EXISTING IN A NETWORK ENVIRONMENT: CHALLENGES AND RESPONSES

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Introduction

While the field of computing is certainly no stranger to change (technological innovations and user demands being what they are), it seems as though changes lately in industry have accelerated to an almost unmanageable pace. As providers of computing services to university communities, we at UCC's have been perhaps slightly insulated from the more violent eddies of change by fairly stable user bases and predictable (if not incapacitating) levels of funding. It is hard to change without upsetting old friends and spending lots of money.

But change we occasionally must. This paper seeks to address some of the more tangible issues encountered by our Center as we pass through a period of, to put it euphemistically, transition. In the summer and fall of 1981, the University of Minnesota Computer Center will suffer the following alterations.

Central Site

mainframe upgrades - CDC Cyber 170-720 --> 170-730 (dual CPU)
NOS 1.3 PSR 485 --> NOS 1.4 PSR 541

mainframe switches - Cyber 730 and Cyber 172 now serving different user groups

mainframe additions - Cray 1S (running under COS)
DEC VAX 11/780 (running under Bell UNIX)

peripheral equipment acquisitions and extensive physical plant modifications to support these changes

future (1982+) changes to support a network of incompatible systems (X.25 links between CDC, IBM, DEC processors running as many as four operating systems)

Remote Sites

Image Processing Center (IPC)

mainframe addition - DEC VAX 11/780 (running under DEC VMS)

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multiple graphics software acquisitions: ISSCO DISSPLA and TELL-A-GRAF

Burgeoning use of microcomputers campus-wide for stand-alone research and text processing applications, and for central site communications: Apple II, Terak

Growing numbers of non-hard science research users who need access to computing resources, but cannot pay for them.

What are we to do? Can we find some way to fashion meaning out of madness? In the pages which follow, we will address ourselves to these problems by concentrating on three principle areas of our services to users: documentation, consulting, and education. In many ways we are presenting a progress report, for many of our problems have yet to be resolved. Indeed, some aspects of the complex situation have yet to be defined as this goes to press. But enough details are clear at this point that we can begin to investigate solutions. Our hope is that, by examining our problems and possible resolutions, we can better understand the process of adaptation that follows close on the heels of change, and perhaps help you prepare for your own inevitable confrontation with systematic flux.

Documentation

We have historically operated as a large university computer center, primarily serving one campus and one relatively uniform user base. Our users have been technically-oriented, and knowledgeable about and experienced with computers. We've had a well-defined system configuration: a system for instructional interactive computing; a system for research interactive computing; and a system for batch computing.

Given this stable environment, we were able to define a consistent documentation scheme. Our documentation was built around a multi-faceted User's Manual, providing background information about computers and the computer center, and supplemented with leaflets, reference cards, guides, catalogs, and reference manuals, all pertaining to special topics.

Our front-line documents assumed some knowledge on the part of the user, and we were able to address these materials to a specific audience. The same was true of the content and organization of our more technical documents. Our programming staff has always been an integral part of our documentation effort; we rely on their writing skills and technical expertise.

Many of our documents were distributed without charge to our users; the "weightier" ones were sold at a nominal cost by the University bookstores. The total selection of documents was not extensive and often consisted of photocopied materials.

Within the last two years, and especially now, the stable situation at UCC has deteriorated, with a corresponding effect on our documentation efforts. We are still a large university computer center, but we have incurred several changes. Our system configuration has changed and grown as we move toward a statewide network environment (we'll have gone from two mainframes in 1977 to six by fall, 1981). Our user base has expanded and diversified, while their overall computer sophistication has decreased. We now see users from the social sciences, the humanities, the classics, etc., as well as from the more traditional departments like

mathematics and physical sciences. The types of services we offer have broadened in proportion to the growth in our user base. Our users request text processing, interactive graphics, DBMS's, text analysis, and number crunching services, in addition to microcomputer-related services. The variety of operating systems and applications programs widens as we increase our service levels. By fall, our six mainframes will operate under four different operating systems, and we will offer interactive SPSS, extensive graphics capabilities, vector processing on a Cray 1, sophisticated text formatters under UNIX, and output service to a XEROX 9700 laser printer, as well as continually expanding services for Terak and Apple II microcomputers.

As you can see, our stable environment has suddenly disappeared. Our documents are inadequate to cover all the proposed changes; we need new documents to describe new services; we need tutorial documents to help less knowledgeable users--in short, we suddenly have to teach a diverse group of people how to use new services and new equipment, without overtaxing our already overburdened programming and writing staff. All this in the face of constantly changing and delayed management decisions concerning hardware and software. The problem is also magnified by changes that will be implemented as our movement toward a computing network continues.

As we move toward fall, 1981, we have begun to solve some of our documentation problems. We have consciously decided to reach out to the less knowledgeable sector of our user base and address their needs with specific tutorial booklets; thus we are changing the focus of our front-line documents and are addressing the early needs of our entire user group. On the other hand, we will maintain the integrity of our documentation program by incorporating new material into existing documents whenever possible. This process parallels the inevitable software conversion effort, which should be complete within one year. We will produce a new document as a last resort, but will generate specialized documents as appropriate for topics like graphics and text processing. We want our users to perceive us as a single dispenser of multiple services, not as a composite of unrelated computing activities and services.

We are keeping abreast of all decisions affecting documentations. This means we are talking to staff members at all levels on a frequent and regular basis. We are guiding and monitoring the documentation efforts of all staff in an attempt to avoid duplication and proliferation of documents. We are stressing the need to test and verify the contents of documents before they are released to users, and above all we are ensuring that the documents will be ready when the new systems and services are ready.

Consulting

With three CDC machines running essentially identical systems, the consulting services we have provided in the past have been two-tiered. A general, face-to-face service staffed by about 55 have dealt with most students' questions about programs they write and with fairly detailed questions from other users about the operating system (tape usage, job control language, and the like). In addition, users who find it inconvenient to come in may telephone a Help-Line staffed by about 20 senior staff members. The Help-Line provides a great deal of elementary consulting, but those who staff it serve to back up the face-to-face service for answering difficult questions. Together, the services handle about 40,000 questions per year.

The face-to-face service and the Help-Line have *not* covered three large areas: statistical applications, business data products, and microcomputers. General consultants have not typically had the expertise in these subjects to provide good consulting for any reasonable portion of each day. We have had limited hours of walk-in and phone consulting for each, however. These services handle around 6,000 questions per year.

As we expanded our graphics and humanities applications and had more users in those areas, it became clear that we would either have to set up two more separate consulting services (thus reducing our general consulting staff) or find another solution. What we did last year was to advertise one hour each day as a "graphics hour" and another as a "humanities hour" and schedule staff with appropriate expertise to be general consultants during those hours. This seems to have worked well.

In acquiring new systems and expanding our work in text-processing and graphics, we have faced yet another possibility of splintering into many limited consulting services. No one can possibly have the knowledge to provide a detailed level of consulting in all areas. Since two-thirds of our face-to-face consultants are students who must have considerable training, we cannot see how to continue the face-to-face service at its present depth but over three or four systems.

We don't like the idea of many separate services. In fact, some staff would like to see the general service answer statistical programming, business data product, and microcomputing questions, too.

We'd prefer to have users visit one site for all face-to-face consulting, both for their convenience and for ours. Even though telephone consulting is not as disruptive to neighboring staff as is walk-in consulting, we'd like to limit it somewhat, too, for it is difficult to get work done with telephone interruptions. What we expect to do is provide general consultants with enough training to answer general questions in more areas, perhaps giving up some of the depth we now attain. Then, instead of the single backup of the Help-Line, we will have to provide backup at all times by several staff members, each with special expertise in an area.

We already marginally provide this backup to our general consultants by means of a staff resource list telling whom to call for information about particular subjects. However, general consultants are emphatically warned not to send users to staff offices. A referral system, by which general consultants send details of difficult problems to other staff who then get in touch with the users, works well now. The Help-Line is the clearinghouse for those referrals, helping to insure that trivial questions are not referred. As we move into new consulting areas, we will try to use the same system, but with backup provided by other people operating in parallel with the Help-Line, if necessary.

By October of 1981, we will have started to provide these new consulting services, and we will know how well we can train consultants in new areas. Aside from training, we will have problems with referrals because space limitations have spread our staff among four separate sites. Electronic mail, while available to staff in protean form, has not yet caught on well enough to permit its use in handling consulting questions. In addition, we have not considered how to make consulting available via the comptuer systems as some computer centers have done. We expect to be able to report both our successes and horror stories for this transitional phase when we complete this paper in October.

Education

There are three aspects of user education at the University of Minnesota that we must consider in light of the impending systems changes: short courses, instructional video tapes, and the UCC Newsletter. Each presents its own range of difficulties, and its own potential for increased success.

In the past, short courses (like documentation and consulting) have had to deal only with a single operating system environment. A few courses on job control language, system configuration, and limited peripheral equipment capabilities like graphics, coupled with the standard offerings of elementary assembly and higher-level languages, were sufficient to handle user demand. As late as 1975, courses were offered rather informally as requested by users, and generally numbered no more than ten per academic quarter. As the structure of the short course system became more refined, a curriculum with formal course descriptions and recommended sequences of prerequisites was developed. Offerings extended into applications packages areas (SPSS, System 2000, etc.) until their total number peaked at 36 per quarter in early 1980. Since then, courses have been further refined and attuned to user needs by including offerings through the University Extension department, and have receded to a quarterly average of twenty to twenty-five.

All of this, of course, must change in the face of the radical alterations of the present day. The curriculum will not need to be restructured so much as expanded to include a host of new topics. At least two (or possibly three) new operating systems must be taught. Classes on the use of the new applications software -- particularly advanced graphics and text processing -- will be in heavy demand. Instruction on interaction with the campus network (and beyond?), when it is implemented, will surely be required. This means at least five new courses must be developed within the next year or so, with the concurrent problems of staff struggling to learn the new material themselves, scheduling and production difficulties, curriculum integration, and so forth. To this must be added the departure of the staff member responsible for short course coordination. The new coordinator is going to have a lot to handle!

One way to lighten the teaching load while at the same time increasing the number of users reached is to use instructional video tapes for elementary topics. To date, tapes on such things as system configuration, keypunch and interactive terminal user, SPSS use, and so on reach a large number of interested users. The importance of this medium is certain to increase as the Center becomes the hub of a network and more users find it more difficult to travel to campus for instruction. We anticipate the production of at least three new video tapes to cover the new systems available, plus the revision of most of the original set.

Finally, the UCC Newsletter must continue to play an important role in user education. Appearing monthly, it lends itself well to advising users who read it on the latest changes. Unfortunately, time and space limitations restrict the depth (and consequent usefulness) of many articles. Staff will have to be particularly conscientious in providing pertinent information in condensed form.

So to sum up the case for education, it appears that much more of the same is in order. A few things will need revision, but that problem is relatively minor when compared to the need for additions. The eternal problems of overworked and underpaid staff, less-than-ideal facilities for such valid educational functions as interactive and text processing

demonstrations, and similar impediments will make those additions difficult.

But we will provide those services not only in education, but in documentation and consulting as well, for that is our mission. Without an informed user community, the best hardware and software in existence is less than worthless. In spite of the radical changes that threaten to destroy the tranquil present, we must ensure that the users not only survive, but florish. That is the ultimate challenge for existing in a complex network environment; it must be the final goal of each of our varied responses.