

Sex really does fit with the computer! I am thinking in terms of, perhaps, the secretary, perhaps yours, perhaps another. She walks over to the terminal where you have given her a task to perform, she sits down at that terminal, and prepares to enter some data. Of course, the first thing she does is snag her stockings on the inside wall of the terminal cabinet because it was made of very rough paint. She then attempts to log on. You had told her to log on with HELLO, MANAGER:SYS, slash, password. She is a pretty good typist but on the terminal she is a little shaky so she mistypes the password. What does she get returned? ERR8. It means your entry is not acceptable; your password is incorrect. But, why doesn't the message say that? There are other ways of looking at cryptic messages, too.

Let's consider her background. She is probably some nice young girl who is very morale, obviously attended church her whole life, minded her parents, yet the computer might have come up with some other messages using such words as ILLEGAL or BAD. Consider the psychological ramifications on this poor kid who has just sat down to her first job and you have given her this task. Rather traumatic. My favorite is the error message you get when at the console, no matter what you do if your input is not acceptable, the system responds with INVALID.

Can you identify the real problem? Sure. It is PEOPLEWARE. In contrast to hardware and software. For those of you who have known me for the four or five years that I have been associated with the Users Group know that my favorite topic is PEOPLEWARE. This is really the human factor or user interface. This area concerns all the same hardware and software

aspects of design, development, integration, production and maintenance. Some of the items involved are used in dialog at the terminal, user manuals, user problems and their handling, user support, user communication. Specifically, this involves psychology at the terminal. A hardware related example might consider the RETURN key. Why call it RETURN? Why not ENTER or SEND? Some people have put ENTER on the key because that is what the user does. Let's go one step further. How about coloring the key? What color should it be? How about green? How about the break key? How about red? Ever try to find that break key on the 2640? It is buried among several other keys; I always hit the wrong one. Or, why not use a two-color ribbon? For hard copy dialog you could distinguish between your input and the computer output. This idea makes it very simple to see "who" has done what. Of course, if you suggest that to some manufacturer you know what they are going to come out with--red and black. And all your input is going to be red; how about green and black. Why don't manufacturers take the human factor more into account? Well, there is a simple reason. First, it is expensive. If you recall, an early military system, something I started out with in computers, the SAGE system. The Semi Automatic Ground Environment was supported by the US Government and that is probably why they had enough money to implement human factor efforts. For every three programmers there was one psychologist on the staff to sit down and analyze those people who were going to use the air defense display system. Those airmen third class didn't want to know how the computer ran, but they sat at this silly thing and had to punch the ring button at the right time. The color of the lights, the seating arrangements, the location of the buttons, were all done by the human factor personnel who also generated simulation exercises.

Furthermore, the typical manufacturer of computer systems does not

understand the user or the user problem. He does not employ human factor analysts or psychologists, generally. Yet the most important element of the computer system is PEOPLE. Without them there is no need for computers. Right? What I am really saying here is that I feel that what we need at this point in time is to make the computer bend to the needs of the user not bend the user to the needs and requirements of the computer. Certainly the manufacturer's concerns for hardware and software are essential. I wonder really what a user is to HP? You might ask Ed McCracken.

But what sells computers? The answer is simple--hardware and software. Those of you who are managers, what do you look at, the hardware specifications. What will the software do for me? But, unless the user, the user sitting down at the terminal, can be a success; and that is the key to our world here, success; with the computer, simply and easily, the most sophisticated computer system in the world is of extreme diminished value.

When you are at the terminal what is the mean time between confusing, misleading, nonexistent responses from the computer system? Or, for that matter, HP? How often do you spend extra time trying to find out what the problem is? What really went wrong? When information is not in the manual, you guess by trying this and that. My engineers spend a lot of time sitting there and going through lemmas to determine just how that FORTRAN statement really works. Consider the error message "parameter in error." Why didn't they just give the parameter in error? There is a whole string of parameters in FOPEN, 15 or something like that. How do you know which one is in error? Why not point it out to the user?

The data processing situation right now in the world is as follows: hardware costs are going down for sure. Bill Foster said the other day that software costs are going up. HP is petrified at the amount of software and they

don't want to write the users' software. It is expensive. The use of batch processing is going down; the use of interactive processing is going up, e.g. time sharing, online. We all have HP3000 computers--interactive processing is one of the basic elements of the HP3000. Sit down at an HP3000 terminal and do what you want to do. Yes, it can process batch; but, I think most people here will use the HP3000 more interactively.

Up at the Birds of a Feather session last night we were talking about terminals across the nation feeding into a computer, all interactive, online, ready to go. The problem as pointed out by the Hughes Aircraft Company DP manager the other day, sort of hit me. He was saying the problem is not the cost of hardware, at Hughes we have two IBM 370/165 computers with three megabytes of core to fill this room and another room full of mag tapes and terminals all over the place. What he is saying, and I believe him, is that the cost of the software development is going up, but one of the highest costs is the transfer of information from the user to the system and from the system back to the user. That is the area User Interface.

What is the computer manufacturer doing to enhance the user interface? In the future more noncomputer oriented users will be interfacing directly with computer systems. They will be scientists, managers, housewives, and kids. They all want results. They want to perform their tasks easily and simply. The thought process, that process that goes on in the mind, for the end user is different from the computer scientist. We here are generally computer science oriented. That user out there is not! Computerese should not be necessary at the terminal. Besides, why not make it easy for the computer scientists? Should I really have to guess if the numbers output by a PMAP are octal or decimal? Why not at least put a percent sign in front? Even though I am a computer scientist and I have a master's degree in

computer science, doesn't mean that I magically know all the magic things that you output from the computer. Make it easy for me. Make my job so I can get my work done.

Shouldn't the computer system designers consider what the needs of the user are? Who is doing research and development in human factors today? How many manufacturers are actually having people do work out there, doing research, taking a look at the end user criteria? Are human factors a real high priority concern for manufacturers? Certainly not for most hardware manufacturers. Today I feel we do not really have friendly computers, let alone forgiving systems. Friendly is being able to come up with good vocabulary so that users can easily deal with computers; and forgiving, in the concept that I make an error and the computer doesn't return with abort, percent sign, and garbage. How do we get there from here? It is clear to me that some human factor analysis needs to be performed. Sure I realize that most manufacturers do not understand the tasks. It is only natural that the most knowledgeable person to perform this is the user. The implication is good, frequent, free flowing, information between user and manufacturer. No longer can systems design criteria not take into account the human factors. No longer can manufacturers generate design specifications in a vacuum. Manufacturers must swallow their pride and break the NIH barrier. NIH; not invented here. And, heavens, heavens of heavens, the manufacturers must make, must initiate personal, direct contact with the user to, watch it gentlemen, to see what his or her requirements are. On the other hand, the user needs to make the manufacturer aware, aware of the problems at hand and help other users get around the current problems through dialog, through documentation.

How do we implement this approach? The Users Group certainly provides one medium for user exchange with user and manufacturer. Another medium, and I think probably of equal importance, is the Newsletter. You are going to have to spell it out and contribute your ideas, your problems, your techniques, your solutions. Nothing in the computer system is obvious, no program is too simple. Bill Bryden and I were joking about that the other day. "I will just whip up this simple program," he said. Three hours later he was still debugging and it was just a simple program. It is difficult to get from here to there.

Only through communication, from you the user, the person most closely related to the computer system, can we, I mean we--user and HP--become a success in an easy and simple manner. In another of the Birds of a Feather sessions last night, one of the fellows was talking about a COBOL routine or a COBOL statement and the code generated. He was talking about the inefficient code the compiler generated. He knew exactly that this statement generated inefficient code and that another statement generated much more efficient code. That is great, that is good for him, but what about all of you out there? You are going to have to put it in a Newsletter, you are going to have to express it in meetings here up front. HP cannot do that for us. We must do that. The user has the responsibility to fully describe his problem. Not only to describe his problem, but to justify them in terms of both his needs and economics then generate as full a solution as possible. Just yelling about the problem is not going to get the solution and manufacturers are not going to pay attention unless they have a real understanding of what that user need is and how they can apply the solution to meet other user's needs. Very definitely economics is HP corporate objective number one. You MUST make a profit.

Your suggestions cannot be used by the manufacturer unless they make the manufacturer a bigger success easily and simply. More important your description of how to use a system, techniques, application solutions, learned information about the system is invaluable to other users, and ultimately your success. We have got to be careful about our relationship with the manufacturer. We cannot just beat on the manufacturer. Truly the greatest burden is on the user. You must be thorough in your analysis; you must site good examples, provide good solutions, provide good alternatives. There is not only one road to these problems for a solution; they are not answers; they are solutions. You must write good documentation. I know that hurts. Most programmers, most EPers do not write. Why, I do not know. Certainly there is some fear to commit themselves to paper. But, documentation has got to be learned. In fact, it seems to me that if I had a lot of programmers under me, one of the first courses I would send them to is a writing course--not computers--writing; how to communicate! When they have a problem they must be able to put it down correctly.

Second to last, we have got to gather consensus. That is what our questionnaires do.

Of course, last, we must be reasonable and businesslike. I realize that this is very frustrating. It is very frustrating for me at times and I do get carried away in terms of not being businesslike. But dealing with these manufacturers we must approach them in a reasonable fashion. Likewise, the manufacturer must realize that we are business people and approach us in a straightforward and honest manner. If you do not do these your good energy is wasted and you only perturb the manufacturer. Throughout the relationship I have had with Hewlett-Packard, I have gained a great respect for that corporation. I have been very personally involved with it through the

Users Group. I have a high respect for the corporation, its people, and the way they handle themselves. I think they do it a little bit differently and I think that makes a difference. Their aim is most definitely an aim for quality. We can say how come you don't do it like DEC does; there are reasons HP is a higher quality corporation in many ways.

Well, what are our conclusions here? Significant progress, advancement of our computer system is best made with full cooperation, understanding and easy communication between users and users, between user and manufacturer. Until the perfect system is generated, we must accept the current status of the system. Only you can expose the real user techniques, problems, and required solutions. That is you must grin and bear it.