How To Murder Your PBX

Water Damage: Personnel and equipment affected by broken water main.

Charles Burns, Elk Grove Unified School District

The Disaster

On December 28, 1992, I arrived at work to see water gushing out of our basement windows. I knew right then and there it would be an interesting day. Little did I know that it would be an interesting month.

The basement of our 65 year old district office building houses the electrical power distribution boxes for the complex, telephone PBX, numerous pieces of data communications equipment, telephone system cable plant, voice mail system and is also our microfilming staging area (over 2 million documents).

Amazingly enough several remote school sites were still merrily working away, entering attendance and enrollment as though nothing was amiss. Turns out that their data communications channel interfaces were above the water line!

We had five and a half feet of water in the basement, with no moisture detection system to shut down the electrical equipment. When the two inch water main blew, it only took a few minutes to fill the basement with electrified water (a very dangerous situation indeed). We are very thankful it happened early Monday morning when no one was there. The electrical panels were smoking when we finally shut down power to the building.

Almost forgot, it was pouring down rain all this time. Since the building had no power and no phones, we sent everyone home. That week in between Christmas and New Years when we all get so much work done turned out to be a disaster week instead of a productive week.

The fire station next door loaned us a monster pump and we punched a two foot diameter hole in one of the windows, shoved the hose through and pumped like mad for about 20 minutes. Of course the basement turned into a whirlpool with 2,000,000 pieces of paper making the biggest papier-mache blob you could ever imagine. Actually only a few thousand sheets got sucked up into it, most documents were in boxes that just began floating around with the furniture (old wooden tables and chairs).

Our maintenance guys found the leak and patched it up, and I went off to a local coffee shop to meet with our phone company, Citizens Utilities.

To give you some background, our school district is 320 square miles with 32 schools and several remote offices (warehouse, transportation, etc). We have a data network that connects our HP super mini's with all schools and we have several LAN's which are connected over ADN circuits. We also have a single T-1 circuit between our district office and warehouse which is about

CEDPA Information

CEDPA is an association of Educational Data Processing Professionals within the State of California. Founded in 1960, the major emphasis of the association's activities are directed towards improving Administrative Information Processing in public education within the State of California.

CEDPA is a California non-profit corporation, as recognized by the Internal Revenue Service.

As cited in CEDPA's bylaws, the purpose of this organization shall be:

(a) To provide information to the California public educational community concerning educational data processing via dissemination at an annual conference and through periodicals and special interest seminars.

(b) To foster the exchange of knowledge of educational data procssing concepts, systems and exprinces between educational data processing installations and other associations both at the state and national level.

(c) To inform the association membership of important information concerning educational data processing.

(d) To provide recommendations to the State Department of Education, State Legislature, school districts, County Offices of Education and other public educational organizations concerning educational data processing.

(e) To develop professional standards for the Educational Information Systems Community within the State of California.

Yearly membership in CEDPA is granted to attendees of the Association's annual conference. Individuals interested in the Association's mailings may request to be added to CEDPA's mailing list by writing to the address below.

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Major Trauma Ahead!!!

Ventura: Forthcoming move produces strained planning sessions and a hope for Windows.

Judy Acosta, Ventura County Office of Education

How many of you have ever made a move from one facility to another while working for the same organization? This is a first for me, and as of yet it is far less than a totally pleasant experience, and we are months away from the actual move!!!!

What once seemed to be an adequate amount of space for designated staff members is now not large enough at all. What happened to all that square footage? What happened to the original plans that I was relatively pleased with? Everyday there seems to be a reason to move someone to another location, or someone needs more space, and the whole plan gets modified.

Who gets the window offices? This may seem like a small question, but believe me, it's not. For this department to even be close to a window is amazing. At our current location, we don't even know whether the sun is shining or not.

Tempers can really flare at the planning stages and personalities come into conflict. Imagine how they'll be when we make the actual move. Just ask my boss how strained some of these planning sessions can be.

To really complicate matters, we will be implementing a new system and in the process of designing another at the time that we are supposed to move to the new facility. This does not allow for a great deal of time and thought to go into taking what you really need and discarding what you really don't need. Imagine the technicians who have to disconnect and reconnect all these personal computers in this large two story building. Who gets priority??? After all, everyone is involved in the design, programming, or support of the new systems and thinks that they should be first. I'm sure glad I don't have to hook all of those computers up or decide "who's on first."

Like all stressful things in life, this too shall pass, and it will be nice to be in a newer building. If everything works out as planned, we will be in the new facility by CEDPA Conference time. Maybe I'll be an expert at planning and moving by then, and can give a breakout session on how to avoid some pitfalls. If any of you have any good suggestions, please let me know.

Microcomputer SIG Chairperson Named

Warren Williams, Coordinator of Technology Resources for Grossmont Union High School District, has been appointed Microcomputer SIG chairperson for CEDPA. Warren brings to CEDPA his extensive background and expertise in microcomputing and networks. CEDPA welcomes Warren and appreciates his support.

Due to the timing of Warren's appointment, the board has decided to forego the North Microcomputer SIG meeting this year. The South meeting is now in the planning stages. The meeting will be held on July 14 at the Red Lion Hotel in Costa Mesa. If you plan to attend and have specific topics you'd like discussed, please contact Warren at (619) 593-0332, or send him a note at Grossmont Union High School District, P.O. Box 1043, La Mesa, CA 91944-1043.

Internet Addresses Published

Due to the increasing popularity of the Internet and the use of this international network as the backbone of electronic communication for many agencies and organizations, Internet addresses will now be included in authors' bylines when they are known. Internet addresses for CEDPA board members who have mailboxes are now included in the CEDPA Information on page 2 of *The DataBus*. If you need to communicate with board members, you can now use the Internet to send E-mail to those board members who have Internet mailboxes.

SISNET News

CSIS, Attendance and The Internet: discussions draw over 50 to Sacramento meeting.

Greg Lindner, Yolo County Office of Education

The April 13 SISNET meeting in Sacramento was attended by 56 people. Quite a turnout! After initial introductions Kathleen Alarid-Barfield from the State Department of Education gave us an update on the CSIS project - California Student Information System. The project is, in a nutshell, intended to allow schools the ability to retrieve and send student records to other schools electronically, thereby reducing the turnaround time to get cum folders. Additionally, the project will provide a basic core data dictionary that can be used to generate state wide reports.

Kathleen is currently working with counties and districts to pilot the project. Additionally, Kathleen mentioned that AB962 and AB830 could have an effect on funding for the project and urged each of us to look at the bills and let our legislatures know which way we stand on them and why.

Joan Gargano spoke next. She gave an overview of the Internet. She then gave some examples of how it is being used in the Davis Unified School District. To summarize, the Internet is a network of computers that use a common protocol (TCP/IP). Computers all around the world are connected via high speed phone lines so that anyone accessing a local connection point can correspond with users just about anywhere in the world. Davis High School has a computer lab of about 30 MACs that are connected to a router (a box that directs network traffic) and a high speed phone line (56kb ADN) into UC Davis. Since UC Davis is a local connection point into the Internet, students at Davis High School have full access to all the resources on the Internet.

One way they are using the Internet is to conduct a world wide experiment on the ozone layer. Each school participating in the experiment measures the ozone layer above their school, records the data and then shares it with all the other schools participating in the experiment via the Internet. Schools across the world are participating in the experiment without ever leaving their sites. All communication is done on the Internet. The Davis students are also accessing the Internet to gather research,

download files, and talk to other students, teachers, and even authors via electronic mail. Needless to say, the classes that access the Internet are quite popular.

John Gilroy spoke next about what's new with Student Attendance. He answered many questions about how this or that should be done and why. He also spoke about what might happen with minimum day attendance but reiterated that we'll have to wait and see. Some things that are on the horizon are SB71 which deals with attendance and funding (you'll need to review this one yourselves!), minimum day attendance - John urged that everyone be prepared for this, and status quo. We'll have to wait and see what happens after the Budget is approved and or SB71 passes. At any rate, John was able to answer everyone's questions!

Other issues raised at the meeting were, "What resolution codes are people going to use to track minimum day attendance at the Elementary level" (most said they would use 4 codes, 1) excused - attended minimum day, 2) excused - did not attend minimum day, 3) unexcused - attended minimum day, and 4) unexcused - did not attend minimum day). Also, a request was made for information on how schools are handling their Healthy Start programs on the computer. If you have information on this, please contact Lisa Downer at Modesto City Schools.

All in all it was a very good meeting. The Host Hotel at the Airport was convenient and the food was plentiful and tasty. Our three speakers were terrific. I really appreciate them taking time from their very busy schedules to meet with us. I also want to thank everyone who attended - having a big turnout like we had really makes the meetings much better since we get a better view of how others are using their Student Information Systems.

Our next meeting will be in August. It will be held in Southern California at a site yet to be determined - (anyone willing to host it?!!). You will be hearing from me before August about the meeting. In the meantime, if you have subjects you would like covered at the meeting give me a call and let me know (916 661-2953).

Are You Hooking Up A Xerox 4235?

Laser: Making it function properly with an HP3000 proves to be a formidable task.

Ken Jones, Elk Grove Unified School District

About two years ago, Elk Grove Unified School District started looking at bringing our laser printer work in-house. Previously we had been using a local agency. They were pretty good about one or two day turn-around but it was expensive and there were problems with occasional delays when the "right" programmer was out of the office.

We found the Xerox 4235 laser printer. It is a mid-sized printer that is capable of 35 pages per minute. Based on our current load, this solution sounded ideal. We also found that Los Angeles Unified had purchased lots and lots of them and was willing to sell their surplus at a considerable savings. The printer was purchased and installed as the system printer on our Hewlett-Packard 3000/947LX in February, 1992. That was the last time anything easy happened.

To highlight the last year's work, here are some of the problems which we have overcome or learned to live with because of our configuration. I have a more detailed paper regarding the solutions which I would be happy to mail or FAX to you if you would give me a call at (916) 686-7797 extension 609.

The Xerox printer is made to work with IBM type computers. It does not play well with HP equipment. The printer has two interfaces, serial and parallel. Parallel connections do not exist on an HP3000 and the maximum speed of a serial connection is 19,200 bps (that's 1,920 characters per second). Doing the math with the number of characters possible on a page, half full pages will print at the printer's rated speed but full pages will be slowed by the serial connection and will only print at about half of rated speed. We don't have a solution for this problem but we haven't had a throughput problem yet.

Hewlett-Packard did a little trick with their printer spooler which has caused us no end of headaches. They assume that any printer which is not manufactured by

Survey of Services to be Conducted

Software: Features and user satisfaction ratings to be published.

Skip Sharp
San Diego County Office of Education

If you are trying to decide whether to acquire a computer software system and you don't know where to turn for advice, help is on the way. As a service to our membership, the CEDPA Board of Directors will be compiling information that should be of great assistance in helping you to decide which product offers you the best solution for your particular problem.

A reference matrix, consisting of features available from various software vendors, and a satisfaction rating for those features (as rated by your colleagues) is in the process of being compiled with a target date of this summer. The purpose of this service is neither to endorse nor refute offerings or claims of any product, but rather to display how the product is seen by those who use it. If you are currently the user of a software system, you will probably be contacted and be asked to provide information regarding your use of the system or module, how it performs, and your overall level of satisfaction with the module(s) that you use. You will also be asked whether you want to serve as a reference source.

The results will be published in raw number format. For example, a student attendance module from The Bugs R Us Company has 25 satisfied users and 10 dissatisfied users, while the registration module from the same company has 2 satisfied users and 15 dissatisfied users. Similar products from Loopfree Software have 42 satisfied users and no dissatisfied users. You can begin to see a picture from this sort of information.

Included in the survey will be information regarding on-going vendor support and the hardware platforms on which the software will operate.

This effort is still in the early stages. If you have suggestions, ideas or would like to be involved in the process contact any member of the CEDPA board.

The California Education Network (CENet)

Technology: Network, now in planning stages, will link all California K-12 schools.

Carole Teach, California Department of Education
(Internet: cteach@mail.barrnet.net)

The California Department of Education (CDE) published the "Strategic Plan for Information Technology" in 1991, outlining a vision of the use of technology to enrich and enhance California's primary education systems. Central to this vision is the use of modern communications technology to bring resources to classrooms and administrative offices. The office of the California Education Network in the CDE is planning and coordinating the implementation of a statewide communications infrastructure, the California Education Network (CENet), to enable schools to realize this vision.

Internetworking experts from California's school districts, county offices of education, and higher education systems have voluntarily joined the CENet team to begin planning the implementation. The group, known as the Technical Planning Committee (TPC), meets twice a month. They recognize the importance of providing students in elementary and secondary schools a technology-rich environment so they will be prepared for their journey into higher education, whether their path takes them to a community college or one of the university systems. The TPC's mission is to plan and coordinate the internetworking of all California K-12 schools in a technically sound, cost-effective architecture enabling schools to equitably participate in the emerging National Research and Education Network (NREN) and in support of instruction, school administration and teacher education.

Members of the TPC have met with staff in many schools, districts and county offices of education throughout California in an effort to understand the communication issues that face local education agencies (LEAs). During these meetings, TPC members also shared information about the plan, design, and implementation of the CENet infrastructure and obtained feedback on ways in which the Department may assist county offices and school districts to connect to this infrastructure and how this connectivity can benefit instruction and administrative activities.

Additionally, the TPC is developing a report which will be distributed to every school district in California. This report will consist of information that will assist schools and districts in their technology planning efforts, including technology models, case studies, designated standards, and training and support information.

For information, please contact J. Vincent Madden at (916) 445-0775 or Carole Teach at (916) 323-1560 or any member of their staff.

Carole Teach is Manager, Office of the CENet.

SIG Meetings Announced

The first **Microcomputer SIG** meeting for this year has been scheduled for July 14. The meeting will be held in Costa Mesa at the Red Lion Hotel, site of the 1990 CEDPA conference. In addition, the South **MIS Managers SIG** meeting will be held on July 16, also at the Red Lion Hotel in Costa Mesa.

The Red Lion Hotel (714-540-7000) is conveniently located in Orange County and offers a free shuttle from the John Wayne Orange County airport. If making room reservations, mention CEDPA to get a $75 rate.

Watch your mail for meeting announcements.

CEPDA Endorses TCP/IP

Recognizing that adopting a communications standard is important in developing a communications superhighway such as that proposed in the design specification of CENet, the CEDPA board of directors recently endorsed the TCP/IP protocol as the communications standard for the CENet. TCP/IP is the protocol standard for the Internet and many other nationwide networks and reflects the direction in network standards for education and research. By implementing TCP/IP, schools in California will be positioned to communicate electronically and access numerous national resources for research and information sharing.

READY! AIM! Aim! Aim! .....

Downsizing: Riverside County Office of Education's strategy is to migrate to an Open Systems platform. This is Part II of a continuing discussion of their progress.

Phil Branstetter, Riverside County Office of Education

Managing a migration effort in a dynamic world is proving to be quite a challenge; it is every bit as complex as we thought and more—what we could use is a few less choices. When the decision was made at Riverside County Office of Education to migrate we had envisioned building staff expertise, acquiring new hardware and software platforms, and gradually converting (or replacing) legacy systems on the existing mainframe over a three to five year period. In very general terms a typical conversion plan.

As we move through the process we have accomplished defining and building awareness among key staff of what Open Systems means to us. We have released and received RFPs for our backbone platforms and consulting services for the migration which we are in the process of evaluating. When we put out the RFP we thought 60 days was plenty to evaluate responses. Sixty days will be sufficient but with precious little time to spare—it's amazing how much verbiage sales forces can generate when they put their Wordprocessors into high gear. The RFP responses have also provided the best information to date on what the scope of moving from a mainframe-based proprietary environment to Open Systems standards-based computing will be. Several key issues have emerged and consequently altered our plan.

First, in evaluating the impact of supporting two environments on staff it is obvious that a long-term migration would be traumatic. Our initial thoughts were that a migration would impact segments of the staff at varying levels during the process with development staff taking the first "hit" by having to learn new tools and doing the actual application conversions. Operations staff would be affected but would have a rather innocuous learning period while systems were being converted but not in production. User support staff would be impacted as applications came into production on the new platform.

What we have discovered is that everyone is going to be substantially impacted immediately. In order to facilitate the migration we need to replace the existing proprietary network protocol. In the original conceptual model of gracefully transfering applications we would have to make applications available from the existing mainframe and the Unix system (our Open System) which immediately affects end users because their logins will be different, screen appearances will be different, there will be network-related hardware changes, etc. Plus add the complexity to our development staff trying to maintain existing systems while reconstructing applications on a new system.

Second, there are 4 zillion ways to accomplish what we are trying to do. A host of vendors with pieces which could arguably fit in our conversion have come forward. Also, news travels fast amongst the vendor circles. Hardware vendors bring in database vendors (or vice-versa), people hear about a conversion and want to present new development tools which seem to be coming out daily, and networking companies (wiring and hardware) are referred to us by who knows who. Our RFP establishes a "prime" vendor to act as a buffer for subcontractors and assist in product evaluation. In approaching products we have generally identified known quantities and vendors as a primary qualification—this is a risky venture and we will minimize exposure wherever possible.

Another key area which cannot be overemphasized and indications are we will have to do a better job in is communicating to our user community what is transpiring and what it will mean to them. We have conducted a "town meeting" introducing Open Systems, we have visited virtually every Superintendent and their Cabinet members to discuss our plans and we have only scratched the surface. Communication is always an issue and these are really significant changes in the works. Communication within organizations is generally a problem and we are attempting to pass information among many organizations. It is also apparent that we need to keep the window of time until, and duration of, conversion as small as possible in order not to lose people along the way.

Our conclusion: WARP speed with the conversion. It will be less painful overall if we aggressively move on the conversion than if we attempt to mask it. Part of our RFP was vendor presentations to a conversion committee. A point made during one of those presentations which struck me at the time as curious but now seems right on target was a comment that if we didn't have a sense of urgency about our conversion to create one. The most successful conversions are those conducted with a profound sense of mission, and no conversion is transparent or even relatively painless. Our current plan has a timeline of 12 months.

San Mateo County Office of Education is Rightsized

Environment: PICK chosen as database and programming language for downsized client-server systems.

Dan Trade, San Mateo County Office of Education

DOWNSIZING OR RIGHTSIZING simply means producing the same or a better product with less resource and less cost, while maximizing the available resources. With school finances being what they are today, now is the time to begin RIGHTSIZING.

This article describes how the San Mateo County Office of Education RIGHTSIZED from a proprietary mainframe system to a client file-server open architecture environment. This is not a trivial move; it is one that requires the full support of your senior management team and the school board.

We made our decision to *rightsize* five years ago. At that time, we were using dual DECsystem-10 mainframes with all applications written in COBOL. We had a DP staff of thirty-six employees and a budget of over 2.5 million dollars. Hardware and software maintenance alone was $230,000 per year.

Today, we have a staff of nine and our annual DP budget is $780,000. This puts more than $1.7 million back annually into the budget to be used by programs that directly benefit children.

Our first major decision was to select our application environment: do we convert our COBOL applications over to a new platform, buy packages, select a whole new environment and programming language or what? Our choice was to scrap everything, redesign and code from scratch. We selected PICK as the database and programming language for our redesign. The major reason for selecting PICK was the wide variety of platforms on which it ran. At that time, PICK was running on Intel 386, 486, and Motorola 680XX processors. This allowed us to do prototyping and some development work on PC's. The PICK relational database, which allows for executing code from dictionary correlatives, was ideal for the complex file relationships we would need in our redesign.

After a difficult housecleaning effort, three programmers were retained. They were sent to Yourdon design and structured programming classes and to PICK programming classes. This was a $32,000 investment, but money well spent.

The next decision was the selection of a hardware platform. Through competitive bidding and selection based on price performance, General Automation was selected for hardware. We ordered two GA modem 8830's with identical configurations. Motorola 68030 processors running at 50 mhz, 32 MB of memory, two gigabytes of disk, 80 terminal ports, and a LAN linked the two machines together.

Nine months since our decision to use PICK, our entire financial system was redesigned, data converted, and twenty-three school districts were on-line (85 terminals). Six months after the financial system was running, our payroll system went live serving all twenty-five districts with an additional 100 terminals. A few other lesser systems came online a few months after the payroll.

In the fifteen months of development, two major and several smaller systems were designed and written. The end result was 700 programs using the latest structured techniques with functional program specifications and complete user documentation, which is in manual form and available on-line to any user while they are within an application.

I attribute this phenomenal development time for only three and one half programmers (I count myself as half a programmer) to the design and structured principles of Yourdon, the business oriented PICK relational database structure, and the power of the PICK programming language.

A major decision that greatly increased our chances of success was to discontinue offering student services. The number of student services clients was diminishing and we could no longer justify the cost of providing these services. Another factor was a mandate from our board to no longer provide services to any out-of-county agency.

With hardware systems of this class, we were able to perform our own maintenance and stock our own replacement parts; this alone saved us $200,000 annually. We also eliminated all line printers and switched all printed output to a Xerox page printer and optioned all user

Rightsizing

reports so they could be printed to a slave printer on a PC or to a district spooled printer or printed in our shop. All reports printed on the laser page printer are printed double sided on a 8-1/2 x 11 inch three-hole punched paper. Payroll and AP checks are also printed and signed on the laser.

Also, we replaced all of our digital data circuits with 56KB ADN circuits and put eight station mini-multiplexers in each district office. At the same time, we rewired the County Office with 4-pair wire to every telephone station in the building and installed a DAVID System digital voice/data switch. This allowed us to connect terminals to the back of our telephone sets and use a single pair of wires for voice and data. The additional 3 pairs of wires going to each station will be used for ISDN and for local networks.

Our final step in moving to open architecture was to replace the GA systems with a SUN Microsystem SPARCstation 10 model 41. We are now a Unix shop, still running our applications in the PICK environment, and have AppleTalk networks, Wide Area Network, and in-house voice over data, all linked together in one neat package. And, the total application environment is still transportable to any vendor's platform that supports Unix.

The conversion from the applications to the SUN took all of five weeks. This points out how easy it is to migrate PICK applications to any hardware platform especially with open architecture and the wide variety of hardware systems to choose from today. I am sure this could also be done with any of the other major relational databases on the market today!

What's interesting about the open architecture environment is the wide selection of products available. You no longer buy from the hardware vendor; you purchase from dealers and distributors. As for parts, you can go to your local computer store and buy fast SCSI-2 controllers or 2.1 gigabyte HP disk drives or anything else you may need. This all equates to better selection, more competitive pricing, and the ability to move from one platform to another with little or no conversion.

The hardest part of the conversion is dealing with Unix. If your staff has no previous experience with Unix, allow plenty of time for training and experimentation. Unix is still a poorly documented unruly piece of software with a total disregard for standards. If the correct appli-

Hooking Up

Hewlett-Packard is real stupid and can't handle the carriage control coming out of our COBOL programs. The spooler does us a favor and strips off the carriage control and replaces it with line feeds and form feeds. The problem is that the Xerox software is keying off the carriage control to do font switching and character placement. We had to fool the spooler into leaving the carriage control alone and it isn't pretty. Hewlett-Packard did not give us the option of turning this "feature" off in the spooler.

The other major problem is that our outside printer vendor was good enough to give us the software from the Xerox 900 that was running our print work. As with many service organizations, getting the job done takes precedence over good software development. The code was a real mess. To compound the problem, some compiler yahoo at Xerox decided to write the 4235 software compiler tightly to the specifications rather than checking what was acceptable sloppiness in their own printers. Lots and lots of code which worked on the 9700 wasn't good enough for the 4235 and had to be rewritten. The 4235 was supposed to emulate the 9700 - NOT!

To make a long story slightly shorter, we are either working around the problems or have solutions to them. If you have HP3000 equipment *and* you are purchasing a Xerox 4235 laser printer *and* you will be bringing existing jobs from some other Xerox printer, WATCH OUT! Call me for technical mumbo-jumbo or just to talk about the problem. There is no need to go through what we did.

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cation software is selected, you won't have to deal too much with Unix once it has been installed.

Our next project is to go down to our friendly computer store and buy a SCSI-2 controller and a couple of optical disk drives to link imaging to the indices of our databases. This looks like it will be a fun project.

Now for the really good news: this is my last conversion. I am out of here in three more years. Hasta la Vista, baby!

Dan Trade is Administrator, OIS for the San Mateo County Office of Edication

Have You Visited Your Library Lately?

Automation: What you find there may be a technological surprise.

Addison Ching, Newport-Mesa Unified School District

In this era of downsizing, some of us are looking for examples of working client-server systems, local area network topologies, cabling, hardware file servers, workstations and the like. Where do we go to find out about these things?

The LIBRARY!

Before you react with "I don't have time to read about theoretical designs — I want to see actual examples!" you should be aware that libraries aren't the collections of card catalogs and *The Reader's Guide to Periodical Literature* anymore. Gone are the days of stamping the return due date on the card placed in the envelope of the book's inside back cover. Forget the Dewey Decimal System.

Many school libraries are modernizing with full-blown technology to assist the tasks of keeping track of books, locating volumes by title or author, and providing research resources to students. A typical system may consist of a PC-based file server that contains the complete shelf list of the circulating volumes networked to several "student" workstations and a checkout station. The student workstations are used to perform the lookup functions previously supported by the card catalog. The checkout station, usually equipped with a barcode reader, is used to record the volume and who is checking it out. Reports can be run indicating what volumes are in circulation, which are overdue, and who has them.

All this technology is tied together using some sort of local area network. Novell is commonly used, but Artisoft Lantastic peer-to-peer networking is also used. In addition another network layer may be added. More about this later.

Automating a library begins with a process called *Retrospective Conversion.* This involves setting up the bibliographic data of circulating volumes in the library database and assigning computerized barcodes to the volumes. This is a resource-intensive process, usually requiring many hours of work. Depending on the size of the library, some schools contract out this task by providing their card catalog to a service agency which then matches the volumes with those listed in several "standard" bibliographic sources. Older volumes may require manual matching and/or data entry to establish a bibliographic reference. The end result of the conversion is a complete bibliographic database of circulating volumes

that is stored on the file server. As volumes are added to the library, publishers usually supply machine-readable media to the library in order to update the library's circulation database.

Library patrons (book borrowers) must also be assigned identifying barcodes. Sometimes these are placed on the student identification card before it is laminated, and sometimes it is an add-on sticker that is attached after lamination. The patron list is also added to the library's database and is used in the checkout process.

Commercially-available systems are readily available to support a computerized library. These systems are relatively simple in operation, embrace many different, but integrated, technologies (hardware, software, and networks) and they work! They can certainly be used as examples of how downsized desktop technology can be effectively used to automate manual processes and make them more cost-efficient.

Many libraries are using grants and school improvement program funds to acquire and implement this technology. One school I am working with is the recipient of a multiple year grant which is supplying the funding to connect every classroom to the library. This certainly should not be overlooked as a potential source for connectivity funding if such connectivity is in the realm of your strategic planning. By providing strategic advice on the network design and by simply adding a router, the entire school's network can be bridged to a mainframe network. If the mainframe is connected to an outside network such as the Internet, this automatically provides potential access for every classroom teacher!

Network layers can be added on to the basic circulation system. One common addition is a CD-ROM file server, a PC that contains several (up to eight) CD-ROM drives. By acquiring selected CD-ROMware such as an encyclopedia, a dictionary, a thesaurus, a nature reference (National Geographic's *Mammals* is a nice example of this) and other CD-ROM based reference materials and loading these on the server, student workstations can additionally provide extended access to these resources, usually through user-friendly menus and search programs.

The next time you're visiting one of your schools, spend some time in the library. You may be surprised at the technological sophistication you find there!

Damaged Equipment

(continued from Page 1)

10 miles away. The T-1 circuit re-routes our Sacramento area calls into a different zone, plus carries 14 voice circuits and a 256k data circuit between the two office buildings. Our Northern Telecom PBX served 14 schools from the district office basement, all of which lost communications on December 28th. Each school has a "key" system handling anywhere from 4 to 14 incoming trunks. The PBX had 30 Direct Inward Dial lines and 22 outgoing trunk lines (52 conversations could take place simultaneously with the outside world). This entire system came down around our ears in 5 feet of water early Monday morning.

The Recovery

Our disaster recovery plan, written about six years ago, helped a lot. While it didn't specifically cover what to do for the phone system, we did have our priorities already defined. The plan was written before the phone system was assigned to Data Processing, which happened just six months before this disaster (lucky me).

Since it was obvious that we needed to concentrate on getting communications back to the 14 schools, we ordered that all the OPX lines that were connecting schools to our PBX be converted to Centrex lines, using the phone company's switch. We were also lucky in that only two weeks earlier we had signed a new contract with the phone company to take all our normal business lines ($45/month) and convert them to Centrex ($16/month). So all the contractual stuff was already taken care of.

The phone company, Citizens Utilities and Citizens Communications, reacted absolutely wonderfully. They pulled people off of vacation (none of them complained at all) and worked around the clock to get us back up and running. They even convinced PAC TEL Cellular to loan us 5 portable phones for that week. By Tuesday morning at 8:00 am, we had the Superintendent's Office, Instruction, Finance, Data Processing and Deputy Superintendent for Operations offices all with these portable phones. They even had call waiting installed so we could handle up to 10 conversations.

The first priority was the schools. We converted 133 OPX lines to Centrex in only 4 days, connecting these to all the various "key" systems at each school. In two more days we had reconstructed much of the cable plant and connected 12 new Centrex lines to the Voice Pro emergency voice mail system (brought in by Voice Pro on Wednesday afternoon and programmed by Thursday). Over the weekend we converted the 22 outgoing trunk lines to 22 incoming Centrex lines and routed them to various offices in the district building. By Monday morning January 4th, we had fully restored voice to all schools, at least one working phone in each office and 1 fax machine operational. The phone company mapped our old direct inward dial numbers to the new Centrex numbers so even the outside world could call the old number and get through to us.

Hewlett Packard and Compucom worked with us to expedite the shipment of bridges, hubs and DSU's to reconstruct our data network. All of them were extremely helpful, overnighting all equipment so that we had everything we needed by Thursday. Our super reliable data network contractor, Comlink, had the datacomm backup up at 95% by Friday. I can only describe this as simply amazing.

The lowest priority were the documents, but we got started on them first thing Tuesday morning (wet paper deteriorates extremely rapidly.) We hired a company called Steamatic to store the documents we wanted to save in a refrigerator. Apparently the water gets frozen, expands and thereby separates the documents. If you let them get dry, they turn into cardboard or Papier-mache and you'll never get them apart in one piece.

Luckily, 75% of the documents had already been microfilmed and were awaiting destruction anyway. We filled up 8 four yard dumpsters with bags of confidential (wet) records and chained them up. Weyerhauser came by later to pick them up for certified destruction. My computer operations supervisor, Virginia Baker, came in off vacation and supervised the recovery of all these documents. She even had her work experience student, who helps us with microfilming, come in and carry bags of wet documents around. We did the fastest document inventory in history as the custodians and others scooped up tons (literally about 16 tons) of wet paper into trash bags.

Any documents we were unsure of as far as retention went to cold storage until we could do further research. The amount of space required couldn't be handled locally, so we rented a couple of refrigerator cars from Southern Pacific Railroad to hold it all.

Reconstruction

Then came the hard part: negotiating with insurance companies. I maintain that we could have been completely operational with a new phone system within 7 days, if we didn't have to slow down and explain everything to insurance adjusters (2 companies involved) and get approval from them for all the expenditures. Our disaster recovery plan did not deal at all with this problem, so the time lines were a little less than optimal.

One of the insurance companies brought in an independent consultant to do their own damage assessment and recovery plan. This man made statements like "I can replace that phone system for $26,000". This brought a lot of pressure to bear on Citizens Utilities, because the insurance company wouldn't pay for the $180,000 new

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system I wanted. Eventually we got everyone to compromise on a refurbished system that in theory was exactly what we originally had. I convinced the insurance company to allow Citizen's Communications to sell it to us, so we could continue the level of service we had been receiving for the last 8 years.

Northern Telecom found all the parts, built us a new system and had it shipped within 72 hours of receiving the order. By January 20th it was in our building and on January 24th we cut over to it.

We've pulled most of the documents out of the railroad cars and the rest are being filmed as we speak. The document inventory was taken to the Board of Education who authorized the destruction of all documents. It took Weyerhauser 2 weeks of daily trips to complete the confidential certified destruction, but now all the dumpsters are gone.

It's pretty amazing. We now have a new one year warranty on our phone system, a new cable plant utilizing the latest ATT 110 block system, a new one year warranty on our voice mail and T-1 channel bank, a current inventory of all our phone lines and a huge savings in phone bills. We would have converted all those OPX's and business lines anyway, but the disaster forced us into doing it instantly, saving several thousands of dollars this year alone.

Prevention

Some suggestions for the future might be to never put anything in a basement that is susceptible to water damage. If any electrical equipment is there at all, put a moisture detection system in that sounds an alarm and cuts power to the equipment. One of the reasons we couldn't salvage the equipment is that the power continued to run until there was almost 4 feet of water in the basement, which literally cooked every circuit board and coated every bare wire with fuzzy green and blue stuff (something called electrolysis).

Also, in your disaster recovery planning, make allowance for time to negotiate with the insurance adjusters. Make sure you have access to equipment that can be rented on a temporary basis at short notice, allowing time to make the hard decisions about what to purchase to get back into normal operating mode.

What's the Point?

If you're tired of your old phone system (or any other piece of equipment), or if you just want to clean out all your file cabinets, find a really old building with really weak plumbing, and put all this stuff in the basement and pray for lots of rain.

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