

Futures Panel: Education, Demonstration Needed for People to Accept the New Technology

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Futures Panel: Education, Demonstration Needed for People to Accept the New Technology

Abstract

I would like to talk with you about a view of the future that will allow us to develop and express ideas more rapidly and easily. A future where technology offers a steady stream of cheaper, faster, smaller and easier-to-use tools that can be used where we work.

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Eric C. Hope

I would like to talk with you about a view of the future that will allow us to develop and express ideas more rapidly and easily. A future where technology offers a steady stream of cheaper, faster, smaller and easier-to-use tools that can be used where we work.

Discussions about the future of information processing are frequently buried in the jargon of bits and bytes, interfaces, and protocols. Rather than talk about specific machines and technologies, I would like to talk about information processing in a more ordinary and perhaps less exciting way. I want to describe the future by looking at a specific publication. The publication I want to talk about is a Quarterly Economic Outlook. I have selected these documents because they represent the types of information that most organizations deal with every day.

Before we start our journey into the future, let me describe briefly two small books. The material contained in each of the books is a combination of narrative text, data

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tables and graphic displays. There are no photographs, no half tones. Everything is printed in black and white. Much of the statistical data is now stored in a variety of computers, some of them internal Xerox computers, some of them external forecasting models. The outlooks are updated quarterly and distributed to several hundred people throughout the Xerox Corporation on a worldwide basis. All in all, these are very ordinary books.

To make our look into the future more personal, I would like you to assume, along with me, the role of the economist preparing the outlook.

For the sake of organization, let's look at the journey in phases—phases not measured in time, but by dividing the life cycle of the document into sections. The sections we will talk about are

- Text preparation
- Reproduction
- Distribution
- Storage

The project starts with a review of the past forecasts and their accuracy and an analysis of the causes for differences between the past forecast and the present. Rather than waiting for the mail to arrive a piece at a time, I now start by "addressing a work station." Already I have fallen into the trap of using the futurist words. The work station in my office is a keyboard with a television-like display that lets me look at information stored electronically. The data is stored either in my office or in some remote memory. "Addressing" simply means turning on the machine.

Let me give you an example of how the station assists the relatively inexperienced operator. I press a button that says "on." The work station says, "Hello, what would you like to do today?" I type, "Help." The machine then displays the first list of choices or a "menu." I select personal files. The machine then displays a list of the personal files. Among these personal files are ordinary mail and a file of letters and memos. But today I'm interested in what we have received from Chase Econometrics and the Wharton School. I ask for the Chase file. Then the machine asks, "What country?" I ask for Mexico. Then the machine asks, "What data?" I ask for inflation. The machine displays historic and projected inflation rates for Mexico.

Next, the key factors explaining the change in the inflation rate—oil prices, drought affecting crop yield and Soviet grain purchases—are displayed. On request, the data is

Hope: Futures Panel: Education, Demonstration Needed for People to Accept transformed from simple numbers to a trend graph for the inflation projections and a bar chart to account for the differences in the two forecasts. The tables are automatically labelled and the average change from one year to another in inflation rates is calculated and entered into the appropriate tables.

I have a choice of methods for updating the narrative portion of the report. The past text on Mexico can be recalled from memory and displayed on the screen of the work station. Or more traditionally, I can read the last report in its printed form. Minor changes can be made with the simplest and oldest of techniques—the pencil. The changes can be entered via the keyboard at the work station or I can ask a typist to type them.

I can add more substantial revision and new sections by either directly using the keyboard at the work station or by using a typist in a conventional draft and revision mode. Whether it is me or a typist, the basic text will be typed only once, stored electronically at the work station and edited using the screen and keyboard.

Having updated the text and data, the final pre-publishing activities can be performed. Type styles are selected—oversized letters for headings, italics and boldface to emphasize the key points, reduced sized type for footnotes, and sections are boxed in. Then, alternative graphic displays are considered and the report is signed. All of these changes are accomplished at the work station and the finished page as it will appear is reviewed on the display, including the signature, forms, and graphics. The power of the work station allows me to be the professional, the typist and the publisher. Or what is more likely, the steps take place at a series of separate work stations that communicate with each other.

We are ready now to move into reproduction. The text can be printed by high quality, high speed devices directly from data stored at the work station. Perhaps as importantly, second and third printings are accomplished with the same speed, simplicity and low cost as the initial printing, using the electronic printer.

The electronic printer reproduces charts, forms, graphs, signatures, and data with equal ease and with no loss of speed.

Simultaneously with the publication of the Outlook in Rochester, identical printers in Los Angeles, Tokyo and London produce Outlooks for distribution to these head-

quarter locations. The required telecommunications links to allow simultaneous printing in Brazil are not yet cost justifiable. Additionally, there are long delays at customs for imported printed materials. For these clients, the main printer provides a microfiche copy of the Outlook that can be sent by air mail. Airmail microfiche copies are delivered in Brazil within two days and used as micrographic originals to print finished, full sized books on demand. The original microfiche is stored for future use as a reference or for reproduction of additional books.

In addition to the hard copy distribution, a number of clients have chosen not to receive the Outlook in its printed form. They review only those sections of the report that are of interest to them at their own work stations. The report can be read there and left in their electronic file for future reference. Or, the client can select portions or all of the report to be printed out by a lower speed printer in his work area.

As you can see from the description that we have just gone through, the once clear distinction between reproduction and distribution has blurred dramatically. Increasingly, reproduction will take place closer and closer to where the reports are needed with the distribution taking place electronically over fast and increasingly less expensive communication links.

Filing, storing and retrieving the material included in the Outlook will offer more choices in the future. The conventional file or pile of paper will continue to be the most common and cheapest form of filing for the foreseeable future. A manager may receive both a hard copy and an electronic "soft copy" at his work station. He may routinely read the report in its traditional printed format at home or while riding on an airplane. He may elect, however, not to save the report but to depend upon electronic files at his work station.

In short, we have a view of the future where once a piece of information or an image is entered into a work station, that image can then be changed, updated, revised, edited without re-keystroking the data.

To summarize what we have seen:

First, the work station has added a new tool to the managerial and professional office. It is a combination typewriter, personal computer, electronic file cabinet, and electronic post office. The computer is a friendly machine. To operate it requires little instruction and no special computer language or skills.

With our work station, we have talked to computers in different parts of the country and communicated with electronic printers and other work stations. Our electronic communications have spanned the nation and the world.

We have used our work station to prepare complex statistical projections with the ease of making a phone call.

We have created forms, graphs, and signed our names electronically—all with the help of simple machine hints, or prompts.

In short, a simple friendly computer terminal now makes its home with us.

Perhaps by this time you are disappointed in this description of the future, for in a real sense all of what we have talked about is available today. Particularly, in terms of text preparation, today's word processors perform many of the editing and storage functions that we have described. In addition, electronic and micrographic printing are already realities, and remote printing through facsimile devices is well established.

The truth for the next five, 10, 20 years is that the capabilities we have today will become faster, cheaper, smaller and simpler to use—and, for these reasons, affordable by a wider and wider circle of people. There will be significant new advances in engineering, software, human factors and manufacturing. But the capabilities from a user point of view are already visible.

The degree to which these capabilities are applied in individual organizations has often been talked about as a function of the plummeting costs of computer logic and memory. While I agree that these cost declines are dramatic, they are not what will cause a change in the way in which we do business. They will simply be a prerequisite that will allow us to change.

Such relatively simple things as the way we construct and wire buildings and the kinds of office equipment that we are comfortable in using will be much more fundamental in pacing the rate at which we individually adopt what technology has made available.

You know, for many people the idea of sitting down at a computer terminal or even an electric typewriter can be very frightening. It is a fear of the unknown, a fear of embarrassing ourselves. And with many of us, it may be a fear of compromising our status within our organization—particularly, as we assume higher and higher managerial responsibilities. As you walk around the corridors of the universities and

in the Department of Agriculture offices, look at the people who use keyboards and terminals and describe their status within that organization.

A fundamental issue in realizing the promise that technology makes available to us will be the willingness of people in higher and higher managerial and professional positions to use keyboard devices, to take advantage of the increased computing and electronic filing power to extend the range of data and ideas.

It is interesting to note that in the current revision of the undergraduate curricula at Harvard University, there is a requirement for undergraduates to demonstrate a proficiency in using a computer terminal to access time-sharing programs. Clearly, the generation that is in college today in an ever widening variety of academic disciplines will think of a terminal as natural a piece of office equipment as a dictating machine, a typewriter and a filing cabinet. I do not think that it is necessary for us to wait for this generation of college students before we can take advantage of what technology offers. But because it will require changes in attitudes toward the use of machines, both organizations and individuals will require specific training and development plans.

Perhaps I can make the point by referring to something that many of you may be familiar with on a first-hand basis. Modern agriculture methods, beginning with crop rotation and extending through the use of modern herbicides and pesticides and hybrid seeds, were all offered by technology. But, without the dedicated effort of federal and state agricultural education programs, and without the county agents, many of these ideas would not have been accepted today. The same purposeful tasks of education, demonstration and training that were required to teach modern farming will be required by each of us on an organizational and individual basis to accept the technology that is being offered to us.

I think we should look forward to the future, confident that technology will provide friendly, easy-to-learn, easy-to-use tools that will allow people to be more productive and more effective in dealing with the world of information—the world of ideas and communication.

I would like to close with what I believe is a very positive and hopeful note. I think that each of us with the willingness to start on this adventure will discover a friendly future. A future where technology will allow us to deal with more ideas and more data with less hassle.