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Just when did NOTIS begin?

Well if you're talking about when the IDEA of applying automation in Northwestern's library arose, it was sometime in the early 1960's when a new library was being planned for Northwestern University, and the planners decided that it should be state-of-the art technologically.

I came to Northwestern Library on January 2, 1967, as a systems analyst, working for John McGowan, then associate director of the library and was given the vague assignment of "beginning to automate this new library." Speaking anthropomorphically, one might say that NOTIS was CONCEIVED on that date.

It is much harder to say when NOTIS was BORN because gestation and "labor" went on for so long, but you could say it was when the first operational system (an online circulation system) went into full production on the day the new library was opened to the public, January 19, 1970.

Compared with NOTIS of today, this first system was pretty puny; however, it was online, with circulation transactions updating records in real time, something almost unheard of in those days when batch processing was the rule.

The significance of this fledgling system was that it was so successful that it served as a launching pad for any of a number of later additions and enhancements. It's amazing what being successful and ontime, the first time around, can do to generate confidence that it can be done again.

However, there was a long gap between the birth of NOTIS and its christening. It wasn't until 1976 that we stopped calling it just "the system" and adopted the acronym NOTIS (Northwestern Online Total Integrated System) coined by Karen Horny, Head of Tech Service. By the end of this six year period of NOTIS's infancy it was clear that we were on the right track. No longer was NOTIS just a novelty; it had been integrated into circulation, acquisitions, serials control and cataloging, and the number of doubting Thomas's was becoming fewer and fewer.

We had also established a methodology of sorts, which, although unconventional, seemed to work for us. More and more Jim focused on hardware and software, and relied on me to supply him with data requirements and functionality. Although we usually tried to get together early in the morning to talk over ideas and problems from the previous day, I led a yo-yo type of existence, shuttling from my office to that of some staff member or another, to try an idea out on them, and then back to Jim to be sure those ideas were practical from his standpoint, before we went any further. On their part, many of the librarians had gotten really interested, and would pop into my office to discuss some idea they had had. Coffee time was also a time when we would launch off into a "what if" scenario, sometimes to the disgust of those people who looked with disfavor on talking business during break time.

It was very informal. And we had almost none of the tools you rely on today. I had a typewriter and a flowcharting template--it wasn't until much later that I got a terminal that could access the mainframe word processing software, ETC. Programs were all keypunched on punch cards.

Of course the tools the librarians were using were equally antediluvian compared with today. Can you believe, that catalog cards for original cataloging were being reproduced on a mimeograph?

But looking back at our systems development operation it is really incredible how fast things got done. Very few time-consuming committee meetings.

Even after the implementation of an application, someone would detect a problem, come to my office and explain the problem. I would alert Jim, and often the next day the problem would be remedied. Big decisions were made as the result of chance meetings. I remember, in 1970, when I was in the process of determining what was needed for cataloging and acquisitions, I met Mike Coston, then head of technical services in the hall and he said "why aren't you including serials? I said I would think about it. After

some brief comparisons were made of serial catalog cards and the MARC books format, I decided we could modify the MARC format to include serials. And after comparing acquisitions practices for monographs with those for serials, I decided we could modify our design to accommodate them.

Little did I know what a can of worms I was opening up.

But again, after a couple of abortive attempts, we managed to get a system up that handled serials, if not elegantly, at least efficiently.

If I had known in advance how complex serials really were I doubt that I would have had the courage to tackle them.

Later on, when we got into developing systems that affected multiple departments, we were forced to become more formal, but during those glory days we essentially had a free hand.

Another factor contributing to our success in those days was that we had no outside grant money and only a very small budget from the University. This meant that we had to take shortcuts which would have been unthinkable in another environment, but it also meant we didn't have to spend a lot of time writing and revising specifications time after time, holding committee meetings, and writing progress reports to funding agencies.

But the important thing is that by the end of this period we knew the direction we should be going; we had established our style of operation; and we had built up enthusiasm and acceptance on the part of most (although not all) the library staff.

This would stand us in good stead in the years ahead, the period from 1977 to 1990.

By the end of this period NOTIS was a mature full-function system, a fact that did not go unnoticed by the rest of the library world. During much of this period, we were inundated with visitors, from all over the world, many of whom were actively "shopping" for a system to buy.

At first we were flattered by the attention, but we weren't really interested in selling. NOTIS had not been designed to be a commercial product, and we knew next to nothing about marketing. But even though we recognized that there would be problems, the siren song finally got to us.

We started very modestly, almost giving it away, but with the proviso that any library that got NOTIS had to take it on an as-is basis--they could expect only minimal help from us. The University of Florida, Harvard, Washington University and Central Oklahoma State were the first brave volunteers.

But the word spread, and more and more libraries were approaching us about acquiring the system. Also, about this time, dollar signs began to get into the eyes of the University Librarian and the University Administration. Wouldn't it be nice, they reasoned, to be able to partly finance the development of the features we needed at Northwestern by the sale of the system to other libraries. To make a long story short, we eventually yielded to temptation and set up a marketing operation in the library, which, for reasons I won't go into, proved disastrous.

Pressure to provide features began to be put on us, that involved time frames that that were absolutely impossible to meet. All-in-all, these were very trying times. As I look back, its a wonder we all didn't crack under the strain.

So, in 1990, when it was finally decided by the University for us that NOTIS would be turned over lock, stock and barrel to NOTIS Inc., we had no choice but to gracefully (or perhaps not so gracefully on some of our parts) acquiesce and relinquish control over the NOTIS we had so carefully nurtured. To continue my anthropomorphic analogy, we had to recognize that NOTIS had matured into adulthood and was ready for the big world, and no longer were we in charge.

It was not easy relinquishing control. It was particularly galling to have to agree to using the commercial version of NOTIS. A number of us in the library felt that though the University's gain moneywise was in some respects the Library's loss. Fortunately some of the most important enhancements which we had developed during the 80's were accepted by NOTIS Inc. and incorporated into NOTIS (I'm thinking particularly about the merged headings indexes with the authority control and syndetic structure they provided, or else I think there would have been open rebellion.)

Because the last decade of our custody of NOTIS, between 1980 and 1990, was not as much fun as the earlier years, I'm going to mostly talk about the early years. Because I think those years will do more to give you the "flavor" of what's it was like for a Library embarking on such an ambitious project.

That's about all I'm going to say about chronology, and from now on I'm going to ignore chronology entirely, skipping most of the details except those that illustrate principles and jumping around from topic to topic and from time to time. Because I would like my reminiscing to at least give you a useful idea or two that might help you avoid the mine fields you are and will continue to have to navigate through. And I don't want to leave the impression that we did everything right; we made mistakes. Some of them were unavoidable given the fact that we were traveling in uncharted waters. Some of them were nearly disastrous. Sometimes we simply lucked out. But we learned from those mistakes, and some of those very same mistakes are being made today.

We made one very good decision, very early on, and that was, wherever possible, to conform to national standards. Unfortunately, at the time we were doing a lot of our development there were very few standards, and those that were being developed had not been fully tested in a real world environment. For example, in 1967, only MARCI existed; it wasn't until 1970 that MARCII became available, and even then it was only for books.

We made another good decision, early on, and that was to encourage cooperation among libraries in their use of computers. Over the years we tried very hard to live up to this objective, but unfortunately a number of factors not in our control intervened to keep us from fully meeting this commitment.

Another very good decision we made, was to aim for an integrated system, modularly implemented, with a minimum of data redundancy. And of course, given the hardware we had available to us, we had no choice other than to give highest priority to processing efficiency. We stuck to these principles all the way. This was in spite of the fact that many so-called experts in library automation "poo-pooed" integration, saying that "total systems" were neither technically or economically feasible. Somewhere in the mid 70's we began to be criticized for doing our own development, rather than waiting for a vendor of turnkey systems to do it for us. One of the things I look back on with the most satisfaction is having proved these skeptics wrong.

There were also a number of experts who thought the whole idea of implementing full MARC was unnecessary. I remember that Allen Veaner, very respected for his role in the Stanford Ballots project, was convinced it would be exorbitantly expensive for catalogers to have to do all the tagging required by the full MARC format. Again, we were right and they were wrong. Eventually it was realized that almost none of the content designation called for by the MARC format could be omitted without impacting unfavorably on type of user or another. This was particularly true when the records of various libraries began to be accumulated in the OCLC and RLIN databases. And in fact LC and committees like MARBI are still trying to figure out how best to include more detail, not less detail, into the MARC formats.

In some ways, I can't really fault those who complained about the complexity of the MARC formats. They were right in that, as long as the MARC format was simply a container for data needed to produce catalog cards, sure you didn't need all of that exotic detail.

But we at Northwestern had another advantage that wasn't related to our ability to make the right decisions at the right time and that advantage was continuity of personnel.

Good systems aren't built in a day, and as many software development houses have discovered to their sorrow, it is almost possible to design complex systems if either the major developers or the administrators responsible for overall guidance are constantly changing. Even after a system is up and going, if its full potential is to be realized it needs tender loving care on a long term basis. I have seen many good systems emerge into the limelight and hailed as the savior of libraries only to fade into obscurity because some of the the original group of developers left and those that replaced them didn't have the same dedications, with the result that maintenance and improvements were either lacking or lackluster.

One of the really unique characteristics of NOTIS and one that contributed greatly to its longevity, has been continuity of personnel. During the entire period of its most rapid growth, from 1967 to 1990, one small group of people -- John McGowan the University Librarian who first got NOTIS going, Jim Aagaard, Karen Horny, Rolfe Erickson and Betty Furlong, and I were constantly involved in either managing, using, or developing NOTIS. For a system to have this degree of staff continuity is almost unheard of in these days of constant turnover in the software development game. Of course other important people came and went but this core group stayed on until the bitter end, and even beyond.

In my case, I even had the same job, systems analyst, for nearly 25 years, with only one change in bosses, from John McGowan to Jim Aagaard, in all those years. I think it says something, since in all that time I was never bored -- angry and frustrated and even discouraged sometimes, but never bored.

Which leads me to say to those of you who are analysts today: I really feel sorry for you because almost invariably these days analysts are being forced to use software developed by someone else. You miss a lot of fun by not being able to design and develop your own system, from scratch. Of course its risky, but there's nothing like the thrill of "doing it yourself."

And even though I'm sure that NOTIS is as good or better than any other system available, I'm sure there are many of you, as there are in the Northwestern Library, who see glaring errors of commission and omission, and really would like to be able to get in and modify the code to suit your particular needs. Only a few of you have that luxury.

Instead you have to go through the laborious and time consuming process of submitting your list of requirements to NOTIS Inc., and never being sure whether it will get done and if it is done when.

Getting back to staff considerations. The development group at Northwestern (which eventually became the Information Systems Development Office, was always small. Even during the late 80's when the NOTIS marketing operation was funding some of our staff (with money they borrowed from the University) ISDO never had more than six people--Jim, and two analysts and two programmers. Even during the time when we had our our IBM computer in the library, the operations staff was similarly small--never more than two people. Only one person, Betty Furlong, served as the liaison between ISDO and the operating departments and also was responsible for initial training of new staff. This was in line with our basic policy that was that all tasks associated with implementing and operating an application once it had been developed and tested would be turned over to the departments. So the Development arm of the library never fell into the trap of managing the use of the system and never became an "empire" apart from the rest of the library. That way we could stay small, and also it insured that the librarians in the using departments became involved from the very first.

Our small staff made up in dedication for its size. However its size was partly because Jim was always a hands-on person and liked to do things himself. He was also a strong believer in the mythical man-month theory -- which stated that the more people you throw at a project, the long it takes to complete the project.

Of course, we wouldn't have minded having more money to work with -- in fact during the entire 23 years we had control of NOTIS, we never had our own secretary, although we theoretically shared John McGowan's secretary. So we mostly did our own typing (and keep in mind this is before the days of word processing).

During the first few years there just Jim and I made up the development staff.

We were always a low-budget operation. Any money John McGowan managed to wheedle out of the University Administration usually went for equipment and even then we never had enough terminals. For many years a group of six terminals in the data center and two in Serials and one in Circulation were all we had. It wasn't until after I retired in 1991 that every cataloger got a dedicated NOTIS terminal.

Unfortunately the lack of terminals meant that we couldn't get rid of paper products as fast as we would have liked, but we solved many of the demands for even more paper products by the simple question? Who's going to pay for it?

Even when the University Administration did give us some extra money it was often on the condition that we "pay it back" by not filling vacancies or dropping other services.

Because we were so short-staffed it required almost superhuman effort on all our parts, but this was particularly true for Jim. Any number of years might go by with Jim taking, at the most, two or three days of vacation. And he was working in the library 10 hours a day, 7 days a week.

We didn't always do things perfectly. Documentation was always a problem, particularly in the days before word processing, although probably not any more so than in other operations of similar size and complexity. I must say, however, that Jim's program documentation and computer operator manuals were always models of clarity.

On my part I usually managed to write fairly complete sets of functional specifications. The problem was keeping them up to date, since so many modifications always occurred during the actual design and implementation.

Betty Furlong was in charge of user manuals, and she did a very good job, considering the scope of operations, particularly in later years. These were always supplemented by NOTIS memos. Karen Horny and Betty Furlong always insisted that they be notified by ISDO in writing, and then Betty would prepare what was called a "NOTIS" memo which was circulated to all affected staff.

Of course we had the same problem then that you have today -- that staff tend not to read bulky manuals and batches of memo's, relying on their neighbor's memory, which of course was often wrong.

Then there was the problem of training new employees. Betty Furlong did yeoman service here, but it was never enough.

One of the biggest problems in training for a system that serves multiple departments was to condition people to think, not just about the needs of their department but about the implications on what they did (or didn't do) on staff in other departments (and eventually of course, on library patrons).

We struggled with this problem for years (and I'm sure its still a problem.) To convince one department to take responsibility for another department's requirement required a tremendous amount of inter-departmental cooperation and good will.

But, overall, what came out of our experiences is that you shouldn't underestimate the ability of intelligent dedicated workers to learn and adapt to new ways of doing things.

I remember Allen Veaner, a highly respected expert in automation because of his experience with BALLOTS at Stanford, insisting that "tagging" and coding catalog copy was neither feasible nor justifiable from a cost standpoint.

Getting back to development staff issues. One of the problems with adding additional programmers and analysts is that you have to train them. And we didn't have time to train them. In some cases we learned to our sorrow that a typical programmer analyst, with experience in the business world with its emphasis on hard, mostly numerical data, could not always make an easy transition to a system where records are variable length, fields are variable length, subfields are variable length, and even the length of printed products was completely unpredictable.

I remember, in the very early days, turning the specs for simple "worksheets" over to a programmer. Six months later she quit, with nothing but a shoe box of unusable punched cards to show. Unfortunately at that time we were relying on programmers in the Administrative Data Processing Department, halfway across campus, and there was no way we could monitor her product, and I'm sure she was too embarrassed to admit that she was having problems.

It wasn't until we had set up our disastrous marketing operation that we got a couple of extra positions using funds allocated by the University to the Marketing function. However in many ways matters got worse. Keep in mind that NOTIS was never developed with marketing in mind; we had always been able to decide on a reasonable time frame for what we were doing, and we often came up ahead of schedule. And when we finished, our programs had been thoroughly tested, both for functionality and efficiency.

Now the situation changed. Marketing people want commitments that suit their marketing purposes. They refuse to accept time estimates such as "as fast as we can." They are always concerned about losing a sale if delivery cannot be made almost instantaneously. And they are often less concerned about elegance of design, efficiency of operation, and thorough testing, than getting the product out the door.

Needless to say, these were bad times for us in the Information Systems Development Office.

But that's enough moaning about marketing woes. Let's get back to the fun days.

I said earlier that we had to take many shortcuts in order to get by with a small staff and a low budget, although we made up for it by hard work, dedication, and a sense that we were real pathfinders. I still remember the days when Betty Furlong, Karen Horny and I (they called us the TROICA) would sit at a terminal, trying out ideas, getting so excited that a casual observer might have thought we had just discovered the secrets of the universe.

But there was one shortcut we did not take, that, looking back, I can see how invaluable it was.

John McGowan, who came to the Library from Franklin Institute, was a strong believer in the technique common in the 50's and 60's called work flow analysis.

So when I first came to the library, my first assigned task was to learn everything I could about the manual library operations (which of course was all we had). This was a good thing because I knew next to nothing about what went on behind the scenes in the library.

So I spent the first six months interviewing almost every employee in the library, from the director of the library to the lowliest clerk who paged pockets in books. I documented their tasks, collected copies and samples of every document they used; and used these to prepare a detailed flow chart of all library operations, with special attention to exception identification and handling.

It was a tremendous learning experience--far better than I could every have gotten in a library school. In fact far better than I could have gotten from years working in a library, given the fact that few jobs allow an employee to acquire more than a superficial knowledge of what goes on in other departments.

Even today, I highly recommend that whenever a person is brought in with automation responsibilities, that no matter how glittery his data processing credentials, that he be provided with time and with access to the people who currently run the library so that he can learn about the library in its totality, before he starts developing systems.

In my mind, its not enough to simply talk to management level people about their goals and objectives. Even though they sometimes know the nitty gritty details, they often don't understand the importance of what seems to them minor deviations from standard practice. Only the workers know these, and they have often developed their own indiosyncratic ways of coping with problems, but these problems are often symptomatic of trouble at a much higher level in the chain or authority.

Early last spring, when I first agreed to talk about how NOTIS got to its current state, I thought it would be a piece of cake. I was wrong.

Not because there was any shortage of things to talk about -- the problem was that there was too much. To avoid putting you all to sleep, I would need to share with you some anecdotes that I hope will give you a flavor of what it was like in the early days. By the term "early days" I shall be referring primarily to the period from 1967 (when I first came to Northwestern) and to the end of the 70's, since this is the period when almost every thing we did here was something that hadn't been done before.

But rather than just reel off a bunch of anecdotes about our trials and tribulations, successes and failures, I like whenever possible to relate those personal experiences to the development of the principles, policies and practices that have contributed to the longevity of NOTIS and which were responsible for the fact that you are all here today.

Plus the fact that many of the principles and policies that we found useful back in those days are equally valid in today's environment and even for the future, although some libraries are still ignoring them, at their peril.

But I'm going also to make every effort to tell you about our mistakes. Because we learn not only from our successes but from our failures and our close brushes with failure. And we had our share of the latter. Many mistakes were due to the fact that we were traveling in uncharted territory, long before the days of tested standards, and long before equipment with today's power was available. Also, particularly with serials, I was somewhat naive. But no more than a lot of others. The few brave pioneers who, like us, had great plans, were also, like us, far from demonstrating the workability of those plans. Some of these early pioneers in library automation made mistakes that were fatal; perhaps by virtue of good luck, stubbornness, or maybe just because we were such a low budget operation that we were not very visible, we managed to recover from most of our mistakes so that we survived and eventually, proved a very important point, which was that local systems were practical, and in fact essential.

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But before I get into the factors that helped us survive in those uncertain times I think I should explain where we started from, so you can get an idea of how far we have come.

When I came to Northwestern, even though I was "experienced" in terms of the standards for systems analysts in those days, I literally had no knowledge of what was required to make a library run. What I encountered, at Northwestern, and I am sure this was typical of most libraries, even the very largest, was an environment which was literally untouched by technology. Ordering was by means of multi-part 3x5 order slips, with one copy filed in the public catalog, one part filed by fund, and one part by vendor. All serials and continuations were controlled by kardex files; circulation was completely manual--with book cards containing the author/title and call number and user's name filed by call number, with clips to show due date. The printed NUC was the primary source used for locating copy. No cataloging in



publication. Only the printed NUC. So if we were able to locate the LC card number, either in the books or in the unbound supplements, we would "order" card sets from LC.

This was looked upon as a great advancement, although in many cases it meant holding the book for weeks before the cards came. Of course when the cards came they had to be matched up with the book. Unless we could get cards from LC, then using manual typewriters and mimeographing machines, sets of unit cards were produced. Regardless of whether we had LC cards or mimeographed cards, they all had to be overtyped and the call number added. Also, if the book went to any of a number of branch and departmental libraries, sets of cards had to be prepared for the catalogs in these locations. The physical processing was also a manual process, with book cards typed, and call numbers added to the spine with a stylus and some type of heat soluble solution.

And here I am, one poorly prepared individual, thrust into this situation with no job description, no plan of anykind except that the university wants to "automate" the new library library that was being built at that time. In fact, my boss at that time, John McGowan the associate librarian had been brought in with that directive by the University. However, just how it would be done, he had no idea, and other than a small commitment of funds, there was no long range commitment to support.

That sounds like a prescription for failure doesn't it. In actual fact it was a blessing in disguise to come into an situation where there have (as yet) been no failures because nothing had been tried, so that, even though many on the staff were uneasy about what what automation meant in terms of their jobs, had no bad experiences to point to and support the claim that it wouldn't work. Even today, its easier to get something going if you don't have any "legacy" systems to consider. Also it gave me some leeway to learn what libraries were all about.

I was given a free rein to visit every department and talk to every employee--both librarians and support staff-- to find out what they did and how they did it. So I spent the first six months analyzing and documenting everything in the library--it was better than any training I could have gotten in library school. And at the same time I got a feel for the culture of the library--where I could find support and where I couldn't. But in fact I found very little resistance--rather simply passivity. The only person I felt who would have liked to actively derail the operations was, fortunately fired soon after that, not, however because of anything having to do with my project, but just because she had long been a thorn in the side of everyone.

In line with my desire to tie together what we did, with the principles and policies that contributed to our success, I should say that this completely open access that I had with the individuals actually doing a job established a pattern that was maintained from the first day to the last day before my retirement, in May 1991. Without such open access we could never have gotten what we did done with so little in the way of staff and financial resources.

So, anyway, as a result of my analysis and based on what I thought would have the most support by the most people, I chose to tackle catalog card production as the first module of what would eventually be incorporated with acquisitions and later circulation. I thought at the time that this was the right progression. The timing of this decision also coincided with the development, by LC, of the MARC I format, and in fact, the University of Chicago was already in the process of developing a system to produce cards. This was, however, before the availability of the MARC tape subscription service.

This ambitious plan was the result of my training at the Chicago Board of Education where I had worked with a group of consultants from GE who were way ahead of their time in insistence on "total" systems, with all parts "integrated." My analysis of the operations made it very obvious that almost every operation in the library was closely linked to at least one and usually more operations, and that doing them in isolation would not result in achieving maximum efficiency. My analysis also made it clear to me that only an online system, one in which events were recorded just when they occurred, was essential if

efficiency was to be achieved. Now both of these ideas were simply not the widely accepted at that time, definitely not in libraries and also in most business operations. For example, those libraries who had developed little batch programs for ordering monographs thought they were great, and what few circulation systems existed were all batch, perhaps relying on data collection devices, with incredible stacks of paper, with data that was old before it was printed.

Since I warned you that I wasn't going to stick to any rigid chronology, I want to mention this whole idea of integration. It wasn't for years that even the so-called "library automation experts," accepted the idea that integration was possible or even desirable.

While I'm on the subject of integration, I can't resist mentioning the skepticism that we eventually ran into about the practicality of library-developed systems versus the so-called "turnkey" systems that eventually started hitting the market. Most people in libraries were convinced that the best approach was to wait for such turnkey systems, which they expected could simply be plugged in and would run by themselves. The vast majority of people still don't understand that just because you buy a piece of hardware that it doesn't always come complete with all the applications.

Unfortunately, even when a few library turnkey systems began making their appear, it wasn't until some time had passed that simply because they were relatively inexpensive they simply could not work on the large volume and the complex data types needed in large research libraries. Almost invariably they covered only a single-function. They could be linked to other operations only very crudely. Of course, by the late eighties this was changing, but in the meantime buyers of these systems limped along with only marginal benefit from automation.

By the end of this analysis and planning stage I was beginning to worry about who would be doing the programming and on what equipment. As John knew from the start, even though I had done considerable programming before I came to Northwestern I considered myself basically an analyst, concerned with the functionality of the system but in no a specialist in hardware and software.

Fortuitously, just at that time, Jim Aagaard, came to our rescue, bringing with him his wide knowledge of computing on campus and the earned respect the University Administration and faculty as well as that of the staffs of the small University Data Processing Department that was responsible for systems such as payroll and budgeting.

I realized immediately that this would give me a chance to do what I was best at and for him to do what he was best at. I can't stress enough that, even then, the team approach to a big job was essential and how important it is that the aptitudes and interests of members of the team be complementary, and that there be frequent and complete communication among members of the team. I read about "groupware" these days, but I always wonder just how effective it is unless backed up by verbal groupware.

I want to get back to the importance that having systems and programming people having minute by minute access to library staff. Sometime in later 1969 John McGowan decided that what was needed was a "pilot project," a small operation where the system could be developed without disrupting the library staff in the main library. The small library in the Tech Institute was selected as the site.

I shall be eternally grateful to John McGowan for the continued support he gave us, but I definitely believe this was a mistake. Now we were cut off by a quarter of a mile from the main library, and the carefully cultivated relationships became less close. It was also a case where out-of-sight is out-of-mind, and hence the automation project and the automators were essentially forgotten about for two years. In the meantime the small staff on the pilot project sat over there and worked with no real understanding of the big operation that would eventually have to be addressed.

As you can see, I am not a believer in pilot projects -- modular development, yes, but building a system with too small objectives is as bad or worse than trying to build for too big a system. But luckily, what I consider the year that I consider least productive stage in the 25 years I worked there, actually worked in our favor.

During most of the time the pilot project was in operation, we were working on the development of a system to produce catalog cards. Unfortunately, we were aiming at what was the only format available at that time -- MARC I. Fortunately, however, the new University Librarian, Tom Buckman, decided that, in order to demonstrate the feasibility of automation, we needed to have a circulation system up and going by the time the new library opened (barely 9 months from then). So cataloging went on hold and all efforts were switched to circulation. Due to superhuman efforts on Jim Aagaard's part and also yeoman service by the senior supervisor in the main circulation department who undertook to create punched book cards for nearly a million books in the main library, we had a system of sorts (primitive by today's standards but miles ahead of the pack at that time). It was not only online, but it was also self service. Unfortunately the only access was by call number. We had no choice at the time. We had neither the time nor the money to support adding any bibliographic data, and the only device we had for input would only accept 40 characters from a punched card anyway. It was also an exception system, something no one would dream of designing today, but the only thing we could afford given the cost of online storage and its relative slowness.

But to make a long story short, we had an operational system up and going on January 19, 1970, the day the new library opened. Only one terminal, though, and IBM badge/card reader. And we had a near disaster the first day. The 1030 fell over, flat on its face. We picked it up, and wonder of wonders it still worked.

And Tom Buckman was right. By having something as visible as an online self service system in operation, it immediately identified the library as being successful in automating the library. If we had followed my original plan and gone for catalog card production first, the produced cards that looked like a typed card, neither the public nor the University Administration would have been as impressed, or as willing to support other library automation related projects.

Something else happened during the early days of the circulation system that I think bears my telling you about. In the 60's and seventies, conventional wisdom was that the best way to bring a new and untested system up was to operate it in parallel with the system it replaced (in this case the manual circulation system). Sounds like the safest sanest route to go, right? No. Particularly not if you are bringing up an event driven real time system, in one event impacts the next and it impacts the next, and where any deviation from the progression of events in order or timing throws everything up for grabs.

Even if we had had twice the amount of staff we had, and even if they had all been trained for weeks in both the old and new system, we couldn't have kept control of the situation, because, if only the book can trigger an event, how do you make that one piece go two ways, particularly if you don't know where it came from.

The moral of the story is don't ever let anyone talk you into parallel operation to test the implementation unless there is no time dependency involved.

Following the successful implementation of the circulation system in the main library, it was time to get back to cataloging and acquisitions. The new librarian had brought in a bunch of new librarians, some of whom weren't afraid of tackling new ways of doing things (maybe partly because they too were naive).

But anyway, we had a lucky break. During the year we had been diverted from cataloging by the circulation system, MARC II came into being. Of course it too was almost untried, and besides it only included monographs, but at least it appeared to be able to handle the complex data needed for

bibliographic control. Also, of course, it had been designed basically as a format for use in producing catalog cards of the type distributed by the Library of Congress.

Here's where I made a decision that could have derailed the whole project, but fortunately didn't. Because, given my background, it appeared that acquisitions was a "natural" for automating and for piggybacking on bibliographic data, I agreed to include acquisitions in the first phase of the system, even though this went against my training which required designing the whole, but implementing it in pieces. My biggest mistake, however, was yielding to pressure from the then head of technical services to include serials cataloging, acquisitions, including check-in. I should have had my head examined. Not only was there not a MARC standard for serials, but the whole idea of "holdings" was not even being talked about in library circles.

But we tried! We augmented the Books format with what we thought would be needed for serials. And we added to be bibliographic data "order fields," receipt fields, and "payment fields."

Actually, predicting what we would need for bibliographic data for serials we didn't do too bad a job. Holdings, particularly for loose issues, I'd like to forget it.

Fortunately, from the standpoint of serials, there was a silver lining. At least we got into machine readable form, in a near-MARC format, about "current" 15,000 serial titles, using the catalog cards in conjunction with the KARDEX. We did it with typewriter terminals, one line at a time. If you made a mistake you had to retype the entire line.

And I learned a lot enroute, enough to make me really appreciate how much more complicated it was to process serials than monographs.

But to make a long story short, catalog card production worked really quite well. The real worries that technical services administrators had had about training users to do MARC tagging proved that yes, it wasn't easy, but catalogers learned faster than had been feared. The real bottleneck was 1) getting the data (by this time IBM was sending out proof cards, which we interfiled. When a book was ordered or received, the file of proof cards was searched, and if found, manually "tagged" and converted to the database. Of course the input device was abominable. We had had the selectric balls used by the 2740 typewriter terminals modified to add a few diacritic characters, but foreign language materials were still a real pain.

By this time IBM had come out with a library print chain, so at least we were able to print cards reasonably well. Of course, no laser printers, like today.

Also, access was by means of a search key only. This worked, but barely. The problems with us were enough to reject for all time such contrive search keys.

Also, because online storage was so expensive, we had to transfer bibliographic and holdings records to offline tape storage, after cataloging had been completed for a specified period of time. This, of course, meant that if added copies were acquired, the record had to be re-input, creating duplicates that it took us years to get rid of once we were freed from storage constraints.

Production of purchase orders was also achieved, although accounting had to wait for quite some time. We were, however, to produce the punched book cards used by the circulation. Multiple use of bibliographic data and production of circulation cards were two very small, but significant, steps toward the goal we always had in mind, a total system, and one in which there was minimal duplication of data.

But serial check-in was another matter. It was soon very clear that it simply wouldn't work, so we just gave up. But we did continue to produce new serial orders through the system, and to produce serial catalog cards.

The above sounds pretty primitive, doesn't it? And it was, by today's criteria. But keep in mind it was state of the art at that time.

But best of all, it showed us once and for all, where we should be going, and what we had to do to get there. We realized, even in those early days, that some remote bibliographic utility that merely pumped out catalog cards at truly exorbitant prices was not the way to go. We all became die-hard converts, early on, to the idea of local systems.

It also made us appreciate, long before most of the library world became convinced, of the important of development to national standards both of format and of cataloging, even if we sometimes thought those standards were more demanding than we sometimes needed. I can't even imagine what the Babel that would exist today if every library had its own format--which almost happened in some areas such as serials and did happen, haunting us today, with detailed holdings and circulation data, which almost no one can exchange with any degree of efficiency.

But not only were we early supporters of data standards, we were also strong believers in the sharing of bibliographic data and the need to a truly "national" bibliographic data base that would reflect the cataloging and the holdings of all participating libraries. As early as 1973 I wrote a position paper which John McGowan presented at a national meeting proposing that, sited at LC, there should be such an online "union" catalog.

Also, we were one of the original participating libraries in the COMARC project, in which we sent our original cataloging records to LC. For reasons I've never been sure of, but think it was mainly because LC was not equipped to process them and add them to their database, this project went nowhere.

We also tested the waters to see if we couldn't get a state-wide online union list of serials set up, in cooperation with the University of Illinois. This too, went nowhere.

I think the concept of "online" it was just too foreign for most people at that time. Because, at that time, whenever you spoke of union lists of serials, people assumed that, even though the original data might be in computer form, the main reason for its being was to produce a printed union list of serials.

I found this concentration on the printed document to be true even at the national level. I was a member of the precursor to the CONSER group, and here again they were thinking "print." In some sense it was just accidental that CONSER grew as it did -- it was only when so many libraries got on OCLC that it was clear that online access to a relatively up-to-date list of serials was much superior to printed lists that were out-of-date even before they were published.

Talking about OCLC, this brings me to the issue of why, since we were so committed to cooperation, that it took us so long to join.

There were many reasons, but only two main ones. The first reason was the fact that OCLC did not (and still does not) provide full processing support and did not have a circulation module, and we were absolutely convinced that birth-to-death control of library materials could only be done on a local system. But secondly, there was the question of cost. In those early years, OCLC charges for producing catalog cards (it could do nothing else), was two and three times what it cost us to use and maintain the LC MARC subscription files. Further, we knew from our own fledgling system just how ineffective search key access was, and OCLC was years away from having better access. Next, but not last, OCLC's response time in those early years was incredibly bad, and we were used to split-second response time. Finally, in those years, the only way we could have gotten back our data was on tape. Not good enough. Couple that with the fact that OCLC did not even have any plans to accept data from participating libraries except using their terminals. They almost dismissed out of hand, that there could ever be full service local systems, with which they would communicate in a peer-to-peer relationship. Most of this is not to fault

And then there was Janet Hill. Janet chaired the committee appointed by the librarian to decide what to do about the catalog with the coming of AACR2. Without Janet's conviction that an online catalog was the way to go, and without her ability to convince others of that, I doubt that we could have gotten the support we needed from either the Library administration or the University administration.

I'd like to close with a little tale about risk taking.

Also, I mentioned earlier, that w

But before I get into

Coming to Northwestern as I did, in January 1967, to find an organization totally lacking in technology more advanced than typewriters and mimeographs, eSurely, I thought, working had no idea it was going to be so hard to cover a project that has been 27 years in the making.

I think only OCLC share the record that a single system has been in operation so long.

Looking back to January 2, 1967 when I first signed on with John McGowan to see what we could do about automating the "new" library, I had no idea that the day would come when I would be talking to a user group of this size.

In fact, if I had, I wonder if I would have had the courage to start.

the matter is that

Coming back to the importance of risk taking, I'd like to end with a little story.

On January 19, 1970, the day the new library first opened to the public, we brought up our first operational module -- an online, circulation system. During most of December, while we were getting

OCLC. They were doing the best they could given the technology available to them, and also given the myopia of most of their users. And who can blame them, given the incredible success they were having as the only practical source of catalog cards.

Finally, sometime in the seventies, I forget just when, RLG became a factor, attempting to compete head-on with OCLC. They too learned to their sorrow that acquisitions, cataloging data and circulation control is not practical to be done at long distance. They were, unlike OCLC, more amenable to the idea that we would supply our data to them in machine readable form. And they even early on recognized the desirability of being able to "send" a record in MARC format directly to the participating library, rather than batched on tape.

All this ties in with the fact that what we were really waiting for was for LC to face up to the duty of developing an online national union catalog.

Good thing we didn't wait any longer than we did.

I mentioned the early preoccupation with paper products. Do any of you remember SADPO. Sadpo was the acronym applied to the automation department of the New York Public Library. By sometime in the mid seventies they were publishing book catalogs. Very very impressive, particularly since, as I recall, they also included cross references and hence they were the early "experts" in authority control. I just checked the other day, and it appears that, for all intents and purposes, just small specialized collections are appearing in book form, mostly done, I believe by G.K. Hall.

But at that time, everyone truly looked up to that group as being the best of the best.

Well, trends come and trends go. But I also remember when RLG was promoting book form catalogs.

Talking about the demise of paper, whatever happened to the printed NUC?

I'm mentioning this emphasis on paper products, because it was one that we were faced with, even in the late seventies and early eighties, before all departments began to have a sufficient supply of terminals. People kept coming and wanting book catalogs of one type or another, acquisitions lists, etc. If we had responded to all these demands we would never have gotten anything else done, especially because everyone wanted a different sort order and a different selection criteria, and a different format.

Fortunately, Jim, who was always better than I was at putting his foot down when someone demanded a service that benefitted only a few and for which a better solution existed, managed to cut most of these requests off at the pass.

It wasn't only book catalogs that were big in the 70's and early 80's. COM catalogs were all the rage. I can thank the reference staff for not letting us go down this path. They regaled me with stories about how users hated Microfilm, and how the equipment was always breaking down.

One other story that shows how an event that seems to create unsurmountable problems can turn out to provide a real opportunity. Take AACR2, (which I'm sure a lot of catalog librarians would have liked to live without). In our case, it gave us a real opportunity (and perhaps the only one we would have had if we had not grasped it) to make the big step to an online patron access catalog.

I'd just like to take the opportunity here to mention how important it was, all along the way, to have staff that are not averse to taking risks. Jim Aagaard, of course, once he had thought about an idea, and had convinced himself that it was doable, never passed up a challenge.

But I'm also thinking about Karen Horny and Betty Furlong, who, especially in the 70's were as excited as I was about taking on some interesting project.

ready for moving the books in the old library into the new library, we had asked that patrons not return their books.

John McGowan went along with the conventional wisdom

Actually, being naive about an operation, and admitting your naivete, is an advantage. It allow you to ask dumb questions.

The people I learned from had to be very patient with me

I remember what a struggle it was to learn the differences between a serial, a monographic set, and a series. And then, compounding my puzzlement, what was the difference between a classed together, unanalyzed serial, and a classed together, analyzed series and a class set series. And heaven help the poor beknighted analyst when a librarian starts explaining what a partly analyzed series is, or why it is that the same physical piece will sometimes have multiple cataloging records, one for the piece as a whole and one for each of a number of sections in the piece, -- in analytics.



And what about the "bound-withs" -- and the multiple versions -- it goes on.

And always the question, still not satisfactorily answered from my viewpoint, is when is something cataloged and when is it not?

But another important aspect of this preliminary analysis was that it enabled me to get to understand the culture of the library and to establish a personal relationship with the individuals I interviewed, helping somewhat to allay any fears they might have had as to what the impact of automation on their job would be.

But most importantly, it established a precedent, which was maintained for most of the 25 years I was associated with NOTIS, that enabled me, as an analyst, to have wide open access to any member of the staff, at any time of the day, about any subject.

Staff got used to seeing me pop, unannounced, into their department, go up to someone's desk and start asking questions. This openness dispelled some of the uneasiness that comes about when you feel that some mysterious plot is being concocted in the inner sactum of the systems development office.

For example, I might march into the head cataloger's office and ask

What the heck is a uniform title, and how does it differ from an author/title heading. These are not trivial questions. Knowing things such as this in advance can make the difference between having a viable system and one that must be scrapped.

Sometimes, I'm sure, my charging in on these busy people was disruptive. But in the long run it saved everyone time and effort and frustration. Questions of this type could never have been resolved in a committee environment.

Many of the policies and procedures we developed over the years were born of necessity, not choice; however luck and timing played a part.

For example, because I believed strongly, from the very first day, in total systems, with minimum redundancy, implemented modularly, online, real time, and as paperless as possible, I determined that our first "module" should be cataloging, since without some way to identify a piece you can neither order it nor circulate it. Actually, I should say catalog card production, rather than cataloging, since the concept of an online public access catalog was something that did not come to mind as being feasible until the middle of the 70's.

At the time I decided that cataloging should be the first module, in 1967, the only model we had to go by was the MARC I format. The University of Chicago, Stanford, and NYPL had been involved in the design of that format and were experimenting with its use. In fact the University of Chicago was deeply involved in designing a cataloging system.

We even went so far as to begin experimenting with inputting records in a modified version of that format.

However, sometime just prior to 1969 Tom Buchman, the newly appointed University Librarian decided that we needed an application that was more "publicly visible" than cataloging, and we needed it by the time the new library was scheduled to open, in January of 1970.

So we dropped cataloging temporarily and went full speed ahead on designing a circulation system, which of course, from the standpoint of library patrons, had a very high profile.

This decree from on high meant that we had to quick rethink our module design, with its emphasis on using one system as a springboard to the next.

I won't dwell on circulation except to say it was an unqualified success, especially the self service aspect.

But talk about luck. By the time circulation was up and going the MARC II format became available, and even though it only included books, it was clear that it was vastly superior to MARC I.

I can't go on without mentioning serials, which were not included in the MARC II format.

I mentioned how serials, as a result of a chance meeting in the hall, got included in our initial plans for cataloging and acquisitions.

I can only repeat what I've said that this was a wise decision, even though the early versions of the system had serious deficiencies, because it was the only way we would have learned what it was we really needed.

I should speak a moment about cooperative efforts on our part.

Even though it took us years and years to make a decision to become a fully participating member of a utility (and we still aren't 100% there) we were committed to cooperation from the very start.

In the early 70's we worked with the University of Chicago to see if we couldn't work out a method so that we could exchange records. That failed, primarily because, by that time we were using the MARC II format, and Chicago was still using MARC I.

We were one of the early contributors to LC of Comarc records. That failed because LC had no way to effectively incorporate records in MARC II format into their database.

We were active in trying to convince LC to develop a truly national bibliographic network, with online access for everyone. I remember writing a position paper in 1973 proposing this which John McGowan presented at a high level conference in Washington. This came to naught because LC was limited by its charge to be primarily a congressional library.

We we even involved in the task force that predated the Conser project. Again we were proposing online, with the task group was still thinking only in terms of printed union lists of serials.

We also tried to spark interest in an online serials database for Illinois, as proposed by AL Trezza, then Illinois State Librarian. This failed because the idea of online was too scary for the folks at the University of Illinois, Urbana.

And Jim was, for a number of years, on the committee that was supposedly going to come up with protocols to link disparate systems.

As many of you are away, however, Northwestern was very late in joining a utility. Both Northwestern and the Utilities are to blame for this -- the utilities because they didn't take full-function local systems seriously, and Northwestern because we were so enamoured with our own system and its cost savings, that we didn't really give the utilities a chance.