

A Study of the Digital Revolution in the Library and Information Sciences
As Seen Through Two Years of the Journal
Information Technologies and Libraries

The American Library Association began at the Centennial Exposition in Philadelphia in 1876 with 103 librarians, including C.A. Cutter and Melvil Dewey, as the founding group (ALA dynamically generated). In 1966, the ALA created a division called the Information Science and Automation Division [ISAD] as a result of the development of MEDLARS, an automated computer catalog storage and retrieval system for the National Library of Medicine (Wikipedia contributors n.d.). That system went online in 1962 and began the movement toward computer automation of cataloging systems in libraries that would continue through the 1990s and 2000s, leading to the present day use of information management systems and the World Wide Web. The *Journal of Library Automation* was started by the ISAD in 1968 and continued through 1981, when its name was changed by the also newly named Library and Information Technology division to the *Information Technologies and Libraries* journal (ALA 2006). By looking at the evolution of this industry journal, it is possible to see the beginning use of the computer and growth of the internet in the search for information, both by librarians and by the general public they serve. The use of this journal to chart the change in the technology of information storage and retrieval can give insight into this new era, especially since libraries of all kinds are one of the most common ways for society to access information. As with the development of the printing press in 1450 by Guttenburg, the effect of an overwhelming new technology takes time to settle into its new form, and the articles in this journal illustrate some of that change in our modern era.

One of the fortunate aspects of this quarterly journal is that it covers a large range of topics and is not narrowly focused on just one or two. Some of the topics covered by the *Information Technologies and Libraries* [ITAL] are “library automation, digital libraries, ...distributed systems and networks,...desktop applications, information discovery tools,...digital preservation and curation, ...open data, the semantic web, mobile services and applications,...universal access to technology, library consortia,...” and many more (ITAL n.d.).

This gives the journal a better scope for showing the depth and breadth of the changes that have occurred in the field of library sciences. It does not just see one area, but the wide scope of effect by the computer and later the internet on information access. This paper will look at two years of articles, the first in 1981, the last year under the name *Journal of Library Automation* [JLA], and then year 2019. However, it helps to look at some of the article titles and abstracts from the start of the journal, in January 1968, to really capture the change in landscape that began with the MEDLARS system. In fact, in reporting on the new system in the *Bulletin of the Medical Library Association* in 1964, Frank Rogers ended his report on the new cataloging system with this sentence “It may be that this will mark the beginning of a new era in medical bibliography” (Rogers 1964). Far from applying only to the medical libraries, it was the start of a new era in all libraries.

The January 1968 inaugural issue of JLA is primarily devoted to describing some of the new computer catalog systems at major universities such as Texas A&I, Stanford, and Brown universities, and the cost of converting a shelf list into the new machine readable form MARC, which was developed at the Library of Congress. It is easy to see that most of these early years were devoted not only to installing the new technology, but also that its main users were the biggest and wealthiest academic and government libraries. In fact, the last article in the list is entitled “The Development and Administration of Automated Systems in Academic Libraries,” showing that there really was a limited field of customers for the first years of the new cataloging systems (De Gennaro 1968). This focus on academic libraries continued through the 1970s, and is also evident into the early 1980s, when we look in depth at the articles for the year 1981, just before the journal’s name change, along with its newly named parent division within the American Library Association.

The first issue of 1981 has an interesting editorial article, entitled “Tails Wagging Dogs” by Brian Aveny. In this short introduction to the issue, Mr. Aveny discusses the last decade and a half of using automated systems at various institutions, and points out the beginnings of a problem that continues through today. He states “A narrow view of the process of creating records has often resulted in introduction of nonstandard practices that provide the required immediate result, but create garbage in the data base. In effect, letting the tails wag the dogs.” (Aveny 1981) He points out that focusing more on short term needs, even with the best of intentions, causes problems that echo into the future. It is revealing that there are many articles

that express this need to plan for future developments when working with today's needs, but the fact that people continue to struggle with this dynamic shows the difficulty in the whole-scale changing of technology.

Many of the articles in this issue and the others of 1981 have similar words in their titles. Many of these words are technical terms and governing institutions, such as *MARC*, *contributed cataloging*, *AACR2*, *OCLC*, *RLIN*, and simply 'code'. These articles describe how a library should approach incorporating the new codes and formats into their cataloging practices. Examples of this are "AACR2: OCLC's Implementation and Database" by Georgia L. Brown in issue No3, or "A Structure Code for Machine Readable Library Catalog Record Formats" by Herbert Hoffman in No2. Some of the articles reference working with the technologies of the time, that have since mostly been replaced by newer formats, such as "Comparing Fiche and Film: A Test of Speed" by Terence Crowley in No4. Some are about ongoing technical problems and adaptations, especially with working with non-English languages and characters, like "Japanese Character Input: Its State and Problems" by Ichiko Morita in No1. The issues described are both strange and familiar to a reader of the year 2020. While new technology may be quickly adopted, difficulty working within a new paradigm has continued to present challenges to societies.

The focus article for the year 1981 is found in the second issue, and is entitled "Design Principles for a Comprehensive Library System" by Tamer Uluakar, Anton R. Pierce, and Vinod Chachra at Virginia Polytechnic Institute, or simply Virginia Tech. The authors begin their article by stating "The use of computers in libraries is no longer a speculative venture for the daring few. Rather, library automation has become the accepted prerequisite for effective library services." (Uluakar 1981) While I have no doubt the group was mostly directing their comments to other libraries similar to theirs- academic libraries of all sizes- it was also prescient of the future of libraries in general. The article goes on to describe the growth and new design of the computer cataloging system that they were designing and installing at Virginia Tech's large library, which had been expanding rapidly in the late 1970s. The collection was spread over a 100,000 square feet building, which had doubled in physical size starting in 1976. The computer cataloging system was needed to replace a large card catalog, of which there was only one, forcing librarians and visitors to walk back and forth through the building from shelves to card catalog. The additional space made that physical format untenable for the future, and so the

university decided to invest in converting to a computer system for cataloging access (Uluakar 1981, 82-83). This is the kind of place in which the earliest computer systems were concentrated, those large enough to be able to save money even with the cost of developing and installing a new technology.

The group designing the new system at Virginia Tech had already gone through two versions, and their article was about the newest version of the Virginia Tech Library System, or VTLS. Their earlier Release I had already implemented the MARC format, which had helped to store such a large catalog, and had integrated the system to include circulation control and remote catalog access (Uluakar 1981, 83). Release II had a different focus than just getting the catalog entered and playing nicely with the system's operators. Now the group wanted to concentrate on getting the screen access to be more 'user friendly,' as we call it today. In the article, it is interesting that this group specifically brings up the patron's ability to use the system, not just the librarian. In most of the earlier articles, those working to get the systems into operation were mainly concerned with how the librarian would use the computer to access catalog information. For the VTLS, the designers were beginning to develop a system that the patron, either student or faculty, could easily use. It is interesting to see the beginning of this work, and the article states it in a way any reader today could understand as a continuing challenge, "The format of all screens, especially those to be viewed by the patrons, had to be visually pleasing. Thus, the use of special symbols (which are so abundant on many computer system displays), non standard abbreviations, and locally (and often quite arbitrarily) defined terms were unacceptable." (Uluakar 1981, 83) Any library website designer will instantly recognize the need to make a pleasing and easy to use format, even though the technology has changed in many ways from 1981.

The second year looked at in depth is 2019 (since Covid-19 has affected so many of the activities and focus of 2020). The journal is now called *Information Technologies and Libraries*, which reflects the change from 'automation' of libraries, to the need to acknowledge the complete integration of 'information technologies' into the library field. As the article in 1981 talked about computers becoming a prerequisite to libraries in the 1980s, by the 2010s, that expectation is complete, in that no one questions computer use but only looks at its optimal use. In fact, the rise of 'digital libraries' in some cases does away with the need for the physical structure the visitor will walk into. The article "From Digital Library to Open Datasets:

Embracing a ‘Collections as Data’ Framework” by Rachell Wittmann, Anna Neatrou, Rebekah Cummings, and Jeremy Myntti in issue No4 of that year talks about going beyond just the digital library providing a search of its holdings by titles and subjects, but providing search of the whole text of the catalog items. The group wants to provide better service for those who cannot come to the space at the University of Utah, as well as create text access for a greater variety of research needs (Wittmann 2019, 49).

As with the articles in 1981, it is possible to look at terms within the titles to get an idea of content. In 2019, there is an increased use of words about creating a better experience, such as *educating patrons*, *usability*, *effectiveness*, *service*, and *strategies*. There is still a need to deal with new technology integration, but even here, it is often looked at as upgrading the current system for better use, such as the last article in No4, “Automated Storage & Retrieval System: From Storage to Service” by Justin Kovalcik and Mike Villalobos. This article is about the first automated storage and retrieval system installed at California State University, Northridge in 1991, and talks about making this older system work better into the future, including dealing with maintenance challenges and loss of dedicated staff (Kovalcik 2019). There is also an article on the practical concerns of everyday use of computers at a community college, which is a bit different from the big academic libraries featured in 1968 and 1981. This article, “Creating and Deploying USB Port Covers at Hudson County Community College” by Lotta Sanchez and John P. Looper, details how a smaller academic library dealt with the disappearance of the USB receivers on the wireless keyboards and mice around the library (Sanchez 2019). For such a practical problem the advance of the technology is still present, as the solution is to use a 3D printer to create port covers for enclosing the receivers. The efforts to bridge language divides is also still an issue, but now the computer itself is part of the solution, as the article “Use of Language-Learning Apps as a Tool for Foreign Language Acquisition by Academic Libraries Employees” by Kathia Ibacache discusses. In 1981, the problem was the computer understanding a different language, now it is about humans using the computer to understand each other.

For 2019, looking at an article in the first issue entitled “Library Services Navigation: Improving the Online User Experience” by Brian Rennick provides a nice bookend to the article from Virginia Tech in 1981. Then, we were at the beginning of the need to create a system for people other than the catalogers and librarians to use, and here we are looking at the more complete use of the computer in all aspects of the visitor’s experience of the library. As in 1981,

the article is still coming from an academic library, this time from the Brigham Young University Library. In the abstract, Mr. Rennick gives a quick overview of his article, stating “While the discoverability of traditional information resources is often the focus of library website design, there is also a need to help users find other services such as equipment, study rooms, and programs. A recent assessment of the Brigham Young University Library website identified nearly two hundred services” (Rennick 2019, 14). He talks about libraries offering diverse services, and the effort to make those services easy to find by means of computer search. Here, we have come full circle from the early days of the technology change. No longer is the primary problem getting the basic bibliographic information into a digital format to take the place of the physical card catalog, but we now are trying to integrate the digital back into the library for multiple purposes. The challenge today is to figure out how the library fits into the digital world, rather than the digital fitting into the library. Another aspect of this article is other information sources, such as Google, creating a visitor’s expectations for web search. As the internet has become part of everyday life, and businesses compete with libraries to offer information, the use of search engines and other interfaces (apps, stores, games, and many others) create challenges for the library to both conform and stand out. The author of the article discusses the struggles to create a website that allows the user to follow their own most comfortable search format, such as using search boxes (Rennick 2019, 15). Looking at different studies, the article talks about both the upkeep and organization of the various pages on a library website, often citing the problem of a wide variety of audiences, such as faculty, undergraduate on-campus students, graduate students and online students. All of these various needs have to be taken into account when designing web access points for services at a library (Rennick 2019, 16).

The editorial of issue No1 sums up some of these points about the user experience. Kevin Ford writes in “Who Will Use This and Why? User Stories and Use Cases” that whenever a developer looks at a program, they should always ask themselves who will be using the program and why do they want to use it before going very far in the development process. He discusses the fact that often one is upgrading an existing system, and that asking these questions will keep designers from putting in features that don’t address a need of the end user (Ford 2019, 6). These concerns are slightly different from the early years, when the systems were brand new, but it is still possible to see the connection to the editorial of “Tails Wagging Dogs” from 1981. Then the

concern was not being careful in the first push to incorporate computers into cataloging, resulting in early wasted effort and future redesign. Today a library's problem is creating wasted effort for the patron, who then might turn to other sources to achieve the goal of information retrieval.

One of the elements to the evolution of the digital revolution chronicled in *ITAL* is illustrated in a terminology change found in all the articles. That change is in the word used for the outside visitor to libraries. In the early years of the publication, the visitor is the patron, and the user is the library staff members who are expected to use the computers for catalog search. As the use of computers shifts to the patron, the term 'user' shifts also. By the 2010s, the word 'user' routinely refers to the library's visitor. A look at the definition of both words in the Oxford English Dictionary tell us a lot about the changes seen in the journal articles throughout its 50-year history:

Patron- A person who supports or frequents a business or other institution; a customer of a shop, restaurant, theatre, etc. (OED Online 2020)

User-- A person who has or makes use of a thing, esp. regularly; a person who employs or practices something (OED Online 2020)

The definition of each shows the change in conception for what a library does, and how it functions. The editorial entitled "Video Technologies: Neologism or Library Trend?" by Thomas Harnish in 1981 issue No2 uses the word patron exclusively. By 2019, most of the articles are talking about the 'user' of the library. This is a subtle difference, but an important one. Both names indicate a person who comes to the library for information, but being a 'patron' means showing support, while the 'user' is one who makes use of it. Both are there, both find it important, but I would argue there is a big difference in how the institution views that person. The patron reaches out to the library, but the library reaches out to the user.

The *Information Technologies and Libraries*, and its earlier form *Journal of Library Automation*, show not only new digital technologies that are introduced to the library field, but also continues to ask the question of how that technology will change the profession, and tries to look at the needs of the future. We are still at the beginning of the digital age. When the printing press was invented in the 1450s, the explosion of books in print caused a rapid lowering of cost for the middle class in Europe (Roser 2013). However, the change in library design that came to dominate the western world would not appear until circa 1600 with the revolutionary new design of the University of Leiden Library that took advantage of the changes over the previous 150

years (Cameron 2006). Today, we are 50 years into the explosive change to information retrieval and access. The articles found in JLA and ITAL reflect that change and evolution from technical concerns of storage behind the scenes, to the front-facing concerns of the patron/user access to that information. It may take another century to fully see the shape of where this revolution will go. Perhaps the best way to sum up this future is found in the concluding sentences in the editorial by Mr. Harnish in 1981, that are just as true in 2020:

“What are the implications of this technical evolution and internal/external factors? One thing is sure: it’s a massive industry growing at a very rapid rate, and it is going to grow even faster...

Readers and contributors of JOLA are the people that can either have an integral part in defining the future direction of libraries, or passively watch patron needs outstrip services. Library schools and people involved in library-related research must play a key role in assessing the value of video technologies and defining how to integrate them into the business and service of libraries. What is going to preserve and enhance the role of libraries in the 1980s will not only be flexibility but another critical element – foresight dedicated to patron needs.” (Harnish 1981, 76-77)

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