

Case Studies

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Editor's note: What was previously the Commentaries and Case Studies department has been divided into two separate departments in order to emphasize and clarify the unique value of each. The Case Studies department provides a forum for analytical reports on projects or activities in specific settings that offer the basis for emulation and comparison in other settings. Although case studies are frequently briefer than research articles, the distinction relates more fundamentally to the nature and presentation of the topic. Submissions and inquiries should be sent to Susan E. Davis, 6606 Carlsbad Drive, Madison, Wisconsin 53705.

MicroMARC:amc: A Case Study in the Development of an Automated System

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Abstract: The MicroMARC:amc microcomputer system, developed at Michigan State University, was the first system to utilize successfully the MARC Archives and Manuscripts Control (AMC) format in a microcomputer environment. The system's developer describes the process by which the system was created, discusses concepts and factors that shaped it, and assesses the results of the project and the reasons for its success.

About the author: Frederick L. Honhart is the director of the University Archives and Historical Collections at Michigan State University, East Lansing, Michigan. In recognition of his work on the development of MicroMARC:amc, he received the Society of American Archivists' 1988 C.F.W. Coker Award, which is given for meritorious work that advances the practice of archival description. The author would like to acknowledge the assistance of Kathy Hudson, California State Archives; Anders Johanson, Michigan State University; and Douglas Noverr, Michigan State University, for their support and comments in the writing of this article.

THE MICROCOMPUTER SYSTEM MicroMARC:amc was developed at Michigan State University between 1983 and 1986, funded in part by a grant from the National Historical Publications and Records Commission (NHPRC). It is a stand-alone, microcomputer-based system that utilizes the USMARC Archival and Manuscripts Control (AMC) format. This article discusses the conceptual basis of the system, the challenges encountered in translating concepts into a functional computer system, and an evaluation of the project's success.

In the late 1970s and early 1980s, attendance at sessions on automation and archives at annual meetings of the Society of American Archivists made me aware of the work being done in the area of automated bibliographic systems. Given the work of the National Information Systems Task Force (NISTF)¹ and the work of the Research Libraries Group (RLG) in implementing the AMC format on RLIN (Research Libraries Information Network), the AMC format seemed likely to become one accepted standard for bibliographic description of archival records in a machine-readable format. Thus, the decision was made to use the AMC format. (In 1983 several microcomputer database management systems were in use in archival repositories, and there was no consensus that the AMC format would be accepted by the profession.)

In retrospect, the decision to utilize the USMARC AMC format as the structural basis of the computer system appears very significant. The AMC format has subsequently become the de facto standard for bibliographic description of archival records and manuscripts in a machine-reada-

ble format. The choice of the AMC format as the structure for the MicroMARC:amc record ensured that the records created on the system would not become obsolete and require reformatting at some future date. Also, the MARC formats are structured so that there is no wasted space in the storage of data, as opposed to most off-the-shelf microcomputer database management systems available then and now.

The entry of IBM into the field of personal computers (PCs) gave the PC a place in business and management and made the use of a microcomputer with the USMARC AMC format a technical possibility. Support for this idea was provided by Michigan State University (MSU) through the purchase of a microcomputer for the archives. Also, a University grant proposal was approved in the summer of 1983 that funded my visit to institutions that were using automated systems and the analysis of how automation could be used at the University Archives and Historical Collections.²

Later that summer, a proposal was submitted to the NHPRC to develop a microcomputer-based system for the description and control of archival records utilizing the USMARC AMC format. From the start, the intention was to develop a system that would be useful profession-wide, not just for MSU. Many smaller archival and manuscript repositories needed a stand-alone, online system to provide an economically viable means to use automation and the USMARC AMC format. The grant was intended to provide the basis for creating the initial version of the system, with future support and development coming through sales of the system. It was recognized from the start that to make a useful system there

¹ NISTF was established to develop a means whereby a national database of archival records in an automated system could be created for research. After exploring various options, NISTF decided that creation of a new USMARC format would be the most practical way to accomplish their goal.

² For a more detailed description of this aspect of the project, the role of microcomputers, the USMARC AMC format, and archives, see my article, "The Application of Microcomputer-Based Local Systems with the MARC AMC Format," in *Library Trends* 36 (Winter 1988): 585-593.

had to be financial support for the system's improvements.

NHPRC approved the grant proposal in February 1984. Even though grant funding did not start until May 1984, several events affected the project in the interim. MSU funded a second microcomputer for the archives so that one could be devoted exclusively to the project, with the other as backup. In an April meeting with Nancy Sahli, who would become an unofficial adviser as well as NHPRC's liaison on the project, she provided a draft copy of "MARC for Archives and Manuscripts; The AMC Format." This significantly assisted the project staff's understanding of the format.

The project team, consisting of Anders Johanson, Manager, Applications Programming Office; Alice Kalush, Programmer, Applications Programming Office; Kathy Hudson, Consultant Systems Analyst; and me, met for the first time in May 1984 and developed a general outline of the system's functions. As systems analyst for the Cornell University Libraries, Hudson had participated in the implementation of the AMC format on RLIN. An advisory board was also established and held the first of several meetings with the project team in June 1984.³

The system was to be a comprehensive, database management system for US-MARC AMC records. One design requirement was that the system be able to control archival and manuscript records throughout their life cycle. This is inherent in any combined archives/records management approach and one that was strongly supported by the advisory board. Life cycle record tracking is accomplished through the use of the 541 and 583 fields, which on the

MicroMARC:amc system are displayed as separate screens, i.e., the Process (541) and Action (583) screens. The report module is used to manipulate the data and generate reports for the management of the institution's records. Another design requirement was that it be user friendly, so that it could be used easily by archivists, manuscript curators, and special collections librarians with limited or no computer experience.⁴

The basic format design structure and agenda were also determined in May 1984. The systems analyst would first develop the functional requirements document, which would be reviewed by the project director and the advisory board. Then, based on this document, the MSU Applications Programming staff would write the system design and specifications document. Only after this document had been approved would the actual writing of the system programs be started. Project staff prepared a timetable for the steps in the project, identifying significant steps for review by the Advisory Board.

The functional requirements document was submitted in October 1984 and reviewed, revised, and completed by January 1985. It established basic design parameters for the system. Functional goals identified in the document included automating all manual processes in an integrated fashion on a stand-alone microcomputer, better reference access to the records for both staff and researchers, and the promotion of standardization, looking to the future for data exchange between repositories and within the individual user's community. System design goals were also identified: developing a system that would operate on standard microcomputer operating systems to ensure the ability to transport and upgrade as hardware advances take place; using a

³ The advisory board members were Francis X. Blouin, University of Michigan; Ruth Helmuth, Case Western Reserve University; H. Thomas Hickerson, Cornell University; and Philip M. Mason, Wayne State University.

⁴ For example, the system was menu driven, with menus for all the modules, subsets of the modules, and support programs. Function keys are used for various operations, and a template identifies them.

modular design for flexibility, ease of enhancement, and maintenance; and incorporating a nationally supported record format designed for the coding and exchange of bibliographic information as the database record structure, i.e., the USMARC AMC format.

In April 1985, the system design and specifications document was approved and work begun on system coding. This was several months later than had been projected in the original timetable and twenty months after the initial proposal was submitted to the NHPRC. During this time numerous changes to the original concept were made, as the project team learned more about how to create a functional microcomputer system utilizing the AMC format. As the project proceeded from general goals to specific designs, project personnel obtained a better understanding of system functions and how they were to be performed. Everyone associated with the project voiced opinions on proposed improvements. The input from the advisory committee was particularly useful in this area, one example being their recommendation that records management functions be incorporated in the report module.

One question that the project director faced was how to communicate with the profession about the system. Because this program was being developed in part through funding from the NHPRC, it received publicity even before it had started. A conscious decision was made to keep the profession informed of the project's progress through sessions at the SAA annual meetings, regional organization meetings, and published notices in the professional literature.⁵ The overall results of this communication were beneficial for the project,

and helpful suggestions and criticisms were received. However, the wisdom of developing a project in a glass house was questioned at times. For example, on one occasion a member of the audience at an SAA program questioned the propriety of using the MSU programming staff as opposed to that of another university! At a later SAA meeting, another software developer challenged the need for such a system.

In order to use the system, project staff began converting the bibliographic descriptions of MSU holdings to AMC format. This conversion involved more time and resources than had been originally allocated, partly because of the time it took for staff members to become familiar with the AMC format. (This was before the SAA presented its workshops on the AMC format, which would have been of considerable assistance.) Another contributing factor was the realization that many of the collections and archival records were not described as well or as completely as they should have been. Some of the finding aids were over thirty years old. Rather than use incomplete or inaccurate finding aids, staff members often significantly revised or completely rewrote descriptions before entering the records into the test database.

During the early months of testing, a bug was found in almost every version. At times there seemed to be an unstated challenge to find the latest bug in whatever version of a module was being tested. Also, as staff members actually worked with the system, changes, enhancements, and new features were continually discussed and often incorporated. Function keys for basic data entry functions (e.g., "go to the end of the line," "line delete," "next screen") were added for data entry. The inevitable result of such an approach was that production of the system took longer than originally anticipated. Both the issues of time and money had to be considered whenever a change to the system was contemplated.

⁵ "Archives and Historians—The Experience of the Michigan State University Archives and Historical Collections," *OAH Newsletter* 14 (February 1986); "MSU Reports on Computer Project," *SAA Newsletter*, March 1986.

By the beginning of 1986, system development was far enough along that serious consideration was given to the writing of a user's manual. The success or failure of a computer system may depend as much on its documentation as on the actual programs. A diverse body of potential users, who would range from computer neophytes to experienced users of computers and the USMARC AMC format, had been projected. Applications Programming staff recommended Patricia Hummer, who had a Ph.D. in history and strong writing skills, and who wanted to explore the area of writing software documentation. Throughout the next six months, she worked closely with Applications Programming and archives staff to write a readable, easily understood user's manual for the microcomputer system.

When the initial grant proposal was written, it was thought that the archives represented by the advisory board members would be the Beta test sites. In Beta testing, the newly written and debugged software is sent to another site for further testing and evaluation. Because the MicroMARC:amc system uses a modular design, it was possible to send it to the Beta testers in a piecemeal fashion. Several factors necessitated a change in this aspect of the project. Only two of the four institutions represented had the required microcomputer equipment available to test the system. Additional test sites also were needed in order to provide as broad a base as possible from which to receive feedback on the system and to include individuals/institutions that previously had not had any experience with the microcomputer system. Ultimately, four additional Beta sites were chosen that had expressed considerable interest in the project and that had the necessary equipment, personnel, and database to conduct a meaningful test of the system.⁶ While

the responses were uneven, due to the variety of experience with automated systems and the time they were able to devote to the project, the six Beta testers provided useful information and criticism. Many of their suggestions were subsequently incorporated into the system and the documentation. One recommendation resulted in the development of a demonstration/tutorial program that users could operate on their computers.

By this time, early 1986, a reassessment of the project seemed necessary. The system obviously could not be completed by the spring of 1986, as originally planned. The NHPRC grant, including an additional 10 percent supplemental appropriation, would be insufficient to fund the completion of the system. It was decided to release the initial version of the system without the MARCIO module (see below), which would be released at a later date. The SAA meeting at the end of August 1986 became the target date for having the initial version of the system completed and available for demonstration.

The cost of the system was a decision on which considerable time and effort was spent. The price was based on a market survey conducted by graduate students in the MSU Marketing Department and based on an assessment of the minimum price necessary to support and enhance the system in the future. As an incentive, the system was sold at a lower introductory price. After the SAA meeting, the system was sold at full price. The pricing and the system's availability for purchase were announced in late spring 1986, even though the system would not be ready for distribution until late summer.

The last module in the development of the system was to be the MARCIO module,

⁶ Georgetown University, the Indiana Historical Society, the National Agricultural Library, and the Uni-

versity of Louisville were the additional Beta test sites. The original test sites were the University of Michigan and Case Western Reserve University.

which exports and/or imports USMARC AMC records, but grant funds were insufficient for its development. One option was to create as quickly as possible, and at the lowest cost possible, a module with the minimum number of functions. A second option was to take more time to create a comprehensive and multi-faceted MARC-CIO module. Partly because of the positive response received during the summer and at the 1986 SAA meeting, project staff decided to take the additional time required to develop a full MARC-CIO module, which was completed in mid-March 1987 and was included with the other modules in the system. All those who purchased the system prior to this time received it as part of their original purchase. This completed the development of the initial version of the microcomputer-based, local system utilizing the USMARC AMC format.

With the release of the MARC-CIO module, the system was considered a success for several reasons. All the goals outlined in the grant proposal to the NHPRC had been met and in most cases exceeded. A functional, microcomputer-based, online system utilizing the USMARC AMC format for bibliographic records, with extensive management and control functions, had been developed. To date, more than sixty institutions have purchased the system. They include college and university archives; religious archives; state, county, and city archives; historical societies; foundations; and business archives. Funds realized through sale of the system are used for continual development and updating of the system. Version 2.0 of the system was released in early summer 1988. Version 2.0 incorporates major improvements in the system: it adds the ability to search on any part of the record and to search on either the first or all words in a word string; it can convert MicroMARC:amc records to ASCII format;⁷ it decreases the time previously re-

quired to generate auxiliary indexes for searching; and it makes the system easier to use.

The success of the project can be attributed to many factors. The most critical were the people who developed the system. Obviously, having intelligent, hard-working, committed individuals is a basic requirement for a project of this nature, but is alone no guarantee for success. A project of this type requires a team effort; everybody must be able to work together and communicate effectively about their activities and the problems to be overcome. In retrospect, it seems that a certain naivete regarding the challenges and requirements of designing such a system was an advantage. It allowed project staff to believe that such a system could be developed, when many other knowledgeable individuals were understandably skeptical. The expertise, ability to listen and communicate, and above all the commitment to the project of the MSU Applications Programming Division, in particular Anders Johanson and Alice Kalush, were/are essential to the system. Because of her experience with the development of other automated systems projects and with the RLIN AMC Project, systems analyst Kathy Hudson knew in advance the difficulties facing the project. Fortunately, she still accepted the position and used her expertise and previous experience to excellent advantage.

One lesson demonstrated in a research and development project such as this is the need for flexibility. As the project moved from concept through proposal, design team, functional requirements document, system design and specifications document, computer programs, and Alpha and Beta testing documentation, numerous changes in the original concept were made. Even rela-

Interchange) codes are the internal codes used to represent characters, special symbols, and codes used by computers.

⁷ ASCII (American Standard Code for Information

tively minor modifications meant more work and more time, but they were made with the expectation of a better automated system. The quality of the system was always the first priority. If it meant delays in the schedule, or additional costs not initially included in the budget, they were accepted as challenges to be met.

To date, the project has realized several major accomplishments. It has moved from a theoretical concept to become the first system to put USMARC AMC format records on a microcomputer, despite a complicated record format and a small micro configuration. The project also produced a number of multifunctional programs that make up the system. The MicroMARC:amc system is a comprehensive database management system that provides almost unlimited access to the information in the record in a variety of ways. The search program provides fast access, and the information available through the report program is normally limited only by the user's imagination. With the ability to convert MicroMARC:amc records into ASCII for-

mat, such records can now be interfaced with other microcomputer systems that accept ASCII records, i.e., almost all word processing software and many database management systems.

To summarize, the MicroMARC:amc project has consisted of three phases. The first was the development of the concept and internal institutional support. The second involved the receipt of funding from the NHPRC and the creation of MicroMARC:amc. Work on the project has now entered its third phase: the support and enhancement of the system, so that it will continue to be an efficient and cost-effective tool for archivists to automate the description and control of holdings. From the project's inception, staff members kept in mind the small repository that can afford only basic microcomputer hardware on which to operate a local system for the description and control of archival records. Assisting these archivists, along with the many other goals enumerated above, has been accomplished with the development of MicroMARC:amc.