

**Reviewed article**

**Providing technology support: the never-ending story of today's library**

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**Keywords**

Academic libraries, Technology, Staffing,  
Customer satisfaction, Management

**Abstract**

The purpose of this article is threefold. First, to introduce into journal literature a multi-year statistical analysis of the daily work required to keep the technologies found in today's academic libraries operational, and to situate this daily maintenance effort in the context of the additional responsibilities of technical staff. Second, given the volume and variety of daily maintenance work and the additional special projects and routine duties of technical staff, to present a parallel assessment of customer satisfaction with the daily maintenance effort. Data about the work and about customer satisfaction with the work are both crucial to understanding the scope of duties and staffing required to provide the hi-tech library services, collections and equipment that will meet or exceed user needs and expectations. Third, to provide examples of how these data are used to support strategic decisions and plans that will move libraries toward their goals.

*Library Computing*  
Volume 19 · Number 1/2 · 2000 · pp. 105-117  
© MCB University Press · ISSN 0742-5759

**Introduction**

Library journals typically report the plans or results of library projects, focusing on such things as reference service, interlibrary loan, significant acquisitions, digital library developments, usage studies or library renovations. What is missing in the literature is an analysis of the work entailed in providing quality support for the technologies that enable library staff to do their jobs and library users to do what they expect to do in today's libraries. These activities include using computers, printers, databases, scanners, microform equipment and photocopiers. Whether it is called a systems office, technology department or something else, each of today's libraries has a unit that provides support for a growing array of technologies crucial to library work. Though library administrators need data about the activities of this unit to make informed strategic decisions about equipment, personnel, staff training and customer service, discussion of the day-to-day work of this unit is conspicuously missing from library literature. To begin to address this gap, this article provides an overview of the support services provided by Carnegie Mellon's Library Information Technology Operations Department, the library staff's quality assessment of these services, and the kinds of administrative decisions that are made based on data that track and assess these services. In "the best of all possible worlds," to borrow a phrase from philosopher G.W. Leibniz (1646-1716), shared efforts to fill this gap will eventually produce a model to guide other libraries in the performance of these duties.

**Establishing the gap**

A search of the literature for books or articles about the day-to-day efforts required to  
Dennis Kierzkowski, Operations' Computer Services Manager, designed, created and generates monthly reports from the work requests database. As manager of the LIT Help Desk, he also monitors requests in the database and ensures that the work gets done. The authors thank him and former LIT secretary, Janet Imler, who helped compile the data, for making this article possible.

maintain to the level of the academic customer's satisfaction computers, printers, scanners, photocopiers, microform equipment, bibliographic and full-text databases, multimedia collections, etc., reveals the gap that this article attempts to fill. Searching Periodical Abstracts, Electronic Collections Online (ECO), Contents First, ERIC and Library Literature databases using different combinations of keywords and subject headings such as "library automation *and* operations," "(library *or* libraries) *and* computer *and* (operations *or* repair)," "equipment maintenance *or* equipment performance," "higher education" and "information technology" retrieves 10 to 30 books or articles published in the past three years. Sample search results are shown in Figure 1. Topics treated are primarily the history of library automation in a country or institution, the automation of specific technical services or centers in libraries, the impact of library automation on library staff and staff training, and desktop computing trends in libraries. A few books or articles appear on library support for distance education, still fewer on strategic planning for or effective management of information technologies in libraries. In fact, the results of these searches reveal the product- or project-driven – instead of production-driven – approach that has become the topic of conference presentations, for example, at the Digital Library Federation Forum in April 2000. None of the information retrieved in the authors' database queries addresses the effort required to maintain the full scope of today's information technologies. A somewhat parallel gap exists in hi-tech library professional associations or networks with organized divisions, interest groups or round tables that conduct workshops, pre-conference or conference presentations, but neglect to address the full scope of day-to-day operations and the data gathering required to effectively manage the present and strategically plan for the future.

The conspicuous absence of published literature on:

- the scope of operational support required to meet user expectations in today's academic libraries;
- customer satisfaction with the support provided; and

- efforts to gather and use data about operational support and customer satisfaction with it to inform strategic planning;

suggests that either librarians see these activities as outside of their purview, or that a newly evolving dimension of librarianship has yet to be articulated. The goals of satisfying customers' needs and meeting the administrative mandates for cost-effective resource allocation and data-driven strategic planning make addressing these issues imperative, whether librarians choose to embrace them as their own or to relegate them to technicians. Perhaps as the profession clarifies the role and responsibilities of the now chameleon-like "systems librarian," this work will find a home in librarianship.

### Beginning to fill the gap

A brief contextual overview is required to give meaning to what follows. Carnegie Mellon University consists of seven colleges serving approximately 5,000 undergraduate and 2,500 graduate students. The total user community of students, faculty and staff is about 10,000. The three University Libraries employ 23 professionals, 62 full-time staff and numerous students working in three organizational divisions that may roughly be described as public services, technical services and technology services. The Library Information Technology (LIT) division is the smallest division in the Libraries, with only two departments, a secretary and a division head, who is the Assistant University Librarian. The LIT Research and Development (R&D) department has two programmers who develop or integrate software, a system manager who maintains new systems being developed and provides technical support to LIT Operations staff, an information analyst who conducts human factors research, and a department head, who is also a programmer and software engineer. The Operations Department has seven staff and a department head.

The Head of LIT Operations is the unit manager. She supervises library equipment purchases; handles projects such as creating replacement cycles for equipment; provides

**Figure 1** Sample results from a search for "(library or libraries) and computer and (operations or repair)" published from 1997-2000

OCLC FirstSearch: List of Records

ECO LibraryLit PerAbs results for: (kw: library or kw: libraries) and kw: computer and (kw: operations or kw: repair) and yr: 1997-2000.

Records found: 17

By database: ECO (10) LibraryLit (2) PerAbs (5) Rank by: Relevance

1.  
Library Automation in Pakistan  
Author: Haider, Syed Source: International Information & Library Review 30, no. 1 (1998): 51 (19 pages)  
Libraries: 326 View PDF Full Text (ECO) (ECO)
2.  
The impact of a library flood on computer operations.  
Author: Myles, Barbara. Source: Computers in Libraries v. 20 no1 (Jan. 2000) p. 44-6+ Libraries: 2162 (LibraryLit)
3.  
Managing with technology: automating budgeting from acquisitions  
Author: Marilyn E. Barnes Source: Asian Libraries 6, no. 1-2 (1997): 77 Libraries: 27 (ECO)
4.  
Managing with technology: automating budgeting from acquisitions  
Author: Marilyn E. Barnes Source: The Bottom Line: Managing Library Finances 10, no. 2 (1997): 65  
Libraries: 516 (ECO)
5.  
Remember all the cool stuff we learned in library school? Stuff like...  
Author: Lee, Richard Source: American Libraries v30n4 (Apr 1999): 80-81 Doc. Type: Periodicals Libraries: 3725 (PerAbs)
6.  
The impact of a library flood on computer operations  
Author: Myles, Barbara Source: Computers in Libraries 20, no. 1 (Jan 2000): p. 44-49 Doc. Type: Journal Article Libraries: 2162 (PerAbs)
7.  
Critical Engagement: The Merging of Public Health Information Resources  
Author: Nancy Allee, and others Source: Library Hi Tech 16, no. 1 (1998): 84-90 Libraries: 1108 (ECO)
8.  
The parallel search bench ZRAM and its applications  
Author: Brünger, A., and others Source: Annals of Operations Research 90, no. 1 (1999): 45 Libraries: 86 (ECO)
9.  
Body language, security and e-commerce  
Author: Norman Desmarais Source: Library Hi Tech 18, no. 1 (2000): 61-74 Libraries: 1108 (ECO)
10.  
Computer-related technologies in library operations (book review).  
Author: MacLean, Elaine C., reviewer. Source: Journal of Interlibrary Loan, Document Delivery & Information Supply v. 9 no4 (1999) p. 87-9 Libraries: 448 (LibraryLit)

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strategic direction for the integrated library management system, Sirsi Unicorn; and serves as liaison with Sirsi and backup for the Library Systems Specialist. The Library Systems Specialist provides day-to-day support for the Sirsi Unicorn system. The Computer Services Manager in Operations supervises the LIT Help Desk, builds and provides support for the Libraries' numerous Filemaker databases, and supervises two technicians and one or more student employees. The technicians and student(s) troubleshoot photocopier and

microform equipment problems, deliver supplies, handle physical deployment of equipment and perform routine hardware and software tasks. The Microcomputer Specialist configures and provides senior technical support for PCs and peripherals. The System Manager supports the Libraries' Unix and NT servers and is the resident network and printing expert. The Systems Expeditor supports Windows, NT and Linux machines and projects, serves as the LIT webmaster and acts as a junior system manager.

LIT Operations is critical to the smooth functioning of the Libraries. Table I provides some numeric data to illustrate the scope of Operations' responsibilities. They are responsible for the:

- ongoing operation and upgrading of the Sirsi Unicorn system – both the “test” system where new versions of the software are initially installed, tested and debugged before being released into production, and the “live” or production system used by library staff and end-users;
- purchase, configuration, deployment and maintenance of all staff and public computers, servers, scanners, printers, peripherals, system and desktop software, photocopiers and microform equipment in the Libraries;
- maintenance of all local databases and online services (serving library staff, administrators and end-users) and access to all remote databases and online services.

Operations staff have routine duties, work on special projects assigned by the Head of Operations or the Libraries Council, and process work requests submitted by library staff. Routine tasks include equipment deployment and maintenance, such as defragmenting hard drives and internal cleaning, software upgrades, and database and desktop backups. Strategic planning (like helping to prepare equipment replacement cycles) and

creating customized reports or databases are considered special projects. Work requests are jobs requested by individual library staff. Other activities include writing procedural documentation, purchasing or evaluating hardware or software, keeping up to date on relevant technologies, and attending training or other meetings.

According to their self-assessment, approximately 31 percent of Operations' time is spent on routine tasks, 28 percent on work requests, 28 percent on special projects, and 14 percent on other activities. Figure 2 shows how the seven Operations staff members allocate their time. The amount of time each person spends on work requests varies according to job responsibilities. The focus of this article is the 28 percent of overall staff time spent processing work requests from library staff. These requests essentially indicate the daily effort it takes to keep library technologies functioning.

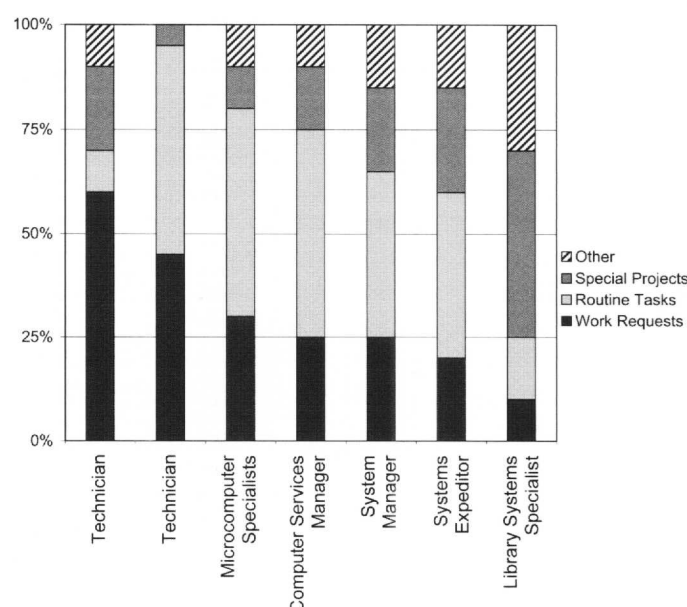
## The work request database

Work requests are logged in LIT's work request database. When library staff encounter a technology problem, they are to enter a request into the work request database. If the problem they encounter prevents library staff from doing their job or prevents library users from doing

Table I Some of the university libraries' equipment and services supported by LIT Operations

Equipment/service	Total
PC computers	182
Macintosh computers	1
Servers (including two Unicorn servers)	7
Laser printers	33
Bubblejet printers	18
Scanners	6
Barcode readers	45
Copcard readers	45
Photocopiers	22
Microform equipment	14
Fax machines	3
Access to remote databases	145
Local databases for end-users	10
Local databases for library staff	18

Figure 2 Operations staff self-assessment of how they spend their time



their work, they are also to call the LIT Help Desk to ensure an immediate response.

Figure 3 shows the input screen for the work request database, which is a relational Filemaker database. A user enters his/her user ID in the field in the upper left section of the screen. Filemaker then automatically checks the personnel database and inserts the staff member's name, telephone number and department in the appropriate fields. Similarly, when a user enters the unique equipment number that Operations assigns and places on each piece of equipment, Filemaker automatically checks the equipment database and completes the manufacturer, model, serial number, location and repair phone number in the appropriate fields of the work request database. Users must select a Problem type from the pull-down menu adjacent to their department name and an Equipment type from the list at the bottom of the screen. They must also enter a date when they need the work to be completed. They describe the problem they are having in the Request/Report field. The remaining fields are completed by Operations staff, who monitor the work request database several times a day and update the database as they do the work required to complete the requests. The Computer Services Manager

periodically checks the database to ensure that all work requests are addressed within 48 hours. The LIT Secretary performs this function when the Computer Services Manager is not available.

Though the work request database has been available for many years, library staff do not always enter requests for jobs they want Operations to do. Some staff habitually call the LIT Help Desk even when the problem does not prevent them or users from doing their work, and some staff call individuals in Operations directly or ask them to do work when they see them in the Libraries. In an effort to capture as many work requests as possible, Operations staff are encouraged to enter work requests for emergency support (calls to the Help Desk), calls to their individual telephone lines, and when they fix problems encountered as they do their work throughout the Libraries.

A survey conducted in January 1999 revealed that 67 percent of the Operations staff were often asked to solve unreported problems when they were in an area working. Though almost half of the Operations staff indicated that they thought library staff were getting better about entering work requests, most of them (83 percent) said that library staff "frequently" call them instead of entering a work request, and

Figure 3 The work request database data-entry screen

	NEW	FIND	INDEX	SORT	QUIT
User ID	Last Novak		First Denise	Phone 87310	ID dn22
Problem type	Dept. Acquisitions, HL		Problem Software	Date Needed 7-3-00	
Problem description	Request/Report I would like to have someone in LIT help me to download SciFinder Scholar 3.0 as soon as possible on Monday morning... The University Libraries has purchased this electronic database and I think the instructions are bit over my head. Thanks - Denise				
Equipment ID	Code bb227	Rep By PCSG	Repair Phone 8-2661	Call No.	
	Mfg Dell Comp	Equipment Computer PC	Model Optiplex Gx1	Ser No G266Z	
	Location HL 123	User Denise Novak	Search Ser No.		
Action taken	Comment Downloaded Winzip..downloaded SciFinder Scholar..Unzipped SciFinder Scholar using Winzip..And Configured SciFinder for Denise to be the administrator				
Equipment type	Disposition Completed as requested				
	<div> <div>For Automation Use Only</div> <div> Date In Fri 06/30/00 </div> <div> Reg # 18290 </div> <div> Est. Date 7/2/2000 </div> </div> <div> <div>Time In 4:14 PM</div> <div>Status Completed</div> <div>Repair #</div> </div>				
	<div> <div>For Automation Use Only</div> <div> M 6 </div> </div> <div> <div>PENDING</div> <div>REPORT</div> </div> <div> <div>Innvt From Network</div> <div>Resolved By In House</div> </div> <div> <div>Action Taken: RHS</div> <div>By Date 7/3/2000</div> <div>Time 12:43 PM</div> </div> <div> <div>Completed:</div> <div>By RHS</div> <div>Date 07/03/00</div> <div>Time 12:44 PM</div> </div>				
	<div> <div>Please Select One</div> <div>By DAK</div> </div> <div> <input type="radio"/> Bar code Reader <input type="radio"/> Fax Machine <input type="radio"/> Microform r/p <input type="radio"/> Print Spooler <input type="radio"/> Unix Station </div> <div> <input type="radio"/> CD Player (Audio) <input type="radio"/> FM Database <input type="radio"/> Network <input checked="" type="radio"/> Scanner <input type="radio"/> WebZ </div> <div> <input type="radio"/> Copicard Reader <input type="radio"/> ID Card Reader <input type="radio"/> PC Platform <input type="radio"/> SSA <input type="radio"/> WWW </div> <div> <input type="radio"/> Copier <input type="radio"/> Macintosh <input type="radio"/> Printer <input type="radio"/> Unicorn <input type="radio"/> Other </div>				

17 percent thought they got more phone calls in 1998 than in 1997. The survey resulted in a renewed effort to educate staff about the importance of entering work requests and following established procedures. In January 2000, a new "Input From" field was added to the work request database so that Operations could track the source of work requests (see Figure 3). Data from January through June 2000 indicate that 81 percent of the requests were submitted by library staff entering the request into the work request database. Approximately 16 percent of the requests were received verbally while Operations staff were in an area working, but less than 3 percent of them were the result of telephone calls to the LIT Help Desk. Very few requests were submitted using e-mail or by library staff walking into Operations staff offices. Regardless of these efforts, some work requests are not entered into the work request database due to timing, human error or resistance. Consequently there is no way to know what percentage of the total work requests is actually entered into the work request database. A rough estimate is that the database captures at least 75 percent of them.

Also in January 2000, a new "Resolved By" field was added to the work request database so that Operations could track how problems reported in work requests were resolved, for example, in-house (by Operations), by sending equipment out for repair, or bringing a field engineer into the Libraries (see Figure 3). From January through June 2000, 95 percent of the problems were resolved in-house.

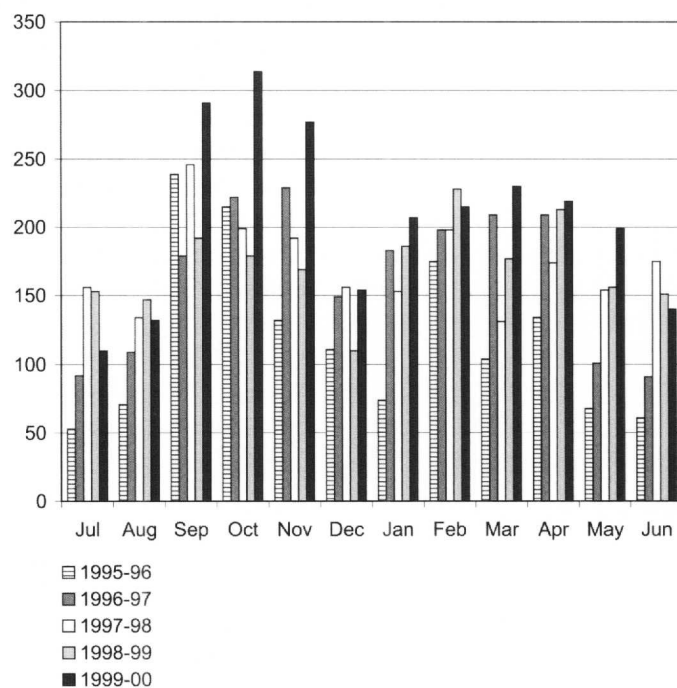
At a LIT staff meeting in 1996, we discussed efforts to capture the time between submission and completion of a work request. This is difficult if not impossible to do accurately for two reasons. First, because Operations staff do not, cannot, should not hover over the work request database. Second, because all work requests are not created equal. Work must be tracked, but not at the expense of actually doing the work. In reality, there is frequently a delay between the time when Operations becomes aware of a work request (for example, someone reports a problem when they see LIT staff in the area) and the request is entered into the database. Operations staff may discover and fix a problem, then enter the work request and mark it completed at the same time. The

situation is further complicated because technology support follows priorities and principles. Problems with public machines and services are higher priority than problems with staff machines. Things that affect multiple people are higher priority than things that affect only one person. Problems that prevent people from doing their jobs take priority over less serious problems or requests for software upgrades. And of course there's the "food chain" principle: if all public fires are out, Operations staff are free to process requests from the University Librarian and Associate and Assistant University Librarians. While we would like to decrease the time, whenever possible, between submission of the request (by whatever means) and completion of the work, we have not yet found a way to surmount the difficulties of tracking the time and factoring in the priorities.

### Overall work requests

Figure 4 provides an overview of work requests entered into the work request database for Fiscal Years (FY) 1995-1996, 1996-1997, 1997-1998, 1998-1999 and 1999-2000. The number of Operations staff during this five-year

**Figure 4** Total work requests entered into the database during five fiscal years



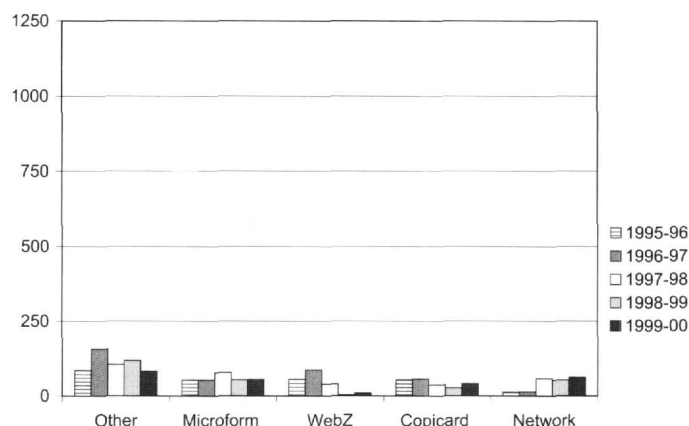
period remained the same, though the one part-time employee was increased to full-time in 1999. The increase in the number of work requests over the years probably reflects the increase in equipment, the introduction of new kinds of equipment and perhaps a higher percentage of work requests being captured in the database. For example, over time the Libraries purchased more desktop computers and printers, introduced scanners and migrated staff from Macintosh computers to PCs. The busiest time for work requests is during the semester, when LIT Operations typically processes 150-250 work requests per month. Fall semester is slightly busier than spring semester.

### Primary and secondary codes: equipment and problem types

To help understand the kinds and frequency of work that Operations staff are asked to do, work requests are coded with primary and secondary codes selected by the user who submits the request. Primary codes typically indicate the type of equipment involved and are selected at the bottom of the work request form. Secondary codes indicate the type of problem and are selected from a menu toward the top of the form (see Figure 3).

Figures 5a and 5b show the distribution of work requests per primary code. Only the often-used codes are indicated. The most frequent problems are with photocopiers, printers, microform equipment, the network, and PCs. The University Libraries began migrating from Macintosh to PC computers for staff use in FY 1997-1998. The migration also began a long-awaited four-year replacement cycle for desktop computers in the Libraries. As PCs replaced

Figure 5b



Macs on staff desktops, the number of PC requests increased and Mac requests decreased. By the end of 1998-1999, all staff had a PC, though some had rebuilt or upgraded PCs pulled from public service, not new machines. However, many staff did not switch from using their Mac to their PC as their primary machine until 1999-2000, which accounts for the high number of PC work requests that year. A further analysis of PC and Macintosh work requests is provided in this article.

Figure 6 shows the distribution of work requests per secondary code or type of problem. Data from FY 1995-96 are not included because Operations significantly revised the secondary codes in 1996-97. Secondary codes are important because they help determine which Operations staff is needed to solve the problem. For example, students and technicians can provide photocopier or printer

Figure 5a LIT work requests per primary code or type of equipment

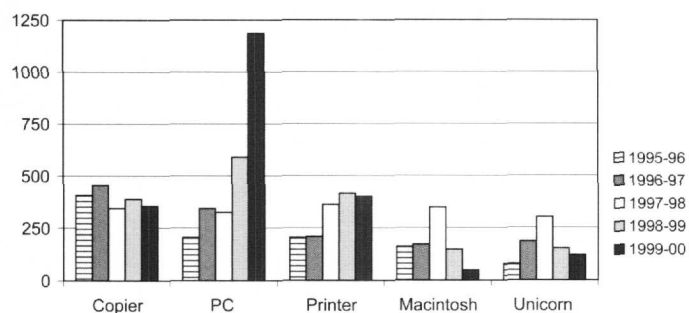
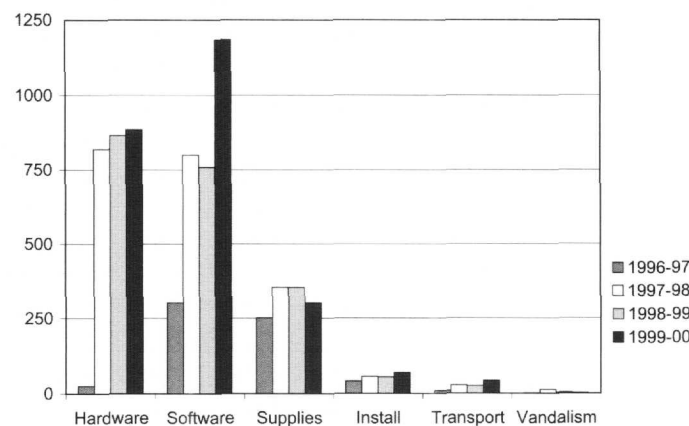


Figure 6 LIT work requests per secondary code or type of problem



supplies, fix paper jams, install software and transport equipment. More skill is required to solve many hardware and software problems. Most of the work requests submitted from 1996-2000 reported hardware or software problems. Many requested photocopier or printer supplies. The start of the Mac to PC migration probably accounts for the dramatic increase in hardware and software problems reported in FY 1997-98 as staff began moving to unfamiliar and often problematic rebuilt machines and struggled to learn a new operating system.

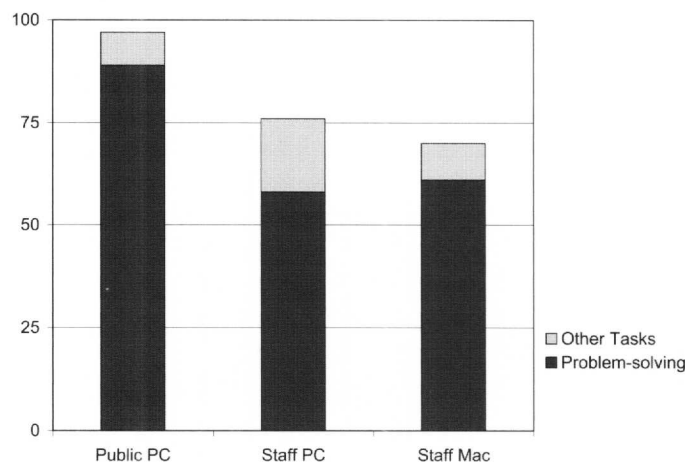
### Content analysis: Macintosh and PC problems

For several reasons, Macintosh and PC problems were investigated further in 1998. For example, rumors that Windows NT was more stable than Windows 95 prompted a look at how stable the Windows 95 PCs were. The Libraries also wanted to assess the downtime of public and staff computers, and to better understand the kinds of problems that users were experiencing. Though the data is old, the information is included in this article because it provides a detailed look at the problems encountered when staff begin migrating to a new hardware platform and operating system.

Content analysis was conducted on all of the Macintosh and PC work requests submitted from January through June 1998 (the last six months of Phase I of the Mac to PC migration). The total number of work requests submitted during this period was 985. Macintosh and PC requests (243) accounted for 25 percent of the total. All but one of the Macintosh computers at that time were staff machines. The other Macintosh was for public use in Fine Arts; it is now the only Mac in the University Libraries.

Figure 7 shows the distribution of the 243 Mac and PC work requests, indicating whether they reported a problem to be solved or asked for some other kind of task to be performed. Averaging 40 requests per month, most (86 percent) of the Mac and PC requests were for problem solving. Over half (57 percent) were requests for problem solving on staff computers; 43 percent were for problem solving on public PCs. By this time most staff had a PC, though many had rebuilt or upgraded PCs or were not yet using the PC as their primary

**Figure 7** Requests to solve problems or perform other tasks on PCs or Macs (January through June 1998)

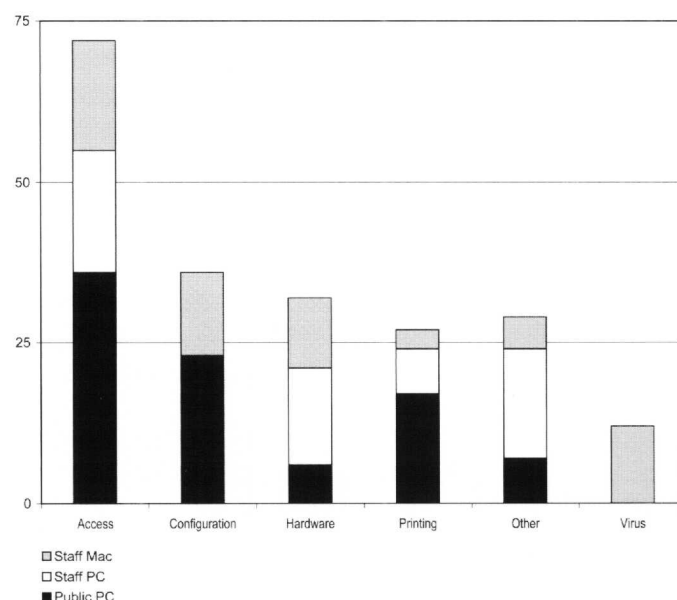


desktop machine. The old Macs were dying and the PCs were causing substantial problems for staff.

### Requests for problem solving

Figure 8 provides details about the 208 requests for problem solving on PCs and Macs. These details derive from codes assigned based on an educated interpretation of the brief problem descriptions and resolutions recorded in the work request database. Approximately 35 percent of the problem-solving requests

**Figure 8** Problem-solving requests for PCs and Macs (January through June 1998)



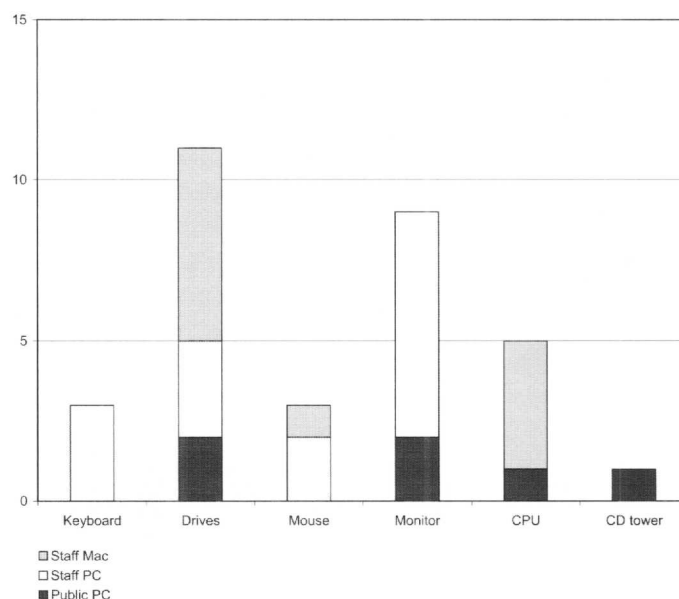


reported problems accessing or logging into an application, database or server (for example, the library server that stores local databases relevant to staff work, the key server that restricts the number of simultaneous users of an application, restricted FileMaker databases, OCLC Passport or staff modules of Sirsi Unicorn). Sometimes the access problem was really user error, such as selecting the wrong AppleShare zone. The data suggest that access problems are evenly distributed across staff and public machines and occur on average 12 times a month.

Configuration, printing and hardware problems were reported at a rate of four to six times a month. Configuration problems accounted for 17 percent and printing problems accounted for 13 percent of the PC and Mac problem-solving requests during this six-month period. Over half of the configuration and printing problems (63 percent) occurred on public PCs. Configuration problems occurred most often with Netscape, Unicorn and the security software Fortress used on the public PCs. Viruses were reported twice a month and at this time were strictly a staff Macintosh problem. (More recently, viruses have become an occasional problem on staff PCs.)

Hardware problems accounted for 15 percent of the PC and Mac problem-solving requests during the six-month period for which data were gathered. They are treated as high priority because they mean downtime for staff and public users, and because fixing them incurs costs. Most of the hardware problems (81 percent) were on staff machines, with slightly more problems occurring on PCs than Macs. Figure 9 shows a further delineation of problem-solving requests related to Mac and PC hardware. Almost half of the hardware problems reported occurred on staff PCs, primarily with monitors. A third of the hardware problems occurred on staff Macs, mostly with drives and CPUs. The data suggest that a very small percentage of the problems reported in the work request database (3 percent of the total requests for the six-month period examined) caused downtime for staff or public machines. However the data could be misleading because emergency requests are placed by telephone and may not be entered into the work request database.

**Figure 9** Reports of hardware problems on Macs and PCs (January through June 1998)



### Requests for other tasks

Approximately 14 percent of the Mac and PC work requests submitted from January through June 1998 were for tasks other than problem solving. These requests occurred five to six times a month. Over half of them dealt with staff PCs, with a third of them requesting software installed on staff PCs. Approximately 29 percent were requests to have equipment transferred to another location, for example, as staff moved to different offices, or asked to have their Macs removed.

### Operations customer satisfaction survey

The Head of LIT Operations conducts a survey each year to determine the level of satisfaction of library staff with the customer service provided by Operations. Since staff requests for service are tracked in the work request database, the results of the survey probably reflect how staff assess Operations' responses to these requests. Significant results from the survey for the past four years are shown in Figures 10a through 10d. The results are displayed as percentages because the number of staff who responded to the survey varied greatly over the years (21-52 percent). The highest response rate was FY 1998-99. The survey asks

Figure 10a Operations customer service survey results

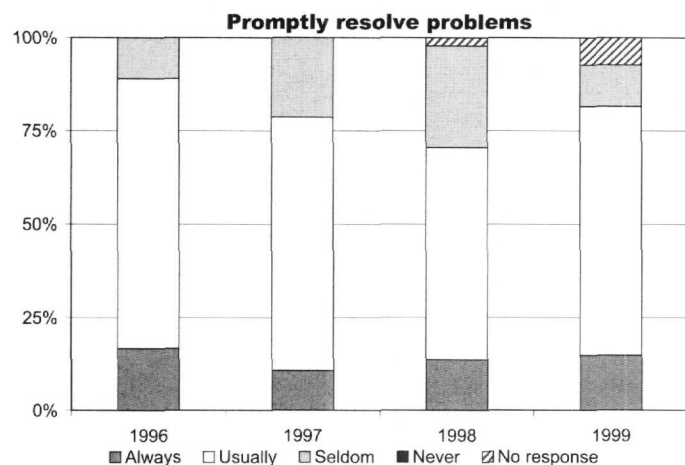


Figure 10d

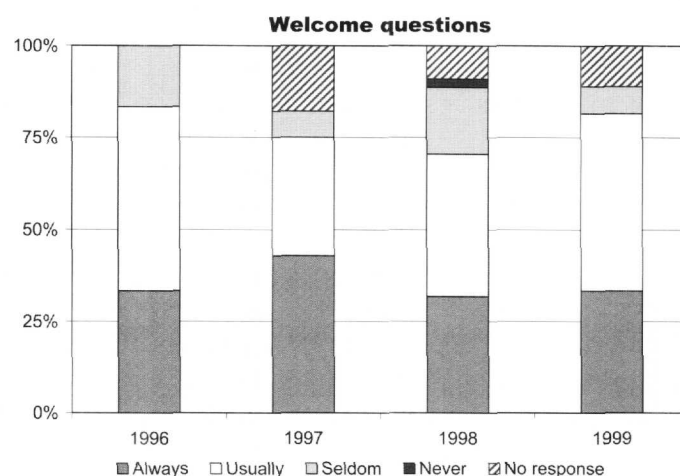


Figure 10b

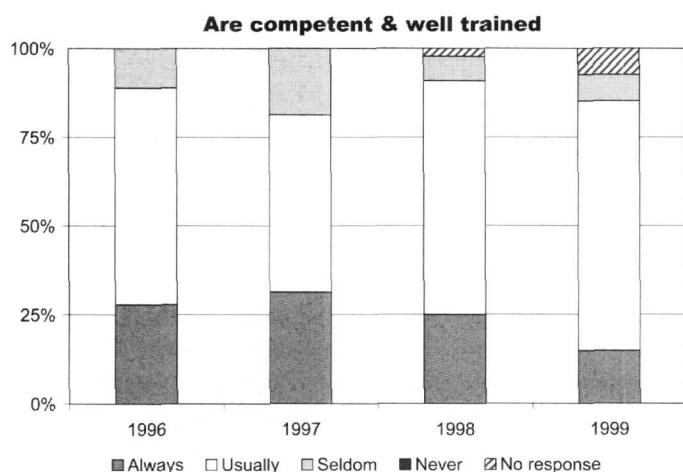
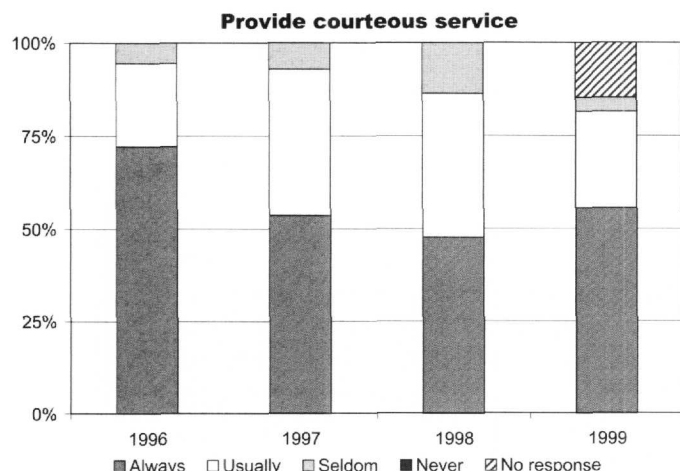


Figure 10c



library staff to rate Operations' performance in several areas.

Library staff who responded to the survey feel that Operations promptly resolves problems, is competent, well trained and courteous, and typically welcomes questions. The survey also asks library staff to indicate what Operations does exceptionally well, and asks for comments on existing services and suggestions for new services. From 1996 through 1999, over half of those who responded to the question about what Operations does exceptionally well indicated that they do an exceptional job of installing equipment. Fewer respondents believed that Operations does an exceptional job at solving software problems. Still fewer believed photocopier, microform and Unicorn (integrated library management system) support was exceptional. Each year after the survey results are compiled, Operations meets to discuss and to develop a strategic response to the evaluation. Written comments from library staff are categorized and addressed. Categories include requests for new services, requests for improved service, communication issues and miscellaneous other comments. Sample comments and responses are discussed later in this article.

### Decisions and plans based on the data

Data from the work request database reveal gaps in the knowledge of Operations and other

library staff. For example, content analysis of Mac and PC work requests revealed that library staff often provide insufficient information for Operations to identify the problem and know which person should handle the request. The user's problem description typically provides only the symptoms. Based on this observation, Operations staff now identify the problem in the database when they "close" the request. Sometimes the problem is identified as "user error," for example, using the wrong password when trying to login to a Filemaker database.

Clear identification of recurring problems enables Operations to provide documentation and training to help library staff troubleshoot, better describe, and sometimes resolve problems themselves by simple actions such as forcing exit from an application (Ctrl-Alt-Delete) or restarting their computer. When library staff can adequately describe a problem, efficiency improves because the appropriate Operations staff can be deployed to address it. When staff can resolve problems themselves, Operations can spend more time dealing with significant problems or implementing special projects.

Based on analysis of the data from the work request database and the annual survey, Operations has written many procedural documents to teach library staff how to do basic tasks. Years ago, this information was posted to an electronic bulletin board or distributed as handouts to a person in each department who was designated as the technical contact for the department and charged with the task of distributing the information within the department. This person was also to be the first contact for answering technical questions in the department, before a work request was submitted to Operations. Staff often complained that they could not find the documentation that was distributed, and they frequently did not use the technical contact in their department as a resource. Admittedly, some departmental technical contacts were more technically savvy and interested in serving in this capacity than others. Both of these venues were replaced in 1998-1999 with an LIT Web site where Operations posts all procedural documentation. The documentation is reviewed and revised annually. In the near future, LIT R&D will statistically analyze the

Web site logs and conduct a survey to determine whether library staff use the LIT Web site and how it can be improved as a resource.

The data also reveal trends that help Operations be more proactive or determine how to distribute the workload. For example, when the survey results suggested that Operations could benefit from additional software training, individuals were designated to become experts or back-up support for specific applications and operating systems. Additional funds were found to provide training to develop this expertise. When the survey results indicated that staff expect immediate communication when Operations handles work requests, the response was to begin putting specially designed post-it notes on the equipment indicating what work was done, by whom, when and, if necessary, next steps. When the survey results indicated that Unicorn support could be improved, all Operations staff were assigned responsibility for learning the basic architecture of Unicorn, the purpose and location of the "test" and "production" systems, and the functionality of the public-access catalog.

Anecdotal evidence and written comments on the Operations survey indicate without doubt that library staff members have different expectations for technology support. Some staff think Operations should troubleshoot and solve every little anomaly in the behavior of the desktop computer, printer and other devices that they use. Other staff think they should be responsible themselves for basic troubleshooting and problem solving and for providing well-informed descriptions of the problems they do report to Operations. This discrepancy is being addressed by the new "workplace knowledge and skills" key competency discussed later in this article. Similarly, some staff think Operations should provide one-on-one, on-demand training for all desktop applications. The request for this new service was brought to the attention of library administrators, who agreed that this was neither feasible nor appropriate. The central computing organization on campus supports and offers training sessions on most desktop applications used by library staff, including Corporate Time (the shared calendar software used on campus), Mulberry (campus e-mail), Microsoft Word, Excel, PowerPoint and Filemaker.

Administrators agreed that staff will attend these training sessions, rather than have Operations duplicate the effort, and that training for library-specific applications that the central computing organization does not support, for example, Sirsi Unicorn and OCLC SmartPort, will be provided by Operations, other library staff or the software vendor.

Operations considers seriously all suggestions for new services or service improvements received in the annual survey. As with the request for one-on-one, on-demand training, sometimes the new service requests cannot be implemented due to insufficient human resources or other potential problems. For example, some staff want Operations to monitor all the software they use and immediately upgrade it when a new version becomes available. Other staff do not want immediate upgrades because they would lose the toolbars and menus they customized, which would disrupt their work on significant projects. The governing council in the Libraries made the policy decision for Operations to notify all staff when a new software version becomes available, and staff are to submit a work request when they want the new version to be installed. Operations will alert staff when a new version is released that could create backward compatibility problems for older documents on staff desktops or new documents sent as e-mail enclosures. When staff requested assistance in repairing their home computing equipment, the policy decision was that Operations staff are not responsible for servicing equipment owned by library staff, but that staff could hire Operations on their own time for remuneration. When staff requested that all staff members be given software manuals for each application on their desktop, the Libraries' governing council agreed to provide documentation to each department, rather than each individual, because the cost of individual copies was prohibitive. In addition, the Computer Services Manager attended additional training on popular software used in the Libraries and the Head of Operations rearranged his workload so that he could provide more assistance with advanced features of these applications. When staff commented that they did not know what to do when an equipment security alarm went off, Operations prepared and distributed procedural

documentation. When staff commented that they wanted better handling of calls that rolled over to the LIT Secretary when no one was available at the Help Desk, the Head of Operations prepared documentation for the Secretary that described priorities for resolving problems, definitions and procedures for handling emergencies and non-emergencies, including troubleshooting steps for frequently occurring problems, and a list of Operations staff to be contacted. Though staff comments often praise the support provided by Operations, even suggesting that specific individuals be given merit raises for excellent work, occasionally they name individuals whose interpersonal skills need to be improved. In response, Operations staff have attended customer service training and training designed to help them deal with difficult individuals.

In 1999, the director of the Hunt Institute for Botanical Documentation (HIBD) Library on campus, which is not part of the University Libraries system, asked LIT to provide technology support for HIBD. Data from the work request database and survey indicated that current staffing could not adequately support another library. Negotiations with HIBD resulted in their providing the funds to expand a part-time Operations position into a full-time position so that LIT could provide technology support for HIBD. Tracking HIBD work requests will enable LIT to assess the value of the work Operations is providing and determine if the financial remuneration is appropriate.

Data from the Operations customer service survey indicate that library staff are generally satisfied with the day-to-day support provided, but the response rate for the survey is often low. Furthermore it may be the case that only satisfied customers respond, even though the survey is anonymous. Plans are to revise the survey to capture the reasons staff contact LIT, the preferred method to contact LIT (submit a work request, call the Help Desk, call or ask Operations staff when they see them in the library), and staff perceptions of the frequency of different kinds of problems.

The goal is to increase the response rate for the Operations survey and ultimately improve customer service. Knowing whether library staff perceptions of problems and their behavior in reporting the problems match the perceptions

of Operations staff and the data in the work request database will help LIT plan documentation, training, reports and meeting agendas to arrive at a shared understanding and common expectations regarding technology support in the Libraries. The anonymity of the annual Operations survey is something of a frustration. On the one hand, it makes it impossible to resolve some of the misconceptions that surface in written comments from library staff. On the other hand, it may increase the response rate to the survey. Offering small bribes like homemade cookies to those who turn in their completed surveys in person also seems to improve the response rate.

Additional strategies are being implemented to clarify and address the computer training issues that surface in both the work request database and the Operations survey. The Libraries' Staff Development Committee conducted a survey in August 1999 to gather information about staff computer training needs that would support plans for providing training during the 1999-2000 academic year. The results, however, were ambiguous, so the Committee revised and re-conducted the survey in September 2000 to clearly distinguish between the computer training that an individual staff member needs right now to do his/her job better and the computer training necessary to do a particular job in the Libraries. Due to the support and encouragement of the Libraries Council and department heads, the response rate for the September 2000 computer training survey was almost 70 percent.

The results of the computer training survey will help department heads and library administrators prepare travel and training budgets. They will also help plan training and orientation for new staff and help department heads describe what technical capabilities are entailed in the "workplace knowledge and skills" key competency in the annual performance evaluation process for staff in their

departments. The "workplace knowledge and skills" key competency is one of five key competencies added to the performance evaluation for 2000 and expected of all library staff. Staff will now be evaluated on how well they can perform basic troubleshooting on the equipment necessary to do their job, how well they can use the software necessary to do their job, how well they keep up to date on the equipment and software needed to do their job, how well they follow procedures and policies related to their job, and their level of relevant technical expertise. The department heads' elaboration of what this key competency entails for positions in their department will clarify expectations and responsibilities that have troubled Operations and created confusion in the past.

## Conclusions

The data from the work request database and annual Operations survey indicate the kinds of problems library staff and users encounter that require assistance from LIT Operations and how satisfied technology "customers" are with the service Operations provides. The volume and variety of work requests that Operations handles with competence and courtesy in 28 percent of their time is noteworthy. Analyzing the data and strategically applying the results from annual customer satisfaction surveys and a database that tracks all equipment and software related problems in the library can help improve operational support for today's technologies. Further improvements can be accomplished by policy decisions that clarify expectations and decrease staff confusion. Senior administrators and middle-management department heads must be involved and supportive for real progress to be made because technology support is not just a technical issue. It is also a financial and political issue in today's libraries.