing it differently.

Second, in our opinion, based on our forecasts we have just scratched the surface in terms of penetration of electronic medium into the work environment. The potential of installing electronic work stations in the United States economy is vast. It must focus primarily, in the next decade and beyond, on the needs of managerial, administrative, and professional personnel.

Third, the greatest contribution that could be made by Congress is to influence the environment so that the public sector could again reemerge as a leader in the use of information technology.

Fourth, the necessarily limited Federal funds for technology research and development should be significantly channeled to facilitating a transition toward more widespread use of individual electronic work stations.

Fifth, if the public sector can harness the 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.

Sixth and last, we discern, based on widespread observations and experiments that I have personally conducted over the last 20 years, that there are very 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 subcommittees, could help to overcome some of these influences by channeling efforts, research, and funds into projects that would help to remove specific institutional obstacles.

Thank you very much.

Mr. HARKIN. Thank you, Mr. Strassmann, for that very interesting statement. I see you also have a copyrighted article which appeared in Technology Review.

Mr. STRASSMANN. Yes.

Mr. HARKIN. Do you wish to have this made a part of the record?

Mr. STRASSMANN. If it is agreeable.

Mr. HARKIN. We will attach that to your statement.

I am very intrigued by your statement. I think I comprehend what you are saying. I do not know that I can verbalize my feelings on it. When you speak about traditional inhibitory forces operating in the public sector that make it a laggard in the use of proven technology, I think I know what you mean, but I am not certain that I can spell it out.

Let me just bring up one thing that I want your thoughts on. The Federal Government has been taking—I do not know if you would call it a leadership role—but somewhat of a leadership role in the use of flexitime, where people can come in and work flexible time schedules. People who have families, let's say, a working mother who has children can come in any time during the flexible time period rather than at a specific time in the morning.

With the increased development of data bases, computer networking capability, it has been suggested that perhaps a Federal office worker could have an electronic work station in the home and could do many of the functions that they would do in an office.

Mr. STRASSMANN. I agree with that, Mr. Chairman. I have an electronic work station in my home, and when it rains or when I finish cutting my grass, I get additional productivity by working a few hours in my little office, which ties into the Xerox internal telecommunications network.

I feel that I am much more productive that way and much more relevant. I see a vast opportunity for this kind of work habit to penetrate the entire work environment, particularly as transportation and energy expense for transporting people becomes more expensive.

Mr. HARKIN. Again, when you have the Federal Government as large as it is—I am not quite sure I understand how or where the

Federal Government has a unique capability and responsibility to encourage. I understand the responsibility and capability perhaps, but the Federal Government, while we try to be cost conscious, let's face it, is not motivated by profits. That is not the motivating force of the Federal Government. Cost cutting is not the motivating force. It has to do with delivering services. I guess that is what Government is about, but doing it in the most cost efficient manner possible.

I am wondering if that is the kind of incentive that would really enable the Federal Government to take a lead role in this, or is it more appropriate for the private sector where they are trying to maximize profits?

I understand the Federal Government's responsibility, but I do not know that it is uniquely situated to do that simply because of what the Federal Government deals in. Now, perhaps some areas in terms of procurement, data collection, the issuance of social security checks, income tax forms, and other related areas, I can see, but I do not know in the broad realm of, say, Department of Agriculture or HEW or Commerce that this is necessarily applicable.

Do you have any thoughts on that?

Mr. STRASSMANN. Well, when I look at an example of a bureaucracy, Xerox is also a small bureaucracy, if I may say so; most people are removed from the profit motive. We have layers of organization the way the Federal Government has.

When you look at the way we have proceeded with automation, we have pretty well taken care of the clerical sector, issuing of the checks, the routine operations where you can almost look at a clerk and just increase the processing, the speed with which payroll checks are issued. By the way, we put about $45,000 worth of automation expenses behind each of our payroll clerks and, therefore, we have like 350 percent of automation behind each 100 percent of payroll. That improves their productivity by a factor of 10 to 15. So it is very profitable to do so.

But that is not where the opportunity is. The bulk of the cost of the Xerox Corp., the way the bulk of the cost of the Federal Government, is in jobs that are absolutely untouched by electronics, and these are jobs where our attorneys and our planners and our financial analysts are administrators the way Government administrators are administrators. To make them productive, we have to create equipment procurement structures which are flexible, motivational structures which make it very desirable for these people to acquire electronic work stations so that they increase the quality of their services. Personally, I have never made a distinction between the Federal Government being subject to different laws of behavior than the bureaucracies of the private sector.

It is a question of degree, of course, but it is a continuum. Therefore, I am much more hopeful, Mr. Chairman, that this is a task that needs to be done and can be done.

Mr. HARKIN. Mr. Walgren.

Mr. WALGREN. Can you make any estimate of the degree of application of this kind of technology in the Federal Government today, and can you make a suggestion where you see a great potential for change and more efficient operation in the Government?

Mr. STRASSMANN. Well, the current expenditure for office automation in the Federal Government, exclusive of the telephone, is about $5 billion in 1979, which is not particularly sizable or impressive by industrial standards. The reason this is so low is because only the most obvious tasks have been automated or supported with technology.

The single largest opportunity that I see in the Federal sector for increasing productivity lies in redesigning of jobs so that a particular piece of paper, such as a welfare eligibility application, does not have to pass through 20 to 25 hands.

We have, by the way, seen some flow diagrams of how many hands have to handle a piece of paper before a transaction in the public sector is drawn to a conclusion. Those flow charts are just unbelievable. I would suggest that you may wish to look at them some day. There are mazes of arrows and lines and copies.

As that piece of paper travels through this maze, it accumulates cost. My suggestion to the Government is to start looking at examples of work enlargement where you equip an individual with a powerful electronic work station so that the same individual can complete a totality of tasks and achieve productivity and increase satisfaction by eliminating redundancy and steps, thus simplifying work and eliminating work.

Productivity comes through work elimination, not through speeding it up. I think there are vast opportunities, particularly in the welfare administration sector where the multiple jurisdictions and the flow of paper is an unbelievable overhead burden, which is not only costly but also ineffective and provides a high degree of dissatisfaction.

There is a large number of examples available, case studies, which I would like to encourage the Congress to consider investing money in to illustrate how these cases can be held as examples where these institutional inhibitions have been removed and which should be held as the prototype to be followed in simplifying work and using the electronic medium.

That electronic medium can really do tremendously well.

Mr. WALGREN. Could you perhaps give us, not now, but as a submission, five such examples just to add concreteness to your suggestion?

Mr. STRASSMANN. It would be a pleasure to do so, sir. I will do so.

Mr. WALGREN. I know I, for one, would be very interested.

Mr. HARKIN. We will leave the record open at this point for the insertion, if you would just send it to us.

Mr. STRASSMANN. Yes, I will do so.

[The above-referred information to be furnished the subcommittee follows:]

Xerox Corporation
Stamford, Connecticut 06904
203-329-8711

XEROX

June 2, 1980

The Honorable Tom Harkin
Chairman, Subcommittee on Transportation,
Aviation & Communications
US House of Representatives
Suite 2321
Rayburn House Office Building
Washington, DC 20515

Dear Congressman Harkin:

During my testimony on May 20 you requested that I provide the two Subcommittees with a brief description of five examples which illustrate the concept of increased "white collar" productivity achieved by means of work enlargement. In each case such a change in the scope of an individual's work would be made possible by means of an electronic "work station."

I have chosen five examples from inside Xerox. Our experiences are by no means unique. I know of dozens of comparable cases from other organizations. One of the Xerox cases is drawn from our Education Center in Leesburg, Virginia, so that you would have an opportunity to directly interview the affected professionals in the event that you accept our invitation (see separate letter) to see a demonstration of our advanced graphic technologies.

Example #1: Improved Productivity of Customer Service Technicians

Conventional Approach: Customer calls answering service. Answering service passes call to dispatcher. Dispatcher locates equipment record and places service request in queue. Periodically a service person calls in to announce availability for additional calls. Service personnel then makes calls, filling out elaborate paperwork concerning equipment failure, parts used, description of activity. If additional spare parts needed, another call is made.

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Enriched Approach: Customer calls dispatcher who can instantly identify equipment service history, status of account, work backlog of service personnel, probable spare parts required. Dispatcher commits to customer when service call will be made, identifies probable spare parts needed and completes automatically most of paperwork. If appropriate, dispatcher may initiate remote diagnostic repair routine to avoid service call altogether. When next service person is available, dispatcher directs completion of service call subject to customer priority and minimum travel time criteria.

Example #2: Improve Productivity of Professional and Administrative Personnel in Education

Conventional Approach: Teacher outlines study plan, study text and visual aids. Manually prepared materials are typed by typists, study text is photocomposed and visual aids go to graphic department. After extended delays early proofs of teaching package are printed collated and distributed for comments, reviews, and addenda. Several weeks or months later, after completion of each review cycle repeating the original complex preparation process, the course material, student text and classroom visuals are ready for use. Dozens of people involved in process.

Enriched Approach: Teacher outlines study plan, study text and visual aids on graphic workstation. Professional editor electronically shares the workstation and prepares final review draft. Reviewers annotate draft material electronically so that text is automatically updated. In a matter of days the whole process is completed and text, student material and visuals are produced, on demand, by laser printer. Only a handful of people involved in the entire process, from start to completion.

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Example #3: Improve Productivity of Professional Personnel in Software Development

Conventional Approach: Consultants and systems analysts work with user in determining user requirements. Complete feasibility study report. Separate teams of specialists prepare program specifications, manual systems specifications, data base specifications, forms design. Extensive time consuming, scheduled coordinative meetings are required to assure consistency of efforts since user and programmer specifications are constantly changing. Extensive clerical and typing personnel is employed typing and re-typing documentation.

Enriched Approach: After user specifications are set, a small development team uses a single, shared documentation system to develop application system. All documentation is simultaneously available, by electronic means, to each team member. Text and instructions are re-usable for various documentation needs. Most coordination meetings are eliminated because member of the team can pass electronic messages and annotations of text as need arises.

Example #4: Improve Productivity of Financial Specialist Personnel

Conventional Approach: Customer order is entered in the Sales Department and forwarded to Administrative Order Desk. Various specialists enter codes for order processing (e.g. Credit Specialist; Equipment Specialist; Billing Specialist; Dispatcher; Commissions Accounting Specialist). Unique logs and local manual entries are created to track the transaction prior to forwarding multipage forms to Region for processing. New forms are created to authorize equipment placement; document credit history; order acknowledgement and any of dozens of special handling conditions. In case of error, much of the process recycles.

Enriched Approach: Customer order entered by single Customer Administrator on interactive electronic workstation. Workstation software contains prompting routines helping in completion of all tasks, inclusive of automatic insertion of codes. Workstation software then automatically initiates telecommunication connection to central credit authorization; warehouse dispatcher and central accounting data base.

Example #5: Improve Productivity of Personnel Engaged in Document Preparation

Conventional Approach: Author handwrites text. Secretary transcribes. Each draft is typed and re-edited until final manuscript and artwork for illustration, graphs and tables ready. Material sent for photocomposition and artwork preparation to graphic design specialists. Proof copies sent to author for approval. Final revised version sent to editor and layout composer. Camera ready text sent to plate-maker. Plate-maker prepares offset metal plates for printer. Printer runs text, collates, sends to bindery.

Enriched Approach: Author types text on workstation and sketches illustrations, graphs and tables. Professional, editor assists with drafts through shared workstation so that only changes inserted in data base. Professional editor also activates software performing composition, layout and graphics functions. When ready, author initiates automatic printing of collated, bound sets.

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I would like to emphasize that in each case noted above the electronic workstation and associated network service facilities are a means for achieving productivity improvements that otherwise would not be feasible. But the net result is not achieved exclusively by adding expensive electronic hardware. In each successful case there is an implied management process to rethink the structure and the process for completing each task.

I trust that this outline is responsive to the request of your Subcommittee insofar as it helps to identify the institutional, non-technological aspects of the "Office of the Future."

If there are any further questions, I shall be pleased to respond. I can be reached at (203) 329-8700 Ext. 3102.

Sincerely,

Paul A. Strassmann

Paul A. Strassmann
Vice President Strategic Planning
Information Products Group

PAS:mah

c: Congressman George E. Brown, Jr.
Congressman Douglas Walgren

Mr. HARKIN. It does not necessarily have to be five.

Mr. WALGREN. I just wanted to pick a number small enough that it would not be burdensome to you.

Mr. STRASSMANN. It will not be burdensome.

Mr. WALGREN. It would provide perhaps a broad range of food for thought.

Just one other thing, have you seen any changes in the Federal Government that are remarkably valuable in this area? Has any such information related to changes in specific management of specific departments come to your attention that you feel are worth complimenting the Federal Government on?

Mr. STRASSMANN. I only know one case that was highlighted in the Federal ADP reorganization study which pointed out an experiment in Portland, Oreg. to simplify the transaction with a welfare client with regard to eligibility using an electric work station. I have not tracked it, but that clearly falls into the category.

The other one I was pleased to see—it used to be at the Kennedy Airport. When I arrived from abroad, I used to have to go through sometimes as many as three stations, the health officer, the immigration officer and the customs officer. Right now they have done work enlargement, increased the productivity. Instead of people standing in three gueue, they stand in one gueue. The work is more interesting for the customs officers. The work can be done in much greater totality. The human contact is much greater because the customs officer is just not opening your case and seeing whether you are smuggling something. He knows what kind of person you are, where you have been, and he has a chance to look at the passport and so forth. I think there is an example I could compliment as a very tangible increase in the service that has been provided. I also suspect that it increases satisfaction of the Federal employees to do a good job.

Mr. WALGREN. Has there been any indication that the Civil Service Reform Act that the Congress passed 2 years ago has led to any more innovative management at this point?

Mr. STRASSMANN. Certainly there is no indication to that effect. I also must point out that the procurement regulations are becoming increasing cumbersome and inhibiting to the process of really moving the ball with advanced electronic work stations. So I am really not encouraged with the institutional behavior of the public sector and especially the Federal sector with regard to taking advantage of what we uniquely as a nation lead the world in.

We are the first civilization in the history of mankind that has moved the bulk of our population into the white collar sector. We are the first civilization in the history of mankind that has at our disposal the kind of wealth in telecommunications and electronic work stations and computers. Nobody is coming even close to us. I certainly do not see that spirit being reflected either in civil service or in procurement.

Mr. HARKIN. Excuse me, if the gentleman will yield.

That raises all kinds of implications for the future. Are we moving away from being a productive society into being a service society? Sure, we are leading the world in communications technology, but the Japanese are stealing away our automobiles. The Europeans are

now in the aviation field. We are being out-produced by other countries in terms of basic production.

I am wondering about the implications for the future of what direction we are headed as a nation in terms of moving this huge supply of people into the white-collar sector.

Mr. STRASSMANN. That is a vast subject, Mr. Chairman.

Mr. HARKIN. That is what I mean.

Mr. STRASSMANN. I would like to have an opportunity, if you wish, to submit to you a memorandum that deals with that subject, although I am perfectly willing—as you can see, I would like to talk about the subject and I would be glad to comment on it right now.

Mr. HARKIN. That is beyond the scope of our hearings, but I was just thinking about what is happening to our productive capacity.

Mr. STRASSMANN. If you wish, Mr. Chairman, I would be happy to write a letter to that effect and comment on that question.

Mr. HARKIN. If you would like to, I would be interested in having your thoughts.

Mr. STRASSMANN. I would be pleased to do so.

[The material referred to follows:]

Xerox Corporation
Stamford, Connecticut 06904
203-329-8711

XEROX

June 2, 1980

The Honorable Tom Harkin
Chairman, Subcommittee on Transportation,
Aviation & Communications
US House of Representatives
Suite 2321
Rayburn House Office Building
Washington, DC 20515

Dear Congressman Harkin:

During my testimony on May 20, you expressed concern whether continuing the rate of investment in the information sector of the US economy continues to be beneficial in view of the lagging performance in the more traditional industrial sectors, such as in automobile manufacturing. You also noted that our relative international competitive advantage may be eroding by concentrating too much employment in the "informational overhead" of our economy.

The topic of how to make a transition from an industrial structure based primarily on manufacturing to one which is based primarily on information employment is indeed far reaching. We at Xerox believe that there are two essential issues which concern the transition process: first, how information labor can be made productive so that it can improve the standard of living and second, how new jobs can be created to generate new competitive capabilities.

1. Productivity - In a separate letter to the Subcommittee, I illustrated how electronics and information processing systems can materially improve the output and quality of services. We are convinced that as a matter of national policy we ought to accelerate the process of installing electronic work stations as a means for enhancing the productivity of our office personnel. The energies freed in this process can then be employed in bettering the quality of our services. We could then devote

more people and greater skills to managing our increasingly limited resources. We in Xerox are absolutely convinced that if we properly manage the process of restructuring jobs, then office automation should not result in structural unemployment but in an increased capability to perform new societal tasks that not only improve our national standard of living, but also enhance our relative international competitive posture which is then not easily duplicated by others, as is the case with more conventional manufacturing.

2. International Competitive Advantage - The US is the first country in the history of mankind that has emerged with the plurality of its population engaged in information management tasks rather than in the more traditional endeavors. Our computer manufacturers; satellite launch companies; publishers; scientific institutes; software firms; microprocessor producers; database vendors; banking and insurance enterprises; other office equipment manufacturers and consultants enjoy all of the attributes of international advantage:

   a) Industry growth rates 2-4 times the US or world industry average

   b) Rapid rates of capital formation

   c) Rapid rates of new jobs created

   d) Significant shares in total global output in their respective market segments

   e) US manufacturers of computer and business equipment enjoyed a trade surplus of more than $4 billion in 1979

   f) Average wage rates per capita exceeding most other US industries

   g) Average output per dollar of capital invested exceeding averages realized in the manufacturing sectors of the US economy

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Clearly, information industries are the emerging, dominant future industry of America because here is one segment that uniquely draws on the strengths of the American people: entrepreneurship and innovation; high levels of education and technological skills; marketing and distribution management know-how.

If we want to keep increasing the relative standard of living in the USA and improve the "real" income per capita, as compared with the rest of the world, then we will have to rely significantly on information industries to contribute towards this goal in the next several decades. This will also mean that we will have to increase the effective use of our own electronic devices in supporting our organizations so that unproductive activities are contained at a minimum.

In order to assist the private sector in accomplishing these goals, there is a need for tax restructuring legislation that reforms our depreciation system. The Capital Cost Recovery Act of 1979 (H.R. 4646) would provide an improved system of capital recovery for investment in plant and equipment and encourage growth, modernization and international competitive position through increased investment and expanded employment opportunities.

Needless to say, these topics have far reaching implications and cannot be accorded adequate treatment in a brief note. But the essence of my remarks should be understood as stating that as an ever smaller fraction of our population can achieve high productivity in agriculture and in high technology manufacturing, then the rest of the work force should re-direct its efforts toward information oriented managerial and professional jobs that are exceptionally well rewarded in the international marketplace.

I trust that these brief notes are adequately responsive to your concerns.

Sincerely,

Paul A. Strassmann

Paul A. Strassmann
Vice President Strategic Planning
Information Products Group

PAS:mah

c: Congressman George E. Brown, Jr.
Congressman Douglas Walgren

Mr. WALGREN. I do not know that it fits into the question, but in terms of highlighting some of the points touched on, one of them was the very sore point as to the development of a language within the Federal Government that does not communicate with the rest of society and does not fit into the system.

Mr. STRASSMANN. That is right.

Mr. WALGREN. I understand that some people in the Carter administration have tried to set an example of this, but I remember in the introduction to an English textbook there was the admonition to omit needless words, and what I am wondering is, is there any way that a machine could be made to analyze language and omit needless words?

Mr. STRASSMANN. It is another vast subject. I would be happy to write something on this, but let me just sum up. We have done extensive experiments on the role of graphics. The human mind is basically visually oriented. Some of the most successful ways of approving the acceptability of cathode ray tubes to unstructured workers in the workplace is through graphics. We have tested this thing on sixth graders, as well as key executives.

There is a whole movement afoot in the area of man-machine interface that deals with pictures, the ability to quickly scan information visually and improve the communications with computers which today, regretably, are too mathmatical and too accountingwise and too many mumbo-jumbo password expressions.

Again, we would be very happy—and by the way, the opportunity is right here in the Washington area to demonstrate that to you, if you would like to take a few hours out, and show you how the human communication with an electronic device can be tremendously enhanced and simplified to execute office functions. It would be a privilege to invite mmebers of the committee for such a demonstration.

Mr. WALGREN. Where is the location?

Mr. STRASSMANN. Leesburg, Va.

Mr. WALGREN. What kind of facility is that?

Mr. STRASSMANN. It is a training facility that we happen to operate in Leesburg.

Mr. HARKIN. We might take you up on that. How long would the demonstration take?

Mr. STRASSMANN. It would take 45 minutes to do the demonstration. It would take you an hour to get there and an hour to get back.

Mr. HARKIN. Just one last question. You talked about an electronic work station in your home.

Mr. STRASSMANN. Yes.

Mr. HARKIN. You are rather analogous, I suppose, to the Xerox Corp. to where some of us would be in the Federal Government, policymaking and higher echelon.

Mr. STRASSMANN. That is right.

Mr. HARKIN. So what type of work can you perform on this work station?

Mr. STRASSMANN. Messages. I have messages to Europe and to people I cannot reach on the phone because they are at meetings. Most of our executives are in meetings all the time, and I may have four or five pink slips on my desk before I finally connect. Only a small frac-

tion of phone calls in the United States actually connect because one or the other party is not there.

A simple device called an electronic work station or an electronic mail terminal allows you to be time independent in your communications with your peer network. It is prodigiously effective. It is quite inexpensive.

Mr. HARKIN. That intrigues me because we have a lot of telephone calls all the time, and we never connect. You try to take these calls but many times home, connections are not made. I do not understand how this system works.

Mr. STRASSMANN. I key in a very terse message into my cathode ray tube, and I send it through the network, and it parks itself so when the other person comes in from a meeting, he or she can just pick it up and scrawl on the thing and annotate the message. In other words, in the same way most of my communication used to be little sheets of paper on which I scribbled and passed it on the someone. That is how most communications take place at the policy level, people sort of doodling on each other's thought pads, and we do that now. It is very effective.

In addition to that, there is a whole peer group that can look at this communication exchange and very quickly achieve, say contract closure or draft reviews. I can do draft reviews by electronic mail. Certainly this testimony that I did not generate until late Wednesday was reviewed through a variety of peer groups inside our company, and most of it was done by electronic mail.

So the speed with which you can go and share in a community of people having a thought pattern is tremendously enhanced.

Mr. HARKIN. This is extremely interesting.

Mr. STRASSMANN. Thank you very much for appearing, and I look forward to the letter you will be sending.

[The prepared statement of Mr. Strassmann follows:]