

## FINDING QUALIFIED EDP PERSONNEL

Around the world the demand for data processing professionals now outstrips the supply. And prospects for the future are not encouraging. Forecasters say that companies will have a harder and harder time finding qualified computing professionals. So we decided to look into some alternate sources of employees. We found that graduates of several types of schools—plus handicapped people, and part-time, at-home workers—are viable and often-untapped sources.

**M**icrodata Corporation is the manufacturer of the Reality series of mini-computers, which are distributed world-wide. The company's headquarters are in Irvine, California, midway between Los Angeles and San Diego. Over the past four years, Microdata has grown dramatically, from \$32 million in sales in 1976 to a projected over-\$100 million in 1980.

For their internal data processing needs, Microdata has a distributed system consisting of eight Microdata mini-computers at four local sites, all of which communicate with each other. This network ties together four management information system (MIS) departments, for manufacturing and engineering, finance, marketing, and field services. These four data MIS departments have 29 employees and perform mainly business data processing work.

We talked with the manager of the manufacturing and engineering MIS department about where he finds qualified data

processing professionals. He told us that since his company is located near a large university—the University of California, Irvine—in the past most of the people Microdata hired for data processing work were computer science graduates from the university. But these people were not really suited for business application programming, so Microdata had a lot of turnover.

In 1977, one promising applicant said he was a graduate of Coleman College, a private college in San Diego that specializes in training business application programmers. After hiring the applicant, the manager decided to investigate the college further. So he visited their campus and toured their facilities. Since then Microdata has hired over twenty Coleman College graduates, and the company is now experiencing much lower turnover.

Why are these graduates better suited to Microdata's needs? The manager gave us

several reasons. First, as mentioned, this college trains students for business application programming, which is just what Microdata wants. Second, the college stresses interactive programming, rather than batch programming. So, although the students have not had experience with Microdata's own Data Basic language, they learn to use it much more quickly than programmers who have worked only in a batch environment. Third, at Coleman College the students are taught basic business practices, as well as programming, so they more quickly adapt to the business programming environment than do many computer science graduates. And, fourth, Coleman College graduates have a more realistic view of the working world, because for most of them, this is the second career they have chosen. Most people go to Coleman College after having worked for several years, and they are determined to be successful in their new field. For instance, the Microdata programmers include a former truck driver, electronics technician, Marine Corps warrant officer, professional golfer, and supermarket clerk.

Although Coleman College is located over one hundred miles from Microdata's facilities, the manager helps orient all graduates to the 'real world'. As each class nears graduation, he visits the college and presents a lecture on his company's approach to business application programming in a distributed environment. Following the lecture, if Microdata has any job openings, he describes the jobs and then interviews interested students.

All of the MIS managers at Microdata are very pleased to have found a source of data processing personnel that so closely meets their needs.

## **Wells Fargo Bank**

Wells Fargo Bank is a national bank with 373 offices throughout the State of California. It provides a full range of banking services to both corporations and consumers. With headquarters in San

Francisco, California, it is ranked twelfth on the *Fortune* list of the top commercial banking institutions.

We talked with Wells Fargo about two approaches they take for finding data processing personnel—hiring severely handicapped people and participating in the internship program of a local vocational high school.

Wells Fargo has been hiring severely handicapped people in their data processing department for many years—long before the 1973 U.S. Rehabilitation Act made it illegal to discriminate against these people simply because of their handicaps. The bank now has four severely handicapped employees in system development and 31 in data operations, out of a total 2,000 in the entire division. The disabilities these employees have include: total blindness, mental retardation, deafness, visual impairments, aphasia, autism, orthopedic and learning disabilities, emotional impairments, and cerebral palsy with resultant speech and motor impairments.

Since the bank has a history of hiring handicapped people, it does not need to search them out. These people come to the bank, often from referrals at the several training centers for the handicapped in the San Francisco area.

The only physical accommodations that Wells Fargo needed to make for these employees have been the installation of a telephone communications system for the deaf. The bank's building already had satisfactory elevator, restroom, and ramp facilities to meet these employees' needs.

Wells Fargo has found that the initial fear of working with handicapped people has diminished significantly over the years. In data operations, for example, where there are now many deaf operators, it has been these operators, themselves, who have made others comfortable around them. In fact, the desire to learn American sign language was so strong in the department that the bank started a class. And

now employees in other departments are taking the class.

One point made by the people at the bank was that deaf people and their various modes of communication are very misunderstood. Lip reading, for example, is only possible for those who have learned to speak first. So employers should not expect all deaf people to read lips. In addition, American sign language has a syntax that is quite different from regular English. So people who communicate visually using American sign language may communicate in writing in a seemingly jumbled manner. The bank's personnel department helps co-workers of prospective handicapped employees better understand such unanticipated differences.

The bank has been very pleased with their handicapped employees. They find them to be very loyal to the company, extremely industrious, and very capable. Managers have learned not to make exceptions for these employees or expect less of them, because these employees do not want such treatment. And the bank stresses that each one has a career path, just like any other employee. Giving handicapped people dead-end jobs is devastating, they told us, so the bank makes the career paths known to them early-on.

*High school internship program.* In addition to hiring handicapped people, Wells Fargo recently began participating in a new data processing internship program of the School for Business and Commerce, in San Francisco.

The School for Business and Commerce is a vocational high school that has job training classes in such areas as: food service, fashion merchandising, medical secretary, word processing, and computer programming. The programming course is a daily three-hour class which teaches on-line COBOL programming on a DEC PDP 11/34 with attached terminals and printers. The tenth and final class assignment in the first semester course is to develop a program to read an inventory file, print out

selected fields (including pre-calculated profit margins), and print out a summary report which includes the number of records processed.

As a part of this program, Wells Fargo has had six students visit the bank twice a week for six weeks, to observe data processing operations. The students were not permitted 'hands-on' training in the computer center; however, they were given the company's entry-level review on the console operator's position, the disk/printer pool, and microfiche processing. With these experiences, they can more realistically consider such positions in the future.

The people at the bank see this student internship program as a more long range program, not one likely to provide a new source of data processing employees immediately. Wells Fargo is expanding this program each semester, to take in a few more students and to broaden the number of areas the students observe—including application programming. The bank hopes to get to know the local students better, as well as let students know the bank better, for possible future employment. In conjunction with this program, one manager has joined the school's advisory board, to help the school better educate its students to meet industry's needs.

So Wells Fargo has some innovative programs, we think, to broaden its sources of data processing employees.

## Comarc Design Systems

Comarc Design Systems is a company based in San Francisco, California, that offers a turn-key 'geo-based' information system for Data General computers. Geo-based information systems are used for answering 'what if' questions about any spot on the surface of the earth. Typical examples are found in natural resource management, forestry, public education, and site selection for power plants and mining operations. Comarc's system operates on data

from maps, aerial photographs, the LANDSAT satellite, and census surveys.

Recently, management decided to accelerate a development project to enhance the graphic output capability of their system. In order to speed up this short-term project, all of the company's personnel were surveyed to see who could be assigned to the project. Also a list of local software houses was created, as possible sources of outside help.

Three outside organizations were selected to work on different parts of the project. One of these companies was Heights Information Technology Service, located in Oakland, California, some five miles away. Heights uses mainly part-time, at-home data processing professionals to perform contract software work. Two people from Heights were assigned to work for Comarc on a project to enhance the use of symbols for the graphic output. A third Heights person was assigned to oversee the work of the other two.

The two Heights people required flexible working hours. One was a mother with young twins who preferred to work from 6 p.m. until midnight, when her husband could care for the children. Generally she worked on-site at Comarc. The other person preferred to work almost entirely at home, so Comarc provided her with a terminal to use at home when she needed it. She did visit the company regularly to review the progress of her work and to get new assignments. Overseeing their work was the Heights project leader who made weekly progress reports to the Heights head office and to Comarc. Comarc found the Heights project management procedures to be very helpful; they never felt out of touch with the work being done by the Heights people.

At the time of the project, Comarc was growing rapidly and had filled up all of their office space. Gaining access to the computer was becoming a problem, so they went to a two-shift operation. Management was very pleased with the

Heights people, under these circumstances, for several reasons. For one thing, they were very relieved that the Heights people preferred to work on the second shift or off-site. Providing work space for them during the daytime would have been difficult, and not nearly so productive. Also Comarc found these people to be truly professional; they were committed to the project, and they were very productive. Further, the Heights people worked well in Comarc's project-oriented structure.

Comarc viewed these people as independent professionals, just as they would lawyers and accountants. So having them work part-time or off-site was not a problem, except in a few cases when they could not be reached to answer questions. But Comarc ran into this same problem when their own employees were sick or out of the office. So in total, Comarc was very pleased that they were able to utilize part-time, off-site professionals for this short-term project. They plan to use Heights again when another such need arises.

### **The demand and supply problem**

Demand for data processing personnel is now at an all-time high, and growing rapidly. Just notice the increased number of advertisements these days for programmers, system analysts, and other computing professionals in newspapers and trade journals. According to the U.S. Bureau of Labor Statistics, in 1974 there were approximately 853,000 people employed in U.S. data processing occupations, 742,000 of them in user organizations (Reference 5). It is forecast that there will be approximately 1.1 million people so employed in the U.S. by 1985.

We see many reasons for this substantial growth. First, there is the hardware. There are just more machines—more machines to be programmed, maintained, operated, and managed by data processing departments. And there are more kinds of machines,

with each type requiring specialized knowledge of some sort.

In addition, the user population is growing, dramatically. Mini- and micro-computers now put computing power within reach of many, many more users, such as small businesses that would not have considered using computers until just recently.

Next there is software. With more machines, there is obviously more software required. And since many companies do not make much use of standard packages, this means in-house or outside custom software development. In addition, computers are being used for more types of applications—and many of these applications are becoming increasingly complex, so their development requires more work hours. In addition, these complexities are fostering a growing number of business data processing specialties. The average middle-size data processing department probably now has (or needs) several support specialists on its staff—database administration, data communications specialists, and system programmers. And another all-too-familiar reason for increased personnel demand is the inordinate amount of manpower spent maintaining current application software, which obviously takes people away from new development work.

So while the demand for data processing personnel looks bright, from the employees' point of view, the supply side does not appear so rosy, from the employers' viewpoint. McLaughlin (Reference 1) categorizes the industry as a 'seller's market'. He says the shortage of qualified personnel runs across all job functions, through all sizes of computer installations, and over all geographic areas. In a survey conducted of 289 firms with data processing departments in the United States and Canada, he found an average vacancy rate of 17% for application programmers, system programmers, and system analysts; and a 27% vacancy rate for data communication positions. One company reported that it now takes them six to seven months to fill

a position. So where have companies generally looked to find people to fill such positions? The top three sources are: recruiting from within, colleges and universities, and hiring experienced, full-time personnel away from other companies.

Many companies have attempted to get data processing personnel by *recruiting from within* their companies and training these people. But this is an expensive and risky solution. For, as most employers have found out, once these people are trained, they take their new-found talents elsewhere. McLaughlin stated that trainees are worth \$3,000 to \$4,000 more per year after eighteen months to two years of experience. And since it is difficult for companies to justify such hefty pay increases, these employees move on.

A second common source of data processing staff is *university and college graduates* with computer science or related degrees. But this solution, too, often does not work out, because these graduates often get bored with business application programming, saying they prefer 'more exotic, demanding work'. So their turnover rate is also high.

Thus many companies have come to rely on personnel agencies and advertisements to lure *experienced, full-time people* away from other companies. This industry-wide practice has two devastating effects. It accelerates turnover and it drives up salaries. McLaughlin found that late last year, the industry's turnover rate in the U.S. was running at a whopping 28%. And the salaries of application programmers had increased 30% since 1976. High turnover has become a way of life in the industry. And if employers continue to rely principally on these traditional sources of supply, the situation probably will worsen.

With this worsening situation in mind, we decided to investigate some alternate sources of qualified personnel: graduates of different types of schools, severely handicapped people, and part-time, at-home workers. Here is what we found.

## Hiring graduates of schools

There are a number of types of schools and training centers from which companies can obtain (generally) entry level data processing employees. Most data processing professionals think of private vocational/trade schools in this context. But we found a growing number of offerings at other types of schools that look promising.

### Private colleges

We suspect, as the demand for business data processing professionals increases, that more and more private colleges will begin to offer both certificates and degrees (two-year and four-year) in computing. One private college that has earned a fine reputation for its data processing programs is Coleman College, mentioned earlier.

*Coleman College* in San Diego, California, is a private college that specializes in business data processing education. It started in 1963 offering a certificate program. Since that time it has added programs for an associate degree and a bachelor degree.

At the college, the basic core course is their certificate program; everyone must take it. This course consists of seven modules, with each class of twenty students starting in module number one and graduating after completing number seven. Each daytime module takes five weeks to complete, with classes lasting about five hours a day, five days a week, for a total of 875 classroom hours for the seven modules. Each evening module takes ten weeks to complete, with classes lasting four hours a night, three nights a week.

Students who want an associate or bachelor degree take additional courses (in the evenings or on Saturdays) in English, accounting, social sciences, mathematics, plus some electives.

Among many data processing installations in San Diego and Southern California, Coleman College has earned a reputa-

tion for up-to-date, comprehensive training of entry level business application programmers. We think more private colleges—those not specializing in data processing education now—will begin to offer certificates and degrees perhaps similar to those now offered at Coleman College.

### Junior and community colleges

Junior and community colleges are public and private institutions that offer career-oriented educational programs. Usually these programs are centered around two-year certificates or associate of arts degrees. More and more of these junior and community colleges are offering business data processing courses. These colleges usually attract local graduating high school students as well as adults who have worked for a few years and now want to broaden their employment outlook, change their career direction, or up-date their skills in order to re-enter the workforce. Retired military personnel are also attracted to community and junior colleges.

In a recent study of one hundred data processing programs in New York schools, which was made by the New York State Consumer Protection Board (Reference 2), they found only nine school programs that they felt were capable of providing modern, comprehensive, and in-depth training for programmers. All of these nine were located at community colleges. This was the first time the agency had conducted a study of data processing training and they reported that, unfortunately, most of the *other* types of schools used very small or outdated computers, they relied on card input, and they even taught outdated or little-used languages. The board also criticized some schools for trying to cover too much material in too short a time.

We will have more to say about evaluating computing courses later. But based on this study in New York State, it appears that one of the best sources of entry level

data processing personnel could be graduates of nearby community or junior colleges.

### High schools

Computer science studies have filtered down through the years from university graduate courses to undergraduate degrees, and now data processing programs are offered at many high schools (and equivalent) throughout the world. Many of these programs aim to prepare students for future college courses. But a growing number aim at giving those students who do not plan to attend college usable vocational skills. But, obviously, students who have had only one or two semesters of programming at the high school level probably are not practical sources of new entry-level DP employees. They may not be mature enough and may not have had enough training. But we think that the attitude that Wells Fargo Bank takes—that these students represent a possible future source of employees—is very realistic. In addition, when companies become involved in advising the high schools on such programs, the training will better meet industry's needs.

### Other school programs

There are some public colleges and universities that have data processing rather than computer science programs. These are worth investigating, for full-time or part-time personnel. We know of one university—California State Polytechnic University at Pomona—that has several programs, some of which are sponsored by the U.S. Small Business Administration.

At Cal Poly, approximately 75 to 80 of their senior students majoring in information systems are employed as programming 'interns' at local companies. The short-term projects these students are hired to work on are carefully selected and then supervised by faculty advisors. In another program at the university, students enroll in a 'co-op' program, where they

take classes as well as work part-time in data processing departments, under the supervision of faculty advisors or company staff members.

We talked with two companies that had used the Cal Poly student programming services in their small data processing departments. Both were impressed with the work of the students, and one has hired the student programmer on a full-time basis. The other company returned to Cal Poly for additional programming services. And both companies made the point that, while the student programmers do satisfactory work, they need good supervision, either from within the company department or from a faculty member.

### Evaluating school programs

When considering recent or upcoming graduates of a data processing training program, be it from a private college, community college, vocational high school, or elsewhere, you really need to evaluate at least three aspects of the school's program: (1) curriculum, (2) equipment, and (3) admission standards.

*Evaluating a curriculum.* What is a good business data processing curriculum? There has been a lot of discussion on this subject. For instance, some say students should concentrate on one language and learn it well, while others say it is better to learn several languages. We have heard of no resolution of such questions, but we have seen a good curriculum that teaches several languages—from Coleman College. We will describe it because we think it can be used as a 'yardstick' for employers to use in evaluating curricula. It emphasizes up-to-date techniques and subjects of current interest, such as on-line programming, databases, and data communications.

Students begin with a *principles of programming* course that introduces them to basic computer concepts and programming techniques. They learn to write a program in PL/1. As in all of the courses,

this one contains both classroom and laboratory instruction. The college has an IBM 370/135, an IBM System 34, and an Interdata mini-computer, as well as numerous CRT terminals, printers, and disk and tape drives, all for student use.

The students then take an *automated accounting* course, which introduces them to basic accounting concepts. In this course they maintain a complete, yet simple, automated accounting system in a simulated business environment.

In the next module, they take two courses in *assembler language*. They study the IBM 370 assembly language and write five programs—one in sales accounting, one to create, update, and re-organize an index sequential file, one to create a balance sheet, another to create mailing labels, and a final one to create an invoice voucher register.

All programming projects at the college base 70% of the students' grades on the completion of executable programs by the due dates. The programs must have good format, use good programming techniques, and not require an excessive number of compilation runs. The remaining 30% of the grade is based on the program's documentation, which must include: a machine setup sheet, a statement of purpose, a logic narrative, flowcharts, record formats, and a final program listing.

Next, they have two courses in *COBOL*. During these courses, the students write nine programs, such as a daily transaction system, building a sequential disk file and an index sequential disk file, and creating an income statement. They also write a program that uses multiple files, requires the use of overlays, and calls a sub-program. This program normally requires about 700 statements.

In the fifth module, students learn *RPC II*, where they write six programs using the IBM System 34. Upon completion, the students should be able to write all specifications for card and disk input files to pro-

duce different types of output in this language.

Taken along with the COBOL and RPG courses is an *operations management and control* course where they learn about IBM's disk operating systems.

In the sixth module, the students take a course in *real-time programming*, which stresses IBM's CICS data communications monitor. They learn the principles of message queueing and scheduling, paging, re-entrant coding, and the development phases of a real-time project. They also take a *tele-processing* course, which introduces them to networks and the various hardware and software aspects of data communication systems.

Finally, in the seventh module, they take a course in *system design* where they learn to survey and document three existing manual systems: a basic sales order writing/billing system, a basic off-line general ledger accounting system, and an accounts payable system. Based on this analysis, they then design an automated system to perform the same functions. They also take a *database* course, which explores various methods of file organization, with emphasis on direct access databases. In their laboratory work they build a database file with three logical files, add records to a file, partition a file, and build and use an inverted bit index. And they take a course on *mini-computer applications*, where they learn to write several programs in BASIC, using the Interdata mini-computer.

As you can see, this certificate program covers a good many concepts, with the students getting lots of hands-on experience writing programs.

*Evaluating equipment.* Obviously, students have to have hands-on experience in a programming course. But more than that, the equipment they use should be what they might find in industry (and not small, older mainframes or mini-computers with obsolete operating systems). Also the system should be adequate to meet class



needs, so that students are given adequate turnaround times. Further, courses that teach on-line programming are preferred over those still using card input and batch compilation.

A school's equipment tells a lot about other aspects of the school's data processing program, such as how up-to-date their instructors are likely to be in their course content and teaching methods.

*Evaluating admission standards.* Data processing courses should not be given to everyone. We all know that programming comes easiest to people with logical skills who can perform detailed work for extended periods of time.

Better schools use a careful screening process, including aptitude tests, interviews, and perhaps checking of references, in order to find the people who will do well in their programs. There were times, of course (and there still may be cases of this), where private schools would accept just about anyone who could pay the fees. But the better schools have always recognized that this was undesirable—for themselves, for the students, and for the eventual employers of the students.

So, we suggest, check the admission process of the school. The more effort the school makes in screening out people who will very likely do poorly in their courses, the better.

### **Hiring handicapped people**

One of the most over-looked sources of data processing employees is the severely handicapped. In this category are people with physical handicaps, such as blindness, deafness, or impairments of motor, speech, or eyesight abilities, or problems of mobility or learning. Other handicapped people include those who require special medical care, such as people with asthma and epilepsy.

Many companies have found these people to be a source of competent computing professionals. Severely handicapped people can be and are employed in the

computer field, working in almost every capacity. We have heard of handicapped programmers, system analysts, data entry operators, and data center managers. Handicapped people are not so disadvantaged in such positions as they might be in, say, sales positions or on a factory floor.

In a recent pamphlet, "Employing seriously disabled people in data processing", published by the Manpower Services Commission in the U.K. (Reference 3), the authors state that handicapped computing people compensate for their disabilities by working harder. These people are conscientious, and they perform better than many non-handicapped people. They also make excellent employees because they are loyal to their employers. The number of satisfied employers of handicapped data processing personnel greatly outnumbers the instances of dissatisfied employers, the study states. In addition, these people have less time lost because of accidents and their absentee records compare favorably with those of non-handicapped employees.

Most of the working disabled people tend to be more intelligent and more determined than the average data processing applicants, we gather, because they have successfully overcome severe adversities. Not only that, in the United States, at least, handicapped people often do not need to work; they may receive adequate incomes from government aid and medical programs. One personnel officer we talked with said this could amount to about \$10,000 a year, *tax free*. Handicapped people give up this aid when they find any job. So the odds are against many handicapped people even looking for a job—not to mention their first obtaining the necessary education and training, in the face of the social obstacles they encounter.

So handicapped people who are qualified for a job are, in general, desirable employees. But, of course, there are special considerations employers must take into account when interviewing and hiring

these people, as well as orienting their co-workers.

### Special considerations

Kutsch (Reference 4a) notes that the greatest problem facing handicapped people is not their handicaps, but rather gaining acceptance from the people they meet and being allowed to realize their individual potentials. This is also the employer's biggest problem—orienting co-workers. Educating other people and overcoming negative stereotypes takes more advance planning and thought than providing aids for the handicapped. Let us start with the initial interview, and pass on some helpful points we learned in our research.

*Conducting the interview.* All of our sources urged interviewers to be very frank with the handicapped person during the initial interview. Do *not* avoid talking about the handicap, its cause, and how the individual copes with the difficulties it presents. In fact, maybe these subjects should be discussed first. Such openness eliminates a lot of uneasiness and misunderstanding, and it brings out the individuality of the person.

For example, when interviewing a deaf person, Anderson and Bravin (Reference 4b) recommend that the interviewer start talking slowly and let the deaf person control the pace and mode of the interview. Some deaf people prefer lip reading, while others prefer written communications. Some speak fluently themselves, others do not. And some prefer sign language. Once the communication considerations have been dealt with, then the scope and context of the interview should focus on the usual job-related issues.

In the interview, the employer should inquire about what special equipment the applicant would need on the job.

*Special equipment and building facilities.* Most handicapped people do need special equipment and building facilities to do their work. However, once these are pro-

vided, they can usually work as independently as any other employee.

Due to developments in technology, there are a number of tactile and auditory products on the market to assist handicapped people. For example, use of the telephone is a problem for deaf people. But there is now a portable terminal that attaches to the telephone which a deaf person can use to communicate with another person with a like terminal. Many telephone companies in the U.S. lease these terminals just as they do telephones.

For the blind, Telesensory Systems Inc. has developed a reading machine called an OPTACON (meaning optical-to-tactile converter). It uses a small camera to scan printed material. A tactile image of each character is presented to the reader's fingers through a matrix of vibrating reeds. This machine has been a boon to the blind for reading printed matter, but the fingers do become numb after extended use.

In addition to such products on the market, handicapped people are very inventive at modifying ordinary equipment to suit their needs. We know of one blind programmer who wrote a program to convert English characters into braille characters. Then he made a simple change to a dot-matrix printer, so that the printed dots made deeper impressions in the paper. The only problem he had with these printouts was that he could easily obliterate them, by mistakenly tossing a book or a heavy listing on top of them.

As far as building facilities are concerned, some handicapped employees do need to have elevators with lowered control panels and maybe braille indicators, suitable ramps, specially designed restrooms, and possibly lowered door handles. Most new building are designed for use by handicapped people. But, as was recommended to us, companies should only make these changes after talking to handicapped users; otherwise, the changes may be designed incorrectly.

We were told that hiring handicapped people does not affect company insurance policies. Insurance companies have found these employees to be no greater risks than other employees.

*Orienting co-workers.* A very important consideration when hiring handicapped people is orienting co-workers to their disabilities. Most people have stereotyped attitudes toward the handicapped, and the best way to remove these often-false impressions is to make employees aware of disabilities in general. The more they understand about a handicap, the more receptive they will be toward co-workers with that disability, we were told. Materials for such orientations, such as movies, books, pamphlets, and even instructors, can usually be obtained from colleges, institutions, and organizations that serve handicapped people. Once co-workers know about the handicap, the disabled person can usually handle the individual inter-personal relationships he faces.

*Finding handicapped applicants.* Contacting special schools for handicapped people is one way to find new employees. There are a number of institutions that specialize in educating people with a particular handicap. The Gallaudet College (for the deaf) in Washington, D.C., and the National Technical Institute for the Deaf (NTID) at the Rochester Institute of Technology in Rochester, New York, are two.

Anderson and Bravin's interesting paper (Reference 4b) lists a number of other sources for finding deaf applicants. The authors point out that the best contact is the placement office of colleges and universities that offer training for the handicapped. They note that these offices usually also provide special assistance for their handicapped students during job hunting as well as during the first few weeks of employment. Some even have established co-op programs where students work part-time as part of their education.

Another place to find handicapped applicants is through government agencies. The Manpower Services Commission in Great Britain, for example, can help locate applicants. This organization also provides or loans sensory aids to handicapped people and the companies hiring them. Government employment offices often have people who specialize in handling handicapped applicants. And in the U.S., the Rehabilitation Services Administration within the Department of Health, Education and Welfare can help employers find applicants.

In addition, there are professional societies that can help. The British Computer Society has a Specialist Group for the Disabled. And in the U.S., the Association for Computing Machinery has a Special Interest Group for Computers and the Physically Handicapped (SIGCAPH). They organize sessions at conferences, publish periodic newsletters, and are a good source of information.

And lastly, there are associations for specific handicaps. The National Association of the Deaf (Silver Springs, Maryland), the National Federation of the Blind (Baltimore, Maryland), and the National Amputation Foundation (Arlington, Virginia) come to mind. Also, there are more specialized associations, such as the Association of Rehabilitation Projects in Data Processing (whose president is Billy Montgomery, Maryland Rehabilitation Center, Baltimore, Maryland), which has helped organize training courses for the handicapped in ten states.

These then are some of the points we found in our research on hiring the handicapped. These people appear to be a promising and under-utilized source of new employees.

### Using part-time, at-home workers

In addition to employing full-time, on-site people, a growing number of companies are beginning to search for employees who can not or do not want to work full-

time or totally on-site. There are numerous combinations of working arrangements that can be conceived in these situations, depending upon whether they are permanent employees or temporary workers. In this report we only looked into two such combinations: (1) temporary workers who work at home, or (2) temporary workers who work on-site but with flexible hours. Two examples of software firms that provide such people on a contract basis are Heights Information Technology Service and F International.

*Heights Information Technology Service* is a one-and-a-half year old software service company that employs professionals who want to have flexible working hours and perhaps want to work at home. The company has offices in White Plains, New York, and Oakland, California. It now has some 110 professionals working out of its two offices, some 10% of whom are men. Heights obtained the idea for its services, and adopted its management structure and project control methods, from F International.

*F International*, with headquarters in London, U.K., has been in business since 1962. It has over 600 professionals working in England, Belgium, and The Netherlands; its people have worked in other European countries, also. F International originated the idea of providing software services with part-time and at-home people.

Heights and F International operate in very much the same manner. The key to their successful use of part-time, at-home people is their project management procedures. Each project has a project leader who is the liaison between the contractor and the service company. Project leaders estimate, schedule, and track their projects; they may or may not perform technical project work. They report progress weekly to both the contractor and the service company. This keeps everyone fully informed on the progress of the work.

Most people working for Heights or F International are independent contractors who are employed on a project basis. The companies require these people to have at least three years of experience in their profession, and to work at least twenty hours a week (at home and/or at the client's site). The companies also try to find people who are good at self-management and who can work on their own without much supervision.

Heights and F International have found that working part-time or flexible hours is often a temporary condition for many working people—for wives with small children, single fathers and mothers, retired people, budding artisans, families where one spouse goes to school full-time, and handicapped people. These people often need the flexible hours for a few years, and then they plan to return to full-time working. The most typical cases are parents who want to work only when their small children are in school, say 9:00 a.m. to 3:00 p.m., or parents who will work only when their spouse is with the children, such as in the afternoons and evenings.

Heights and F International negotiate the project work as well as the anticipated amount of time the clients expect to need the people *on-site*. Project members are picked who meet these needs. In some cases, project members can use terminals at home, for on-line programming and testing, rather than working on-site.

So Heights and F International are examples of an interesting alternative source of computer professionals—who work part-time or flexible hours, on-site or at-home.

### Special considerations

As we mentioned, we only talked to client companies that have used part-time or flexible-hours professionals on a temporary basis. But their experiences and recommendations may be useful to companies thinking of employing such people on a permanent basis.

For the temporary employment, work was contracted for on a project basis, rather than a work-hour basis. Obviously, estimates were made of work-hours needed. But the point is that the work was product-based, not time-based. Companies that already work on a project basis can more easily use such professionals, it would appear.

Second, companies that allow their employees more freedom—such as flexible working hours—are more likely to be able to use part-time, at-home people.

Third, a good project management system—which includes estimating, costing, scheduling, and tracking of projects—is very important for using these people. Companies that routinely use these procedures can more easily use off-site professionals and not have their work get out of control over time. Someone on-site also needs to be the co-ordinator for these off-site people. But once a routine reporting schedule has been implemented, these people can usually work on their own.

Some jobs do require being on-site, such as during the system analysis and design phases of a project. But during coding, they can be off-site (at home), especially if they have a terminal to access the company's computer system.

So using part-time/at-home or flexible-hours people is feasible, and if standard company procedures appear to mesh well with this more flexible style of work, then they are a possible new source of employees. We have heard of one company that began looking for such part-time people by reviewing their past personnel files to find women who had left the company when they became full-time mothers. We

know of no organizations that register such computing professionals, so they may not be easy to find.

## Conclusion

There is a shortage of professionals in the data processing industry. We see and hear more and more people lamenting over the situation each month—in articles, in speeches and at meetings. But there are some under-utilized sources. Graduates of some schools, handicapped people, and part-time, at-home workers are just three. Surely there are more. When we hear about them, we will pass the information on to you.

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