Notes on Operations

Technical Services Workstations: A Review of the State of the Art

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The technical services workstation is an evolving technology. In its fully evolved state, it consists of a higher-end personal computer that is networked to local online systems, bibliographic utilities, and the Internet. It has available to it all the typical administrative tools associated with local area network (LAN) technology. A suite of technical services resources has been or is being developed to complement it, including the Library of Congress Cataloger's Desktop, LC Classification, and Dewey Decimal Classification. A number of institutions are placing local or standard, national-level documentation on the Internet in hypertext markup language (HTML) form. Enhancements such as macro-driven processing are becoming common. With the advent of fully functional Windows terminal emulation programs for bibliographic networks, the promise of multiple online sessions is becoming a reality. Other Windows terminal emulators and interfaces and Windows clients will be appearing soon, and Z39.50 clients are starting to appear bundled in with these packages.

Not all developments in technical services can be pinpointed as definitively as the advent of the format for Machine-Readable Cataloging (MARC) or the appearance of our national bibliographic utilities. Much as the bibliographic utilities, particularly the OCLC Online Computer Library Center, Inc. (OCLC) and the Research Libraries Information Network (RLIN), began as regional or as specialized databases that expanded upon their geographic or special membership affiliations, so too the technical services workstation (TSW) can trace its origins directly to the MARC format and the utilities that made MARC records available to libraries. By that I mean that we can trace the TSW's roots back ultimately to the primitive terminals that we used to connect to the utilities over leased telephone lines in the early 1970s. As those early terminals began to give way to the first generation of personal computers (PCs) in the early 1980s, when OCLC and RLIN released the first versions of their terminal software for PCs, it became inevitable that the single-session, primitive PC would evolve into a more advanced and multifunctional platform.

Despite the fact that for many of us the OCLC M300 was our first glimpse of a PC, the evolution of the TSW was torturous for more than a decade, until a few pioneering institutions began to nudge

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the state of the art in technical services forward. Those institutions—Columbia University, Cornell University, the Library of Congress (LC) and the University of California–San Diego were among the most prominent—had a vision, or a variety of visions, all converging on the goal of expanding and enhancing not only the catalog with new resources, but also endowing their technical services staff with new technologies. In retrospect it is clear that the MARC format, online systems, and telecommunications networks—both LAN- and Internet-based—would converge around an advanced PC. The ultimate goal will be to concentrate as much easily manipulable technical processing power on the desktop as possible. The current movement from mainframe-based processing to client-server architecture is conceptually not that different. Both have as their goals to empower the desktop computer and enable it to share the processing load with the central computer (server). Indeed, the very movement toward client-server architecture is enabling further development of TSWs because institutions realize that the financial investment in the TSW desktop and telecommunications infrastructure is an investment—a down payment—on that future, fundamental migration to a new architectural environment.

ALA Character Set

Perhaps the most crucial need that has always separated library computing and telecommunications—particularly in large, academic research libraries—from the rest of the computing world has been the need to support the American Library Association (ALA) character set. The basic ASCII character set has never sufficed for libraries, nor will it ever. Ultimately we will have Unicode, but that is a new, still-ongoing, development. The need to be able to represent at least the characters used in languages that use the Roman alphabet and in the transliteration of non-Roman alphabets has driven many of the decisions library technical services and library systems offices have made over the last twenty-five years.

Despite all this, one of the significant compromises that many libraries have had to make as they have moved into the networked world has been precisely to accept less than full support for the ALA character set. Not every local system has enjoyed a communications package built expressly for it that is simultaneously conversant with the ALA character set. One of the most surprising revelations in the TSW survey that the Cooperative Cataloging Council's Automation Task Group (now the Program for Cooperative Cataloging [PCC] Standing Committee on Automation) conducted in the summer and fall of 1994 was the wide variety of communications packages in use among libraries and that not all of them (only 74%) fully supported the ALA character set (Kiegel 1994b, questions 13 and 14).

Nonetheless, while libraries have had to settle for this compromise, they have still indicated that their clear preference remains to provide support for the full character set if and when possible (Kiegel 1994b, question 14). The PCC Standing Committee on Automation is now resurveying this population for an Association of Research Libraries (ARL) SPEC Kit, expected to appear in early 1996. Preliminary indications are that this situation has not yet changed dramatically, though the advent of a new generation of workstation products seems to indicate that it will be changing within the next one or two years as a new generation of Windows terminal emulation programs and clients is released.

When OCLC developed the M300, support for the ALA character set was a hardware-based solution: OCLC developed a specialized chip to support the character set. As the power of PCs and their graphics capabilities advanced, however, programmers developed solutions that combined off-the-shelf hardware (an EGA graphics card) with specialized software. OCLC made this decisive step forward with Terminal Software version 5.1. (This was before the shift to the Passport series of software releases.) The executables in this program were dated August 4, 1987. Terminal Software 5.1 made use of loadable fonts using the EGA video

mode. At that time the VGA mode had already been introduced by IBM, but it was too expensive a hardware option, so OCLC did not implement it on that level. Instead the EGA loadable fonts were also supported on VGA so that the configuration screen treated them alike as a single option. OCLC first implemented EGA on Wyse monochrome EGA monitors. Monochrome mode still switched on older Tseng and OCLC character ROMs on the Tseng graphics cards and modified IBM monochrome cards because OCLC needed backward compatibility with older monochrome hardware (Truthan 1995).

Moving support of the ALA character set from specialized hardware to a combination of standard hardware and customized software went hand in hand with OCLC's resolve to free itself from being the required supplier of hardware and allowed it to focus its agenda and its energies on software development. In retrospect it was a major step in decoupling use of the OCLC online system from OCLC hardware and in enabling libraries to pursue a vision of standardization with the rest of the computing world.

Similarly, as libraries have moved the technical services modules of their OPACs from terminals, which often supported the ALA character set by means of installed hardware or emulation cartridges—such was the case with mid-1980 Telex terminals and late-1980–early-1990 IBM 3163 terminals—to PCs, full support for the character set has lagged behind. Only a limited number of solutions for supporting the character set have been developed for use within the DOS environment. The ones most familiar to NOTIS libraries, for instance, are Yale University's YTerm and Cornell University's TN3270 software. They offered libraries a glimpse of a networked future that fulfilled their needs at a time when a Windowed, multisession, and multitasking environment was still just an over-the-horizon dream.

Of the two emulation packages designed for NOTIS, YTerm is the older and the one more closely identified with prenetworked telecommunications. While YTerm can run over a local network, its primary means of conducting telecommunications sessions is via a PC's COM ports. And while both YTerm and TN3270 can run under Windows in so-called DOS boxes, Cornell's software was designed around networking and the Internet. In that respect it was the first serious package that enabled those libraries whose catalog infrastructure (i.e., IBM mainframe based) it fit to move into a wired, networked world.

The Cornell software, however, had several major drawbacks. It was not a true Windows application, so it could not run in a true multisession environment. The closest catalogers could come was to run multiple applications and switch (via Alt-Tab) between them, but regardless the sessions could not be simultaneously displayed in a series of open windows. It supported only a very limited number of network cards. And, perhaps most significant, it soon became an orphan product: further development work on it ceased just as advances in PC and telecommunications technology, coupled with significant downward trends in their pricing, brought the vision of multiple sessions within the reach of the library community.

For NOTIS libraries the current successor to Cornell TN3270 is a software package developed by Pierre Goyette and his colleagues at McGill University (information on the McGill packages can be found on the World Wide Web (WWW) at http://musicm.mcgill.ca/~roy/http/TCP3270.html). Available for Windows as TCP3270, this software represents a giant stride in the consolidation of technical services applications in a single environment, namely Windows (it is also available for DOS, NET3270). TCP3270 is a true Windows application, with pull-down menus, online help, mouse control, sizable fonts, etc. It has four attributes that cause it to stand out at this early stage of technical services' migration to Windows:

- It can run multiple sessions (up to five at a time).
- It is designed specifically for use on local networks and the Internet.
- It is Winsock compatible.
- It uses a Windows True-Type font to enable display of the full ALA character set.

It can also print the full ALA character set on any Windows-supported graphics printer. This is a demonstrable advantage over the old Cornell software, which was unable to print the full character set.

Winsocks and Windows

"Winsock compatibility" is a term that is already frequent in library telecommunications literature, and it will become more so. A Winsock is an application programmer's interface (API) that essentially allows Windows programs to work over the Internet—in simple terms, it allows a Windows program to "talk" over the Internet. It is, in fact, Winsock compatibility that is one of the crucial factors in enabling multiple Windows sessions. The new RLIN Windows software, OCLC Passport for Windows, WWW browsers such as Mosaic and Netscape, SeaChange's BookWhere? Z39.50 package—all are Winsock compatible, and that means that all can coexist as simultaneous sessions.

The shift from DOS-based programs to a set of programs and utilities all built around Microsoft Windows has enormous inherent advantages for the profession besides the character set and Winsock compatibility issues. The most significant of these is a common, consistent interface and the ability to copy and paste between applications. A consistent interface will lead to simplification in training routines because, as staff become accustomed to dealing with various Windows applications, the learning curve becomes much flatter. For copy and paste between various library bibliographic systems to be fully functional, however, will eventually require some further work to enable proper treatment of non-ASCII characters as they move through the Clipboard from one application to another.

During the next one to two years we can expect to see an entirely new generation of products begin to emerge from local systems vendors as they begin to develop their own true workstations. First to emerge will be true Windows emulators with advanced functionality. Close on the heels of those products will be true Windows clients incorporating Z39.50 as an integral part of their functionality. The workstation package that is most advanced at this stage is probably that from the Library Corporation (Bibliofile), the Integrated Technical Services Workstation (ITS for Windows), which already incorporates context-sensitive help, online documentation, and authority checking and will soon have Z39.50 and an advanced macro language. GEAC is also hard at work on its package, as indeed are most of the other major vendors, though at the fall 1995 NOTIS Users' Group Meeting it was apparent that the Ameritech Library Services Academic Library Division is still in the early stages of designing a more narrowly defined Cataloger's Workstation (Meyer 1995; Weissman 1995).

Library of Congress Workstations

A word about LC's Bibliographic Workstation (BWS) is in order. LC has long been saddled with what it has recognized as an archaic mainframe system that has grievously limited its ability to move forward on a broad range of technical fronts. Partly to counter that problem, but also to replace their old ComTerm terminals, LC began to develop a technical services workstation designed to work within the constraints of their network and system. The result was the BWS, an IBM PC running under OS/2 with software developed specially for LC. One of the most significant aspects of that software was its ability to support the ALA character set. LC's decision to focus its time, energies, and financial resources on OS/2, rather than, say, Microsoft Windows, was and is an extremely interesting decision. The automation experts at LC are strong advocates of OS/2, but the general marketplace has resoundingly chosen to focus on Windows. LC's decision might well have been the correct one, at least for LC, but it does not appear that it will be a lead that will be followed widely any time soon.

In the last four years the Cataloging Directorate of LC has begun to install BWSs on a massive scale. Management at LC, as elsewhere, looks to advanced tech-

nology as one means to increase productivity in an era of retrenchment and downsizing. During 1994 and 1995 members of the Cataloging Directorate (Robert August, Richard Thaxter, and David Williamson, and also Larry Dixson in Network Development, among others) developed an impressive number of utilities (Electronic CIP, Text Capture and Electronic Conversion [TCEC]). While it is too early to make firm predictions, they have begun to investigate a client-based Z39.50 application, BookWhere?, as a potential replacement to their host-based Z39.50 and as a means of extending and enhancing their catalogers' electronic reach across cyberspace (Williamson 1995a; Thaxter 1995). By means of these programs catalogers at LC might eventually conduct remote searches, retrieve records, and mark them up with ISBD punctuation for conversion to MARC records. Staff at LC are also investigating the possibility of using these programs to feed MARC records to the LC system, MUMS. Furthermore, by doing much of this searching of remote databases via Z39.50, they have the advantage of access to many disparate systems and catalogs without having to learn the command structures and syntax associated with each of them.

Recently members of the Cataloging Directorate have begun to experiment with a new program, ClipSearch, which was developed as a utility for use with the BWS. It provides the BWS with the capability of intersession searching, automatic copying of headings from authority records to bibliographic records, as well as online MARC code lists. They plan to enhance it soon to provide for automatic generation of name authority records as well (Williamson 1995b).

It is a curious fact that as the power of desktop computers grew over time and as their prices dropped, library cataloging backlogs grew to crisis proportions. Readers of library literature are all familiar with the depressing frequency with which phrases such as "crisis" and "backlogs" have appeared in library technical services literature. The causes for this—the explosion in publishing and all the other reasons proffered—are well known. Solutions, such as cataloging simplification and reliance on various levels of minimal-level cataloging, are also well known. Development of technical services workstations can also be viewed as a solution, albeit a much more positive and proactive solution, but possibly also a defensive one, than these other solutions that technical services staff have tended to accept begrudgingly. We live in an age of restructuring and reengineering and the application of business techniques to library services, and there is no doubt that TSWs enable library staff to work smarter and accomplish "more, faster, cheaper, better." But it has been only in the last few years that libraries have begun to invest in powerful workstations in large numbers.

There exist, in fact, few more positive statements about catalogers' willingness to adapt and innovate than this technology and the burgeoning number of applications and utilities, many of which represent grass-roots efforts, being developed for use with the technical services workstation. A recent article on "reinventing catalogers," which describes catalog departments as not having changed much in the last twenty years, entirely misses the point of how catalogers are becoming increasingly entrepreneurial and innovative (Waite 1995). Attendance at the series of Association for Library Collections & Technical Services (ALCTS) institutes, "Technical Services Workstations: The State of the Art of Cataloging," as well as at a number of talks I have given on workstation technology during the past year, is vivid witness to catalogers' palpable hunger to adopt this technology. Doing so, however, demands a shared partnership between technical services departments and administrators to demonstrate the need and justify the potential dividends from these devices. Those institutions that have already done so are already reaping the rewards of their foresight (Kaplan 1995a; Kaplan 1995b, 10).

Recently Roger Brisson of Pennsylvania State University and Janet McCue of Cornell University discussed the transformation and retooling currently under way in technical services departments that are adopting workstation technology. They

sketch a number of cataloging scenarios in which they contrast the old, manual method of cataloging with the new means by which catalogers can assemble a record by gathering information electronically (Brisson 1995; Brisson and McCue 1996). The "vivid descriptions" that the Cooperative Cataloging Council Task Group I included in its final report, by means of which they challenged us to imagine a totally online, networked future, are indeed starting to become our new reality (CCC Task Group I 1994).

Impact on Productivity

One of the most significant revelations of the previously mentioned TSW survey was its impact on productivity (Kaplan 1995a). Included among those results were the following:

- Cornell University's Mann Library: acquisitions time cut in half
- Harvard College Library's Cataloging Services Department: production up 63% despite an 18% reduction in hours
- Library of Congress: productivity for certain phases up by as much as 25%
- New York Public Library: significant increase in throughput with fewer staff
- Pennsylvania State University: 200% to 300% increase in productivity for original cataloging
- UCLA: increased total output with decreased number of staff
- UNLV: 10% less time to catalog LC copy; 25% less time for member copy
- University of North Texas: disappearance of backlogs (including long-term backlogs)

Electronic Documentation

LC, through the Cataloging Distribution Service (CDS), is developing the Cataloger's Desktop and LC Classification Plus precisely as a means of enabling its catalogers to increase productivity. The intent is to convert a large number of unwieldy paper documents to an improved, networkable, windowed, electronic format, with all the advantages of electronic indexing and easy updating.

These documents once consumed entire shelves of reference space at a cataloger's desk. Most institutions, of which I expect Harvard College Library was typical, could not afford numerous sets of all these diverse documents, particularly the LC classification schedules, with all of their attendant updates, commercial recompilations, etc. A few complete sets were available at widely scattered locations, and they were not quickly accessible to all catalogers. Moreover, keeping these schedules current was a time-consuming task, and consulting the basic schedule plus all of its updates was not a particularly efficient (nor pleasant) way to work. With Classification Plus it will be possible to check the schedules, already recompiled, from any LAN workstation.

CDS has made rapid progress in converting the most consulted paper documents to electronic format. The list, which is still growing, currently includes:

- Library of Congress Rule Interpretations
- Music Cataloging Decisions
- Subject Cataloging Manual: Classification
- Subject Cataloging Manual: Subject Headings
- USMARC Concise Formats: Holdings Data
- USMARC Concise Formats: Classification Data
- USMARC Concise Formats: Community Information Data
- USMARC Format for Authority Data
- USMARC Format for Bibliographic Data
- USMARC Code Lists for Countries, Geographic Areas, Languages and Relators, Sources, and Descriptive Conventions

As for Classification Plus, CDS plans to release about seven schedules in early 1996 (including *E-F, H, L, R, T,* and possibly Z), with the remaining schedules to be released on a staggered basis as they pass quality assurance in LC's Cataloging Policy and Support Office (CPSO). Classification Plus will also include the LC subject headings (not in tagged format) with many links between the subject headings and the classification schedules. True hypertext links will be made between call numbers embedded in the subject

headings and their appearance in the schedules, but it will be possible to do keyword searches, for instance, between captions and other occurrences in the schedules and the subject headings. Indeed, CPSO plans over time to use this product as a means to regularize and enrich the vocabulary shared by the schedules and the subject headings, as well as to add more classification numbers to *Library of Congress Subject Headings* itself.

The search engine that CDS selected for both Cataloger's Desktop and Classification Plus is from Folio Corporation. Among the various advantages that this selection offers is that it is a Windows product, allowing catalogers to keep their various cataloging sessions open while consulting relevant documentation. It also has easy networking capabilities, support of hypertext links, and the ability to support local "shadow" files consisting of local text highlighting, bookmarks, hypertext links, or notes. All of these options can be implemented on an individual or departmental basis to support local options and local decision making, and all are reconcilable and can be carried forward from issue to issue of the Desktop.

Use of a common interface—Folio Views—for the Desktop and Classification Plus will expedite the training process because staff will only have to learn to navigate and use a single program. There is a reasonable expectation that CDS will be able to secure price savings as well for institutions ordering both packages because they will not need redundant software licenses from Folio Corporation.

As their plans for a machine-readable version of *Anglo-American Cataloguing Rules,* second edition, 1988 revision (*AACR2*), go forward, ALA Editions is also considering use of Folio Views as the software engine for what is envisioned to be a CD-ROM product. While there are many issues regarding the copyright holders yet to be resolved, and many other matters still be to finalized, ALA Editions is hoping to have a product ready to demo in time for the ALA Annual Conference in 1996. If all goes well, it will be demonstrated there at a program sponsored by the Library Information Technology Association (LITA)/ALCTS Microcomputers for Technical Services Interest Group (by June this group should be renamed the LITA/ALCTS Technical Services Workstation Interest Group).

At the same time as CDS is preparing Classification Plus, Gale Research is working on a competing product, a networked version of SUPERLCCS. While it was demonstrated along with Classification Plus at the ALA Annual Conference in Chicago in June 1995, it is too soon to tell how the marketplace and catalogers in the field will accept either product. It is already clear, however, that Gale Research has the more difficult job because its editorial staff cannot rely on the policy experts in LC's CPSO for help in designing their product, while the availability of this support has been a major factor in the development of Classification Plus at LC.

The subject of online classification should not pass without mentioning OCLC Forest Press' development of Dewey for Windows, the Windows version of its Electronic Dewey. The DOS version has long been out, while the Windows version remained a research project until mid-1995. OCLC Forest Press has now committed itself to bring out the Windows version, and it is expected to appear in mid-1996 (OCLC Forest Press 1995). The new version will satisfy a major criticism of the earlier version, namely that it was not a networked application.

Cataloger's Desktop is rapidly becoming the de facto standard in documentation. By the fall of 1995 over 180 institutions had entered subscriptions to it, far surpassing CDS' expectations. Some institutions (e.g., Pennsylvania State University and Johns Hopkins University) have decided to mesh their local processing manuals and decisions closely with the Desktop by creating local "infobases" for their manuals. They can then hypertextually link their own decisions to those of the Library of Congress. The national trend, however, is not to make use of Folio Views in this fashion, but to create local Web sites on which to mount local documentation. The University of Virginia was among the early leaders in this trend, but now there are a number of prominent sites with more and more documentation

that is generically useful and easily available over the Internet. A few examples are the Name Authority Cooperative (NACO) Manual (http:// infoshare1.princeton.edu/ katmandu/cp20/ cp20_toc.html), an online glossary of European languages (http://buddy.library.mun.ca/~charl8P9/ biblang.html), and Tools for Serial Catalogers (http://www.library.vanderbilt.edu/ ercelawn/serials.html). One of the most extensive is TPOT: Technical Processing Online Tools at the University of California, San Diego (hppt://tpot.ucsd.edu), which also includes Barbara Stewart's list "Top 200 Technical Services Benefits of Home Page Development." Many of these Web sites point to one another, and, as with the Web in general, more tools and more sites are appearing all the time. Exploiting the growth of electronic cataloging tools on the Web is, in fact, one of the most fertile and innovative areas for applying use of technical services workstations.

Local Area Networks

Local area networks, once rarely found in libraries, are becoming commodity items. It is actually their development and the concomitant development of technical service tools designed specifically to run on networks that are enabling technical services staff to redefine their workplace as a collaboratory one. In the series of ALCTS institutes on the "Technical Services Workstations: The State of the Art of Cataloging," which was previously mentioned, Janet McCue of Cornell University goes so far as to suggest that being connected to a network and the Internet is an essential attribute of a technical services workstation. The explosive growth of the Internet has only made this criterion more pronounced.

From the administrator's perspective, one obvious advantage in placing computer packages on local area network servers is that it eliminates the need to buy and install a copy of every program on every staff member's machine. A site license for ten simultaneous users might well be capable of serving a population of one hundred staff. Programs have been developed to provide simultaneous use metering and enable publishers' and developers' rights to be protected. The equivalence suggested for Cataloger's Desktop, for example, is one simultaneous license for each ten potential users.

Workstations and the National Utilities

In the middle to late 1980s the national bibliographic utilities began to worry about their continued viability in the face of rapid growth and development of local systems. As local systems grew ever more powerful, with workstations capable of advanced editing features, and particularly as large research libraries began to mount the LC MARC file locally as a resource file for use in acquisitions and cataloging, the utilities began to worry about the effect this would have on their financial well-being. This led in part to the utilities' creating incentives for contribution of original records to their databases. At RLIN that reward has taken the form of free searches, whereas OCLC awards actual monetary credits that have increased markedly over time. OCLC currently rewards an institution inputting a new bibliographic record online—not via tape or batch loading—a credit of $3.65. The OCLC policy, known as Contribution Pricing, has been evolving now for almost a decade and, in addition to rewarding institutions for contributing original cataloging, is theoretically calculated to reach a point where there are no charges for cataloging usage, but rather only for various kinds of access (searching, holdings, etc.).

Tape loading of bibliographic records and holdings from local systems into the national utilities has grown exponentially over the past decade. Where tape loading was once the exclusive province of the national libraries, it has now become so common among large libraries that both OCLC and RLIN have had to make major arrangements to handle tape loading. For many years RLIN used to make use of long weekends for batch loading of records, and it has now developed a new database configuration to enable it to deal with batch loading more efficiently. OCLC opened the door, albeit only

slightly, toward monetary credits for tape-loaded records when they began to credit each tape-loaded record twenty-five cents. (The original rationale for credits was to reward institutions for the additional searching required to establish the uniqueness of a new bibliographic record. Over time the rationale at OCLC has shifted to encouraging and rewarding the contribution in a more direct fashion, but batch-loaded original records still received only a minimal financial reward on the theory that the machine at OCLC, and not a cataloger in the field, is doing the work to establish a record as original.) Then, too, record loading itself has begun to change dramatically as institutions have begun to move away from exchanging records on physical tapes and have migrated toward using FTP (file transfer protocol) as the preferred medium of exchange. It is worth noting that this was one of the major recommendations of the Cooperative Cataloging Council Task Group II on Availability and Distribution of Records (CCC Task Group II 1994).

The move toward creating original catalog records in local systems, rather than directly online in the national utilities, has become a fundamental tenet of cataloging policy in many organizations, such as Harvard College Library. Several causes have contributed toward this trend, including the power of workstations connected to local systems and the (local) preexistence of acquisitions-level records, which catalogers can upgrade more quickly and easily than by keying a record from scratch in the utilities. Figures from OCLC bear out the significance of this trend: while it is true that between July 1, 1994, and June 30, 1995, OCLC saw more than 1.5 million original records created directly online, nonetheless in that same period OCLC batch loaded more than 314,000 member records that were received either on tape or via FTP (Greene 1995). This latter area, particularly where FTP is concerned, will clearly be an increasingly popular means of entering records into the OCLC database. It is worth noting that discussions are taking place with the goal of extending the batch-loading option in OCLC to CONSER and PCC BIBCO records.

The growth of local systems, again particularly among large libraries, has led to both RLIN and OCLC developing technical means whereby those institutions could integrate access to the utilities with their local infrastructure. At RLIN this was originally known as LANTerm, later EtherTerm, but RLIN has now moved away from this methodology in favor of almost total reliance on the Internet—mediated at an institution's discretion by use of a CompuServe Dedicated IP Network or dial connection, plus some minimal direct-dial lines.

In the case of OCLC there have been and continue to be several options, including use of a communications controller attached to a local network, but the preferred solution among large libraries is now to use the Telecommunications Linking Program (TLP) to connect to a network router and from there to OCLC. At Harvard University, for instance, this technology has enabled large financial savings (approximately twenty thousand dollars per year) on telecommunications by eliminating many stand-alone, isolated, dedicated circuits. At the same time, by pooling all of the remaining circuits and making them universally accessible to anyone on the campus network with appropriate software and authorization, the remaining twenty-six virtual circuits can be shared on a contention basis by several hundred staff members. The TLP also has the added advantage that it runs at fifty-six KBS (kilobytes/second), much faster than the standard OCLC telecommunications protocol. Finally, OCLC too has recently made Internet access for technical services (the Prism service) available to its members; users of their reference services had already enjoyed that option.

At the Harvard College Library, the largest unit of the Harvard University libraries, we have discovered that integrating access to bibliographic utilities with the local processing environment has had highly positive results beyond the financial savings. There has been a pronounced psychological impact on technical services staff who have ready and easy access to the

utilities right at their desktop. It is no longer necessary to get up, walk halfway across the building to discover whether a dedicated OCLC computer is available, perhaps interrupt someone, do some searching or claiming, and then return—again halfway across the building—to one's own desk. (And then, no doubt, discover that further searching is required.) Rather, all this processing can be done, literally, by "letting your fingers do the walking." Catalogers no longer tend to batch their searches for deferred sessions, but tend to process a book as an entire entity.

We can actually measure the difference by comparing transactions in the pre- and post-TLP eras. In the first six months of fiscal year 1995, searching (excluding Title Scan searches) in OCLC by the Harvard College Library increased 84% over the comparable period for fiscal year 1994 (103,891 to 191,113 searches). Even more significantly, prime-time production (claiming) of records was up 134% (19,452 to 45,551) and non–prime time production was up 100% (8,308 to 16,645)! The obvious interpretation is that, while we are not only doing more searching because access to OCLC is vastly easier and more ubiquitous, we are also making more efficient and more economical use of our searching activities than we had previously.

This integration of local systems and remote bibliographic utilities, while a progressive step, is just now becoming fully the tightly integrated system that we need. Because neither RLIN (until June 1995) nor OCLC (until January 1996) had Windows packages, it was not possible to run simultaneous Windows sessions in conjunction with open local processing sessions. As that is changing, however, it becomes possible to envision different scenarios for processing. For instance, rather than batch loading or Generic Transfer and Overlay (GTO) transfer of records from utility to local system, why not use the ability afforded by multiple sessions to copy and paste from the utility to the local system? It will, of course, be necessary to develop the tools (hot keys, macros) to convert records from one format to another, but that is possible, and it is a function that we should expect local systems vendors to offer us once they and the national bibliographic utilities have reached a common threshold in reliance on Windows.

Program for Cooperative Cataloging

Three years after the formation of the original Cooperative Cataloging Council (CCC) and almost two years after the release of its strategic plan, it is worth noting the impact that the CCC has had on the development and adoption of TSW technology. Throughout the reports of the initial six CCC Task Groups there was a common thread of applying new, advanced technologies to the process of bibliographic control. A number of the most significant challenges were gathered together in the automation appendix to the CCC's strategic plan (CCC 1994). Among those, the most pertinent for TSW development were:

- Encourage development of Z39.50.
- Encourage use of TLP/EtherTerm.
- Expedite development of online cataloging tools.
- Develop word-processing capabilities within a TSW platform.
- Develop capability of windowing on TSWs.
- Develop customizable macros and macro packages.

Shortly after the CCC released its strategic plan, it created a Task Group on Automation whose primary charge was the issues listed in the automation appendix. During its first six months, this group managed two significant accomplishments. The first was the Internet survey (previously mentioned) to gather information on development of TSWs. I was its primary designer, and Kiegel of the University of Washington was primarily responsible for the compilation and interpretation of the responses (Kiegel 1994a; Kiegel 1994b). We found that most institutions were gravitating toward platforms consisting of a PC-compatible workstation, with an 80486-class processor as the then-preferred choice. Pentium-class machines

were beginning to appear in libraries already in 1994. Windows was clearly the preferred multitasking environment. Current specifications for many institutions now show that they are buying machines as follows:

- Pentium class, 60+ MHz
- 16 megabytes RAM
- 340+ megabytes hard drives
- VGA or SVGA monitor, with fourteen inch still the norm but with seventeen inch the preferred size if sufficient funds could be found—the ability to run a monitor at higher resolutions on a larger screen can result in a two-thirds increase in applications that can be viewed comfortably and allow easier comparison of multiple records on a single screen
- Mouse
- Ethernet card
- DOS, Windows (current versions of both)
- Communications software configured for the local system or online catalog.

The Task Group's successor body, the Standing Committee on Automation of the Program for Cooperative Cataloging, as previously noted, is in the process of compiling an ARL SPEC Kit on technical services workstations.

The second major initiative of the Task Group on Automation was to convene a meeting of library service vendors at LC on November 18, 1994. Representatives of some forty vendors attended. The objectives of the meeting were to introduce the vendors to the programs and aims of the PCC and to demonstrate for them a number of grass-roots enhancements to cataloging productivity. Beyond that, the intention was to initiate a dialogue between the PCC and these vendors in the course of which we could exchange ideas and plans for furthering the goal of increasing cataloger productivity. It is gratifying to see that the vendors, while conscious of protecting their corporate business plans, are nonetheless beginning to reveal their corporate strategies for implementing some of our propositions. Some of these concepts are now beginning to come to market (CCC Automation Task Group 1994).

Authority Records

In terms of national programs there are even more pressing reasons to push forward with the opportunities afforded by the release of RLIN and OCLC under Windows. When the CCC's Task Group on Availability and Distribution issued its final report in 1993, it called for transferring distribution of both bibliographic and authority records from a system based on tape loading to one based on use of FTP. That transition has begun and in many areas is already largely accomplished, particularly where distribution of records from OCLC and RLIN to LC, and from LC to OCLC and RLIN, are concerned. By the time this note will have appeared, OCLC should have completed testing the capability to accept and load into its PRISM authorities save file NACO records received via FTP. Contributors will still be required to verify the records' uniqueness and update them once they are in the save file, thereby actually causing them to be indexed in OCLC's mirrored version of the LC authority file and from there transmitted to LC for further distribution as part of the national authority file.

But now, particularly with regard to time-sensitive authority records, conditions demand new solutions. A number of institutions have developed programmatic responses to the creation of authority records; chief among these has been the sophisticated Cataloger's Toolkit, a Visual Basic program developed by Gary Strawn at Northwestern University. The manual associated with this program is available for inspection online (http://www.library.nwu.edu/clarr/). This program and its associated toolkit allow technical services staff to create authority records basically by clicking a button on the screen. Pasting that locally created record over to an open national utility session now becomes the next challenge.

An alternative approach involving national programs where records must be handled directly within the bibliographic utilities is offered by work being done by Robert Bremer of the Online Data Quality Control Section at OCLC. CONSER

(and Enhance) participants must still enhance (lock and replace) preexisting serial (and nonserial format) records online in OCLC, although, as noted above, work to enable batch loading of CONSER and BIBCO records is ongoing. Working online in OCLC, it will then be possible to use macros Bremer is creating with the new OCLC Macro Language for Passport for Windows to generate authority records for personal and corporate main or added entries.

Steps such as these are truly exciting and enable us to transfer much of the manual work associated with the creation of authority records to automated processes. The PCC Standing Committee on Automation has recently established a Task Group on Expediting Creation and Delivery of Bibliographic and Authority Records to investigate and make recommendations on a generic model for local systems vendors that will detail the requirements of an automated authority creation module. The task group is charged to:

- Design a data model, preferably system neutral, for system-mediated (i.e, macro-driven or programmatically driven) creation of authority records
- Design a model for real-time transfer of records from a local system to a bibliographic utility session

If there is any single area of technical workstation development—besides the release of RLIN and OCLC under Windows, and the prospect of systems vendors releasing terminal emulations and Z39.50 clients under Windows—that has excited the profession, it is the prospect of macro-driven, programmatic solutions to many of our cataloging concerns. I have mentioned Gary Strawn's programs at Northwestern to create authority records. David Williamson at the Library of Congress and now Robert Bremer of OCLC have taken their cue from him and have developed similar programs, though OCLC's is one-dimensional by comparison. Harvard College Library's Cataloging Services Department applied a DOS shareware program, NewKey, to its cataloging operations, and the startling increase in productivity we experienced has already been noted. I have calculated that 1.5 million keystrokes per year have been eliminated (along with the attendant chance for error) by automating much of the copy cataloging process. Copy cataloging has for the most part become a hot-key process, with the operator reviewing the record and wanding the barcode.

It is envisioned that the next generation of Windows macro packages might enable the process to be even simpler and more error free. That might well come at the price of moving away from a simple scripting language, such as exists in NewKey, and adopting complex programming languages such as Visual Basic and its derivatives that are embedded in Passport for Windows and McGill TCP3270 version 3.0. In addition, there are other stand-alone Windows macro packages—such as ProKey and SmartPad—that might work well in certain environments, but that do not offer the completeness of packages based on Visual Basic.

One can postulate that advances in macro programming will free us to concentrate more and more on the truly intellectual parts of the cataloging process by automating increasingly large portions of what is now rote keying and rekeying.

Conclusions

This is a time of great ferment in technical services departments. The threat of outsourcing has added a new urgency to modernizing the way we do business. Recognition of accountability and the bottom line is driving much of the progress in bringing the real promise of automation to technical services. This process is not just top-down or systems office-down; frequently the real developments in technical services workstations are happening on the front lines with innovative and entrepreneurial staff members in technical services departments. Long frustrated by the slow pace of mainframe-style automation, technically minded individuals in institutions large and small are creating tools to run on their desktops and in so doing are creating the technical services workstation. There is indeed a revolution going on in technical services today. As we

continue to apply significant programmatic solutions to many of our more repetitive, less intellectually demanding tasks, we can begin to divert our resources and energies to the true tasks that lie ahead: providing bibliographic and authority control to works both traditional and new.

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