

# Technology and Full Employment

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William C. Norris  
Chairman and Chief Executive Officer  
Control Data Corporation

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Fourth in a series of  
perspectives on employing  
technology to solve the  
pressing problems of society.

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From an address to a public hearing of the Minnesota Full Employment Action Council in Minneapolis, Minnesota, on September 6, 1977. On October 28, 1977, Senator Hubert H. Humphrey (D-Minn.) entered the speech in the *Congressional Record* along with some of his observations.

Excerpted from the *Congressional Record*, October 28, 1977, as entered by Senator Hubert H. Humphrey (D-Minn.).

*Mr. Humphrey:* Mr. President, thousands marched from coast to coast the week of Labor Day demonstrating their desire for policies to achieve and sustain full employment, and testifying to the costs of falling short.

The costs are human and individual: Broken families, low self-esteem, and the gnawing futility of entrapment among the impoverished in a society of plenty. The costs are social: Higher mortality and illness, property crimes of survival, and subsequent imprisonment. The costs are economic: Hundreds of billions of dollars of potential production gone forever, and the consequent inflation from supply outstripped by reasonable demand.

In Minneapolis, Mr. President, The Full Employment Action Council (FEAC) held a public hearing on September 6 at the Regional Native American Center on the need for full employment, and heard from 18 witnesses, including authorities on unemployment costs, planning, political leaders, and the unemployed themselves.

The first witness was Mr. William Norris, president of Control Data Corp., one of the largest firms headquartered in Minnesota. Control Data, with offices and outlets across the country and throughout the world, is a fine corporate neighbor to the Midwest. It pays its taxes and provides jobs; it builds assembly plants in depressed areas of our large cities; it innovates to stay at the frontier of a complex vital industry; and finally, it provides quality services and products to our citizens in healthy competition with other computer companies also situated in our part of the country.

Mr. Norris' statement stressed the importance of full employment, calling the present situation "the Nation's No. 1 problem." In pointing out the need for 20 million new jobs in the next decade, Mr. Norris cited the role of business in developing new products and sharing information on useful technological improvements. But sharing information in a world full of paper is a big job that requires organization to obtain economics of scale. And that, he tells us, is a long way from happening:

"The reluctance of private industry, coupled with the grossly inefficient methods of government and academia for communicating information, result in the technological wheel being wastefully reinvented every day. Moreover, technologies are lying on the shelf grossly under-utilized."

He suggests some ideas of how to facilitate technological information exchange. These views are well considered and deserve attention from Congress.

Among other insights Mr. Norris provided was a candid assessment of the hesitancy of some segments of the business community to embrace enlightened objectives in employment and social policy:

"But the increase in technological innovation that could reasonably be expected in today's environment would fall far short of what is required. The reason is primarily the indifference of business toward major societal problems. For too long business has been preoccupied doing the things that are the most profitable and leaving the solutions to most of the major problems of society as the responsibility of government. Meanwhile, these problems are growing to disastrous proportions."

Let me add my voice of assurance to those in the private sector who are listening: We in Government welcome all the help we can get.

Finally, Mr. Norris addressed the legislative context for sustaining balanced growth with full participation of dynamic, innovative commercial enterprises:

"The legislative actions required to more effectively convert technology into jobs through the concentration of resources on a regional basis to focus efforts and achieve widespread cooperation appear to be embodied in the provisions of the Humphrey/Hawkins (Full Employment and Balanced Growth) bill. As noted earlier, the types of projects that need to be undertaken to meet societal needs are the same as those, or could be, that are to be implemented by the full employment and balanced growth plan of the bill."

I wish Mr. Norris hearty success in persuading his business colleagues of the benefits of sensitivity toward the needs of society including full employment.

#### SUMMARY:

Technological innovation is the wellspring of new jobs. To help solve the problem of unemployment, technological innovation must be increased by making existing technology more available; by accelerating the creation of new technology, and devising more effective means of applying technology.

The major focus must be on unemployment — identifying and stimulating the private sector to undertake projects for creating new jobs. The central vehicle for coordinating the resources of all segments of society should be regional development offices. These offices will facilitate programs that create jobs by addressing the needs of society. Suggested programs include fostering entrepreneurial enterprise, developing alternate energy sources, revitalizing urban centers, reducing minority youth unemployment, and developing alternatives to capital- and fossil fuel-intensive methods of farming.

Legislative actions are required to achieve these goals. The types of projects that need to be undertaken can be the same as those proposed in the Full Employment and Balanced Growth Plan of the Humphrey/Hawkins Bill. All sectors of society must work together to solve the problem of unemployment. Only from this united effort will come the needed jobs and the enduring solutions to the other major problems of our global society.

The opportunity to participate in this forum is greatly appreciated. It would be most gratifying if I were able to contribute to a long-term solution to unemployment, because I believe it is the nation's number one problem.

Not only are more jobs needed, but almost as important, more skilled jobs. The unemployment problem will become even more critical as in the next ten years another twenty million new jobs will be required. This would be the largest increase of any decade in our history; in the last ten years only thirteen million were created.

The basic question is whether the U.S. can increase jobs and still improve productivity or whether this is another situation where we only can make trade-offs: are we faced with a choice between more automation, better productivity, and fewer jobs on the one hand or more jobs, less efficiency, more inflation, increased government pay-outs and deficits on the other?

#### TECHNOLOGICAL INNOVATION

This apparent dilemma is solvable through increased technological innovation. Technological innovation is the wellspring of new jobs. Capital investment is also a source of jobs and capital is required to support technological innovation. A dollar invested in technology will create more jobs and return more income than the same amount invested in capital equipment.

Technological innovation is one of the key factors in productivity improvement, along with capital investment and employee training.

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To avoid misunderstanding, I should mention that the definition of technology I use is “a way of doing things.” I also use the words “technology” and “knowhow” interchangeably. How to grow two stalks of rice in place of one is knowhow or technology. How to design a nuclear power plant is another example. Obviously there is a broad span of technology.

#### HOW TECHNOLOGY CREATES JOBS

Now let me give you a clear example of how technology or knowhow creates jobs. You have probably heard of or seen the portable sanitation units – or portable chemical toilets – that are used on construction sites. Before these portable units, there were environmental pollution, unsanitary conditions, and lost time by workers due to improvisations. Then some innovative individuals in various parts of the

country combined chemical knowhow, low cost construction technology and servicing management to provide an economical answer to the problem. Jobs were created in the manufacture of the units and in the servicing. Today in this business, there are over a thousand manufacturing jobs and another three thousand servicing jobs throughout the U.S. It is now a \$100 million industry with over a thousand small businesses contributing to the economy of communities in every state. And it continues to grow.

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As more knowhow is put into manufacture of the units, costs are reduced. As you know, this is called productivity improvement. Lower unit costs, combined with efficiencies in service, open up new uses and the employment of more people. In addition to construction sites, the units are being used at fairs, athletic events, parks, boat landings, summer cottages and home barbecues.

Although this example clearly illustrates job creation and productivity improvement, these results are not so visible in most cases. However, there have been many studies that verify the processes. For example, one study of the linkages between jobs, productivity and technology shows that growth of employment in high technology industries is almost nine times as fast as in low technology industries; output growth is almost three times as fast, and productivity twice as fast.

#### BUSINESS AND THE PROBLEMS OF SOCIETY

But the increase in technological innovation that could reasonably be expected in today's environment may fall far short of what is required. The primary reason is the indifference of business toward major societal problems. For too long business has been preoccupied doing the things that are most profitable and leaving the solutions to most of the major problems of society as the responsibility of government. Meanwhile, these problems are growing to disastrous proportions.

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For example, one of the most serious societal problems that's closely related to employment is the achievement of more abundant and less costly sources of energy. Our economy is utterly dependent on cheap and readily available gas and oil for energy. Within twenty to thirty years, world production will begin to fall off. Considering that fifteen to twenty years are required to get meaningful results from the average

new development, there is precious little time available to avoid disaster.

There are many other major societal problems crying for more attention. These include the improvement in energy conservation, greater environmental protection, new materials, less costly food production, more efficient water conservation, revitalization of inner cities, better education, better health care and improved productivity.

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Solutions to this vast array of major problems, along with a nationwide increase in technological innovation, will in the long run, provide millions of private industry jobs that must be part of a systematic route to full employment. What is required are jobs that are created from products or services to meet the country’s long-range needs. This should be our main thrust for job creation. As a businessman, I have been involved for over 30 years in establishing small businesses that have grown and have provided needed products and services and, along the way, more than 40,000 jobs.

So I believe that leadership for planning and implementing full employment programs must be provided by business, working in cooperation with universities, government, labor unions and other major segments of society. These programs should be planned so that they are in accord with the national goals and priorities embodied in the full employment bill. Our major societal problems are massive ones and massive resources are required for their solution. The best approach is that they are viewed as business opportunities with an appropriate sharing of cost between business and government. Economic growth will be stimulated along with job creation. The key resource needed is technology, i.e., the knowhow to solve the problems.

In order to create jobs, improve productivity and increase technological innovation at affordable costs, we need to make existing technology more available and to devise more effective means of putting technologies to work. Only by doing this will we achieve the most timely solutions to our major societal problems.

#### BETTER AVAILABILITY

In elaborating on improved availability, it should first be noted that there is a vast amount of valuable technology throughout the world. But much of it is little known and little used because of lack of efficient mechanisms and incentives for communicating knowledge and then actually transferring technology to productive use. In other words, the transfer of technical information and technology is grossly inadequate within our society – in government, in industry and in our universities.

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The Federal government spends more than \$1 billion annually to disseminate results of federally-funded research and development. Yet it is frequently impossible or extremely difficult for either government or industry to obtain these results in a useful form. And let me repeat — in a useful form.

The reasons include inadequate records, ineffective coordination of federal programs, lack of attention to the needs of industry, and inattention to the information and technology transfer needed by the scientists and the engineers who create the technology. Since most university research is government-sponsored, it suffers from similar patterns of poor dissemination of results.

In the private sector, there is relatively little transfer of technology across industries. Yet studies show that many major innovations are the result of applying the technology of one industry in another; e.g., the high-speed computer initially came from the electronic industry, not the business equipment industry; instant pictures were not invented by Eastman Kodak, and so on. The bottleneck in industry preventing more of this happening is the concern for maintaining an exclusive proprietary position. In the private sector we find a dichotomy between “over-protection of rights to technology” and “responsible sharing of technology for economic and social good”; a new attitude of cooperation by private companies is needed.

The reluctance of private industry, coupled with the grossly inefficient methods of government and academia for communicating information, result in the technological wheel being wastefully reinvented every day. Moreover, technologies are lying on the shelf grossly under-utilized.

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Obviously we must use our technical information and technologies more efficiently in creating jobs and in improving productivity. Further, we must remain aware that productivity improvement alone can be counter-productive to full employment. It must, therefore, be accompanied by a creative force for new products and services that will absorb both the newly unemployed and the expanding work force.

Technologies, wherever obtainable, should be viewed as the single richest potential source for the creation of new jobs. They provide the basis for whole new businesses and for new and improved products and services in existing business.

A major need, then, is to increase greatly the efficiency with which information on the vast reservoirs of technologies in government, universities and industry is communicated to those who can create new jobs by converting those technologies to new products and services. Increased efficiency in communications is essential, but not sufficient. Such sharing is non-traditional and difficult. Special incentives are also needed, including tax breaks, to induce the private sector to make its technologies more available.

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Policy changes and productive legislation are needed, summarized as follows:

- A. A clearly stated redirection of policy to achieve the broader use of government-sponsored R&D results in the creation of jobs.
- B. Stimulation of government laboratories and universities to make their technologies more available and to aid in their efficient transfer. This can be achieved by allocating a percentage (five to ten percent) of project funds to information and technology transfer, and by assigning added responsibility and incentive to scientists and engineers doing the work.
- C. Encouragement of government agencies having informational data bases to make them available to the private sector at minimal cost.
- D. Provision of tax incentives or direct payments to encourage private companies to sell and/or lease their technology for the public good. This type of government support would only be a front-end requirement to stimulate the initial creation of jobs.

#### NEW TECHNOLOGY

While more efficient transfer of existing technologies will be of enormous benefit, there are also new technologies needed for solving our major societal problems. However, the investment and risk required for many such developments are either beyond private industries' resources or do not provide an acceptable return on investment. Therefore, we must keep in mind that technology developed by one company or group of companies eventually has major benefits to the entire economy, and because of these extra benefits or “social dividends,” support is warranted from society as a whole.

Normally the development of technology that is financed by private enterprise has a large enough payout and low enough risk that an acceptable return on investment in R&D is virtually assured, even though a greater return is eventually realized by the rest of society. Society usually gets from private business the products that meet conventional business tests rather than those that address the more funda-

mental needs of society. Without government support, therefore, technology to meet all of society's needs will not be created. Therein lies a major reason why private enterprise is not aggressively pursuing solutions to many of our most pressing problems.

A whole new round of innovation is necessary. Innovations are needed like the discovery of electrical power, the invention of the telephone, or the beginning of the chemical industry in the 1880's. There are many likely targets: solar energy, fusion energy, new products that use much less energy, new materials, water conservation methods and new agricultural technologies. The costs will be very high and the risks great, both because of uncertain technological outcome and unpredictable market reception.

The diverse technologies created will be useful over a range much broader than the initial projects because of the subsequent development of new products, processes and services and the improvement of existing ones. Hence, new technologies will have far greater value to society than can be realized by the individual companies involved. Clearly government should join with private companies to pursue these projects. Leadership and management should come from the private sector and funds from the government until experimental models prove feasibility and the risk is manageably reduced. Thereafter, the balance of the cost should be borne by industry.

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Projects that meet societal needs, such as those for new energy sources, better transportation, environmental improvements, and water conservation, should be supported under the priorities and programs part of the Full Employment and Balanced Growth Plan of the Humphrey/Hawkins Bill. In meeting these needs not only will jobs be created, but many of them will be skilled jobs. This is particularly important so that those who take lower-level, shorter-term employment in jobs corps and public works can look forward to job opportunities at a higher skill level.

#### PUTTING TECHNOLOGY TO WORK MORE EFFECTIVELY

Increasing the availability of existing technology and developing new technology are both essential, but we must put technology to use more effectively in order to achieve the most timely solutions to major societal problems.

The major deterrent is the widespread lack of understanding of the role technology plays in the economic process, particularly that new jobs are derived from the application of technology. Moreover, just the use of the word "technology" often causes people to turn off with the attitude that technology is for the long hairs — don't bother me — or

worse. More recently, technology has been thought of by some people as a synonym for pollution and dehumanization. So there is not only lack of support for increased technological effort, but opposition by some — both reactions stemming primarily from a lack of understanding.

Yet, there is a deeply-rooted and growing concern in our country, and indeed worldwide, over unemployment. Efforts, albeit not very effective, are being made toward more permanent means for creating jobs as opposed to the short-term job corps/public works-type of approach.

Most of these efforts have been concentrated on facilitating the formation, development and more efficient operation of small businesses for achieving economic growth and creating new jobs.

One such effort, with partial funding by the National Science Foundation, has resulted in innovation centers at the Massachusetts Institute of Technology, Carnegie-Mellon and Oregon State Universities.

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The Small Business Administration started one such effort by making \$300,000 available in 1977 to test the concept of establishing small business development centers at eight cooperating universities. These centers aid small businesses with their management problems, particularly those involved in starting new companies, and with finding and applying technologies required for new or improved products and services in existing organizations. This program will be expanded in 1978.

There are other similar organizations like the new Enterprise Institute in Maine, started in 1974 with the belief that entrepreneurship and innovation in the small business sector was the fastest route to healthy economic growth in Maine. Its funding level is about \$700,000 over five years and is provided mostly by a grant from the Kellogg Foundation.

One organization in a formative stage is the Committee of Urban Public Universities. This group's objective is to coordinate and apply university resources more effectively in cooperation with other public and private organizations to help solve unemployment, urban blight and the like.

There are many other community organizations that are engaged in facilitating economic growth in various ways by helping to finance new plant construction, inner city housing revitalization, public works, etc.

These many types of organizations do help to create jobs but usually on too small a scale. They are fragmented and duplicative, and too often merely study problems instead of providing solutions. There is not adequate involvement of big business, labor unions, churches, uni-

versities or local governmental units; and most of the organizations have low visibility. They are micro solutions to macro societal problems. These are massive problems requiring massive resources and entailing many controversial issues.

#### FOCUS ON UNEMPLOYMENT

What is needed is a pulling together of available resources on a regional and national scale to identify, prioritize and facilitate problem solutions with the implementation being done in the traditional manner by the private sector.

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The major focus must be on unemployment — identifying and stimulating the private sector to undertake projects for creating new jobs. Although the main emphasis would be on unemployment, other societal problems would be addressed whose solutions help create jobs.

This approach has several advantages. One is that only by much more direct involvement of major segments of society will there be adequate general awareness of what technology is all about and what its relationship is to jobs and productivity. Another benefit is that of societal consensus — most will agree that the number one need is more jobs. Many who would reject proposals for increased government spending in development of alternate energy sources for fear of increased pollution or unjust enrichment of business, would seriously study and more likely support actions leading to more jobs.

#### AREA DEVELOPMENT OFFICES

The central vehicle for new job creation would be the establishment of regional development offices. These would be highly visible and would involve all segments of society. Their principal objective would be to identify and to help promote the means of creating new jobs, chiefly through the more efficient use of existing technology and the development of new technology. The development offices would motivate businesses, particularly large corporations, to assume leadership in programs to solve major societal problems, using techniques discussed earlier.

##### *Specific Functions:*

1. Selection of appropriate societal problems for attack.
2. Encouragement of businesses to assume the leadership of projects for solving the problems.
3. Encouragement of cooperation among businesses and between business and universities in implementing the projects.
4. Dissemination of research and development information on services and products required to help meet major societal needs.

5. Stimulation of companies to make their technologies available to others for non-competitive uses.
6. Encouragement of non-research intensive companies to upgrade their technical capabilities.
7. Assistance to aspiring entrepreneurs and inventors in evaluation and preparation of business plans and start-up efforts, together with identification of financing sources.
8. Assistance to small businesses in acquiring new products for manufacture, distribution or servicing.
9. Promotion of state and federal legislation to increase support for technological innovation.
10. Suggestions for helping establish national priorities and goals.

The area development office would be manned by a small permanent staff. Professional expertise needed for program selection and promotion would be supplied by volunteers employed by other organizations and by retirees.

*Financing:* The cost of supporting the permanent staff and a limited number of research studies would be borne by annual contributions from the participating organizations. Costs of any research study requiring a very large effort would be covered through federal or state government grants.

#### POTENTIAL PROGRAMS

The method of operation of an Area Development Office is best explained by looking at five programs that might be undertaken.

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*Entrepreneurial Enterprise:* One important type of program is that of fostering the start-up of new, small enterprises. A new business means new jobs. An inventor has an idea for a new product or service, and wants to start a company to develop and market it. Financial backing from the usual sources is not available. Venture capitalists are usually not interested in unproven ideas.

The Area Development Office provides assistance. A volunteer team of experts are assembled from local business and universities to review the idea, and if sound, to help in the preparation of a business plan and in the prompt completion of the many other steps in setting up a business. Since there is substantial risk, the initial capital is spread among a number of investors, including all types of businesses, banks, insurance companies, larger industrial companies, venture capitalists, plus labor unions, religious organizations and local civic and government units.

The potential for job creation can be glimpsed by noting that the Small Business Administration estimates that there are 800,000 would-be entrepreneurs in the U.S. If half were able to succeed in starting a business employing an average of ten persons, there would be 4,000,000 new jobs created.

*Solar Energy:* Another important project would be one to facilitate the development of solar energy. In view of the critical importance of alternate sources of energy, a huge increase in development is needed.

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The approach should be to identify the projects with the best potential and encourage implementation by existing companies. When the risk is too high, or financial commitments are beyond the means of individual companies, then joint ventures should be encouraged – either by collaboration between existing companies or through the formation of new companies.

Here again, there is an enormous potential for job creation. There are about 180 companies in this field, most of them small; so if more technology were available, not only would the present ones expand, but many new businesses would start up.

*Urban Program:* Another important program is one helping to revitalize declining inner-city areas and to alleviate the nation's housing crisis. All new technology is not needed, but many existing technologies are not widely known.

The inexorably rising costs of transportation will reduce drastically the distances people can afford to commute daily. Hence, there will be residential clustering around employment centers and incentive for industry to locate amid existing housing.

Resolution of the nation's housing crisis will require a much expanded level of effort in the construction and maintenance of affordable housing. Preservation of existing urban housing offers great entrepreneurial opportunities and potential for job creation.

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“Reducing unemployment among minority and disadvantaged young people is another priority program.”

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*Reducing Minority Youth Unemployment:* Reducing unemployment among minority and disadvantaged young people is another priority program. The present forty percent rate of unemployment among the minority young in most of our large cities is not only shameful, but dangerous.

It is certain that dedicated and coordinated large-scale cooperation among business, government, academia and labor can make a vast improvement. This has been proven by Control Data's success in placing plants in poverty areas, by our computer-based basic skills training, counseling and placement service, and by the success of 70001 LTD.

70001 LTD. is a non-profit organization that operates with CETA (government) funds. It provides out-of-school, unemployed youth with immediate employment along with on-the-job training, education and development of self-confidence and motivation to enter and advance in the field of marketing and distribution. It has extensive cooperation and support from the American Retail Federation and related national business firms. The 70001 Program is producing significant results, but it is limited to the retail field, with emphasis on personnel guidance and counseling. Unfortunately, it does not deal with the huge bulk of the more severely disadvantaged. Even so, 70001 is a good start and does show that meaningful cooperation can occur among major sectors of society.

*Back to the Countryside:* A longer range program to be considered is one that stimulates and supports migration back to rural areas. There is a trend in this direction although it is not yet a true back-to-the-farm movement. This trend will no doubt continue – even accelerate – but without proper planning fuel shortages, unemployment, lack of adequate education and health care, and other problems will develop. Thus, a number of urban problems will spread into the countryside and become even more difficult to solve.

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Migration back to the countryside, including a movement toward smaller farms, if encouraged and properly managed as part of a national program and accompanied with appropriate broad-based research and development, would have great benefits for our society. Unemployment would be materially reduced. Food production would be increased, and food costs decreased. Greater conservation of natural resources and more environmental protection would be achieved along with the provision of a greater availability of a life style of growing popularity.

Many elements of change affecting agriculture and food processing are already apparent that not only support this thesis, but dictate its adoption. These include the steeply rising costs of energy, decreasing availability of fossil-based fuels and fertilizer, rising costs of equipment and land, the growing scarcity of water, unacceptable environmental pollution, and diminishing returns from many of the present direc-

The present highly-centralized, enormously capital-intensive, fossil-fuel-dependent and environmentally destructive methods should start to give way to more decentralized approaches that are more in harmony with nature.

The advances in communications-oriented data processing techniques, including computer-based education, will make it possible to reduce drastically the amount of travel required by rural people in seeking occupational and educational alternatives. It will be feasible for many kinds of work to be performed in the home or in small operations near by, with needed education and information accessible in the same manner.

These views conflict with the most prevalent ones which are extrapolations of the past and predict the eventual extinction of the small farmer. These predictions may yet be borne out because the salvation of the small farmer may not occur automatically and, most certainly, will not occur at all unless technology for increasing the efficiency of the small farm is developed.

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What is needed are national goals to develop alternatives to the present fossil fuel-intensive, huge capital investment and environmentally destructive approaches. The goals should include the formation and operation of smaller units with appropriately scaled equipment and methods that require a minimum of fossil fuels and involve more human labor – not back-breaking labor, but the work that’s involved in integrating a small but diversified operation.

#### LEGISLATION

The legislative actions required to more effectively convert technology into jobs through the concentration and cooperation of resources on a regional basis appear to be embodied in the provisions of the Humphrey/Hawkins Bill.

As was noted earlier, the types of projects that need to be undertaken to meet societal needs are the same as those that are to be implemented by the Full Employment and Balanced Growth Plan of the bill.

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Also, the proposed Area Development Offices would be the best source of data for establishing national priorities that are specified by the Humphrey/Hawkins Bill. Moreover, these offices are indeed needed for achieving the most timely solutions to major societal problems.

To conclude, what I am saying is that the old ways are not working, partly because solving the unemployment problem is always "Someone Else's" problem. Everyone really only wants to keep doing what he is doing and doesn't want to change. What I am proposing is to enlist all sectors of society to solve the problem of unemployment. In working together to help solve it, there will be not only a better understanding of the origin of jobs, but also of the enormous difficulty to create them. Out of this effort will also come a much better and badly needed understanding and respect for each sector of society by the others. Most important, out of this effort will come more jobs.

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