TECHNOLOGY AND SOCIETY

(FORMERLY "CSIT NEWSLETTER)

IEEE

CONTRIBUTED PAPERS, REPORTS, REVIEWS, AND CORRESPONDENCE OF THE COMMITTEE ON SOCIAL IMPLICATIONS OF TECHNOLOGY

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MARCH 1977 - ISSUE #17

EDITOR: FRANK KOTASEK JR.

ELECTRO 77 "SOLAR ENERGY: A STATUS REPORT"

Thursday, April 21, 1977
2pm to 4:30pm
Versailles Ballroom, Hotel Americana
7th Avenue at 52nd Street, New York City

This is a symposium of four talks by outstanding leaders in the field. Because this is the first program on this subject at our general meeting, it is designed to introduce the subject to the community of EE's. The opening talk, in presenting an overview, displays the scope and emphases of the ERDA program, factors that are little known outside the active participants in the field. The application to heating and cooling of buildings is the nearest one to widespread use and impacts a huge demand area. Silicon solar cells are chosen as a fairly well-known representative of the solar electric technologies and one in which significant advances are being made. The final talk covers a number of interesting systems questions that are both important to the field of solar electricity and likely to concern EE's.

The program is as follows:

1. "An Overview of the Federal Solar Energy Program," Dr. Henry Marvin, Director, Division of Solar Energy, ERDA.

2. "Solar Heating and Cooling of Buildings," Mr. Albert Weinstein, Manager, Special Energy Systems, Westinghouse Electric Corporation.

3. "Silicon Solar Cells: Status and Prospects," Dr. John V. Goldsmith, Technical Program Manager, Low Cost Silicon Solar Array Project, Jet Propulsion Laboratory.

4. "Systems Considerations in the Use of Solar Electricity," Mr. Piet Bos, Program Manager, Solar Energy, Electric Power Research Institute.

Session Organizer and Chairman:
Dr. David Redfield
RCA Laboratories
Princeton, NJ

Dr. Redfield is Chairman of the CSIT Working Group on Energy and Environment.

In this Issue

EDITORIAL: "TECHNOLOGY AND SOCIETY"

This publication enters its fifth year with a new name--which I believe will more accurately reflect its contents--and a new editor. The name TECHNOLOGY AND SOCIETY was chosen by a vote of CSIT at its November 20, 1976 meeting, as was the new editor. On behalf of Dr. Balabanian, I thank the readers who took the time and effort to respond to our name-the-newsletter contest for their many imaginative ideas.

In view of the critical role of technological change in modern society (and the inevitable feedback effect on technology itself), a publication such as TECHNOLOGY AND SOCIETY should be of great value to IEEE members. However, TECHNOLOGY AND SOCIETY's present circulation of 1900, although it is a very encouraging beginning, shows that not everyone is persuaded as to its value. Consequently, two of my main goals as editor will be to improve two-way communication between TECHNOLOGY AND SOCIETY and its readers, and to seek out and publish the widest possible variety of quality articles, reflecting the wide variety of viewpoints among IEEE members on the subject of social implications of technology. I would appreciate any advice or assistance that readers (especially those who may be critical of present editorial content) could give me in this undertaking.

The many valuable comments and suggestions provided by readers with their subscription renewal coupons represent a good first step in this effort. (These comments and suggestions are tabulated on page 18.) Through your continued involvement, we can continue to improve the quality of TECHNOLOGY AND SOCIETY and make it increasingly responsive to your concerns and interests.

Frank Kotasek, Jr.

NEW SUBSCRIPTIONS: IEEE MEMBERS wishing to receive TECHNOLOGY AND SOCIETY should write to: Ms. Joan Breslin, IEEE, 345 East 47th Street, New York, NY 10017. Please include IEEE membership number.

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A BRIEF SKETCH OF CSIT'S HISTORY

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[Dr. Kaufman is Vice-Chairman of CSIT]

I. The Beginning

CSIT began as a result of a petition* signed by more than 600 Members, Senior Members, and Fellows of the IEEE. The petitioners requested that a professional group be formed to "promote among IEEE members a sensitivity to the impact of their technology on society, and to conceive means to predict and evaluate that impact". The CSIT petition, coming at a time (February, 1972) when a clear mandate for change within the IEEE was taking place--a mandate to address the professional needs of Electrical Engineers--was additional evidence that the pursuit of technical excellence, although necessary, was no longer sufficient.

In response to the petition, the IEEE Board of Directors decided that an Ad Hoc Committee of the Technical Activities Board (TAB)--chaired by the Vice Chairman of TAB--was more appropriate than a professional group. CSIT's structure (purpose, membership, and principles of operation) took shape at its first meeting held on June 24, 1972, chaired very effectively by TAB Vice Chairman Ed Wolff, and attended by interested members of various IEEE bodies and several of the IEEE members who helped frame and circulate the initiating petition.

In December of 1972, the first issue of the CSIT Newsletter appeared, and subsequent issues have followed on a quarterly basis. In addition to carrying papers submitted by IEEE members (and others) on various society/technology issues, the Newsletter has reported on many of the projects undertaken by the CSIT Working Groups. The earliest of these active Working Groups (Ethics, Energy/Environment, Education, and Systems Engineering) are still very active and have since been joined by Working Groups on Information Technology and Crime Countermeasures.

II. Early Activities

The following is a sample of CSIT's earliest activities--during its first year of existence (1973). This sample is of necessity biased, reflecting only the author's sense of importance.

1) Workshop on "The Engineer and Military Technology" and an "Open Forum" of contributed papers at the April, 1973 IEEE International Convention [1].

2) "The Bart Case: Ethics and the Employed Engineer"--a paper by Professor Stephen Unger in the September, 1973 issue (#4) of the CSIT Newsletter. This first issue of the Working Group on Ethics resulted in the historic IEEE Amicus Curiae Brief [2].

3) "Codes of Engineering Ethics"--CSIT Newsletter (issue #5, December, 1973). This paper contained a proposed code of Engineering Ethics, largely framed by Professor Unger and revised by the Working Group on Ethics. It initiated, and formed the basis of the new code of ethics announced by the IEEE in 1975 [3].

*In accordance with the IEEE bylaws.

It should be pointed out that most of CSIT's activities have resulted in long-term interactions with various other IEEE bodies. Thus, both the Bart issue and the proposed code of ethics were presented to (and modified by) the Ethics and Employment Practices Committee, the USAB* and ultimately the IEEE Executive Board and Board of Directors. As might be imagined, this interactive process, while educational, is an effective filter. Hence, with perseverance, a "system output" can occur--but inevitably transformed and attenuated.**

III. An Evolving CSIT

As CSIT evolved, bimonthly meetings of the active membership proved effective for taking stock of the various working group activities. Because the center of gravity of the active membership (to date) is in the New York City area, and because travel expenses are not covered by the IEEE, these meetings have taken place in N.Y.C. Telephone communications, working group papers mailed to interested members, and of course this newsletter, attempt to keep members precluded from attending these meetings up to date and involved. Anyone wishing to obtain a feeling for CSIT's current activities and its interactions with other Institute bodies is urged to attend the above-mentioned meetings if possible (consult the "Meetings" section of this Newsletter for the date, time, and place).

As the early petitioners had hoped, CSIT has become a structure within IEEE that considers a host of questions about the society/technology interface--questions which typically defy quantification, but which are nevertheless vital. Understandably, raising such issues often calls comfortable assumptions into question--and hence it comes as little surprise to find rather strong feelings voiced about CSIT (both pro and con). CSIT has emerged from its "Ad Hoc" status and is now in its fifth year of existence, but its vitality and purpose can be maintained only by a constant flow of ideas. CSIT needs your involvement.

REFERENCES

[1] "The Engineer and Military Technology". IEEE CSIT Newsletter, Issue No. 5, December, 1973.

[2] "Engineering Ethics: The amicus curiae brief of the Institute of Electrical and Electronics Engineers in the Bart Case", IEEE CSIT Newsletter, Issue No. 12, December, 1975.

[3] "IEEE Code of Ethics", IEEE Spectrum, February, 1975, p. 65.

*United States Activities Board--the IEEE Board responsible for IEEE professional activities.

**An example of the (often frustrating) interactive process was described in the June 1976 issue of the CSIT Newsletter--"An IEEE Award for Outstanding Service in the Public Interest".

PUBLIC POLICY ISSUES AND THE APPLICATION OF COMPUTER TECHNOLOGY

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[Contributed by the Technology & Society Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, New York, NY, December 5, 1976.]

Continuous developments in the areas of computer componentry, data-base technology, and computer networking have significantly increased the ability to store and manipulate vast quantities of information. The challenge to the public sector is to keep pace with these technology developments in protecting individual liberties and societal interests. The long-standing concern with databanks and privacy is just one area on which to focus attention. Electronic Funds Transfer Systems, approaching readiness by commercial interests, could have a most fundamental effect on the way we transact business. Information utilities could dramatically affect our access to goods and services. The purpose of this paper is to heighten awareness of ways in which applications of computer technology will affect our lives, and to highlight the areas that need public debate and government policy-making.

INTRODUCTION

Development of computer technology has created challenges to administrators, legislators, and jurists to keep pace with scientific advances. Often, the interests of government, industry groups, consumers, and others have been at odds in the treatment of technology. For example, the applicability of copyright and patent laws, written long before the popularization of computers, for the protection of proprietary software has been a matter of some debate [1]. Likewise, computer software has received inconsistent treatment for taxation purposes, being considered tangible property by some and intangible by others [2], and for purposes of determining liability, being considered alternately as the delivery of goods or of services [3].

Admissibility of computer records as evidence in courts of law and discovery proceedings involving automated record-keeping systems have been matters for judicial interpretation [4].

Incremental marketing of excess computing capacity by banks and communications common carriers has been a subject of interest to those concerned with anti-trust violations [5, 6].

While most of the foregoing situations would concern only managers, administrators, and lawyers, other issues surrounding the application of computer technology require and receive wider attention. Governmental interests are aroused when, for instance, specialized communications networks promise to have a major impact on the communications services available to the general public. Current Justice Department anti-trust suits against IBM and AT&T meanwhile challenge the structure of those corporate giants [7].

The interest of the private citizen is often much more directly involved, as with the accuracy and timeliness of data used in credit-reporting agency computers and criminal justice information systems. Decisions involving the disposition of data, particularly the question of how long specific information about an individual is useful and should be maintained, are policy decisions, not technological or technical ones, and should be decided by the public or its representatives [8].

The public is, likewise, directly affected when plans to computerize supermarket checkout using the Universal Product Code threaten to eliminate product price-marking. When the public speaks its mind, as it has through legislative action and opinion surveys on price-marking, the industry eventually listens [9].

The intent of this paper is to focus on a few selected areas of the application of computer technology and to look at the implications for legislative action. These areas include Electronic Funds Transfer Systems, information utilities, and automated record-keeping systems.

Very briefly, the technological trends in the computer industry that make these applications feasible include: decreased cost per instruction achieved through large-scale integrated circuit technology and advanced system architecture; emphasis on distributed computing power and minicomputer systems, and the networking of computers; and increased storage capacity and improved ability to manipulate information through sophisticated data-base management software [10]. The combined effect of these developments is to improve the economic and technical feasibility of the collection, manipulation, and exchange of large quantities of information.

ELECTRONIC FUNDS TRANSFER SYSTEMS

The term "Electonic Funds Transfer Systems (EFTS)" has come to designate a variety of proposed systems. An EFT system would be one in which debit cards would be used to effect an immediate transfer of funds from the payor's account to the payee's, using a communications terminal at the point of sale in various retail outlets. Its development as a system, and the recognition by the banking industry of its feasibility and desirability, have been evolutionary in nature. The development of Automated Clearing Houses for processing of checks and inter-bank money transfers, so-called Automated Teller Machines and Customer Bank Communications Terminals (CBCT's) for automated deposits and withdrawals, direct deposit of paychecks in employee bank accounts, and customer-authorized bank transfers for payment of fixed monthly obligations such as mortgage payments and utility bills have been steps along the way to a banking system in which less paper was handled and cost of processing reduced [11].

Banking studies have shown that innovations were necessary simply to keep up with the growth rate of transactions and their processing cost. In the United States in 1972, checks were used for about 10 percent of all monetary transactions, or roughly 30 billion transactions. With a growth rate of 7 percent a year on the number of checks, it cost about 20¢ per check for processing. Credit card transactions were used about one-fifth as often as checks in 1972, but the number of credit card transactions has been growing at the rate of 35 percent per year, with a typical cost of 60¢ for processing. It is expected that electronic money transfer and descriptive billing rather than actual sales receipts might result in an order-of-magnitude savings in processing costs [12].

None of the EFTS proponents suggest that the system will totally replace the use of cash. It is pointed out that the use of debit cards is one more mark along a continuum of artificial payment schemes that includes coins, paper money, checks, and credit cards. Estimates of the proportion of total transactions that will be effected by EFTS range up to about 30 percent by 1980.

The nature and scope of an eventual EFT system is problematical. Advances in electronic componentry, communications systems, and networking technology will permit an on-line, real-time system to be realized. Nevertheless, a large capital investment will be necessary to get such a system up and running, with a high number of retailer and consumer participants needed to break even. One can well envision a period of some competition in the development of local and regional networks before a fully-interconnected national network is achieved.

Governmental involvement in the development and regulation of an Electronic Funds Transfer System remains to be determined. The Congress authorized establishment of an EFTS study commission in October 1974. The fact that the President delayed 12 months in appointing the commission and, when he did, filled it with banking industry representatives suggests a hands-off federal attitude on EFTS developments or, at the most, a business orientation to EFTS rather than a more balanced government-industry-consumer orientation.

Of particular concern to state legislatures addressing the question of electronic banking has been the question of whether CBCT's constitute branch banks. State laws forbidding branch banking could inhibit the development of EFTS since the initial rulings of the Comptroller of the Currency that CBCT's do not constitute branch banks have been overturned.

A myriad of concerns have sprung up as a result of EFTS proposals. A sample would include the elimination of the float on which many consumers rely in transacting business; the continuation of the traditional customer-bank relationship, predicated upon paper-based negotiable instruments and the holder-in-due-course concept as spelled out in the Uniform Commercial Code; the threat of extinction to small banks and of anti-trust violations, as large banks promote EFT systems and compete for customer accounts; the relationships between the banking and communications industries in the development and control of a communications-based banking network, and the implications for the monopoly status of the communications utilities; the effect on the Postal system as more transactions are accomplished electronically and fewer are sent through the mails; and the effect on retailers and particularly their credit-granting business if bank terminals are placed in retail outlets.

While legislative study commissions shape up as the battleground for small banks versus big banks and banks versus retailers, perhaps the greatest concern of the consumer, that of the threat which Electronic Funds Transfer Systems pose to his personal privacy, receives scant attention. A real-time EFTS would serve as an effective surveillance mechanism, indicating an individual's wherabouts anytime he used his card. Furthermore, the periodic descriptive billing statements provided to the customer as a summary of his transactions would provide quite a profile of the individual's spending habits and personal activities, and would constitute a major threat to personal privacy if appropriated for surveillance purposes.

This potential threat to privacy becomes heightened when one looks at selected developments in the last decade. Of particular concern are tax investigations conducted by the Internal Revenue Service, which has statutory authority to subpoena records pursuant to those investigations [13]. In U.S. versus Davey [14], the appellate court upheld the IRS' right to subpoena the records of a credit-reporting agency on an individual's bank. In so doing, the Court rejected the agency's claim that the precedent would permit the IRS to use it as a private investigative source.

Congress, recognizing the usefulness of bank records in the pursuit of IRS investigations, passed the Bank Secrecy Act of 1970, and subsequent Treasury Department regulations required banks to keep microfilmed copies of depositor checks. In a case recently adjudicated [15], the Supreme Court upheld the government's right to subpoena these bank records of customer transactions. The Court rejected a motion to suppress the evidence thus obtained, a motion based upon a claim of privileged communications with the bank and invasion of privacy by the government.

In so doing, the Court stated that the customer had no legitimate expectation of privacy in dealing with his bank, that writing a check drawn on a bank constitutes a voluntary public disclosure, and that, since the bank is an interested third party to a negotiable instrument transaction, its records may be independently subpoenaed. Some feel, to the contrary, that the act itself is unconstitutional, designed to circuitously obtain self-incrimination, and that its provisions, combined with the subpoena power of the government, constitute an illegal search and seizure.

It appears that the records of an EFTS might fall within the purview of the Bank Secrecy Act. If so, then analogously one would have no legitimate expectation of privacy in an EFTS. With the documented abuses of IRS and FBI investigations for purposes of political harassment so fresh in mind and keeping in mind the special surveillance potential of a real-time EFTS, all the foregoing considerations cause one to pause and take stock of the situation.

While many economists, banking industry representatives, and others advocate a hands-off, free-market attitude toward the development of an Electronic Funds Transfer System, the threat to personal privacy and civil liberties seems too great to leave to the private sector which, to date, has demonstrated very little concern about the subject. It must be underscored that privacy--i.e., the right to be let alone--is a matter of public policy, to be decided, preferably, in the legislative chambers.

INFORMATION UTILITIES

One might characterize the age we live in as the "Age of Information". Increasingly we find that access to information is power. Reliable decision-making depends upon information. So does access to business, educational, and social opportunities. Even the pursuit of pleasure depends upon it.

The coming decade most likely will witness the development of "information utilities" offering informational services to the public at a cost. Such services, offered on an interactive basis, might be brought into the home using present two-way cable TV capabilities and/or devices connected to the telephone. The vitality of such services may motivate the formation of an appropriate regulatory commission (similar to those for water, light, and power services) to pass on the types of services offered, rate structure, and access by the public.

While no good example of a full-service, economically feasible information utility comes to mind, elements of such a utility exist in separate parts:

. For years, time-shared computing services have been offered on a dial-up basis, connecting some off-site terminal to a full-scale computer via the telephone system, with a charge levied on the basis of system resources utilized.

. Just recently, a major computer manufacturer has announced that PLATO, long a federally-funded computer-based educational system, would be offered on a commercial basis to the public.

. Most cable television systems offer an information channel carrying abbreviated wire service news reports as well as time and weather information.

. The Ohio Colleges' Library Center (OCLC) has a bibliographic data-base on line for bibliographic searches.

. The National Technical Information Service will likewise conduct a bibliographic search for a fee.

. The New York Telephone Company, noting the success of its Dial-a-Joke idea, is expanding its offereing of dial-up programs to service-oriented consumer ideas.

. The Bell System is offering a communications device to facilitate on-line credit verification.

. Highly successful airlines and motel reservations systems provide immediate information on the availability of services and bookings, if desired.

And on and on. A fully-integrated system of information services would be a very powerful system, indeed. Advances in computer technology, particularly in the size and organization of memory, the manipulation of relational data-bases, and the advent of distributed computing systems and minicomputers will make such systems not only technically fesible, but cost-effective. In that event, access to such an information utility and control of such a system will become matters of great public concern.

AUTOMATED RECORD-KEEPING SYSTEMS

Given the importance that information plays in our lives, and the increasing technical feasibility of collecting, storing, manipulating, and disseminating information on an ever-wider scale, a commitment must be made, as a matter of policy, to certain basic principles regarding information: that an individual requested to provide information do so with his informed consent, including the knowledge of the uses to which the information will be put, the statutory authority of the agency collecting it, and the penalty, if any, for failure to provide the data; that there should be no databank whose very existence is secret; that an individual should have access to the records kept on him; and that he should have the right to contest the accuracy of statements made about him and seek redress [16]. The Federal Privacy Act of 1974 [17], which applies principally to federal data systems of a non-law-enforcement nature, embodies many of these concerns.

As an outgrowth of the study commissions and legislative inquiries into the area of data-banks and privacy, some significant legislation was passed, notably the Fair Credit Reporting Act of 1970, the Freedom of Information Act, and the aforementioned Privacy Act of 1974. A large number of concerns remain to be addressed, however.

One of the most sensitive and emotionally charged of these is the question of usage of a universal identifier, particularly the Social Security Number. Despite public opinion to the contrary, there is no statute or administrative rule prohibiting the use of the number in other record systems [18]. As a result, an ever-increasing number of institutions--public and private--require disclosure of the number for identification purposes. Concerns about the abuse of this record-keeping procedure resulted in inclusion of specific provisions in the Federal Privacy Act of 1974 which basically forbid any federal, state, or local government agency from denying to any individual any right, privilege, or benefit provided by the law because of his refusal to disclose his Social Security Number.

It must be recognized that agreement on the use of a universal identifier constitutes a public policy issue. It would appear clear, I think, that we have a stake--as individuals and as a society--in the accurate identification of people. Whether it concerns apprehension of criminals or conferring of welfare benefits, it behooves us not to wrongly identify individuals.

Given that some universal identifier is to be used, its form should be decided upon primarily by technologists. Problems exist with the use of the Social Security Number. Aside from the ease with which one is obtained and the fact that a person legally may have more than one number, errors in transmission of even a single digit of the number commonly result in another valid number being received--an undesirable property. Design of a system incorporating check digits and a large number range, such as is used with credit cards, would reduce the erroneous identification of individuals through accidental error or fraud.

More fundamentally, the public policy issue to be decided is whether and to what extent agencies of government should exchange information among themselves and with private data-banks, not whether a universal identifier should be permitted. Database management systems will be capable of matching up records on individuals in different data systems, even without universal identifiers or standardized record formats. In fact, such manipulation of information will become so easy to accomplish in the next decade that it is imperative that policy decisions on criteria for information exchange be made in the very near future. Whether these criteria are to be promulgated by legislative action or by administrative fiat is for the public to decide.

CONCLUSION

Only a few of the many aspects of applications of computer technology have been highlighted. Prospects for legislative action concerning the use of computers should be viewed in light of the political realities of the day. In 1976, several Presidential hopefuls scored the unwieldiness of the government bureaucracy and received a sympathetic hearing. Attempts to create new regulatory agencies to look after business and governmental uses of computers may meet political opposition. The privacy issue, despite Congressional inquiries into the abuses of the intelligence community, seemed to have low political appeal.

At the same time, the Supreme Court, with a strongly conservative orientation, has demonstrated a restrictive view of personal privacy and civil libertarian interests. If these interests are to be protected, this protection will have to come from the voluntary efforts of industry or from the action of legislatures throughout the nation.

REFERENCES

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[4] Tapper, Colin, "Evidence from Computers", Rutgers' Journal of Computers and Law, Vol. 4, No. 2, 1974, pp. 324-406.
[5] Association of Data Processing Service Organizations, Inc. v. William Camp, Comptroller of the Currency and American National Bank and Trust Company, 279 F. Supp. 675 (D. MN 1968) aff'd., 406 F.2d 837 (8th Cir. 1969) rev'd., 397 U.S. 150 (1970) remanded.
[6] Federal Communications Commission, "Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities", Docket No. 16979, 28 FCC 2d 267, March 18, 1971.
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[13] 26 USC #7602.
[14] U.S. v. Davey, 426 F. 2d 842 (2d Cir. 1970).
[15] U.S. v. Miller, April 21, 1976.
[16] HEW Secretary's Advisory Committee on Automated Personal Data Systems, Records, Computers, and the Rights of Citizens, Government Printing Office, Washington, DC, 1973.
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NEWS, NOTES, & COMMENT

BRITISH STUDY WARNS: GO SLOW ON NUCLEAR POWER

A report of the Royal Commission on Environmental Pollution entitled "Nuclear Power and the Environment," issued in September 1976, cautions against the hasty development of nuclear power in Britain. The main conclusions of the report are as follows:

* Although the abandonment of nuclear fission power would be neither wise nor justified, a major commitment to fission power and a plutonium economy should be postponed as long as possible.
* The production of large quantities of plutonium poses a serious danger in conditions of increasing world-wide political unrest. We should not rely for energy supply on a process that produces in quantity a byproduct as dangerous as plutonium unless there is no reasonable alternative.
* An alternative energy strategy, which would avoid the need for a large-scale nuclear program based on fast breeder reactors, might be feasible.
* There should be greater emphasis on the development of alternative energy sources, including energy conservation, combined heat and power systems, and fusion power.
* There should be no commitment to a large-scale nuclear power program until it has been demonstrated beyond reasonable doubt that a method exists to ensure the safe containment of long-lived, highly-radioactive waste for the indefinite future.
* The probable benefits of improved actinide separation are uncertain and are unlikely to justify delay in the solidification of radioactive wastes. Consideration of this issue by an expert body is needed.
* It is likely that the most attractive option for the permanent disposal of solidified wastes will be in geological formations--either on land or beneath the seabed. However, at present, neither of these has been studied sufficiently nor demonstrated as a feasible option.
* There is a lack of clearly-formulated policy for the disposal of intermediate-level solid waste at nuclear power plants. The policy of accumulating more highly radioactive solid wastes at sites operated by the U.K. Atomic Energy Authority and British Nuclear Fuels, Ltd., with a view to eventual ocean disposal, appears inadequate. Such disposal may prove unacceptable, and the possible future requirements again point to the need for a national disposal facility.
* The cost of a sound waste-management program is unlikely to add appreciably to the cost of electricity generated from nuclear power.
* The Commission does not oppose development of the first commercial-scale fast breeder reactor (the so-called CFR-1) on environmental grounds. However, all of the foregoing considerations should be taken into account by the government in reaching a decision.
* There should be no commitment to a large-scale nuclear power program including fast breeder reactors until the issues have been fully appreciated and weighed in the light of wide public understanding. A procedure for consultation is required to this end.

The Commission was chaired by Sir Brian Flowers, F.R.S., who is rector of Britain's Imperial College of Science and Technology, a member of the U.K. Atomic Energy Authority, and a pioneer in the British nuclear industry.

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F.K.

WEINBERG: U.S. CAN AFFORD NUCLEAR MORATORIUM

A study group headed by Dr. Alvin Weinberg, an articulate advocate of nuclear power for much of his career, has concluded that a 30-year moratorium (from 1980 to 2010) on the construction of nuclear power plants in the USA would result in higher annual direct costs for electricity of no more than 1% of the gross national product.* The report asserts that a moratorium would eliminate 50,000 jobs associated with the nuclear industry, but that its overall impact on employment would be only temporary.

The substitution of coal for nuclear power would increase coal consumption by 1 to 3 billion tons per year (total US coal consumption was 569 million tons in 1973). The report projects a net decrease in total pollutant emissions from coal-burning plants, due to the offsetting effects of improved pollution-control technology. (This is unlikely to satisfy environmentalists, since present emissions from coal-burning plants already pose a serious public health hazard.) Coal-mining accidents and deaths would increase, and the land required for coal mining would increase substantially. The report asserts that the impact on world CO_2 levels would be slight.

The relatively modest impact of a nuclear moratorium follows from the report's estimate of a total annual energy demand of 101.1 to 125.9 quadrillion Btu's in the year 2000--substantially lower than AEC and power industry projections. (US energy consumption in 1975 was 71.1 quadrillion Btu's.) However, the Weinberg report is in remarkable agreement with the Ford Foundation Energy Policy Project's estimates** of 100 quadrillion Btu's (Zero Energy Growth scenario) to 124 quadrillion Btu's (Technical Fix scenario) in the year 2000. The Ford ZEG scenario entails government action (e.g. energy sales tax) to encourage energy conservation; the TF scenario assumes a neutral government policy toward energy consumption. The Weinberg and Ford Foundation estimates were arrived at independently and used different methodologies.

Dr. Weinberg currently is director of the Institute for Energy Analysis, which produced the report. He was energy policy adviser to the Nixon administration, and, before that, he headed Oak Ridge National Laboratories.

* Institute for Energy Analysis, Oak Ridge Associated Universities, Economic and Environmental Implications of a U.S. Nuclear Moratorium, Oak Ridge, TN, 1976. This study was commissioned by the National Academy of Sciences.

** Ford Foundation Energy Policy Project (final report), A Time to Choose; America's Energy Future, Cambridge, MA, Ballinger, 1974.

F.K.

SCIENCE, TECHNOLOGY, AND SOCIETY: A GUIDE TO THE FIELD

The Cornell Program on Science, Technology, and Society has produced a directory entitled Science, Technology, and Society: A Guide to the Field. In this 600-page volume, teaching and research activities are listed for nearly 400 U.S. colleges and universities, including descriptions of over 2000 courses and over 100 formal programs, institutes, centers, etc. STS-related activities are listed for professional organizations, research corporations, government agencies, and public interest groups. A listing of bibliographic resources and periodicals is also included. The guide is available gratis while the supply lasts from:

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Also now available free are the following Cornell STS Program booklets: Publications; Guide to Courses and Curricula 1976-1977; and the Third General Report.

QUESTIONS FOR IEEE CANDIDATES

As in previous years, the September issue of TECHNOLOGY AND SOCIETY will publish the responses of candidates for major IEEE offices to a set of three or four questions in the area of social implications of technology. To help us choose questions that reflect the concerns of IEEE members in this area, we invite TECHNOLOGY AND SOCIETY readers to suggest their own questions for the candidates. Please send your suggested questions to the editor by June 1, so that we can get the September issue out to you before you mail in your ballots.

GRANTS, FELLOWSHIPS, ASSISTANTSHIPS

ENGINEERING FOUNDATION RESEARCH REVIEW FELLOWSHIPS 1978-1979

(DEADLINE: JUNE 1, 1977)

Sponsored By

THE ENGINEERING FOUNDATION

with the cooperation of its FOUNDER SOCIETIES: American Society of Civil Engineers; American Institute of Mining, Metallurgical and Petroleum Engineers; American Society of Mechanical Engineers; Institute of Electrical and Electronics Engineers; American Institute of Chemical Engineers.

GENERAL - The ENGINEERING FOUNDATION announces the availability of Engineering Foundation Fellowships during 1978-1979 for State-Of-The-Art reviews in fields recommended by its FOUNDER SOCIETIES.

The program is directed toward members of engineering faculties and industrial specialists who have established a professional reputation through publications.

A grant of $5,000 will be awarded on a competitive basis to a member of each of the FOUNDER SOCIETIES for a proposed research review in a field of direct interest to his FOUNDER SOCIETY.

PROPOSED REVIEWS - Proposed reveiws shall provide an analysis in depth of a specific field including recommendations on engineering research needed to advance the state-of-the-art of that field.

A list that illustrates the type of topics that might be chosen has been prepared by the Technical Activities Board and is available on request.

EVALUATION AND SELECTION OF PROPOSALS - Proposals shall be sent to the Executive Officer of his professional society (see below). A panel organized by his professional society will evaluate and select meritorious proposals. They will be submitted (in rank order) to the Projects Committee of the ENGINEERING FOUNDATION who will make the final selection of a proposal for each of the FOUNDER SOCIETIES for submission to the Board of the ENGINEERING FOUNDATION for final approval.

DEADLINE - All proposals being submitted to the FOUNDER SOCIETIES must be postmarked by June 1, 1977.

Selected proposals by the FOUNDER SOCIETIES to the Projects Committee of the ENGINEERING FOUNDATION must be postmarked by August 1, 1977.

ANNOUNCEMENT OF FELLOWSHIPS - Selected fellows will be notified by letter from the secretary of the ENGINEERING FOUNDATION on or about January 1, 1978, with copies to their FOUNDER SOCIETIES. The FELLOWSHIPS will be effective as of February 1, 1978.

FINAL REPORT - A final report shall be submitted to the ENGINEERING FOUNDATION and to the FOUNDER SOCIETY by each fellow for publication. The ENGINEERING FOUNDATION reserves publication rights.

Appropriate recognition of the ENGINEERING FOUNDATION and the cooperating FOUNDER SOCIETY must be prominently displayed on the title page of the publication.

PAYMENTS - The ENGINEERING FOUNDATION will provide 50 percent of the grant at the start of the fellowship and 50 percent at the end of the fellowship when the final report is presented.

INSTRUCTIONS FOR PREPARING A PROPOSAL - The formal proposal shall contain the following information. Twelve co copies are needed.

The Cover Sheet - The first page of the proposal shall include the title of the review; name of applicant, title, institution and location; name of person financially responsible for administering the fellowship funds.

Description of Proposed Review - The next section (not to exceed four pages) shall contain the proposed review in sufficient detail to allow an evaluation of its merit on the basis of delineated approach and time required for its fulfillment. Maximum time will be one year.

Qualifications of Applicant - The next page shall describe the special qualifications of the applicant for conducting the review followed by a biographical sketch and a listing of publications.

Proposed Budget - The proposed budget shall appear on the last page in specific details describing how the funds will be utilized. The budget cannot exceed $5,000 and cannot include indirect costs. Such a fellowship award is not renewable.

MAIL PROPOSALS TO: Dr. Herbert A. Schulke, Jr.
General Manager
IEEE
345 East 47th Street
New York, NY 10017

Proposals must be postmarked by June 1, 1977.

NSF ETHICS AND VALUES IN SCIENCE AND TECHNOLOGY PROGRAM (EVIST)

GENERAL

Complete details of the EVIST program are contained in the EVIST program announcement, which may be obtained by writing to:

Ethics and Values in Science and Technology
Office of Science and Society
National Science Foundation
Washington, DC 20550

In the event that the applicant organization has not recently been the recipient of an NSF award, it is important that responsible officials be familiar with the compendium of NSF policies and procedures for the administration of NSF grants contained in NSF 73-26, the NSF Grant Administration Manual, which may be obtained by written request to:

Central Processing Section
National Science Foundation
Washington, DC 20550

PREPARATION AND SUBMISSION OF PROPOSALS

Proposals may be submitted by colleges, universities, laboratories, industrial firms and other organizations, both profit and non-profit. Proposals from individuals acting independently of institutional sponsorship will be considered only under exceptional circumstances.

Preliminary proposals enable the staff to determine whether a project has relevance to the Program's objectives and to provide appropriate assistance to the applicant in the preparation of a formal proposal. For these reasons no formal proposal will be accepted unless a prior preliminary proposal has been reviewed by the EVIST staff. The EVIST Program will review three series of proposals each year. Closing dates for the receipt of preliminary proposals are January 1, May 1, and September 1. Comments are provided to preliminary applicants within four to six weeks of preliminary deadlines. Closing dates for the receipt of formal proposals are April 1, August 1, and December 1. The effective starting dates of grants should be set no earlier than six months after the submission date of the formal proposal, and every effort will be made to announce decisions on the funding of proposals within that time frame.

A preliminary proposal should be no longer than five pages and should treat each of the following areas:

1. statement of problem or need for project
2. research or organizational design, including time schedule
3. anticipated results and impact of project, including plans for evaluation and dissemination
4. project duration (not to exceed 30 months)
5. qualifications of professional project staff
6. if the project involves forums or workshops: selection criteria for speakers, participants, and topics
7. tentative budget.

Four copies of each preliminary proposal should be sent to:

Ethics and Values in Science and Technology
(see address above)

PROGRAM DESCRIPTION

Program Goals

The principal goals of the National Science Foundation's Ethics and Values in Science and Technology (EVIST) Program, established in 1974, are to increase understanding and interaction among the scientific and technological communities, the non-scientific professional communities, and the general public with regard to:

* The ethical issues and conflicts associated with scientific and technological developments as they affect individual and social priorities, goals, and directions;
* The impact of changing ethical and social standards on the scientific and technological enterprise, including the issues raised by the choice of research and development priorities and of regulatory mechanisms for the conduct of research and development;
* The processes which generate value conflicts among scientific and social groups and institutions, as well as strategies that may lead to the resolution of those conflicts.

The scope of public discussion about the relationships of science and technology with social institutions and processes has broadened greatly in recent years to encompass a range of issues that require consideration of the ethical and value implications of scientific activities. The level of professional discussion of these matters has also evolved considerably in recent years, influencing as well as influenced by the public discussion. Individual scientists and engineers, as well as their professional societies, have, in many cases, taken the lead in bringing such ethical and value issues to the attention of both the scientific community and the public. Although this has especially been the case for issues arising in the context of clinical medicine, it has also occurred in all the basic and applied sciences and engineering.

The EVIST Program is interested in supporting projects which reflect these developments. Accordingly, it will continue to give its highest priorities to identifying new ethical issues arising out of the activities of science and technology, to developing new strategies for illuminating issues of continuing concern, and to enlarging and refining the discussion of these issues and their implications.

Priority Program Categories

The EVIST Program will give priority consideration to proposals in the following substantive categories:

1. Value issues in the professional education and conduct of scientists and engineers, e.g.:

   a. the education of young scientists and engineers in ethics and values;
   b. the sensitization of working scientists and engineers to the ethical and social issues implicit in their work; and
   c. the articulation and assessment of professional, corporate, and institutional ethics with respect to issues of responsibility, accountability, and liability.

2. Value issues growing out of scientific and technological innovation, e.g.:

   a. current research directions and their potential benefits and hazards;
   b. the dynamics of technological innovation, and its consequences; and
   c. the institutionalization and uses of early warning systems.

3. Value issues in institutional choices, e.g.:

a. social needs, social choices, and scientific priorities, (including their cross-cultural implications);
b. individual priorities of scientists and engineers and their social consequences; and
c. public and private decision-making (market mechanisms in research and development, social mechanisms for conflict resolution, citizen protection and participation).

Normally, the EVIST Program will support only projects or parts of projects with significant representation from those disciplines supported by other Foundation programs, including the natural and social sciences, engineering, and the history and philosophy of science. Project staffs should also include persons competent to deal with the substantive value issues addressed by the project and, where appropriate, representatives of the major social groups affected by and affecting the problem, issue, or conflict under consideration.

Proposals for projects dealing with value issues arising in the context of clinical medicine are welcomed, provided they include the substantial participation of natural scientists, social scientists, or engineers.

Proposals which involve the collaboration of humanists with natural scientists, social scientists and/or engineers may be considered for joint support with the National Endowment for the Humanities.

Modes of Activity

EVIST projects may be carried out in a variety of ways, including but not limited to the following:

* Disciplinary as well as multi-disciplinary research, particularly case studies of specific situations in which science/values issues have arisen, and studies focused on ethical and value issues associated with ongoing research projects. In all such studies it is important that all perspectives be considered that are required for an adequate exploration of the issues, and that accurate, objective and balanced descriptions of the relevant factual information be presented.
* Planning conferences to explore and crystallize the value issues associated with particularly significant policy issues, with scientific and technological components, and to develop research and/or action agendas for enlarging and refining the public debates over those issues. All such conferences should be planned and executed in conjunction with representatives of the principal social and professional groups affected by and affecting the issue.
* Workshops conducted by regional, national and international groups (particularly scientific and engineering societies) to examine and clarify individual and institutional responsibilities associated with scientific and technological activities, and to develop mechanisms for explicating and resolving the value conflicts that may arise in the exercise of those responsibilities. Special events held in conjunction with, or as integral parts of, regular international meetings of scientific and professional societies and other similar groups will also be eligible for support. Workshops and special events of this kind should be planned and executed in conjunction with representatives of the major social groups affected by and affecting the problem, issue, or conflict. Proposals for local or regional workshops will generally be given low priority unless there is evidence of their potential national impact. Proposals for international workshops or for special events organized as parts of international meetings which will receive partial support from non-US sources will be considered more favorably than those that would require complete support from the Foundation.
* Experimental workshops and other types of projects to develop new strategies for increasing effective public participation in assessing the value dimensions of policy decisions with scientific and technological components. These projects should also be planned and executed with the participation of representatives of the major social groups affected by and affecting the decisions. Proposals should provide evidence that the results of the proposed experiment are likely (1) to have significance well beyond the originating locality, and (2) to be sustainable without continuing Federal support. The intent of any such workshop should be to develop modes for effective public participation rather than to make particular short-term impacts upon one or more specific public policies. Individuals and groups interested in organizing workshops dealing more directly with public interest science issues should consult forthcoming announcements for the NSF Science for Citizens Program.
* Projects to enable scientists and engineers to enhance their fields of research and teaching. Priority will be given to summer workshops and institutes of national scope which provide training in value issues for scientists, engineers and physicians, and to projects that provide opportunities for intensifying interactions between scientists and humanists already working in the EVIST area.
* Colloquia and other experimental activities addressing the integration of EVIST issues into the professional education of scientists and engineers. (Proposals limited to the development of courses and curricula will not be considered by EVIST, but may be submitted to the Science Education Development and Research Division of NSF). Proposals for projects in this category should involve multi-institutional and multi-disciplinary participation in their planning and execution, and should provide evidence of potential national significance for higher education.
* Projects to lay a foundation for significant future work, including the compilation of archival materials and of bibliographies of existing resources, and the preparation of reviews on specific science/values topics.

Unsolicited proposals for other projects that deal with ethical and value issues in science and technology but do not fall into any of the foregoing categories will be accepted and carefully reviewed, but will be funded only if they are of exceptional merit and if sufficient funds are still available.

The EVIST Program is not presently accepting proposals for projects focusing on ethical and value issues associated with new military technologies and national defense strategies, or for projects that would use or develop classified materials. No support will be given for projects whose primary objective is to advocate particular policy positions, nor to course and curriculum development projects. The program will not support any project of more than 30 months duration. It should also be noted that the program provides support only for specific projects, as opposed to general support for programs or organizations. Grants in support of projects may include funds for direct and indirect costs incurred by the host institution. Projects supported by EVIST can and should result in the production of traditional scholarly materials such as articles in professional journals, reports, newsletters, and magazines. They can also result in books and course materials. Because

of the general significance of the issues dealt with by many EVIST projects, prospective grantees should also consider whether and in what forms the results of their activities can be made widely accessible. Project components designed primarily to transmit the results of completed research to the general public may be considered for funding by the Foundation's Public Understanding of Science program.

Interprogram Support

Certain proposals may be considered for joint support by the EVIST program and one or more other programs within the Foundation or in other Federal agencies. In particular, the National Science Foundation and the National Endowment for the Humanities have established procedures that permit them to work in close collaboration on science/values problems. Twin advisory committees composed of persons with distinguished backgrounds in science, the humanities, and public affairs have been established to provide policy guidance, and a staff member at each agency has been designated to act as liaison officer. Through coordination between the two agencies, proposals may be referred from one to the other as suggested by the subject matter, methodology, and the primary disciplines involved. In appropriate instances, there may be joint funding of approved proposals. Inquires to NEH should be directed to:

Program of Science, Technology & Human Values
Office of Planning
National Endowment for the Humanities
Washington, DC 20506

NFS SCIENCE FOR CITIZENS PROGRAM (SFC)

National Science Foundation
Directorate for Science Education
Office of Science and Society

[Ed. note: Although the February 15, 1977 deadline for preliminary proposals has been extended, future funding of the SFC program is uncertain. Applicants are advised to contact the Science for Citizens Program for a clarification.]

Dear Colleague:

The Congressional mandate for the establishment of the Foundation's new and experimental Science for Citizens program (SFC) authorizes support for pilot projects for several specific purposes, including funds to "assist nationally recognized professional societies and groups serving important public purposes in conducting a limited number of forums, conferences, and workshops to increase public understanding of science and technology, and of their impact on public policy issues." We are now inviting the submission of informal preliminary proposals intended to meet these general objectives, to assist us in the preparation of more specific guidelines and to begin the review process for suitable projects during the current fiscal year.

The objectives of the Congress and of the Foundation with respect to forums, conferences, and workshops to be supported by SFC are spelled out in the enclosed excerpts from the National Science Foundation Authorization Act for 1977 and the accompanying Joint Explanatory Statement of the Committee of Conference of the House and Senate. We call your attention in particular to the following limitations:

1. This activity is limited to the support of forums, conferences, and workshops intended to increase public understanding of science and technology and of their impact on public policy issues. No other form of activity, and no activity intended to achieve other objectives, will be supported by SFC at the present time. (Guidelines are being prepared for the award of a limited number of public service science residencies and internships, for which a program announcement should be published in February 1977.)

2. The criteria that will be used in judging the eligibility of proposals for support include the extent to which they "will contribute to the development of facts, issues, and arguments relevant to public policy issues having significant scientific and technical aspects"; the extent to which they "explore a broad spectrum of points of view"; and "the ability of the society or group, using its own resources, to conduct activities of this kind."

3. No grant may be made by this program to any person, group, or organization required to comply with the registration requirements of Section 308(a) of the Federal Regulation of Lobbying Act (2 U.S.C. 267a).

To avoid unrealistic expectations, we should emphasize that the funds available for this program will allow us to support only a few of the proposals we are likely to receive.

A preliminary proposal should be no longer than five pages. It should state the objectives of the project and briefly describe (1) how the project will advance SFC program objectives; (2) its organizational design and time schedules; (3) its anticipated products, if any, and dissemination plans; (4) plans for internal monitoring and evaluating progress and outcomes; and (5) criteria for the selection of topics, speakers, and participants. A tentative budget and a brief statement of the qualifications of important project staff and consultants should be appended.

The deadline for submission of a preliminary proposal for this purpose is February 15, 1977. All proposals received by that date will be acknowledged directly by the program and we will try to respond to them by March 31. Proposals will be initially reviewed by the professional staff of the Office of Science and Society for their suitability for the Science for Citizens Program, and may also be reviewed by the SFC Advisory Committee. On the basis of these reviews, we hope to be able to encourage a number of formal proposals, which will be eligible for funding during the fiscal year ending September 30, 1977.

Preliminary proposals should be sent directly to:

Science for Citizens Program
Office of Science and Society
National Science Foundation
Washington, DC 20550

We look forward to hearing from you prior to February 15, if you have a proposal that you think may be suitable for the Science for Citizens program. We will also welcome your

comments and suggestions on program objectives and activities at any time.

Sincerely yours,

Alexander J. Morin
Director
Office of Science and Society

JOINT EXPLANATORY STATEMENT OF THE COMMITTEE OF CONFERENCE ON THE NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, 1977

Section 5: SCIENCE FOR CITIZENS

The Senate bill included a section authorizing $3 million for a "Science for Citizens Program" including an augmented Public Understanding of Science Program. The House bill authorized $300,000 for a more limited program.

The conferees have agreed to fund an experimental Science for Citizens Program including an augmented Public Understanding of Science Program at a level of $1,200,000 in fiscal year 1977. Because of the concerns expressed by some over the Foundation's lack of experience in dealing with public groups, the conferees have stipulated that direct assistance to such groups will be limited to proposals requesting support for forums, conferences, and workshops to increase public understanding of the scientific and technical aspects of public policy issues. The forums, workshops, and conferences funded under this program are to explore a broad spectrum of points of view. Further, no contract, grant or other arrangement is to be made under the Science for Citizens Program to any person who is required to comply with the registration requirement of Section 308(a) of the Federal Regulation of Lobbying Act (2 U.S.C. 267a).

The conferees also direct the Foundation to develop further information, including contract studies as necessary, concerning the implications of NSF assistance to nonprofit citizen organizations, drawing on pertinent scientific, public policy, technical and legal materials, and to report to the House Committee on Science and Technology and to the Senate Committee on Labor and Public Welfare on the impact of such assistance on the Foundation and on public participation in governmental processes by January 31, 1977.

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, 1977

Section 5: SCIENCE FOR CITIZENS

(a) The National Science Foundation is authorized and directed to conduct an experimental "Science for Citizens Program" and an augmented Public Understanding of Science Program under which funds will be available for pilot projects to:
(1) improve public understanding of science, engineering and technology and their impact on public policy issues;
(2) facilitate the participation of experienced scientists and engineers as well as graduate and undergraduate students in helping the public understand science, engineering and technology and their impact on public policies; and
(3) assist nationally recognized professional societies and groups serving important public purposes in conducting a limited number of forums, conferences, and workshops to increase public understanding of science and technology, and of their impact on public policy issues, after consideration of the following eligibility factors:
(A) the extent to which the proposal of the society or group will contribute to the development of facts, issues, and arguments relevant to public policy issues having significant scientific and technical aspects, and
(B) the ability of the society or group, using its own resources, to conduct such forums, conferences, and workshops.

(b) One or more review panels shall be established for the purpose of evaluating applications for awards under this section. The membership of each review panel shall have balanced representation from the scientific and nonscientific communities and the public and private sectors.

(c) No contract, grant or other arrangement shall be made under this Section without the prior approval of the National Science Board.

(d) To assist the Congress in evaluating activities initiated pursuant to this Section, the Director of the National Science Foundation, in consultation with a review panel having a balanced representation from the scientific and nonscientific community and the public and private sectors, is directed to prepare a comprehensive analysis and assessment of such activities to be submitted to the House Committee on Science and Technology and the Senate Committee on Labor and Public Welfare, not later than October 31, 1977. An interim report is required no later than March 1, 1977.

M.S. PROGRAM IN SCIENCE, TECHNOLOGY, AND VALUES AT R.P.I.

The Center for the Study of the Human Dimensions of Science and Technology at Rensselaer Polytechnic Institute is accepting applications for Fall 1977 admission to its interdisciplinary Master of Science program in Science, Technology, and Values. Students can design individualized pre-Ph.D. curricula from among more than two dozen courses in the areas of the history of science and technology, philosophy of science, sociology of science, sociology of medicine, biomedical ethics, economics of science and technology, history and philosophy of mathematics, and science policy. Terminal degree curricula can be developed in four major areas of concentration: Human Values, Management Communications, Socio-Economic Processes, and the Social Context of Science and Technology. Applicants must hold a B.S. or B.A. degree with a minimum of 30 semester credits in engineering, or physical, biological, or social science.

Applications for teaching or research assistantships must be received by March 1, 1977. For more information and application forms, write to Professor Robert Baum, Director, Human Dimensions Center, Rensselaer Polytechnic Institute, Troy, NY 12181. R.P.I. is an equal opportunity/affirmative action employer.

LETTERS

[Readers are urged to comment freely, for publication, on any and all aspects of Technology and Society and on the full range of issues of social implications of technology. Short, concise letters are preferred. Letters should include author's signature and mailing address. Please send letters to: Frank Kotasek Jr., 73 Hedges Avenue, East Patchogue, NY 11772. Affiliations of authors are given for identification purposes only.]

DEAR EDITOR:

Reference your editorial response to the letter from Mr. Jack M. Noy regarding the ousting of the Allende regime in Chile. [CSIT Newsletter, December 1976.]

It is amusing to me how the leftist liberals in this country stand up and scream when a Marxist government comes out second best. This happens so seldom because such governments usually liquidate the opposition permanently rather than put them in prison as was done in Chile. Witness the million plus killed in Laos and Cambodia since the Communist take-over. I must have missed your editorial condemning these actions and the forceful communist conquest of Angola.

You are doubtless aware that Mr. Allende was elected by less than a majority when he took office. It is my judgment that the uprising which overthrew him was just as popular as the election. I do not condone imprisonment of political opponents but it is infinitely better than outright liquidation as so often happens when the Marxists/Communists take power.

I believe you should look into the background and affiliations of some of the organizations which have attested to the alleged abuses by the new regime in Chile.

Do you really believe that a few CIA agents could be a significant factor in the overthrow of the Allende government? I see your charges as a flimsy attempt to discredit the CIA as is being done by the eastern liberal press and other news media. In my view, the people of Chile owe a great debt to the group who ousted the Allende government.

Since the new editor of the CSIT Newsletter also signed the editorial response, I suppose that the Newsletter will continue to be used to champion leftist causes. Therefore, please leave my name off your subscriber list.

Sincerely,
Paul A. Hudson
Boulder, CO

Editor's Response:

It should be noted that an estimated ten thousand political prisoners have been killed by the Pinochet government in Chile. Technology and Society will continue to publicize documented cases of engineers imprisoned for political reasons who have neither used nor advocated violence.

Our statement regarding the CIA was based on the Senate Select Intelligence Committee's report, Covert Action in Chile, 1963-1973 (stock # 052-070-02948-0), which is available at 80¢ a copy (check or money order) from: Supt. of Documents, US Govt. Printing Office, Washington, DC 20402. The CIA reviewed this report and consented to its publication.

F.K.

DEAR EDITOR:

Perhaps I am getting a little senile, but the December issue contains a letter on the "CANNONS OF ETHICS FOR ENGINEERS." Are we literally going to "fire" engineers for ethical misconduct? If so, will we be using a 6 inch, 8 inch, or 305mm cannon?

Shades of Al Smith's campaign for President! Maybe we are only talking about "canons", not "cannons".

If "cannons" was used as "editorial license", it certainly "grabbed" my attention. Otherwise, I feel that perhaps we, as engineers, should attempt to avoid emotion-filled words in our discussions, unless we wish to be politicians.

Other than the above "nit-picking", I wish to congratulate the staff and writers on a very fine newsletter.

R. Neil Fisher
Miami, FL

[Sory about the eror. It won't hapen again. --Ed.]

Dear Mr. Kotasek:
Re: Detained Engineers in Chile

Thank you for your letter of 15 November 1976.

As regards the number of political prisoners being held in Chile today, exact figures cannot be ascertained. The releases of prisoners in November 1976 affected those people held under state-of-siege legislation (i.e. held without charge or trial). However, the liberation did not affect other categories such as prisoners awaiting the completion of their trial and sentenced prisoners--it is estimated that there are several hundreds of these prisoners still in detention. The category of "disappeared prisoners" (i.e. people arrested but whose arrest and detention is denied by the Chilean authorities) is estimated at over 1,500 people. Amnesty International and other human rights organizations, including the United Nations Commission on Human Rights, regard the problem of disappeared prisoners as a matter of great urgency. In 1976, several hundred people were detained and their arrest denied by the Chilean authorities. From March 1977 until the end of April 1977, Amnesty International is having a major campaign on the problem of disappeared prisoners. One of the main objects is to publicize the problem and encourage professional associations/trade-unions etc. to write to the Chilean government on behalf of members of their profession or trade-union who have been arrested and are now disappeared in Chile.

I am enclosing a list of [nineteen] engineers arrested in Chile and who have since disappeared. This list is being incorporated in a publication which should be available after the middle of March 1977. If your organization is interested in participating in the campaign and obtaining copies of the publication entitled "Disappeared Prisoners in Chile" you should contact the American Section of Amnesty International, which has an office in New York. [Amnesty International, room 309, 2112 Braodway, New York, NY 10023; Telephone (212) 787-8906]

If you would like to begin to write letters now to the Chilean authorities requesting information about the whereabouts of the disappeared engineers listed, I am enclosing a Chilean authorities list for your information.

Yours sincerely,
Erwan Le Bot
Latin America Research

Amnesty International
Secretariat
53 Theobald's Road
London WC1X 8SP
England

[Ed. note: Tragically, there are dozens of countries, both Communist and "free-world," holding political prisoners, and Amnesty International will provide information on any of them. I will be glad to forward personally such information on engineers detained in Chile and in the Soviet Union. (An article on human rights in the Soviet Union will appear in a future issue.) I believe that letters from individual engineers can be almost as effective as organized efforts by professional organizations, and I would urge any concerned individual to send a polite letter to the head of state of one of these countries (and send a copy to its embassy in Washington, DC), inquiring as to the whereabouts, status, reason for detention, etc. of specific engineers.]

DEAR EDITOR:

I would like to ask the readers of CSIT to donate any technical and scientific journals they can spare to university libraries in Vietnam. The technological development of this third-world country--in the midst of reconstruction following a devastating war--requires up-to-date scientific and technical information in a wide variety of fields. Journals and texts dealing with energy conversion (especially solar), bio-medical engineering, and ultrasonics (for detection of bomb damage to dike systems) would be welcome. In fact they would be happy to receive journals from a whole "spectrum" of application areas--preferably reasonably current issues (say, within the last 5-6 years).

At the present time the Vietnamese are experiencing difficulties obtaining western journals from any source (East or West). Nor can they realistically expect a flow of such material in the near future through official Washington sources. Our government continues foot-dragging on the question of post-war aid to a country it was busily "bombing back to the Stone Age" not long ago.

For these reasons, I feel it would be very helpful and appropriate if we as individuals contribute to the process of reconstruction by sending the Vietnamese much-needed technical journals and texts. This hardly requires an acceptance of Vietnam's form of government--only a realization of the importance of technological development to the well being of its people. After all, it was the people of Vietnam who suffered so terribly during the war (a war we now acknowledge was a "tragic mistake"). And these people will continue to suffer if that nation is not helped to recover and develop.

If you wish to participate in this effort please send a description of what you have to donate to:

Dr. Ed Cooperman
Department of Physics
Cal State Fullerton
Fullerton, CA 92634

You will be contacted and a pick-up of material will be arranged.

Sincerely,
Jack Levine
California State University
Los Angeles, CA

DEAR EDITOR:

A friend of mine has been working in Zaire, on introducing middle-level technology to the area. The emphasis has been on local control, such as wooden crop seeders that can be produced locally. The group is now interested in setting up a small portable sawmill, based on a gas-powered chain saw in a cutting frame. Since gas can at times be difficult to obtain in that country, they would like also to be able to use a small steam engine as a backup. None of us has much experience working with steam engines and would appreciate help from anyone reading this who might have some knowledge on purchasing, applying, and operating small steam engines. Please write to:

Dale Petty
425 Margaret W
Detroit, MI 48203

Sincerely,
Dale Petty

DEAR EDITOR:

On September 1st of this year, Illinois Institute of Technology established a Center for the Study of Ethics in the Professions. The Center, a grouping of philosophers, engineering faculty, and other professionals, will seek to encourage scholarship dealing with the ethical and social issues involved in the practice of engineering, science, business, and other professions.

The Center has as one of its immediate goals the establishment of a resource center which would assist scholars, professionals, and professional societies with an interest in this area. Eventually, we hope to achieve national recognition as an academic center and clearing house for information on ethical issues in the professions. Our present activities include planning colloquia, a lecture series here at IIT, and a course, "Moral Issues in Engineering", which will explore the theoretical bases of codes of professional ethics, the concept of professionalism, and the ethics of competitive business situations.

The Center would very much appreciate any assistance that you can provide in reaching interested individuals and appropriate committees or other groups within your organization. We would also be grateful for any information you may have on recent publications and conferences or other events dealing with professional ethics. We will be glad to place individuals and groups on our mailing list, or provide further information on the Center's aims, activities and resources.

With thanks,
E. T. d'Anjou, Project Manager
Center for the Study of Ethics
in the Professions
185 Life Science Building
Illinois Institute of Technology
Chicago, IL 60616

[Ed. note: The following exchange of letters is in reference to Dr. Gerald Rabow's proposed position paper, "The Application of Systems Engineering to Societal Problems," which appeared in the March 1976 CSIT Newsletter. Dr. Rabow is chairman of the CSIT Working Group on Systems Engineering and Public Technology. Dr. Edmonds is no longer with IEEE Headquarters, but he is still an active member of CSIT.]

December 29, 1975

Peter D. Edmonds
Administrator - Technical Services
IEEE

Dear Peter,

I've read with considerable interest the new draft position paper on Systems Engineering and Public Technology by Dr. Rabow of CSIT.

I am passing the paper along to Dr. Richard Vidale, Head of the Department of Systems Engineering and Computer Science at Boston University, who is Chairman of the SMC Education Committee, asking him to make a judgment of whether and how SMC should review. At the same time I add my own reactions, representing only that--my own reactions.

First, there should be no question but that SMC concurs in the principle of more systems engineering in public technology. That's a principal reason why we're in business. We have moved continuously and responsibly, I think, in modeling urban systems, health care systems, etc. We have convened special workshops involving leaders from outside IEEE in discussions of national goals and large scale regional socio-economic models. Our last national meeting was largely devoted to technology forecasting and assessment, not only the "harder" aspects but the "softer" ones as well.

Second, I think I can speak for most SMC membership that we welcome cooperation with CSIT. While I'm sure some of our membership might not agree with CSIT on many points, we are on record as acknowledging a mutual area of interest and willingness to engage CSIT (per my letter of two years ago published in the CSIT Newsletter). I honestly regret that more interactive activities have not developed. I have found the few CSIT meetings I've attended interesting and colorful, and have enjoyed my discussions with various CSIT members.

As regards Rabow's letter of November 19 which suggests that SMC considers it inappropriate that CSIT intrude into SMC territory, that "EE's (intrude) into social science," that "science and technology (intrude) into human areas" and that "the naive (intrude) into the real world"--I would take the liberty of reacting strongly.

As one who has formal training in both engineering and social science, as a teacher of MIT courses which combine quantitative systems modeling techniques with readings from Weber, Marx, Ellul, and current social critics, as a pre-1965 anti-war activist and member of the Union of Concerned Scientists, and as the only TAB member to vote against a proposal for IEEE to host classified meetings, I certainly don't want myself to be accused of such charges.

On the other hand, SMC membership no doubt includes many who would choose to stay aloof from political and social activism, especially in association with their professional technical work, and would prefer that no IEEE activity so involve itself. Their feelings must be respected, and this is one reason why SMC per se has seen itself more as an active convener than as an advocate (e.g. our sponsorship of the recent packed-house public debate between Paul Ehrlich and opponents on the California Nuclear Initiative at the September SMC meeting in San Francisco).

Now let me come to the Rabow position paper itself. I think the point is that we are now well beyond the first blush of application of systems engineering in the public sector. In fact, the errors and misapplications of systems engineering by the Pentagon, New York City, and others through the '60's and early '70's are now well documented in books by Ida Hoos, Robert Bugoslaw and others. And most of these were "competent" systems engineers with good intentions. The cases of outright charlatanism are even more embarassing.

So where are we now? We are struggling to help a young discipline with an uneven record of gains and losses to become a responsible adult. This is done, I believe, by carefully documenting and criticizing the developed techniques and their present and future potentials as well as their successes and failures in application. It is not done by pushing systems egineering in general, as though it were a patent medicine,

good for all ailments of society. In fact, I believe that to do so is dangerous and counterproductive for the aims which I know CSIT and SMC share.

[On page 29] the position paper states, for example, that "It is thus incumbent for societal systems engineers to make clear in every instance the extent to which a societal system engineering project might fall short of the ideal. This includes any assumptions and uncertainties, all risks and by whom they are incurred, and to what extent any recommendations are experimental". This sounds to me like the kind of language some advertisers use to suggest on the one hand that the company scientists who devised the product are all-knowing, but on the other hand the company bears no responsibility for anything.

I am puzzled by the recommended actions [p. 29] in the sense that these are essentially the kinds of things which various professional societies have been trying for many years. What's new?

Having been sharply critical and reactive to the position paper itself, let me now agree with Rabow that continuing effort by IEEE to taxonomize--to define and classify--what systems engineering can do to help resolve social issues is warranted. And I agree that systems engineering goes well beyond the quantitative analysis--as does any professional discipline--into matters of art. Psychometric scaling, multi-attribute utility, and social choice are cases in point. The mathematics is well developed. The "bedside manner" aspects, i.e. the skills in applying these techniques to real people and institutions, are not well developed. They essentially involve aspects of subjective judgment, scary matters for many engineers. But this is where the careful work needs doing.

Here's another suggestion: an area where CSIT and SMC might work together. It's an area I, and others in SMC, happen to be interested in, where the rapidly advancing technology could provoke profound social trauma. I refer to the use of microprocessors and industrial robots in both the manufacturing and service sectors--and the concomitant effect on the human worker. I would welcome an expression of interest by CSIT in this area.

I hope these candid comments are helpful.

Sincerely,
Thomas B. Sheridan
Massachusetts Institute of Technology

June 16, 1976

Dr. Gerald Rabow
Otis Elevator Company
Parsippany, NJ

Dear Dr. Rabow,

The review of your paper has been progressing and I am now in a position to make a recommendation.

Let me begin by saying that I concur with the thrust of Tom Sheridan's comments in his December 29 letter to Peter D. Edmonds. To Tom's remarks I would add the following: On page 28 you make the assertion that our understanding of the components of societal systems and their interrelation is less than in the case of physical systems, but that this is a difference of degree rather than kind. You state that when societal systems are understood, they are likely to be more complex than physical systems but nevertheless the physical system analysis techniques contained within electrical engineering will be found useful in making predictions about societal system responses to intervention.

I feel that such a philosophy does not recognize the fundamental difference that exists between physical components and human components: awareness of self and the environment. The electrical engineer's techniques work on physical systems because the physical laws governing the behavior of the element are the same regardless of whether the element is examined in isolation or imbedded in this system or that system. But, man behaves according to his perception of his environment. We have a level of adaptation that goes far beyond state-of-the-art description or analysis in electrical engineering. It is this adaptation that partly explains why theories of socio-economic systems always seem to be lagging reality.

I don't want to give the impression that systems engineering methodologies have no application in societal problems. I do feel we should proceed with extreme caution and humility. The record of achievement in this area has been uneven and has produced some outspoken critics. In fact, there are still many within engineering that doubt the legitimacy of systems engineering.

I know from my discussions with Tom Sheridan and from my own reactions that we could never obtain an across-the-board endorsement from the SMC leadership (or membership) of your paper as an official IEEE position. I would encourage you to submit the paper for publication in our Newsletter or Transactions as representing your personal position. I think, though, that the most effective way to promote the application of systems engineering to societal problems is to document successful applications and theoretical developments in the same manner that SMC has been doing. We have, as you know, sponsored conferences and special issues of the Transactions on the topic of socio-economic systems.

As for the discipline of "societal systems engineering", there are university programs emerging in this area. I am planning to do an article for the Transactions on systems engineering programs, and would welcome your help in identifying programs emphasizing societal systems. Faculty engaged in this area would appreciate the publicity and an opportunity to compare notes. Why not sponsor a workshop or technical session on Societal Systems Engineering at a future meeting of SMC? Once a certain minimum consensus has been obtained among societal systems engineering educators, an article could be submitted to a widely-read publication such as Futures to publicize SMC's involvement.

I am looking forward to more communication.

Sincerely,
Richard F. Vidale
Professor and Chairman
Computer & Systems Engineering Dept.
Boston University

Dr. RABOW RESPONDS:

Although I am disappointed that Professor Vidale did not endorse the WG-SEPT position paper on the application of systems engineering to societal problems, I think that he has been very helpful in giving a clear statement of the informed opposition to the paper. I think that there is little disagreement between Vidale and myself on the technical facts. When he says that the level of adaption of man goes far beyond the state-of-the-art of adaption analysis in electrical engineering, he is really agreeing that the difference is in degree rather than in kind.

In deciding how to invest its intellectual and technological resources, society and its leaders should consider not only how readily achievable some prospective advance is likely to be, but also how great society's need is for this advance. In my opinion, society's need for societal systems engineering, or something akin to it, is so great that an allocation of substantial resources toward it is justified at almost any non-zero likelihood of success.

The problems of society which need solution include war, crime, un-, under-, and mis-employment, maldistribution of goods, misuse of environment, and excessive limitations of individual freedoms. The intuitive techniques which have been unable to solve the above problems in the past will probably be even less able to cope with our increasingly complex societal system in the future. The frequent counter-intuitive behavior of our societal system has been amply demonstrated.

There is only one new technique that might help in controlling our societal system, namely societal systems engineering (or one of its synonymous expressions). Whatever doubts there are that systems engineering can be extended from physical to societal systems, it is "the only game in town".

If there is some chance of thus helping solve society's problems, and even if it is only a minority view that there is, then society should make a resolute effort in this direction and develop societal systems engineering much more rapidly than is being done at present. Those most knowledgeable in this area, such as IEEE, should inform society of the availability of this option.

The position that IEEE should take is thus not primarily a technical question, but one of societal values, and that is why CSIT is properly involved. Due to an overwhelming societal need, the normal pace of development, with normal support in the form of publications and conferences, is not adequate in the case of societal systems engineering. Efforts, of which the proposed position paper is only one, are needed to convince society that additional resources should be devoted toward societal systems engineering.

G.R.

BRICKBATS AND BOUQUETS

As of February 16, 1977, 1800 coupons requesting continuation of receipt of the CSIT Newsletter had been received. 265 of these contained comments, which are tabulated below.

We especially want to thank those readers who took the time to give us their comments, which covered the entire spectrum from "Right on" to "Can CSIT." Most comments (including the critical ones) were thoughtful and constructive, and should prove helpful in improving Technology and Society and making it more responsive to the concerns of IEEE members. We welcome the 35 readers "willing to assist CSIT" to the ranks of our active membership and will be in touch with them in the near future.

TOTAL RESPONSES	265
FAVORABLE	total 225
Subject areas of interest	
Energy-Environment-Nuclear	17
Employment, Professional, USAB, PAC	10
Appropriate-scale technology	8
Technology & government; liaison	6
Ethics	4
Book reviews	4
Education	3
Societal decision-making	3
Biomedical	3
Crime countermeasures	3
Candidates' views	3
International aspects	2
TV election coverage	2
Science court	2
Miscellaneous	5
Other favorable comments	
Outspoken, non-trivial approach	3
Disagree with newsletter, but find it worth reading	2
Miscellaneous	18
Suggestions	
Encourage reader responses	4
Seek new subscribers more aggressively	3
Take paid advertising	2
Include price and # pages of books reviewed	1
More variety	1
Larger headlines	1
Larger type	1
General words of encouragement	114
NEUTRAL	total 8
CRITICAL (incl. eight subscription cancellations)	total 32
Dislike editorials or ed. comments	5
Waste of IEEE money	3
Should present both sides of issues	3
Too anti-nuclear	3
Too anti-technology	3
Should refrain from political propaganda	2
Wordy, pedantic	2
IEEE should be purely technical	2
Newsletter harms IEEE's reputation	1
Poor writing	1
Too anti-free-enterprise-system	1
Miscellaneous	6

MEETINGS

ELECTRO 77, APRIL 19-21, NEW YORK CITY

Exhibits:	Sessions (42 in all):
New York Coliseum	Hotel Americana
Columbus Circle	7th Ave. at 52nd St.
(8th Ave. & 59th St.)	all three days:
Tues: 9:30am - 6:30pm	10am - 12:30pm
Wed: 9:30am - 9pm	and
Thur: 9:30am - 5:30pm	2pm - 4:30pm

Electro is the successor to the IEEE International Convention and NEREM. The registration fee of $6 for IEEE members and $9 for others covers all three days of sessions and access to all exhibits. You may register during the convention at either the Coliseum or the Americana Hotel. Most Electro manuscripts will be available in full preprint form (including full text and illustrations) during the convention.

The following items may be of interest to readers:

Energy Conservation Exhibit
A special Energy Conservation exhibit will be presented in the Coliseum lobby and the street-level exhibit floor. The exhibit will display and demonstrate a number of important research and development projects in solar energy, devices to reduce energy consumption, and systems for energy management. The exhibit will be open during show hours each day. There is no charge to Electro registrants.

SESSIONS:

"Future Shock for Engineers"
Tuesday 10am - 12:30pm, Versailles Ballroom

"Programs for Energy Conservation"
Thursday 10am - 12:30pm, Georgian Ballroom B

"Managing the Creative Engineer (Panel)"
Thursday 10am - 12:30pm, Royal Ballroom A

"Solar Energy: A Status Report"
Thursday 2pm - 4:30pm, Versailles Ballroom
See page 1 of this issue for details.

CSIT MEETING, May 14, 1977

The next meeting of CSIT will be held on Saturday, May 14, 10am to 3pm, at the Engineers Club, 32 West 40th Street, New York, NY. CSIT meetings are open to all IEEE members, and we hope you will take this opportunity to become better acquainted with us and with our activities. Light lunch will be provided. If you plan to attend, please notify Ms. Joan Breslin, IEEE, 345 East 47th Street, New York, NY 10017, (212) 644-7887.

INTERNATIONAL MEETING ON HUMAN ECOLOGY, May 16-21, 1977

The Society for Human Ecology will hold its Second Vienna International Meeting on Human Ecology on May 16-21. The following working groups are planned at present: principles of gestalting habitats; residential habitat; occupational habitat; regenerational habitat; circulational habitat; essence of the ecological potency; pedecology; gerontecology; human ecological problems of the handicapped; the human element in the person-environment-stress setting; basic concepts; methods and models; terminology; human ecological praxology; ethics; legal problems; ecophilosophy-ecopolitics; education and training; urban ecology; autonomous dwelling places; extreme conditions; ethnological problems; human palecology.

For registration information and hotel accommodations contact:

Society for Human Ecology
Karlsplatz 13
A-1040 Vienna
Austria
tel. (0222) 65-37-85 - 293

The Society's periodical Colloquium Internationale will be reviewed in a future issue of Technology and Society.

INTERNATIONAL CRIME COUNTERMEASURES CONFERENCE
July 26-29, 1977

The 1977 International Conference on Crime Countermeasures Science and Engineering will be held at Oxford University, Oxford, England, July 26-29. Science and technology applied to law enforcement, security, and crime prevention is the subject of this conference, which is sponsored jointly by the IEEE; the Office of Engineering Continuing Education, University of Kentucky; and Oxford University.

Papers have been solicited which describe recent developments in the following fields: police systems; command, control and communication systems; alarm devices and systems; computer systems security; automatic vehicle monitoring; automatic identification and authentication of voice, handwriting, fingerprints, and other signatures; entry control systems; searching aids (x-ray, sonic, magnetic, microwave); electromagnetic spectrum conservation; communication privacy and security including advanced modulation techniques; pollution detection; related areas of basic science and novel applications.

Further information concerning this conference may be obtained from the Conference Chairman, George C. Byrne, or the co-editor of the Proceedings, Dennis Shaw:

George C. Byrne
Stanford Research Institute
Menlo Park, CA 94025
USA

Dr. Dennis Shaw CBE
Keeper of Scientific Books
Radcliffe Science Library
Parks Road
Oxford OX1 3QP
England

CSIT SPEAKERS BUREAU

Some CSIT members have given talks to groups of engineers and other interested citizens on aspects of the social impact of technology. We have found that this is an effective mechanism for promoting awareness and understanding of technology-society issues, and therefore CSIT has set up a SPEAKERS BUREAU.

Anyone wishing to arrange for a speaker or a discussion leader should write or phone:

Len Zimmerman
Bell Telephone Laboratories
Room 2C-414
Holmdel, NJ 07733
(201) 949-5737

At present, speakers are available to talk on:

Solar energy
Nuclear energy
Ethics and the engineer
An overview of the social impact of technology

Volunteers are needed to talk on these or other topics so that the load on any one speaker will be limited, the list of topics can be broadened, and a wider geographic area can be served efficiently. If you can give some of your time, please send your name, address, phone number, and topic or topics to Len Zimmerman at the above address.

CSIT WORKING GROUPS AND THEIR CHAIRMEN

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