Technology and the Handicapped

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Twelfth in a series of perspectives on employing technology to address the pressing problems of society.

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The concept of independent living for handicapped persons is emerging in importance with the recognition of the needs and rights of individuals with disabilities. Getting to this point has taken far too long.

The great impetus for the concept of independent living came from the 1977 White House Conference on Handicapped Individuals, where over 100,000 persons participated from the local, state and national level. One of the major findings of the conference was this: "The right of individuals to live and receive service in the least restrictive and culturally-oriented environments should be emphasized and supported by programs of training, housing, transportation, education, employment, and other human services as well as by activities in other areas addressed at the conference."

The report went on to say that "independent living and support of alternative living arrangements is considered a necessity."

The United States Congress added its emphasis to independent living for the handicapped through Title III of the Rehabilitation Act, providing for comprehensive services for independent living. It defined comprehensive services to mean: "Any appropriate vocational rehabilitation service and any other service that will enhance the ability of a handicapped individual to live independently and function within his family and community and, if appropriate, secure and maintain appropriate employment."

Congress has also added some basic underpinning to assure the rights of the handicapped through a number of laws mandating quality education and other services and requiring individual programs carefully developed in consultation with the client, the providers and others involved in implementing these programs. An example of this is the Education For All Handicapped Children Act.

The White House Conference implementation plan and congressional actions place great responsibility on the state and federal governments, and recently, we have seen substantial public sector growth in services to handicapped persons.
However, increasing taxpayer resistance to government spending is adversely impacting the required public funding. There is, in addition, increasing competition for existing dollars as advocates for a number of movements sharpen their lobbying skills.

The result is an on-going struggle to fund programs that can help handicapped persons achieve their greatest potential and independence.

As public sector funding fails to increase (or even keep up), a larger role emerges for the private sector. As a recent HEW report indicates: 
"The private sector role in developing and providing services must have greater recognition as federal and other government funding becomes more restrictive."

The reason it has taken so many years for the concept of independent living to emerge is simply the widespread view that the government has the responsibility for solving the problems of the handicapped, and that the private sector participates only through charitable contributions.

The problems of handicapped people are not unique in this respect. In fact, throughout most of our history, there has been the delusion that the government is primarily responsible for solving our major societal problems—rehabilitating disabled individuals, rebuilding our blighted inner cities, providing better, more available and less costly domestic sources of energy, reducing the costs of housing and food, and most important of all, providing enough decent jobs, especially for handicapped and disadvantaged Americans.

As these and other problems grow into crisis proportions, they provide evidence that the government alone is unable to address them in an adequate and timely manner. The time is long overdue when business should take the initiative, in conjunction with government and other sectors of society, in addressing these problems as profitable business opportunities, with an appropriate sharing of costs between the private sector and government. Where the resources for solving problems are beyond those of a single company, as most are, then resources should be pooled through cooperative projects or joint venture companies.

Control Data adopted this strategy some 12 years ago. It has been pursued vigorously and has proven sound. Although we undertake some social programs because they are the "right thing to do," we view the major, unmet needs of society as opportunities for business, generating profits and providing jobs. Let me describe briefly some of Control Data's programs addressing major social needs.

**Inner-City Plants:** Deteriorating inner cities are a major social problem, and this is addressed by our inner-city plant program. We have successfully established new plants in four economically depressed areas, and a fifth is under construction. When the fifth is completed, total employment in those plants will reach 1,500 persons.

Our poverty area plants have been made as profitable as our conventional operations. At the same time, we are serving the interests of each community and providing a path for disadvantaged persons to enter the mainstream of industry.
Planning for the first inner city plant began in 1967 during the time of rioting in the streets of Minneapolis. A site in a black poverty area on the north side of the city was selected. The doors of the plant opened in January 1968.

It cost $2.5 million to bring that plant up to the employee training and efficiency levels of other plants. The government paid $1 million of that amount, and the $1.5 million that Control Data paid was regarded as the equivalent of research and development for a new product. Considering that we now have an efficient production operation, with an average employee tenure of more than 5 years, and considering what we have learned, the payoff is a handsome one.

*North Side Child Development Center:* At the time the North Side plant began operation, there were no child care facilities in the neighborhood. But many of the residents—employees and potential employees—were female heads-of-households with young children. Clearly, child care had to be provided if the most urgent employment needs in that neighborhood were to be served. So we enlisted the support of the community and got a day care center started in a vacant 80-year-old school building.

In 1976, the day care center moved into a new building specifically designed as a child development center. It was built with 90 percent private funds and loans from local firms. The center provides care for more than 130 children, ages 6 weeks to 13 years. Trained personnel conduct a carefully designed program for enriched child development. The program encompasses personal management and social development, physical development, arts and crafts, sciences and black history and awareness. It is an A-one-plus center which I unabashedly proclaim as the finest, bar none.

*Part-Time Job Opportunities:* We also learned that there were many job seekers who could not meet full-time work hour requirements. These included female heads of households with school-age children as well as high school, vocational and college students in need of income to help them stay in school or to supplement family income.

To address that problem, early in 1970, we opened a plant employing part-time workers in the middle of the depressed Selby area of St. Paul.

This operation was started in an abandoned bowling alley, and in 1974, a new facility was opened to accommodate growth. It was the first new industrial facility to be built on a mile-long stretch of Selby's dilapidated commercial strip since a trolley-car power house was erected in 1889.

The Selby plant's employment level is now at 230 persons. The first shift is mostly made up of mothers of school-aged children. The second shift is composed primarily of high school and college students.

Near the Selby operation is our newest and largest inner city plant, housing Control Data's Worldwide Distribution Center. The fourth inner city operation is the Capitol plant in Washington, D.C. These two plants function similarly to North Side and Selby.
**PLATO Computer-Based Education:** Basic to jobs for all segments of society, however, is education and training. Control Data's largest program addresses the need for better, more available and lower-cost education.

The only way to make major progress in solving this massive and urgent problem is through the use of advancing technology, such as television, audio/video tapes and satellite transmission coordinated in a network learning system with computer-based education.

Control Data has been engaged in developing PLATO computer-based education and training for 17 years. We see computer-based education and other advancing educational technologies as ultimately having a greater positive impact on the lives of disabled and disadvantaged persons than any other program or technique.

**Fair Break:** For example, PLATO computer-based education is central to Fair Break, which is a Control Data inner-city program to prepare young, disadvantaged unemployed persons to get and keep a job, and to make more jobs available to them. Seven Fair Break centers are now operating. The youths spend an average of four months in the program receiving training in basic skills, job readiness, life management, and job-seeking skills. Each participant works part-time with Control Data or another firm to create a source of income and to identify any problems which should be resolved before employment is sought out in the community. The program is delivered in cooperation with city schools, with funding from government comprehensive employment and training programs.

**PROJECTS FOR HANDICAPPED**
Experience gained from these and other activities has recently allowed Control Data to launch additional programs of special importance to handicapped persons. A distinguishing feature of these programs is that they embody systems of technologies that address educational, job and living needs in a comprehensive and interrelated manner. Through the years, technology has been utilized in serving these needs, but mostly in a limited way. There has been no general, broad-based effort to expand jobs. Instead, technology has been applied primarily on a project-by-project basis for selected types of disabled persons and in scattered locations.

Also, too often, machines and instruments are viewed as the means of meeting special educational and living needs. This is not to say that instruments and machines are unimportant, but rather that the systems approach must be used as well.

I will describe three comprehensive and interrelated programs addressing the educational, job and living needs of people who are handicapped.

**EDUCATION**
The central program is education and is based on PLATO computer-based education. It is important to note that PLATO is a computer-based interactive educational network system that allows students to learn at their own pace. Students interact with the system through a special terminal with a keyboard and a TV-like screen.
The screen presents lessons stored in the computer in the form of graphs, drawings, text and photographs. Audio features allow material to be presented in this mode. PLATO can direct students to other resources outside the system. There is the potential for many modifications to adapt PLATO for use by persons whose disabilities vary over a wide range.

Courage Center: For example, one of the Courage Center residents has been working as a member of a Control Data team developing additional modifications. With his help, modifications of the keyboard were developed to enable operation with a mouth stick. Another modification will be made to enable use by those with severe cerebral palsy.

Smith-Kettlewell Institute: Another current effort is at the Smith-Kettlewell Institute of Visual Sciences, San Francisco, where a waistbelt for deaf persons, called the Teletractor, has been developed to translate sounds into skin sensations. Control Data provided a research grant to develop lesson "Ticklebelt." In the lesson, a computer-driven audio device states a word or sentence, an electronic device attached to the waistbelt translates the sound frequencies into rippling sensations on the stomach and the associated word is flashed on the screen of a PLATO terminal.

While there is much work ahead, it is already evident that the combination of sound and computer technology has great potential for improving education programs for people who are deaf.

Colorado Hearing & Speech Center: PLATO computer-based education courses are also being developed for use by hearing, speech, and learning-disabled children at the Colorado Hearing and Speech Center in Denver. One of the lessons that has been developed is called "Memory Train," which provides drill and practice in visual memorization, a skill essential to reading.

On the PLATO terminal screen a train carrying familiar items, including animals and toys, empties its cargo and the children are to touch the item and then the boxcar that had been carrying it. When they touch the right car, the item goes back to its proper place on the train.

Burnsville: Another PLATO effort in Minnesota is for learning-disabled junior high students. It is a cooperative effort that involves Control Data, the State Department of Education and Burnsville School District 191. Teachers report that although learning-disabled students are known for being highly distractible, they remain glued to terminals. They also point out that the computer is exacting because it was programmed that way and is more demanding than a human being in that it requires the full attention of the students. It is also forgiving, patient, and allows time to develop proficiency.

Network: The last, but certainly one of the most important features of PLATO that I will mention is the ability for students to communicate with one another, that is, peer interchange, whereby they can readily help each other. Instructors also communicate with students and vice versa. Instructors and students involved in the same course can be located in different parts of the country.
HOMEWORK
It is this communication capability that makes possible Control Data's most comprehensive
program for disabled persons—a program called Homework. The objective of Project
Homework is to provide training and employment alternatives to the severely disabled
homebound population. Currently, there are more than two million Americans classified as being
homebound because of a severe mental and/or physical disability.

Homework evolved within Control Data Corporation because we have many severely disabled
homebound employees. Tragically, this same group of people has a wide range of unused skills
and capabilities. Therefore, a project was created to identify training and job opportunities for
them using a PLATO terminal.

The first PLATO terminal was installed in August 1978 in the home of one of the 12 home-
workers selected. The first work identified for the home-workers to perform was designing,
developing and evaluating educational courseware. Depending on their interest, experience and
skill, each participant was trained to perform one of the three functions via the PLATO terminal.
The end product of Homework is educational courseware to be marketed by Control Data.

Homework has given Control Data many significant insights. We have found that legislative
changes are needed to reduce the number of disincentives facing disabled persons who try to be
employable and self supporting. Under current Social Security regulations, a disabled person is
discouraged from working by restrictions on the amount of income that can be earned before he
or she is cut off from benefits. Thus, severely disabled homebound persons as well as others
attempting to work and earn a meaningful wage face the loss of their disability income and
benefits. Control Data is recommending legislation that will provide more realistic work
incentives instead of disincentives.

Control Data is expanding homebound employment during 1979, and making additions to the
types of work performed that will include computer programming.

Homework is not intended to be restricted to Control Data employees. With progressive
legislative change, Homework will become an employment alternative, not only for the disabled
population, but also the able-bodied.

Homework can bring the PLATO terminal into the home, providing training and education as
well as a means of communication for the disabled person. A counselor participates in the
computer network along with the other employees. It is truly a network of disabled persons with
varying disabilities learning different skills at different rates but sharing the learning experience.

URBAN REVITALIZATION
Another program especially relevant to handicapped persons is one aimed at building and
rebuilding urban communities, with emphasis on closer proximity of living quarters, jobs,
education, health care and other essential services. Because of the diverse and extensive
resources required, a consortium of organizations has been formed called City Venture.
City Venture will plan and manage innovative and comprehensive programs for revitalizing existing urban areas and creating new cities.

City Venture is based on a conceptual approach that has emerged from the urban failures of the past. Now, for the first time, resources are being harnessed for an effective approach to revitalize decaying inner cities and build new cities, avoiding the mistakes and omissions of the past.

This approach mandates that any plan for building or restoring a community must be based on meeting residents' needs for high quality, accessible and affordable education and, even more important, decent jobs.

Under this approach, small enterprises are a major source of jobs, as well as an important means for building, rebuilding, and maintaining housing and commercial centers. Small businesses also participate in providing health care, education and other social services, together with a myriad of other needed products and services, including food production, processing and distribution, and waste recycling.

For the first time the needed diverse and extensive resources have been brought together by City Venture in a unique and efficient pooling of the resources of individual organizations.

It is important to note that most of the management, professional, technological and financial resources required for building and restoring communities lie within large corporations. But, within those corporations, management, professional and technological resources are under-utilized. For example, many of the technologies of one company could be used without threat by other non-competitive companies, especially those of smaller size. Also, managers in large companies are relatively unchallenged for a good part of the time, and professional people cannot work productively on one type of problem continuously.

City Venture, by bringing together applicable technologies and offering managers and professional people the opportunity for part- or full-time contribution for selected periods, can greatly improve the utilization of technologies and people, to the advantage of City Venture, the individual companies, society and the people involved.

Participation by The American Lutheran Church and The United Church Board is a landmark event that enhances the sensitivity and acceptability of City Venture. By sensitivity, I mean appropriate attention to the rights and needs of individuals and the correct balance between profitability and social responsibility.

Acceptability is increased because the presence of the church removes some of the reluctance of many government administrators to place contracts with for-profit corporations. They prefer, instead, to contract with universities and other non-profit institutions, regardless of the value received for the cost.

BTC: Because of their vital role in the success of any urban program, the formation and healthy growth of small businesses are not left to chance. So a Business and Technology Center is
established, which itself, is a business engaged in providing a wide range of consulting, shared facilities and services for facilitating the successful start-up and growth of small businesses. Buildings containing flexible laboratory and office space are subdivided and leased to small businesses. Centrally-shared facilities and services, such as a library, model shop, clean rooms, drafting, accounting, purchasing and legal services, as well as a complete range of computer services, including technology locating and transfer services and computer-based education are provided.

Economies of scale make it possible to provide the Center's clients with needed facilities and services of much higher quality for considerably lower cost than each one would be capable of providing alone.

INDEPENDENT LIVING IMPLICATIONS
In the light of this background, it should be evident that one of the greatest potential opportunities for improving the lives of disabled individuals can be realized as we rebuild our blighted cities or build new ones, by including centers for independent living and other special facilities coupled with education, training and business enterprises as an integral part of the comprehensive plan. Greatly improved cost/benefit can be derived from advancing technologies. The degree of independence, productivity and quality of life will be enhanced for handicapped individuals, and the level of needed subsidies greatly reduced or even eliminated.

The keystone is the total approach that integrates training, education, jobs and other basic needs. Particularly promising are small enterprises employing handicapped persons engaged in urban food growing. Technologies are emerging that will make it possible to grow and process food much closer to main consumption points and save transportation costs and energy. I am mainly talking about growing food indoors through the use of greenhouse hydroponic, aeroponic, and other methods.

We believe that there is enough existing technology, along with developments soon to be available, to warrant establishing small-scale food growing and processing businesses. Control Data is sponsoring two projects in the Minneapolis area—one, a greenhouse using solar energy and waste heat from one of our plants to grow tomatoes. Production is estimated to be 20 times greater per square foot than that obtained by most growers. The other will be a small-scale food canning operation. Eventually, both operations will be sold to individuals to be operated as small independent businesses.

CONCLUSION
Additional technologies could be mentioned that can benefit disabled persons, but I believe the point has been made that technology is available to support independent living. The question then is, will it be applied? The answer is yes. The greatest uncertainty is the time scale, because of the magnitude of the effort. Yet, there are reasons for optimism. The effort to apply technology to benefit the disadvantaged is accelerating. The programs just described, and a host of others not mentioned, are making a significant and expanding contribution.
An even more important reason is the growing concern, especially by younger persons, that there are too many imperfections in our society. They want to get involved in correcting them, either on a volunteer basis or as part of a career.

Further, the many Control Data programs which I described could not be successful without dedicated employees working on the job as well as giving their personal time, and even more important, being supported by thousands of people in the communities where the efforts are taking place.

Our corporations, universities, churches, labor unions and other organizations haven't been concerned enough to seriously address the crying needs of disabled persons and other major societal problems. Instead, each segment of society has been pursuing in isolation its own best interests with too little regard for how well society is being served. Those who do care have been frustrated at the futility of trying to achieve improvement alone.

Earlier, I mentioned the delusion in our society that societal problems are primarily the responsibility of government. The delusion is compounded by the mistaken belief that it is immoral to make a profit from solving a social problem. Let me give you another perspective on the profit question by quoting a statement made by a physician in connection with Project Homework:

"I think Homework is a tremendous program. I do not care if it was established to save the corporation money eventually, it is still a great program. Control Data has given my patient something I never could: a new interest in life and a new meaning. My patient is gloriously happy that there is a possibility to make a way in the world again and be independent of government and insurance company handouts."

The last thing that a disabled person or non-disabled person wants is charity. All want and deserve to be a part of mainstream America, which is an entrepreneurial society. Special needs should be met in the same way as the need for food, clothing and shelter is met for all. No one objects to a reasonable profit on a can of beans. Why should there be objections to making a profit on meeting special needs of disabled persons? Those who raised the objections haven't cared enough to think hard enough about the problems and their solutions.

But there are heartening signs. Witness the 12 companies and two church organizations comprising City Venture. As other organizations pool resources and work together, independent living for disabled persons can be achieved, cities can be revitalized and other urgent needs of our society can be met on an adequate and more timely basis within our capitalistic system. We must view social problems as profit-making opportunities. This is not mere theory, as I have attempted to convey by describing what Control Data is doing in meeting important needs of society.

Even though experience teaches that our private enterprise system can meet social needs, it also teaches that the task is far more difficult than any performed in the past. It cannot be accomplished without dedicated cooperation among all segments of society. While this cooperation has not been achieved in the past, nor is it being achieved today, there is a growing
awareness of the need to do it and a growing desire to do it. Increasing initiative from the private sector and advancing technology will better address societal needs, including those for independent living by disabled individuals.