Developing Policies for End-User Support

Michael Wolfe
St. John's University
January 1999

As more workers are required to be users of computer information systems, an increasing part of the organization's information technology (IT) budget must be devoted to supporting these end users. A common environment is the support of office automation tools such as word processing, spreadsheets, email, etc. In this environment, end users invariably encounter hardware and software problems.

A problem common in the early 90s involved an early version of Word Perfect for DOS, which, by default, used the same directory for the program executable and user documents. Users would sometimes save their documents over the program executable. A problem common today in buildings without a reliable supply of electricity is the loss of some network services as power levels fluctuate. Users are frustrated when commands suddenly--and to them, inexplicably—stop working. Options for supporting end users who encounter such problems vary from no organized support to a full-time support staff traveling to the user's work area to correct the problem as quickly as possible. While the cost of the latter service is easily measured, it may well be exceeded by the costs of the former: lost productivity from inadequate support has been estimated at several thousand dollars per year per end user.

Development of an optimal support policy is, at least in principle, a straightforward minimization problem: minimize the total cost of providing computer support plus the cost of lost productivity from computer-related problems. Letting π_u be the end-user's lost productivity per unit time and π_s be the support personnel's lost productivity per unit time, i.e., the value of what each could be producing for the organization if not for the end-user's IT problem. The end user will suffer this loss of productivity until the problem is fixed, a time t_u; the support personnel will suffer this loss of productivity for the time required to travel to the end-user's work area, and the time required to fix the problem, t_s. Thus, the problem is:

$$\min \pi_u t_u + \pi_s t_s$$

A specific instance of this minimization which is amenable to analysis is the case where the support staff regularly travels to the user's work area to correct problems. The support staff might correct the problem, or might try to train the end-user to correct the problem in case it recurs. This is what I call, the "Fish or Pole" question: "Is it better to give the end-users a fish (fix their problem) or a pole (train them to correct their own problems)?"

In some organizations, end-users are strictly enjoined from attempting to correct any computer-related problems, but must call the support staff and wait until the support staff can correct the problem; in other organizations, end-users are expected to correct many minor problems, either on their own, or with telephone support. Interestingly, either policy might be optimal, depending on the specific environment.

Specifically, consider the case where the worker has a number of tasks to perform, some of which require information technology resources, but some of which can be performed while these resources are completely inaccessible. Further assume that the response time of the support unit is such that the problem can be corrected while the worker is performing those tasks which do not require information technology, so that there is no lost productivity on the part of the end-user from the information technology system failure. It is also not unreasonable to assume that, regardless of any disparity in their compensation, the actual productivity of the support staff is comparable to that of the end-users they support. Thus, the cost of repairing each incident is

$$\pi_s t_s$$

which is minimized by minimizing t_s, so that the optimal policy is to send the end-user to perform other tasks, while all repairs are performed by the IT support staff.

The problem becomes much more interesting when there is a significant loss of productivity on the part of the end-user during an IT failure, especially IT failures which could be corrected by the user. For example, in the case of lost network connections due to power fluctuations, the end-users could correct the problems themselves by re-booting their computers, as the logon scripts will re-connect all lost resources. Assume, then, that there is a lost productivity for the user, that the user's lost time includes both the time waiting for the support personnel to become available, and that the time required for repair is $t_u = W + t_r$ if the support personnel just repairs the problem or the wait time plus training time, $t_u = W + t_t, t_t > t_r$

The increased cost of training is, then

$$(t_t - t_r)(\pi_u + \pi_s),$$

and future savings will be

$$\pi_u W + \pi_s t_s$$

The organization must then consider the discounted present value of the overall income stream,

$$-(t_t - t_r)(\pi_u + \pi_s), \pi_u W + \pi_s t_s, \pi_u W + \pi_s t_s, \ldots$$

This can be approximated if we estimate the expected value by assuming failures occur regularly at the mean time between failure (MTBF), expressed in years. If d is the discount rate, then the discounted value is:

$$\frac{(\pi_u W + \pi_s t_s)(1 - d \bullet MTBF)}{d \bullet MTBF} - (t_t - t_r)(\pi_u + \pi_s)$$

The discount rate d must include the possibility that the user will forget the training; hence, rates of 30% per MTBF are not unreasonable. Even at these discount rates, it is better to train the end user unless training takes more than twice the expected wait time.

Dr. Michael Wolfe earned his BS in Mathematics from The University of Texas at Austin in 1972. He earned his Ph.D. in Management Science and Information Systems from The University of Texas at Austin in 1988. He was an Assistant Professor of Management at West Virginia University, an Assistant Professor of Computer Information Systems at the University of Louisiana at Monroe, and is currently an Associate Professor of Management at St. Johns University in New York.

Dr. Wolfe's research interests are in the areas of information systems to support groups using the World Wide Web, and in management of the computer support function. He received several Air Force Grants to study local and mainframe-based group support systems from 1989 - 1993, and grants to study the use of the World Wide Web to provide databases to widely dispersed groups in 1995 and 1996.

His research work has appeared in Decision Support Systems, The Journal of Econometrics, and the International Journal of System Sciences.. Dr. Wolfe has also presented a number of research papers at National and International conferences. He has also served as a reviewer to a number of research journals and conferences. Dr. Wolfe had his contribution to the Southern Association of Information Systems Conference named best paper. Dr. Wolfe is a member of INFORMS, the Association for Computing Machinery, the Association for Information Systems, and the IEEE.