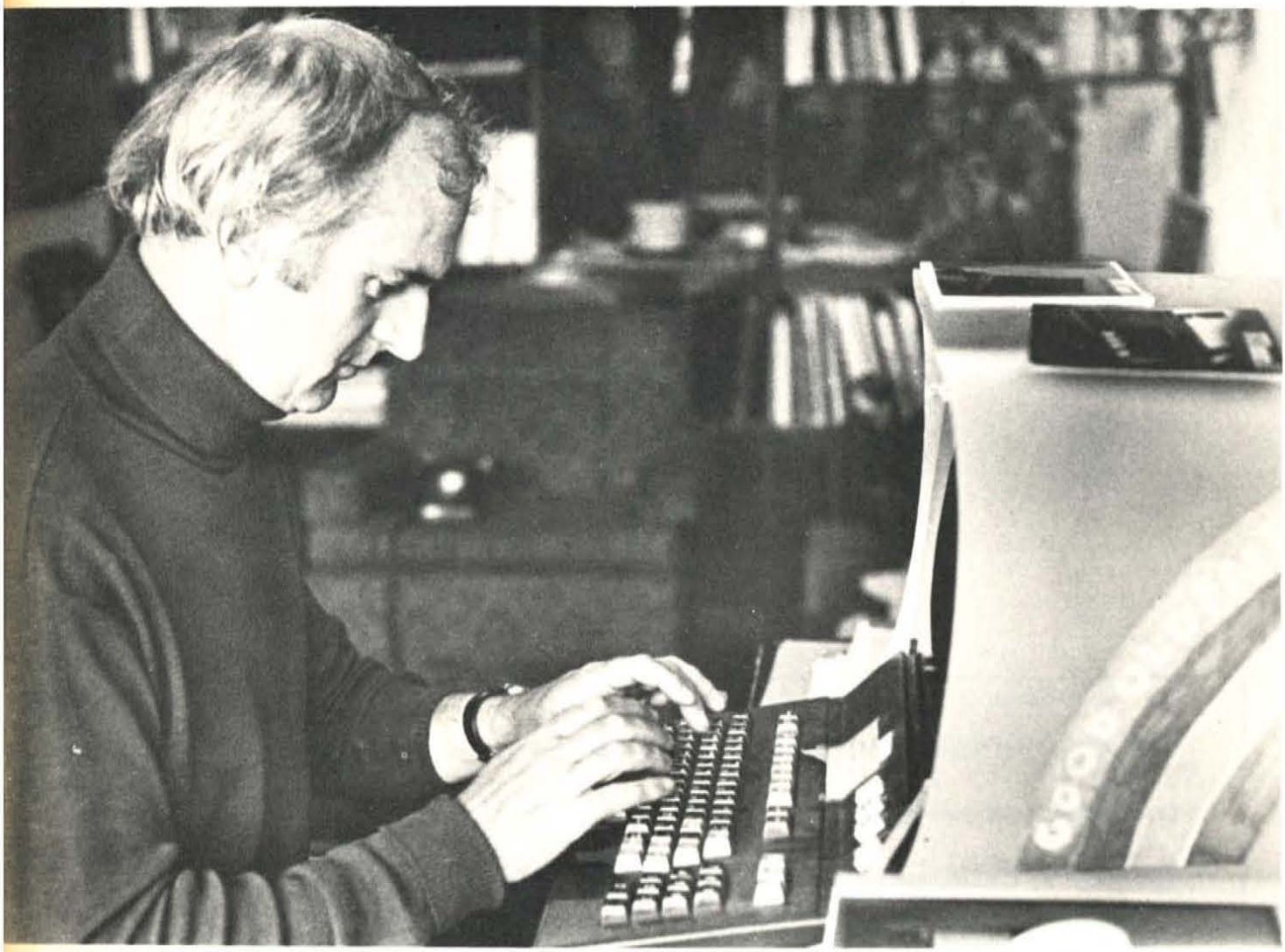
spring, 1979 III, 2

# THE JOURNAL OF COMMUNITY COMMUNICATIONS



## Taking Control of Technology

Editor – Sandy Emerson.

THE JOURNAL OF COMMUNITY COMMUNICATIONS is published four times per year by Village Design, P.O. Box 996, Berkeley, CA 94701.

– Letters, articles, art, and poetry are invited.

Village Design is a tax-exempt, independent, non-profit corporation, and donations are tax-deductible.  Subscription rates: 1 year, $9. Add $3/year foreign subscriptions.

*Spring, 1979* *Volume III, Number 2*

# THE JOURNAL OF COMMUNITY COMMUNICATIONS

# EDITORIAL

## WARNING: TECHNOLOGY ISSUE / ISSUES IN TECHNOLOGY

This is an issue about the relationship between communications technology and social change. Since computers, particularly small, cheap computers, are currently at the forefront of new developments in communications technology, the majority of the articles concern the use and misuse of computers in information and communications systems.

For example, operations researcher Stafford Beer attempted to install a distributed production-monitoring system in Chile which would have given workers and the government cooperative control over the production processes. The history of the CYBERSYN project and Beer's perceptions of it are detailed in "Stafford Beer: the Untechnocrat and his Liberty Machine." Beer's dream of a viable cybernetic system for regulating the Chilean economy was abruptly terminated by the coup which toppled Allende's government and the Chilean socialist experiment.

This article opens the debate about the degree to which an appropriate technology can influence social change. The design for CYBERSYN had been developed some years before Beer found a government willing to put it into action. Even in Chile, where the social climate was inclining to the idea of increased workers' participation, the CYBERSYN system could facilitate collective action only to the degree that the managers and politicians permitted it to do so.

The design of CYBERSYN was decentralized: the data in the system was to be distributed widely and the programs were to provide for maximum local control of decision-making about production. Beer, and others, have theorized that the distribution of data processing through small computers and decentralized computer networks could help distribute power in a society, and give people more control over their own lives by giving them more control over information. If, for example, TV sets could be turned into computer terminals and connected to a data bank over the telephone, linking thousands of people in a computer network . . . the result, unfortunately, might be something like Prestel, the "home information appliance" that the British Post Office is putting out on the market this year. Although the technology of Prestel is capable of enabling a people-to-people communications system and information exchange, the social context of its use does not permit the system to live up to its potential. Instead, this system is only minimally interactive, giving its subscribers the opportunity to choose information items from a menu prepared by official Information Providers. As explained in "The Home Information Appliance: an Introduction to Prestel," the limitations of this system come not from the technology but from its administration.

A more optimistic point of view is put forward by John Garrett and Geoff Wright in "Micro is Beautiful," in which they discuss the liberatory potential of microprocessors at some length. To this Alan Campbell replies: "Hard Chips."

In "Design Principles for an Information System" the people at The Community Memory Project outline some social and technical parameters for a community communications system which would be managed and maintained by its users. The inclusion of a requirement for co-operative community administration of this system makes it radically different from Prestel, which is administered by a government communications monopoly.

Information networks such as Prestel and Community Memory, whatever their differences in social protocols, are made possible in part by communications technology that was originally developed for the military. As Paul Baran points out in "Some Perspectives on Networks: Past, Present, and Future," it certainly might be possible to use this technology in a people-to-people communications network, and he suggests that computer hobbyists will lead the way in this effort. M.E.D. Koenig, on the other hand, suggests actually substituting computers for weapons in "The Toy Theory of Western History," on the grounds that the development of more and more elaborate weapons is the result of a frustrated desire to play with toys. He feels that computers would be an adequate substitute. These two proposals, modest and immodest, add some new twists to the examination of the relationship between technology and social change. Not only could a technology developed for the military be put to progressive social use, but it could even supplant the military entirely.

In the debate around the relationship between technology and society, the real issue is that of control. The use of a given technology depends on who controls it: it is the control of technology that determines its use, rather than the use of a technology determining its control. In communications systems, small computers are becoming both cheap and effective; whether ordinary people will take control of this technology and determine their own uses for it or whether its uses will be decided mainly by business and government interests is a question deserving consideration now and action soon, before it's too late. (See also the review of "Electronic Message Systems" and the report, "Computer Hobbyists Begin to Organize.")

For our part, we'd like again to invite our readers to take control of this Journal! The two articles in this edition of "Feedback," and the report on the NEX-US Directory, are particularly welcome since they DON'T deal with computers. The next issue of the Journal will include some articles on community information networks and the growing phenomenon of 'networking.' So: let us hear from you, before the 4th of July.

— Sandy Emerson
Editor

**The Journal of Community Communications**
c/o Village Design
P.O. Box 996
Berkeley, CA 94701

# FEEDBACK

## IN DEFENSE OF BAY AREA ALTERNATIVE LEARNING NETWORKS

*by Bart Brodksy*

A number of us at Open Education Exchange read and were disappointed with Ljuba Zharska's article critiquing adult "learning exchanges," or "free universities," as they are more commonly called, in the Bay Area. (Journal of Community Communications, Fall, 1978.) As founder and Co-ordinator of the Exchange, and as one of Ljuba's interviewees, I've taken it on myself to distill some of our complaints into this brief rebuttal. My object here is not to issue a point-by-point correction, but, hopefully to give your readers a more complete perspective on the state of the alternative education movement, and of Bay Area institutions in particular.

It was obvious to a number of us that Ljuba in her article was trying to foist her own conception of community activism and institutional responsibility onto the "learning exchange"model as she defined it. Free universities and learning exchanges come in all shapes and sizes -- some based on university campuses, others community-based; some supported by student fees, others supported by grants from foundations and even large corporations; some political, others couldn't care less. What we have in common is a dedication to the ideals of intellectual freedom, cultural exploration, and community, rather than state, control of educational possibilities.

Ljuba indicts alternative schools for their "narrow, individualistic direction," taking all too lightly our function in helping individuals "to make daily life healthier, cheaper, less boring, less lonely." Let's not forget that free universities operate primarily under an educational charter; they never were intended to become substitutes for direct political organization and activism. The failure of modern social and political institutions to serve democratic and humanistic needs is our collective responsibility, not the failure of learning exchanges to generate political leadership. If free universities did nothing more than to help some of us "survive," that in itself would be a significant contribution. Can even this much be said of our state- controlled educational institutions?

Ljuba's fragmented perspective on the free university movement stems from her limited experience, and from her attempt to generalize by extrapolating from only three examples -- Open Education Exchange, Lavender University (primarily gay and lesbian oriented), and Orpheus Currently, there are no less than seven well-established Bay Area alternative Universities catering to specific audiences. These include Communiversity (a true "free" university in the Haight and Sunset area, where teachers teach unpaid and students attend tuition-free); the Bay Area Socialist School (primarily Marxist- oriented political classes); the Berkeley Holistic Health Center (disseminating alternative and community healthcare information); and Breakaway (very low-cost, women-only feminist activity and awareness classes). Different schools cater to different audiences. Some are more overtly "political" or issue-oriented than others. However, all of us have had some impact in disseminating progressive and new age values through out the general community. Of these local alternative schools, the Open Education Exchange is probably the most "mainstream." But I say this neither as an apol-

ogy nor a boast. It is precisely our widespread acceptance that permits us greater dissemination of the ideals and techniques propagated in such classes as "paralegal skills," "women's rights in divorce," "holistic health," "do-it-yourself auto and home repair," "alternative energy systems," and more.

We strongly disagree with Ljuba's conclusion that "the possibility of present-day learning exchanges developing into genuine educational alternatives is doubtful, at least in the near future." Free universities and learning exchanges, some 200 strong throughout the nation, are affiliated through a loose national network. We are asserting ourselves as a significant educational force, and there is a growing recognition of our contribution. Traditional adult schools, not only throughout California, but throughout the United States, in Canada, Europe, and even Australia, seeking to broaden their scope and structures, have contacted us asking for more information and samples of our catalogs.

Open Education Exchange Coordinator Janet Geis and I sympathize with Ljuba's specific critique of our organization as lacking in "classes with rigorous intellectual or political content." Ljuba failed to credit us with first pointing this out *to her* during our interview. Our mini-class format is but one of many possibilities; we do what works best for us, given our current financial and organizational limitations. We do make a point to offer a number of political and activist classes each year, even though we always lose money because of their limited student appeal. Yet, despite the fact that the general community seems far more excited by disco dance lessons than alternative energy sources, communes, or community organizing, it has always been our editorial policy to make space in our paper for community action information. We have given free space to the Free Clinic to publish their Community Switchboard Directory, and we have also given or traded for editorial space or advertising with *Plexus, North Country Star, City Miner,* the Ecology Center, Bay Area recycling centers, and others. In fact, we offered Ljuba, during the course of our interview, free editorial space to her in conjunction with her work for Abalone Alliance. Ljuba apparently chose to ignore this offer -- a chance to reach our readership of over 1/3 million local residents -- while criticizing us for "serving the same old stuff to the same people." Ljuba, our offer still stands.

Most recently, the Open Education Exchange staff has been working to enlarge our newspaper. If we can generate sufficient revenues by accepting local advertising, we will be able to make additional space available in our newspaper for community announcements and interviews with local organization leaders. In the meantime, we're working as many as 80 hours a week just to break even.

We are doing our damnedest to make the Exchange a viable progressive education alternative. For the present, we would appreciate more *constructive* criticism, not more counterproductive, nihilist radical rhetoric.

# WHAT IS A BROADCAST INFORMATION SYSTEM?

*by David Stodolsky*

While completely in agreement with the sentiments expressed by Sandy Emerson in her introduction to Volume III (1978-79), I feel that the imprecise use of certain terms could block effective communication. The dangers are polarizing groups which in fact have common interests or yielding certain valuable concepts to the establishment media without a challenge. Sensitivity to this problem is shown by use of the term "broadcast" in quotes in the introduction, but further clarification is needed if this term is to be used meaningfully.

Three terms which define crucial parameters of a community information system are used in the first paragraph of the introduction; they are "non-hierarchical," "interactive," and "broadcast." The first two terms are presented as desirable properties of an information system and as in opposition to the last.

Examination of these terms may clarify their meaning and the relationships among them. The verb "broadcast" is defined as "to spread (information, etc.); inform many people of" (Webster, 1976). This certainly fits the functions of a community communications system. A broadcast system can be either non-hierarchical and interactive as in a conference phone call or a CB radio interchange, or hierarchical and non-interactive as in a typical radio or TV broadcast.

The crucial distinction is identified in the second paragraph: Do people have control over the content of the information they receive? Whether the information comes as a radio or TV broadcast or through a computer network is irrelevant for the purpose of this definition. The communication is either available to all (who wish to receive the broadcast) or it is restricted to a pre-selected subset of persons (point-to-point). People can control their information inputs in two ways: 1) eliminating those items they do not want; 2) getting those items they do want. If information they want is included in a broadcast, then they can achieve the second by doing the first. Making sure that the information IS broadcast involves the questions of interaction and hierarchy. Explication of these concepts is beyond the scope of this note, however.

The broadcast of information can undermine secrecy and the use of information as a mechanism of control. Just because the establishment media has debased the broadcast system, by imposing a strict hierarchy which eliminates interaction and actually promotes secrecy, is no reason to yield the term "broadcast" to them. Likewise, there is no need to apologize for the Journal of Community Communications being a broadcast communication. It is also interactive and non-hierarchical I would argue, however, that, if anything, a truly non-hierarchical and interactive community information system must be a broadcast system. So let's not allow the mechanics of computer-net vs. radio-net vs. journal to cloud the true issue of whether individuals select for themselves the information they receive. Our responsibility is to demonstrate the true advantages of a broadcast system in informing the community, and thereby illustrate the debased nature of the establishment media.

*References*

Webster, Noah. Webster's New Twentieth Century Dictionary of the English Language. USA: World Publishing Company, 1976.

Emerson, Sandy. " An Introduction." The Journal of Community Communications, 1978, III (1), 4-5.

# STAFFORD BEER: THE UNTECHNOCRAT AND HIS LIBERTY MACHINE

## A Review of the CYBERSYN Project

*by Tom Athanasiou*

Source Documents:

"Cybernetic Praxis in Government" in PLATFORM FOR CHANGE by Stafford Beer. London: John Wiley and Sons, Ltd., 1975.

"Cybernetics in Government: Experience with New Tools for Management in Chile 1971-1973. In CONCEPTS AND TOOLS OF COMPUTER-ASSISTED POLICY ANALYSIS by Hermann Schwember. Basel: Birkhauser Verlag, 1977.

Despite their negative public image, computers and other information technologies have potential beneficial uses which are both numerous and striking. Unfortunately, attempts to use them in this way are rare. The CYBERSYN project, conducted during the short 34 month period that the Allende government was in power in Chile, is probably the most ambitious attempt to date to use a computerized telecommunications system as an integral part of a strategy of social transformation. CYBERSYN'S story is particularly interesting both for the sophistication of Stafford Beer's design, and for the attempt to implement it during a period of great volatility in Chilean society.

It is no accident that computer technology is distrusted by so many. The rapidly developing electronic battlefield, the rising rate of unemployment (in part due to automation), and the terrifying extremes of surveillance and control, which the "microcomputer revolution" so easily allows, are clear grounds for pessimism. The potential of information technology to support new and liberatory social forms could easily be passed by in the blind dynamic of our civilization. The possibilities are all too clear. Computers are currently enmeshed within, and support, oppressive and exploitative social institutions, and are increasingly identified with those institutions. In Chile after the coup, the same kind of computer technology that the designers of CYBERSYN had hoped to integrate into the process of social reconstruction was taken over by DINA -- the Chilean secret police.

It is a simple matter to point to the 25 cents per hour that Asian women are paid to assemble integrated circuits, or to the information retrieval systems deployed in the service of the police and credit bureaus. It is much more difficult to point to uses of computer technology that prefigure other, more fluid and less desperate ways of conducting human affairs. In this regard computer technology is distinct from other elements in the potential, post-capitalist industrial mosaic. Solar photovoltaic cells, urban aquaculture systems, and other more "conventional" alternative technologies come to us either as long suppressed or recently invented benign possibilities. None has the history of, or potential for, abuse that computers so strongly call to mind.

It was thus with great curiosity, and a desire to be enlightened, that I investigated CYBERSYN (a contraction of the words "cybernetic" and "synergy"), which I first found described in the last sections of Beers' PLATFORM FOR CHANGE. CYBERSYN was no mere computer project, but the

name given to a system by which the entire national economic life of Chile would be planned and coordinated. The concept of CYBERSYN combined a highly refined notion of cybernetic efficacy with a (as we shall see, ambiguous) sensitivity to the development of workers control. It is notable that CYBERSYN, as well as all of those popularly initiated activities which had developed in the absence of the traditionally repressive state, was immediately terminated after the coup. That the coup occurred largely as a result of actions which the United States took to "destabilize" the Chilean situation is now well known, as are the activities of the transnational corporations and the C.I.A. It is against the background of these events that CYBERSYN must be considered, for it was no accident that a government which aligned itself with socialist revolution was the first to become interested in Beers' proposals for the "metasystemic redesign" of the instituitions of social production.

## THE LONELINESS OF THE LONG DISTANCE PLANNER

> What is needed is structural change. Nothing else will do. But this cannot be heard by people who regard the structures as given -- because of subroutines in their cerebral computers ... the maintenance of the structure has become an end in itself.
>
> The more that I reflect on these facts, the more I perceive that the evolutionary approach to adaptation in social systems simply will not work any more. Evolutionary systems in biology, which do work, always embrace structural change: this turns out to be what evolution is about. Adaptation is not obtained by overloading...the control system, which is the only solution that society currently has. It has therefore become obvious to me over the years that I am advocating revolution.
>
> -- Stafford Beer (PLATFORM FOR CHANGE - 35)

The particular shape that CYBERSYN took was largely the result of the ideas of Stafford Beer, who was called in by the Chilean government to be the main consultant on the project. Beer is an interesting case. It's not, let's face it, every day that a former president of the Operational Research Society of Great Britain and of the Society for General Systems Research in the United States declares that he is a revolutionary.

Actually, Beer's radicalism is ambivalent, and the application of systems theory to human society is anything but an obviously positive development. In Chile, where Marxist analysis of one sort or another was the dominant theoretical influence, the implementation of Beer's cybernetic analysis took on a different form than it would have had in Euro-America, the heartland of technocracy. Not that Beer is just an average systems analyst. He's not. Even before his experiences in Chile he began his unorthodox radicalization. Working as a management consultant to the corporate and governmental bureaucracies of the capitalist world had already convinced him of the need for basic social change, though it had by no means taught him how that change might come about.

Beer was a pioneer in the 'science' of rational management. He may have developed his ideas while consulting to the same social classes that were later to sabotage the Chilean project, but his inspiration came from nature, not politics. Many of his most interesting ideas are drawn by analogous reasoning from the structure of the human organism, which he takes to be the paradigm of all that an organization should be. He is an honest man, and thus did not repress his perception, or stop his analysis, when it became socially inconvenient to proceed. This perhaps is why in his work the methodology of cybernetics seems to expose its own limitations, and why he could come to see Chilean ideas for workers participation in the management process, though they were not part of his original concept, as fully compatible with his ideas for the reorganization of Chilean society.

Norbert Weiner, the founder of cybernetics, called it the science of control. Beer thinks that this was an unfortunate choice of words and redefines it as "the science of effective organization". He would like to think that organization, at least those aspects

of organization to which cybernetics addresses itself, is socially neutral. Having spent his life trying to rationalize the anarchy of the capitalist market, he nonetheless talks of management, and of "effective organization" as if they were independent of particular societies. He calls for the "redesign" of society, and insists that "We have to devise a plan for getting from here to there as quickly as possible. History and philosophy bear upon that plan. All that bears upon the design of the optimal system is -- science".

(PLATFORM FOR CHANGE - 199)

If we are to understand the designers of the CYBERSYN system and what they thought that they were doing, it is imperative to recognize the technocratic reductionism that underlies this last statement, and to recognize it without ignoring the kernel of truth which it nevertheless contains. The designers were no simple-minded group of Machiavellian bureaucrats intent upon creating the ultimately rationalized state-socialist society, (though they were afraid that they would be portrayed as such). They were variously engineers, psychologists, Marxists and bureaucrats, and they were implementing a project that was intended to 1) rapidly increase the efficiency of the nationalized sectors of the economy, 2) strengthen this economy against the onslaught of the CIA-financed right wing of Chilean society and, 3) allow for the development of an organizational context which would permit greatly expanded popular participation in the management of the economic life of Chilean society.

Hermann Schwember, who was a member of the CYBERSYN team, states that "The first problem was that no definition of participation existed which could be acceptable to all political groups involved. The different attitudes varied from those sponsoring a utopian form that should involve everybody in everything to those who would have preferred some minor concessions to workers by accepting some formal representation in some of the boards or committees." (POLICY ANALYSIS-132)

The dominant notion seems to have been that once it was decided what policy was to be followed (a decision which would ultimately be made by the standard forms of representative government), the communications systems of CYBERSYN would allow those policies to be implemented with maximum efficiency and maximum local autonomy. CYBERSYN, in its turn, would be the result of the cybernetic principles of "effective organization". Beer here makes an assertion which clearly distinguishes him from the average systems scientist: that design should strive not for "optimization", but for "viability". (This is, incidentally, a realization not uncommon to those who have carefully observed natural phenomena.)

> Viability is associated with the overall ability of the system to survive and evolve harmonically in a dynamic environment, while optimality requires for a very complex system that it be permanently cornered into compatible extreme values of some coordinates with the frequent risk of all kinds of oscillations in other identifiable and non-identifiable coordinates.
>
> (POLICY ANALYSIS - 84)

The viable system that CYBERSYN took for a model was the human organism itself. The human organism is "viable" because, to use the term of the Chilean biologists H. Maturana and F. Varely, it is "autopoietic". It has its own organizational structure as its homeostatic variable. It was hoped that the productive life of human society could be made to exhibit the same characteristics by constructing an electronic nervous system that would support all of what radical ecologist Murray Bookchin has called the "cell tissue" of society within one dynamic totality.

There is more here than the mere desire to modernize the management process, more even than the demand of the frustrated planner to be free of the constraints of capitalist ossification. Modern technology has the potential to support large and complex societies, such as ours, with an interactive and non-hierarchical network of communications links. Eventually, we could develop tools that would facilitate global coordination and planning without either requiring or justifying centralized control or a separate managerial class. In a context of

social transformation such as existed in Chile, it was possible to envision the implementation of the first, primitive version of such a global information system. This was the significance of CYBERSYN.

The problem for Beer, and for many of the other designers of CYBERSYN, was to develop methods of organizing production that would allow decisions to be made at the most appropriate social level, be this level the individual shopfloor, or the national planning process, or some level in between. They referred to the levels, using a cybernetic term, as the levels of social recursion. It was to the relationship between levels of social recursion that the designers addressed themselves. Only a system that preserved the automony of the individual levels, and yet linked the whole society together when this was appropriate, could meet the design goal of viability.

The notion of recursive organization is of more than academic interest. It is closely bound up with the notion of individual and local autonomy, and was explicitly seen by the designers as an alternative to the "irrelevant dichotomy" of centralism and decentralism. "No viable system can be rigidly and completely controlled from a central unit, on the one extreme. No viable system can, on the other extreme, [do without] some form of central control in order to monitor the system performance and the environment evolution." (POLICY ANALYSIS - 85)

This is crucial, and demonstrates the relevance of the Chilean experience to contemporary concerns. While Schwember's equation of systemic coordination with "central control" is politically revealing, it is clear that the necessity of coordination is the real issue. This is the importance of systems such as CYBERSYN. They can allow high degrees of local autonomy, and thus diversity and resilience, while at the same time allowing global coordination, the need for which is usually forgotten by advocates of decentralism. Within the Chilean context the most important immediate implication of the recursive form of CYBERSYN was that its implementation in no way came into conflict with the self-activity of the Chilean working class. It seems inevitable that some conflicts would have arisen had events not been overtaken by the coup, but it would be a serious mistake to take this to mean that the interests of the revolution, and the plans of the designers, were entirely without congruence.

The Chilean revolution was strongly characterized by a movement of workers' participation and control. This movement was an expression of the same deeply rooted political consciousness that expressed itself in the election of the Allende government, but was by no means limited to the mechanics of the electoral process. This must be stressed to avoid the misconception that the Allende government was bringing workers control into existence by governmental decree. In some cases this was true, but it is much more accurate to stress that the Allende government, by not defending the interests of international capitalism, allowed the self-initiated activities of the working classes to develop in the relative absence of state repession. A study carried out in the last six months of the Popular Unity government by two economists showed that the strongest influences upon the degree of worker participation in management were all political in nature and that technological complexity did not, in itself, constitute a barrier to that participation. In fact,

> The study found that the factories where workers were mobilized prior to socialization and more actively involved in the process of the factory's passage into the "social area" were the factories with the highest level of worker participation. Factories which were socialized through a bureaucratic decree or with little worker involvement had lower levels of worker participation after socialization. (Zimbalist and Petras)

A key fairy tale in the ideological arsenal of capitalist society is that a managerial class is necessary for the sucessful operation of complex, highly technological enterprises. The experience of succesful workers control in Chile and elsewhere indicates that this is mere mythology. The purpose of the CYBERSYN project was consistent with the self-motivated actions of the Chilean working class in that an aspect of its purpose was to render workers participation and control increasingly effective by constructing a tech-

nological framework for the self-management of society. It was the belief of the designers that the "management principle" could be effectively dispersed throughout society with the proper education and the proper organizational framework. While they, particularly Beer, seem naive in terms of their understanding of the political realities that confront the implementation of a socially enabling form of communications technology, and while they stop short of supporting the full empowerment of the working class, it would be unfair to characterize the impact of a system such as CYBERSYN as anything but an advance over traditional ways of viewing social planning and coordination.

## THE LIBERTY MACHINE ITSELF

> This old world was characterized by the need to manage *things* -- stone, wood, iron.
>
> The new world is characterized by the need to manage complexity.
>
> Complexity is the very stuff of today's world.
>
> The tool for handling complexity is ORGANIZATION.
>
> (PLATFORM FOR CHANGE - 15)

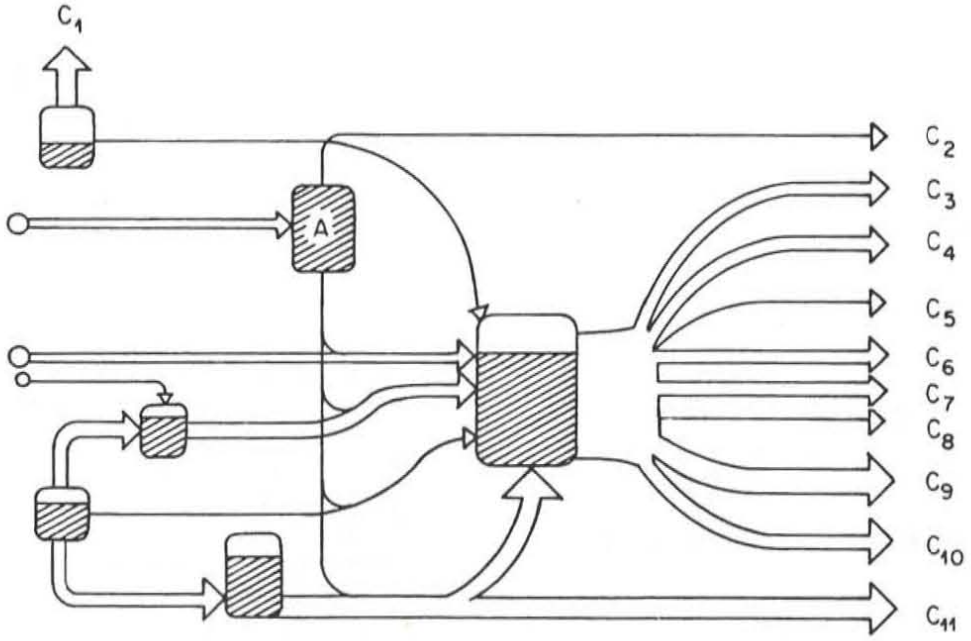
For Beer, the "management crisis" is not an inevitable consequence of the exploding complexity of modern industrial society, but rather a result of the strangulation of society by bureaucratic institutions. Beer had long proposed to anyone who would listen that an experiment should be done, and that his principles of rational organization be given a chance. He got no takers until Chile. These principles, as we have seen, refer primarily to the structure of "viable" systems, and imply the use of modern communications technology only in that this technology is necessary to support the forms of social organization which Beer considers viable.

The computers, then, were merely tools. They cannot be, and at no time were thought by the designers to be, substitutes for the changes in social relations which constituted the core of the redesign. Computers were, however, felt to be essential to the successful implementation of the CYBERSYN system because they allowed the vast amounts of information which characterize complex modern societies to be filtered and processed in such a way as to make them comprehensible to mere humans.

In cybernetic terms, the CYBERSTRIDE programs were designed to attenuate the "variety" of the external world so that only the significant aspects of the processes being monitored were ever reported to the humans who had to deal with the outputs. The analogy with the human organism is key here: the autonomic nervous system controls and tracks the mechanisms of the human body, such as the heartbeat and breathing, which allows higher faculties to function free from perpetual preoccupation with the mechanics of life. Beer is clear:

> Above all, we would use our cybernetic understanding of filtration to deploy computers properly as quasi-intelligent machines, instead of using them as giant data banks of dead information. That use of computers, taken on its own as it usually is, in my opinion represents the biggest waste of a magnificent invention that mankind has ever perpetrated. It is like seeking out the greatest human intellects of the day, asking them to memorize the telephone book, and then telling them to man 'Directory Inquiries' at the telephone exchange".

In practice, this meant that the human ability to assimilate graphic representations of information was combined with a mode of processing appropriate to the monitoring of production processes. The outputs of the CYBERSTRIDE programs were primarily graphic. They used outputs such as quantified flow charts, in which the thickness and color of the flow lines were used to indicate the relative quantities and characteristics of the flows, for example of raw materials, through the areas being monitored. Variable levels of resolution




*An example of a quantified flow chart: thickness of the lines is proportional to the productive capacity. Productivity is indicated as the level within boxes; a bottleneck process is highlighted at A. Outputs (customers or other producers groups) are listed as C1 to C11. -- Beer, Platform for Change, p.434.*

were also available, so that a box representing, say, steel production, could be seen alternatively as three boxes representing different forms of steel production, or three different kinds of steel, or steel to be exported to three different countries. CYBERSTRIDE thus avoided the worst abuses of quantification by displaying quantities relative to each other, mutually defined and defining, and free of the meaningless precision which usually characterizes aggregated measurements.

Moreover, CYBERSTRIDE could present any process in a number of different ways. Any process could be said to have a POTENTIAL representing the largest magnitude that it might reach under a specific set of normative goals, a CAPABILITY, which refers to the most that can be expected of it under existing conditions, and an ACTUALITY, which represents real existing levels of production. Each of these states could be calculated in a dimensionless way (as a quantity between 0 and 1), and then displayed graphically to expose different aspects of the process under consideration. Operational monitoring could thus be made to correspond to the precise aspect of a process that was of interest. Planning would also be facilitated by the ease with which relevant information could be displayed. Tactical planning, for example, would concentrate upon the ACTUALITY of a process, while long term planning would tend to focus more upon the POTENTIALITY of various industrial sectors.

The CYBERSTRIDE programs were designed to report only that information which was statistically significant, and thus avoid flooding the outputs with reports which essentially meant only "no change":

> When a new value for any index is computed, CYBERSTRIDE looks at it in terms of the recent history of that index...this is what I meant when I spoke of computers as quasi-intelligent machines. CYBERSTRIDE throws off the huge component of variety that has no meaning, because it represents a chance fluctuation. It is at once alert to significant changes, focusing on them an analytic eye, and capable of estimating on the strength of that analysis what will happen next. (PLATFORM FOR CHANGE - 444).

These features, combined with the real-time collection and display of information that modern technology makes possible, formed the technological basis of the experimental Chilean production control system. Special rooms, known as Operations Rooms, were designed which allowed decision makers to have immediate access to the outputs of the CYBERSTRIDE, and of its companion FUTURES system. This FUTURES system was based upon the modeling techniques of J.W. Forrester, of "WORLD DYNAMICS" and "LIMITS TO GROWTH" fame. It was used to provide on the spot projections of various components of the economy with the goal of facilitating dynamic analysis. Together, these tools pro vided an environment which encouraged both long-term planning and real-time coordination .

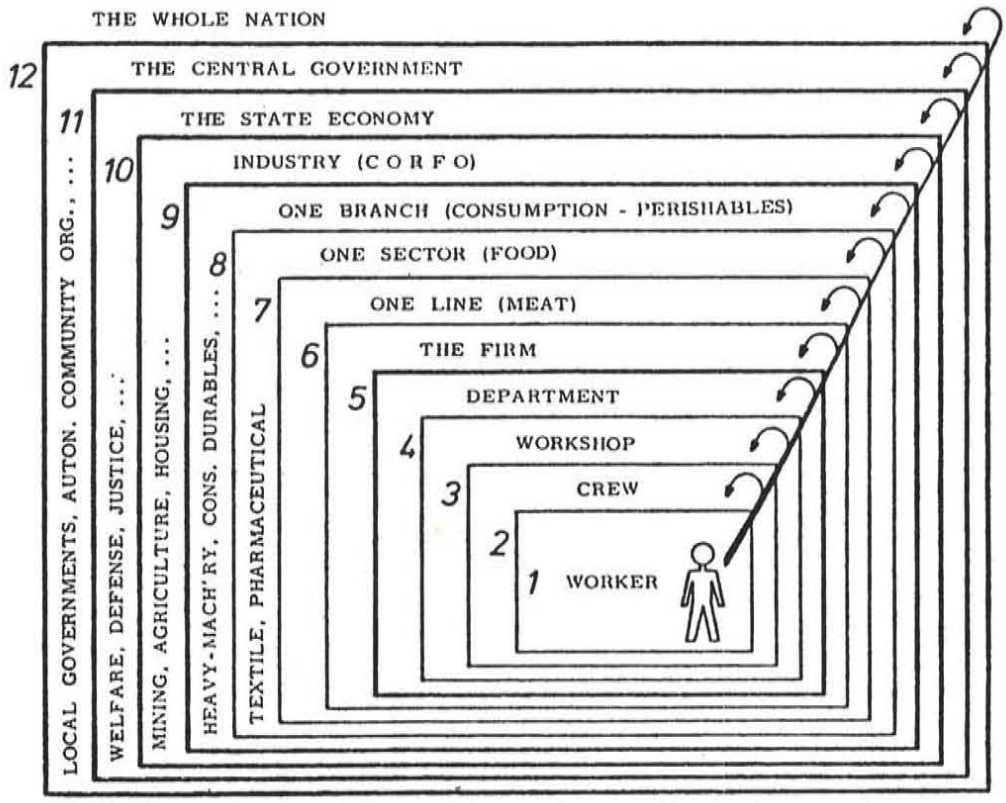
But perhaps the most important aspect of the CYBERSTRIDE system was the multi-leveled, "recursive" nature of its design. The programs themselves were in no way geared to centralized control of a national economy, being as suited to the monitoring and analysis of an individual workplace as they were to an entire national, or even global economy. While data about all sectors of the national economic life were automatically drawn upward by the nervous system of the CYBERSYN, this process was not unmodulated, and was implemented with the explicit purpose of protecting local autonomy while it allowed global monitoring and planning.

For example, if the production of a particular factory began to fall off, this fact was not immediately reported upward to the next level of social recursion, but was first reported only to the committees responsible for the management of that factory itself. It was only after a perturbation had gone uncorrected for a longer period of time that it would be reported upward. Thus each sector of the economy was able to remain linked to the ones immediately above and below it without being so strongly tied as to render impossible any real degree of local autonomy. Each sector, too, might monitor aspects of its own mechanism that would be of no interest within a more global aggregate, but which were important within the local environment.

The ultimate realization of the potential of such a system can only come after a period of protracted experimentation and refinement. This, of course, was never possible in Chile. The only complete Operations Room that was ever constructed could not be fully computerized due to parts shortages caused by the economic blockade of the Chilean economy by the U.S., and the coup occurred long before a number of other planned computer centers could be finished. Some exploration of the potential uses of these kinds of management tools within the context of workers self-management did, however, occur, and the results tended to be quite positive.

Schwember, a former member of the CYBERSYN team, has done us the service of summarizing the lessons of workers participation, from the point of view of the designers, and also of revealing the true attitudes of the CYBERSYN team towards authentic workers control.

> It is feasible to teach in a short period enough about the principles of organization of viable systems and their basic mechanism to workers, even if their general education is very low...They can effectively understand the process of decision making and the importance of the ancillary tools. They would even become easily confident in strange environments such as the operations room.




*The cybernetic model of social recursion used in CYBERSYN. Note several revealing features: 1) the retention of the notion of a central government; and 2) the definition of the economy as a subset of the State.*

" Once a problem has been presented..they are able to start a learning process of discriminating the basic issues from the technicalities that should be left to the experts. In the few cases where we could develop the process far enough, they came to not only respect the expert advice but to demand it.

" The most difficult aspect is for those workers who participate in certain kinds of decision making to avoid confusion of their role. They tended rather easily to consider themselves invested with new power and show a strong bias to meddle in problems at various levels and areas. "

(POLICY ANALYSIS - 134)

## TECHNOCRACY AND REVOLUTION

> I really am talking about social upheaval. When we think of young people as being in some kind of revolt, our image is often of drop-outs, hippies, cannabis-smoking and possibly murderous tribes. But what would happen if the nice young computer programmers in dark suits and white shirts were the yeast of revolutionary ferment right inside the most established of our formal institutions? It could mean a new kind of revolution.
>
> (PLATFORM FOR CHANGE - 285).

We know from Beers' post-Chile writings that he left the project a good deal less naive politically than he began it. Prior to Chile we were confronted with a man who seemed somewhat unaware of the true nature of the "social meta-systems" that dominate our society, and who clearly thought that the revolution he desired could be made by enlightened scientists and technologists. In the 450 pages of PLATFORM FOR CHANGE, the "advertising culture" is as close as he gets to calling the beast by its proper name. I can testify from a careful reading that if the book had an index, the term capitalism would certainly not be found among the entries.

After Chile we hear no more the confident assertion that the problems which face humanity "are not in essence economic or political problems at all; they are cybernetic problems." (PLATFORM FOR CHANGE-32). He is no longer so naive. In 1973 we hear instead that "science and technology are driven forward towards a society of conspicuous consumption, since this is the only development that our economic machinery can countenance" (DESIGNING FREEDOM-55)

After Chile, Beer was denounced by former colleagues for working with the commies. This too, it seems, might have made him more able to see the obvious. But such did not occur. This is important because there seems to be something about the mode of discourse within which his arguments are framed that prohibits the recognition of the particular social relations, and political/economic dynamics, of capitalist society. Beer is an honest man, but honesty seems not to be the point. Neither is intelligence. What seems missing from his cybernetic perspective is a basic respect for the qualitative aspects of the human/historical process. It is this, and not any ill-will, that truncates his understanding of social reality.

He is certainly aware of the dangers that face us if we don't start doing something differently. PLATFORM FOR CHANGE contains not only the sketch of the Chilean project, but also images of continued enslavement and even of Apocalypse. Computerized advertising, virtually irresistible with its customized commercials, is much more likely to be implemented than the Liberty Machine, and Beer knows it.

For Beer, the problem seems to be that science and technology are not in the hands of the people. He dreams of a day when we can use our powers to "do what we like". This, in itself, is a fine vision. But the expression it finds within an image of humanity refracted through the distorting lens of over-simplified scientistic models is both dangerous and misleading.

Beer calls himself a revolutionary, but his notions of how change will come leave something to be desired. He still awaits the day when other scientists and technologists will awaken and return the control of science to the people. It is not surprising that he would take this position, for he believes as well that science is the force behind human historical development. He supported the project in Chile, incidentally, because it was "good cybernetics":

> Well, it is science and technology which, like it or not, shape the world TODAY. While people are arguing amoung themselves, a new world is continuously and inexorably being forged by scientists, by technologists.
>
> (PLATFORM FOR CHANGE - 335).

Since the rise of industrial capitalism, science and technology have been molded and developed according to the exigencies of the marketplace. The form that computer technology took, for example, was strongly influenced by the desire of the managers for better technologies of control. Automation was less a historically necessary process than a result of the logic of capitalist economics. But never before has it been so true that the potential for liberatory technological advance is stifled and repressed by the representatives of the dominant social order.

Contemporary cultural/political reality calls upon us to step beyond not only the hoary myth of the social neutrality of science, but the more recent penchant for scapegoating science for the predicament of humanity as well. Beer rails against this latter attitude, but seems oblivious to all that is valid in the criticism of scientific approaches to social concerns. He avoids as well the critique of contemporary social relations that could clarify the debate. He has shaken the belief in the inevitabity of "progress", and even come to see that science can be a tool for the perpetuation of suicidal, and otherwise undesirable social forms. But he is not equipped by his theories of social cybernetics to understand the complexity of the current social malaise.

The problem is a deep one, and cannot be resolved within the metaphysics of the "system". The formalisms of cybernetics are the problem, for the categories of analysis which see "variety", "information", and "management", or any particular entity only to the extent that it can be described in these or similar terms, are not by any means categories adequate to the complexity of human social existence. To the extent that society is analyzable in such terms, it is comprehended only in its most formal aspects. Not that these aspects are irrelevant; they are not. Cybernetics is a powerful form of instrumental reason and is clearly on its own turf when it comes to operational analysis of the sort which led to the vision of the CYBERSYN system. But when it comes to social or political reality (as it quickly does) systems analysis can only obscure our understanding behind a fog of inappropriate, and ultimately absurd pronouncements.

Consider the following thought, found in the heart of Beer's evaluation of the Chilean experiment:

> I am pointing to the possibility that it is open to mankind at last to compute a set of organizational structures that would suit the needs of actual men -- as being at once themselves independent viable systems with a right of individual choice, and also members of a coherent society which in turn has the right of collective choice. Now one of the main issues identified was the issue of autonomy, or participation, or perhaps I just mean liberty, for whatever element within whatever viable system. Then this means that there ought to be a computable function setting the degree of centralization consistent with effective ness and with freedom at every level of recursion.
>
> (PLATFORM FOR CHANGE - 428).

A computable function? For determining freedom? Beer is dealing rather lightly here with problems that have preoccupied reflective humans for thousands of years. And yet there is something to what he is saying beneath the mathematical mysticism. Beer is trying to tell us that we must not be naive, that there are real problems to be resolved if we are to design a society where participation is possible on a global scale, and that we can solve those problems with the proper approach. Yet I cannot escape the feeling that in Chile, workers "participation" in management meant a good deal less than I would like it to have meant. This too is prefigured in the technocratic approach which is evidenced here. After all, if there is a computable function then there must be someone with a calculator. It, finally, makes sense that

*Prepare yourselves to run the industries.*


Beer, and the other members of the CYBERSYN team, believed in the ultimate necessity of a managerial class. No matter that the managers would only be the embodiment of some "principle" of coordination; the necessities that they perceived would have to come prior to the "participation" of the workers in the economic life of the nation. This is why Schwember was aggravated at the "confusion" as to their role that the workers tended to have when consulted about various managemental decisions. In the end it is possible to propose a very simple question; are the workers or the managers to decide when the desires of the workers, and of other sectors of the population, for autonomy and self determination have been satisfied? What if the workers decide that they would like to do away with the managers altogether? After all, such things are possible, especially with the development of aids for global self-coordination such as CYBERSYN. It is probably fair to say that such emphasis as there was in CYBERSYN on the implementation of workers participation and control was a result of the political/cultural context of the project, and not of the cybernetic theory of viable systems.

In summary, the CYBERSYN project was one of the most exciting computer/communications projects that has been performed to date. It demonstrated not only the potential for use of information technology, but also the necessity for the social transformation which must at all times come prior to an emphasis on any technological solutions to social problems. Existing as it did within the confluence of conflicting cultural and political forces, it underscored many of the most notable limitations of the scientific approach, at the same time that it demonstrated its strengths.

*Additional References*

Zimbalist, Andrew and James Petras. WORKERS' CONTROL IN ALLENDE'S CHILE. Nottingham, England: Institute for Workers Control, Bertrand Russell House, Gamble Street, n.d.

Beer, Stafford. DESIGNING FREEDOM. London, England: John Wiley and Sons, 1974.

# THE HOME INFORMATION APPLIANCE

## An Introduction to Prestel

*by Stephanie Klein*

This year, the British Post Office plans to introduce the domestic market to its "interactive public information utility" known as Prestel (formerly known as "Viewdata"). Prestel is an information system in which a data base is stored in a central (usually regional) computer. Prestel can be used either by the general public, primarily through their home televisions, or by businesses (which may have a separate data base or even form a private "Closed User Group"). The information in the data base is accessed by connecting a television set to the central computer through the telephone. Despite the promises of its publicity, Prestel seems neither highly interactive nor genuinely public, and the 'utility' of its information is determined by official Information Providers, not by the people who purchase and use the system.

To use the Prestel system, the user must have: 1) a telephone to connect to the regional computer (a home phone is fine); 2) a modem, or coupling device between the (modified) TV, the telephone, and the computer; and 3) a television set, modified to receive, display, and transmit computer signals. While the cost of this equipment is currently significant ($300 - $400 over the price of a standard color TV set), industry forecasters expect the price of the entire set-up to drop significantly within a year.

The user searches the system by punching in page numbers on a numeric keypad, such as that found on a calculator. Each 120-word frame (page) lists fields of information in 'menu' form and directs the user to other pages which list subfields. By narrowing down a general topic (such as 'restaurants' ) in this way, the user finally reaches the page which may contain the information he or she was looking for.

Some have criticized this searching technique as cumbersome. A more important aspect to criticize is the fact that users cannot themselves put information into the data base. The primary interaction that this system provides is that of selecting items from a menu prepared by the Post Office and by Information Providers. Information Providers first lease an 'editing terminal' which allows them to enter and update their information, at a cost of $800 per year. An Information Provider must also rent a minimum of 100 pages of space on the data base. Users pay a small fee (added on to their telephone bill) to an Information Provider each time they access a particular piece of information. At these prices most home users will obviously not be Information Providers - the costs and space requirements are prohibitive. The restrictions on who will provide the information ensure that Prestel will be an information utility in the service of commerce and official institutions, rather than the community.

The 'social design' of Prestel, that is, the fact that the flow of information is largely one-way, from the Information Providers to the information consumer in the home or business, reflects the tendency of marketplace forces to take over more and more functions which were formerly performed by families and communities for themselves. Necessities such as food, clothing, education, and information are now items of consumption; individuals no longer need to know how to produce these goods and services but only how to purchase them. The end result is that individuals become less competent in providing for themselves and increasingly depend on the market to supply their needs.

In Prestel, a large portion of the information will be commodity oriented. Not only will the computer indicate what commodities are available, but it will also, in some instances, be the medium through which a consumer can order and pay for goods (which further isolates the individual from social life).

The irony is that potentially, cybernetic systems could be used to facilitate individuals' understanding and control of the processes and production of goods, and of information, in a large and complex society. The technology of Prestel is not the limiting factor in its use; it is the social context in which it exists. Presently, decisions on how to use technology are private concerns dictated by market requirements, rather than community needs.

Most home users will have only a numeric keyboard rather than one with letters as well as numbers. Thus, users' ability to send messages to other subscribers is very limited. (In the market trial, users could select from a menu of 'canned' messages and add dates, times, etc. with their numeric keypads). The Post Office does not plan to allow broadcasting of even short messages to more than one other subscriber at a time, and thus the communications function of Prestel is, currently, practically nonexistent.

Moreover, the fact that Prestel is being promoted for home use by individuals means that it is not a primarily 'public' system. For those who can afford it, Prestel is a private system which places its users in an isolated and relatively passive relationship to the information silently parading across the home TV. To its credit, the British Post Office has announced that a certain number of terminals will be available for coin-operated use in bookstores and libraries.

The British Post Office has been developing Prestel for a long time -- since around 1970 -- and its administration and use have been carefully structured toward profitability for the Post Office, the television manufacturers, and the Information Providers. The result of this development is a 'home information appliance' over which the public has relatively little control. Like most modern appliances, Prestel is fairly inaccessible to individual tinkering and almost impossible to fix. It is the product of skillful marketing rather than a response to expressed community needs. Unfortunately, systems such as Prestel are likely to be what are marketed as 'interactive information utilities' rather than the genuinely interactive, flexible, community-controlled information and communications systems that computer technology could provide.

For more details on Prestel (Viewdata), see the following publications:

1. Easterbrook, William. "Viewdata -- Mass Computing in Embryo?" Kidder, Peabody & Co., Inc., April 13, 1978.

2. Rosch, Gary D. "New data and information system set for commercial market trial." Telephony, March 20, 1978.

3. Stokes, Dr. Adrian V. VIEWDATA: a public information utility. Langton Information Systems Ltd., 1978.

4. "Three men on a Viewdata bike". The Economist, March 25, 1978.

5. Valery, Nicholas. "Foot in the door for the home computer." New Scientist, April 14, 1977.

# DIALOGUE

*The following two articles are reprinted from UNDERCURRENTS, a radical technology magazine published in Great Britain. "Micro is Beautiful", by John Garrett and Geoff Wright, discusses the social implications of the small computer. Since microprocessors allow for decentralized storage and processing of information, the authors feel that this technology can lead the way to a less hierarchical form of social organization. Although computers could threaten jobs because of automation, microprocessors could also be used to distribute and coordinate work throughout the community.*

*In "Hard Chips" Alan Campbell responds that revolutions don't live by technology alone. Decentralized computer systems in themselves can do nothing to change the current social structure and its bureaucratic institutions. In fact, microprocessors could help to maintain the current order. Obviously, when they are used in police surveillance systems or computerized commodities, microprocessors don't automatically lead to social change. The technology itself is not inherently revolutionary.*

*The discussion of the relationship between technology and society is an important one. We encourage our readers to comment on this issue.*

*-- S.K.*

## MICRO IS BEAUTIFUL

*by John Garrett and Geoff Wright*

During the current recession, many industries have been technologically stagnant, owing to lack of new investment and cutbacks in research and development. But the computer industry has been in a state of frantic excitement -- almost bewilderment -- over the technology it has created.

Here was an industry which only five years ago was quietly expanding, putting its main efforts into improving reliability and in giving the chiefs of commerce and industry the increased central control they wanted through the provision of suitable management information. All it was seeking to do was to run the status quo a little more efficiently.

The market was dominated by one major company, IBM, with its competitors realizing that to survive, they would have to follow the leader and start making IBM-compatible equipment.

The trend in the use of computing power seemed to be towards large computers handling large corporate data-bases in centralized data processing departments. The hierarchical nature of the machine architecture, the data-base software, and most importantly, the data processing departments themselves, seemed to mirror exactly the cumbersome, inflexible, bureaucratic organizations they were servicing.

### DISTRIBUTED PROCESSING

Five years on, this trend is still continuing. But strangely, a new contrary tendency is beginning to upset the steady progress towards a computerized 1984, a tendency towards *distributed processing.* This has been made practical by the introduction of low-cost commercial mini-computer systems, from 1966, and even lower cost commercial micro-computers, from 1972.

Distributed processing is the decentralizing of computing power around a network of computers, instead of all computing power residing in one, usually large, central computer. Advances in communications technology, particularly the British Post Office *Viewdata* system, suggest an unlimited access to any such networks.

George Cogar, President of Singer Machines in the US, has said that in twenty years time, the present phase of computer technology will be seen as the end of centralized data-processing activity.

What perhaps set the seal on the changed direction in the industry was a decision made by IBM in February 1975 to abandon its next range of even more powerful data-base handling computers, called Future Series (FS). IBM had found itself threatened, not by its old familiar rivals but by the midgets of the industry, the mini-computer manufacturers, and even by the semi-conductor suppliers who had started to assemble their own micro-computers.

## TURNABOUT

In a major turnabout, IBM has developed a mini-computer -- which incidentally came out of what IBM's other branches termed the 'toys division', who made office equipment. It adopted the radically new philosophy of distributed processing, in its SNA (Systems Network Architecture). In addition, IBM has invested heavily in the communications industry, taking a 30% stake in Satellite Business Systems, who are developing communications satellites for intercomputer transmissions across the globe.

Let us examine more closely some new products and ideas in the three rapidly merging industries in this field: *electronics, computers and communications.*

In particular, we want to look closely at four developments which could be of great potential significance for the creation of a fundamentally-changed society.

* The emergence of the cheap programmable micro-processor

* The 'domestication' of computers, i.e. the use of standard household devices for input, storage and power supply

* The development of computer networks

* The decline in the idea of centralized computer power.



## THE MICROPROCESSOR

1977, it has been said, was the year of the microprocessor. It was certainly the year in which the computer industry began to wake up to some of its implications.

The microprocessor has a similar architecture to the mini- or larger computers, but its central processor can be contained on one, two or three semi-conductor chips which can cost as little as $24.00. A complete microprocessor system with memory, buffers, interfaces, power supply and a simple input/output device can cost from $800 to $2000 -- or even less in kit form.

Microprocessors can contain two types of memory, Read Only Memory (ROM) and Random Access Memory(RAM).

Programs stored in ROM are permanent and most can only be changed by substituting another ROM chip. Processors containing ROM only are mainly used in 'dedicated' systems where there is a single application, such as controlling traffic lights or lifts.

More interesting from a Radical Technology viewpoint are microprocessors with Random Access Memory (RAM), as these are readily reprogrammable without any need to change the hardware. In addition they can modify themselves by altering their own programming to respond to external changes.

Their main advantage is that when incorporated into machinery such as numerical control (NC) or process control equipment, they allow far greater flexibility. The replacement of hardware by software enables the same machine to perform a greater variety of tasks. One machine can do the work of many, thus reducing the installation costs for a manufacturing requirement. In addition programs can be made 'conversational', i.e. the machine will ask the operator what it should do and respond accordingly. Conversational programs allow the operator greater control over the machine and also enable mistakes to be rectified quickly. All these characteristics make them eminently suitable for small workshops or factories producing

small batches of many different components, under workers' control.

Microprocessors could also be used to control the heating or cooling of dwellings -- for example, in heat sources to be quickly switched from solar to standard energy supplies in response to changed external conditions. The could also be used in controlling the light, heat, watering, ventilation and humidity in a greenhouse -- perhaps with a different program written for each variety of plant. (The New Alchemists are exploring this idea in their 'Arte' on Prince Edward Island in Canada.)

Predictably, micros have been attacked by many of the proponents of centralized computing as meaning a 'twenty-five year leap back'. They are relatively slow, unsophisticated and have fewer software aids than larger computers. But in most computing applications, there is little need for speed and their basic nature makes them both flexible and, moreover, fun to use. These qualities, as well as their low cost, make them ideal for a democratic, small-scale industry.

## THE DOMESTICATION OF COMPUTERS

Perhaps the most striking demonstration of this occurred in September, 1977 when the French firm, RZE, brought out the Microl V computer. The 'V' stands for valise or suitcase. In one standard suitcase is a Zilog Z80 processor containing a 32K main memory, a 150K floppy disk drive, a forty character plasma display and a thermal printer. It can be programmed in Fortran and Basic and for its power supply it can be plugged into the cigarette lighter socket of a car.

Computers have got smaller, but more importantly, are using familiar household equipment. Data can now be read from and written to conventional audio-cassettes and transmitted using the telephone network, via a 'modem' which superimposes the pulses of digital data on to a carrier wave. Data can be entered using ordinary handwriting using the Quest Automation 'Datapad' in which the machine can be taught to recognize individual styles. Speech input and output are also being developed so one will soon be able to hold a conversation with a computer. The television set has become a computer output device which with a teletext decoder can receive the teletext services, Ceefax (BBC) and Oracle (ITA).

Moreover, from mid-1978 when the remarkable Post Office service, Viewdata, commences its pilot scheme, the television set will become both an output and an input device, linked by telephone line to Post Office computers. Viewdata, unlike the teletext services, is interactive, allowing a subscriber to receive AND transmit information. Subscribers can use a 'keypad' to communicate with the Post Office data-base.

Prices of Viewdata-equipped TV sets will initially be an artificially high $400-500 above the cost of a normal color television but the difference is soon expected to fall to well below $200.

In this society, it will probably be used by supermarket chains to give their stores instant updates of prices. A free society should be able to do much more with it.

The significant aspects of Viewdata for us are twofold:

* It provides potentially-unlimited access to information from all kinds of data-bases linked into the system

* It also provides a potentially-unlimited medium of communication. Homes equipped with Viewdata television could use it to communicate with each other, as well as with any data-bases in the system. The system would be ideally suited for democratic decision-making. (If the Post Office restricts its use to isolated subscribers on line to a Post Office data -base, it will be a political rather than a technical decision.)

What the domestication of computers really means is that the computer is rapidly becoming available and comprehensible to the ordinary person.

## COMPUTER NETWORKS

*"Ironically, what was designed for the defense of the state could become the communications structure of a decentralized society."*

The development of computer networks is perhaps the most significant of the four changes in political terms. Such networks have been operating for many years, but previously consisted of central computers with remote terminals on which data could be sent to the computer, and output received back. In recent years, however, terminals (often with the aid of microprocessors) have become 'intelligent', i.e. the terminals themselves can carry out simple programming locally.

The trend has not stopped there. There are now full inter-computer networks, with mini-computers in place of terminals. Each site can now have its own local computing facilities but having the added advantage of a shared data-base. Communication is commonly via the telephone service but in the future is likely to be via high-speed computer 'grids' (the Post Office is currently developing one for the UK) or via communications satellites.

Computer networks were originally developed for the defence of state communications in the event of nuclear attack, enabling the administration to survive the destruction of its key computer centers. In the event of parts of the system not operating, the network will 'reconfigure' itself to branch around them. Ironically, what was designed for the defence of the state could become the communications structure of a decentralized society. Communes, farms, workshops and factories in a region, each with a computer in the network, would be able to do their own computing to link others or to update and use data-bases. The ability to reconfigure round non-functioning units means that the system would still be able to operate even if half the communes could not get up in the morning!

Trading between units could be achieved by each inputting the goods and services they had available, and those they required. Economic co-ordination would be helped by consumers giving advance warning of what they desired and producers outlining what they intended to produce.

A decentralized society needs a very fast and efficient decision-making system, involving all those who might be affected. The traditional democratic method of delegate conference, as many have experienced, can end up being slower and more hidebound by rules than central direction. Communication networks should allow decision-making to be faster, more responsive to events, and theoretically enable ALL members of a unit to be consulted rather than just one delegate. Politics could become the day-to-day occupation of the many rather than the personal gamesmanship of the few.

Care, however, must be taken to avoid control of any computer network or control of information in the network being in any one unit's hands. To prevent this, data-bases themselves can be decentralized round the network. All that is strictly required of any central computer is to route transmissions to their appropriate destinations like a telephone exchange. Even that role can be reduced with more cross-connections -- though obviously the more links, the greater the cost of the system.

## DECLINE IN THE IDEA OF CENTRALIZED COMPUTING POWER

*"...the results of having distributed intelligence in machines or computer networks may have an impact in popular social ideas far greater than their physical uses."*

The present generation of large computers have central processors which, however powerful, can only handle one instruction at a time. But some of the newer 'supercomputers', such as the Cray 1 or Control Data Star 100, have replaced the one central processor by sets of 'functional processors', each specializing in specific processing tasks -- so that one processor handles instruction fetching, others handle various different arithmetic and logical functions, and others store the results in memory.

In computers like these what is left of a 'central' processor is thus changed to that of co-ordinating a series of functional processors.

As well as changes inside the machine, there have been changes in the storage and handling of data. The new types of 'Data Base Management System'(DBMS) have shifted away from 'hierarchical' structures and towards 'relational' structures. In a hierarchical DBMS, retrieving data requires searching through many levels of indexes or pointers for each item which often proved to be slow and inefficient. In a relational DBMS, different kinds of data are held in different independent structures with no links assumed. Access to data can be more direct.

In a purely practical sense, the architecture of a machine or a piece of software is irrelevant. Hierarchically organized structures may be the most efficient for one particular task, relational structures for another.

However what is significant philosophically is that designers are no longer automatically thinking in terms of 'hierarchical' or 'tree' structures when creating either hardware or software. They are using concepts such as 'parallel' structures, 'ring' structures or 'switched systems', all of which imply either no central control or that of co-ordination only.

The technology of a society is more than its tools. Because it is concrete, we use it to describe abstractions. If technical systems are hierarchically structured, then we will tend to see social systems in those terms.

By the same token, the results of having distributed intelligence in machines or computer networks may have an impact in popular social ideas far greater than their physical uses.

One is tempted to compare the emergence of these products and ideas in the centralized bureacratic societies of the industrialized world with the development of power-driven machinery at the end of the Middle Ages. The social class that had produced it, the Guild Craftsmen, were not capable of exploiting it. It took the rise of capitalism and the introduction of factories to utilize fully the productive forces the craftsmen had created. We believe we have now at our disposal a technology that is not capable of being fully exploited in the industrial societies we live in, and which points the way towards a new kind of decentralized future.

We have concentrated on developments which should increase an individual's control over what he or she produces and the way he or she does it. Equally however there have been developments which displace human beings entirely from the productive process -- in particular the introduction of robots into assembly line work and the idea of an automated factory. We feel one of the debates in the RT movement must be to weigh up the advantages of humanless mass production as against small workshops using their infinitely flexible programmable machine tools to produce a wealth of small-scale and non-standard variety. Perhaps some products are more suitable for the one and others for another. If so, what kind of mix?

Let us now look at the political aspects of the crisis. Automation is likely to continue for very good economic reasons. Not only does it improve efficiency and productivity, it also has a future cost advantage. While the cost of automatic equipment is becoming cheaper, workers' efforts to improve their standard of living are pushing up the cost of labor. In addition, recent legislation to improve job security has led to an increase in workers' power which is considered a threat by those who own and control industry. Recent CBI surveys have shown a general desire to automate, even among quite small firms, rather than employ more labor. This is even more true in countries with higher wages than our own. In Japan, there are even state subsidies to replace workers with robots. The Japanese Ministry of International Trade and Industry have started designing an automatic metal-working factory in which the production section is completely unmanned. The promise of an investment boom which will mop up unemployment will not be fulfilled. Any investment boom will be more directed to capital rather than labor. But there are limits to this process. One is the social danger of a growing class of permanently unemployed. Second is that governments have to finance unemployment. Even if a government were willing to tolerate a high level of unemployment, with all the social dangers, a point would be reached where the financial burden would be crippling. The third is that unless the unemployed were paid generously, the amount of purchasing power among consumers would not be sufficient to buy the increased production. This would apply throughout western Europe, Japan and North America, so the only expanding market would be the Third World and Communist countries. But the Third World is also industrializing and it is likely that they will enact further legislation to protect their new industries.

Potential unemployment is therefore likely to be substantial. As far back as 1967 the British Institute of Management estimated that there were eight million people unnecessarily employed by British industry. This was well before a lot of new equipment was developed. The top ninety British companies are planning up to a thirty per cent reduction in their labor force. In the last five years the print industry unions have lost fifty per cent of their members and accept that in the next five years they will have to accept a further forty per cent reduction.

Our main point is that through development of mainstream technology, the present social and economic system is producing a structural crisis.

As the moment the politicians are saying things will go on in the same way as before and those who want to find alternatives to traditional forms of work are a lazy bunch of parasites. But the traditional Puritan work ethic becomes nonsense in a situation where more can be produced using less people. The fact is that the politicians are wrong and the hippies were right, even if the hippies failed to analyze the reasons. We are reaching the point where the restructuring of industry and work must be the concern of everybody, not just minority groups.

## FUTURE POSSIBILITIES

*"There is no point in talking about extending democracy without extending the availability of information."*

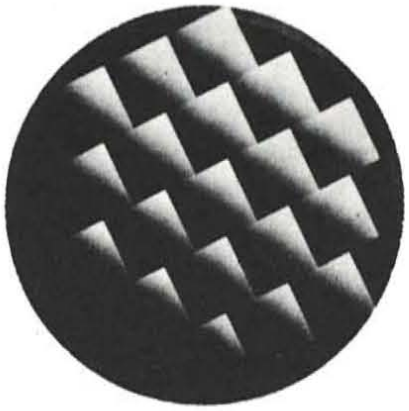
It is not our task to produce a Utopian blueprint but we can indicate some possibilites, suggested by the development of technology, in three main areas: *democracy, economic management, and decentralization of population and industry.*

There is no point in talking about extending democracy without extending the availability of information. At the moment both government and the controllers of industry hog information to help them maintain control. Information and communication have always been organized hierarchically in harmony with bureaucratic control. With recent developments in computer networks, decentralized control with no loss of efficiency is possible. All homes and workplaces in the country could be networked via the Viewdata system. Such a system makes possible decentralized, democratic, economic management on the feedback principle. People feed their needs into the system and the information is directly available to the producers who can gear their output accordingly.

Whether such a system is created is a political decision. The technical means are available. Other political decisions are whether to use automation to free people to participate in new creative industries. Shall we have a guaranteed minimum income in terms of goods and services? Shall we decentralize both population and industry by taking over large farms and estates to establish new communities and industries? What about work-sharing of necessary but unpleasant work?

We believe that it is the job of the RT movement to examine these possibilities and the technical and political means of achieving them. The present 'ecology' movement has little appeal to most people. Its public image suggests a preparation for the impending collapse of civilization and a return to a pre-industrial society: hardly something to make people dance in the streets.

We disagree with this whole approach and say a Golden Age is quite possible. Instead of predicting gloom and despair we should inspire people with a vision of the next stage of social evolution. If people have a clear idea of what is possible then the political means of achievement can be created. It is those of us who are young now who will consign the present system to the history books. It is up to us to start the debate.

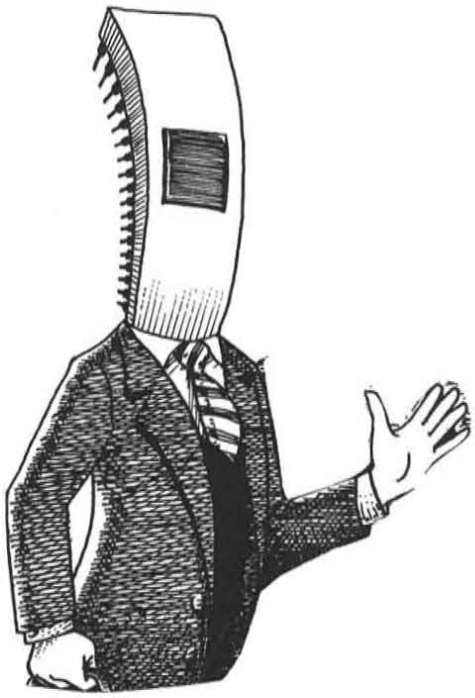


# HARD CHIPS

*by Alan Campbell*

Many of the changes in the computer industry they mention are indeed happening, but they are indulging in wish-fulfilling fantasies if they think those changes are going to lead to, or even make more probable, real and desirable social change.

Take 'distributed computing'. Which means lots of little computers linked by communication lines, instead of one big monster machine at HQ. Sure, its happening. It's happening pretty slowly because software changes have not kept up with hardware changes, and so far no-one has too clear an idea how to make twenty identical machines do something coherent together. When they do figure out how, I'm willing to bet an early application, right after the military ones, will be a computer-in-every cop-shop, all linked together and talking back and forth amicably with the Police National Computer. Of course, if the National Question has been solved by then, it will be the Police World Computer. William Burroughs will love it.



## NOT MUCH MICROFUN

Or take the microprocessor. Geoff and John say 'their basic nature makes them both flexible and, moreover, fun to use.' Micros are as flexible as they're allowed to be, just like any general purpose computer. A raw Intel 8080 chip with its pins sticking up in the air is very very flexible, if you got the time, skill and patience to wire it into something and give it a program. Inside a sewing machine or a fuel injection system it has no flexibility at all. Fun to use? Probably as much fun as any small computer. Fun when the program works, not so much fun when you got a miserable nasty bug that keeps appearing and disappearing and your boss (or your deadline) is breathing hard down your neck.

'These qualities', our heroes continue, 'as well as their low cost, make them (micros) ideal for a democratic, small-scale industry.' Huh? Yeah, well low cost certainly helps. Computing has always had more than its share of freelancers, oddballs, small engineering companies working on no capital and advertising cardboard models that they'll make one of if only someone will order it. Micros mean individuals (or collectives) can set up shop complete with their own hardware instead of renting computer access from a company with a big, expensive mainframe. Low capital costs mean lots of entrepreneurs. Lots of entrepreneurs can be cut-throat competition, price wars, sharp marketing -- all the joys of *laissez-faire* capitalism.

## THE MYTH OF THE SMART MACHINE

*"Microprocessors have opened a whole new world of ripoffs, and irrelevant consumer toys. Wonderful, isn't it?"*

Geoff and John allude briefly to the democratic metaphor in computing -- the development of networking, 'parallel' processor structures, and the like. They think that the use of less hierarchical terminology to describe computer architecture will seriously affect popular consciousness, and presumably bring a self-managed society somewhat nearer. They believe that the democratic metaphor in computing will become a technical metaphor for the whole of society. Might be. But I suspect technical metaphors make sense to people only when the technology or myths built around it are available to lots of people. Evolutionary Theory became Social Darwinism because there was a massive educational and polemic apparatus around eager to seize Darwin's (and Malthus') ideas and push them into every ear that would have them. I don't see anyone building any social myths around Cray array processors. Except maybe the myth that The Machine, with its built-in democratic metaphor, is smarter and faster and more accurate than any puny human could hope to be. If computer technology has any effect on mass consciousness, I think it probably reinforces belief in the essential obscurity, complexity and inaccessibility of bureaucracies and sci-tech. Networks and array processors just make matters worse.

Geoff and John talk about the 'Domestication of Computers'. Again, rather over optimistically. The baby computers -- 'home computers' -- based on microprocessor chips that they describe are no longer being sold to private buyers. One US survey suggested that less than 10% of the baby computer sales by the end of this year would be to households and hobbyists; all the rest will go to industry, research and business users (1). Consumers as usual are being sold commodities. Hobbies to fill the time you don't spend talking to the people you live with. 'Home game centers' which will rival TV in narcotic power. Viewdata, which will give you access to the pleasures of TV TIMES, WHICH and airline and rail timetables at the touch of a button. All for at least three times the cost of a simple black box that would make your TV into a general purpose computer terminal, instead of something you can only use on the Post Office computer. Microprocessors have opened a whole new world of ripoffs, and irrelevant consumer toys. Wonderful, isn't it?

Aside from direct changes in computing and communications commodities, micros will make major changes in other commodities and allow the creation of profitable new ones. Calculators, sewing machines, digital watches, fuel injection systems, most home appliances -- if they haven't been changed already, they will.

## WATCH OUT FOR THE MARGINOTS

It's widely predicted that production processes in many industries will themselves be radically changed by the introduction of smart manufacturing processes, software controlled tools, robots, etc. There's plenty of analysis to read if you want to guess how changes in products and processes will affect us (2). The general consensus seems to be that unemployment will rise, product obsolescence will accelerate, whole chunks of industry will melt and then boil away entirely, if they don't just flow off to another country where the labor's cheaper. I haven't done enough

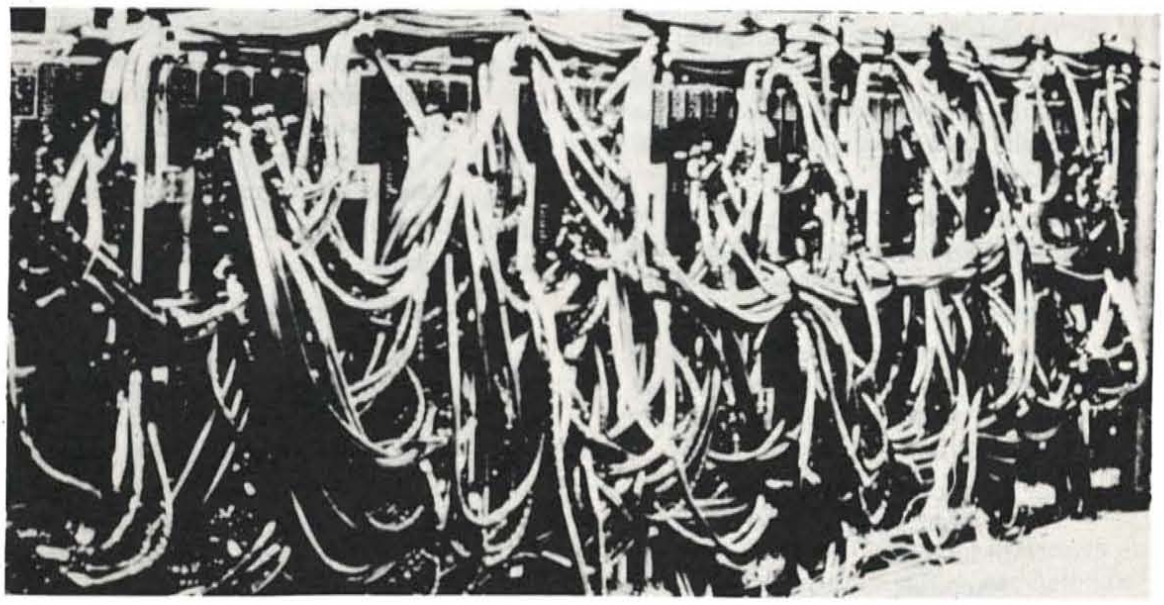
research to contribute to the guesswork. Except to notice that the growing army of programmers, analysts, technicians, engineers, operators and other skilled workers who tangle with computers could bear watching. People who work with machines a lot often suffer from 'engineering neurosis' -- they like their problems to have defined and complete solutions, and if they don't they lop the messy edges off so the problem will fit the solution. Many are obsessed with their machines. Many begin to think like them. As the army grows, however, there will be more and more technological *marginots (3),* those who are fascinated by technology and money, but know what side it is usually on. I don't know what those malcontents can do. Perhaps no more than tell all the other malcontents what's going on in their corner of the economy. But at least they're there.

*References*

1. COMPUTING, June 29, 1978.

2. See THE CHIPS ARE DOWN by Colin Hines, Earth Resources Research Ltd., 40 James St., W1. 30p. Good research, lousy conclusions. Or IMPACT ANALYSIS BY INDUSTRIAL SECTOR, M. McLean and H. Rush, Science Policy Research Unit, University of Sussex. I haven't read it, supposed to have good stuff. Or ELECTRONICS: THE GLOBAL INDUSTRY, North American Congress on Latin America, Report Vol. XI, No. 4 (April '77), on the international mobility of the electronics assembly process, a large chunk of which is now based in Korea, Hong Kong, Puerto Rico, and other low wage areas.

3. *Marginot* is the French term for the kind of disaffected people we like to think read UNDERCURRENTS (A.C.).



Back panel wiring of an early computer.

# DESIGN PRINCIPLES FOR AN INFORMATION SYSTEM

*These principles were drafted by The Community Memory Project, which is developing a computerized community communications system for public use. For more information, contact: The Community Memory Project, 1814 Ward St., Berkeley, CA 94703*

- The sources of the information are the people who make use of the system.
- The system is accessible through a number of local "information access" places, where people can use the system's terminals directly, for a very low cost.
- Anyone can enter an item or notice (like posting a notice on a bulletin board), by typing at a terminal.

And can file the item by attaching to it any number of "key words", which characterize the item for future retrieval. Keywords are not limited to a predetermined list, but can literally be any words the user can imagine.

- Information entered at any place (point) is immediately available to people at all other places throughout the system.
- The physical points of storage of information are many in number and spread out, interconnected by communications channels.
- Users can retrieve items that have been entered into the system by calling for them by keyword if they know the right one to use

OR they can browse by calling for keywords of interest and observing the resulting responses

OR they can make contact with "human dictionaries" who can (perhaps for a price), provide advice on finding a particular item.

- Once an item is found, users can, if they desire, attach a commenting item to that item which will be available directly to all future users who find the original item. Comments can be added to comments ad infinitum.

Such a system would NOT:

- Require users to have advanced technical knowledge or skills.
- Interpose "trained personnel" between the users and the equipment.
- Guarantee the accuracy of any information contained in it.
- Be available exclusively to anyone, but would conform to publicly defined standards of equal access; (a sort of "constitution" of the system).
- Be owned and controlled by any one single person or organization (including governments) but would be owned and controlled locally by associations of community groups and individuals.

The purposes of this system would be:

- To provide a channel through which people of similar interests can find each other, for whatever purpose they each find desirable.
- To provide a faster and more egalitarian method of publication and criticism with the hope of fostering public discussions.
- To provide a channel through which small scale economic interchange can be made viable.

Such a system is practical, possible, and desirable. It can be brought into existence at any time, with no requirement for new technology. Only a relatively modest development effort is needed.

# SOME PERSPECTIVES ON NETWORKS - PAST, PRESENT AND FUTURE

*by PAUL BARAN, with an introduction by Sandy Emerson*

**Introduction.**

In the mid 1960's, computer scientist Paul Baran developed a method of transmitting data which is called "packet switching". In packet switching, information sent through a computer terminal is divided into serially numbered packets. These packets are transmitted in bursts over a web-like data network and are reassembled into the original message at their final destination. The fact that each packet can travel many different routes and that a packet can be sent several times in case of error means that messages can be sent over a network reliably even if up to half the network is not functioning. Packets are sent by the first open path, be that a straight line or a 'great circle route.'

Packet switching was developed by Baran and his colleagues at RAND Corporation for the military, as a technology which could assure the survival of command and control communications systems in the event of an attack which knocked out many communications lines. In *Information Processing 77,* a publication of the International Federation of Information Processing Societies (IFIPS), Baran relates the history of the development of packet switching and then discusses the possible applications of this technology to a community communications system.

As developed for the military, the object of packet switching was not to improve the state of the art of computer communications networking, but to assure military survivability. As Baran states:

> In the late 1950's and early 1960's the two major world powers had developed intercontinental ballistic missile systems capable of carrying multi-megaton thermonuclear warheads. The technology of offense far eclipsed that of defense and a most dangerous and potentially unstable situation resulted. Only the country that unleashed its weapons first could be assured that it would survive.
>
> Each nation relied upon receiving warning that their opponent had indeed fired their missiles before responding. With highly vulnerable command and control communications the dangers of a dangerous age are multiplied. Failure of these control systems, whether by accident, intent or mere stupidity, could tempt the isolated parts of the network to panic into irrevocable actions. What was needed was a defense system that could withstand the onslaught of a Pearl Harbor type attack and retain the capability for returning the favor in kind shortly thereafter. As unpleasant as this all is, the mutual building of tough, survivable defensive capabilities -- "second strike capability" -- neutralized much of the gain for opening hostilities. It is this single change of defense postures that cooled tensions among the great powers and made detente possible.

This is a very confident statement -- that U.S. success in the military communications race was a factor in achieving detente. However, packet switching did make possible an extremely strong communications network that could survive even heavy attack. In effect, packet switching produces a communications network whose performance as a whole is actually greater than the sum of its parts. Even though there is a great deal of redundant message sending,

packet switching is cost effective. Each link in the distributed network need not be perfect, but the end result of having multiple imperfect paths is a strong (or, to use a computer science term, "robust") network. (The fact that such a network is not only strong but cheap is a nice extra, since saving money has never been one of the military's prominent characteristics.)

When the packet switching design was first proposed, communications experts of the time were not at all comfortable with it. They simply refused to believe that the same message sent rather off- handedly several times in succession could possibly make sense on the receiving end. Indeed, when Baran first presented his idea for this computerized communications network, he was met with an emotional rejection by "communications experts not familiar with digital processing. They kicked, screamed, grumbled, and worse. They were initially certain that the proponents did not understand how communication systems work." Part of their response can be appreciated by the realization that the telephone plant even at that time represented an investment in the tens of billions of dollars. When someone comes around and talks about building inexpensive communications networks using unreliable links and nodes, and of networks arranged willy nilly for extremely high survivability, it violates all their basic premises of network design." In fact, the folks at AT&T responded to Baran's long and very detailed explanation of computerized communications by giving him "a tutorial starting with how a carbon button telephone instrument worked."

The first packet switching network was the ARPANET, developed for the Advanced Research Projects Agency of the Department of Defense. The ARPANET development of packet switching has set the standard until now. Baran feels that there could still be great improvements in speed, cheapness, and strength. One of the most striking features of a packet switching network is that it is decentralized. Rather having a 'hierarchical' communications system with a control center governing all message transmission, each link in a distributed packet switching network can function fairly autonomously, which contributes to the strength and reliability of the network as a whole.

In the remainder of this article, in which Baran discusses the possible applications of packet switching in a community communications system, he will be quoted directly.

**********

**Approach**

We have learned a little about the payoff for distributed processing. We understand the use of redundancy in error correcting digital processing and in the building of reliable organisms. Perhaps it is time to consider transferring some of these concepts to the architectural design of our information systems and even our social order systems. In the larger view, could we have a more stable world if it were organized along the same lines as distributed information and control systems? Is the concept of the sovereign level of government each centralized in a single vulnerable node, such as a Washington or a Moscow, a wise choice in the very long term future? Change cannot take place rapidly here. Try as we might to build a stable and peaceful world, national governments with inviolable internal sovereignty may be expected to be around for at least the next hundred years. During this time we must live with nationalistic sovereign nations with the right to do whatever they please within their borders, even in a world where the weapons are extremely destructive and portable. Most governments are run by reasonable people primarily concerned with betterment of their own citizens' lives. Nuclear proliferation is occurring and we must face the long term reality that in the family of nations there are occasions, however rare, in which the power is in the hands of an erratic or even crazy leader.

## COMPUTER DATA BECOMING PEOPLE DATA

**Hidden use of data networks.**

Let us move beyond the negative issues of the need and directions for building more robust systems for the moment and consider a promising development -- the

development of sophisticated electronic message services. This has come about by the broadened use of data networks in general, and the ARPANET in particular.

In the next several years the early packet networks of the world will begin to interconnect. The resulting overall network will be more effective and useful for international communications than ever before possible. It could well become more important than voice telephone connection. Most people believe the networks are conveying digital data between computers. More likely the major portion of the data traffic is language text. It is messages exchanged between humans with relatively unsophisticated intermediate processing. Increasingly computer terminals, and the connected computers, are primarily facilitating the exchange of human-to-human messages.

Those knowledgable about these matters are disposed to look the other way and pretend that it is only "data" being sent to avoid a sticky regulatory battle. By accident of history, the tariff structure used by the telephone and telegraph administrations throughout the world for language text transmission is based upon telegram transmission costs. The tremendous decline in transmission cost in terms of bit- kilometers has not been directly reflected to the network users. The savings by new transmission technology are, throughout the world, generally used to cross subsidize other services felt to be more socially desirable. Rate disparities are commonplace. Bit-kilometer tariffs between countries are disproportionately expensive in comparison to flows within a nation's borders. The telephone user pays less for his bits than the data user. A three minute international telephone call can transmit about 7000 pages of text, in digital form, for only a few dollars, but the old tariffs in existence block such applications. Thus, those who transmit data at these bargain rates do not want to talk about their loophole. In the process, however, we are concealing a major evolutionary development -- a breakthrough in low cost international communications for alphanumeric text.

**Pro and anti-people technology.**

Some observers of mass communications consider communications technology in terms of being pro or anti unfettered person-to- person communications. For example, reusable magnetic tape video recorders are called "pro-people" because individuals can, at a person-affordable cost (under $1000) control their own communications medium. Other forms of video recording that require an expensive shared reproduction facility costing in the millions of dollars, such as the proposed videodisks, are called "anti-people." The high cost of the master producing machines take power from individuals. This power is concentrated into the hands of those who can afford to own an expensive duplicating machine -- large corporations or governments. Amateur CB radio is "pro-people" communications. National network TV broadcasting is regarded as "anti-people" as it permits control by institutions.

The proponents of "pro-people," or small scale technology (versus conventional "anti-people," or large scale technology) hold an implicit belief. That is that a society organized on a distributed, or a more person-to-person basis, can be more stable, less constraining and more adaptable to change than more impersonal, hierarchical, monolithic organizations.

**Building an international people-to-people network inexpensively**

Would a "pro-people" international communications network be socially useful? Is it feasible? Could use of in-place telephone circuits plus a little small scale technology make it possible to build low cost people-to-people written text systems crossing national boundaries? Let us consider this wild thought a bit, including the applications, the technology, and its likely source of evolution.

Conventional communications networks represent large scale investments and are generally national monopolies. One impact of packet switching is to reduce the cost of entry into the bit transmission and remote processing business. It lends itself to permitting a small amount of raw transmission bandwidth to be purchased and

subdivided among many non-co-located users. We must consider five major components of our hypothetical person-to-person packet switched network: 1)the user's terminal, 2) a local distribution system; 3) an IMP, or packet switching node; 4)long distance transmission lines or satellite; and 5) a host computer, somewhere.

In fathoming the future it is necessary to reconsider our old view as to the economics of complex electronics. The LSI revolution is far along and its offspring, the microprocessor, is here together with powerful support chips, plus very low cost memory. The hardware to build a workable switching node, or IMP, for a packet system even today is now affordable by the computer hobbyist. Very low cost terminals will soon be here. These can be bootlegged by acoustic coupling to the existing telephone network. Since the long distance telephone cost is tolerable if we buy a voice circuit and divide it up among the potential users all the hardware ingredients will soon exist for a people- affordable network. We shall consider its application, but first let us ask "who might build such a system?"

**Who may be the builders?**

The computer hobby is a phenomenon less than two years old. Computer clubs abound in the U.S. At this time 250 stores in the U.S. specialize in selling micrcomputers and low cost peripherals. The computer hobbyist group appears to be comprised of those who work in the computer field by day with their avocation following their vocational interest at night. These are highly competent and imaginative individuals, and are not totally impoverished. Each issue of the present hobby literature is probably richer in economically useful ideas than can be found in journals of the professional computer literature. Hobbyist software tends to be better written than commercial programs. ...Unlike the commercial sector, hobbyists actively trade their software. ...One can build more cost effective equipment using the hobbyist standard than commercial data processing standards....We may well be entering a new era where small groups of individuals using their own funds can be the builders of the digital communications and processing systems of tomorrow. Of course, large companies, well funded government laboratories and other institutions will always be around to take claim for the commercialized versions of any innovations, as has always been the case. We may have to watch this phenomenon carefully to see how it occurs. What we do know is that the basic elements needed are now down to the pocketbook level of the hobbyists.

The major stumbling block that might hold back this person-to-person channel of development is the rigorous grip that the communications industry holds everywhere in the world by virtue of government monopoly regulation. This nationalization or heavy administrative control came from the past historic control of communications by the military agencies of government starting in the day of the optical semaphore telegraph. Perhaps it is time to reconsider the use and control of communications channels and extend personal freedom by allowing the public access rights to its own communications resource.

**What will it be used for?**

How is the new network going to be used? If the American scene is correct, we might see games and messages. The messages could well replace the postal mail. Of course, you may argue, we already have a good international mail system. Yes, a letter can generally be exchanged between any two people in much of the developed world in anywhere from a few days to perhaps two weeks With a good electronic message system you can interact several times a day with virtually instantaneous transmission. A different form of communications results when messages are exchanged in hours in lieu of days at a time. With proper technology, the cost of electronic messages can be cheaper than postal rates.

**Impact.**

Any time you change things by a decimal order of magnitude, you change quality as well as quantity. The automobile = 100 kilometers/hour; the airplane = 1000 kilometers/hour. Neglecting secondary characteristic differences, such as the airplane's ability to travel over water, the simple factor of 10 can provide revolutionary change in the structure of society. With

a drastic increase in the speed of international person-to- person mail, a revolutionary change can take place; not simply in the speed and cost of transmitting written text, but also in the way letters are written and how they are used. With a good text editing and retrieval system there is less need for typists to retype letters before transmission, thus serving to both shorten the length of the messages and to accelerate turnaround time.

By its nature, data is a universal language. Certainly the Arabic numeral set is universal. Even the character sets of the world's written languages tend to map onto a much smaller set than the number of languages themselves. A single Roman alphabet (with a handful of local character exceptions) combines the separate languages of the entire Western world. Many more people will be able to communicate across the written text language barriers than can the oral language barrier. (Many more read, albeit slowly and painfully, the language of others than can hear it and understand it in real time).

**Subversive objective.**

By undercutting the existing tariff structures for record traffic by bypassing government controls, we may be able to do more to create effective and international cooperation at the person-to-person level than all the grandiose institutions that have been tried in the past, including the United Nations, internation broadcasting, grandstand games such as the Soyuz- Apollo linkup, the Peace Corps and large scale diplomatic agencies taking turns entertaining one another at the expense of the taxpayers of the hosting nations.

## CONCLUSIONS

I have discussed two seemingly divergent topics in the latter section of this paper: building tougher network structures and encouraging the development of person-to-person communications around the world bypassing rigid national control structures. They are really related issues as both are directed towards a more stable world order.

Very long-term world stability can occur only if the vast economic and social disparities between nations can be reduced. This will take improved international communications, not only for governments and businesses, but also for people. Still, it might take a hundred years or more. In the interim, civil comfort may require understanding of how to build more robust information systems for societies' infrastructure.

Information is different than all other resources. If I sold you a physical commodity, I would no longer have it. Sharing information benefits all. After I give information to you, I still have it to use for myself. There are greater chances for devising a non-zero sum game for information activities than ever possible in physical resource trading. Improved information flows may well be more important than physical resources. In the highly developed countries of the world today more than half of the GNP is developed via the transmission and processing of information. Thus, the scope for economic impact can be great. God has sprinkled mineral resources very unevenly, but brains surprisingly uniformly throughout the world, considering the different needs to survive in different cultures. Altruism has its bounds. While it is nice to have a long range view of a world with reduced economic tensions (never forget that both Adam Smith and Karl Marx were only economists), there are heavy prices to be paid for such transition.

To give an example close to home: with the future almost zero cost computer communications capability, it will be possible to program a computer from anywhere. Can you imagine a world where most of the software will be written by the lowest cost labor available, irrespective of what country it may be found? Clearly, it is a mixed blessing, with most of us who read this having very much to lose in the short term while the rewards may be long in coming and can be felt only by others. Maybe this is what statesmanship is all about.

*References*

[1] Paul Baran, On distributed communications: I. Introduction to distributed communications networks. The RAND Corporation, Santa Monica, California, Memorandum RM-3420-PR, August 1964.

Sharla P. Boehm and Paul Baran, On distributed communications: II. Digital simulation of hot-potato routing in a broadband distributed communications network. RAND Corp. Memorandum RM-3103-PR, August 1964.

J.W. Smith, On distributed communications: III. Determination of path-lengths in a distributed network. RAND Corp. Memorandum RM-3578-PR, August 1964.

Paul Baran, On distributed communications: IV. Priority, precedence, and overload. RAND Corp. Memorandum RM-3638-PR, August 1964.

Paul Baran, On distributed communications: V. History, alternative approaches, and comparisons. RAND Corp. Memorandum RM-3097-PR, August 1964.

Paul Baran, On distributed communications: VI. Mini-cost microwave. RAND Corp. Memorandum RM-3762-PR, August 1964.

Paul Baran, On distributed communications: VII. Tentative engineering specifications and preliminary design for a high-data-rate distributed network switching node. RAND Corp. Memorandum RM-3763-PR, August 1964.

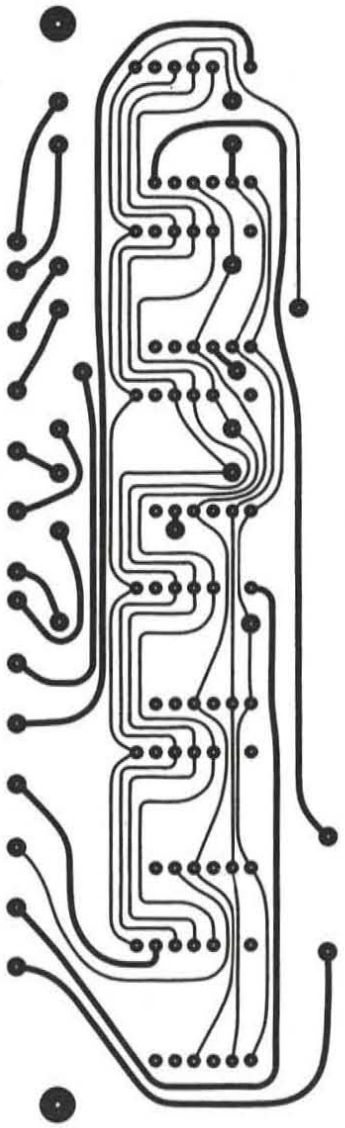
Paul Baran, On distributed communications: VIII. The multiplexing station. RAND Corp. Memorandum RM-3764-PR, August 1964.

Paul Baran, On distributed communications: IX. Security, secrecy, and tamper-free considerations. RAND Corp. Memorandum RM-3765-PR, August 1964.

Paul Baran, On distributed communications: X. Cost estimate. RAND Corp. Memorandum RM-3766-PR, August 1964.

Paul Baran, On distributed communications: XI. Summary overview. RAND Corp. Memorandum RM-3767-PR, August 1964.

[2] D.W. Davies, K.A. Bartlett, R.A. Scantlebury, and P.T. Wilkinson, A digital communications network for computers giving rapid response at remote terminals. ACM Symposium, Gatlinburg, October 1967.



# THE TOY THEORY OF WESTERN HISTORY

*by M.E.D. Koenig*

The excess of militarism which has plagued Western society for the last century and a half is largely the result of a motivation which our society consistently underestimates. That motivation is very simply the desire to play with toys. The phrase "play with toys" is used here in the very broad sense of manipulating devices which push the "state of the art".

The consequences of this seemingly harmless propensity have been extraordinarily significant and rather unfortunate. We have rationalized and built large military organizations primarily for the purpose of providing those technophiles among us with the opportunity to play with the neatest and newest toys. The military is in reality simply a gigantic communal toy-owning organization. That is its fascination and its true raison d'etre.

The insidious nature of our predilection for toys lies not only in the consequences of the rationalizations that we have used, but in the blindness of the non-technophile to the importance that toys possess for a very major portion of our society.

The motivations of most people in the military are for the most part unrecognized, even by themselves. They are, like most of us, very unaware of their unconscious motivations. Those who are aware suppress it. Playing with toys is not perceived as a mature man-like thing to do in our society and, even if it were, the admission of it would jeopardize the military's existence by violating its rationale for existence. How many people are, on the face of it, willing to spend a vast amount of our national resources on a toy cooperative?

If the military functioned only as a toy-owning organization, its function would be innocuous enough. However, the problem is that once a military organization has been created, its momentum builds and there is a tendency to use the organization for its avowed purpose. This problem arises primarily because of society's refusal to admit the importance of toys as a form of manipulation.

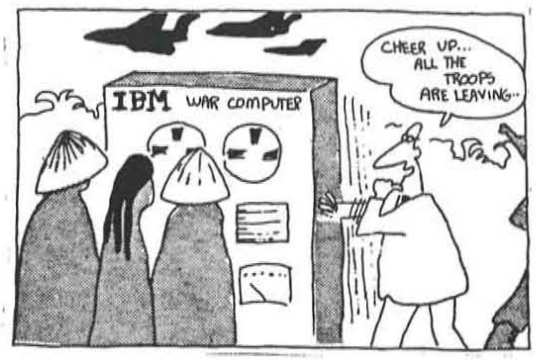
The military and the technophiles must find a way of rationalizing their toy coop, and the rationalization takes the all-too-familiar form of "national defense," "national preparedness," "missile gap" and so on. This rationalization has been determined in large part by the nature of technology itself. The most enjoyable toys are the most powerful, those that push the state of the art the hardest. For the last 150 years the nature of technology itself has been such that those applications which pushed the state of the art have been defensible only for the military.

A P-40 is, for example, a far more exciting toy that a DC-3; a destroyer pushing its 2,000 tons with 60,000 horsepower offers a pleasure far more visceral than a freighter using a quarter of that power to push ten times that weight. The destroyer's power-to-weight ratio is greater by more than an order of magnitude.

If one wanted to design the "hottest" -- toy jargon for the fastest, most powerful, highest performance -- plane one could conceive, who could possibly justify it except the military? If one wanted to build, or fly, or merely be associated with a "hot" machine, there has been essentially no alternative to the military. Admittedly, when a technology is new, there may be alternatives to military design and procurement; the national air races of the 1930's were an example of advanced high performance design in a civilian context. However, as technology grows more sophisticated, and as expenses escalate, the military tends to become the only supplier of the

pleasures associated with extreme technological performance.

Democratic the military may not be, but it is in a sense a populist institution which can make available the toys of our culture to millions of people for whom they would have been otherwise unobtainable. Great personal wealth is the only alternative and not many of us are blessed with it.




**Hippie Protest**

The unconscious realization of this state of affairs was a major motivation behind the hippie movement, or "counterculture" of the 1960's. The hippies were saying, in effect: "Society, your goddam toys are dangerous; we want to substitute something else -- love, drugs, beads." Hippies were also prisoners of our culture, and they were, unfortunately, in the main unaware of what they were really trying to say. They diluted and disguised their message with political propaganda, rationalizing their actions just as effectively as the technophiles rationalized theirs.

The irony is that while the technophile's rationalizations continued to serve military purposes, the rationalizations of the hippies were counterproductive, alienating many of their potential supporters. For example, these unverbalized aims of the counterculture were what the policemen and the national guardsmen at the Chicago convention were responding to: the response of the child whose toy was threatened.

Despite the basic logic and relevance of the hippie protest, it was in a very real sense beside the point and after the fact. That is, new technology has been increasingly applicable directly to non-military applications. In this trend lies our hope of breaking the spiral of escalation. Toys are inevitable, and our task is to provide access to these fruits of technology outside the military, and to increase the opportunities for the public to participate in their pleasures.

**Decreased Military Control**

This trend away from military dominance of the forefront of technology is composed of three basic elements:

One element has been the introduction of nuclear weapons. The nature of military hardware has been changed; it has been dehumanized. Destructive power has been incredibly concentrated, and the opportunity to play with toys correspondingly lessened.

One individual ICBM in a silo in Montana contains far more destructive power than a squadron of 21, B-17s carrying ten men each, but delivers not nearly so much visceral excitement. Only a few men are directly involved, and their opportunity to "practice" with their toys is severely limited -- indeed, it becomes a matter of congressional debate. This perhaps is part of the motivation for manned bombers and submarine-launched ballistic missiles -- if the missiles are no longer adequate toys because practice is limited, the old standbys can be called upon and justified as new "delivery systems." In this context, the development of small "clean" nuclear warheads, and talk of limited nuclear war is a disturbing regression.

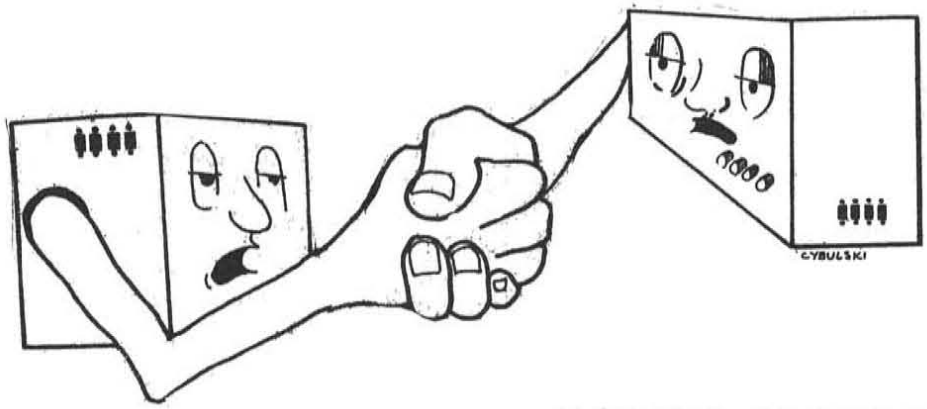
Involvement with the military's most impressive hardware has also been limited to a select few. Increasingly, the military provides sport for spectators rather than direct participation. And the stronger this trend becomes, the greater the importance of NASA's better-quality, toy-dominated spectaculars. These spectator sports -- NASA and manned-space exploration (now sadly moribund) -- are the second element.

The visceral thrill, the gut-filling rumble, that a Saturn V provides is important and will be so long as man occupies a physical self. The point is that a civilian organization, NASA, has toys the military cannot match -- fascinating powerful toys that are also of relative safety to society.

The third and most important element has been the introduction of the computer. The computer is a toy of such a vast spectrum of potential use that the military can dominate only a very small part of it. Any university computation center, or any major industrial organization, has computers of a power that are quite comparable to what the military possesses.

The computer is, in fact, a machine with an entirely new set of constraints. The most exotic use of a computer puts no more strain on any given logic circuit than does the most trivial use. The constraints are now a function of how the organization defines its role, and in this context a military rationalization becomes a constraining influence.

With pre-computer toys -- aircraft, guns, motorcycles, whatever -- the fascination was, in effect, with how much the toy could extend oneself -- how much it could put onto you. On the other hand, with a computer the fascination is with what one puts into the toy.




**Computer as a Toy**

A further consequence of the unique nature of the computer, and one that is equally as important, is that not only is the hardware available outside the military but the most interesting and satisfying opportunities to use that hardware are also in the non-military sector.

That is, even if the DC-3 had possessed the performance potential of a P-40, a commercial pilot, with passengers or cargo aboard, simply would never have an opportunity to "wring his plane out" in the fashion of a military pilot. But with computer technology, this position is reversed. The opportunity to put a computer through its paces is far greater in the groves of academe than in any military organization.

At first glance, this sounds ominous, regressive: once we received from the machine, now we give to it. But now we have a toy that extends not our limbs, but our minds. When we create knowledge to impart it elsewhere, to man or machine, we have not lost but gained. A computer is a toy unique in its capacity for non-destructive manipulation -- no other device can be "floorboarded" so safely.

A trend toward decreasing military control of our toys is obviously one to be encouraged. Along these lines some suggestions and ideas are herewith offered.

We should promote the rapid acquisition of computer expertise by societies other than our own, particularly Soviet and Chinese societies, and embargoes and restricted lists should be modified. Perhaps we should give computers to the Soviet Union and to China -- even parachute them in.

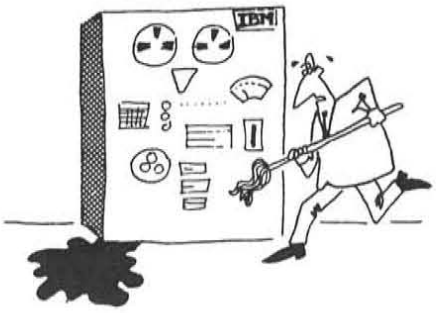
We should continue with manned space exploration. There is no real need for space exploration to be a race. Indeed, it can be a very appropriate vehicle for international cooperation. However, it must be supported at a level that will allow it to maintain a technology that is substantially in advance of the military. We must also admit that an element of the spectacular is a necessary and a quite legitimate aspect of exploration. "Space spectacular" should no longer be a phrase of condescension.

Not all of us are intrigued by computers, however, and the need to provide non-military access to "traditional" toys is of equally great importance. Given the nature of modern military weapons, the speed with which we can provide this access becomes crucial. Dare we simply wait for the slow evolution of the trends described above?

An even more direct solution was hinted at earlier: a direct substitute for the military -- a straightforward government-supported organization or agency whose explicit purpose is to provide access to toys.

Such an agency need not start with its own toys, it need only provide access -- the establishment's equivalent to the *Whole Earth Catalog.*

It has been a stock remark for years among the technophiles that the government could reduce its defense budget simply by charging for access to its toys: renting brief rides in an F-4 with supersonic speeds guaranteed; holding public firepower demonstrations; selling space aboard a destroyer for a weekend of antisubmarine warfare operations.




There is, of course, no requirement that this "toy access department" (TAD, a division of HEW) specialize in military toys. Many technophiles covet, for example, the chance to operate powerful Peterbilt's (if all the legendary prowess of Rolls Royce, Bugatti, and Ferrari were combined in one automobile, that car would be to cars what Peterbilt is to trucks) or GGI's (the classic electric locomotive). What is crucial is that the hurdles obstructing non-military access to toys be drastically lowered.

The military problem has arisen not only from the nature of technology itself but also from the refusal of decision-makers and opinion leaders to legitimize toy manipulation as a socially acceptable goal, and from their maladaptive acceptance of the abstraction of "defense" as the major rationale for providing access to toys. The furtherance of toy manipulation for its own sake must be legitimized as a national goal.

# REVIEW

## ELECTRONIC MESSAGE SYSTEMS: THE TECHNOLOGICAL, MARKET AND REGULATORY PROSPECTS

A report submitted to the Federal Communications Commission by Kalba Bowen Associates and the Center for Policy Alternatives (MIT). Cambridge, Massachusetts: April, 1978. xxii + 243 pp., plus bibliography and abstracts.

This is a relatively recent report which provides a good overview of the issues affecting the development of electronic message systems. Electronic message systems (EMS) are any means of electronically transmitting messages from one computer terminal to another. Electronic message systems come in many different forms, ranging from in-house office systems for use by a single company to a public message system for use on a national or even international network. The regulatory picture on EMS is currently unclear - such systems could come under fairly heavy regulation or evolve in a free market, unregulated environment. This report was submitted to the Federal Communications Commission (FCC) for its use in setting a research agenda in order to consider what, if any, regulations might be appropriate for EMS.

Currently, electronic message systems are being promoted for two main uses: 1) office automation, with the primary objective being to automate administrative processing tasks and to increase the productivity of the office worker; and 2) message transmission, in which the goal is "the movement of text from one place to another faster, cheaper, and more conveniently than the current postal service or voice telephone network." (p. iii).

These essentially dissimilar functions could influence the development of EMS in quite different ways. There is no intrinsic difference in the technology of an EMS used for office automation and one used for public communication. Each has a means of putting in information, transmitting it, and having it displayed on the other end. It is the context of use that makes the difference. The regulatory picture, and how EMS are "sold" will determine how such systems will look and function, whether they will be for public or for private use, and how much regulation will govern them.

A point that emerges again and again is the degree of influence that 'market forces' could have on the way EMS develops. While computer hobbyists are promoting EMS as a public message service, the large corporations are either emphasizing office functions or holding off on wide-scale development of EMS until the regulatory picture, final costs, and demand for EMS become clearer. At this time developers of many types of EMS services, both planned and in existence, are trying to assess the market. The question then becomes one of whether the public at large can influence this outcome or whether it will be decided in corporate boardrooms. Will "marketing" act in the public interest? Potentially, marketing could determine

both the nature and scale of EMS demand. For example, if the main function of EMS is seen as office automation, then such systems would be used primarily within a company or among the branches of a large corporation, and they would not necessarily connect with any other EMS network or be required to follow any standard protocols to make them interconnectable or accessible outside the defined boundaries of the firm. If, on the other hand, the communications function is emphasized, EMS systems could become universally accessible and multiply interconnected, forming a national or even international communications system for public use.

The implications of the direction of development go beyond questions of public access. Increased office automation could lead to loss of jobs and increased routinization of work, while maintaining or even enhancing managerial control. Although an in-office computer system could just as easily be used to increase worker participation in company decision-making, the office automation that is currently in the works is not tending in this direction but is designed to increase worker productivity.

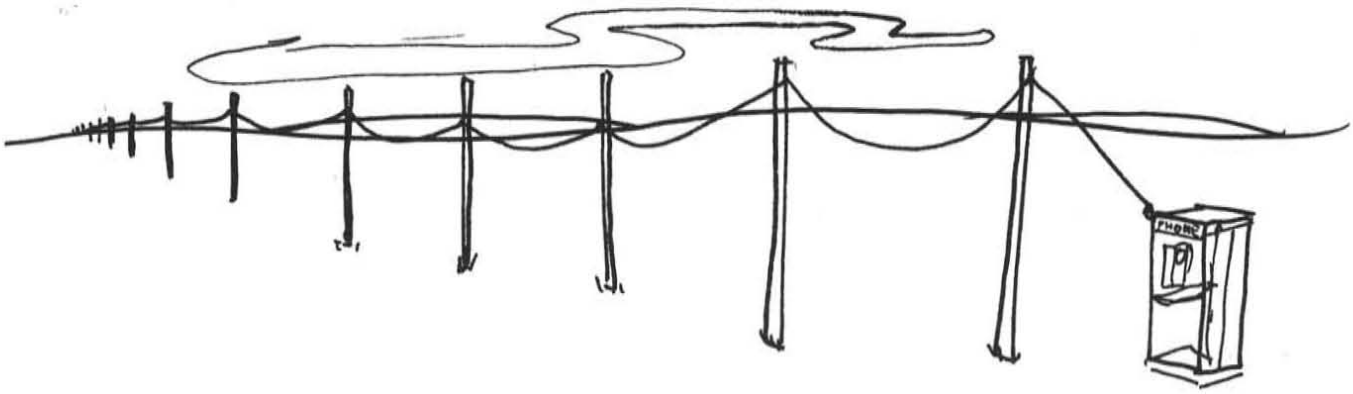
On the other hand, proponents of developing EMS as a communications system may find themselves restricted by questions of its effect on the U.S. Postal Service, and may be hampered by lack of standards and interconnections, so that small networks cannot easily grow. A public EMS utility would also have to deal with issues of privacy, protection of information, and copyright.

The report concludes by delineating the major areas of research that should be undertaken by the FCC, and again emphasizes that, given the current social structure, market forces will probably be the deciding factor in EMS development. "Numerous types of EMS systems are currently available or proposed. It will undoubtedly be a few years before reliable projections can be made about which subsets of these systems are likely to prevail in the marketplace." (p.230).

Whether the "marketplace" should be the key factor here will be determined to some extent by whether an informed public begins to pay attention to the development of computerized message systems in order to monitor and influence their development. Without public participation in this debate, business needs alone may be considered and other options for electronic message systems may be foreclosed. Since electronic message systems could have a very great social impact, the public should seek to gain control of this technology before the nature of its development is already determined.

This report is clearly written in fairly non-technical language and could be a useful resource for entering the debate around the uses of EMS. It gives several examples of electronic message systems and a good overview of the regulatory picture, by listing legal decisions which may have some bearing on EMS. A bibliography with abstracts of some of the major citations is also included.

*- Reviewed by Sandy Emerson*



# REPORTS

## COMPUTER HOBBYISTS BEGIN TO ORGANIZE

*by Tom Athanasiou*

A loosely organized volunteer group of computer hobbyists, centered in Palo Alto, California, is currently engaged in the design of software protocols that would allow a reliable, low cost electro ic message system to be implemented over a distributed network of personal computers. Other organizations, using less sophisticated software, are already providing message exchange services using the cheap new microcomputers and the telephone system.

A spinoff of the "homebrew" hobby computing culture, the Personal Computing NETwork, or PCNET, will ultimately be capable of error free transmission of messages and a fairly sophisticated level of information processing. After many months in development, the latest plan is to begin services at the minimum functional level, which will allow the network to begin to develop before the final debugging is completed. Eventually, the PCNET software will be able to handle two messages at the same time, and guarantee that those messages are correct. In the meantime, the PCNET people feel it is more important to get a minimal message system operational.

In that it allows many different kinds of equipment to be connected and to use the same computer programs, PCNET functions much the same as the ARPANET, which was designed for the use of the military. Indeed, many of the contributors to the PCNET are ARPANET veterans. The PCNET was organized in 1977 by David Caulkins after The First West Coast Computer Faire, and has grown to include an active committee of about 20 people (with a mailing list of about 500). Membership is concentrated in the San Francisco Bay and Boston/ Cambridge areas, but there are also members from as far away as England and New Zealand. Similar activity is rumored to exist in such unlikely places as Dallas, Cleveland and Pittsburgh.

Another major accomplishment of organized computer hobbyists is the CBBS (Community Bulletin Board System), which has been brought up in 8 different cities, including Chicago, Atlanta, and San Diego. The CBBS is an electronic mail system which allows short messages to be easily distributed within a local area. The PCNET people in Palo Alto would like to connect these CBBS's together, as well as expand their capacities. They would like to see the day in which the whole nation (the whole world?) would be linked together by an absolutely distributed electronic communications system capable of cheaply transmitting messages and data files over long distances, with a minimum of errors, using only inexpensive equipment. (There is talk of sending messages long distances by linking together a series of local telephone calls, but the phone company may have something to say about this.)

The goals and motivations of the PCNET organizers are basically social. Dave Caulkins sees PCNET as a way of increasing "the 'grassroots' communications bandwidth -- the amount of information flowing between people under their direct control, unmodulated by larger organizations with various axes to grind or sell." PCNET is interested in keeping message systems out of the hands of large bureaucratic agencies, and especially out of the hands of the U.S. Postal Service.

Indeed, computer hobbyists are already beginning to be noticed as a potentially powerful influence on the development of electronic message systems. A major report to the F.C.C. on Electronic Message Systems, recently completed by MIT's Center for Policy Alternatives, has this to say:

> The importance of these hobbyist activities should not be underestimated. First, they are a means of quickly introducing a large number of people to the possibilities of EMS. Second, the low capital costs of hobbyist equipment sharply reduces the economic and technical barriers for a would-be entrepreneur working out of his garage to offer hybrid data processing/communications services. Together these trends could result in the creation of a broad constituency for the more relaxed regulation of computer communication.

## SELF DETERMINATION: The NEX-US

*by Mark Zemelman*

Self Determination is a personal/political network of more than 2,000 Californians who have joined together to bring about humanistic political change in our communities and throughout the state. We are individuals tremendously varied in our interests and abilities, yet brought together by our commitment to personal and social change, and our realization that human growth is intrinsically tied to social processes. Rather than organizing to confront political and social problems solely on an issue-by-issue basis -- an overwhelming task when one acknowledges the complexities which confront us -- we seek to create a new force in California. Our intent is to infuse the political process at every level with a perspective which is person-valuing and which nurtures our capacities for cooperation and self-reliance.

To this end we have developed the Network Exchange Program (NEX). Its purpose is to locate, disseminate information about, and facilitate use of resources which assist persons and groups to become more effective and active in efforts at personal growth and/or community improvement. The emphasis of the NEX is on those resources which increase self-reliance and cooperative activity, rather than perpetuate reliance on "professionals." For purposes of the NEX, resources are persons or community groups who offer information, training, experience, and/or support which directly aid in the intellectual, emotional, experiential and skill development of persons.

As part of this project we are compiling a resource directory (NEX-US) which

will contain listings from individuals and organizations throughout California offering to teach skills which promote humanistic personal and political change. For example, we expect to have listings in fields such as community organizing, health and personal growth, alternative lifestyles, food distribution, personal/political issues, and environmental issues.

In the short run, we at SD hope the directory will connect people who would like to begin or develop informal or formal networks with those who have the skills necessary to do so. We also hope that, by working on the networking process, groups that have formed around separate issues will discover their common values, share skills and develop support systems.

The long term intent is more ambitious. As an organization, SD's goal is to assist the building of a constituency of people who, in developing themselves, will reshape the political processes of California. Contrary to the current myth of the separation of personal and political life, where government serves simply as a corrective for aberrations in either sphere, SD believes politics ought to serve to draw people into the community as a necessary part of human growth. NEX-US is one part of the overall network, responsible for an important part of the implementation of this vision.

As a means of information compilation and dissemination, this directory is special in that each component is designed with explicit attention to the long-term values which it promotes. For example, in locating listings for the directory, we ask potential listers to describe their skill in terms of what the user can expect to gain by it. We are less concerned with the skill per se than with the process by which it is taught and the result of its use, especially with respect to self-reliance and cooperative abilities, the two most fundamental values underlying empowerment.

Also, we decided to have no criteria for expertise. We hope that people will draw skills from their hobbies and social activities as well as from their professions. We expect that the level of expertise will be clear from their descriptions of content and format.

Just as we hope that people will find involving, consciousness raising tools and people through the directory, we are also trying to make the directory itself an interesting learning experience. At our office we have extensive files on over 400 organizations located in the Bay Area primarily. The NEX-US files are potentially useful to any one interested in networking or in doing research on networking, since they contain information about what kinds of ideas and methods worked for a particular group -- what programs/services and concepts were altered, encouraged or abandoned for a more effective way of creating positive community interaction.

In addition to the individual and group listings, the NEX-US Directory will include short manuscripts (no more than two typeset pages, or 2000 words) describing a particular skill or the processes for accomplishing a particular goal. Manuscripts may be submitted by anyone in the community, and will cover such topics as how to do block organizing, etc. The manuscripts should be self-contained statements, supplementing the skill sharing offered in the listings.

The NEX-US Directory will be published in loose-leaf form and will be revised frequently. The first printing will be 10,000 copies, to be distributed in the Bay Area and Santa Clara County. Writers will be given credit, and a free copy of the Directory, in lieu of payment for manuscripts.

For a listing application, or further information, please contact Faith Whitmore or Mark Zemelman c/o Self Determination, 2341 Forest Avenue, San Jose, CA 95128, or call (408) 984-8134.

# THE OPEN NETWORK

The Denver Open Network was established in 1975 by Mountain Forge, "an alliance of philosophers, poets, and visionaries of other kinds, who are devoted to the well-being of every sovereign explorer." (Open Network News, December 1978, p.7). In their definition, a network is "an array of points connected by lines of communication."

The Open Network was designed to be a tool for explorers and a life-support system for builders, thinkers, and dreamers. In four years, it has grown to include nearly 500 intellectually curious and enterprising users exploring new ideas, new technologies, and new ventures. Among these are scientists, artists, mathematicians, craftsmen, writers, entrepreneurs, politicians, investors, bankers, theologians, educators, engineers, architects, consultants, city planners, philosophers, and inventors.

The Open Network works by giving the user a place to find others with similar interests. It is complementary to personal networks -- business, family, social, etc. However, unlike traditional organizations, it has no social, political, religious, or educational entry requirements nor does it endorse any ideology.

A user is defined as a person or organization who has access to The Open Network's information. Users gain access by paying a $25 annual fee, by trading a service, or by having been given access by some other user of the Network. Some users are satisfied to receive the newspaper once a month; others have made the Network a real tool in their lives.

The Network News is a monthly publication for exchanging information among users. Without charge, any user can post an announcement of up to 100 words in what is called the Research section, or can buy a larger space, called a 'domain'. Domains are unrestricted in their use and are considered the private property of the purchaser(s). The Network News is self-supporting, but it is not paid for by the sale of advertising space. Domains in the Network News sometimes may be the sort of thing that is usually called advertising; but in many cases they will defy traditional classification. Network members therefore describe the News as participatory, since it is supported by the people who use it. While not excluding traditional advertising, Network News staff prefer to think in terms of user domains, so that the paper can seem to be created and co-evolved by all the people who care about it.

In addition to the newsletter, the Open Network has "weavers," promotional brochures, a library, and a computer for storing and retrieving network information. Weavers are users of the Network who are particularly skilled at using the tools provided by Network Research. They share their services or sell them to other users or clients. Weavers usually have an expertise or interest in a special area. Unlike Network Research, which must remain objective about recommending particular services, a weaver can make specific choices for clients based on their own knowledge, ideas, and values.

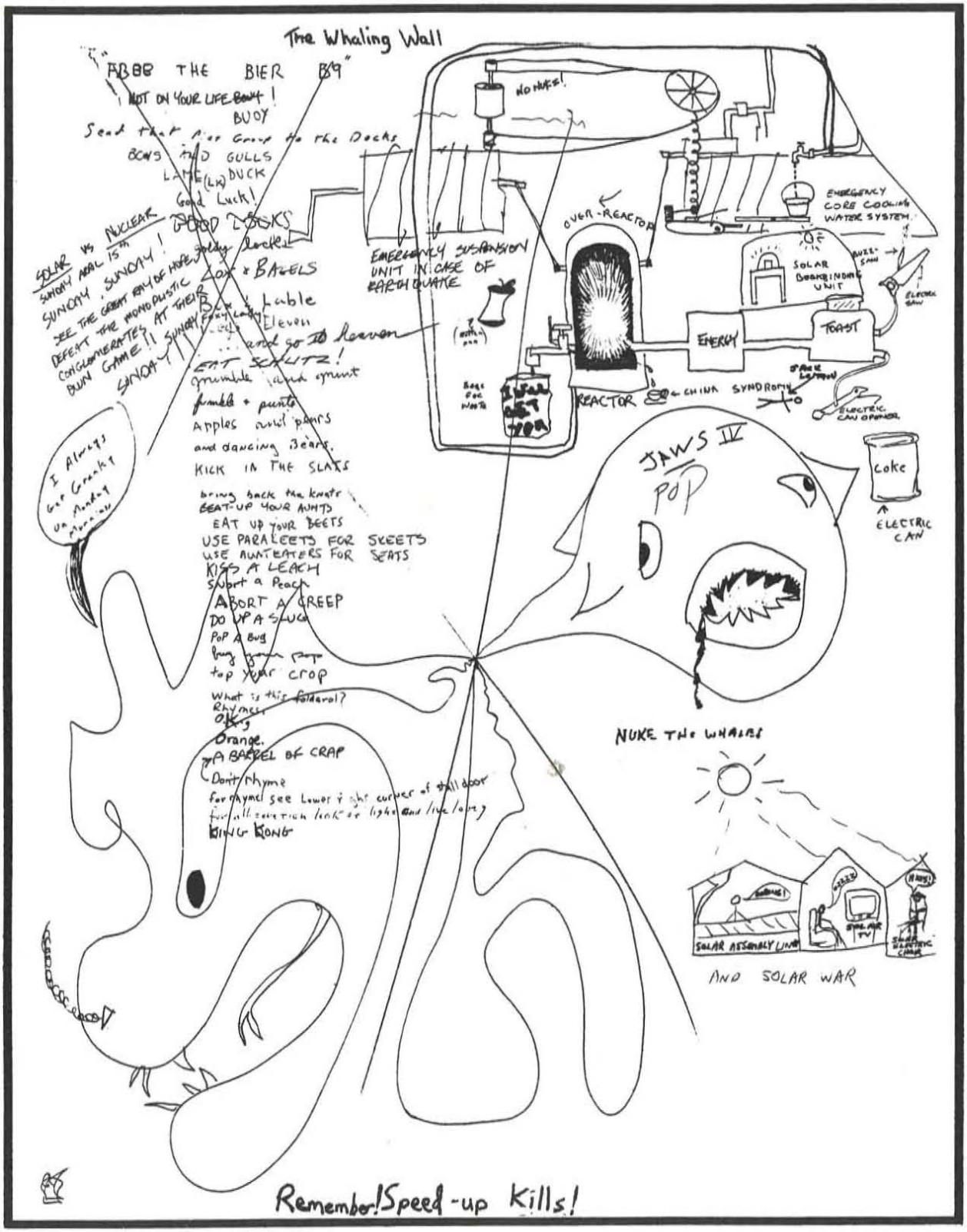
Promotional brochures offer users the chance to earn $5 for every new recruit who joins the Network. Information from users is stored in the Network's computer and is indexed by descriptors, or keywords. Weavers and Network research people constantly work with the information in the computer in order to guide users in their search for connections. The Open Network also makes available an assortment of brochures, newspapers and manuscripts from across the country, and is planning to expand its library facilities this year.

In the December, 1978 issue of the Network News, Mountain Forge members Chuck Quigley and Stan Hoffman discuss the theory behind the Open Network:

> Network theory is the study of pattern, relationship and communication channels in spontaneous inorganic, biological, technological, and social or cultural systems. The most articulated branches of network theory are found in mathematics, computer science, and the physical sciences, and the most developed practical applications are in design and development of efficient physical distribution systems for energy, communications, shipping, traffic patterns, and so on. By shifting our perspective, we may discover interesting and useful applications of network theory to social interaction.
>
> Technically, the word network may be applied to any form or organization -- all organization depends on patterns of relationship and communication. But as commonly used by people interested in innovative and creative forms of social organization, such as the constituents of the Denver Open Network, the term network refers to certain basic principles of relationship that contrast with the traditional Western top-down style of hierarchy based on ranking individuals according to power. Decisions and decision-making generally flow in only one direction -- down -- with little horizontal communication and less in an upward direction. The notion of network includes such organizational patterns, but it also includes more versatile and flexible structures.
>
> Because each individual maintains his personal integrity and sovereignty, the network can grow, evolve, and effectively design and redesign itself in response to the current needs and purposes of the participants....The overall purpose of the Denver Open Network is oriented toward discovery rather than specific predefined goals. The network concept is the most useful, efficient, and powerful basis for such a purpose.

For more information on the Open Network, contact:

Network Research
P.O. Box 18666
Denver, Colorado 80218




## THE BATHROOM WALL

*Interactive graffiti from the bathroom wall of Cleo's Print Shop, Oakland, CA. Reproduced with permission.*

**BACK ISSUES STILL AVAILABLE**

Curious about the ghosts of issues past? We have a limited supply of issues from 1975 and 1976, as follows:

| | *Featuring:* |
|---|---|
| Volume I, Number 0 (June 1975) | Efrem Lipkin & Ken Colstad – *Community Memory: a Public Information Network* |
| | Michael Rossman – *Some Indications for Community Memory* |
| Volume I, Number 1 (January 1976) | Lee Felsenstein – *Report on the Status of the Tom Swift Terminal Design* |
| | Michael Rossman – *A Communications Network for Change in Higher Education* |
| Volume I, Number 2 (June 1976) | Lee Felsenstein – *The Cruncher* |

Sample copies of Volume III, 1 (Fall, 1978) are also available. Features an update on the Community Memory Project, and articles on coffee houses, learning exchanges, etc.

---

SUBSCRIPTION AND ORDER FORM

Please send me:

_____ I, 0 ($1.00)

_____ I, 1 ($1.00) _____ III, 1 ($1.50)

_____ I, 2 ($ .50)

I'd like to subscribe to the *Journal.* Enclosed is my check for $_____. (make checks payable to Village Design) (1 year – $9).

Name: .....

Address: ..... State ..... Zip .....

Phone Number: .....

The Journal of Community Communications
c/o Village Design
P.O. Box 996
Berkeley, CA 94701