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## ABSTRACT

Four speakers presented their points of view on library networks and automated systems at the April 1, 1970 meeting of the Catholic Library Association's College and University Libraries section. Carlos Cuadra gave the keynote address "Library Automation and Networks" which stresses the potential application of automated information systems to library networks. Henriette Avram discussed the MARC Project in her talk, "The National Scene." The New England Library Information Network (NELINET) was the topic of two speakers: Sam Goldstein's "NELINET -- A Regional Network as Seen by the Project Director" and "NELINET -- A Regional Network as Seen by a Participant" by Donald E. Vincent. Robert S. Taylor considered library networks from "The College Point of View." A brief discussion session among the participants is included. (SJ)

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# Network Concepts

FOUR POINTS OF VIEW

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NETWORK CONCEPTS -- FOUR POINTS OF VIEW

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## INTRODUCTION

Two key and closely related developments in contemporary librarianship are library networks and automated systems, developments which often seem to librarians to be always on the verge of major breakthrough but which at any given moment are more in the realm of the possible than the real. Yet little by little, progress does take place, and the state of the art is advanced to a recognizable plateau at which a review should be made. And so the College and University Library Section of the Catholic Library Association, Robert J. Haertle presiding, presented at its April 1, 1970 meeting a program entitled: Network Concepts -- Four Points of View.

This program, as designed and arranged by Mr. Haertle and the Planning and Program Development Committee, co-chaired by Eugene P. Kennedy and Lloyd F. Wagner, belied any suspicion caused by either the date or the severe weather. It was at once informative and lively, timely and vital, so much so that at the end of the meeting a consensus of those present indicated the appropriateness of publishing the talks as proceedings of this section meeting. The talks are printed herein much as they were delivered, not as formal papers, but rather as more or less extemporaneous presentations to an audience of librarians unequally versed in the concepts and terminology of networks and automation. Consequently these talks were, and are, less technical than might have been the case had the audience been composed solely of specialists. The very lack of technical reference and the overall spontaneity of the speeches produced an enthusiastic response in the audience, all of whom were interested in realistic approaches to the topic.

The keynote address, given by Dr. Carlos Cuadra, focuses on automation stressing particularly the potential application of automated information systems to library networks. He considers the present stage of library automation to be the threshold of breakthroughs which will result in reduced costs, increased productivity, and improved service. That networks will be the basis for such developments is beyond question since libraries will not be able to go it alone although there are, then, significant problems of communication. Dr. Cuadra introduces the option of the library utility, a large computer facility servicing a grouping of libraries. Finally he notes a number of obstacles to successful library network operations and reiterates a common theme: most problems can be overcome provided that library personnel develop receptive attitudes and are properly trained in these highly technical areas.

Then, following Dr. Richard De Gennaro's brief introductory statement and description of the characteristics of a network, four panelists present four points of view: Mrs. Henriette Avram, "The National Scene"; Mr. Sam Goldstein, "NELINET -- A Regional Network As Seen By the Project Director"; Mr. Donald Vincent, "NELINET -- A Regional Network As Seen By a Participant"; Mr. Robert Taylor, "The College Point of View." Mrs. Avram of the Library of Congress has been the director of both MARC and RECON projects and discusses both with that intimacy of detail only she commands. (In his introduction of Henriette Avram, Dr. De Gennaro finally explained the MARC acronym: Mrs. Avram's Remarkable Catalog.) Sam Goldstein, speaking as a MARC customer, finds MARC to be useful as a data base but costly, and so he stresses in no uncertain terms the need for cooperation by even the largest and wealthiest libraries. His

description of NELINET, an operating network of the main campus libraries of the six New England state universities, is continued by Donald Vincent of New Hampshire representing one of the participatory institutions who notes some of the difficulties encountered and gains realized in network cataloging. And finally, Robert Taylor, of the new Hampshire College in Amherst, Massachusetts describes the college library, or really any library, in terms of being a switching center; in doing so, <sup>he</sup> broadens our horizons intra- as well as inter-institutionally.

Considerable discussion ensued between talks and afterwards; some of the questions and answers are included here. No bibliography is appended; however, in the September 1969 ALA Bulletin (pp. 1117-1134) is the excellent "Bibliography of Library Automation," an ERIC/CLIS Bibliography, Series Number 2, compiled by Charlene Mason. The Mason bibliography is an up-dating of the June 1967 ALA Bulletin bibliography compiled by Lois C. McCune and Stephen R. Salmon (pp. 674-694).

Special thanks are due Lloyd F. Wagner, Director of Libraries of the Catholic University of America, who was responsible for obtaining a transcript of the tape recording of the meeting and who handled the extensive correspondence with the panelists. In editing these talks I have attempted to retain as much of the original wording as possible; however, any errors or obscurities in the text may safely be attributed to the editor, not to the panelists whose presentations were consistently clear and intelligible.

Richard A. Matzek

October 14, 1970

KEYNOTE: LIBRARY AUTOMATION AND NETWORKS.

Carlos A. Cuadra.

Later this afternoon you will be hearing from a number of very talented people who are actively working on automation projects connected with individual libraries or groups of libraries. They will be speaking from an intimate knowledge of those efforts. What I would like to do is provide something in the way of context for the later discussions by commenting on what I consider to be the present status of library automation with particular attention to library networks and any likely alternatives to networks.

The notion of networks is a fairly new one in the library field although the notion of cooperation is obviously very, very old. I think that it is the combination of cooperation plus the use of technology that has given rise to the interest in networks. This morning at breakfast a group of us were trying to tally all of the library networks that we knew to be functioning. We came up with a total of zero, which does not mean that nothing is happening but just that there are not many networks that have progressed to the point where they are actually doing a significant job for the participating libraries. One reason for looking at the status of automation in individual libraries is that these libraries are the foundations -- the starting points -- for networks. Each individual library is a node in the network so we have to look at what is happening in individual library automation to see how far we can move toward networks.



Where does library automation stand today? About a year ago in the Wilson Library Bulletin, several distinguished observers of the library scene gave some fantastically different appraisals of an article that was intended to be a fairly straightforward report on the status and prospects of library automation. The reason for the differences in point of view had to do, I think, with the different frames of reference of the various reviewers. To some of these reviewers we were several light years beyond the primitive punch card systems of the 1930's, and to other reviewers, looking at the fact that fewer than five percent of the libraries were making any significant use of data processing and that most of them were doing it largely under their own roof with no particular reference to other libraries, we were still light years away from any kind of significant success. I do not really know where we ought to be at this stage in history, but I think I can comment a little on where we stand today by looking at what has been happening in the last several years.

A couple of weeks ago some of my staff members and I were reviewing past copies of the chapters on library automation in the Annual Review of Information Science and Technology, and we asked ourselves: What is new? What has happened since 1966? Have there really been any breakthroughs or is it just more of the same? I think that, for the most part, the answer is that the progress has represented more of the same. This situation is not necessarily bad because there were a number of important activities underway in 1965, 1966 and 1967 which are now beginning to bear fruit; for example, the MARC Project on which I will be commenting later. There are also a few developments that may approach breakthrough status; they have to do largely with technology rather than with library operations per se.

I will comment on those developments in a moment as well. I think the most important progress that can be noted is the noticeable change in attitude regarding the difficulties of library automation. If I may employ a personal example, five years ago I was not able to interest my company in library automation. At that time the interesting glamor problem was information retrieval. It was thought that information retrieval was going to save the world, with library automation generally regarded as a rather mundane and trivial problem. I think there has been quite a change now; library automation is recognized as very important and as an intellectual challenge. Librarians and computer people alike seem much more aware of the substantial amount of time and effort required between the original desire to automate and the achievement of some system that can really accomplish something. Now, the easiest way to express what I think are the main elements of progress is to talk in terms of (1) the activities of individual libraries, (2) the activities of the Federal Government, (3) the activities of industry, and (4) the activities of some other elements in the information economy.

ACTIVITIES OF INDIVIDUAL LIBRARIES. With respect to the activities of individual libraries, what we have seen over the past three years is that more and more libraries are beginning to get their feet wet in computer technology. Just about two months ago the LARC Association published an inventory, admittedly incomplete, of libraries engaged in some sort of automation activity. There are seventy-one pages with four to six libraries per page; among these are libraries which were not visible in the automation effort several years ago. We also see new kinds of services and new kinds of library operations being tried as well as more libraries trying to do some of these things

in some form of cooperation with other libraries. There is also evidence that a broader range of libraries is beginning to become active in automation work. For example, we are beginning to see more school libraries in this area. In 1965 no school libraries were known to be seriously working toward automation and now a number of them are.

In addition to these quantitative differences between the present scene and that of three or four years ago, there are some qualitative differences. There seem to be fewer blind alleys and fewer obvious failures than we were having a few years ago. I think this improvement attests to the fact that library automators have been reporting on their experiences, both good and bad, and, by doing so, have been helping other libraries to steer a straighter course to the successful use of technology. We are not at the stage that we reached in information retrieval systems several years ago when the subjects of cost effectiveness and evaluation became very important. That stage usually comes after the one that we are in right now, the stage of simply trying to make computer-based library systems work at all.

To put it in a slightly different way, there is a lot of learning going on and it is beginning to pay off. One of the things that I think has been learned is that both the amount of library materials and the cost of processing them are increasing more rapidly than the ability of most libraries to pay the bills. I read the other day that, whereas the cost of education in general is rising about seven percent each year, the cost of library operations is rising about eighteen percent. Another article I read, by Fred Kilgore, indicated that the library cost per student is rising twice as fast as the general economy. I think it is perfectly clear that unless libraries develop

or make use of more efficient techniques, and this strengthening includes active cooperation with other libraries in designing and operating systems, many libraries will face a serious deterioration in their collections, their services, or both. I think it is also evident that at any given point in time there is a finite amount of human and monetary resources in our society available for library operations. The cost for people has been rising much faster than the cost for machinery, but the productivity of people working in libraries has hardly increased at all, in contrast with the increased employee productivity in other industries such as the automobile industry. Right now, productivity in libraries is almost a linear function of the number of employees. Therefore, more staff and more supervisors will be needed to control the ever-growing intake of publications and the growing demands for library service. I think it is clear, in 1970, that there is no longer any question about whether we should use technology or whether we should cooperate. The only questions are when and how these things ought to be done.

ACTIVITIES OF THE FEDERAL GOVERNMENT. Let me turn now to the activities of the Federal Government related to networks. As I am sure most of you know, the Federal Government has taken a very active role in helping the libraries to help themselves. The MARC Project is one of whose existence probably no one here is unaware or unaware of the impact it will eventually have on library operations. I regret that I have to use the word "eventually," but it is appropriate because, at this point in time, not more than one library in a hundred, or perhaps not more than one in five hundred or a thousand, is prepared to make effective use of the MARC records, even if the MARC file were

much larger and even if the cataloging were done in a more rapid fashion than at present. I will come back to those two aspects of MARC in a moment. However, it seems to me that, eventually, simple economic pressure will force a reduction in cataloging in individual libraries around the country, and MARC will be the key to that reduction. The two other national libraries have also been contributing to progress in library automation, not only through their own research and development efforts but also through their effects on other elements of the library community. The bio-medical communications network being planned and partially implemented by the National Library of Medicine is interesting because it reflects a conception of the library not as a passive repository for materials but as an aggressive educational force and as a hub for a vast information network. Four weeks from now NLM will initiate an experiment in which dozens or perhaps scores of medical information facilities throughout the United States will be able to search a file of about 150,000 MEDLARS document citations for about four hours a day using an interactive terminal. Many medical librarians and information specialists will be getting their first hands-on exposure to the kind of instantaneous computer support that is possible in reference work. Other government agencies are doing their bit for library automation and library networks in different ways. For example, the U.S. Office of Education has funded a study by the American Library Association of library information networks. This study will culminate in a special week-long working conference this coming September to analyze and discuss every aspect of network-planning development. Just a month ago U.S.O.E. funded another study related to library networks. This one involves the identification of all

U.S. libraries which are involved in a consortium of institutions of higher education. The objective of the study, which will take about a year and a half to complete, is to develop some empirically based guidelines for the planning, development, and operation of academic library consortia. These are only two of probably several network oriented projects that U.S.O.E. will be funding this year.

THE ACTIVITIES OF INDUSTRY. I would like to comment now on the activities of industry and how they relate to library network operations. The primary contribution of industry to library automation and network development has been to make available the necessary tools for this work. During the past three years we have seen some important progress in technology related to libraries. One aspect of progress is not very spectacular but is very important: the continued decline in the cost of computer support and the continued increase in the memory capacity of computers. Parenthetically, librarians have been beaten about the head and shoulders for years and years for being backward, for not learning about computers, for not taking to automation, and so on. I personally think that this accusation is rather unreasonable because the cost of library automation has really been very high. One needs to have a system design staff; one needs to have a programming staff; and one needs to have access to a computer that one can depend on using, one which one's administration is not going to replace. So it has been an almost perfectly rational and sane response for most libraries to avoid getting involved with automation. But the main point I would like to make is that the costs for computer support continue to go down. They have been going down every year for the past 15 years. Processes that used to cost a dollar 15 years ago and a quarter two or three years ago now cost a penny or

a tenth of a penny. That reduction is an important contribution to the development of individual library efforts and automation, and it will certainly continue.

Somewhat more spectacular than this declining cost in computer support are the scores of new terminals from which one can interact with the computer. For example, just since 1965, the number of terminals has increased tenfold. In the price range under \$25,000 there are some 79 display terminals made by 51 manufacturers, and more of these models are announced every month. The number 79 does not even include the simple terminals that only print, such as the teletypewriter. Some of the terminals are very expensive; others are quite reasonable. One can be purchased outright for as little as five hundred dollars. Another can be leased for 35 dollars a month and it includes a cathode ray tube display.

These kinds of developments are very significant for library networks because most of the networks that I think we will see in the next couple of years will be operating with a large central computer that supports library work in each of the participating libraries; the mode of access will be through some sort of terminal. We will probably see certain files, such as the MARC file, held in common, that is, in one location, and each library will search it as it needs to.

One fly in the ointment of library networks and, in fact, of any use of computers from remote locations has been and still is the high cost of communications.. If one wants to access a computer from across the country, it will generally cost anywhere from 50 cents to a dollar a minute. In some instances the communications cost has been greater than the computer cost. There have been some important changes here recently that will have an important impact on library networks.

A number of companies interested in providing microwave transmission service on a nationwide basis have goaded A.T.&T. into accelerating its plans for more extensive support to data transmission as opposed to voice transmission. Some simple devices are now being produced by A.T.&T. which provide for almost instantaneous hookup to a computer instead of the present 10 to 13 seconds that it takes to dial and reach a connection. In some areas of the country the minimum length call has dropped under three minutes to as low as six seconds. This reduction is a boon to organizations that need to send information from one computer to another across the country and that have previously had to pay for the full three minutes each time, even though their transmission was very short. The six-second minimum will not really help library networks very much for a while because libraries will typically be transmitting more voluminous messages than business organizations do. However, I think the steps now being taken in the communications industries, both by the microwave people and by the common carriers in response to the pressure, are going to drive down the cost of communications and improve the quality of the service. These steps will thus support one important part of the networks.

Even with better communications and computers, there remain some problems. The remote use of computers from outside a local dialing area is notoriously unreliable. I doubt if many of you have had the opportunity or requirement to demonstrate a computer system to an audience. To have the system completely fail is a very embarrassing experience. We had a recent demonstration in New York in which we had three failures within the space of one hour. As it turned out, it was not the computer: it was the communications system,



specifically, one node in the communications system consisting of the operator in the hotel. We were demonstrating a library support system that my company developed, and we were connected to the computer in California. We were moving along very well when, all of a sudden, in the middle of searching the MARC file, our system stopped. Sure enough, the hotel operator had pulled the plug from the switchboard and disconnected us from the computer. The person who was running the demonstration called her and asked her to reconnect. He also cautioned her: "Don't be concerned if you don't hear a voice because there is no one on the other end; it's a computer. It doesn't talk; it just makes a very quiet sound." The operator reconnected and we resumed the demonstration. Two minutes later it happened again. The operator would check the line and, hearing no voices, would pull the plug and disconnect us. I guess that this situation is rather ridiculous, but it does illustrate the fact that there are problems other than those involving sheer technology, problems that have to be overcome in the development of networks. I doubt if many of the networks that are presently being planned in Ohio, New England and elsewhere are going to work properly the first time around. We are going to make a lot of mistakes and the sooner we start to develop and try out these networks, the sooner we are going to learn from the mistakes we make; that is one reason why some of the work that you are going to be hearing about this afternoon is really so important.

OTHER ACTIVITIES. I mentioned earlier that perhaps there were some developments that could be considered breakthroughs rather than just more of the same. If there have been any such things in the past three years, I think that my choice would be the marriage of computer and microfilm technology. I am not talking here just about microfiche

devices which hold microfiche and are controlled and accessed through the computer, although these devices are very important and there are a number of them on the market. What I am talking about is the direct output from computers onto microfilm and the direct input from microfilm into computers. The first of these processes is called COM which stands for Computer Output to Microfilm. What it does is to permit the computer user to skip the steps of printing computer output on paper and then filming the paper to get the microfilm. With COM, one can go directly from digital computer data to microfilm. With the right equipment one can achieve high graphic arts quality at very little cost. A survey by the National Microfilm Association showed that there were about three hundred of these COM units in use at the end of 1968. Their prediction is that, within a few years, the number will grow to about 30 or 40 thousand.

As interesting as COM is, there is a related development that I think is even more interesting: computer input from microfilm, which is usually abbreviated CIM. Essentially it is the mirror image of the COM process. How does one get a citation, an abstract, an LC card, or full text into a computer? That problem has been one of the biggest in library automation because of the very high cost of converting the existing file. The way it used to be done was by key-punching everything that had to be put into the computer. This process is long, slow, laborious, and error-prone. Nowadays, if you are smart, you do not key-punch it; you type it and have it converted into computer-readable form by an optical scanning service bureau that is set up to do this sort of thing. The beauty of computer input to microfilm is

that one does not need to do any new keyboarding. One simply provides the typed or typeset material, and the CIM service bureau microfilms it and then has its machines read the microfilm. The reason why this method can work better than ordinary scanning of pages is that it is easier for the machine to move and scan small pieces of microfilm than it is to handle large pieces of paper. Also, the density and contrast of the microfilm are more controllable than that of the paper copy.. Thus, for a variety of reasons, one can now read both printed and typed material directly into machine-readable form without key-punching and without having to retype. This development will be a boon for library automation.

So far I have been talking primarily about the hardware contributions of industry to library automation and to library networks. There have also been some important, if unspectacular, contributions in computer programming for libraries. For several years it has been possible for various customers to buy programs for data management and for information retrieval. But there has not been much in the way of programs designed specifically for libraries. Now it is possible to purchase or lease programs for acquisitions, for circulation control, or for producing book catalogs. Such programs do not work on many different computers yet, but in the next few years I think we will see many more off-the-shelf, ready-made computer programs for sale. And, like the decision to participate in consortia and networks, the decision to buy ready-made programs will help to cut down the high cost of automation.

One other non-hardware development is worth mentioning, the emergence of the concept of the library service bureau which functions much like a utility. This concept differs from the network or consortium

concept in that it does not involve the notion of cooperation. Up until the present time, libraries with any interest in automation had only three basic choices. The first choice, which most libraries have elected, was simply to forget it. The second choice was to go it alone; only those libraries that were wealthy or had a government grant or the equivalent chose this route. The third alternative, which we see represented by NELINET, the Ohio College Library Center effort, and others, is to join with other libraries in a cooperative venture to share the cost, not only for equipment, but also for designing, developing, and operating the system.

The utility idea is essentially a fourth choice, and that choice is only now beginning to be tested. I mentioned earlier that the MARC Project was in some respects disappointing at the present stage of development. The reason for saying that is that last month my company completed an experiment to test a computer-based library utility concept which we had developed. A number of Southern California libraries took part in testing the system and the service: two junior colleges, two universities, two public libraries, and a special library. One aspect of the service was to permit the libraries to search the complete MARC file and to place book orders which would then be generated by the computer and sent directly to the vendors. The libraries found that, even though the MARC file available to them at the end of the experiment had about 32,000 bibliographic entries, the period of coverage was too limited to be of great use to them for book ordering. Of course, this problem will be corrected when LC completes Project RECON, the retrospective conversion of the catalog. But another thing that we discovered in our study was that the libraries had already seen most of the items on the MARC tape in Publishers'

Weekly or some other source. In some cases, they had ordered them long before they encountered the catalog record in the MARC file. So, even if the libraries had access to a computer support utility, they might not make effective use of MARC unless the cataloging at LC became faster or unless the libraries could restrain their book ordering behavior until the items appeared on the MARC tapes.

UNSOLVED PROBLEMS AND CHALLENGES. It probably would not be fitting to complete any kind of progress review on library automation without commenting on a few significant lacks of progress. Library automation activity is still very much a unique enterprise in each institution. Libraries seem to continue to apply automation in much the same way that they apply conventional library methodology. Except for the MARC Project, there is very little evidence that libraries are ready to consider, in a serious way, setting standards that can be applied uniformly anywhere in the nation for the tasks of library automation. The National Advisory Commission on Libraries finished its work and its report nearly two years ago. To date, I have not detected any sign that its recommendations have even been noticed, much less heeded, by either the Johnson or Nixon administrations. We still do not have anything resembling a mechanism for national guidance or assistance on library development, and I suspect that in spite of the good intentions of the important new network projects of U.S.O.E., there will be a good deal of money wasted in the next few years through uncoordinated network development, through lack of attention to standards for information exchange, and through unnecessary duplication of activities.

A few years back I was involved in some consulting work for a junior college library. They were interested in recommendations for automation. My chief recommendation had nothing to do with automation

or computers. It was that they institute a staff training program involving perhaps no more than a little reading and staff discussion each week to begin developing their own capabilities to make their own decisions about library automation. I pointed out that, if they did not do this developmental work, they would forever be at the mercy of consultants, including consultants like me, who for all they knew might be telling them absolute nonsense. I think this advice was pretty good and I hope they have followed it.

Gene Kennedy alerted you to a prejudice that I have about library training and the importance of preparation of individual librarians to undertake automation activities. I am personally convinced that the hardest problem about networks is not computers, nor microfilm, nor communications; it is not jurisdiction or political problems in cooperation; it is not even standards, though these all are very important, even crucial. I think that the most serious problem is the lack of training and preparation of people so that they can contribute to progress in the individual libraries which will be the nodes of networks. I think our most urgent need is for some sort of national, concerted effort to upgrade the capability of individual libraries and librarians to help define and develop the networks of which they will eventually be a part.

FOUR VIEWPOINTSIntroduction.

Richard De Gennaro.

My role this afternoon is merely to introduce the subject, the board of distinguished panelists which we have here today, and to maintain general law and order during the brief question period. The subject of this afternoon's session is library networks, and the title is "Network Concepts -- Four Points of View." This title gives me a perfect entrée into a story I can tell.

Points of view can make a great difference, as is dramatically illustrated by this excerpt I am about to read from a review of Lady Chatterly's Lover which appeared in Field and Stream magazine awhile ago. It says, and I quote, "This fictional account of the day-to-day life of an English game-keeper is of considerable interest to outdoor-minded readers as it contains many passages on pheasant grazing, on the apprehending of poachers, on ways to control vermin, and other chores and duties of the professional game-keeper. Unfortunately, one is obliged to wade through many pages of extraneous material in order to discover and savor those sidelights on the management of a Midland shooting estate. This book cannot, however, take the place of J.J. Miller's Practical Game-Keeping." So, you see, point of view does make a difference, and we have four of them this afternoon. And from the looks of the four panelists and from their credentials it is clear that our specific point of view will be on networks based on the new technology, that is, on computers and perhaps graphic display techniques, teletype hook-ups and facsimile transmission. We might also get into other aspects of networks, but I think that is the primary point of view from which we will approach our topic.

Let me say a few words of introduction to the subject. Joe Becker, who is President of EDUCOM and one of the earliest and most tireless promoters of the concept of information networks based on new computer and communication technology, has described the four major characteristics of the automated network as follows. The first characteristic is formal organization in which many units sharing a common information purpose recognize the value of group affiliation and decide to enter into a compact. NELINET, which will be discussed extensively this afternoon, is this kind of organization. The second facet is communications, since any network includes circuits that can rapidly interconnect dispersed points. The third is bi-directional operation by which information may move in either direction with provision made for each network participant to send as well as receive. And the fourth and last characteristic is a directory and searching capability. A directory hook-up system enables a participant to identify the unit most able to satisfy a particular request. A switching center then routes<sup>p</sup><sub>K</sub> messages to this unit over the optimum communication path.

That, then, is a brief description of the basic characteristics of networks, not necessarily library networks, but networks in general. And let me reiterate what Dr. Cuadra said earlier: there are no such networks operational in the library field today. And I believe, as does Dr. Cuadra, ~~that~~ it will be several years before we see such networks taking shape. The network concept was more acceptable four or five years ago than it is today, again as Dr. Cuadra said. Much of the blue-sky thinking and irresponsible forecasting that was prevalent then has been replaced lately by less glamorous and more realistic views. This change has come about as the result of actual attempts



by responsible and hard-working people such as our panelists here to design and implement experimental networks. The four panelists who are here with us this afternoon have participated in considerable pioneering network activity. They have learned a good deal through their experience and they will certainly pass on some of their knowledge and experience to you.

Although I have not heard the talks before, I am prepared to assure you with some degree of confidence that this session will not be devoted to blue-sky forecasting. It will, however, give you some idea of the great potential for libraries in computer-based communications networks and a good deal of practical insight into the many real problems and difficulties involved in bringing them into existence.

#### FOUR VIEWPOINTS

##### The National Scene.

Henriette D. Avram.

I am not going to go into the history of the MARC Project; it has been documented rather thoroughly in the literature, and I am making the assumption that most of you know it.

INTRODUCTION. MARC went from a pilot to an operational system in three short years. The initiation of the pilot project was in February 1966 and the Library of Congress (LC) has had an operational distribution service since March of 1969. In fact, we had our first birthday March 24, 1970. To date we have distributed 55 thousand records. LC constantly tries to improve the timeliness of its cataloging and of the MARC service. The Library is now cataloging over two hundred thousand titles a year, a truly significant number of titles. The body of data being included in the MARC Distribution Service is the entire English language output of the Library of Congress, which includes not only the American imprint but all the Title-II imprints in the English language as well. At present there are 77 subscribers to the MARC service. The institutions are not all in the United States; tapes are also sent to Canada, Japan, England, Denmark.

One of the most significant aspects of the MARC Project has been the cooperation of a large segment of the library community in designing the MARC II format. It is very important to understand the meaning of this format. It was designed to be a communications format with no requirement that all the data included in the format be used in an individual institution. The Library of Congress MARC II format is what we term a rich format. There are data elements that are explicitly

identified in the format that the Library of Congress would not identify for itself. The purpose of the identification, in some instances, is to allow libraries out in the field to choose either to include or to exclude particular data elements. Both are very important for a communications format which serves many users for a multiplicity of uses.

MARC AS A STANDARD. Mr. Cuadra spoke of the need for standards as a requirement for network development. The magnetic tape format for the interchange of bibliographic information satisfies this need. MARC II is an implementation of this format. An implemented format is composed of three basic elements the first of which is structure, i.e., the physical representation of data on magnetic tape. The structure may be thought of as an "empty container" into which we insert data. The second element is content designators. Content designators explicitly identify and characterize data elements for computer manipulation. For example, a name may be labelled as a personal name or a corporate name. The designation, personal name, could be further refined as a forename only, or a family name. The third element is the content itself, i.e., the data that constitutes a bibliographic record such as the author's name, the name of the publisher, the place of publication, etc. The structure of the format, the "empty container," has been developed by the American National Standards Institute Sectional Committee Z39 Subcommittee 2, and at this time is a proposed U.S. standard very close to acceptance. The proposed standard has been recommended for consideration by the International Standards Organization.

The format structure has been adopted by the Committee on Scientific and Technical Information (COSATI) and there is now in

being a COSATI implementation. The International Nuclear Information System (INIS) has also adopted the format for the interchange of bibliographic data among the member countries. The MARC format for books has been accepted by the Association of Research Libraries, the Special Library Association, the American Library Association, and the British National Bibliography for use in the U.K. MARC Project. All this activity is a strong incentive toward further cooperation both for national and international sharing of information.

Using the same format structure, LC has applied it to serials, maps, motion pictures and filmstrips, and manuscripts. These formats are in different phases of completion. The format for serials has been distributed; as each additional format is published, it will be made available to elicit comments.

MARC as it exists today is just a beginning. We have a community lacking two important resources: funds and manpower. The problem of manpower brings to mind the need for training, not only in the library schools but of the librarians themselves. One thing I say emphatically -- there will be no successful library automation program without the combination of many disciplines: librarians, programmers, systems analysts, etc. The problem must be defined by the librarian, because it is his problem. The knowledge and experience of the programmer, the systems analyst, the systems engineer, etc. are essential to assist in the definition of the problem and to implement its solution.

MARC EXPANSION. There has been a good deal of discussion about the need to expand MARC to other languages and to other forms of material. LC is interested in expansion to satisfy its own requirements and those of the library community. There is a growing awareness that there is no single best answer as to what would be the most useful body of data to

distribute next. A meeting was called at LC and sixteen of the MARC subscribers were invited to participate to discuss expansion and other matters of mutual interest. Depending on the collections of the particular institution and on the use of the MARC data base in the institution, requests for expansion differ. In large research libraries where current English language material is just a small percent of the total collected, there is a strong recommendation for LC to expand to other Roman alphabet languages. On the other hand, where English titles make up the predominant part of the collection, the pressure is for older English titles, i.e., the retrospective material. Some libraries, recognizing that the MARC Distribution Service is not a complete source of cataloging data until the name references associated with the name entries are distributed, request the LC name reference file be the next candidate for distribution. And other institutions are principally interested in other forms of material such as the non-print media. The Library recognizes the importance of expansion and will extend MARC as soon as resources permit.

CONSISTENCY AS A REQUIREMENT FOR NETWORK DEVELOPMENT. Mr. Cuadra stated that costs of computers are going down and addressed himself to some of the technical problems requiring solution. I am not minimizing the technical problems. I recognize the need for massive storage devices to house the large files we have. Techniques must be developed to allow efficient retrieval from these files. Library files have complex relationships within a file and across files. If I change a subject heading in the LC Subject Authority File, I should be able to change that subject heading throughout the entire Official Catalog, wherever applicable. Most of you are aware that many LC subject headings

have not been updated because of the enormous expense involved in updating subject headings in the Official Catalog. In an automated system, I should be able to accomplish this updating. In my mind, far more difficult to solve than the technical problems are the bibliographical problems. I recently wrote an article for the April 1970 issue of Library Trends<sup>1</sup> in which I tried to explore what some of these problems are. An individual library may be conceived as a network in which all staff members of that library use a consistent data base. How does one accomplish that in a network? We have available to us today certain tools such as Anglo-American Cataloging Rules (AACR). Since LC maintains the position of superimposition, each library must guarantee that the entries on MARC records are consistent with their individual catalogs. Without this consistency, we lack a prerequisite tool for networks. One solution might be to close the present catalogs. I do not know if you are aware that LC is considering closing the Official Catalog and starting again. This possibility is only in the discussion stages and has many far-reaching implications. If we could assume that ten years from now the needed bibliographic tools were available, the name and subject authority files, with timely updates, the classification schedules, and the combined index to the classification schedules, and if every library could close its catalog and start again, the concept of sharing data in a network environment should be closer to fulfillment.

There is evidence that libraries are moving toward the sharing of computer-based bibliographic information. The work being done by the New England Library Information Network (NELINET), the Ohio College Library

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<sup>1</sup>Avram, Henriette D. "Bibliographic and Technical Problems in Implementing a National Library Network". Library Trends. V. 8, no. 4. April 1970. Pp. 487-502.

Center (OCLC), the conceptual design work in progress at Washington State Library and the efforts of the Oklahoma Department of Libraries are all encouraging. I would hope that they receive the funds required to make progress. The University of Saskatchewan in Canada is working very closely with other university libraries within the concept of sharing. Intuitively, we all agree that an economical approach to requirements of bibliographic service should be to catalog a title once, record the information into machine-readable form, and share the data stored in regional computer-based files. The big question is, always, how do we get from here to there.

Much work is going on in the international as well as the national scene. Under Title IIC of the Higher Education Act, LC buys one copy of every scholarly work published in certain countries throughout the world, and distributes the bibliographic records to the library community. The BNB and LC exchange their respective MARC tapes each week. However, although we accept each other's descriptive cataloging, we cannot make use of the machine-readable records because of the differences in the form of heading and subject analysis. We are once more faced with the bibliographic problems. If every record in a machine-based file must be inspected for consistency for the individual agency concerned, one questions the validity of the concepts of a network. Another activity on the international scene is the work in progress by the International Meeting of Cataloguing Experts Working Party (IMCEWP) on Standard Bibliographic Description (SBD) under the auspices of the International Federation of Library Associations. I am a member of the Working Party and the goal is to standardize a printed bibliographic description beginning with the title proper. The group's major concern is the

ordering of information, rather than the content of information, and standardized punctuation. There are two significant reasons for attaining this goal. First, if information were recorded in a standard order, e.g., if place, publisher, and date always appeared in that order, the information would be more easily understood by people regardless of the language of the bibliographic description. The main reason for including the pagination is to uniquely identify an edition of a work. Yet there is little consistency in the way the pagination statement is recorded. For example, the British include plates as part of the extent of the work while in the United States plates are part of the illustration statement. It is difficult to talk about standardization in terms of form of entry and subject terms when we do not even agree on how to count the number of pages. The second reason for attaining an SBD is to take advantage of a technique called format recognition, now underway at LC for current English language monographs. Using cues in the bibliographic description such as order of information and punctuation, the computer will analyze the data and assign the content designators, work now performed by library personnel. This method should significantly reduce the cost of input. The Working Party is making progress and there is evidence that there is interest in this kind of cooperation.

RECON. With MARC a reality, libraries began talking about and, in many cases, actually implementing projects to convert their retrospective materials to machine-readable form. Not only would the same titles be converted many times, a very uneconomical approach, but the result of such conversion is again the creation of inconsistent data bases. A proposal was written by LC to the Council on Library Resources (CLR), and funds were received to conduct a study investigating the technical,



economic, and bibliographic problems of centrally converting the retrospective material for LC and the rest of the library community. The work was performed by a Working Task Force (RECON Working Task Force) resulting in a report<sup>2</sup> which recommended that a pilot project be undertaken to test empirically at LC what was theorized in the report. A second proposal was submitted to CLR and LC received \$230,000 for a two-year pilot project. All English language monographic titles (1969) which were not included in the MARC Distribution Service as well as all 1968 English language titles will be converted to machine-readable form. Thus, libraries which have subscribed to MARC will have a well-defined data base. In addition, 5,000 research titles selected from 1901 to date and representing English and other Roman alphabet languages will be converted. This sample of older records in many languages will test out more thoroughly the techniques identified in the RECON study to determine by categories of information (language and time) the feasibility of retrospective conversion of each category of information. RECON appears to be in disagreement with statements I made earlier concerning closing our catalogs and going forward. This question really depends on how we view the future: two systems, one manual and one in machine-readable form, or two systems, a retrospective and a prospective, both in machine-readable form and the real difficulty of coming to grips with the problems we face. However, the concept of RECON, the idea of converting once nationally, whether or not the data converted be only a subset of the whole, should be valid if we convert at all, based on the economics of cataloging once and sharing what it costs to catalog and

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<sup>2</sup>RECON Working Task Force. Conversion of Retrospective Records to Machine-Readable Form. Washington, D.C., Library of Congress, 1969.

what it costs to put information into machine-readable form. The RECON record is similar to the MARC record, the only difference being that there are certain content designators in the MARC monograph record which cannot be included in RECON records without the book in hand.

The RECON records will be updated to the bibliographic accuracy of LC's Official Catalog. The conversion of the retrospective titles will determine what funding would be required for a full-scale conversion effort, what technique is best for conversion within the present state of the art, and whether it is feasible to consider retrospective conversion centrally at all.

In connection with the pilot project, the RECON Working Task Force has been assigned four tasks<sup>3</sup> which have significance for the future of networks and for the future of library automation.

Libraries exist to serve the information needs of people but the material must be under control before we can provide reference to that material. In addition to solutions to technical problems and bibliographic problems we must have the right kinds and mix of people -- librarians and systems people -- people who have the courage and enthusiasm to tackle the problems at hand.

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<sup>3</sup> Avram, Henriette D. "The RECON Pilot Project: A Progress Report". Journal of Library Automation. June 1970. Pp. 106-107.

FOUR VIEWPOINTS.NELINET -- A Regional Network As Seen By the Project Director.

Sam Goldstein.

After listening to Dr. Cuadra and to Henriette Avram, I really feel that there is nothing left for me to say, but because I am essentially a ham it will probably take me about twenty minutes to say it. So let me make some preliminary remarks. Because Dr. Cuadra will be staying with us through the entire session, because he is a fellow worker in this field, and because he is perfectly capable of answering in his own defense later, I am going to take the unusual liberty of disagreeing on a couple of points with our luncheon speaker.

In the first place, I think that Carlos is quite wrong in his assessment of what the most significant developments in library automation have been over the past few years, because there has in fact been only one significant development in that field -- and she is sitting on this panel with us. Without Mrs. Avram's contribution much of today's ferment and optimism for library automation would be nonexistent.

Secondly, I have to disagree, from a regional point of view at least, with the number of options that Dr. Cuadra said were open to any library which was contemplating some amount of automation. As I recall, Carlos said that there were three basic choices open to that library: it could forget all about automation; it could go it alone; it could join with other libraries in a cooperative venture. However, for most of the more than 250 academic libraries in New England, the second of these alternatives is, in fact, academic;

they simply do not have the human, economic, technical, and library resources to do anything but forget about automation or automate in a cooperative context, especially if they are going to try to deal with data bases as massive in size as MARC.

I think I can bring out this latter point by playing around with some figures relating to MARC costs. As all of you know, the first year of the MARC service cost each subscriber only six hundred dollars for which he received 52 weekly tapes containing 50,234 bibliographic records representing the entire English language current imprint cataloging output of the Library of Congress for that period. Now, I did not divide six hundred dollars into 50,234, but obviously it comes to a little more than one cent per record, and that is a good buy by any standard. Or is it? Henriette mentioned that March 24th marked the first anniversary of the MARC service. Well, she may be correct in terms of LC's internal output, but most subscribers actually received their first tape on April 1st, and as one of those subscribers, I can assure you that there is a little bit of an April Fool's Day joke about that low-cost subscription.

For example, the average length of each MARC record is 584 characters. If I multiply 50,234 by 584 I suddenly discover that I am dealing with 29,336,656 characters. If I compromise between the 7 and 9 track versions of the MARC tapes and assume that I am using 8 bits to represent each character, I arrive at a storage requirement of 234,693,248 bits just for the first year of MARC data. If I then try to put this information into any kind of disc or other random access file, I will need directory access, and if I allow 10 percent, which is probably below my actual minimum requirement, I am talking about

handling another 23,469,025 bits. And if I want to add my own library's local holdings information to the MARC record, I will have to add another 50 characters (or 400 bits). And if my library is involved in a network or other cooperative, and if ten of us hold the same item, we will have to add 4,000 bits to that single MARC record. I could go on, but I will stop here. The point that I am trying to make is simply this: our original \$600 subscription has cost NELINET an additional \$600,000 just to be able to use this MARC data base effectively in a rather limited way thus far, and I do not believe that this large expenditure has been due to any ineffectual developmental approaches. The evidence continues to mount that the efficient and innovative use of large bibliographic files of this type is going to require cooperative utilization, not only for the smaller libraries in our area, but sooner or later even for such regional library giants as Harvard, Yale, MIT, and so on.

Of course, some librarians will tell you that the data presented just now reflects a fictitious kind of reasoning, because in their library they acquired only 1,000 items of the 50,234 items covered. Well, all I can say is that if they can show us how to extract those 1,000 records cheaply, and with some real-time correspondence to their actual library operations, NELINET will be happy to offer them an extravagant salary in order to secure such expertise.

Before I leave this topic, let me clarify two things. First, I think that MARC is the cornerstone of library automation hopes for the future; my preceding remarks were not intended to denigrate MARC in any way, but rather to alert you to the potential problems involved in using it cheaply and effectively. Secondly, I am not opposed to automation at the local library level, especially where one can do something

locally in an automated way that makes sense; but I am cautioning you to be careful that, when you are getting your feet wet in the waters of automation, you do not get in deep enough to drown.

NELINET. Don Vincent, who will speak to you as soon as I finish, is going to tell you about NELINET from the point of view of both a participant and a founder, and tomorrow afternoon Ann Curran, who represents our technical subcontractor, is going to describe in detail the systems that we are actually operating or developing. Therefore, I will confine myself to providing sufficient history and background to give you some idea of the cast of characters and the kind of cooperation involved. I will go far enough with the project's progress to date to give you a general idea of what is going on, but I will stop short of the detailed description that Ann will provide tomorrow. I will also avoid any discussion of the "blue-sky" aspects of the project, other than noting here that we are moving to create a large central data base shared by all our members, a data base that is effectively the catalog of every participating library rolled into one. We are far from realizing this goal, and because of the scale of the problems involved we do not know that we ever will, but the attempt to do so has already borne some fruit.

NELINET is an acronym for the New England Library Information Network. I like to describe this network rather loosely as an open-ended library consortium, which simply implies that we have certain members now, and that we look forward to having additional members in the future. The present membership consists of the main campus libraries of the six New England state universities. For those of you who are not familiar with the New England region, these are the libraries of the University of Connecticut at Storrs, the University of Maine at Orono, the University of Massachusetts at Amherst, the University of New Hampshire at Durham, the University of Rhode Island at Kingston, and the

University of Vermont at Burlington. Some of these state universities do in fact have libraries at other campus locations or attached to professional schools, but the ones that I have mentioned are those libraries which are actually participating in the project at this time. For several years the directing librarians of these institutions had been meeting informally to discuss areas of common interest and possible cooperation. Eventually, they decided to pursue these prospective areas of cooperation under a formal agreement administered by the New England Board of Higher Education, which we acronym as NEBHE, pronounced "neby." It is the organization for which I work, and when things are not going too well with the project, which does occasionally happen, I have been referred to as the "nebbish" of NEBHE.

NEBHE. NEBHE is an interstate agency which is specifically charged by its charter with the promotion of regional cooperation among the public and private institutions of higher education in New England. In 1965, on behalf of the NELINET libraries, NEBHE submitted a proposal to the Council on Library Resources suggesting that a feasibility study be undertaken to determine whether automated techniques could be cooperatively utilized to improve and expand the quality and character of technical processing operations in the member libraries. At about the same time, and quite independently, the computer applications firm of Inforonics, Inc., of Maynard, Massachusetts, submitted a proposal to the Council which suggested the possibility of creating a central file of machine-readable bibliographic and local library data that could be remotely accessed to obtain a variety of technical processing and related library services.

As you can see, although it was by accident, the two proposals complemented each other. On the one hand were the libraries seeking possible technical solutions to certain of their problems; on the other hand there was a commercial firm offering a particular technical solution to these problems. Nonetheless, Verner Clapp, who was then President of the Council on Library Resources, rejected both proposals on the grounds that neither was viable in the absence of a national source of inexpensive current cataloging data in machine form, and in the absence of a national standard by which such data could be structured and communicated.

However, when Henriette's MARC Project itself became a reality in mid-1966, both of these prerequisites were well on the way to being met, and Mr. Clapp brought NELINET and Inforonics together. We have been together ever since. We have subsequently received five successive grants from the Council on Library Resources, amounting to over half-a-million dollars. Apart from the initial feasibility study, and the requisite systems design and analysis studies, the bulk of this money has been expended upon the development of a customized catalog card and label production system. We have also received a grant from the United States Office of Education, amounting to some one hundred thousand dollars, which is being used for the development of what initially we called, somewhat simplistically, a union catalog system, but which we now refer to more realistically as a holdings file processing system, since it can be used in connection with library functions other than union cataloging, as, for example, in circulation control, interlibrary loan, and local book catalog production.

TECHNOLOGY. I suggest that those of you who would like detailed descriptions of these systems try to attend tomorrow afternoon's



Cataloging and Classification session. As I noted, Ann Curran, who has been perhaps the one person most responsible for the technical implementation of these systems, will describe them in considerable detail at that time. For our purposes here today, I think it is sufficient to note that the catalog card and label production system involves the machine production of a variety of products, including conventional catalog cards with call numbers and overprinted headings, book spine labels, and book pocket and book card labels. This machine production is made possible by the extraction of appropriate data elements from a catalog data file in conjunction with local data provided by the requesting library. The libraries teletype requests for those products which they desire to Inforonics, where these requests are run through a series of computer programs which search a magnetic tape master file of Library of Congress MARC II records, and, for those titles found, produce a magnetic tape containing catalog card, book pocket label, and book card label images, and a paper tape containing book spine label images. The magnetic tape is run on a conventional line printer to produce the appropriate catalog cards, book pocket labels, and book card labels, while the paper tape is printed out on a Dura tape typewriter to produce book spine labels, which in this case are of the Selin type.

Let me wander a bit afield here, since we are often asked just how much cooperation we achieve among the NELINET libraries, and what our prospects will be when new network participants get involved. Well, the Selin label situation might give you some idea of what kind of problems we often have. After a substantial amount of discussion -- and disagreement -- the NELINET libraries finally resolved to use Selin labels as the network standard. Recently we gave a presentation to the

New England state colleges, and during the course of this presentation some of the librarians present told us that we had made a mistake in using the Selin label and that a different kind of commercially available adhesive label was far superior. When we broke for lunch, however, several other librarians surreptitiously whispered to us that their own experience had been that this particular adhesive label "stunk" and that we should stick to the Selin. Our best guess is that you can never really win, but you have a lot of fun losing.

In any event, let me also describe briefly the holdings file processing system. This system is still under development, but it consists essentially of the programming and file organization needed to retain and utilize the local information supplied by the library at the time it requests catalog cards. This information includes the library's identification symbol, any branch or special location designation, copy number or volume number if applicable, local call number if different from the Library of Congress call number, and so on. Thus, as a by-product of catalog card production, each library is essentially creating a machine-form record of the fact that it holds that particular bibliographic item, and since that record is stored with comparable records of the other member libraries, each library is essentially contributing simultaneously to the creation of a machine-form union catalog. Some day we dream of using this data for on-line interlibrary loan procedures, union and local book catalog production, circulation control systems, and so on. In the interim we are just building in the capabilities.

I hope this thumbnail treatment has given you some idea of the various aspects of the project about which Don Vincent will now go into greater detail.

FOUR VIEWPOINTS.NELINET -- A Regional Network As Seen By a Participant.

Donald E. Vincent.

When I was in high school, and, admittedly, a good deal smarter than I am now, I invented an elaborate theory which I called the necessity for interstitial man. I felt that the social, moral and economic imperatives of our society formed such a complex network that man had to seek and discover holes in the net or be intellectually and emotionally suffocated. Nowadays, this might be called doing your own thing. Since that time, I seem to have become more involved in developing networks than in trying to avoid their constraints. Luckily -- or apply -- networks constructed by systems of libraries have enormous gaps which will probably take decades to fill.

Over the past seven years the University of New Hampshire Library has been associated with a variety of cooperative endeavors, all of which have different structures, all of which demonstrate varying degrees of maturity and success, and all of which have their own lessons to teach.

NELINET. The most visionary and exciting of these programs is NELINET. Being involved with NELINET is something like being able to buy Xerox or IBM stock at a dollar a share and riding with a potential growth company. In other ways, this involvement has resulted in a somewhat frustrating, albeit extremely educational, relationship for each of the New England state university librarians. The major project started in 1964. Since that time a formidable two-foot-high pile of technical reports has appeared replete with such terms as "smerge," "sort key generators" and "card formatters," which, in spite of a week

or so at the IBM Homestead, are not my common language.

I would like to concentrate chiefly on the perception of NELINET by one university library, on some of the reactions we have had, and on what we eventually expect to happen. If the project is perceived as an iceberg, the tip most visible to the library staff has been and remains ready-to- file catalog cards with overprinted subject and other added entries produced from MARC tape. For the University of New Hampshire, this process became operative in December 1967 and our catalogers had a happy few months criticizing the typeface used on the line-printer, the spacing within the collation, the form of the edition statement, punctuation before subject divisions, margins, and divisions made in LC call numbers. The development of MARC II meant extensive reprogramming at Inforonics and MARC II card production was delayed until October 1969. The demonstration run lasted for five weeks. Of 511 requests submitted, 75 were rejected for one reason or another, 436 were searched on the tape, 208 were found and 159 were considered acceptable. Card production has been resumed by Inforonics, after a hiatus of several months, with each library contributing a modest service fee of \$1.56 per card set. As of June 9th, we sent off 966 requests for cards and have received 640 sets back. Forty-four sets were returned because of errors, most of which were probably in the MARC tape. The returns were of high quality and could be filed immediately in the card catalog. I present these rather meager statistics, not with any sense of discouragement, but to illustrate something of the time scale needed for an experiment of this type.

STAFF RESPONSE. The staff, I believe, has somewhat of a sense of unreality about the experiment because of its slight operational impact up to now. In some cases, it is viewed as an administrative toy

that interrupts hard-won routines. Peculiar statistics are always being requested, or our inexpensive and quick proof-slip / Xerox card production system is bypassed for a computer product that appears extravagant. The long-range and desirable goals of the project are sometimes forgotten in the press of day-to-day activities. This personnel component is something about which we have all been increasingly concerned. Although there have been a great number of briefing sessions for staff by Inforonics, tours of the plant and innumerable meetings, an even greater effort must be made to involve and inform our total library communities, both professional and clerical. We hope the next project funding will include an information officer at NEBHE headquarters who can devote his full time to training and briefing activities.

The project is not likely to end soon, but will extend somewhere into the misty future. An experiment of this type clearly teaches us one lesson: timetables and costs -- in spite of the best efforts, good will and honest judgment of experts -- are, in the final analysis, almost impossible to predict with any high degree of accuracy. The technical complexity of high-order computerization leaves the average librarian, despite self-study, workshops and courses, somewhere in looking-glass land. For example, judgment on the level of machine language to be used takes a Henriette Avram, and computer configurations require a panel of experts. We can make judgments on goals, however, and pound out, slowly and painfully, standards acceptable to all on the petty little points that hang up librarians, especially catalogers. For example, U.N.H. does centralized cataloging for our two sister institutions at Keene State College and Plymouth State College. When I showed them a computer-produced set of cards, the lack of a period

before the book number of the LC call number was immediately spotted and considered unacceptable. Yet, all six state university libraries have accepted this practice as standard procedure although certainly not without some anguish!

In another case, a small college asked if it were possible to have computer-produced card sets without any subject headings or added entries, like L.C. card sets. The unit cards were judged of excellent quality, but they wished to stick with red subject headings. I am sure that tears were shed over the passing of hand-written catalog cards, also.

FUTURE GOALS. Our ultimate goal is to have, in machine-readable form, the largest portion of the holdings of all libraries in the system. Everything of major importance will finally depend upon reaching this degree of comprehensiveness, including union lists on a regional basis, local special purpose book catalogs, improved I.L.L., shared cataloging, circulation control systems, acquisition searching and cooperative purchasing. In more specific terms, five developments are planned.

- 1) The capacity to input, collect and update local holdings information and to process this data to obtain line-printed union catalogs.
- 2) A search system, using display terminals that will permit a variety of searches of any available data base, including MARC II tapes, holding files, L.C. RECON, etc. This system will even permit "best match" with difficult and inaccurate order information.
- 3) An investigation of the usefulness of developing a common NELINET circulation system that will save on individual development costs and give region-wide compatibility.

4) The development of a local library input capacity into the system. The need for this capacity is heavily dependent upon the status of L.C.'s RECON project.

5) Provision for a Library Management Information System for budgetary, statistical and operating purposes. The Inforonics people tell us that "development of a successful management information system would entail a greater portion of detailed systems analysis and design than the other projects, as well as a greater total programming effort."

Now, NELINET is more than just an attempt to establish a technical processing service center; it is also a consortium of libraries concerned with a variety of cooperative enterprises. The very act of being involved with a major experimental project has had a number of important spin-offs. One of these ramifications has been to give the group a favored position in applying for Title IIA Special Purpose Type C grants under the Higher Education Act of 1965. In fiscal 1968, for example, \$270,000 was received and in fiscal 1969, \$75,000. These were tidy little sums indeed and were most useful in strengthening regional resources. Because we were using a data-phone teletype installation for transmitting requests for catalog cards to Inforonics, it was relatively simple and cheap to convert to a dual TWX / Dataphone system and begin to send more interlibrary loan requests to one another. Our own figures show that we have both borrowed and loaned almost twice as many items to each of our sister institutions since we installed TWX. The actual figures are not startling -- for example, 188 transactions in 1966/67 compared with 362 transactions in 1968/69, but they do indicate a real trend. We are attempting, in a very honest fashion, to work towards cooperative acquisitions, even towards joint ownership of specialized and less frequently used library materials. We have agreed to make the

total library resources of each state university library available to the students and faculty of all six institutions. We have produced the second edition of a Joint List of Major Microform Holdings of NELINET libraries. We have identified more or less unique subject areas of strength in our various collections. We have exchanged lists of periodical and serial holdings. We have begun discussions on the cooperative handling of agricultural reports.

NEW HAMPSHIRE COLLEGE AND UNIVERSITY COUNCIL. All of these accomplishments are positive and worthy, but their aggregate impact on day-to-day library operations has been minimal up to now. A number of factors operate to cause this restriction. First of all, the geographical spread of NELINET demands technological innovation and invention to make it really workable. If I compare, for example, the success of the New Hampshire College and University Council in improving I.L.L. services within the state to the success of NELINET with I.L.L. within the New England region, the contrast is remarkable. In the latter case, volume has doubled; in the former, volume has increased 360 percent. The New Hampshire College and University Council consists of eight small colleges and the University of New Hampshire. We have established a bi-weekly transportation link among the group and have even agreed upon bulk loans for periods of up to a semester, as needed. Both of these procedures do not as yet seem practical for a multistate network. The colleges have also been able to specify precise areas of particular strength in each of their collections, such as Music, Art, Sociology, etc., which they will continue to develop and upon which the other colleges can rely. They have also pooled several thousand dollars for joint purchases, including reprints of items listed in the Essay and General Literature Index, and have designated the U.N.H.



Library as the storehouse for this material. They have developed an "Intend to Purchase" form showing all individual items with a list price of fifty dollars or more and sets of one hundred dollars or more. I must admit that the latter form is not always used regularly or consistently, but it has prevented some unnecessary duplication and has served as another method of exchanging bibliographical information. Colleges in a small geographical area can successfully do these things, particularly when they can rely upon a good research collection as a resource.

What about universities which are rapidly developing new Ph.D. and other programs and are physically scattered? Is meaningful resource sharing possible, or joint purchasing, or even cooperative consultation on acquisitions? At this stage of the game, this degree of cooperation is not too likely. University libraries cannot delimit their collections, unless the university itself will delimit its programs. Rugged individualism is still the rule on most campuses, although token cooperative programs do exist.

Technology seems to offer the most likely solution to this dilemma. New instruments of bibliographical information and access to this information must be developed before regional systems of resource sharing can become truly operational.

All of us involved in NELINET see our technical project as having the greatest potential for meaningful cooperation within the region, although we will continue to struggle with all the other conventional dimensions of network / consortium development. New England is certainly providing a fertile testing ground for all forms of cooperative endeavor.

FOUR VIEWPOINTS.The College Point Of View.

Robert S. Taylor.

By the way, I have just figured out what RECON means -- Reckless Efforts Cumulating Over Networks. Also, while we are explicating acronyms, I have a favorite one, PERT, which means -- Poisoning of Educators in Real Time.

BIBLIOGRAPHICALLY-BASED CONSORTIA. I wish to discuss some four different aspects of this topic of networks as they relate to the college library. Only one of these aspects has been covered today, bibliographically-based consortia. I will not say much about these consortia because you have heard a great deal about them already. Most college libraries do not have the resources nor the personnel to initiate or participate in network development. And yet, these deficiencies are the very reasons why the college libraries should be involved, for they need the benefits that cooperative networks can bring.

It is easy to talk of instantancies. We have instant cereal. We have instant milk. We have instant information. One of the things I found out over the past year, however, is that we cannot have instant libraries. And I think that is one of the real problems, touched upon several times here today. We must have patience. In the meantime, there are certain things we must do.

Several people have brought up the possibility, and I think it is probably the right one, that, at the present time, the best thing for the college library to do is to sit and wait. But there are things one can do while one sits and wait. One of the most important is to begin to develop a bibliographically-based network within your own

community, whether it be a city -- St. Louis, San Francisco, or New York -- or a region, small enough so that you can hold down the communication costs and related communication problems. The communication problem has been well illustrated today by Don Vincent's description of the transmission difficulties between Durham, New Hampshire and Boston.<sup>1</sup> Messages were sent as rational statements but were converted into meaningless garbage by the time they reached the receiver. Then too, the cost of communicating, over a long distance for an extended time period, may be beyond the means of smaller libraries. So I strongly suggest that you concentrate on local networks, as some of you have done already in union lists of serials and interlibrary loan systems. But I suggest you go one or two steps further principally so that you get your feet wet in the problems of design or automated systems and communications networks.

Because I will refer to our plans at Hampshire College, I should say something about what Hampshire is and you will see some of the problems that a library in a new college faces as it attempts to design for the future. Hampshire College is an experimental college, privately supported, which will open in September 1970. It is located in Amherst, Massachusetts, and grew out of the interests of four local institutions: Amherst, Mount Holyoke and Smith Colleges, and the University of Massachusetts. I have been there since 1967, primarily concerned first with the physical design of the building and now with the design of operational systems. The Library Center includes a media library, a bookstore, a

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<sup>1</sup>The description referred to was in response to a question to Mr. Vincent from the floor; the text may be found on page 57 below -- Editor's note.

display gallery, computer services to education, and television and film studios with support facilities. The library is connected by conduit to every room on the campus.

On a bibliographic basis, we are developing a machine-readable base. However, it is not in MARC format. I consider this departure a temporary but absolutely necessary step, because we cannot afford to develop a MARC base. To be perfectly honest, I do not know what a MARC base would give us at this time, particularly since about 85 percent of our material is not on MARC tapes. We have an abbreviated entry, principally a Library of Congress card number, that will get us into a MARC system when the latter is large enough and retrospective enough to begin to take care of our total needs. As I said, we consider this approach a temporary step at this time, so that we can produce such things as monthly acquisitions lists, specific bibliographies based on the L.C. classification, and so on.

Now, the second approach to networks is something which has not even been touched here, and I think my third and fourth approaches will also be new.

NON-PRINT MATERIALS. There has been little concern for types of materials other than printed materials. I am estimating that the Hampshire library will be made up of between 20 and 30 percent non-print materials. We want these materials to be part of a total collection, represented in the public catalog and computer listings, in the same fashion as the book collection. We are faced with some very real problems here. We are, at this moment, concerned with the "bibliographic" control of films, tapes, disks, slides, transparencies -- you name it. This problem is one which I think all libraries must face, and soon. Some very interesting ongoing work is being done at this time through

the U.S.O. I. Institute run by Pearce Grove. Last summer there was a three-week meeting at the University of Oklahoma. The meetings were resumed for a week at the ALA Midwinter, which I attended, and the group will meet again at DAVI in Detroit in May. They are attempting to approach the development of standards for bibliographic control over these kinds of media. The Library of Congress, as we have already heard from Henriette Avram, is developing now a MARC compatible format for films and film strips. I truly hope that this important work will soon include slides, audiotapes and phonodiscs. How long this process may take is another question. I would guess it will take three to five years, depending on funding, until a usable base is fully available.

Meanwhile, back at my ranch, I wish to have a machine base now, for this kind of material. Again, it is going to be makeshift and temporary, but detailed enough so it can be integrated into our public catalog permitting a person to search for and receive information in all media. How far, at this time, we can go in developing a machine-readable base I do not know. We are right in the middle of this development now. In the next two months, we must make decisions on what kind of format we will use at this stage. From a network standpoint, we are interested, for example, in developing a union list of slide holdings in the five institutions. There are between one and two hundred thousand slides in the present four institutions. These slides form a fantastic resource for people who want visual means for the study of architecture, art, history, and for a whole range of other subjects. And yet, there is virtually no access to such a resource.

LIBRARY AS SWITCHING CENTER. My third approach is a little more blue-sky, and it will show my prejudices as to what I think a library should be. I would like to look upon the library as a switching center.

Any library serves a variety of publics with a range of needs and requirements. They want not just a single book or a particular journal, but they also need answers to sometimes very specific kinds of questions. And I think that libraries should be able to act as intermediaries for them to other kinds of resources. We should be able to use the phone much more frequently to seek answers to questions than we do now. We should be able to put a person into contact with the primate data center at the University of Oregon, or to the basic census data that will be generated on tape in the next twelve months, or to any other of the hundreds of major data and information analysis centers which are burgeoning across the country. There are a whole variety of sources which we have not even begun to use for our clientele. I have a very strong feeling that the library is the only institution in the college that can do this sort of thing, and do it well. This concept will require a basic change in attitude by librarians.

I might mention briefly here a program which is under discussion here in Boston and in Montreal, called the International Electronic Highway. It includes groups at station WGBH, the major educational television station in Boston, Harvard, MIT, Bell Telephone, Hampshire and others in New England. In Canada, it includes McGill, Laval, the University of Montreal, the National Film Board and several other groups in the Ottawa-Montreal area. It is the blue-sky beginning of a major network which would allow joint seminars, joint conversations, and the transmission of a variety of data between and among these institutions. The first report on this endeavor has just been finished. If this network comes into being, the library at Hampshire College will be the input node for the five institutions in the Amherst area. We will

retransmit from there. I cite this program to illustrate the idea that libraries can do many things as part of networks beyond the bibliographic area.

INSTITUTIONS AS NETWORKS. My fourth approach is quite different and I am not too sure how far I want to push it. But I do feel it is too important to omit. In a sense it is an entirely different approach to the idea of networking. Instead of looking outward from the institution, let us look inward. An institution, a college, for example, is a very intricate sort of network and the library serves as a major node. There are many nodes, of course, but the library is a critical one.

I wish to take this approach for several reasons. First of all, I want to make the familiar strange to you because this reversal may give us a chance to be more creative about what it is that libraries can do. Secondly, we are quite familiar with the problems of bibliographic networks, and we have learned more this afternoon. Consequently, I would like to approach networks at a different level. Thirdly, I think we can perhaps better understand some of the needs of the individuals we serve when we look at the institution itself as a network. Also, if we do it carefully, we might be able to understand a little better the problems of networking on the broader institutional scale. For example, we might look at the tremendous number of messages that move around the campus, a whole network holding an institution together. Such a network is worth examining to see what role the library might play. Such an approach is valid, however, only if we are willing to assume a posture other than that of merely being a sort of bibliographic warehouse. At present the library plays principally an archival role, a necessary, but traditional role. We service the formal requirements

of instruction and research in the hope that there might be a chance of serendipity in this process. What I am suggesting is that there are other what might be called short term messages that the library could handle within an institution. Could the library not become also an information switching center within this campus network?

INNOVATIONS AT HAMPSHIRE COLLEGE. First of all, the library is developing information centers on several subjects. One, a film information center, is concerned with collecting, analyzing, and disseminating information about films. In this center we will have not just informational material but also competent people servicing this collection and working with people outside the library and hopefully among the five institutions. The information center, then, is one type of approach.

The second one is the dial access approach with which some of you are familiar; in fact some of you may well be from institutions with such systems. The Hampshire library, as I mentioned earlier, is connected by conduit to every student room and every office and laboratory on the campus. We are not going to use dial access, however, which we find to be too expensive. Instead, we are exploring the possibility of bringing in CATV cable which has about a 20 channel capability. We would pick off four channels, three networks plus educational television, and use the other sixteen as we see fit. For example, on the fifth channel, we might run a continuous newspaper and bulletin board which can be tuned in at any time. The other channels can be used on demand by students who will phone the library and say "I would like to see Professor Jones' video display." Our man says "Yes, channel 27 is open; tune in in about 30 seconds and you will get it." We anticipate some



very real problems here, but we intend to try this system within the next two years. We may not be able to run a full system because of the cost; we may not be able to put it into every student's room, but we do expect to put receivers at least into every lounge in the residence houses.

I have cited these plans merely as examples of other kinds of networks which work internally within the institution. I think they are areas which as librarians we must be concerned with. The college is still small enough to be able to work with people as individuals, and the library is still close enough to the rest of the institution so that one can experiment with services. And one can be close to changes in curriculum.

These areas are some of those with which the library must keep current. Now, the things I have mentioned are not things that are going to happen over night. I thought that when I first came to Hampshire, two-and-a-half years ago, that I could start from zero. That assumption, as I am finding out, was extraordinarily naive. If you use a scale of one hundred, you are lucky if you can start somewhere around seventy.

In summary, I feel there are many ways of using the network approach, not limited to those networks which connect one library to another for bibliographic data. Equally important are those "networks" that exist within a campus and that connect the library to its individual users. In our planning for bibliographic networks, we certainly will watch carefully the development of NELINET and look forward to the time when we can participate either in NELINET or in some equivalent sort of system both for cataloging and processing as well as for borrowing and lending needs. Such a base for our use does not yet exist in machine-

readable form. Perhaps in ten years we will have a retrospective base of this sort somewhere. Recognizing this fact, my principal concern has been to establish a foundation from which a different kind of library can grow, can develop, and can adapt to change.

FOUR VIEWPOINTS.Discussion.

(Editor's note: The transcript of the discussion following the various talks was not completely decipherable; only the major questions raised are herein included.)

QUESTION. I wonder if it would be possible to use the standard book number as the identifying element since there is no necessary agreement in the use of entries all over the world?

MRS. AVRAM. The standard book number is now an international number. There is a country code assigned as the first digit to indicate the country of origin. That international number was adopted by the International Standards Organization and is being used. All American publishers are not yet using it whereas in England the control seems to be better. Another problem is the large mass of material that is not the output of trade publishers. This situation is particularly true at the Library of Congress. No government publications have standard book numbers. LC has taken the approach that they will put the standard book number on every catalog record where it appears in the work being cataloged. We cannot stop using the LC card number since that is part of our control system. But if we had a standard book number at the beginning of the system it would be the direction we would take. It is planned, in the mechanization of the Card Division, to build in the capability eventually to accept orders by either the LC card number or by the standard book number.

MR. CUADRA. I am intrigued by the example of the many different ways of counting pages and the problems of resolving this difference. I am curious about what has been learned in the MARC project about the process of engineering consent, or engineering compromises. Does one

have to go through a lengthy period for every decision? Are there some lessons that can help to streamline the process?

MRS. AVRAM. I do not know if you can actually streamline the process. The difficulty of arriving at agreement is understandable. There are different types of organizations of different sizes and with different requirements. There are differences in the individuals themselves. The library problem is especially difficult because we are doing something now in terms of potential for the future and we are still tied to the past. That difficulty exists when we are discussing just libraries and their needs for information. But then one must superimpose on top of these difficulties the additional difference between the functions of a library and the functions of a national bibliography. A national bibliography is not concerned with a collection but rather with the announcement of materials published in the country. A library has the requirement to maintain a catalog, gathering together all the works of an author and all the editions of the work. The approach taken by the Library of Congress in its MARC format, which is, I believe, a valid approach, has been to design a full format during this period of discovering the potential of machine-readable cataloging records. It is simpler to exclude information later than to face trying to add information to an already existing machine-readable file.

QUESTION. You sort of skirted around a question I would like to ask directly. From the use or intended use of the MARC tapes by 77 subscribing libraries, or, for instance, from the 16 subscribers who were at the LC meeting you mentioned, is there a way to obtain a pattern of this use so you might be able to solve or predict some of the network constructs of the future, or some network patterns?

MRS. AVRAM. I believe that Sue Martin is asking if there is a way to look at what we know exists, or what is being planned and project trends we can observe. I actually wanted to make this study during the MARC Pilot, and I still think it would be an interesting one. Some of the problems libraries are having are apparent, such as funding and people. So many libraries request funds for automation projects and basically they are trying to accomplish a like function, for example, the production of a book catalog. These organizations might get together and try to see what they could do cooperatively. The importance of cooperation is evident when we consider the character-set problem of libraries. LC designed a character set with 176 characters. The American Library Association adopted the character set, and a manufacturer is now building a print train containing the majority of these characters. The print trains will not cost as much as if you had to pay for an individually designed train. To answer Sue specifically, what you are suggesting should be done. The material is available; the problem is having someone with the time to study and to summarize it.

QUESTION. Mr. Vincent, in your use of the NELINET computer-produced card sets, what is the reason for the large number of unsuccessful requests?

MR. VINCENT. We happened to have transmission difficulties most of all. I think we were one of the libraries with the largest proportion of garbage coming through on the other end. And the people at NELINET could not make it out. This transmission difficulty is one of the problems with the network concept that Dr. De Gennaro mentioned: the communication links are not always of prime quality. I think there were occasional mistakes made by our catalogers in sending some requests which were not within the guidelines. Basically though, the problem was one of

lack of communication stability; transmission was so bad that NELINET just skipped processing the request.

MR. GOLDSTEIN. May I add to that too? Although New Hampshire did in fact have a communications problem, the main reason for this low hit ratio is really that the orders sent in by the libraries include a large number of standing order items, and these items tend to show up in the libraries well before they appear in the MARC tapes. Thus, if you sent in one hundred requests for items that you have received on standing order, the chances are that the corresponding MARC records will not appear until a number of weeks later. The problem becomes one of just how long the library wants to hold the books and just how long it takes for the MARC data to appear. Unfortunately, we do not have sufficient statistical data at this time to indicate what the time for the MARC data is, or how much of each library's current acquisitions falls into the standing order category. As the census people put it, "We cannot know where we are going until we know where they are," and the truth is that most libraries do not know where they are, and that includes the NELINET members. But we are trying to find out more about our operations, especially our monographic acquisition patterns, and this desire to learn more about ourselves and to acquire real experience was one of the main reasons that we went into production. Even without the supportive statistical data, however, I feel confident in attributing the major cause of the low hit ratio Don mentions to the absence of a one-to-one time correlation between the standing order receipt and the MARC data preparation.

MR. VINCENT. I might add, NELINET is holding requests now for six weeks; as the new tapes come in, the requests will again be searched. This procedure upsets our catalogers again because they do not like to

hold quite this long with proof slips. I think this problem will solve itself in a reasonably short period of time.

QUESTION. What do you do in your library while you have your staff and books tied up for two or three years while someone is working on automating your systems?

MR. VINCENT. You do not have it tied up. You always run this kind of thing in parallel. In many cases, we are still running our proof-slip, Xerox card production system. We will hold certain things a few days just to see what happens, no more than a two week period. Perhaps the catalogers will accept longer delays -- for some of this material we will wait six weeks -- but there always are priorities within the system which just have to be spelled out. In any case you end up with a set of cards good for demonstration purposes; you pass them around and admire them extravagantly.

QUESTION. My question is triggered by Bob Taylor's comments about the library as a switching center, but others may want to answer it. The question is: in how many places in the United States ought there to be a complete MARC data base that is accessible and searchable? Also, in how many places in the United States should there be an ERIC data base, a Chemical Abstracts data base, a NASA data base, etc.? And if anyone says "one" to any of these questions, where should it be?

MR. GOLDSTEIN. Let me tell you what we say about NELINET. I hope all of you realize that we feel extremely positive about this project, but we refer to it as an unspecified regional of an unspecified national network. In that context, anyone on the panel might bring me up to date. But the last study I have seen which really looked into this question in depth was Robert Down's 1926 study of union catalogs in the United States. He divided the country into, I believe, 16 regions. The RECON report

approaches this question at least inferentially but not in depth. While I say I do not have an answer, I think I must agree with Dr. Cuadra in calling for some national guidance. Being an unspecified module is an uncomfortable position. It makes planning difficult. I think the National Advisory Committee on Libraries came up with the conclusion that networks would evolve. And I am going to sound like a member of the Russian innercircle and suggest that they evolve within some kind of general plan. So I do not know the answer. I would hate to think of having a single center at this time, in Washington, for one reason because communications is a factor. Also one of LC's problems even now is sheer volume. As I understand it, apart from what they can do by mechanization, one of their problems is that they get six hundred thousand requests for catalog cards a day. And it used to be that they did not even have a chance to presort these requests so that their people did their searching on rollerskates. All we are saying is that if one merely translates the old ways into new, old wines in new bottles, all LC will end up with is a mess of tapes with which they well might be unable to cope. I suspect I have not really given an answer, but perhaps I have been able to isolate some of the problems implied in the question.



BIOGRAPHIES OF THE PARTICIPANTS.

Carlos A. Cuadra.

Dr. Carlos A. Cuadra has been Manager of Library and Documentation Systems at the Systems Development Corporation in California since 1968. His background is in psychology; he received his doctorate in 1953 from the University of California at Berkeley and was employed as a staff psychologist in various clinics and as a human factors scientist by the Rand Corporation. His involvement with information systems dates back to 1957 when he first joined the Systems Development Corporation and since then he has worked and published specifically in the library systems field. He directed a study entitled Technology and Libraries (1967) for the National Advisory Committee on Libraries, and he was a founder and continues as editor of the Annual Review of Information Science and Technology (1966- ). He was the recipient of the American Society for Information Science (ASIS) annual award of merit in 1968. At Systems Development Corporation, he is responsible for the design and implementation of automated library systems for governmental and private agencies.

Richard De Gennaro.

Dr. Richard De Gennaro is the newly appointed Director of Libraries, University of Pennsylvania. At the time of the CLA Conference, he was Senior Associate University Librarian at Harvard University; he has served at Harvard in numerous other library capacities. His degrees are from Columbia, Wesleyan and the University of Paris. He has published a number of articles on library automation including the recent College and Research Libraries' paper: "Harvard University's Widener Library Shelflist Conversion and Publication Program" (September 1970).

Henriette D. Avram.

Mrs. Henriette Avram, a graduate of Hunter College and Georgetown University, is the Chief of the MARC Development Office of the Library of Congress and has been Director of the MARC and RECON projects. Previously she served as a systems analyst for the Department of Defense, at Datatrol Corporation, and in other organizations and has published widely in the field of automated control of library materials. She was responsible for the MARC Pilot Project Final Report (1968); she chaired the RECON Working Task Force which published the Conversion of Retrospective Catalog Records to Machine-Readable Form (1969).

Sam Goldstein.

Mr. Sam Goldstein is currently Project Director at NELINET, the New England Library Network developed under the auspices of the New England Board of Higher Education (NEBHE). He previously served in the Boston Public Library, a special library, and the libraries of Brandeis and the University of Massachusetts, in capacities ranging from science librarian to Associate Director for Readers Services.

Donald E. Vincent.

Mr. Donald Vincent, Director of Libraries at the University of New Hampshire, in Durham, for the past eight years, previously served at the Dearborn campus of the University of Michigan as Director of Library Services. Prior to that he was at Wayne State. He is a graduate of the Universities of Buffalo and Michigan and has served on the New Hampshire Governor's Committee for Better Libraries.

Robert S. Taylor.

Mr. Robert Taylor has the enviable position of Director of the Library at Hampshire College, the newly opened, experimental school in Amherst, Massachusetts; he has been there in a planning capacity for almost three years. Previously he served as Associate Librarian at Lehigh and during his varied career has been involved in a number of planning operations for the government. He is a graduate of Lehigh, Columbia, and Cornell.



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