
The Triangle Research Libraries Network: A History and Philosophy

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The Triangle Research Libraries Network (TRLN) was created by a consortium of three neighboring research universities in North Carolina: Duke University, North Carolina State University, and the University of North Carolina at Chapel Hill. Operated by the libraries at these universities, with the support of each university's administration, its purpose is the creation, development, and maintenance of a computerized system which provides high quality bibliographic control of and access to library collections at all three institutions.

In the spring of 1989, TRLN is operating a full-function online public access catalog known as a Bibliographic Information System (BIS) in a distributed network of Tandem computers, and it is maintaining a data base of more than two million records. The circulation sub-system is online in a beta-test environment, with full implementation expected later in the year. Many more enhancements, including advanced searching capabilities and acquisitions and serials control, are already in the development stages. TRLN is a nationally recognized innovator in the creation of online public access systems. What makes TRLN unique is its distributed and cooperative approach to solving the problems of library automation. The roots of that cooperative approach lie more than fifty years in the past, in days when computers were still a dream in a few mathematicians' imaginations.

The long history of cooperation among the universities in the Research Triangle area began in 1933 when Robert B. Downs, Librarian at the University of North Carolina (UNC) and Harvie Branscomb, Librarian at Duke, drafted a series of documents outlining agreements between the two libraries for coordinating the development of their collections and the shared use of those collections. A program for the exchange of printed catalog cards representing new library acquisitions was initiated. Along with the exchange of cards came new policies regarding interlibrary lending of materials and the creation of a docu-

ment delivery service which exists to the present day.¹

In the 1940s, these agreements were expanded beyond mutual access programs to actual definitions of shared collecting responsibilities. A grant from the Rockefeller Foundation, awarded jointly to UNC, Duke, and Tulane University, allowed for the coordinated purchase of Latin American materials. For the next twenty-five years this cooperative approach to the acquisition of area studies materials was formally extended to many other areas of the world. In Commonwealth studies, for example, Duke maintains strong holdings in Canadian materials, which are complemented by UNC's extensive collections of Australiana. In East Asian studies, UNC collects Chinese materials and Duke, Japanese. Francophone and Lusophone Africa are particular strengths of UNC's collections, while Duke focuses on studies of Anglophone Africa.

These cooperative agreements have continued to be strengthened and refined. In addition to defining collection development by broad geographical areas, bibliographers have refined areas of common interest by adopting a historical perspective. For areas of more specialized research in Russian history and literature, for instance, UNC collects extensively in materials on pre-Revolutionary times, while Duke places greater emphasis on Soviet studies. Recently, negotiations between the two universities were concluded which define collecting responsibilities from French regional, or provincial, history. While Tulane is no longer a partner in these agreements, and the University of Virginia has begun to cooperate in the acquisition of Slavic studies materials, the central core of cooperative collection development agreements between Duke and UNC remain in place and continue to grow stronger.²

The existence of these agreements, along with the increased funding for library materials that became available in the 1970s, set the stage for events that would lead to the formal creation of the Triangle Research Libraries Network and the development of a shared cooperative online network of library holdings and resources.³ In March 1976 Connie Dunlap, University Librarian

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at Duke, and James Govan, University Librarian at UNC created the Duke/UNC Committee on Cooperation. The purpose of this new committee was to review the collection development agreements between the two universities. One formal endeavor was the initiation of a serials review project aimed at the reduction of duplication among serial subscriptions at the two schools.

The committee met frequently for the next year, and its work met with enthusiasm on the part of the library staffs. In April of the following year, 1977, Connie Dunlap wrote to James Govan proposing that the two universities begin a formal long-range planning process to broaden and develop further the cooperative efforts already underway. Quickly, a new group was formed, known as the Cooperation Committee, which now included Cy King, Librarian at North Carolina State University (NCSU). With the addition of NCSU to the consortium, the strong liberal arts collections at Duke and UNC gained the support of the state's premier scientific and technical library. The new group was known as the Triangle Universities Libraries Cooperation Committee (TULCC). A subgroup, the TULCC Technical Committee, later became the TRLN Coordinating Committee, which oversaw the early stages of the network's development. The responsibilities of this group reside today with the Executive Board of the Triangle Research Libraries Network, the governing body of TRLN as it is in 1989.

That each database exists and operates independently of the other two, while at the same time being ultimately linked to them, is the unique accomplishment of the Triangle Research Libraries Network.

At the end of 1977, TULCC produced a report, *Proposal for Funding to Support Cooperative Library Development Programs*, which resulted in a federal grant of \$250,000 in Title II-C funds to support library acquisitions at the three institutions during fiscal 1978/79. The ideas contained in this report laid the foundation for all that was to follow. The *Proposal* recognized that the long history of cooperation in the Triangle provided the framework for a new and significant approach to the use of library resources. It explicitly mentioned "the utilization of the collections as a single, unified resource" positing the development of an interactive online catalog of library holdings as

essential to successfully implementing such a concept. The report proposed a three-year program to explore further the automation of library services, the cooperative provision of public services, and access to the collections. Funding for cooperative collection development gave new vigor to the agreements among the three universities.

In 1978 the three libraries working to further the goal of automating access to the collections retained a pair of consultants, John Knapp and Ritvars Bregzis, to follow up on the committee's recommendations as stated in the *Proposal*. The Knapp/Bregzis Report, released in January of 1979, recommended the development of a distributed local area network for the provision of bibliographic access and became the source for much of the second (and successful) Title II-C proposal for development funding in fiscal 1979/80.

While the second Title II-C proposal was being drafted, TULCC established the Task Force on the Syntax of the 049 Field. This group, which later became the TRLN Cataloging Policy Committee, worked throughout much of 1979 to produce a report which detailed the complexities of creating machine-readable holdings statements as distinct from bibliographic records. The report led to much important work in the design of what became a core component of the Bibliographic Information System⁴. At the same time the COM Catalog Task Force was established and began to produce specifications for the unified microfiche catalog of machine-readable library holdings. This catalog served as the union list of TRLN library holdings until the public introduction of BIS in 1985.

The decision to develop a system locally was a significant one, and undertaken after considerable deliberation. There were several turnkey systems available at this time. Two factors, however—one economic and one philosophical—argued for the creation of a "home-grown" project. In the matter of economics, there was widespread concern in the late 1970s about the long-term stability of commercial vendors and their commitment to libraries' needs. As the nearly complete failure in this country of IBM's DOBIS system has since shown, this concern was not unfounded.

More importantly, the commercial turnkey systems at the time were simply automated circulation systems. There existed a perception that computers were not powerful enough to support the processing requirements of a system that could replace the conventional card catalog. Those librarians who envisioned the creation of a

cooperative program in the Triangle, however, felt that what was truly needed was an integrated system designed to address all aspects of bibliographic control and access. The most important and fundamental element of such control was the MARC record. By combining the strengths of the traditional card catalog with the power of automation, librarians of the Triangle libraries hoped to create a new approach to automating library services which gave primary emphasis to the collections being described. This philosophy demonstrates how cooperative collection development and access have always been the inspiration for their efforts.

Local development of an automated system was rapidly approaching. A search was begun to hire qualified systems staff to begin design and implementation. Jeanne Sawyer was hired as a library systems analyst. She had been a science cataloger at UNC with a strong interest in automation, which was supported by work at the Environmental Protection Agency and by her membership on the UNC Computer Applications Task Force. She was also pursuing advanced degree work in computer science at UNC. Also recruited for the project was Gwyneth Duncan, an employee of UNC's Administrative Data Processing center. She had several years of experience with automated library applications in her work with main-

taining circulation and serials records for the campus libraries. Under the leadership of Sawyer and Duncan, a programming staff was assembled and work was begun on several projects.

By the end of 1979, specifications were being established for the COM catalog. The items contained in this catalog would be processed from tapes containing MARC records, received by the libraries at UNC and NCSU from OCLC, and from records in the Technical Services Data Base maintained at Duke. The first step toward the creation of a local online network would be the development of a system for processing these archival tapes. This system would create new records for each of the three libraries consonant with the demands of the cooperative system, which was designed to accommodate expansion if more libraries joined the consortium. Additionally, the archive tape system (ATS) would ensure the bibliographic integrity of the records of each institution, a point given considerable importance in the program of local cooperative development since its earliest days.⁵ A third major project, the development of the online editing system (OES), to allow for the local editing of records once they had passed through the ATS, was also initiated.

In June 1980 the name Triangle Research Libraries Network (TRLN) was officially adopted by the consortium, marking a historic milestone

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in the fifty-year collaboration of universities. And in many other ways, 1980 was a significant year for TRLN. Coding for the ATS was completed in May and, after successful testing, the system went into operation in September. At the end of the year, the first edition of the COM Catalog was produced and was distributed to the member libraries in January 1981.

Until this point, operations were being carried out on a UNIVAC computer at UNC's Administrative Data Processing offices. Another task force investigated the purchase of equipment that would permit the network to be independent of existing computer resources on the three campuses. Among the leading vendors was Tandem Computers, a small, growing company based in Cupertino, California. The final decision to purchase Tandem equipment was precipitated by the sudden opportunity to buy a used system at a greatly reduced cost. There were several important factors that led to the consideration of Tandem which ultimately have proved crucial to the success of the program.

Three basic design elements of Tandem computers were of over-arching importance. The first of these was the "fault-tolerant" nature of their operation. Dual processors support the work of the system under normal conditions. Should one of the processors fail, the operating load is shifted to the processor which is still functioning. Non-critical operations can then be suspended, if necessary, to maintain system performance. This fault tolerance is what has led to the adoption of Tandem systems by organizations such as banks, airlines, and stock exchanges, which cannot afford even minimal downtime on their systems.

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The second consideration was the modular nature of Tandem's processor architecture. In the ordinary manner of constructing processors, a limit to transactions and performance is imposed. If the demands of the system exceed the limits of the processors, the entire system must be upgraded, or to put it more bluntly, replaced. Even with a trade-in on the old processor, this represents a considerable expenditure each time a processor upgrade is required to meet increased

system loads and may involve software conversion as well. Tandem's modular approach however, allows the *addition* of new, supplementary processors to existing ones with the processing load being redistributed among them. This approach significantly reduces the initial investment in hardware, as well as making the cost per upgrade considerably easier to bear. Additionally, most minicomputer systems available at the time were limited in the number of terminals they could support. With Tandem equipment, additional processors could be acquired to support an expanded number of terminals attached to the system. For institutions bound by significant restraints in budgeting and purchasing, such an option was of critical importance.

Finally, since its inception, TRLN had been seen as a distributed network of computers. Each university would maintain its own database on its own hardware; these systems would be networked to provide unified access to the individual databases and a transparent interface between them. In the early 1980s, Tandem was a leader in the production of distributed systems and networking; the concept was integral to the processor's design. For these reasons, Tandem was the system of choice for TRLN.

With basic functional design work in progress, and the Tandem hardware installed, work on the online editing system (OES) became the primary focus of the project. The software design of the OES was completed in the fall of 1981, two 200-megabyte disk drives for storage of the database were purchased, and the system became operational in the spring of 1982.

Since the earliest days of TULCC, system design had been accomplished with the direct participation of the library staff who would be the primary users of it. Task forces and committees comprised of library staff working in cooperation with systems staff became an integral part of the design process. Each new system design proposal was presented to the library staff for review, along with an explicit statement for the rationale behind the development. While this slowed down the design process considerably, it ensured that staff had significant input into a system that would become central to their library's operations. It also allowed for the incorporation of many points of view: the system was not a technical processing system, a circulation system, a "public" system. From the beginning, it was constructed as an integrated system. The primary emphasis in development had always been the libraries' collections. The broad involvement of library staff in deciding how to implement access

to those collections was the key to a successful implementation of the system.

During 1982, staff began to use the OES to edit local records and to make recommendations for the implementation of what was called BIS-1. This was to be the preliminary model of the public access catalog (the actual public catalog being known as BIS-2). While design work continued, so did national interest in the project.

With a number of independently developed systems around the country in operation, considerations for creating a national database of shared bibliographic records came to the fore, and discussions began between OCLC and TRLN to address the issue. As TRLN was developing considerable expertise in the networking of online systems, the TRLN/OCLC link was to have been a prototype for the linking of OCLC with all other local systems. Work on direct computer-to-computer links between OCLC and TRLN got underway, and excitement grew with the prospect of becoming a full partner in this national networking project. The direct link would have allowed immediate updates of both the TRLN database as local catalogers added TRLN holdings to the OCLC records, and the OCLC database, as local catalogers created original records on the TRLN system for addition to the OCLC database. In early 1983 the link seemed to be one of TRLN's major contributions to library networking in general.

Unfortunately, to anticipate history for a moment, the proposed link never came to pass. TRLN was awarded a grant by the Council on Library Resources to support development work on the link, but technical difficulties in establishing standards at the national level for the interface, delays in OCLC's development of its new application system (known then as the Oxford Project), and the general difficulty of achieving agreement between disparate national organizations forced the project to be suspended. Its future remains uncertain even today.

The 1983/84 fiscal year marked a significant turning point in TRLN's history. Until then, primary support for development and hardware had been provided by grant monies totaling more than \$1.7 million dollars. The three libraries had made only limited financial contributions to the system's development, but had allocated significant staff resources to design efforts. In 1983/84 financial support from the three universities increased considerably in anticipation of the ending of federal funding for development.⁶ Although strong support for the project existed among all of the directors of the main libraries at each cam-

pus, it was felt that the universities' administrations should be more fully involved in the governance and control of TRLN.

Accordingly, the three directors approved a governing structure recommended by the TRLN Organizing Committee. In summer 1984, the chancellors of the three universities signed a "Memorandum of Understanding" which restructured the organization of TRLN and created the position of Director of TRLN. Prior to this agreement, the Director of the Academic Affairs Library at UNC, the sponsor of the Title II-C grants, had been the Project Director. Under the new arrangement, a governing board comprised of library directors, including the four directors of the separately administered libraries on each campus (e.g., the UNC Health Sciences Library and Duke's Fuqua Business School Library) as well as academic officers at each institution, was created. The TRLN Director reported directly to this board.

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In addition to the structural reorganization, the Memorandum of Understanding established the commitment of all three universities to the continued development and funding of TRLN. Thus the project could be said to have matured from an experimental system to stable organization sponsored by three major research universities. After a national search for the TRLN Director, Jeanne Sawyer, TRLN Library Systems Analyst, was selected to lead TRLN into the future.⁷

In the meantime, work had continued apace. Initial testing of BIS-1 proved successful, and the transition from the original OES to a full-featured online catalog was made with little disruption to normal staff activities. Support for asynchronous terminals (in addition to the synchronous Telex terminals used with OES) was implemented, and plans were made to bring the system up for the general public. By June 1985 support for author, title, and control number searching, including ISBN, ISSN, LC card number, and record identification number was provided for the over half a million records in the system. The creation of subject heading indexes to allow subject searching of

TRLN records by Library of Congress Subject Headings (LCSH), Medical Subject Headings (MeSH), and locally created subject headings was well underway. Development of call number searching also began.

In the meantime, TRLN advisory committees on circulation, acquisitions/serials control, and cataloging policy continued to define specifications for the system. Staff also began addressing the difficult problem of providing comprehensive authority control, a feature no other automated system in existence offered.

August 12, 1985, marked another milestone in the history of TRLN. On that day, the first public catalog terminals were installed in Davis Library at UNC. After nearly a decade, the online catalog had arrived and was available to the public. Within six months, dial-in access to BIS from remote terminals on the UNC campus was made available. At the same time a Tandem system was installed at NCSU to support public access terminals on that campus. The following July, the third node of the network became operational at Duke. While these events naturally had important ramifications for staff and patrons at all three universities, they also marked an important change in operations for TRLN staff.

Before the introduction of public online searching, the system had been available in a controlled testing environment where refinements were scheduled, and "bugs" in the system were fixed fairly easily. Suddenly, users eager to exploit the system's capabilities conducted ambitious experiments in bibliographic retrieval. As use increased, TRLN staff faced new problems that could not have been uncovered in the testing environment. Whereas previously TRLN staff could focus most of their efforts on new development of systems, there was now a significant element of system maintenance. More time had to be diverted to the resolution of problems rather than the development of new features. The net result of this change was a slowdown in development and a readjustment of priorities.

During 1985/86, with the installation of Tandem computers at Duke and NCSU, telecommunications lines connecting the three campuses were laid, and the UNC Educational Computing Services, located in the Research Triangle Park, assumed responsibility for maintenance of the network lines. New system software was put into development to allow multi-institutional searching of the databases, and additional staff time had to be diverted to maintain the network.

Jeanne Sawyer estimates that, once BIS became a public system, the amount of staff time

available for new development was cut from ninety percent to fifty percent. Thus, the amount of time that would be required to introduce new features to the system nearly doubled.

At the same time, a whole new class of users of the system, including librarians who previously had been at most marginally involved with TRLN, became vocal participants in the development process. Even though nearly ten years had gone into the development and testing of BIS, and perhaps because the available features worked so well, expectations about future performance became extremely high.

As noted above, 1985/86 was the first year of TRLN's history when the cost of development and hardware resources required to support an increasingly complex system had to be borne by the universities themselves without significant external assistance. Concomitantly, inflation, especially in the cost of library materials, but also in general operating expenses, was putting a severe strain on the operating budgets of the consortium and, by extension, on the budget of TRLN.

Although each campus had purchased its own expensive Tandem computer, development work on the system was still being carried out on the UNC installation. The high overhead in computing resources required to operate the online catalog at UNC as well as the development work for the entire network caused unacceptable response time at UNC. Not only did library patrons find the system slow to use, but the demands of increasing use at UNC meant that programmers' testing and development work proceeded more slowly. Routines that might have required only minutes to run now took hours as critical CPU resources were dedicated to processing patron searches of the database. Not only was there less time available in terms of TRLN staff hours for development, but less processor time for creating and testing new developments was available.

The solution was to purchase a fourth Tandem system, to be located at UNC and dedicated solely to development work. Skillful planning on the part of TRLN systems staff reduced the impact of this purchase on an already strained budget. TRLN reconfigured the UNC computer so as to effect an upgrade of the hardware at UNC.

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along with a migration of the older UNC equipment to the dedicated use of the TRLN staffs development activities.

Despite these strains on resources, development work continued. In November 1986, subject searching of the databases was introduced, the first major upgrade to the system's capabilities since its public introduction. This was an important step forward in providing access to the collections of the three universities and one which again necessitated a significant investment in hardware resources to support the maintenance of the large subject indexes.

Once subject searching had been implemented, work on call number searching began in earnest. This was a feature that would be required for the implementation of the circulation subsystem, but it proved to benefit library patrons as well. A UNC research study showed that for many library users the ability to browse the stacks for relevant resources is an important component of library services. Construction of the call number indexes, which allow patrons to enter a complete or partial call number and then to view an online shelflist, was complicated by the existence of three separate classification schemes at the member libraries. While NCSU's catalog is entirely based on LC classification, the Perkins Library at Duke uses the Dewey Decimal classification. At UNC, the main library collections are split between LC and Dewey, and the medical libraries at both Duke and UNC employ the National Library of Medicine system. Despite the complexities posed by these varying classification systems, call number searching became operational at UNC in the summer of 1987. Implementation of this newest feature of BIS was again delayed at Duke and NCSU because of a lack of disk storage space to support the call number indexes.

In February 1987, with Tandem computers operational at all three sites and network lines connecting the three in place, the introduction of multi-institutional searching became a reality, and the long-sought goal of supporting a distributed, networked system became a reality. With network hardware installed, the introduction of the software supporting multi-institutional searching meant that TRLN had achieved what no other online system in the world is capable of accomplishing. It became possible for a patron at Duke to search local holdings, then to forward that search to UNC, to NCSU, or to both, and to obtain a merged retrieval set of the holdings of all three libraries. Here at last was the distributed network of three universities' collections "utilized as a sin-

gle unified resource" as outlined in the first proposal for Title II-C funding for the system's development in 1977. That each database exists and operates independently of the other two, while at the same time being intimately linked to them, is the unique accomplishment of the Triangle Research Libraries Network. The importance and prevalence of distributed computing, in which the resources of multiple, discrete systems are combined to provide transparent utilization of those resources to users, have become increasingly evident to computer professionals throughout the seventies and eighties. Firms such as DEC, one of IBM's leading competitors in the provision of hardware and software in traditional computing areas, have built their reputations and their success on distributed networks. Only the Triangle Research Libraries Network has successfully applied these principles to the library environment; in doing so it has made a significant contribution to library automation.

The future of TRLN holds many challenges. Work on the circulation sub-system is nearly complete. Beta-testing of circulation began at NCSU in spring 1989. A major problem that remains to be solved before circulation can be effectively implemented concerns the confidentiality of patron records. For most efficient operation, TRLN desires to load patron information such as status (faculty, staff, student, other), addresses for billing and notifications, and other necessary data from electronic files already available in the universities' administrative units. However, because these data contain sensitive information—at all three schools, for example, social security numbers are used for student identification—legal concerns may slow down the implementation. The matter is currently under study by legal advisors at all three universities, and it is hoped that a resolution can be reached in the coming year.

The initial implementation of circulation includes the ability to charge and discharge materials, to record holds, to produce overdue notices and bills, to create "provisional" records for items not already included in the database, and to check out materials to temporary locations, a feature useful for keeping track of materials charged through interlibrary lending to schools other than the TRLN institutions. It will also allow for the sharing of patron data among the three institutions. This last is an extremely significant feature, as it will allow a student from NCSU to check out materials from Duke, for example, and thus further enhances the treatment of the three collections as a single resource.

Once circulation is operative, the development schedule projects a year to implement enhanced searching features. These include the ability to perform keyword searches on specified fields in the database and to combine keywords with boolean operators to increase subject access to the collections and obviate the necessity for using the controlled vocabularies of LCSH and MeSH.

At about the same time a "global change" feature will be introduced. This feature although largely transparent to patrons, will allow library staff to make quick and comprehensive changes to controlled fields in the MARC record. Many librarians remember the proliferation of split files in card catalogs after the introduction of AACR2, when Samuel Clemens officially became Mark Twain, and they will appreciate the importance of this element in the system design.

Design work is now in progress on the penultimate major sub-system of BIS, acquisitions and serials control. While some years away, this module will provide important benefits to users of the system. Searches will retrieve, in addition to items cataloged for the collection, records for materials on order, in process, backlogged, or otherwise unavailable through ordinary means. The serials component of this system will allow patrons to determine whether the latest issue of a journal received on subscription has arrived, whether items not on the shelves are missing, being claimed, or at the bindery. A related development, which should be in place by 1990, will be the loading of detailed holdings information about serials currently owned by the libraries into BIS. This information already exists in machine-readable form, and the process of converting it into BIS holdings statements is moving forward on all three campuses.

Once the system provides all the basic elements of a fully functional online catalog—cataloging, circulation, acquisitions, and serials—there will be one last important element to put into place: authority control. While the "global change" feature can replace Clemens with Twain, it will not help the user who searches for "Mussorgsky," unaware that official LC cataloging rules call for the spelling "Mussorgskii." Complete authority control, with its extensive system of intelligent cross-references, is still far off. No online system now provides true authority control, and much research still remains to be done into how this crucial element of a cataloging system can be effectively implemented.

The Triangle Research Libraries Network, as

Jeanne Sawyer observed two years ago, has passed out of its childhood and has emerged into adolescence. Like most adolescents, it is undergoing growing pains, not the least of which was Ms. Sawyer's recent resignation, in August 1988, as TRLN Director in order to complete her dissertation in computer science and to pursue other career goals. Her leadership has brought TRLN to its current level of achievement, and her wisdom, warmth, and dedication will have a lasting impact. TRLN will face most of its adolescence without her guidance.

Joe Hewitt, Associate University Librarian for Technical Services at UNC, has noted that most automated library systems can be described as "90% systems." That is, they are constructed to handle ninety percent of the materials likely to be found in research libraries. He goes on to speculate that many of the "90%" systems are in reality "75%" systems that lack many of the important features of conventional card catalogs, such as the ability to record extensive piece-specific holdings information. When a large multi-volume monographic set published in Germany has twelve *Bände*, each of which comes in one or more *Teile*, which are further divided into *Abteilungen*; when each of these smallest parts is a physical volume of several hundred pages; when the individual parts are published as they are completed and not in numerical order; and when the circulation librarian must determine whether the one piece that a patron urgently needs is in the library's collection, lost, misshelved, on order, or simply (and frequently) still unpublished...; in such a circumstance the deficiencies of the "90% system" become apparent—to the librarian at least, if not necessarily to the hapless patron. Bosch's "Garden of Earthly Delights" contains no such horrifying vision of Hell.

It has been the aim of TRLN, from the start, to provide not a 90% system, but a 99.9% system that would accommodate the demands of three different university libraries. This commitment to quality, to exhaustiveness, and to control has been a guiding philosophy of TRLN since its inception. But such high aspirations have their price. For TRLN this has meant delaying the gratification of introducing new features, enduring prolonged testing of systems, and spending long hours of research to identify small but important features that must be considered in the design and coding of the system.

Similarly, while the broad involvement of library staff in the design of the system has resulted in the application of considerable expertise to the problems of creating an effective online

system, it has also demanded a price in terms of development time. Nearly two years has gone into the creation of specifications for the acquisitions/serials control system, and another year of detailed functional design by systems staff will be required before programmers can begin the task of coding, testing, and debugging the software to operate it.

As noted above, during 1985 and 1986, TRLN underwent a sea change. The introduction of a public access catalog meant that BIS was no longer an experiment: it was a success to which the libraries were committed. With the expiration of grant funding at approximately the same time, that commitment became financial as well as philosophical. The rapid growth in the database (UNC alone was adding 120,000 volumes a year in the early 1980s) demanded a concomitant growth in hardware resources, as did the introduction of new features such as subject searching. A new universe of users expressed their often disparate opinions of the system, opinions which demanded a careful listening ear. Staff time which had previously been devoted almost entirely to development was curtailed sharply by the demands of maintenance. Allocation of scarce processor cycles to the needs of public searching compounded the loss of man-hours by slowing down the speed at which new developments could be tested and debugged. TRLN's adolescence had indeed arrived. A sudden, rapid spurt of growth left in its wake an awkwardness and a heavy dose of uncertainty. Those persons associated with TRLN—its developers, its librarians, its users—wondered about the future and what it will bring. What will TRLN be when it "grows up"? What is the best way of getting there? Are other developing library systems coping better with their growing pains? How will we know when maturity has arrived?

These are serious questions which will not be resolved overnight. Conflicting answers to them abound. Is the emphasis on exhaustiveness perhaps too idealistic, too impractical? Might other systems be purchased and integrated with BIS? Do we need to do all the development by ourselves? Will TRLN become outmoded, overtaken by the strength and resources of OCLC and its LS2000 system or some other competitor?

In its thirteenth year, TRLN is in a state of profound transition. But much serious consideration is being given to these issues, and that in itself is a sign of vigor and health. As Socrates proclaims in Plato's *Apology*, the unexamined life is

not worth living. TRLN is taking a long hard look at its accomplishments and its objectives. The answers will be found.

TRLN and its frequently indistinguishable child, the online catalog system known as BIS, is a vast and complex organism. Sometimes it works well; sometimes it doesn't. BIS is a work-in-progress. If TRLN can maintain its dedication to producing the 99.9% system it set out to achieve, its accomplishments will truly be enviable. Indeed, in creating the only distributed, wide-area network library system in existence, its record is already enviable, and the contributions TRLN has made to the understanding of automated library systems, their functioning and their development, represent a significant advance in librarianship.

The basic principles that underlie the work of TRLN are sound. Cooperation among libraries is not simply desirable, it is essential, and cooperation is at the heart of the Triangle Research Libraries Network. The TRLN project reflects the belief that a man's reach should exceed his grasp; such a proposition, however, is often painful to live with. TRLN has not yet created, as many may have hoped, "The Library System of the 1980s." But, by continuing to attend to the fundamentals of librarianship, the system will evolve and adapt to the future, and, indeed, can lead the way there.

References

1. Joe A. Hewitt, "Cooperative Collection Development Programs of the Triangle Research Libraries Network," *Resource Sharing and Information Networks* 2, 3-4 (Spring/Summer 1985): 140.
2. *Ibid.*, 143-44.
3. Unless otherwise noted, the details of the development of TRLN projects and systems from 1976 to 1983 are taken from the text of an unpublished speech by Joe A. Hewitt entitled "TRLN's History and Prospects," which was delivered on March 23, 1983 at the National Humanities Center to participants from all three TRLN universities. Some of this information is available in an abbreviated form in Gary D. Byrd, et al., "The Evolution of a Cooperative Online Catalog," *Library Journal* 110, 2 (February 1, 1985): 71-77.
4. For a thorough discussion of the work of this Task Force and the TRLN Cataloging Policy Committee in establishing specifications for the holdings statement, see Arnold Hirshon, "Considerations in the Creation of a Holdings Record Structure for an Online Catalog," *Library Resources and Technical Services* 28, 1 (January-March, 1984): 25-40.
5. See Jeanne Sawyer, "An Archive Tape Processing System for the Triangle Research Libraries Network," *Library Resources and Technical Services* 26, 4 (October-December 1982): 362-69.
6. Byrd, et al., 72.
7. Information on the development of TRLN from 1984 onward comes largely from the unpublished *Annual Reports* of Jeanne Sawyer, TRLN Director from 1985 until 1988.
8. Hewitt, "TRLN's History and Prospects."