



COMMITTEE on SOCIAL IMPLICATIONS of TECHNOLOGY

SEPTEMBER 1976 - ISSUE No. 15

EDITOR: NORMAN BALABANIAN

CANDIDATES' VIEWS

Continuing a tradition started by the former editor, the views of the twenty candidates to the offices of IEEE President, Executive Vice President, and Regional or Divisional Director on a few issues were solicited. The letter outlining the issues and the responses received until press time are published below in alphabetical order within each office.

Dear (name of candidate):

As you probably know, the Newsletter of the IEEE Committee on Social Implications of Technology is widely read throughout the Institute. Since you are a candidate for a policy-making office within IEEE, our readers would be greatly interested in learning of your views and positions on a number of issues important to the Institute and of particular concern to CSIT.

Accordingly, your answers to the following questions are solicited.

1. The establishment of an annual IEEE field award for Outstanding Service in the Public Interest has been proposed. The intention is to recognize engineers who act to protect the public interest, particularly when such action is taken despite personal risk. Selection procedures and criteria are to be the same as for other IEEE field awards. What is your position on the establishment of such an award?
2. The IEEE is an international technical/scientific organization. Its public meetings (as distinct from Board, council, or committee meetings) are generally open to all members. But some units within IEEE have, from time to time, sponsored public meetings which were open only to a spe-

cific class of members, namely, members who enjoyed national security clearance. What is your position on the imposition of criteria other than membership for attendance at IEEE-sponsored public meetings? (Payment of a registration fee is not an issue).

3. A code of Ethics for engineers was published in February 1975 Spectrum and has been under discussion. (See March and June 1976 issues of the CSIT Newsletter.) The effectiveness of such a code depends on the vigor with which IEEE acts to enforce it and to protect those engineers who act in accordance with it. What is your position on the establishment of mechanisms within IEEE for these purposes, including the possibility of (a) imposing sanctions against those engineers who violate the code, (b) imposing sanctions against those employers who take actions against engineers who act in accordance with the code, and (c) establishing an IEEE defense fund for electrical engineers discharged or otherwise harassed for adhering to the code?

Please limit yourself to a collective total of no more than 500 words for all questions. In answering, refer to the question by number, but do not repeat the question. Please address yourself directly to the issues and refrain from personal comments on other candidates. Responses adhering to these guidelines will not be edited. To meet publication deadlines, please respond by August 15.

Sincerely,

Norman Balabanian
Editor, CSIT Newsletter

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DO YOU WANT TO CONTINUE RECEIVING CSIT NEWSLETTER?

Since the inauguration of a Newsletter by the Committee on Social Implications of Technology, the distribution has grown to about 8,000 through accretion of numerous independent lists and through requests by individual members. This has resulted in unavoidable duplications because the mailing lists have not been tied back with membership records. In order to take corrective action on the problem of duplication and at the same time reconfirm a desire of current recipients to receive the CSIT Newsletter in 1977, we have included a Request Coupon below.

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verify that your membership number and the address shown on the reverse side are correct and proper, and return the coupon to the TAB office at IEEE headquarters. Individuals who do not return the coupon will be dropped from the 1977 distribution list, except for those who are receiving the Newsletter in some official capacity and to whom distribution will continue to be automatic.

Whether or not you wish to receive the Newsletter in 1977, the CSIT Officers and Editor would appreciate your comments and suggestions for improving the Newsletter. Thanks for your past interest and help.

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The address in my IEEE membership record should be updated, as follows:

Comments and suggestions _____

I would like to assist the Committee in the following areas: _____

CANDIDATES' VIEWS

RESPONSES

PRESIDENT 1977

IRWIN FEERST

1. I favor establishing field awards not only for Public Interest Service, but for Professional Activities. But I think your question does not go far enough. Since IEEE is legally constituted as a dual purpose (technical and professional) organization, I believe IEEE ought to have an equal number of its major awards (Medal of Honor, etc.) devoted to non-technical endeavors. Moreover, it is time IEEE elevated members to the rank of Fellow in recognition of their professional activities. Indeed, I spoke to members of IEEE's Awards Committee about this at headquarters this past spring. At my urging, the Board of Directors has asked Nathan Cohn (IEEE's Fellows Committee) to look into expanding the scope of the Fellows awards.

But there is an obvious trap here. As a necessary pre-requisite for all of this, we must overhaul the procedures for Fellows awards and other major and minor IEEE honors. This is because the mechanism for these is now in the hands of the self-perpetuating clique who has always run our professional lives. Genuine change is not possible under these circumstances.

2. I do not believe that any - repeat, any - IEEE board, committee, technical, council, etc. meeting ought to be closed to any member. Those technical meetings which involve matters of national security should be sponsored by either a government agency or a private contractor.

3. I have long fought to have IEEE adopt a stronger Code of Ethics and a stronger set of Employment Practices Guidelines. We should seek to emulate those of the American Chemical Society. One of the reasons for our weak guidelines is that IEEE saw fit to join with many other professional societies (but not with ACS) so as to emerge with a common set. Naturally, what resulted was the weakest common denominator. This was a tactical error and we shall strengthen ours, even if this must be done unilaterally.

To enforce the code, I have urged that a list of violators be printed in Spectrum each month. Members may then decide if they wish to accept employment with, or to purchase products manufactured by the offending company. But why is this so strange? The American Association of University Professors has had this procedure for more than 20 years and the American Chemical Society for more than 3 years.

For years, I have publicly advocated the establishment of an IEEE Legal Defense Fund, which would provide the means for having IEEE act as a professional defender for its members. To finance this without raising dues, I plan to sell IEEE's building and land in Piscataway, NJ. This will serve as the initial endowment for the Fund, and its earnings will be used for the stated purposes.

ROBERT A. RIVERS

1. I believe that the Award for Outstanding Service in the Public Interest should be non-periodic, given to an individual who has protected the public interest in the face of severe penalties, and should

have significant monetary value such as \$10,000 or \$25,000. I am not sure that the present field award mechanism is the right way, but I believe that it should be handled by an ad-hoc special board committee and based upon substantial nominations.

2. I believe that there are many interests to be represented in the IEEE and see no reason why we should create artificial and poorly disguised separate organization of Classified Meetings by the people that are organizing an IEEE open meeting. While I believe that the Security business is overdone, there is a need to interchange classified information and we should be able to accommodate those members that would benefit.

3. I am for the Code of Ethics. I am for its implementation through an Ethics Review board with the power to Censure and to deprive a person of his membership privileges. I am for publicly recognizing an organization that takes disciplinary action against an employee who objects to violating his code of Ethics. I am for a legal defense fund to be used for individuals harrassed or discharged for adhering to the code of ethics. I have in the past proposed and supported IEEE acceptance of and implementation of a Code of Ethics. I believe that a Code of Ethics without a system for implementation is a fraud.

ROBERT M. SAUNDERS

Herewith is the joint response of Robert M. Saunders, Board of Directors' nominee for President and Robert D. Briskman, Board of Directors' nominee for Executive Vice-President.

1. We regard with much favor and enthusiasm the institution of a Field Award for Outstanding Service in the Public Interest. However, those who must select the candidates or approve the criteria for selection of the candidates from the dossiers submitted have considerable difficulty in determining what the criteria should be. When this matter last came to the Executive Committee and the Board of Directors, it was decided that the Institute should have more experience of an ad hoc nature before trying to make the award a routine affair. All committees and boards of the Institute were and are encouraged to submit well documented and carefully reasoned cases for special awards for Outstanding Service in the Public Interest. The award to Senator Javits, made in 1975, was one example of how this can be and was done.

2. The IEEE has as its primary function the exchange of information of interest to the members. To maximize this exchange the IEEE has an established policy endorsing "open" technical meetings. We fully agree with the principle that the IEEE should not adopt any criteria which would restrict a member from attending any of its technical meetings. At the same time we recognize that some information can be exchanged only under a security or proprietary classification. If the exchange cannot be carried out in "open" IEEE meetings or by other means, then the exchange of information principle becomes paramount and the manner and condition under which the information is disseminated secondary. Since the establishment of the TAB policy on "open" meetings last year, no complaints have been received on abuses of the provisions therein. Mr. Briskman has additionally established last February a TAB Meetings Committee which, as one of its functions, will specifically monitor conformance of field units with IEEE policy in this operational area.

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"NAME THE NEWSLETTER" CONTEST

The Committee on Social Implications of Technology has decided to provide a suitable name and corresponding logo to the Newsletter. Readers are invited to submit suggestions. Drawings of logos should provide sufficient detail to make the intent clear. Names suggested so far are:

ENGINEERING AND SOCIETY

REFLECTIONS (Logo: mirror with a reflection)

Deadline for submission has been extended to November 1.
Suitable prizes will be awarded for the chosen name and the chosen logo.

New subscriptions: IEEE members wishing to receive this Newsletter should write to: CSIT Newsletter, IEEE TAB Office, 345 East 47th Street, New York, NY 10017.

The editorial staff invites letters and articles from readers. We are interested in publicizing news of all upcoming meetings, study groups, discussions, lectures, or workshops that in any way relate to the interaction between technology and society. Correspondence may be sent to any of the above editors. "The views expressed in this Newsletter are those of the respective authors and not those of IEEE."

The IEEE Committee on Social Implications of Technology Newsletter is published quarterly by the Committee on Social Implications of Technology of the Institute of Electrical and Electronics Engineers, Inc. Headquarters: 345 East 47th Street, New York, NY 10017. Sent automatically and without additional cost to each member of the Committee on Social Implications of Technology and to other IEEE members through written request. Printed in U.S.A. Second-class postage pending at New York, NY and at additional mailing offices.

CANDIDATES' VIEWS

3. A Code of Ethics was established in 1912 and revised in 1975. Historical records show that some members have been expelled or otherwise disciplined over the years. So there is adequate precedent for action being taken against members who are judged to have violated the Code. In recent years the mechanisms for such reviews has become inoperative and to re-establish them represents a formidable task indeed. Whether or not a majority of the members would wish to rejuvenate the Code of Ethics compliance method is questionable.

What seems to be emerging in the Institute is a realization that the IEEE is best equipped to develop meaningful standards -- technical, (IEEE and ANSI Standards) employment, (Joint Societies' Employment Guidelines) and personal professional conduct (Code of Ethics) -- and is poorly equipped to enforce, judge compliance, and impose sanctions. We believe that before we launch on the development of enforcement, compliance, and punishment methods the members should be canvassed by referendum to determine what their wishes may be.

EXECUTIVE VICE-PRESIDENT 1977

CARLETON A. BAYLESS

1. I am in favor of such an award. I believe that the award should be substantial in dollar value, that the award should not be an annual but rather an "ad hoc" type which has been approved by the Board of Directors - and where the consideration is that the member has suffered adverse economic penalties to himself.
2. IEEE has many diverse interests. Penalties are suffered if our US members aren't able to participate in meetings discussing classified information. Although the act of classification may be overdone, yet I believe our members ought to be able to participate in classified meetings which are of course open only to those holding the required security classification. To do otherwise will put our US members at a disadvantage and not allow them to participate in the exchange of information of this type.
3. I am in favor of the implementation of the code of ethics through a review board. To have a code of ethics without an implementation procedure is a fraud. I believe a procedure whereby sanctions are taken against those engineers who violate the code should be established. The sanctions to be taken "against employers who take actions against engineers who act in accordance with the code" will have to be studied closely for an effective procedure. Black lists and white lists have been mentioned in some quarters. The intervention between the employee and his employer is a sensitive area that must be explored carefully and I believe a way can be found such that we are implementing the code of ethics without automatically taking on an adversary role toward the employers. An IEEE defense fund for purposes in (c), properly established and properly defined as to which situations are appropriate, seems to be a good step forward.

ROBERT D. BRISKMAN

(See responses of Robert M. Saunders above.)

REGIONAL DIRECTOR 1977-1978

Region 2

WILLIAM C. FARRELL

1. I concur with the proposal, provided that there can be guards against minority views being rewarded at the expense of majority views.
2. I see nothing wrong with closed meetings on secure subjects. The alternative appears to me to be withholding valuable information altogether.
3. I am against an IEEE defense fund. However, I would support the provision of a consulting staff to assist deserving members in such matters. I would subscribe to imposing sanctions against engineers and employers if, and only if, proven guilty in a court of law.

HOWARD B. HAMILTON

1. Concerning the establishment of an IEEE field award . .

Engineers do have an obligation to act to protect the public interest, despite personal risk. However, I feel a formal IEEE award procedure to recognize such action could be misapplied and degenerate into a sanction action against employers and become a political tool. Since IEEE is primarily a scientific/technical organization I am against this possibility.

2. Regarding sponsorship of meetings wherein attendance is restricted to a specific class (or 'cleared') group of members, I am opposed to such sponsorship.

3. A code of Ethics is a must for any profession. I disagree that some enforcement provision or mechanism for disciplining violators is necessary. I feel serious violation is a legal matter and should be handled as such. I am against IEEE "defense funds" for individuals and against sanction procedures applicable to employers. If I, in good conscience can't perform assigned duties with my employer, I'll work elsewhere.

Region 4

HARRY G. HEDGES

1. I would support the establishment of an IEEE Field Award for Outstanding Service in the Public Interest. I would expect that criteria of similar quality to those for other Field awards would need to be written so as to honor those who had made truly significant contributions in this area.
2. I do not feel I have sufficient information to make definitive comments on this issue. However, in general, it would be my feeling that IEEE-sponsored public meetings should be open to members in good standing without imposition of other criteria.
3. I believe the effectiveness of a Code of Ethics rests as much with the individuals and their belief in the Code and the organization that promotes it as with any enforcement procedures that the organization might enact. Therefore, pending the receipt of other arguments of which I am not aware, I would not be strongly in favor of attempting to establish mechanisms within IEEE for the purpose of attempting to enforce the Code of Ethics.

EDWARD C. JORDAN

1. At first glance this proposal appears to be an excellent idea deserving of enthusiastic support. Closer scrutiny shows that there may be problems and that the issue is complex with both pros and cons.

On the pro side the IEEE has already demonstrated by word (editorials and articles) and action (amicus curiae brief in the BART case) that it encourages and supports stands in the public interest. It would seem to be a simple extension of this policy to establish an award to recognize those with the courage to act despite personal risk. Such an award would put the IEEE firmly on record as supporting engineers who serve the public interest.

On the contrary side it should be noted that existing awards recognize technical excellence and contributions which the IEEE has the expertise to judge, and where objective evaluations can be made. Awards to recognize "service in the public interest" may in some cases require subjective evaluations of non-technical contributions. Actions taken "despite personal risk" are likely to be on controversial matters often involving legal and political considerations. For the IEEE to take an official stand (by making an award) on a matter on which members have strongly opposing views, could offend a large fraction of the membership.

Accordingly, I would favor the establishment of such an award, but only under conditions where the criteria and selection procedures are carefully formulated to avoid the more controversial issues in which IEEE involvement could bring harm to the Institute.

2. In general, conferences held under IEEE group or society sponsorship should be open to all members of the Institute on the payment of the appropriate registration fees. On occasion, various groups and societies have found it convenient to schedule the open meeting at the same location and immediately before or after a classified meeting which many of the members will be attending. I see nothing wrong with this arrangement, as long as the classified meeting is not held under IEEE sponsorship.

3. The IEEE has adopted a Code of Ethics which can serve as a standard for ethical conduct within the profession. I think it should mount a strong effort, through editorials, special sessions, etc., using all of its prestige, to encourage both employers and employees to subscribe to the code. It should have a Board of Review empowered to recommend expulsion in cases of flagrant violations. I do not believe, however, that the IEEE should attempt to act as policeman, judge, and jury, to seek out and punish those who fail to follow its guidelines. With regard to (c), I personally would be willing to contribute substantially to such a defense fund, as I am strongly in favor of providing organized support for those who may be harassed for adhering to the code. I also think an appreciable fraction of the membership would be willing to do likewise. I do believe, however, that it should be a voluntary additional contribution, and not an assessment paid from regular membership dues.

BURKHARD H. SCHNEIDER

1. I see no objections to having an "Outstanding

Service in the Public Interest" award as suggested by the question. It should be recognized though that one man's idea of public service may be another man's idea of public disservice. Under no circumstances do I believe it necessary to give special recognition to engineers who "act to protect the public interest, particularly when such action is taken despite personal risk." This could imply that the IEEE should encourage its members to undertake acts of confrontation with their employers. Acts of public service are generally readily recognized by all segments of society. Personal risk implies great controversy over whether the service was indeed in the public interest.

2. If exchange of technical and scientific information can only take place in a meeting with restricted attendance as opposed to not having the meeting at all, then I am in favor of continuing meetings on important technical subjects even though they must be restricted to those enjoying security clearance.
3. I favor the IEEE taking action against members who are in violation of an officially adopted code of ethics. Such action can, of course, only be dismissal from membership. I vigorously oppose the IEEE taking sanctions against employers or in any way involving itself in confrontations between employers and employees.

General Comment

I do recognize that some segments of industry employing IEEE members have serious employer/employee relationship problems. I stand in fundamental opposition to the idea that the IEEE should act as the vehicle for resolution of these problems. Other legal avenues are open to our members which do not involve the IEEE. Further IEEE involvement in employer/employee relationships will surely lead to the ultimate abandonment of the principal goals of the IEEE as a technical organization and learned society.

DIVISION DIRECTOR 1977-1978

Division II

JOSEPH F. KEITHLEY

1. I believe firmly that honesty and integrity are fundamental necessities in the work and attitudes of a professional. In products, services, or opinions rendered, an engineer should certainly put the fundamental ultimate good of society ahead of other considerations. An award for Outstanding Service in the Public Interest could be an IEEE Field Award.

I can, however, foresee many difficulties in drawing up the requirements for the award and in measuring candidates against the selection criteria. What is the public interest? How best to serve it? How to weigh performance with costs to achieve that performance? Can we afford these costs?

I would favor a responsibly drafted proposal for an award for service in the public interest.

2. I believe that the IEEE policy is to have all IEEE sponsored public meetings be open to all members. Meetings requiring security clearances should be

sponsored by the government granting or requiring the clearances. I feel that the IEEE should refrain from sponsoring meetings where criteria other than membership is required. Moreover, should not our public meetings be open to non-members as well?

- 3a. The legal profession has disciplinary procedures which it uses for individuals who violate the code of the Bar Association. They have several degrees of punishment based upon the offense committed. They also have policies for hearings and appeals by the accuser and accused. After careful study of this procedure and those of other professions, the IEEE could well begin to institute some disciplinary procedures against individuals violating its code of ethics. I question, however, how effective the IEEE could make its sanctions against individual engineers in the U.S. or other parts of the world, where licenses for most kinds of our employment are not required.
- 3b. I feel that employers who take actions against engineers who act in accordance with the code deserve censure. It is not clear to me, however, how to establish equitable procedures in collecting pertinent facts about a case, establishing cause and effect relationships, making judgments, and taking effective action against a guilty party.
- 3c. I would favor a responsibly administered defense fund for electrical engineers discharged or otherwise harassed for adhering to the code. I would also favor a fund to reimburse those injured by an electrical engineer who violated the IEEE code.

Division VI

RICHARD J. GOWEN

The IEEE must continue to evolve in the support of the engineer and scientist professional who specializes in the application of electrical technology. The hallmarks of such a professional must be the possession of a body of relevant technical knowledge, the adherence to a code of ethics, and a dedication to the service of mankind. If the IEEE is to be an effective professional organization then it must support these needs of a professional.

1. I strongly support the development of an award for Outstanding Public Service in as much as such an award recognizes the highest dedication of one of the members of our profession to serve the good of mankind, particularly when such action is taken despite personal risk.
2. IEEE scientific and technical meetings provide the membership with the means of maintaining the high degree of current knowledge essential to a professional. It is understandable that due to the highly specialized and sensitive nature of the material, that a segment of our membership may find the need to "close" a meeting to only those with a national security clearance. As a service to all members, I support such a concept providing that the occurrence of such a "closed" meeting is made available to all interested IEEE members.

3. The IEEE must become a rigorous spokesman for the Code of Ethics. Methods must be developed to effectively enforce such a code through sanctions to both engineers and employers. Monies must be allocated to effectively represent the professional interests of the membership as expressed in the Code of Ethics.

EDWIN C. JONES, JR.

1. Article 1, Section 2, Paragraph 2 of the IEEE Constitution states that "one of the purposes of IEEE is to strive to enhance the quality of life for all people throughout the world." A public interest award, having an objective "to recognize enhancement of the quality of life" is worth consideration. It seems to me that it would be a valuable addition to the current list of IEEE awards, while an award to "protect the public interest" seems to be one with a base that is too narrow. I support further study with a goal of developing guidelines and selection criteria.
2. The question regarding IEEE meetings and concurrent non-IEEE meetings for which a security clearance is required is one that has been resolved by the Board and which now permits co-operation between IEEE and the second sponsor. I support this decision because of my belief that those engineers who choose to work in this branch of technology also need professional opportunities. This does generate certain problems but the alternative idea of prohibiting such cooperation would generate a more severe set of problems. I also support the decision that attendance at meetings can be restricted on the basis of practical considerations such as physical limitations of facilities.
3. IEEE does have an important responsibility to provide professional leadership to engineers, whatever their chosen specialty and whoever their chosen employer. IEEE also has a responsibility to provide employers with information that they can use to enable them to create good professional working conditions for engineers. If either engineer or employer fails in a substantial way to meet guidelines or codes, IEEE could, after suitable investigation, impose censure or sanctions, especially if it is believed that these would be effective, though I have serious doubts that they would be effective. IEEE could more easily publicize exemplary actions. Other alternatives exist. The question of what IEEE should do (in the U.S.) is under intensive study.

The questions both of legal defense funds and cost of living funds follow when and if a decision to impose censure or sanctions is made. Without such funds, censure and sanctions would have no meaning, especially for individual engineers.

General. The questions posed by CSIT are quite specific, and they must be answered in a general way. Since we as engineers have the responsibility "to enhance the quality of life for all people throughout the world," we must consider the CSIT questions and related ones within the framework of this general goal. We must consider any proposed solution and ask "Will it work?", "Is there a better way?", "What are the consequences?", "Who will benefit and who will suffer?" These (and more) questions must be asked of technological developments and of actions designed to improve the quality of life.

PRODUCT LIABILITY:
Theory and Practice

PHILIP SPERBER
COUNSEL, CAVITRON CORPORATION
YESTERDAY

Up until about 60 years ago, there were only three basic theories under which to sue for a personal injury stemming from a product or service sold by the defendant: negligence, res ipsa loquitur and deceit.

Negligence involved a breach of the manufacturer's duty to conform to a reasonably prudent standard of conduct created by the rest of the industry and by society for the protection of purchasers of products against unreasonable risks of harm. There was a significant problem, however, in using this theory to sue a manufacturer. The standard of conduct for manufacturers to act cautiously in making safe products was minimal. The trend of the time was that the buyer would assume the risks when purchasing a new and untried product. The leaders of the nation in this era strongly felt that industry had to be protected against the public's onslaught in order for the economy to prosper and expand. In his Harvard lectures, Justice Holmes stated that "a man acts at his own peril."

The theory of res ipsa loquitur evolved because it was so difficult to prove that manufacturers were negligent in designing and making their products, especially since their duty to exercise care to prevent unreasonable risk of harm to the purchaser was minimal. The courts established the circumstantial theory of res ipsa loquitur which made the manufacturer liable if the injured party could show that the injury would not ordinarily have happened in the absence of the manufacturer's negligence and that the instrumentality causing the injury was under the exclusive control of the manufacturer. Thus, if a beam of a traveling circus tent snapped and fell on plaintiff and caused personal injury, the plaintiff no longer had to show that the circus company failed to exercise a duty of care in selecting a beam of proper strength and material. The problem with this theory was that most products were bought and brought home, where they were no longer under the exclusive control of the manufacturer, in which case the doctrine of res ipsa loquitur could not be relied on, notwithstanding that injuries from the products would not ordinarily have happened in the absence of the manufacturer's negligence.

A manufacturer was liable for deceit if it made a material misrepresentation (false or misleading representation of fact) or if it conducted itself in a misleading manner designed to induce the purchaser of the product to act in reliance on the misrepresentation or the conduct to the purchaser's injury. This theory was effective in the days of the traveling medicine shows and others who hawked their wares by making misleading claims regarding the attributes and quality of the products sold. The problem with this theory was that it could rarely be used to impose liability against manufacturers for two reasons. First, products did not normally come with written warranties, and there were no implied warranties of merchantability in the old days. What you saw and heard was what you got. Second, privity or a direct contractual relationship between the injured party and the manufacturer was required in a deceit action. Since many manufacturers sold through middlemen, such as wholesalers and retailers, the ultimate

customer could not sue the manufacturer for deceit.

Thus, until 1916, most manufacturers had almost no liability for products sold through middlemen, with the exception of inherently dangerous products such as explosives and drugs. It was the age of caveat emptor - "let the buyer beware". Let's now take a look at the major developments that have led to the current thinking of the consumer movement - "let the manufacturer be sued".

In the year 1916, Donald MacPherson purchased a new product called the Buick and was injured when one of the wheels fell off at 15 miles per hour. The New York court trying the case held that "if the nature of the thing is such that it is reasonably certain to place life and limb in peril when negligently made, it is then a thing of danger. If to the element of danger there is added knowledge that the thing will be used by persons other than the purchaser . . . , then, irrespective of contract, the manufacturer of the thing of danger is under a duty to make it carefully."¹ MacPherson won the law suit against Buick in this landmark case which did away with privity of contract.

The next major development came almost three decades later in a California case involving a bottle of Coke where Justice Roger Traynor said "I believe the manufacturer's negligence should no longer be singled out as the basis of a plaintiff's right to recover in cases like the present one. In my opinion, it should now be recognized that a manufacturer incurs an absolute liability when an article that he has placed on the market, knowing that it is to be used without inspection, proves to have a defect that causes injury to human beings."² This case greatly broadened the doctrine of res ipsa loquitur and the general rule of negligence in that the concept of strict liability, or negligence per se, was born. In other words, the product causing the injury no longer had to be within the exclusive control of the defendant and failure to exercise care was no longer an element to be proved by the injured party.

The next major development came in 1951 with the promulgation of the Uniform Commercial Code by the American Law Institute and the National Conference of Commissioners on Uniform State Laws and the Code's adoption by the industrial states over the next decade. The Code revolutionized the doctrine of deceit in two ways. First, an implied warranty of merchantability was established in that goods sold must be fit for the ordinary purposes for which they are bought, notwithstanding that no warranty or representation was made by the manufacturer: Section 2-314. Second, the requirement of privity was abolished as between the buyer and the seller. The seller's warranty was extended to any person who would be reasonably expected to use, consume or be affected ultimately by the goods sold and who was injured in person by breach of the warranty, notwithstanding no direct contractual relationship: Section 2-318.

The next major development came in the early 1960's when a Californian named Greenman was injured in the head by a piece of wood which was propelled by a power tool. The California Supreme Court ruled that "a manufacturer is strictly liable in tort when an article he places on the market, knowing that it will be used without inspection, proves to have a defect that causes injury to a human being."³

Shortly thereafter, Dean William Prosser, American Law Institute reporter for the Second Restatement of Torts, drafted a new section on strict liability in tort for manufacturers in light of the Greenman decision and the growing number of product-related injuries that had

mushroomed into 100,000 pending product liability suits annually.⁴ This section provides two basic theories of strict tort liability, holding the manufacturer liable without fault or negligence when the injury stems from a defect in the product or a material misrepresentation. The first theory provides that a manufacturer selling a product in a defective condition that is unreasonably dangerous to the user or his property is liable for physical harm to the user or his property, notwithstanding that the manufacturer has exercised all possible care in the preparation and sale of the product. The second theory provides that the manufacturer whose advertising or labeling makes to the public a misrepresentation of a material fact concerning the character or quality of its product is liable for physical harm to the user of the product who justifiably relied upon the misrepresentation, notwithstanding that the misrepresentation was not made negligently or fraudulently.

These theories do not mean that the manufacturer is liable every time there is a product injury. For instance, the defect in design or manufacture of the product must be proven by the injured party. The user must show that the product was not reasonably fit for the ordinary purposes for which it was sold and was used or the user must show that the product did not perform as one might reasonably expect in view of its characteristics and intended functions.⁵ Also, the user must show that the product defect was present when it left the control of the manufacturer and did not result from external factors that were not foreseeable by the manufacturer. Further, the injured party must show that the product was dangerous to an extent beyond that which would be contemplated by the ordinary user with the ordinary knowledge common to the purchasing market as to the product's characteristics. For example, although a chain saw sold without a safety guard can cut off the user's fingers, it is not considered unreasonably dangerous for two reasons. First, it is not feasible to have a safety guard while the chain saw is being used to cut a tree. Second, the user voluntarily and knowingly assumes the risk of cutting his fingers when misusing or carelessly using the chain saw because the danger is patent.

TODAY
According to the Presidential Commission on Product Safety, the 1970's ushered in more than 20 million products-related injuries in the United States each year. The Defense Research Institute recently reported that one million product liability lawsuits are expected to be in litigation by the year 1980. In the last ten years, the average product liability award has exploded by tenfold -- to \$100,000, and million dollar awards are coming into vogue.

Because of the consumer movement and the number of product injuries, the public has become increasingly vocal and sensitive about unsafe and unreliable products in this decade. In fact the federal government has responded with legislation of all sorts and the creation of agencies such as the Consumer Product Safety Commission, the Occupational Safety and Health Administration, the Bureau of Radiological Health and the Environmental Protection Agency. These new agencies and the old line bureaucracies, such as the Food and Drug Administration and the Federal Communications Commission, have already promulgated voluminous regulations relating to product design, operating characteristics, performance features, labeling requirements and other safety standards. Many states have followed in the footsteps of the federal government in setting up mirror agencies, sometimes with even stricter standards than the federal agencies. Failure to comply with these government product stan-

dards is prima facie proof of negligence since government standards are circumstantial evidence of the standard of care established by our society.

It should also be pointed out that there are federal laws, such as the Fair Packaging and Labeling Act, the Magnuson-Moss Warranty FTC Improvement Act and the Federal Food, Drug, and Cosmetic Act, under which extensive labeling regulations have been promulgated covering all aspects of warning labels, instructions for the user and warranty statements. These regulations establish what Congress and the Executive Branch consider to be reasonably prudent guidelines for the seller to adopt in communicating all aspects of his product to the buyer. Failure to adopt these labeling standards could mean a presumption of negligence or recklessness in a product liability suit.

Because of concern over federal involvement and bungling in the standard-setting process and because of the money to be made bidding on government contracts and in consulting in the standards area, trade associations, professional associations and watchdog groups have become actively involved in churning out voluntary standards and 'critiqueing' existing standards on the market. Guidelines established by organizations such as the American National Standards Institute, American Society for Testing and Materials, American Standards Association, Association for the Advancement of Medical Instrumentation, Emergency Care Research Institute, Institute of Electrical and Electronic Engineers, International Electrotechnical Commission, International Standardization Organization, National Electrical Manufacturers Association and National Fire Protection Association carry much weight with juries as evidence of a level of care to be exercised by manufacturers.

With consumer, government, industry and professional activism in the product liability arena at an all-time high and with the discussion of the historical development of product liability theories as a backdrop, let's take a look at the manufacturer's liability today.

Since the doctrine of strict tort liability in most states eliminates the manufacturer's need to show that it met its duty to exercise reasonable care in putting a safe product out on the market, and since the doctrine of strict tort liability will be advanced by plaintiff's counsel more often than not, appearances don't count as much as they used to! In other words, going through the motions of considering safety in design, construction, testing and inspection phases of product development is no longer good enough. Because so many manufacturers in the past have paid mere lip service to safety in contrast to expenditures of time, manpower, and money in design, construction and quality control, this was the very impetus from which the concept of strict tort liability arose.

Thus, today a manufacturer must make a greater effort to assure that the way the product is designed and the manner in which it is manufactured will not give rise to conditions or defects that might harm the buyer or the user due to latent or concealed dangers, regardless of whether the product has been misused, with respect to operation or purpose, and whether the misuse could be foreseen. If there are inherent dangers that state-of-the-art technology and techniques cannot yet eliminate, and if such dangers are not apparent, then appropriate warnings must be given. Otherwise, the product would be unreasonably dangerous and an injury arising from the inherent danger, which is considered a defect under the law, would subject the manufacturer to liability under the strict tort liability concept.

REDUCING LIABILITY ON EXISTING PRODUCTS TODAY

Most manufacturers cannot afford to throw away capital equipment in redesigning, retooling, and overhauling production techniques in order to upgrade products that were introduced five to fifteen years ago, when the standard of care was less stringent. What should manufacturers do when confronted with judges and juries who expect a greater degree of safety, and with government and voluntary standards that establish greater levels of care?

The answer lies in the least expensive direction: Up-date labeling!

The product liability attorney should meet with the senior designer, product engineer, manufacturing manager and quality control manager for each product and have a safety brainstorming session. All past complaints and injuries should be reviewed, and all inherent hazards and possible breakdowns and ways in which the products could be misused should be brought out, discussed and analyzed.

It is desirable that the participants in the brainstorming session be encouraged to bring forth any and all ideas, no matter how wild they may seem. It must be remembered that today the manufacturer may very well be held liable for injuries that no one would have been expected to foresee. Also, sometimes "screwy" ideas suggested by one person might stimulate an excellent idea in the mind of another. The synergistic effect of this type of brainstorming session is unequalled in stimulating the creativity, effectiveness, and thoroughness needed to bring to light all unsafe aspects of the product and ways to upgrade the labeling to warn the user of the concealed danger.

TOMORROW'S NEW PRODUCTS

As with cost control, performance requirements and product appeal considerations, it is desirable to establish a safety protocol for each new product from the time of its conception to the time it leaves the plant. It should be established procedure to have brainstorming sessions in order to:

1. Explore all reasonable design alternatives from the safety viewpoint;
2. Investigate the dangers involved with performance goals and intended purpose of the product design prior to detailed design work and pre-prototype construction.
3. Determine how the product design could be subject to misuse or abuse having nothing whatsoever to do with the intended function of the product;
4. Assure manufacture and assembly of components and modules for a finished item that meets product specifications and is fault-free;
5. Foresee what the ultimate user might do to and with the product without the benefit of any instructions on use and intended purpose (this brainstorming session should take place at the stage where product design and method of manufacture have been decided on);
6. Conduct and discuss a systems safety analysis and fault-free and failure mode and effect analyses under the assumption that a newly designed and manufactured product will malfunction;⁶

7. Analyze and discuss each step of the manufacturing process to determine where human error or carelessness and assembly machine fault may result in finished products not meeting design and performance specifications;
8. Select critical components for 100% zero defect testing at various points during the production process;
9. Outline testing protocol for reliability, durability and other safety aspects simulating actual user conditions: temperature, humidity, altitude, vibration, shock, line voltage, electromagnetic interference, exposure to chemicals, etc.;
10. Establish inspection procedures for vendor components, part tolerances and operating parameters that affect product safety; and
11. Consider necessity and procedures for testing the product with a sample population of the market prior to full scale production.

The purpose of the above listed actions on the part of management is fourfold. First, the above described exercise establishes a formal safety-engineering protocol, encouraging company personnel to take safety seriously. Second, a greater percentage of problem areas and defects will be spotted and remedied prior to full-scale production than in the past, when it was common practice to expect that technical problems might develop in the field, necessitating some form of corrective action. Third, some of the actions suggested above will force management personnel to be creative and imaginative in foreseeing how the product might pose a risk to users and abusers. Fourth, the defects, hazards and misuses that are found or foreseen and that cannot be eliminated by design modification will alert management to the warning notices that will be necessary.

Designing, building, testing, inspecting and labeling for safety still does not do the job of marketing a liability-proof product. The element missing is called "evidence of the exercise of reasonable care."

Not all states follow the rule of strict tort liability. In those states that do, the jury may find that there is no strict tort liability because an unreasonably dangerous defect does not exist. In these cases, the jury's verdict may hinge upon whether the product was negligently made. Even when the manufacturer is found strictly liable in tort, evidence that it had exercised all the care that could have been expected under the circumstances may help keep the damage award low.

It is important that the manufacturer be able to produce documentation and testimony showing that it exercised reasonable care in the design, manufacture, testing, inspection and labeling of the product to assure that it is safe both when used in the manner intended and where misused or abused in any foreseeable manner.

One way of proving that the manufacturer has performed to the highest standard, using all available and known analytical techniques and technical knowledge, is by showing that the manufacturer has met or exceeded the government and voluntary standards and guidelines for product safety. Company management should actively participate in standard-setting and, when necessary, should actually initiate such activities to make sure that its products meet accepted industry standards. In many instances, the existence of a voluntary standard

is the starting point for a government agency when a decision is made to promulgate a regulatory standard in that product area. The chances of obtaining government acceptance of a voluntary standard -- or at least the important features of it -- are very good.

On the other hand, evidence of industry custom or an accepted standard of care is not conclusive.⁷ The designer, charged with a duty to exercise due care commensurate with available knowledge and products at the time, cannot ignore developments and simply rely on the fact that "it has always been done this way."⁸

A chronological record of the detailed design of the product and all changes made during its development should be kept by the personnel involved. The same record-keeping obligations also apply to the manufacturing, testing and inspection phases from the time the first model is constructed to the time preproduction prototypes are completed and the company is ready for full scale production. Personnel should be asked to record their observations and results obtained during product development, regardless of whether favorable or adverse. As already mentioned, brainstorming sessions should be recorded, the reasoning behind design and other changes should be recorded, and likewise with all other aspects of the safety-engineering protocol.

CONCLUSION

A better understanding by technical and management personnel of the simple legal principles that act to subject their companies to product liability is a key fac-

tor in liability-proofing of products. Too many engineers and executives fail to recognize that proof of negligence is no longer needed by the injured party. Recognition of the doctrine of strict tort liability is the impetus needed to put design and labeling safety considerations on a par with cost control, packaging and operating characteristics.

FOOTNOTES

¹MacPherson v. Buick Motor Company, 217 N.Y. 382, 111 N.E. 1050 (1916).

²Escola v. Coca Cola Bottling Co., 24 Cal. 2d 453 (1944).

³Greenman v. Yuba Power Products, Inc., 59 Cal. 2d 57, 377 p. 2d 897, 27 Cal. Rptr. 697 (1967).

⁴Restatement (Second) of Torts, § 402 A & B (1965).

⁵Dunham v. Vughan & Bushnell Mfg. Co., 42 Ill. 2d 339 (1969); Baily v. Montgomery Ward, 431 P. 2d 108 (1967).

⁶Chestnut v. Ford Motor Co., 445 F. 2d 967 (4th Cir. 1971).

⁷The Court in Turner v. General Motors Corp., 514 S.W. 2d 497, 506 (Tex. 1974) held that the industry custom itself may be shown to be negligent. Also, see Ford Motor Co. v. Thomas, 285 Ala. 214, 231 So. 2d 88 (1970).

⁸C.D. Herme, Inc. v. R.C. Tway Co., 294 S.W. 2d 534 (Ky. 1956).

BOOK REVIEWS

THE EXISTENTIAL PLEASURES OF ENGINEERING
SAMUEL C. FLORMAN, St. Martin's Press,
New York, N.Y., 1976. (160 pp. plus a short preface)

Reviewed by HARRY SCHWARZLANDER, Electrical and Computer Engineering, Syracuse University.

I.

The aim of this little book is in part made explicit in the preface: "... The existentialist most typically sees the engineer as an antagonist whose analytical methods and pragmatic approach to life are said to be desensitizing and soul-deadening -- in a word, antiexistential. To show that this adversary relationship is based on a misapprehension of the nature of engineering experience is ... a principal objective of this book."

Florman starts out with a warm glow for the "Golden Age of Engineering" -- the approximately 100 years ending about 1950 -- as characterized mainly by the pronouncements and prophecies of some prominent engineers of those times. He then leads us through an increasingly desolate landscape populated by critics of engineering, by engineering blunders and debacles, and -- eventually -- by the "antitechnologists". It is the post-1950 landscape. However, the author does not leave us to fend for ourselves on such inhospitable ground. In fact, on closer scrutiny, all the demons we meet turn out to be carefully placed stage props, easily conquered by Florman with a stroke of his pen. After identifying the road which is suggested for humanity by the antitechnologists as "a dangerous delusion", he stops to take stock: Who are we (we engineers)? Are we not just ordinary people -- perhaps even too much so? Are we not merely doing what human beings have always longed to do -- to work with materials, to fashion tools and objects, to create? To do what we find at times truly exciting and inspiring, even if, in our modesty, we will rarely say so? Florman then unfolds before us the vista of the new promised land -- the Existential Philosophy of Engineering. There the makers of things are once again able to relish their creative effort which after all is in the service of their fellow men; the fruits of their labor are appreciated by all, even as it was portrayed by Homer and in the Bible; and the unique beauty and charisma of the machinery of modern times is admired by the people, once their fears or unfamiliarity have been overcome. Engineers try to excel in their craft and are rewarded by a sense of achievement and the satisfaction that comes from expressing one's natural drive -- they give themselves over to the existential pleasures of engineering.

II.

Florman begins, in his Preface, by asking: "What is the nature of the engineering experience in our time? What is it like to be an engineer at the moment that the profession has achieved unprecedented successes, and simultaneously is being accused of having brought our civilization to the brink of ruin?"

A question which arises immediately when one is confronted by a book about "engineering" is: What kind of "engineering" are we talking about -- what is "engineering" to mean in this treatise? And "technology"? The author disposes of this matter quickly by appeal to common sense and common understanding. I find it un-

satisfactory to deal with the very object of discourse in such fuzzy generality -- a brief disclaimer at the end of the book notwithstanding. Furthermore, some of the issues Florman tries to deal with become inaccessible without a more precise look at "engineering" -- in fact, the existence of these issues may even be, in part, due to the common usage of the terms "engineering" and "technology". When concepts become too broad, they tend to lose their usefulness. What do we have, what do we know, that does not involve technology? Perhaps "technology" is no longer a useful concept. After all, isn't blaming technology a bit like blaming human nature, democracy, or "the system"? But Florman goes to bat in defense of technology, and puts any blame for undesirable effects exactly into the lap of "human nature".

Thus the author's line of thinking becomes derailed right at the outset, and throughout the book he continues to slug about with generalities in a matter-of-fact way. It is no exoneration of the author to note that a great deal of writing about "engineering" turns out this way. Indeed, this circumstance might be a symptom that here lies a problem of some significance and profundity -- profound in that perhaps new insights are waiting to be uncovered and that our present way of looking at engineering, technology, and such, does not give us a good handle on the situation; perhaps someone must generate a new analysis, new words, new thoughts. Existential Pleasures does not.

In Chapter 2, for instance, Florman speaks about the "decline and fall" (of the status of engineering) in recent years -- a growing sense of disenchantment with technology. Yet, was it not the changing style of engineering, rather than "engineering" itself, that aroused the public -- for instance, through the effects of large-scale application of certain kinds of engineering innovations (as discussed at length by Barry Commoner in The Closing Circle)? But even engineers had mistaken it for engineering itself, being traditionally rather insensitive to their role in the larger context of society and history. For instance, where were the engineering firms, large or small, who could point to their achievements in what is now sometimes called "intermediate technology" -- who could immediately enter and clarify the public debate?

Florman sees the problem differently: We cannot expect engineers to decide what is right and proper. "We will search in vain for a single engineering moral absolute." But do we really need one? Let us first bring moral questions out from the back closet. Merely acknowledging a moral component in engineering decision-making will be a step forward. After all, in that world of engineering which the author pictures as the Golden Age, service to humanity and the common good is the theme he catches in the various quotes he has selected. Naturally, the needs of humanity are different now from what they were 50 or 100 years ago. And, yes, opinions will differ as to the most appropriate course of action on a given matter; but disputes occur in all areas of human endeavor. This does not mean we should avoid such issues. The author would have us retreat from moral questions because the world is so "complicated". Well, it seems to me, engineers are as equipped as anybody to deal with complicated matters. Where engineers tend to be on soft ground is where important factors bearing on a problem are not specifiable; still, in

such cases they might contribute to the clarification of the problem. Besides, does the engineer not contribute to the growing complexities of the world? To Florman, these are due to the fickleness of society, its changing standard of taste, and inadequacies of our democracy. In such a societal environment, "it is irrational to blame the engineer for things that were done at the behest of society ... Professionals have an obligation to lead, but they also have a duty to serve." Florman seems satisfied to have engineers serve as the broom of the sorcerer's apprentice.

After having himself well established as technological apologist in the first three chapters, he moves on with glee and gusto to tackle antitechnology. He identifies Jacques Ellul, Lewis Mumford, René Dubos, Charles Reich, and Theodore Roszak as some of the most outspoken representatives of this movement, and goes on to ridicule at length various passages selected from their writings -- one of his own existential pleasures, no doubt. Here, as throughout this book, so many points invite comment that it is difficult to be brief.

It galls Florman that the anti-technologists "refer to 'technology' as a thing, or at least a force, as if it has an existence of its own ...". But is this really so far-fetched? After all, there are many familiar examples of specific technological schemes that have such a nature: A corporation is a piece of "legal technology" -- created precisely for the purpose of having an existence of its own. Certainly no one will deny that the technology of oil extraction, distribution and refinement is a "force" in the world today ("force", of course, in the sense of an "influence" or "constraint" on people's decisions and actions.). A modern government also is a thing of technology. No great leap of the imagination is needed to see many interconnections between corporations, energy supply, governments, and so many other instances of technology, that taken all together it might be seen as a "thing" -- the thing "technology". (But recall the earlier caveat about the word "technology".) Florman himself, at another place in the book, comments on the engineer's "desire to change the world he sees before him" as follows: "Doubtless the impulse was born from the need [of mankind for any such changes], but it has taken on a life of its own."

Florman counters the antitechnologists with "common sense", and takes it for granted that his down-home sense of reality is shared by all his readers. Common sense also illuminates the real problem: "Contemporary man is not content because he wants more than he can ever have." At the same time, Florman is appalled by suggestions to change the nature (i.e., culture) of man. Instead, "... since the cause of the problem is not technology, which can be restrained, but the pressure of desire, which cannot be restrained, it is difficult to know what to do except to continue to muddle along as best as we can."

Once the real villain -- humanity -- is unmasked, what role is left for the engineer? First, Florman reminds us that "we call ourselves pragmatists" (The "we" is sometimes we engineers, sometimes we Americans; but excluding those antitechnologists, of course) and then warns against Dubos' call for "a philosophy of the whole environment, formulated in the light of human aspirations and needs." For, (according to Florman) "the passionate search for a philosophy is the very thing that is most likely to lead us down the dreadful path of dogma and totalitarianism." This is rubbish. Florman seems unaware that he himself embraces and defends "a philosophy". Besides, is human society even possible without some structure of beliefs and values -- allowing that it may not be clearly articulated, nor

self-consistent, nor embraced equally by all members of the society?

Then again, Florman rejects the antitechnologists for having a "yearning for simple solutions where there can be none." But the creation of a new philosophy (which the antitechnologists are said to be searching for) is the very antithesis of a "simple solution", and may be quite appropriate when there are no simple solutions, no engineering solutions. This point will be revisited below.

With his existential philosophy of engineering, Florman believes he has a satisfactory position for the engineer, removed from every possible firing line of technological criticism. To him, "... Sisyphus can serve as a symbol of the modern engineer ..." and, with Albert Camus, he sees Sisyphus as happy in his repeated struggle up the mountain. "We have stopped talking about 'progress'." ... "The engineer ... has abandoned all messianic illusions." In other words, the engineer is, and should be, largely removed from the world of ideas. Instead, contemporary creative writers become useful guides: "A consideration of this artistic evidence can hardly fail to be a crucial element in our search for a philosophy of engineering to supplant the discredited utopian beliefs of our youth." Enjoy yourself -- you're OK, says Florman to the engineer. With many literary quotations he tries to fortify his stand, and lest it might appear too self-centered, he assures us that "despite the fact that most engineers have become acutely aware of the disagreeable problems inherent in technological change, and have relinquished all illusions of redeeming mankind, there still exists a strong sense of helping, of directing efforts toward easing the lot of one's fellows."

To each his or her own. Some engineers will find Florman's philosophy of engineering either a useful guide for establishing their public image, a satisfactory solution to the problem of integrating their professional and personal lives, a desirable professional ideal within the context of their particular world view, or merely convenient for dealing with some specific problems and situations. Others will not; and they will resent his pronouncements on who we are, on what engineering is, and what the engineer's guiding principles should be or have always been. It would be unfortunate, however, if the book's impact on the reader produced merely a general emotional reaction. If it encourages some of us to think our way independently through some of the issues, it will have served a useful function.

III.

Being engaged in explorations that are directed toward an alternative future that is neither antitechnological nor technocratic, I also find the antitechnological writings unsatisfying. But the reason for my dissatisfaction is that they do not go beyond trying to create or convey a consciousness. They do accomplish that, and attention must be paid -- they cannot be swept under the rug on account of style or even occasional inaccuracies of fact. And precisely because this new consciousness touches the engineer specifically, the engineer needs to respond. A response such as Florman's however, a response in kind, is simply not the answer.

Jerome Wiesner has said: "One cannot deny that there are many unsuspected, undesirable, and very dangerous consequences of a rapidly growing technology. Dealing with such matters properly may be the most difficult task we face in the years ahead, second only to managing

man himself...". I also believe that the present time presents to humanity, and especially to the engineering spirit -- our creative/conceptualizing/analytic/synthesizing/constructive capacities -- an enormous challenge which goes far beyond the challenge of the space program. It seems that the difficulty inherent in trying to respond to this challenge is that there looms an enormous abyss between critics of technology and various other perceptions of generalized problems on the one hand, and on the other hand the ground on which engineers are used to operating. And the antitechnologist literature offers no satisfactory clues on how to bridge this gap, and perhaps inherently cannot provide such clues since the solution must include technology -- technology being an area of human capability;

and this task certainly will require us to fully muster all our faculties.

I see little effort going into serious attempts to span this abyss, and current projects in "intermediate technology" and solar energy, for instance, strike me as mere sounding of the depth -- stones dropped off the edge. The existential philosophy of engineering constitutes a retreat to safe and familiar ground. It will take a sophisticated process of careful analysis, new conceptualization, invention, design, and experience, in order to be able to move forward here. Rather than rigidly defending old containers, we should be prepared to dissect concepts and institutions, and to fashion new tools with which to build for the future.

BOOK REVIEWS (cont'd)

ENERGY AND MAN: TECHNICAL AND SOCIAL ASPECTS OF ENERGY
M. GRANGER MORGAN (ed), IEEE Press, 1975

Reviewed by W. HOWARD CARD, Electrical and Computer Engineering, Syracuse University

This book contains 65 energy-related articles reprinted from about 33 different sources. All but three articles are dated 1971 or later. All but five were originally published in the United States. The papers are accompanied by about five pages of comments by the editor, three appendices, and two indexes.

The editor's stated objective is to draw together many of the highlights of the large body of material on "the technology of energy and its interactions with society" ... "to ease the burden on new students, and at the same time to provide a convenient reference source for professionals already working in the field."

The papers are grouped into five parts starting with Part I Reference Frame—The Earth System comprising seven papers. The first paper surveys total earth resources. The remaining six papers address the question of whether or not man's activities may in the future seriously affect the world's climate, and may even now, for example, have contributed to the drought in the Sahelian zone of Africa. These papers, along with the references cited by the editor, provide a good starting point for readers interested in world resources and in climate changes.

Part II An Overview of Energy Use in the United States comprises nine papers, including, as might be expected, the article from the September, 1971 Scientific American "The Flow of Energy in an Industrial Society" but, surprisingly, nothing from the Stanford Research Institute 1972 report. [1] Instead there are eight papers on a range of subjects. One paper "Underground Power Transmission by Superconducting Cable" contains useful descriptions of four of the largest electric power networks in the U. S. (Pacific coast, TVA, AEP, and Con Ed). Another paper compares 35 separate studies that have attempted to forecast future energy consumption. Several papers treat the energy-environment controversy; these express opinions ranging from "our national security is being placed in jeopardy" to "a balance can be achieved only within a broader framework, within what might properly be called an energy ethic."

Part III The Technology of Energy constitutes almost half the book and provides the nonspecialist with a glimpse of many of the technical areas of energy. There are three articles on geothermal energy, three on solar, one on windmills, one on ocean thermal, several on coal-fired electric plants, and five on nuclear. Also there are papers on batteries, fuel cells, liquid hydrogen, flywheels, pumped storage, Bonneville Power, and d-c transmission. Two papers on transportation energy provide an entry into this field. Readers of the IEEE Spectrum, Science, Scientific American, and Technology Review will find that they have already seen a third of the papers, and will find the other papers to be of a similar nature.

Part IV Social Issues—The Benefits and Costs of Energy consists of 11 papers including the editor's own paper

¹Stanford Research Institute, Patterns of Energy Consumption in the United States, Superintendent of Documents, U.S. Government Printing Office, Washington, DC, Jan. 1972.

from the Proceedings of the IEEE "The Social Costs of Producing Electric Power from Coal". These papers deal carefully with the correlation of energy consumption with economic growth, comparison of the environmental impacts of various energy sources (coal, oil, nuclear) for electric power stations, strip mining, and land reclamation. In addition there are articles on the human cost of nuclear power, including uranium mining, and a fascinating case study of an environmental-versus-nuclear controversy.

Finally, Part V Social Issues—Prices, Demand, Growth and Conservation concludes the book with five papers intended to provide an indication of current research; these include such topics as the effects of energy cost increases, elasticity of demand, and energy demand growth. The final two papers deal with the efficiency of energy use (including data from the 1972 SRI report [1]), and energy conservation by, for example, improved insulation of buildings.

I have two general and several minor criticisms. Too often the book uses secondary material, e.g. J. McCaull's (very readable) survey report on windmills, rather than selected original work of Heronemus or of Putnam; thus there is excessive preoccupation with the windmill efficiency, which really is not very important (the cost of energy production is paramount) and lack of clarity about the purpose of variable pitch blades. Another author says "they [AEP] have located the power-producing plants as close as possible to the fuel and hydro sources". Granted that a coal-fired electric plant can be located almost anywhere between the coal mine and the load, a hydroelectric plant has to be located very close to the supply of falling water. Unfortunately, there are numerous other examples of obscurities in some of the survey papers.

The second general criticism concerns the absence of any papers that propose alternative life styles that would require less energy. Thus, the fact Sweden's per capita energy consumption is less than half that of the United States yet Sweden has a higher standard of living passes virtually without comment. There is some mention of the high energy efficiency of walking and bicycling but many of the papers included seem to share the unsubstantiated and fatalistic view that "we could not now make any major move toward a lower per capita energy consumption without severe economic dislocation."

The minor criticisms include: the absence of references originally included with several papers; absence of necessary original page numbers in some papers; missed chances to correct typographic errors in original papers and references by the editor to the papers by numbers which do not appear in the finished book (e.g. "Papers 16 and 17 deal with ..."). The subject index is of very limited usefulness, (e.g., does not include TVA, insulation, or all the references to tidal power.) A number of other similar minor criticisms could also be made.

This book includes material not readily available to many potential readers. This fact, coupled with the well-balanced selection of papers (except as noted), means that the editor has achieved his objective. I recommend the book for engineers and scientists who want information outside of their own specialty, and students who want an introduction to the whole energy field.

LEADING FROM STRENGTH: TECHNOLOGY AND AMERICA'S FUTURE
PROCEEDINGS OF CENTENNIAL SYMPOSIUM ON TECHNOLOGY AND
PUBLIC POLICY, Vanderbilt University, 1975

Reviewed by GERALD RABOW, CSIT Working Group on Systems
Engineering and Public Technology

The Centennial Symposium on Technology and Public Policy, was held November 6-7, 1975 at Vanderbilt University, Nashville, Tennessee. It consisted of four sessions, whose featured speakers were respectively Emilio Q. Daddario, Director of the Office of Technology Assessment of the U.S. Congress and former member of the House of Representatives; John C. Sawhill, President of New York University and former Federal Energy Administrator; Simon Ramo, one of the founders of TRW Corporation; and Lewis M. Banscomb, Chief Scientist of IBM Corporation. Each of the featured speakers was followed by three or four panelists, giving their prepared responses, and this is included in the Proceedings, but subsequent discussion and comments from the audience are not included.

Some of the issues discussed were growth (whether to encourage it, how, and what kind of growth), living standards (should we bring everyone to ours, reduce ours, or maintain permanent inequality?), the relation of democracy and expertise, the removal of disincentives and use of proper incentives rather than regulation, and the proper mix of government sponsorship and private enterprise. For those who have not been exposed to dialogue on such issues, the Proceedings might be a good way to become acquainted with present thinking in the field of technology and public policy.

I found the results of the symposium rather disappointing. I perceived neither any significant new ideas, nor a synthesis of the different views of the participants. One comment I would single out for strong disagreement was made by panelist Frank L. Parker, Chairman of the Department of Socio-Engineering at Vanderbilt University: "As our economic and social system becomes more complex, it involves a higher degree of control and planning and less individual freedom of choice. This is necessarily so."

A higher degree of control and planning does not necessarily result in less individual freedom of choice. Poor control systems and planning may do that. A sup-

errior societal control system would not only seek to maximize the options available to individuals, but would also indicate to them (perhaps through incentives) how their choices might affect society.

Perhaps the best summary of both the merits and the shortcomings of the symposium was made by panelist Elmo R. Zumwalt, Jr., visiting professor of management at Vanderbilt University and former Chief of Naval Operations:

"Mr. Daddario's presentation of the manner in which the Congressional branch of our government is striving to deal with its responsibilities in connection with the promises, the threats, and the uncertainties which emerge from the ever expanding potential and influence of technology' struck me as thoughtful. Yet it also left me with a sense of unease. Upon reflection, I concluded that my problem was not with his evaluation of the five major dilemmas which face our society 'as a consequence of the rapid growth and expanding influence of technology.' I think that these dilemmas are well stated and comprise a reasonable starting inventory for the discussion. My concern is with the connotation that situation has in any important way begun to improve or that the Congress has met its responsibilities or in any way begun to deal with wisdom, foresight, and discipline with the complex problems we face in the subject area.

"I support the creation of OTA (Office of Technology Assessment). I think that the work it has done to date has been useful. But I believe that the OTA and its work is no more than a single fix on the voyage to the establishment of an appropriate political milieu for dealing with our evermore-inter-related and complex world, of which the exponential, uncontrolled growth in technology is an important subset."

Perhaps some future symposium will address itself to the establishment of such an "appropriate political milieu for dealing with our evermore-inter-related and complex world," and come up with proposals on how to organize a respectable fraction of our technological talent toward making progress in this direction.

LETTERS TO THE EDITOR

DEAR EDITOR:

I must take issue with several statements in your March 1976, editorial. It does not follow that because I advocate the development of nuclear power that I am an advocate of the arms race, nor that I advocate wasteful consumption. I believe that the mining of uranium ore and the ultimate disposal of radioactive wastes imposes less of an exploitive burden on the earth than the available practical option, which is the consumption of fossil fuels. I most resent the statement, "... nuclear power proponents unquestioningly and without discussion assume...". I personally find the evidence that electric energy consumption will increase to be persuasive. I did not arrive at that conclusion without question or discussion, and I cannot believe that the thousands of engineers who share my view are the naive, sophomoric technologists your statement implies.

Hilton U. Brown, III

EDITOR'S RESPONSE

Notwithstanding the vehemence of Mr. Brown's denial that he makes the kind of taken-for-granted assumptions claimed in the editorial, the wording of the letter clearly makes it evident that his agenda is circumscribed by just such thinking. The editorial pointed out that arguments on future energy use start from different conceptions of a satisfying life-style and an appropriate society. Any claim of a future "need" for energy must be based on some vision of society and how it uses energy. Almost invariably, those in the U.S. who see a large "need" in the future are looking through the glasses of Americans accustomed to an energy-intensive society of wasteful consumption and armaments production.

Mr. Brown claims that "the available practical option" to nuclear power is "the consumption of fossil fuels". That is, we must consume fuel, presumably in large amounts. But why? Our present level of well-being can be achieved at a far lower level of energy consumption. If the index of per capita consumption of energy in the U.S. is taken as 100, the corresponding values in a few other highly developed countries are [1]:

U.S.	100
Sweden	51
Germany	44
Switzerland	30

Each of the other countries has a living standard at least equal to that of the U.S., yet their average energy consumption is only some forty percent of ours.

Furthermore, that is only part of the story. Even this low per capita energy consumption can be substantially improved while still maintaining a thoroughly satisfying living standard; for example, by demilitarizing the world, changing production modes, and modifying styles of living. If Mr. Brown dismisses the above as not a "practical option", it must be only because he "assumed" it away; that it is practical is demonstrated in Switzerland.

Mr. Brown believes that "... electric energy consumption will increase..." [Editor's underline.] That, of

course, might be a political judgement. The evidence that he finds persuasive can be of two kinds: political and technical. Mr. Brown might simply be assessing the relative political forces and might be concluding that those who have a larger stake in increasing energy consumption have the greater political power; which is evidence enough that their will must prevail and justifies his conclusion that it "will increase" -- quite independently of whether such an increase is warranted by human welfare considerations. If this is the kind of evidence he has in mind, I withdraw from the arena.

But if the evidence he has in mind is of a different nature, consisting of quantitative projections of electric energy consumption, then the point of the editorial is valid. Such projections must, of necessity, be founded on assumptions about the nature of the coming society and the modes of life people will be leading. All too often, the premises of contemporary American ways of doing things are taken as unchallenged "givens"; they thus become self-fulfilling prophecies. No doubt there exist individuals who question these premises, but Mr. Brown would have been on firmer ground if he had provided references to the "evidence" in the literature: the projections of future energy consumption where these premises and assumptions have been questioned, alternative assumptions made, and projections of the resulting energy consumption made. Certainly the IEEE Board's January 29 statement -- which was the immediate impetus for the editorial -- was not founded on such an analysis.

1. The Contrasumers, A. J. Fritsch, Preger, 1974, p. 178-179.

The following letter is from the Association for Cooperation in Engineering (ACE) of which IEEE is a member.

To: Presidents of ACE Member Societies

The ACE Coordinating Committee on Energy believes that progress in reducing oil imports and conserving scarce energy resources require a vigorous campaign on the part of all engineers.

Consequently, the Board for Engineering Cooperation of ACE requests that each ACE society accept as one of its major programs a coordinated energy conservation and utilization initiative. This initiative is to serve as a guide for activities of the society, its local sections and its technical departments, and to be featured in its programs and publications.

In view of this request, I would appreciate your giving this widespread distribution throughout your society for that is the way in which the engineering profession can make a real contribution to solving the energy problem of the United States. Thank you for your cooperation in this matter.

Joseph J. Martin
Chairman, Association for
Cooperation in Engineering
Chemical Engineering Dept.
University of Michigan
Ann Arbor, Michigan 48109

DEAR EDITOR:

It was interesting to read your comments on our nuclear safety articles in the latest issue of CSIT Newsletter.

However, I think you may have been a bit hard on Gadi and myself in our interview format coverage of Messrs. Bridenbaugh, Hubbard, Minor, and Pollard. When someone makes a charge, it is quite proper to say that he "alleges" or "contends", or even "claims". In short, one cannot categorically say, without corroborating evidence that a charge is ipso facto incontrovertible proof.

Thus in the case of Pollard, I could only use these terms. I'm sure you will understand that as soon as he dissented with NRC and resigned, he was no longer privy to that Agency's plans, documents, criteria, and any other "hard copy" that would serve to support his contentions; and, he was the first one to admit that he could not back up his views by such prima facie evidence. In short, he made it a point to say in our telephone conversation that he "did not have total recall," and, therefore, did not wish to be crucified by NRC or the press if any of his facts and figures did not jibe with the documents and/or statistics in NRC's sole possession.

I'm sure you appreciate that when Pollard's charges were made, it was only proper to solicit and carry the other viewpoints; namely, those of NRC and Con Edison. The format of my article was not one of a debate, but merely that of a charge and a rebuttal. It was rather amusing to me, and perhaps you did not note it, but at times, NRC and Con Edison seemed to be at a variance in their rebuttals to the original allegation.

I hope this will help to explain the format of the published articles.

Gordon D. Friedlander
Senior Editor
IEEE Spectrum

EDITOR'S RESPONSE

1. The comments were not mine but those of Frank Kotasek, Jr., of the CSIT Working Group on Energy and the Environment, as indicated.

2. The second and third paragraphs of the letter seek to justify the use of terms like "alleges", "contends" and "claims" for the statements of Bridenbaugh, Hubbard, Minor and Pollard (BHMP). It is perfectly proper to use such terms, not only "when someone makes a charge" but when someone makes any statement, including a visual statement such as a photograph. (Remember the doctored photographs so effectively used by McCarthy 25 years ago.) But the point of Kotasek's article was the unequal treatment afforded BHMP's statements and those of

the rebutters. Such terms were not used to characterize the statement of NRC and Con Ed.

The items that cried out most strongly to be qualified by an "alleged" or a "contended" were the captions on the photographs on page 73 and on the cover of Spectrum. It is worth repeating these captions:

Cover: "Oil-soaked rags torched by Consolidated Edison on a mock-up of its Indian Point nuclear plant control and power cables, resulting in negligible damage." (Underlining supplied)

Page 73: "In a simulated test at Arthur Kill Station on Staten Island, Con Edison put the entire pack 'to the torch' to see what damage could possibly happen. The answer: virtually nothing." (Underlining supplied.)

Was this "torching" witnessed by Spectrum editors? Were the photographs taken by a Spectrum photographer at the test site or were they supplied in a press release by Con Ed? A call to the Spectrum offices elicited the reply that they were "supplied by an outside source." We are not told that a test was "allegedly" carried out and that the damage was "alleged" to have been negligible; not even that Con Ed says it was negligible.

3. The fourth paragraph also deserves comment. Notwithstanding the letter's disclaimer about the format, the first heading in the article reads: "A debate on the issues." There is an appearance of evenhandedness in giving Pollard's "charges" and the NRC and Con Ed rebuttals. In fact, Pollard's contentions are a response to initial statements and practices by NRC and Con Ed, which are in the public domain; they are the initiators of the debate. Kotasek's point was that they were given an opportunity for rebuttal while Pollard was not. (Incidentally, the score in column-inches is rebuttals 63, Pollard 24.) The fact that, as Friedlander notes, the NRC and Con Ed rebuttals were at times at variance with each other (Kotasek gave an example of this), should have been all the more reason for seeking Pollard's counter-rebuttal -- another 39 column-inches would have just pulled him even.

DEAR EDITOR:

Please print this in your next CSIT Newsletter:

To Members of CSIT:

Thank you for your continuous concern for IEEE employees.

Your proposals [in the June issue of CSIT Newsletter] concerning IEEE personnel practices are excellent and, if adopted, should be widely publicized -- for the greater benefit of all and to the credit of IEEE.

Esmi L. Bidstrup
Deputy - Educational, Field,
Standards and Technical
Services--IEEE

NEWS, NOTES, & COMMENT

ERDA ASSIGNS HIGHER NATIONAL PRIORITY TO CONSERVATION

In 1975 the Energy Research and Development Administration (ERDA) submitted to the President and the Congress a report entitled A National Plan for Energy Research, Development, and Demonstration: Creating Energy Choices for the Future (ERDA-48). It was recognized that such a plan is not static but will be modified by newly discovered energy supplies, changes in energy policy, scientific successes and failures, economic conditions, actual progress in introducing new technologies, and other circumstances. As a consequence, ERDA intends to report annually on progress in the preceding year and to revise its plan annually.

The first report (carrying the same title but designated ERDA 76-1) was issued in June 1976. The major revision in the Plan is the higher priority assigned to energy conservation:

"Conservation (energy efficiency) technologies are singled out for increased attention and are now ranked with several supply technologies as being of the highest priority for national action. The primary responsibility for developing and bringing into use improved technologies for energy efficiency rests with the private sector but the Federal Government is increasing its funding for this area to provide encouragement and stimulus, to the total national effort."

The total allocation for energy RD&D has been increased in the FY 1977 budget by 34 percent over FY 1976. The corresponding increase for energy conservation is 64 percent -- going from \$55 million to \$91 million. These amounts are dwarfed by the budget for nuclear power.

	FY 1976	FY 1977	% Increase
Fission reactors	\$522M	\$709M	36
Waste Management & fuel reprocessing	163	282	73
Total	685	991	45

IMPROVEMENT IN IEEE LIFE INSURANCE PLAN

An improvement in the IEEE life insurance plan is scheduled to go into effect on September 1. There will be a 20 percent increase in member benefits with no extra charge for everyone under the age of 61, except for residents of Texas and Wisconsin.

According to IEEE General Manager Schulke:

"Coverage will be available to members under 61 years of age in multiples of \$12,000. There will also be an increase in maximum member coverage from \$100,000 to \$120,000 except for residents in Wisconsin.

In addition, a technical adjustment to conform with modern actuarial tables will further reduce the cost of coverage for members under age 45, except in Texas and Wisconsin. Another benefit is that maximum coverage for spouses in all states except Wisconsin will be increased to \$35,000 in multiples of \$5,000.

While it is not possible to make all of these changes in the coverage available under the indi-

vidual policies for Texas and Wisconsin residents, arrangements have been made so that, to the extent dividends permit, residents of these states will receive an extra dividend credit designed to reduce the net cost of their coverage to the level provided in other states."

Members who wish to obtain additional information about the Life Insurance Plan or any of the other coverages available as part of the IEEE Group Insurance Program should get in touch with the IEEE Administrator, 1707 L Street, N.W., Suite 700, Washington, D.C. 20036. The telephone number is (202) 296-8030.

"SCIENCE COURT" INCUBATING

In many controversial technical issues (eg. the SST, ABM, issue of fluorocarbons) not only are there contentions over policy options, but even the basic facts are in dispute. A proposal has been floating around for a few years to resolve the "scientific facts" of such issues through an adversary proceeding before a Science Court -- a panel of sophisticated scientist-judges. Experts would be appointed to argue each side of the case, subject to cross-examination by the opposing side. The judges -- who would presumably be in a better position to detect errors and to see through scientific camouflage -- would issue their conclusions on the scientific facts. They would not concern themselves with policy recommendations. Government decision-makers and regulators would then use this information as one of several inputs.

A federally-funded experiment to try out the idea seems imminent. The Department of Commerce is one agency that has an interest in the Science Court idea. This fall it is sponsoring a meeting to be held on 20 and 21 September at the Xerox Center, Leesburg, Va. (For information, contact Florence Feinberg, Department of Commerce, Washington. Phone (202) 377-5065.) At the meeting, proponents and opponents of the Science Court idea will have an opportunity to state and debate their positions. In addition, people on various sides of past and current technical controversies will attempt to agree on ground rules for the adversary proceeding.

The National Academy of Sciences (NAS) is working on a proposal (to be funded by NSF) to explore a number of different models for resolving technical controversies, including the "science court" model. There is considerable skepticism at NAS about the validity of any test that they might come up with. The feeling that adversary proceedings are not the best way to illuminate technical controversies is wide-spread.

In the meantime, a task force of the Presidential Advisory Group has been meeting to iron out the idea. It has just issued a report proposing many of the details of an experiment. [1] According to the report, the Task Force will select one or more "issues" to be used in the experiment, issues in which "facts and values" can be easily separated. "Case managers" will then be selected by the Science Court to argue both sides of the case, perhaps on the basis of proposals solicited. A panel of judges will be selected, after challenges for bias by the case managers, from a list certified by the Science Court -- or perhaps by institutions such as NAS. A referee -- having a function somewhat like that of a parliamentarian -- would be selected by the Science Court to ensure adherence to the rules of procedures.

POLITICS and REASON

A presidential campaign is a fine spectacle. If it is no more than that, for whatever reasons, it is time to ask why. When the republic was being arranged, the Federalist papers burrowed deeply into regions of political thought and meanings. Nearly two centuries later, the ordained rhythms of politics seem an end in themselves, concerned with a transition of parties and power but not a transition of reason or purpose. It is a troubling curtain raiser on our third century.

The functions of elective politics is to choose leadership. This is a choice to be grounded on substance rather than on electronic and acoustic images. The characters and abilities of the potential leaders enter into making the choice, but it is the substance that defines the quality of the choice. What are the terms on which an affluent and technologically powerful nation proposes to conduct its affairs in a troubled world? For that matter, are affluence and power, together with the means to secure and persevere them to be the continued goals of our public policies and the measure of effective leadership? If not affluence and power, then what? In the scramble for votes, who is going to speak of such matters, and who will listen?

It may be said fairly that this is a brimming century of information and knowledge. Science, technology, and humanism have all spread a feast of information before us for the taking. Our comprehension of the human condition and its dilemmas is not yet what it should be, but there is no denying that we know enough to grasp the dimensions of our responsibilities and the consequences of trifling with them. If the turmoil of the past decade has resulted only in giving issue politics a permanent bad name, we are in trouble. At the margins of one's memory there is an echo of Adlai Stevenson's advice to a Princeton senior class: to touch the truth and feel the hem of heaven.

For at least two decades, American science with good reason has argued for something resembling a national science policy framework. Some of the elements of such policy are now written into recent legislation. Even so, it seems more likely that the future directions of

science and technology in the United States will be shaped by the working premises, values, and general mind-set of the country. If the accepted proposition were to be, for instance, the unconstrained economic growth is the consensus goal, then science and technology would be called upon to support it. If, instead, the common sense is that compulsive and unqualified growth will lead to new disorders and the exhaustion of both resources and human tolerance, then science and technology would have a very different agenda. How does knowledge get worked into so fundamental a choice as this?

It is a very large and real question. Rufus Miles, in a provocative book,* argues that we are close not only to the limits of growth but to the limits of political solutions. A hundred years ago Thomas Huxley saw what was coming and observed that "Size is not grandeur and territory does not make a nation. The great question is what are you going to do with all this? What is to be the end of which this will be the means?"

There is still time for a politics of reason. It has been in fashion to parade the costly failures of knowledge. Too little has been said of its indispensability. To pin the future simplistically to the idea that more is bound to be better, without recycling Huxley's questions, is to ignore the profound dilemmas in the relationship between power and responsibility. Nor is it enough to be content with assurances of the future health and exuberance of science and technology, apart from addressing their uses. This is what "science and public policy" ought to mean to us: a reach for higher ground in the partnership of knowledge with governance.

WILLIAM D. CAREY, Executive Officer of AAAS and
Publisher of Science

*R.E. Miles, Jr., Awakening from the American Dream,
(Universe Books, NY, 1976).

[The above editorial is reprinted from Science, Vol 193,
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Association for the Advancement of Science.

NEWS, NOTES, & COMMENT (cont'd)

This person would presumably be a scientist. Funding will be sought from NSF and possibly foundations and industry.

From the issue at hand, which will no doubt be value-laden and controversial, the case managers will distill series of factual statements. These can be accepted or challenged by the opposing side. Attempts will be made to mediate challenged statements in order to get acceptance. Failing this, resort will be had to the adversary proceeding whose details are still under discussion. (Eg. written or oral argument, subpoena power or not.) An important distinction from a court of law will be that scientific, not legal, rules of evidence would be applied. The proceedings of the Science Court would be public. At the end of the proceeding, and after deliberation, the judges would give their opinions about the "facts" under contention, stating where sufficient scientific knowledge does not exist and suggesting areas where research should be undertaken. The final step will be to evaluate the experiment.

Outright opposition to the idea of a Science Court has been expressed by the Scientists Institute for Public

Information (SIPI) on the grounds that such a science court would introduce authoritarianism into science, establishing an "official line" from which individuals would find it increasingly more difficult to stray.

The Science Court notion is predicated on the idea that it is indeed possible to separate values and ideology from what is called "scientific facts" -- a doubtful proposition. Furthermore, by directing energy toward resolution of "scientific facts", issues can be posed in such a way that one possible policy option is ruled out from the beginning. An illustration is provided by the Task Force report where one of the examples of issues under consideration is: "Is Red Dye #40 safer than Red Dye #2?" The answer to that question is no doubt interesting to some people. The idea is that if a Science Court resolves that #40 is safer than #2, the Government decision-maker can authorize the use of #40 as a food coloring. But the really important question is: why put chemical dyes in human food?

1. "The Science Court Experiment: An Interim Report",
Science, 20 August 1976.