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ON PROVIDING USER SUPPORT IN A CHANGING ENVIRONMENT

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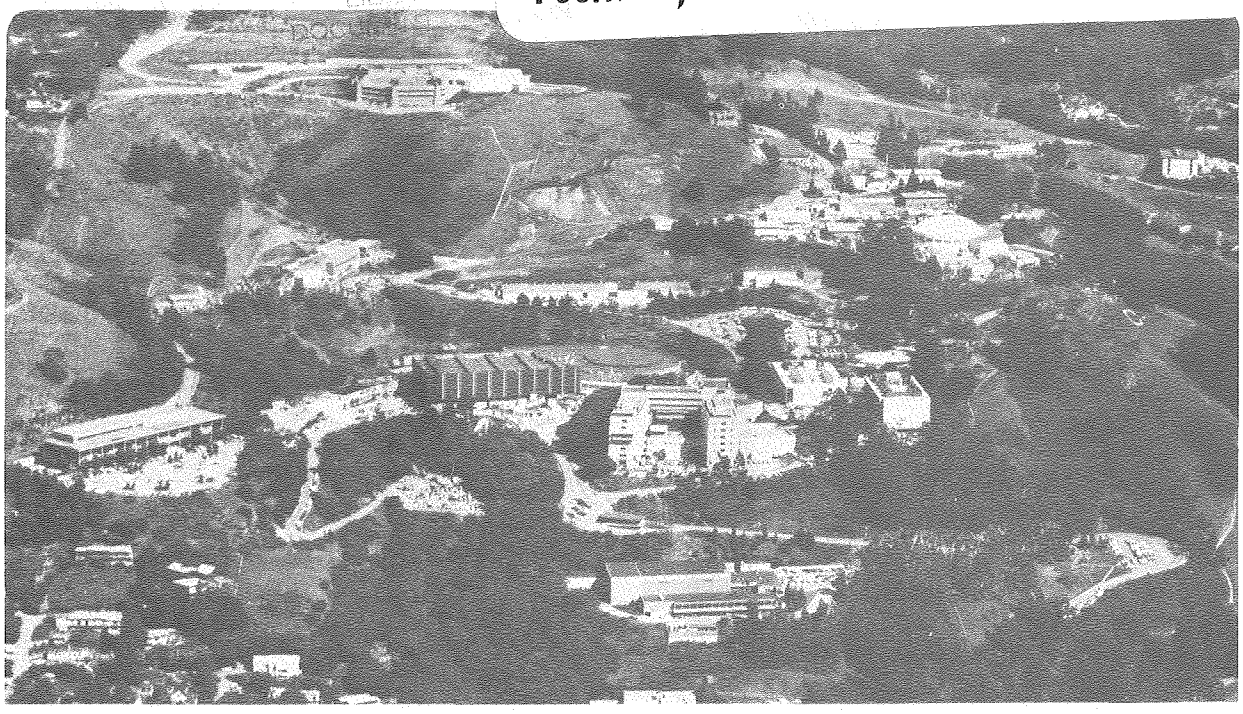

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On Providing User Support in a Changing Environment*

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Introduction

In the face of rapidly changing products and user needs, a familiar problem to large computing facilities today is deciding what services to offer, and how to offer them. Dropping hardware costs, increasing need for interactive computing (including text processing, graphics, and data management systems), and fiscal limitations for both the central facility and the users are some of the changes we are experiencing at Lawrence Berkeley Laboratory. How can the central computing facility provide the services users need in the most expedient and inexpensive way possible?

Part I. Problems

Large central computing facilities within an organization tend to suffer when there are organization-wide budget cuts. Whether the institution experiences dollar cuts, or inflation shrinks an unchanged budget, the central computing facility will be given less money to replace and supplement obsolescent equipment.

Moreover, since computing spending comes from discretionary funds in most cases, many departments will instruct their computer users to cut back

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or find cheaper ways to compute. If the central computing facility provides computing on a recharge basis, users will either seek free computing at other institutions (those that subsidize computing), or try to use the cheapest computer time available at the central facility. They will also avoid using those services that cost extra.

Another big problem is that individual departments are purchasing their own small computers to handle their needs. It seems easy, at the initial stages of computer acquisition, to manage perfectly well without computer professionals. Lured by dropping hardware costs and the availability of "off-the-shelf" software, and frustrated by inadequate and expensive access to the kind of services they need, many departments find purchasing their own computers to be a viable solution. And, in the short term, perhaps it it.

In the long run, however, the organization finds itself with a conglomeration of unrelated systems and each department competing for the organization's attention to its individual needs. Already weakened and demoralized by these competitive facilities springing up within the organization, the central computing facility finds itself unable to sustain its budget. Perhaps most importantly, the users find themselves without many valuable services that only a central facility can provide--for example, consulting services, COM (computer output on microfiche) access, mass storage and printing devices, and communication aids such as a low-speed switch for terminal access to more than one computer. So, purchasing their own machines almost invariably backfires eventually for individual departments.

Not only are computer users finding that they need more and more kinds of computing facilities and features, but more kinds of personnel are using computers. At the same time, there is often no growth in computer

professional staff to accomodate the new users; in some cases, computer personnel is even reduced due to lack of funds. The clerical work force, for example, has begun to use text and word processing facilities heavily, often on machines their individual department has purchased; but they could greatly benefit from some of the expertise and computing features that only a large central facility can offer.

While users are seeking lower rates, the central facility must maintain or even increase its rates, in order to compensate for the lack of income generated by normal use. It must somehow support increasing personnel costs and attempt to replace obsolescent equipment--the very equipment that is not keeping up with users' needs. Of course, the central facility can never compete with those organizations that offer free (subsidized) computing.

In this viciously circular situation, the organization as a whole must make a cohesive plan that includes a commitment to the long-term value of computing, and must stand behind its computer professionals, who will be providing the necessary services.

Our Computer Center at Lawrence Berkeley Laboratory has experienced some of these problems; later, I shall discuss the solutions we have found with which to address them. A brief description of our setup would be helpful here. Our Computer Center is a department within the Laboratory, which is operated by the University of California under contract for the Department of Energy. Situated in the Berkeley hills above the University of California Campus, the Laboratory has changed from Atomic Energy Commission to Energy Research and Development Administration to Department of Energy sponsorship. Initially, research was predominantly in high-energy physics; other disciplines such as energy, environment and earth sciences have had the most growth

in recent years.

In the past, our Computer Center had the only general purpose computers at the Laboratory, and consisted essentially of one large batch system that was locally written and maintained. Although the Computer Center conferred with departments that used the computers as to their needs, Computer Center professionals also had some leeway in choosing what was needed for the users. Now, however, the picture is more complicated because there are other computing facilities within the Laboratory. In order to plan, the central facility must be aware of the other computing facilities' plans. Consequently, top management needs to oversee all of the different computing factions.

As more and more people at the Laboratory are becoming computer users, user needs have diversified. No longer are all the users looking for the same features from a computer system. Increasingly diverse computer use has led to dissatisfaction with the Computer Center on the part of its users. They not only consider the cost of using the central facility to be unduly high, but they find it unable or unwilling to solve their very individual problems.

Some users remember when our central facility provided solutions to most of their needs, incorporating necessary services into the "homemade" central system. Perhaps they don't realize how greatly computer use at the Laboratory has grown, how diverse and complex the computer field has become, and how difficult it is for a central facility whose staff is not expanding to keep up with their needs. In short, as the technology has grown and diversified at the Laboratory, the communication between users and computer personnel has broken down. Not surprisingly in such a situation, users' attitudes toward computing in general have worsened.

The budgetary problems and the diversity of computing needs and functions have placed a heavier burden on Computer Center management than it has experienced before. Computer Center Management must seek ways to decrease the credibility gap between the central facility and the dissatisfied users. They must be willing to change the organizational structure to fit new roles within the Computer Center; they may have fewer staff members to do more work. Management must also deal with morale problems within the staff, and the frequent crises that inevitably arise from an unstable situation.

Perhaps most importantly, Computer Center management must prepare their staff for the future and guide them through their changing roles. Computer personnel skills do not necessarily match current user needs. Whereas previously, computer professionals could successfully perform their tasks in the manner they chose, Computer Center management must now step in and guide their staff in bringing about the long-term goals of the organization.

The technology explosion has had a great impact on computer personnel. Adjusting to their new roles and, in some cases, acquiring new skills, have become major factors in the jobs of computer operators, systems programmers, and in-house consultants alike. Fiscal reductions have restricted freedom for computer professionals and have thus affected their morale.

Technological changes have also tended to widen the gap between computer professionals and top management. Computer professionals feel their technical knowhow should be incorporated into the decisions of managers. They have serious reservations about the ability of management (top and middle) to successfully lead the Computer Center through the transitional times ahead without their technical guidance. And conversely, management has doubts about the ability of computer personnel to see the broader picture of

computing. Management would like them to adjust to their new roles and trust in management's ability to guide the organization as a whole.

Part II. Solutions

I have only outlined the problems that an organization with a large central computing facility faces today. The problems I have discussed point to the critical need for a commitment from top management of such an organization to promote long-term solutions for its computing needs. All hardware acquisitions should be reviewed by high-level planning groups so as to fit the overall goals of the organization and make the best use of available funds. Also, these groups should pay attention to past growth patterns and try to predict future patterns if possible. They should be willing to implement innovative solutions in order to maintain their staff of highly skilled and perhaps irreplaceable computer professionals. In short, changes should be made with minimal trauma to the organization as a whole.

Managers of the central computing facility must educate higher level management as well as guiding their own staff and re-educating the users as to which of the users' expectations are reasonable. At our Computer Center at Lawrence Berkeley Laboratory, we have implemented some solutions that I believe are worth sharing.

About a year and a half ago, our Computer Center began to change. What had previously been a centralized, locally developed batch system was evolving into a local network that connects various specialized computing functions together and provides much more interactive access than was previously available here.

In order to implement this plan we reorganized our computer personnel. We put most of the computer professionals in the department together into one group called Software Support and Development. It includes both systems programmers and user services personnel. As the various projects in the large scheme of a local network grew, the group evolved into project management teams. Each significant project now has at least one systems programmer, one user support person and one project leader.

Some projects are fairly long-term, while others are assembled and disbanded according to the specific needs (and crises) of the time. Project leaders report to the head of the Software Support and Development group; most personnel report to their project leader. But because there is much overlap and flexibility, personnel can be mobilized fairly easily for specific tasks within their realm of expertise.

While some staff members are quite versatile, others specialize. User support is considered a specialization, and includes documentation, user education, and consulting. Also, an ongoing consulting project addresses user problems that are uniform across project lines.

When possible, the work process is similar to that on the M.A.S.H. television program, in which actors, writers and directors all work together to produce the week's script. In that production, the actors are a vital part of the planning and writing process. Similarly, the consultants at our central computing facility have worked with their manager in putting together strategies for providing user support. This difficult task must include many different systems and functions that the Computer Center now offers.

One solution that the consultants and their manager came up with is to train operations personnel to answer simple questions in the central

consulting office. This approach not only serves as a screen so that the consultants can use their time for more complex problems, it also helps make use of operations staff who are already working at the Computer Center but whose function has diminished as the technology has expanded. It has boosted the morale of both operations and consulting staff, and will still allow the users to get the level of assistance they require.

In order to benefit from changing roles within the Center, Computer Center management made a commitment to formal technical training programs, whose cost is high but whose benefits far outweigh the price. Using operations personnel in software and user support areas when the jobs they were originally hired for no longer exist is but one example of this philosophy. All changes, both in personnel activities and in the kind and number of systems offered, require such a commitment from management to invest in the future skills of the staff.

Even management style has changed at our computing facility. The traditional, hierarchical system has evolved into a system more like a matrix, which we feel is more suited to the diversity of systems and features we offer. Because of increased openness about technical issues within the department, morale has improved. Specifically, a technical departmental committee made up of both managers and technical staff provided a vehicle for promoting trust and confidence between management and staff. This committee met weekly and gave advice and input to the Computer Center director.

Another example of an effort to bridge the gap between management and technical staff was to develop a list of Computer Center projects and update it every few weeks. The list is maintained by a technical staff member who gathers the progress information on each project from all involved members of

the Computer Center. Because this list incorporates both managerial and staff efforts into each ongoing project, it provides an overview that is not limited to one perspective. All Computer Center personnel have access to this list.

Returning to the problem of the Computer Center's relationship with the user community, we have found that the problems of user dissatisfaction and a shortage of computer personnel are intertwined. The users themselves are the key to both problems. First, the Computer Center must educate the users as to what they can reasonably expect from the central facility. As I have mentioned, because the users were somewhat indulged in the level of service we were able to offer previously, some of them have unrealistic expectations. For example, whereas eight consultants could provide excellent service and support to the users on every aspect of a homegrown batch system, those same eight will be unable to provide the same depth of knowledge on the four very different, vendor-supplied and documented systems that we have recently acquired.

Ongoing communication between users and the Computer Center can increase trust and bring about a realistic perspective on problems. We have instituted two different programs at the Laboratory that have been successful both in increasing dialogue between users and computer staff, and in determining user needs and priorities. One of these is the liaison program, a formal group of four computer professionals who meet regularly with computer users from all divisions within the Laboratory. Though fairly new, this group has already produced long range planning data and reports, and reports of computer users' priorities.

The other such activity is the forming of Lab-wide special interest groups, which have been most successful in determining user needs and improving the communication process between the central facility and the users. So far, there are three such groups: graphics, database management, and text processing. There could be more such groups in the future.

Another kind of solution, one we have been fortunate enough to be able to implement, is offering our users access to computing resources outside our realm. We have embarked on this venture with the Computer Center on the U.C. Berkeley campus nearby, so that each facility's users may take advantage of the other facility's CPU's. The two Computer Centers split the labors of these offerings.

Other ideas for making do with fewer computer personnel include using videotapes as instructional aids for users, and directing users to university-offered courses on various systems. These are useful tools in an environment in which users must take more and more responsibility for their own education and problem-solving.

In a Computer World article by Daniel McCracken, he states that software developers should

> "Encourage end users to develop absolutely every application they possibly can. Naturally, you'll have to provide them [with] appropriate applications development tools to make this possible." [1]

In keeping with this philosophy, the liaison group and the special interest groups I have described could be expanded to become a user self-support network in the future. This would alleviate some of the problems

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[1] "Software in the 80's: Perils and Promises" by Daniel McCracken. Computer World Extra, Vol. XIV, No. 381, Sept. 17, 1980.

that occur due to a shortage of computer personnel, and would allow users to take advantage of each other's expertise and insights. For example, users could easily benefit from knowing how other users were approaching text processing problems on the UNIX[2] system. They might share software scripts and procedures, knowledge of subtle features, and even solutions to esoteric bugs.

Another possibility in this spirit would be to form "local users' groups" to interface with specific vendors. These groups would be Laboratory-wide and would meet regularly. For example, VAX users could provide ample support to each other in terms of what documentation and applications are most useful.

In conclusion, as well as developing their own applications, users should rely on each other for many services previously provided by the central computing facility. As the central facility continues to offer a wide range of hardware and systems, as well as specialties such as graphics and database management systems, the number of computer staff members per machine and per user will decline.

As McCracken would encourage, the central computing facility can still serve a vital function in these groups by providing the appropriate tools and whatever expertise it can contribute. Nonetheless, as more diversified computing resources are offered, it is inevitable that the amount of service that the central computing facility can provide to the users will be proportionally smaller than it was in the past. And although communication with users is becoming a vital part of their job, computer personnel must also spend their time learning new skills and updating their technical expertise.

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[2] UNIX is a registered trademark of the Western Electric Co.

More than ever before, it is essential for anyone dealing with computers to adjust to a changing medium. High-level managers must make a commitment to the value of computing and to the long-term computing goals of the organization. Middle managers, i.e., managers of the central computing facility, must bridge numerous gaps; they must educate the high-level managers and must guide their staff in providing the users with the tools they need. Systems programmers, consultants, and operations personnel must learn new material and interact with the users more than ever before. And users must educate themselves as to what they can expect from the central facility and how they can make the best use of, and contibution to, the services available to them. In short, every computer user, programmer, operator, and manager must be open to the role changes that the rapidly evolving computing environment demands.

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