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Machines Don't Fail—People Do

EDWIN F. SHELLEY

On the evening of April 24, 1980, the United States launched a dramatic military operation to rescue the 50 American hostages held in Teheran. In the early hours of the following morning the rescue mission was aborted because of the mechanical failure of three out of eight helicopters assigned to the mission. Eight American servicemen died during the withdrawal operation.

More recently, on June 3rd and then again on June 6th a computer failure in our air defense system triggered an erroneous warning that Russian missiles were launched and speeding toward targets in the United States. Nuclear countermeasures were initiated, and retaliatory strikes were finally called off after several minutes of frantic checking to determine the validity of the computer signals.

The avalanche of political comment on the tragic failure of the rescue mission and on the close brush with nuclear Armageddon has obscured a crucial lesson for all Americans: if we wish to preserve our independence as a nation and our freedom as a people we must overhaul our attitude toward personal responsibility in our work.

Machines do not fail—the people who design, build, operate or maintain them fail. There was a time when trains rarely derailed, when cranes rarely buckled, when roofs rarely collapsed and when standard military gear functioned even in a storm. A failure rate of three out of eight (almost 40%!) would have destroyed the U.S. space program long before we landed on the moon. It would

have paralyzed the invasion forces on D day and lost World War II for the Allies. An airline failure rate of three planes out of eight would stop all air travel. An unresolved failure in the air defense computer system could launch World War III.

Yet a high failure rate, routinely blamed on machines, is becoming typical of much of American society today. When your department store keeps dunning you for a bill that you have already paid, the so-called "computer error" was caused by an ordinary clerk pressing a wrong key or an ordinary programmer who didn't allow for contingencies. When you buy a new automobile and spend the next six months in and out of the shop getting it to run properly, it is not machine failure, it is a failure by a careless designer, assembler, inspector or manager responsible for the car's production or delivery. When you get your wedding invitations back from the printer and the

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Edwin F. Shelley was a flight test engineer during World War II and designed military ordnance for the Army, Navy and Air Force in the 1950's. He is Director of the Center for Energy Policy and Research at New York Institute of Technology.

First CSIT Regional Group Formed

A working group of the IEEE Committee on Social Implications of Technology has been established in the Washington, DC area. Following preliminary efforts of over a year sparked by Terry Hewitt, two general meetings of the group were held early this summer.

The first public effort planned by the group is a dinner-meeting scheduled for October. The principal speaker is to be a member of the federal government who has an active interest in the interrelationship of technology and society.

The working group is also making efforts to expand its membership. IEEE members in the Washington, Maryland and Virginia area who are interested in information on the working group are asked to contact either of the following:

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Subscription Rate Increase

Although the number of subscribers to *Technology & Society* is at a record high, publication costs have also been going up so that we have been operating in the red. Starting in 1981, the annual subscription rate is being raised to \$3. This is the first increase since 1977 when the \$2 annual rate was instituted.

Redfield Appointed DOE Advisor

CSIT member David Redfield has been appointed to the Solar Photovoltaic Energy Advisory Committee of DOE's Energy Research Advisory Board. The appointment was made by Deputy Secretary John Sawhill upon nomination by IEEE. Redfield is also Chairman of the IEEE Photovoltaic Standards Coordinating Committee. Unfortunately, the demands on his time from these two activities will prevent him from remaining active on CSIT. He is being replaced as the CSIT delegate to the IEEE Energy Committee by Tony Robbi, who had been our alternate on the Committee.

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Moral Reasoning and Engineering

MICHAEL S. PRITCHARD

Quite recently schools of engineering, like other professional schools, have been attempting to introduce an ethical dimension into their curricular offerings. The reasons for this are various, but they are not the specific concern of this paper. The primary purpose of this paper is to suggest some ways in which philosophy, with the aid of developmental psychology, might contribute to the teaching of engineering ethics to engineering students.

I. The Problem

It is clear that in order for philosophers to contribute to engineering ethics, they must familiarize themselves with the various kinds of contexts within which engineering practice takes place. This does not require them to become engineers themselves, but it does require consultation with engineers and considerable time and energy. On the other hand, few engineers have much familiarity with moral philosophy and they typically have so many other professional responsibilities that they cannot realistically be expected to devote large amounts of time to the study of moral philosophy. Still, philosophers and engineers should be conversant with one another where moral philosophy and engineering ethics can fruitfully be joined. Unfortunately, very little of the present literature facilitates this joining. Philosophical writings seldom are addressed explicitly to an engineering context. Most of the literature from engineering that deals with ethics is too restricted to specific cases (and perhaps the relevant codes of ethics) to dwell on the more philosophical issues that could be raised. This gap between the philosophical and engineering literature is similar to that which existed in the early phases of the development of what has now come to be called medical ethics. As the study of medical ethics has progressed, this gap has significantly decreased (see, e.g., 12). But this takes time. Meanwhile, there is some uncertainty in the engineering area about just what philosophy might be able to contribute, even though many engineers and philosophers are convinced that something positive eventually will emerge. (This cautious optimism is supported by the ongoing work of two NSF/NEH workshops consisting of engineers and philosophers centered at Rensselaer Polytechnic Institute and the Illinois Institute of Technology.)

Matters are complicated by two further factors. First, most engineering programs presently have very little room for much concentrated study of ethics. Typically, at most only one or two credit courses are offered. Philosophers might wish for more, but they have little reason to expect it at this time. Second, most engineering students have little

or no background in philosophy; and they can be expected to be more interested in concrete problems in engineering than in the abstract writings of philosophers.

So, the rather formidable task is to develop, within the constraints outlined here, efficient but effective ways of bringing moral philosophy to bear on the teaching of engineering ethics. I now turn to what seems to be a promising, though problematic, line of inquiry.

II. Lawrence Kohlberg's Theory of Moral Education

I will use Lawrence Kohlberg's theory of moral development as a point of entry. Before recommending a particular use of this theory, it is necessary briefly to discuss the nature of the theory itself.

Lawrence Kohlberg is a developmental psychologist at Harvard University who, inspired by Jean Piaget's early studies of moral development (8), has done extensive research for over 20 years on the moral development of children and adults (3, 7). Unlike Freud, Kohlberg believes that moral development undergoes significant structural changes well into adulthood. Following the lead of Piaget, Kohlberg stresses the importance of cognitive aspects of moral development. Moral development in the child consists in the gradual adoption of more and more logically sophisticated forms of moral reasoning. This presumably takes place in an invariant, sequential manner. For Kohlberg, there are six qualitatively distinct stages of moral development. Transition from one stage to the next supposedly is facilitated by the experience of moral conflict that cannot be resolved at one's present level of development. This "dis-equilibrium" is overcome by the adoption of a more sophisticated level of logical thinking and, Kohlberg thinks, a more adequate form of moral reasoning. So, moral development must wait upon logical development, which Kohlberg, like Piaget, says takes place in stages.

Kohlberg's stages are divided into three levels, each of which consists of two stages. These can be outlined roughly as follows. (For a more complete account, see 3 and 7.) First, there is a pre-conventional level with a predominantly self-interested orientation. Stage 1 is marked by the fear of punishment and the hope of reward. Stage 2 is the "back-scratching" stage—the idea of reciprocity appears in the form of "You scratch my back and I'll scratch yours." These first two stages are characterized as highly egocentric—the child at this level apparently has difficulty understanding the perspectives of others. There is a tendency to assume that others see things just the way the he or she does. So, a young child may give a present to another child that is of no real interest to that other child—the first child mistakenly assumes that the second child shares the same interests.

It is important to make note of egocentrism because it

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also appears in adult life, and it can interfere with the type of reciprocal thinking in the Golden Rule type reasoning that first appears at stage 3 in Kohlberg's theory. This type of reasoning requires that we imaginatively and sympathetically "put ourselves in the other's shoes." You might recall Woody Allen in the movie *Annie Hall*. While waiting in line to see a movie, Annie is obviously very upset because she has missed her therapy session. Woody is obviously concerned about how this will affect their sex life. Annie then bitterly comments, "You're so egocentric that when I tell you I'm upset because I missed my therapy session, all you can think of is how it will affect you." Or, there is Bill Russell, former NBA basketball star, commenting on the difficulty he had applying the Golden Rule to his players while he was coaching the then unsuccessful Seattle Supersonics: "I tried to treat them like me—and some of them weren't." (Cited in *Sports Illustrated*, July 11, 1977.) Finally, my favorite illustration is at my own expense. While explaining to a moral philosophy class what Kohlberg means by egocentric thinking, one of my students remarked: "I think I get it. An example would be—you're interested in Kohlberg, so you assume that we will be, too!"

The second level of moral development on Kohlberg's theory is called conventional morality. Stage 3 is based on a genuine concern for others—as expressed in friendship, loyalty, and the desire for social approval. Stage 4 is grounded in respect for authority and social order—institutional, legal or religious. Both conventional stages are characterized by pressures to conform to current commonly accepted moral standards and rules. These pressures may come from peers in the form of social approval or disapproval. In institutional settings "group think" phenomena illustrate conventional morality.

The third level of Kohlberg's theory is called postconventional. This is the level of critical morality. It is marked by critical reflection on the types of moral reasoning used in the earlier stages. These types of reasoning are examined for their shortcomings, and they are no longer accepted without question. Kohlberg is apparently convinced that this critical perspective ultimately leads one to autonomously accept universal principles of justice and human rights. His articulation of stages 5 and 6 has been challenged on many grounds. But, from the developmental standpoint, the most striking contrast between the earlier stages and these last two stages is that stages 5 and 6 are self-reflective; and those who reason at this level exhibit greater independence of mind in moral judgement.

At each stage in the entire account what receives emphasis is how one reasons to a conclusion, rather than the conclusion itself. It is quite possible for opposite conclusions to be drawn from the same type of reasoning. For example, compare these two examples of what Kohlberg would call stage 2 reasoning. In the play, *Little Orphan Annie*, Daddy Warbucks: "You don't have to be nice to the people you meet on the way up, if you're not coming back down again." The more cautious John Wooden allegedly told his players after UCLA won the NCAA basketball title in 1964: "Be gracious to those whom you

have defeated on the way up to this pinnacle, because you will be meeting those same people on the way down."

III. Applications of Kohlberg to Engineering Ethics

Although Kohlberg's theory has by no means won universal acceptance from philosophers and educators, it has received rather widespread acceptance among educators in the primary and secondary schools. It has been put to various uses in classrooms across the country, and it seems to have an ever-growing number of advocates. It has even been applied in prisons. However, neither Kohlberg's original theory nor the case studies developed to put the theory into practice were framed with an eye on professional ethics in general, or engineering ethics in particular. Recently Richard McCuen, a civil engineer at the University of Maryland, has attempted an adaptation of Kohlberg's theory to engineering ethics (4) that provided the germs for my present reflections.

McCuen has postulated three levels of professional development, each of which parallels in certain respects Kohlberg's three levels, and each of which contains two stages. The three levels are labeled, respectively, "preprofessional," "fundamental professional," and "principled professional." (See Appendix I for the full description of McCuen's stages.)

McCuen's initial study raises particularly interesting questions. He devised a questionnaire consisting of Kohlberg-like moral dilemmas. He thought this would enable him to determine the stages of professional development of engineering students. His initial study suggested to him that those beginning their study of engineering typically reason at stages 1-3, while those with more engineering experience show a greater tendency to reason at higher levels. Still, he concluded, the vast majority do not employ stages 5 or 6. This seemed to parallel Kohlberg's claim that 80% of the adult population in this country reason at stage 4 or lower.

On the face of it, McCuen's study should be of considerable interest to engineers—especially those who take engineering codes of ethics seriously. Most of these codes insist that the paramount duty of the engineer is to enhance the safety, health and welfare of the public in the performance of professional duties. McCuen quite plausibly holds that this requires stage 5 or 6 reasoning. Furthermore, historically the codes seem to have moved from stage 3 and 4 concerns with loyalty to client, employer and the profession to the more autonomous stages at which engineers may be expected to exercise greater independence of judgement—even to the point of whistle-blowing.

However, whatever initial appeal the Kohlberg/McCuen approach might seem to have, it must be examined with great care. McCuen's initial use of Kohlberg's theory assumes the fundamental validity of Kohlberg's stage theory of moral development—both in regard to the empirical data it relies upon and in regard to the somewhat controversial philosophical and moral assumptions built into the theory. There should be concern about the ability of the evaluators to interpret the results of any testing instrument. And, there should be concern about the use to

which any such testing might be put—for example, as a possible test of ethical competency to enter the profession. The latter is particularly worrisome, since there is not only reason to doubt the validity of the standards of measure (as I will argue later), but also some question about the right to exclude someone from entering the profession on such grounds, even if the standards of measure were valid.

Given all of the above worries, one may fairly ask what relevance Kohlberg's theory has to the teaching of engineering ethics. At this point in time I would discourage any use of the theory that *assumes* its validity as a reliable measuring rod of the moral development of engineering students. There are too many questions about the theory that need to be answered. This is the only kind of use of the theory suggested by either Kohlberg or McCuen. My suggestion, instead, is that the theory be used as a teaching tool in the following way. First, students can be presented with a few case studies that pose ethical questions. An attempt can be made to get the students to articulate the reasons they would give for resolving the questions in whatever ways they do. Then Kohlberg's theory (along with McCuen's parallel account, if desired) can be presented to the students for their consideration. They can be invited to try to appraise their reasoning according to Kohlberg's criteria. Then they should be encouraged to appraise Kohlberg's theory itself.

In this way Kohlberg's theory can be used as a means for identifying and evaluating the students' own ways of moral reasoning. But it will be done in an above-the-table manner so that there need be no fear of a "hidden agenda" that may be secretly used to their disadvantage. Using the theory in this way can be a means of encouraging systematic, philosophical thinking in the context of engineering. This is because, in fact, Kohlberg's theory addresses itself to basic issues of ethical theory. The standard theories of egoism, utilitarianism, and Kantianism, for example, all receive attention. But they receive it in the context of case studies (the examples present in Kohlberg and McCuen's questionnaires). So, the problem of the abstractness of ethical theory is partly overcome (especially if good engineering examples are selected). And ethical theory is introduced without the immediate need for a heavy investment of time in reading philosophical works. This self-examination via Kohlberg's theory can result in substantial critique of the theory itself. There is no reason why engineering students, or anyone else, need unreflectively accept Kohlberg or McCuen's theories.

Students can be invited to analyze and evaluate thinking in other ways insofar as they are dissatisfied with the Kohlberg/McCuen approach. Their instructors and fellow students can assist them in this through open and critical dialogue. Since Kohlberg has concentrated on the moral development of children, it is understandable that he would not use his theory as a vehicle for generating philosophical reflection in this way. If Piaget and Kohlberg are right about cognitive development, children operate at different cognitive levels. And younger children presumably would not be sufficiently developed cognitively to reflect in this way on how they reason. But engineer-

ing students, engineering teachers, and practicing engineers are all cognitively well developed. So, there is no reason why they cannot be presented with the theory for their consideration.

When I have used Kohlberg's theory this way in my moral philosophy classes, the results have been quite useful. My students seem to be very interested in considering theories about why they have moral concerns and in discussing the extent to which their moral beliefs and moral reasoning have been shaped by their parents, their peers, and their social environment. One of the more valuable things that quickly emerges from the examination of Kohlberg's theory is that students find it difficult to deny that they do have the capacity to reflectively consider and perhaps modify the beliefs that they may previously have accepted uncritically. I suspect that students who are confronted with Kohlberg and McCuen's evaluation of their reasoning about moral issues will be more highly motivated to examine ethical theories than when those theories are simply paraded past them, as in the typical introductions to philosophical ethics.

IV. Objections to Kohlberg's Theory

Earlier I indicated that I would raise some objections to Kohlberg's theory. This can best be done through an examination of examples. Not only will this illustrate some of the shortcomings of Kohlberg's theory, it can also point constructively in the direction of needed further lines of inquiry for those interested in engineering ethics. I will present two examples, the second of which is directly relevant to an engineering context. Both examples focus on dimensions of morality that do not receive adequate attention in Kohlberg's and McCuen's theories.

Neither Kohlberg nor McCuen address the quite legitimate concerns we might have about such things as the right to protect one's self-interest, reasonable limits to self-sacrifice, and the importance we attach to self-respect and personal integrity. Interestingly, the codes of engineering ethics do not address themselves to these concerns either. What an examination of the two examples will bring to light is the need to consider the rights of engineers in relation to their alleged responsibilities. And this examination will raise the question of whether the working contexts of practicing engineers need modification in order to accommodate those rights and responsibilities.

Example #1:

Nine-year-old Ralph Heard, Jr., didn't think he was a hero for saving his mother and brother from their burning apartment last year. Neither, it appeared, did anyone else in Atlanta. No local paper reported the fire; a neighbor whom Ralph helped rescue sued for damages because the flames had started in the Heard apartment, and when Ralph returned to Kimberley Elementary School after six weeks in an emergency unit (where it was feared that facial burns had blinded him), classmates jeered at his head-mask with taunts of "burnt boy."

Ralph came home in tears most days—sobbing as he never had at the burns that seared 50 percent of his body. But eventually justice triumphed, sort of. After Ralph's mother moved the family to a new school district, a visiting fire marshal noticed Ralph's mask and asked for explanations. The story touched off a string of tardy tributes from a local radio station, the Hartford Insurance

Group, Atlanta Mayor Maynard Jackson and even the Governor—who honored him with a special proclamation in the gold-domed capitol.

Still, Ralph hasn't lost sight of the painful surgery ahead or of the painful mockery behind him. "Yes, I'd do it again," he answered a reporter after pondering for several minutes. "But only for my family. Not for nobody else." (*Newsweek*, August 6, 1979, p. 50)

This example might be compared with Kohlberg's famous Heinz example. Kohlberg apparently thinks that the highest stage of moral development would insist that Heinz should be as willing to steal a needed cancer-curing drug for a stranger as for his wife—since, at the highest level of morality, it can be seen that it is human life, as such, that is to be valued, not simply the human life of a loved one. What would Kohlberg say of young Ralph's reasoning after his ordeal? Since at one time Ralph actually risked his life to help save a neighbor, this suggests that Ralph was at least at stage 3. However, now Ralph says that he would do it again, but only for his family. This, on Kohlberg's view, would seem to constitute moral regression, perhaps even to stage 2 (where actual reciprocation occurs, in contrast to ideal, or imaginative, reciprocation at stage 3).

But, would this be a fair analysis? Ralph's heroic efforts resulted in derision by his classmates and a lawsuit on the part of his neighbor. The derision threatened his self-esteem. Is it not perfectly rational, and morally acceptable, in such a circumstance to refuse to do again something that might have such consequences? What is especially interesting about this example is that it is Ralph's sensitivity to what his peers think of him (stage 3) that resulted in his "regression" to stage 2.

Ralph was subjected to humiliation and a lack of gratitude. His self-esteem was under attack—and unfairly so. Rather than betraying a lack of moral maturity on Ralph's part, this example seems to illustrate some serious problems in the social environment within which Ralph must live. The problem is much larger than Ralph.

Example #2:

The duty not to harm the public welfare or safety.

This example is an adaption of one provided by Norman Bowie's Center for the Study of Values at the University of Delaware. It exemplifies the kind of situation many might find themselves in when working in a corporate structure. Imagine a design engineer, John Williams, who is convinced that the lawnmower being produced in the Lawn & Garden Division of his corporation is unreasonably unsafe. The consensus among the design engineers is that it will be another six months before the mower can be redesigned in such a way that the safety hazard is significantly reduced. However, if the corporation does not go ahead with the present design, the corporation will suffer a serious economic setback. Further suppose that, despite the objections of the design engineers, the president of the corporation has ordered a go-ahead on the mower. Finally, suppose that John is a member of the National

Society of Professional Engineers (NSPE), which has a Code of Ethics requiring its members to hold paramount the safety, health and welfare of the public in the performance of their professional duties.

Should John become a "whistleblower?" Some might plausibly argue that he should. Kohlberg seemingly would support this view. Now, what would Kohlberg say if John said, "If I blow the whistle, what good will come of it? I'd probably lose my job." Insofar as John's defense rests on self-interest, it sounds like stage 1 or 2. So, on Kohlberg's analysis, it seems that John is operating at a rather low level of moral reasoning.

But suppose that the truth of the matter is this. John knows well that his peers would look with tremendous disapproval at his blowing the whistle. After all, whistleblowers are "tattlers," or "rats." Besides, John's peers might regard his whistleblowing as an act of disloyalty to his employers—as well as an act that could have potentially harmful consequences for all of those associated with the corporation (loss of profits, possible sanctions taken against the corporation). These are all stage 3 concerns. And if one introduces regard for the authority structure within the corporation, stage 4 considerations arise. So, insofar as John is sensitive to stage 3 and 4 considerations, he will see himself as having some reason to refrain from blowing the whistle.

However, he may not be satisfied to resolve the issue in terms of stage 3 or 4 reasoning, for he may feel guilty about not doing anything further to forestall the lawnmower being put on the market. That is, he may feel the pull of public responsibility, a stage 5 or 6 consideration according to Kohlberg and McCuen. Still, given all of the above, it would take a great deal of courage to blow the whistle. And heroism is not usually regarded to be a moral requirement. But John might regard his stage 3 or 4 reluctance to blow the whistle as a sign of moral cowardice. Few of us are willing to acknowledge and accept such cowardice in ourselves. So, we may look for ways to rationalize our inaction. To maintain self-respect, we may fall back on postures like John's, "I have to look out for myself, I can't afford to lose my job; what good will it do anyway?"

Apparently Kohlberg would characterize such a posture as preconventional. Yet it is precipitated by elements characteristic of conventional, stage 3 and 4 morality, as well as the postconventional concerns expressed in the NSPE Code of Ethics. So, ironically, John's "regression" to stage 2 reasoning could be the result of the conflict raised by his reasoning at stages 3, 4, and 5 or 6.

It seems that the problem transcends the individuals whose moral reasoning is being analyzed in Kohlbergian terms. If heroism is not a moral requirement, then we should not always expect individuals to reason in the manner commended by Kohlberg's stages 5 and 6. And those who reason at "lower" stages should not necessarily be thought of as less morally mature than those who reason at stages 5 and 6. If we nevertheless believe that it would be desirable for individuals to reason at stages 5 and 6, then we must attend to the social and institutional structures that inhibit as well as enhance moral development.

Before concluding with Kohlberg and McCuen that those who do not satisfy the criteria for their stages 5 and 6 are using less than fully adequate forms of moral reasoning, we need to take a closer look at the contexts within which this reasoning takes place.

When we do take a closer look, it is likely that the moral landscape will appear much more unclear and problematic than the Kohlberg/McCuen account suggests. Before concluding that an infrequency of stage 5 and 6 responses indicates a lack of moral maturation, one must determine to what extent that infrequency is a function of the appropriateness of *other* sorts of responses. It should be noted that if it is arguable that other sorts of responses are sometimes appropriate, serious doubt is cast on the adequacy of Kohlberg's characterization of moral reasoning in terms of different *stages*. Instead, we might better talk about different types of reasoning that are appropriate or inappropriate for different kinds of situations. Thus viewed, those who are morally the most "mature" would be those who most consistently use appropriate types of reasoning in different types of situations calling for practical decisions. Insofar as we are in the dark about what is appropriate, we are bound to be uncertain about what constitutes moral maturity. This simply reinforces the importance of engineering students continuing to reflect on their moral reasoning.

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Appendix I: McCuen's Stages of Professional Conduct Development

Preprofessional Level

At this level, the ethicality of professional conduct is measured only in terms of the overall consequences to

oneself. Such an egocentric orientation does not provide for moral judgment in terms of the consequences to the firm, the profession, or society. Human welfare is not considered as an element in judging the morality of professional action. Respect is motivated only by the power of those who can directly affect the individual.

Stage 1. The individual is totally ignorant of one's professional responsibilities. Proper professional conduct is determined by the direct consequences to the individual, with no regard for the consequences to the firm, the profession, or society. The individual does not work in a relation of confidence with a client or the firm and views these relationships only in terms of the value of the firm and the client to oneself.

Stage 2. While the egocentric orientation of stage 1 professional conduct remains, an individual at stage 2 views professional behavior with a "marketplace" orientation. In contrast with stage 1 behavior, the individual is aware of the place of the firm and the profession in serving society's needs. However, this awareness does not serve as a primary motivation for professional conduct and the absence of loyalty to the firm and the profession still remains. The element of reciprocity will be evident in professional conduct but it will be interpreted in a pragmatic way.

Fundamental Professional Level

At this level, the individual acknowledges the firm and the profession as the primary factors in the determination of proper professional conduct. Loyalty to and support of the firm and the profession are used as yardsticks for measuring proper professional conduct. This professional behavior orientation places the needs of firm and the profession above the needs of both the individual and human welfare.

Stage 3. At this stage, behavior involves a loyalty to the firm but without recognition of the service of the firm in meeting the needs of the profession and society. The individual judges proper professional conduct as that which benefits the firm.

Stage 4. At this stage, the individual recognizes the firm as part of the profession, with support and loyalty to the profession to be in the best interests of the firm. However, human welfare is not recognized as being a primary factor in moral action. One earns respect by serving the firm and the profession in a way that reflects a maintenance of professional unity.

Principled Professional Level

At this level, the fundamental principles of professional conduct have validity and application apart from the authority of the firm and the profession and apart from the individual's own identification with the firm and the profession. Service by the individual in support of human welfare is recognized as being in the best interests of the firm and the profession, as well as society. Proper professional conduct is measured in terms of the benefit to human welfare.

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Implications of Computer Use in Politics

ARSENIO B. TALINGDAN

Everyone is familiar with the use of computers to tabulate election day results and to make predictions as to the eventual winner. What people are not so familiar with is the use of computers in other areas of the electoral process.

A prodigious amount of time, money, effort and planning goes into an electoral campaign today. This is due in large part to an increase in the sophistication of the citizenry, a greater variety of issues which concern individual citizens, higher mobility, and a decrease in their group or party loyalty. Further, the candidate must cope with a large number of voters who decline to be involved in the electoral process for a variety of reasons.

This paper will attempt to discuss the implications of computer use in politics. In large part, it will deal with the issue from the viewpoint of a politician's use of computers, and will deal only fleetingly with the flip side of the coin—the use of computers by voters to make political decisions (e.g., use of a system similar to the Viewdata system for instant voting)—primarily because of a lack of material on and actual use of the latter.

First, I will discuss the potential uses of the computer in the electoral process, providing examples of actual use where applicable. Second, I will discuss the implications of computer use, providing, at the very least, some questions to consider about the effect that computers may have on the nature of politics.

Potential Uses of the Computer

Most of the uses to which computers have been put in the political area has been by candidates for office. This is due, perhaps, to the greater resources available to candidates, as opposed to citizens to lavish on computers. Candidates generally have sufficient financial resources to acquire the hardware and the skill to use computers. Most individuals at present either lack the skills or the money to use computers. This has been changing of late, with the drop in hardware costs and the increased teaching of computer courses, but the time is still far away when the average American will use computers.

The Politician's View

For a politician, life can be divided into two parts: campaigning for a political position and incumbency. In fact, it can be argued that there is no division between the two, that a politician is, in effect, campaigning even while in office. This is because performance in office may be used to judge a politician at reelection. However, for the purposes of this section, a politician's use of computers will be divided into two parts: the campaign and the incumbency.

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The Campaign

In order to properly execute a campaign, the candidate for political office has need of a great deal of information on political matters: what issues are involved in the campaign, the constituency's reaction to these issues¹, daily happenings that have a bearing on the campaign, biographical information on political figures and what they say.²

In part because of this need for information, and also because of the increased complexity of the political environment in general, there has been a shift in political power from the traditional political leaders like the Tammany Hall bosses, to technicians—communications and computer specialists who provide the candidate with the specific information and techniques needed to reach the voters of today. [17, 2]

A campaign can be broken up into three interdependent parts: (1) collection of information; (2) campaign strategy and planning; and (3) execution of the campaign. Computers are used in all three facets of the campaign.

Computers have long been used to process information. One of the most important uses for it in the campaign is in the maintenance of a data base of information on the electorate. This information is used to target groups of the candidate's constituency who are most likely to respond favorably to certain issues, or in general, to categorize and group voters into manageable blocs.

Let us assume that we are candidates for political office. Then we would use computers in our campaign to process information on:

1. Voting behavior: (a) analysis of past voting behavior from the smallest possible voting units; (b) detection of voting trends; (c) other types of analysis, such as extent of ticket splitting (i.e., voting across party lines), voter turnout, etc.

2. Demographics: process census data, as well as other data to make predictions of voter preference.

3. Media markets: determine which medium reaches what section of the populace, i.e., analyze media markets by: (a) voting behavior; (b) demographics; (c) importance in political decision-making: i.e., is this particular newspaper, radio station, magazine, etc. influential in shaping its audience's political decision-making?

4. Opinion polls: (a) identify groups based on party affiliation, interest group membership, etc; (b) construct

¹ Do they oppose it? What groups support it? And other similar, detailed information as to voter preferences.

² For example, during the recent presidential primaries, it would have been useful for candidate George Bush to know about Reagan's statements on the applicability of the GI Bill to Vietnam veterans, to have it checked, and to have issued a statement within as short a time as possible.

voter profiles based on demographics, media use and attitudes on candidates; (c) isolate variables important to campaign decisions.

5. Organization activities: collect membership and mailing list information to mobilize support, raise funds, voter activities, and mail campaigns.

Incumbents can also use correspondence files accumulated during office for further information on the issues that strongly affect constituents.

Once the data for the above has been collected and placed into computer-readable form, it is processed to yield information on: (1) relationship between different items of data in the system; (2) selection of variables most important to the campaign; (3) outline the projected impact of alternative campaign strategies.

This data is then used to:

1. Target groups: identify important blocs of voters, and principally the undecideds (for later persuasion by direct mail and other means). For example, President Carter's 1980 election campaign uses persuasion by direct mail, using computers to create a mailing list and send "personalized" letters to people who have been identified (through the use of polling data, demographic information and results from previous elections) to be likely to support the president. [25]

2. Aid in resource allocation: time, money, media, personnel, etc. For example, the use of computers to schedule appearances by key personnel of the organization in the Carter campaign. [25]

3. Relate vital information from demographics, media markets, and opinion polls to target useful groups—potential contributors, people likely to support the candidate, etc.

4. Pretest campaign techniques and media appeals.

5. Draw organization plans.

6. Prepare issues research.

7. Adopt media schedules.

8. Adopt budgets.

9. Prepare decision flowcharts based on the dynamic conditions of the campaign.

Once the information has been gathered and placed in machine-readable form, it is used to create lists of target groups, as discussed above. It is also used to create letters to be sent to potential supporters or contributors. These letters are either used for fund-raising or persuasion. President Carter uses direct mail mainly for persuasion [25] while Democratic rival Sen. Edward Kennedy uses them for fundraising. [26] These letters can be made quite personal, as word processing technology allows them to cite such specific information as responses to telephone interviews, amount of contributions given and the dates they were made, etc. Further, they don't look "computer-generated," instead, they look individually typed. And given the high speeds of word-processing systems (which can use laser printers and do everything but lick stamps), specific segments of the electorate can be flooded with mail.

Computers can also be used for simulation and model-

ing studies, to evaluate the electorate's response to various decisions and aid the candidate in political decision-making.

To sum up, computers can be used in a political campaign to process information about the electorate and permit the candidate to make informed decisions about strategy, resource allocation, and appropriate positions on issues. It can also be used to identify specific groups within a constituency, to find out what issues matter to them, and to attempt to persuade them to support a candidate. Depending on how manipulative and devious a candidate is, such persuasion can be rather dangerous for several reasons.

1. The voter, upon receiving a "personal" letter, which looks as if it was written specifically for him, might feel flattered at such personal attention by the candidate and might therefore be receptive to the contents of the letter.

2. Drawing on the database of information amassed through polling, demographic studies, membership lists, and the like, the letter can cite specific instances where the candidate's position is close to that of the voter. For example, if the voter has been identified as belonging to conservative political organization which supports increased military spending and opposes social welfare programs, the letter can point out that the candidate, while in office, voted for an increase in funding for a military program whose contractors are located in the voter's area, while failing to mention that the candidate also voted for an increase in funding for social welfare programs, along with an increase in taxes to support those programs. Direct mail involving the use of computers opens up the possibility of voter manipulation. [5]

The Incumbency

Once one has been elected to office, one still uses the computer. In fact, the skillful use of the computer can help one to be reelected, by providing better constituent service and legislative performance. The computer is used for a number of purposes.

Research: General research into areas that might be of some political use. For example, if a politician wishes to find out how much government money his district is eligible for, he could use the computer to search through the mountains of data that the government generates and pick out those items of interest.

Drafting bills: The research mentioned above would be of use in drafting legislation. For example, if research indicated that a certain industry has no further need for a regulatory agency (like the airplane industry and the CAB), then legislation can be drafted to phase out the agency.

Constituent service: Provide better service to constituents. For example, if a constituent is a disabled veteran looking for financing for a house, the politician can use the computer to look through various databases and determine if the constituent is eligible for funding. In this case, the computer is used to facilitate doing something which was previously somewhat inconvenient to do. This area can

have benefits for the politician, as constituent service is often remembered when elections come around.

Another way in which computers are of use to incumbents is in legislative support. Computers can be used to count the votes for legislation, conduct straw polls, and otherwise support the legislative process. Such a use is actually implemented today in the House of Representatives.

The Voter's View

As mentioned previously, the use of computers by individual voters is not far advanced. This is due to the constraints of hardware cost and lack of skill in the use of computers. Nonetheless, there are two general areas of possible future use of computers by individuals.

1. The voter can amass his own private database. With such a database, he can check a politician's statements for consistency. A voter can call up complete information on a politician's record, and thus avoid being manipulated by a politician who provides selective information calculated to generate support for the politician's election. This differs in emphasis from what a rival politician would do—the voter is interested in acquiring relevant information about the election (it is to be hoped) whereas the rival politician is perhaps more interested in information that will help him win the election.

2. Computer technology can provide for an increase in voter participation in the democratic process. This is because technology would allow voters to be polled as to their position on various issues, and thus do away with a need for a representative. The Viewdata system is an example of a current system which can be modified to allow for voting. Such systems would have to deal with the issues of security³, convenience, and an informed electorate⁴.

Implications

Invincibility of the Incumbent

Consider the following story.

The year is 1982 and the upcoming elections are becoming a topic of discussion. The last snows of March are melting, but you are not yet well enough to greet the spring.

Late last month, while returning home from the grocery, you slipped and fell on the ice. The results: a broken leg and a letter four days later from your congressman expressing his concern. He promises to do all he can to assist you.

Now, a month later, you receive a second letter from your congressman telling you he has just learned you qualify for additional medical coverage under the Uniform Health Care Act of 1979. His research has shown you broke the same leg while serving in Vietnam in 1967, and there is a special provision in the health care law that makes you eligible for extended benefits.

You, of course, are delighted by this news, and you silently vow to vote for this man in the coming elections. Curiously enough, only three incumbents are defeated that fall.

The point of the story is that this is not at all far-fetched. Unless we begin to address some very serious questions⁵ in

³ After all, fraudulent data can be entered into computerized voting systems without appropriate safeguards.

⁴ Greater participation is of no use if the electorate is not informed about the issues and can intelligently evaluate alternatives.

⁵ For example: (a) Does the use of a computer enable an incumbent to

the near future, it is entirely conceivable that the power of the incumbency in our representative democracy will grow to the point of invincibility. This will occur regardless of the nature of the campaign-financing legislation which Congress might enact. It will happen even if we are blessed with some 600 supremely honest people who attempt to campaign without abusing the privileges of their incumbency.

Advances in information and communications technology, and the drop in cost of this technology, puts us in danger of rendering the concept of a fair election meaningless, not because of the evil nature of the incumbent, but his INTEGRITY. Technology will allow an incumbent to do such a significantly better job of representing and servicing his constituents that the electorate will be presented with less and less of a rational choice in an election. This is because there will always be a large block of voters who will see the personal treatment from their representative to be reason enough to vote for him in a future election. Challengers will be forced to resort to imagery and demagoguery, or to exploit factors not related to their particular campaigns, just to attract voters' attention.

The campaign reform issue is that through use of advanced technological aids, an incumbent will be endowed with an image of competence and service and become almost immune to defeat. Therefore, unless the challenger is provided with compensatory, if not comparable access to information and communications technology, he will be unable to mount a credible challenge.

One facet of this issue is this: each representative, in the course of his incumbency, amasses a constituent database. The issue is whether data bases which have legitimately accrued as a function of representation should not also be made available to bona fide⁶ challengers prior to an election.

run successfully for reelection? More specifically, does the effective use of a computer to provide services to constituents incline those constituents to support the incumbent for reelection, or will the constituents realize that perhaps the challenger will provide equal, or better, service? If the voters do realize that every candidate has the potential of providing effective service, will they then drop service to constituents as a factor in their decision, or will they give the edge to the incumbent because his service to constituents is known, whereas the challengers' service to constituents is unknown?

(b) Does an incumbent's position place the challenger at a disadvantage with respect to a readily available database on constituents, which the incumbent has accumulated while in office? If so, should this database be made equally accessible to all qualified candidates? Who determines which of the candidates can access this database? How can we do this while at the same time protect the privacy of those persons in the database?

⁶ We, of course, have to decide which of the challengers are valid candidates, an issue which trends to arouse controversy. How do we decide? If those who make this decision are a subset of those eligible to vote, then are we not compromising the democratic process? If the database is of use in a campaign, and access to it is limited to the incumbent or some other subset of the set of candidates, then aren't we also compromising the democratic process?

A side issue, which will not be treated in detail here, is that of privacy. Should the database be made available to people other than the incumbent or his staff? If it is made available to other candidates, are we not compromising the presumed confidentiality of the relationship between a constituent and a representative?

We must address the issue of *equalization of capabilities*. The dilemma is that some of an incumbent's increased capabilities derive not from sources which can be regulated, but from the impact of advanced technology on the incumbent's performance of his constitutionally mandated responsibility of representation.

Elections Determined by Technical Expertise

The campaign environment has become quite complex in recent years. Voters no longer vote along party lines, but instead, take into consideration other (not necessarily better) factors. Voters display a large amount of mobility, and move around the country to such an extent that voting trends within districts can change drastically from election year to election year. The indifference of other voters can make the influence of small, vocal minority groups vastly out of proportion to their size. All these things combine to make the traditional political machine rather ineffective and promote the rise of communications and computer specialists.

The ability to target specific groups of voters and convince them of the reasonableness of a candidate's position makes the technical experts the new political bosses. It promotes a shift in power (which may or may not be to the detriment of the electorate) from the traditional party bosses to the (often faceless) technical expert.

Disproportionate Influence

Being able to gather a wealth of information on the electorate, and to predict what issues are important to the voters, can have further detrimental effects on the democratic process. Information about the electorate is necessarily based on the past. If the latest polls show that the voters, for example, support a subway strike, that does not necessarily mean that they still support it several days later, when they have been walking through the rain to get to their jobs. We therefore have an inherent bias towards past positions.

This is, however, a technical problem. When polling devices develop to the extent that instantaneous polls can be taken, then the bias towards the past disappears. However, one problem remains: the special interest group. Given that a large part of the electorate is indifferent, the candidate becomes subject to undue influence by interest groups who are willing to pound on doors to make themselves heard. For example, if the candidate knows that a small minority of constituents strongly disapprove of nuclear power and are willing to vote on that basis alone, while the majority of voters do not have strongly held opinions over the issue, then the candidate would find it worthwhile to disapprove of nuclear power, knowing that the majority of the constituents do not feel strongly enough about the issue to vote him out of office for that position alone. Whether or not this is appropriate is an issue for discussion. Should we allow for the intensity with which voters view specific issues, or should we merely count the position voters take, regardless of how strongly they may feel about the issue? Consider what is perhaps an extreme example: let us say that we have a proposal for increasing taxes to pay for increased police protection. If it is

further proposed that a certain subset of the electorate bear most of the burden for the increased tax, then perhaps this group will feel strongly against the proposal, while others may not feel strongly about supporting it. But it is evident that increased police protection is for the common good. The issue is who pays for it. And it is in everyone's self(ish) interest to have somebody else pay for it.

Use of Computers by Voters

Computers can have beneficial effects as well. If individual voters can have access to vast amounts of political data, and have the skill necessary to extract specific information of interest, then those voters will no longer be vulnerable to a politician's use of the selective presentation of information for political persuasion. The voter can check for contradictions, examine a politician's position in great detail, and check on his voting record. This, however, requires that the voter be involved enough, rich enough, and have the necessary computer skills to carry out the above operations. It is to be hoped that advances in technology will someday make computers inexpensive enough, and easy enough to use, that the average citizen can use them as an effective political tool.

Summary

In summary, computers can be used in a number of ways.

1. To enhance the invincibility of an incumbent.
2. To invade the privacy of voters by the construction of individual-specific databases.
3. To process data for public opinion analysis and generate selective mailings to convince rather than to inform.
4. To increase the influence of interest groups out of all proportion to their size.
5. To cause a shift in political power from traditional party bosses to technicians.
6. To have election results determined not by issues but by technical expertise.
7. Perhaps, to provide for a better informed electorate and a democracy more responsive to the wishes of the citizens.

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Defense through Decentralization

MARK HULBERT AND PAUL HASSE

Defense Needs in the 1980's

Nuclear and conventional military hardware have for the last generation been the lynchpins in defense strategies. These tools provided a feeling of national security by offering a capability to forestall acts of aggression and to destroy an enemy's civilian population in the event of nuclear attack.

Yet the feeling of security provided by such tools is beginning to erode. A plethora of problems has dramatically illustrated the extent to which the national security provided by nuclear and conventional weaponry does not translate into human security. Citizens of Western nations feel less secure despite growing defense expenditures.

Defense strategies based on conventional and nuclear weaponry may no longer be appropriate, given the evolving face of urban and transnational warfare. Traditional military responses are often ineffective when confronted with the taking of hostages, the burning of embassies, the sabotage of key industrial sites, and other acts of state-sanctioned terrorism. Our present defense systems are designed to effectively forestall large-scale, immediate, and direct attack. Clearly, a new approach is required.

A New Approach

The key to an effective defense in the future is not increased reliance upon centralized defense strategies. What seems required is a Gestalt shift in defense thinking—a basic reorientation in perceptions of available response modes.

In broadest definition, the new challenge to traditional defense thinking consists of state-sanctioned terrorism. The essence of terrorism is its strategy of a decentralized assault against a highly centralized military industrial complex. The post-war period offers numerous examples (Vietnam, Northern Ireland, Zimbabwe-Rhodesia, Nicaragua) of centralized military systems proving largely incapable of thwarting decentralized movements. When the threat to populations is not in the form of a large-scale direct attack, a centralized defense is often incapable of offering genuine security.

It is likely that our present defense systems will prove increasingly inadequate in the 1980's. As economic and social concentration proceeds, civilian populations become more vulnerable. A society whose energy needs are satisfied by a few power plants, for example, can be rendered helpless through sabotage. Traditional military strategies are simply not structured to effectively respond to such tactics.

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But the danger of sabotage could be effectively diluted by the decentralization of quality targets. Discouraging the new construction of centralized power facilities would reduce the potential for sabotage, while the "defense costs" involved are merely the cost of promoting a safer, alternative technology. The need for large standing armies and expensive, single-purpose weaponry, would be reduced.

Alternative Responses to Conventional Attack

A society in which all targets have been decentralized would be desirable not only because of its relative immunity from terrorist attack. There is also reason to believe that a decentralized defense would reduce the efficacy and therefore the probability of conventional attack.

Other nations have realized the deterrence potential of decentralized defense. The Soviet invasion of Czechoslovakia in 1968 convinced Yugoslav leaders that a decentralized response would exact the greatest possible toll from conventional military invaders. Switzerland has also recognized that decentralized defense strategies are inimical to conventional aggression. Moreover, the wars in Vietnam and Afghanistan demonstrated conclusively that a conventional military invasion and occupation becomes extremely difficult (if not impossible) to successfully implement when its target is a society with substantial social and economic decentralization.

The possibility of nuclear conflict would similarly be reduced in a world utilizing decentralized defense strategies. Because conventional military conflict would be less inviting, it is less likely that a "localized" military conflict would escalate into a worldwide nuclear war.

New Directions for Research

Given the lack of emphasis by the American military towards decentralized defense strategies, even a modest examination of this subject might prove productive. The methods of conceptual analysis illustrated above could be directed at the entire spectrum of U.S. defense needs, yielding responses which may prove to be less expensive, safer, and yet more effective defense procedures.

This research could lead in many directions. An exchange of ideas with European scholars may reveal that strategies similar to those of Yugoslavia and Switzerland are applicable to U.S. defense needs. Technological innovation could lead to communication and information retrieval systems that cannot be exploited by invading or occupying forces. Research into urban design and architecture might develop ways in which cities could be rendered more immune to assault and successful occupation.

Virtually all of the suggestions arising from the analysis will require a political consensus for implementation. It is therefore essential that thorough and responsible research

be undertaken to provide an unimpeachable foundation upon which to build interest and support among the public. In this way, debate can focus upon technically feasible choices for the future.

Among the activities that might be undertaken to explore alternative defense strategies are the following:

(a) Instituting a prize awards program to encourage im-

aginative thinking among American academics, scientists, and engineers.

(b) Convening conferences among leading scholars and public officials on the subject of decentralized defense.

(c) Publishing collections of essays on this topic.

(d) Publishing a journal to distribute the latest research in this area.

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middle initial is wrong, it was not the automatic press which substituted initials. Of course, the printer does the job over at no charge, but obviously the cost of such errors must be built into the price of the wedding announcements—and the price of the automobile, and the department store merchandise.

Thus, in the commercial sphere, our growing carelessness and lack of personal responsibility is reflected in lower productivity and higher costs for goods and services. We compete less effectively with other countries, and our national standard of living declines. "Nobody's perfect" and "I'm only human" and "Work isn't everything, you know" translates into "I can't make ends meet," "I can't afford a vacation this year" and "I need a raise."

Increasingly frequent examples of "machine failure" simply represent the failure of people to take reasonable care in performing their jobs. They are not the failures of some inanimate devil called a machine—machines do precisely what their designers, builders, operators and maintainers tell them to do. Although some machines are more complicated than others, they all obey the same laws. Assuming that the basic knowledge exists for designing, building, operating and maintaining a particular machine, its reliability is determined by the care taken by the people engaged in each of these tasks. The railroad locomotive built in the last century under an earlier standard of care, and now retired to a museum after 50 years of operation, could roar out of the museum tomorrow to resume the task for which it was designed.

The military effects of this alarming syndrome of personal irresponsibility and carelessness can be catastrophic. The failure of a dramatic rescue mission with the loss of

eight lives, the resulting scorn of our enemies and the shaken confidence of our friends—these are just curtain raisers. The crucial drama comes when we must defend our allies, and ultimately ourselves, against the escalating advances of practitioners of realpolitik. Our military power—real or perceived—is an important stabilizer in today's world. Any advantage which we may possess in sophisticated weaponry becomes a terrible disadvantage if the weapons fail to work. And they *will* fail to work if the people—from top to bottom—responsible for their design, construction, maintenance and operation are not imbued with a strong and continuing sense of responsibility for their respective jobs. Competent leadership is obviously important, but in the end it may be the degree to which we practice individual responsibility that determines whether we survive as a free nation.

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Stage 5. Proper professional conduct is defined in terms of standards that have been agreed upon by society. The firm and the profession serve as instruments for reaching consensus as to what represents proper professional conduct. The professional recognizes the value of serving society and uses this as a guide to professional conduct in situations where professional standards do not apply.

Stage 6. At this stage, professional conduct is guided by universal principles of justice and of the reciprocity and equality of human rights. The individual and the firm act in accord with these principles through the recognition that they represent the best interests of both society and themselves. Professional action at this stage will serve to maximize the prestige of the profession.

Frontiers of Engineering in Health Care

The 2nd Annual Conference of the Engineering in Medicine and Biology Society (EMBS) will be held Sept. 28-30 at the Washington-Hilton Hotel in Washington, D.C. Over 100 "state-of-the-art" papers will be presented by leaders in the field. Tutorials and workshops on a broad variety of timely topics will also be featured. The conference immediately precedes the 22nd Annual Conference on EMB to be held at the same hotel.

Status Report on New Organization and Publication

STEPHEN H. UNGER, Chairman, CSIT

Status of the Proposals to Form an IEEE Society on Social Implications of Technology and to Upgrade Technology and Society to an IEEE Magazine

Early this year, CSIT launched a petition campaign, in accordance with IEEE's bylaws, calling for the formation of an IEEE Society on Social Implications of Technology (SSIT). The reasons for this action can be found in the petition text, accompanying explanations appearing with the petition in the March and June issues of *Technology and Society* (T&S), and in the case summary reproduced as an appendix to this report.

As of July 16, 614 signatures were in hand from members from all over the United States and from many other nations well distributed worldwide. Many were accompanied by encouraging letters or comments. Signers were also well distributed with respect to technical specialties and type of employment, with significant numbers from private companies of all sizes, public utilities, government at all levels and universities; private consultants and retired engineers were also represented.

In parallel with the SSIT campaign, CSIT renewed its application to IEEE's Publication Board to upgrade T&S to magazine status. That body, at its mid-June meeting, referred the matter back to the Technical Activities Board* (TAB), which is CSIT's parent body.

According to IEEE's bylaws, formation of a new society requires approval by the Executive Committee of the Board of Directors (EXCOM) upon receipt of a petition signed by 100 IEEE members above student grade. EXCOM first consults with TAB and, after approving the formation of the new society, must also approve its constitution before it can begin operations. Prior to consideration by TAB, the matter is first reviewed by TAB-OPCOM, which makes a recommendation to TAB.

This May, at which time over 200 signatures had been obtained on our petition, CSIT brought the matter before TAB-OPCOM. After some discussion it was tabled until the July 17 meeting (to be followed the next day by a meeting of TAB).

As CSIT chairman I attended these two meetings (in Minneapolis) to present our case. (The magazine and SSIT proposals were treated together.)

Following a lengthy and lively debate (the substance of which is outlined below) TAB-OPCOM, by a vote of 6-4 with one abstention, recommended approval of the SSIT proposal.

*For those unfamiliar with IEEE's organizational structure, a brief explanation may be useful. TAB is comprised basically of all 30 society presidents, the divisional directors—each representing a subset of the societies, and the chairmen of TAB's 8 or 10 standing committees and councils—including CSIT. It is chaired by IEEE's Vice President for Technical Activities. The 12 members of TAB-OPCOM are the TAB Chairman, the seven divisional directors, and the chairmen of several key administrative committees, such as finance.

The subject was introduced at the TAB meeting on July 18 with a summary of the pro and con arguments developed at the TAB-OPCOM meeting. This was followed by an open debate in which every society president who spoke (perhaps six to eight) opposed the proposal. Most of them also attacked CSIT. Perhaps the only good word any of them had for CSIT was a statement by one strong opponent that, in contrast to all previous issues he has seen, the June issue of T&S was fairly good. Several members of OPCOM also spoke in opposition, while a few others joined me in strongly supporting the resolution. IEEE President Leo Young proposed a compromise (more about this further on). Unfortunately, one society president who strongly supports our position was unable to attend the TAB meeting due to a parallel meeting of his own AdCom.

To the best of my recollection, the arguments made against our proposal, and against CSIT, at both meetings, are outlined below. Of course not all of these were made (or necessarily accepted) by any one person and some may have been advanced by people who afterward changed their minds during the course of the discussion.

(The ordering is not significant.)

(1) CSIT, particularly as reflected in T&S, is biased in an anti-technology direction, almost always emphasizing negative aspects rather than benefits of technology.

(2) Articles and editorials in T&S, particularly those related to nuclear energy, are often strongly biased, distorted, full of technical errors, and far below IEEE quality standards. (Time did not permit going into detail on this point.)

(3) CSIT, again particularly in the energy area, has promulgated positions at variance with those of the cognizant experts more qualified to speak for the IEEE.

(4) Should an SSIT be formed, it would lack technical expertise and tend to attract "Nader types" and other emotional anti-technology people.

(5) Should an SSIT or CSIT publish an archival journal (say a magazine) sold to libraries and nonmembers, the biased, uninformed views that it would contain would thereby acquire the prestige of IEEE, misinforming the public, embarrassing IEEE and weakening IEEE's general influence. This would be true regardless of what review procedures were set up.

(6) The kind of people who become active in technology and society issues tend not to be objective.

(7) CSIT has become involved in areas, both technical and nontechnical, that are outside the scope of IEEE.

(8) Every IEEE member and every IEEE society should be concerned with technology and society issues. It would be a serious mistake to isolate this concern within one particular society.

(9) Each society should have its own technology and society committee. TAB should form a T&S council comprised of these committees. In this form the expert knowledge embodied in the societies would be better utilized.

(10) TAB should stay clear of all activities not strictly technical. Social implications should have a place elsewhere in IEEE.

(11) CSIT should not be involved with ethics or professionalism. This is the domain of the Member Conduct Committee (MCC), USAB and IEEE's professional activities committees (PAC's).

(12) To a large extent, technology and society issues are the domain of the Engineering Management Society.

(13) CSIT has advocated proposals in the ethics area that would have IEEE intervene between engineers and their employers.

(14) IEEE is a transnational organization and members outside the USA are not interested in technology-society issues.

I shall not attempt here to rebut these arguments. T&S readers are well qualified to evaluate them without help. However, some special information is relevant to particular points: On item 11: Conversations I have had with Dick Gowen (USAB Chairman and IEEE Vice President of Professional Activities) and Jim Fairman (MCC Chairman) indicated that they welcome a role for CSIT or SSIT in developing ideas in the ethics area. Furthermore, several PAC chairmen have been active on CSIT.

With respect to item 14: Of T&S current total of over 2600 paid subscribers, over 440 reside in over 50 nations outside the USA. As has been noted in a past issue of T&S, there is an active Working Group on Technology and Society in the Swiss IEEE Section. Its Chairman and a number of members signed our petition. Pertinent to point 8 is that the Communications Society has an active T&S committee, and it also endorsed the idea of SSIT. Furthermore CSIT welcomes the participation of appointed representatives of other IEEE entities. Currently representatives of four societies are active members of CSIT.

Now to resume the narrative. Toward the end of the discussion, Leo Young, expressing general support for the SSIT idea, proposed that, in order to accommodate many of the concerns summarized above, the SSIT constitution provide that a substantial number (he was not precise, but my impression is that he meant about one third) of its governing body (AdCom) be people appointed by divisional directors. The others would of course be elected by the society's members. The effect would be to give SSIT some of the character of a council (see argument 9 above). I accepted this compromise and it was tentatively agreed that I would chair a small working committee representing various viewpoints on TAB to draft an appropriate constitution, that would then be brought back to TAB for approval. However, before embarking on this task, I asked for some assurance that its satisfactory solution would indeed lead to approval by TAB of SSIT. A straw vote was then taken to determine how many votes there were for *any* TAB entity on technology and society that would have the

authority to publish a magazine. The result was well under a majority and it seemed clear that there was not enough support in TAB this year to warrant continuing to press our case.

Although the outcome of the discussion was disappointing, the other TAB members were friendly and courteous. TAB Chairman Bob Larson handled the meeting with exceptional skill and fairness.

Copies of this report are being sent to all TAB members for comments (which, if they consent, will be printed in full in the earliest possible T&S issue after receipt). Of course comments from T&S readers are also invited.

What Next for CSIT

At our next CSIT meeting (Sept. 13), we shall discuss ideas for making our committee more effective. Some initial lines of thought are:

(1) Redouble our efforts to seek active participation in CSIT by representatives of IEEE societies and other IEEE entities.

(2) Publish written debates in T&S on controversial topics.

(3) Solicit, even more vigorously than heretofore, articles representing responsible viewpoints on all sides of issues.

(4) Continue efforts to establish local CSIT groups in different geographic areas, similar to the newly formed group in Washington.

(5) Cooperate closely with CSIT groups within IEEE societies.

(6) Increase our visibility within IEEE, particularly by getting more subscribers to T&S. (See subscription form elsewhere in this issue.)

Appendix

Case for Upgrading the IEEE Committee on Social Implications of Technology to IEEE Society Status

Origins: CSIT was formed as an Ad Hoc Committee of TAB by the Executive Committee of IEEE in 1972 in response to a petition signed by over 600 members calling for the formation of a Society on Social Implications of Technology. It became a standing committee in 1976.

Field of Interest: Engineering ethics: understanding the impact of electrotechnology on society and vice versa; and understanding the benefits and detriments of technological options. Some examples of topics that fall within this field of interest are: energy policy alternatives; national security policy alternatives; technology and less-developed nations; and crime countermeasures.

Activities: The issues mentioned above (and others) have been addressed by CSIT through articles and letters in its quarterly newsletter *Technology and Society*, heavily attended sessions organized at national IEEE meetings, direct dialogues with other IEEE entities and through liaison with other professional societies such as ASME and

Continued on page 24

Reviews

Technology and Change, John G. Burke and Marshall C. Eakin (eds.). (San Francisco: Boyd and Fraser, 1979). A Courses by Newspaper Project. *Reviewed by Terry L. Hewitt.*

This is the second of a two-part review of "Connections: Technology and Change" which is a joint effort of the Courses by Newspaper (CbN) project and the book/television series titled "Connections." See March 1980 issue of *Technology & Society* for the first part. The Courses by Newspaper program includes a 15-part series of weekly newspaper articles, the course offering at numerous colleges and universities in the fall of 1979, the book under review and a Reader/Study Guide and an instructor's Source Book. The major portion of the printed material in the CbN program is contained in the book which is an anthology composed of 69 different selections by nearly as many different authors. These writings cover a combined total of nearly 500 pages and are divided into five parts: Technology and Trial, Technology's Effects, Conditions of Technological Development, Sources of Technological Change and Retrospect and Prospect.

The intent of the book is to present a representative survey of the range of viewpoints regarding science and technology and their impact on society. It is recognized that World War II was a pivotal point in the growth of science and technology—at least in terms of the massive amounts of money and people which have since typified science and technology. That period was also a critical point for the growing concerns about the wisdom of the apparently rampant growth and spread of science and technology.

We therefore have today those who actively encourage technological change and those who just as actively seek to impede that growth. *Technology and Change* is an attempt to present the many diverging points of view spanning these extremes. In the words of editor John G. Burke:

Readers of this book will not find in it any pat solutions to the problems created by advancing technology. The arguments of the critics of technology that are presented herein are just as articulate and persuasive as those of technology's advocates. What should be realized is the fact that the problem of technological change is extraordinarily complex, and that any proposed simple solution may actually imperil the future. Further, it should be recognized that each and every one of us is involved in the process of technological change because of the choices we make—where we live, what we eat and drink, how we dress, how we get to work, how we spend our spare time. Complexity does not preclude study, analysis, and understanding. It is this type of activity with respect to the problem of technology and change that this book seeks to encourage.

A quick scan of the contents is all that is needed to be assured that the editors have chosen quite representative selections. For example—in the first section we find "Are We Really in Control?" by Barry Commoner, "The Technique of Total Control" by Lewis Mumford, "The Technological Order" by Jacques Ellul and "In Praise of Technology" by Samuel Florman. Following selections are by authors as diverse as Peter Drucker, Jacob Bronowski,

Marshall McLuhan, Albert Einstein, Friedrich Engels and Ralph Nader. Content ranges from the philosophical level of Jacques Ellul to the very practical level expressed by assembler Dan Clark regarding the drudgery of the automobile assembly line.

Two of the most poignant articles are "The Garrison Dam Disaster" by Arthur E. Morgan and "Nuclear Weapon Development" by Andrei Sakharov. Morgan, a civil engineer who served as Chairman of the Board of TVA, relates the story of how the US Corps of Engineers forced the Arikara Indians from lands they had lived on for hundreds of years in order to build the Garrison Dam in North Dakota. Sakharov relates the continual frustration he experienced in his attempts to influence the Russian leaders who were pursuing a course of nuclear bomb testing. On the other hand, we can follow the satisfaction and achievement of technology in articles such as "How the Transistor Emerged" by Charles Weiner and "The Invention of the Riveting Machine" by Sir William Fairbairn.

Parts 2-5 of *Technology and Change* each contain a considerable number and variety of selections which are able to be further subdivided into selections which focus on reasonably narrow themes. These themes are the topics of the 15 newspaper articles, and this same grouping of selections is one feature of the Study Guide. This approach is very effective in that the reader may thus concentrate on a reasonable number of selections without the feeling of being inundated by the total of 69 selections. For example—part 2, containing a total of 13 selections, is divided into three groups, each with its accompanying newspaper article and central theme.

Each part of the Study Guide is divided into Learning Objectives, Overview, Key Concepts and Definitions, Factual Review and Essay and Discussion. The Learning Objectives gives brief statements which focus on the central ideas of the newspaper articles and companion reader selections in *Technology and Change*. The Factual Review presents a number of questions which could be taken as a "test," while the Essay and Discussion section presents more open-ended questions. The Study Guide is a short, concise and well-written book and is a very useful aid to the person interested in a serious study of the CbN program. The 15 newspaper articles are written by different authors—some of whom also have selections in the reader. The articles are usually philosophical in nature and attempt to give some perspective or overview of the topic rather than an in-depth exploration.

Of particular interest to engineers would be "The Imperatives of Engineering" by Eugene S. Ferguson, "The Government's Role in Technology Change" by A. Hunter Dupree, and "The Mystery of Inventiveness" by Lynn White, Jr. Ferguson describes the characteristics of engineers, Dupree relates the recent history of U.S. government funding of science and technology and White approaches the subject on invention by briefly describing the development of four technological contributions—the horseshoe, the internal combustion engine, the crankshaft and the parachute.

The Courses by Newspaper project is funded by the National Endowment for the Humanities. The intent of the program is obviously to reach as many people as possible and expose them to the history, problems and possible future paths of science and technology as they affect society. For the individual with a technical background, the program should be an awakening to the many related aspects of technological "progress" which are not normally encountered in one's path through the technical educational process nor in the usual working environment.

Parkinson: The Law, by C. Northcote Parkinson. (Boston: Houghton Mifflin Co., 1980.) 207 pp. Price \$8.95. *Reviewed by John S. Jackson*, Professor of Electrical Engineering, University of Kentucky, Lexington, Kentucky.

The next generation well may rank the name of Parkinson with that of Newton, who discovered the laws which govern our physical universe. Parkinson takes political economy from the hands of astrologers and presents us with the beginnings of a new science. Parkinson's law is a creation of genius. That work expands to fill the time available is a natural law and is as immutable as the law of universal gravitation. That expenditure rises to meet income is as certain as the knowledge that to every action there is an equal and opposite reaction. Both Parkinson's first and second laws concern waste and it is waste that has been fashioned by the art of statecraft to form the integument which holds together our economy.

Since the first law appeared, thirty years ago, the burden of waste and inefficiency has come to saturate the consciousness; you can taste it in the morning coffee. Concern about the stability of government based on officially sanctioned waste and administered inefficiency led to postulation of the Law of the Vacuum: action expands to fill the void created by human failure. Dependence upon waste and the conscientious withdrawal of efficiency as measures to maintain order and insure domestic tranquillity is an open confession by government of its failure.

This is a heavy message, and when C. Northcote Wodehouse becomes serious the nation is in trouble. He quotes Jefferson, "If we can prevent the government from wasting the labor of the people, under the pretense of caring for them, they will be happy." The history of this nation, it seems, is bracketed by warnings about waste.

Needless, harmful, absurd. In these words, Parkinson describes that index of waste, excessive tax levies. Keynes is quoted to the effect that a high tax rate produces inflation. Above 25 percent there is serious inflation; at 30 percent, national influence declines; there is loss of freedom at 35 percent; at 36 percent the nation stands at the brink of the taxation precipice. These percentages are given in satiric, not arabic, numerals. Even casual readers learn that quantitatively you must never push Parkinson past his first significant digit; but the evident truth of his observation makes strong men wilt.

The phenomenon which Parkinson so keenly observes and remarks possesses an essential irony: the onerous

waste which staggers the mature economy with debt and taxes is the direct product of efficient labor-saving technology. Not so long ago, a younger nation achieved its wealth and stature through this same efficient, labor-saving, technology. Later, the mature economy must carefully tailor its response to technology.

Twentieth century Western society is not the first to experience this phenomenon. For a culture to develop a state of refinement and civility, leisure is necessary. Labor-saving techniques must be acquired. This technique was slavery in ancient cultures and is technology in contemporary Western society. These labor-saving techniques produce an abundance of surplus man-hours. At a critical level of excess man-hours, there is engendered a consciously cultivated art of statecraft: wasted work, supported by excessive tax levies. We find this waste at a level exceeding 20 percent in the last days of the Athenian Empire. We find such waste in our own Parkinsonian State.

Words that make you sweat and cringe and breathe heavily flow strange from Parkinson's pen. In a chapter entitled, "Pension Point," he provides a remarkably felicitous solution to the disposal problem created by the apparently limitless supply of man-hours set free by modern labor-saving technology. The problem is addressed in terms of the corporate structure, where the supply of junior executives exceeds the availability of senior positions.

After having reached the age of Authority at forty, the senior executive passes successively through the ages of Achievement, Distinction, Dignity, and Wisdom before final retirement one third century later. But what of the junior executive, at age forty, awaiting retirement of his senior? He is faced with a dismal progression of the ages of Frustration, Jealousy, Resignation, and Oblivion before ultimate retirement.

Parkinson suggests that early retirement, besides providing leisure for the seniors, would serve two ends: happiness for the juniors and health of the corporation.

Parkinson has given us an appropriate alternative to the waste-based state. Attenuation of the period of active employment would give each man a turn at the wheel. Such abbreviation could be implemented by early retirement, by appropriate vacations and sabbaticals, or through a shortened workweek. Any one of these measures would create a bias toward independence since the state's role as mediator of man's metabolism would be lessened. All could live in an ambience of belonging—of being an active, responsible, worthy part of the whole. In this manner we may stave off that day when all will work for the government, the year 2195 as reckoned by Parkinson.

News, Notes, and Comments

Proposed IEEE Constitutional Amendment

A constitutional amendment creating the position of President-Elect is before IEEE members. Two statements, one supporting the amendment and one opposing it, are as follows.

IEEE Board of Directors Statement on Proposed Constitutional Amendment—Concept of President-Elect

The Board recommends adoption of the proposed amendment which accomplishes three objectives: (1) introduction of the President-Elect concept; (2) clarification of Delegate and Assembly roles; and (3) procedural simplification.

The proposed amendment shifts the current three-year term of President, Junior Past President and Senior Past President by replacing the latter office by the President-Elect office, thus guaranteeing that a President will have had at least one year of experience on the Board before assuming office. The President-Elect concept is consistent with the practice of many other professional societies.

The proposed amendment clarifies the roles of the membership-elected Delegates who constitute the Assembly, which has sole authority to elect the additional officers and directors not elected directly by the membership.

The amendment also simplifies the Constitution by transferring appropriate guidelines and practices to the Bylaws.

Robert A. Rivers' Statement in Opposition

The President-Elect amendment should be voted down for two important reasons: (1) It introduces an additional year of delay in the Institute's ability to respond to changes in your concerns, and (2) It replaces the present known and reasonable schedule for balloting (Sept. 1 mailing to members as of Aug. 1) and petitioning nomination to one to be determined by the Board of Directors in the By-Laws.

Bylaws can be and are changed at almost every meeting of the Board of Directors. You would not know with certainty when the balloting would take place and would effectively be deprived of a right to support the candidate of your choice.

The explicit protection in the present constitution has served the Institute well. The Institute has survived and prospered even through the most trying times of the early Seventies with the present procedures. Adequate opportunities exist for future presidential candidates to have served on the Board of Directors and the Executive Committee prior to assuming the presidency. A year of training

as President-Elect is unnecessary for those candidates who have rightfully served the Institute in a number of different positions through the years.

Finally, all member responses to a solicitation for inputs have been against this amendment.

AAAS Report on Scientific Responsibility

The Committee on Scientific Freedom and Responsibility of the American Association for the Advancement of Science announces the availability of its 1979 annual report describing current projects and interests of the Committee. Introduced by a statement entitled "Scientific Responsibility" by Committee Chairman John T. Edsall of Harvard University, the report's highlights include summaries of the year's activities of the AAAS Clearinghouse on Science and Human Rights and the AAAS Professional Ethics Project, both Committee projects. Included in the Subcommittee reports are two Advisory Opinions prepared by the Subcommittee on Individual Claims during its review of claims submitted by U.S. scientists who claimed that their scientific freedom or responsibility had been restricted; a summary of the Forum on Science Teaching sponsored in June 1979 by the Subcommittee on Freedom and Responsibility in Science Teaching; and a copy of a statement on employee protection sections in eight federal environmental laws prepared by the Subcommittee on Protection of Professional Responsibility.

The report's appendices include an article on whistle blowing and scientific responsibility from *Technology Review* by Committee Staff Officer Rosemary Chalk and Committee member Frank von Hippel of Princeton University; a statement on the impact of U.S. visa policies on scientific freedom prepared by John Edsall and presented during April 1979 hearings before the Commission on Security and Cooperation in Europe (Helsinki Commission); and a statement on science and human rights in Argentina prepared by the AAAS Clearinghouse on Science and Human Rights and the Committee on Human Rights of the National Academy of Sciences.

Copies of the 1979 annual report may be ordered at a cost of \$2 each (individual orders should be prepaid) from: AAAS SFR-9, 1515 Massachusetts Avenue, NW, Washington, DC 20005.

International Engineering Ethics Project

A research project—to identify and examine the ethical conflicts and dilemmas facing engineers practicing in a culture other than their own—is currently being undertaken by an engineer/philosopher team. Although international business ethics and public policy concerning technology transfer have received some discussion, this project will concentrate on the ethical problems confront-

ting the individual engineer engaged in some particular engineering project in another culture.

Conflicts can arise for anyone working in another culture with alternative customs and with alternative conceptions of justice, welfare, public interest, the good life, treatment of minorities, etc. But in addition to such general concerns, this project will address specifically the ethical dilemmas that arise within all areas of engineering work: design, implementation, management, worker relations and interaction with local institutions such as political, legal, regulatory, economic, religious or educational.

The codirectors of this project are currently engaged in collecting more detailed information and establishing a network of contacts. It is expected that an analysis of these situations will aid in the identification and anticipation of such difficulties, will aid engineers in handling such situations, and will help to minimize stress for both the engineer and the project culture. Individuals who can contribute to this study, particularly those with first-hand experiences, are asked to contact either Professor E. C. Jones, Department of Electrical Engineering, Iowa State University, Ames, Iowa 50011, or Professor C. A. Smith, Department of Philosophy, University of Missouri-Rolla, Rolla, Missouri 65401. All information received will be treated confidentially.

The IEEE 1980 International Conference on Cybernetics and Society

The 1980 ICCS Conference will be held October 8-10, 1980 at the Hyatt Regency Hotel in Cambridge, Massachusetts. The Technical Program will include six symposia on the topics of System Dynamics, Pattern Recognition and Artificial Intelligence, Energy Systems, Biomedical Systems and Biocybernetics, Transportation Systems, and Man/Machine Systems. Sessions will also be held on the topics of Modeling and Simulation, Decision Analysis, Design Methodology, System Effectiveness, Education, Microprocessors, Computer-Aided Design/Manufacture, Robotics, Health Care Systems, and Public Systems and Policy Analysis. There will be three major addresses, 280 technical papers from 16 nations, two tutorial short courses, and panel discussions. For a copy of the Advance Program and registration forms, write to:

Dr. Richard F. Vidale, Chairman, 1980 ICCS
Department of Systems, Computer, and Electrical
Engineering
College of Engineering
Boston University
Boston, MA 02215

Engineering Ethics Bibliography Published

The Center for the Study of Ethics in the Professions at Illinois Institute of Technology has published a 158-page

annotated bibliography on ethical and social issues in the engineering profession.

The paperback publication is titled *A Selected Annotated Bibliography of Professional Ethics and Social Responsibility in Engineering*. The Project Director for the preparation of the bibliography was Dr. Robert F. Ladenson, Associate Professor of Philosophy at IIT.

Major categories covered include professional ethics in engineering; social responsibility in engineering; and general materials from history, philosophy, and sociology that are relevant to engineering practice. Topics include codes of ethics, bribes and kickbacks, consequences of "whistle blowing," and the sometimes conflicting roles of business, government, and professional associations.

The bibliography is available on request without charge to educators, engineers, professional engineering societies, and others interested in ethics references. Requests for copies should be sent to the IIT Center for the Study of Ethics in the Professions, Illinois Institute of Technology, IIT Center, Chicago, IL 60616, phone (312) 567-3017.

ASPA Adopts Whistle Blowing Policy

After an 18 month study, the American Society for Public Administration in December 1979 adopted a position statement on whistle blowing and directed that the Society's position be disseminated to Congress and the President of the United States. Excerpts from the statement follow.

American Society for Public Administration Position Statement on Whistle Blowing

The American Society for Public Administration endorses the growing public demand for improved accountability of government employees in order to achieve more efficient, effective, and ethical enforcement of the laws, and more competent conduct of the public business, recognizing that most whistle blowing results from different perceptions of accountability.

Therefore, in order to improve accountability at all levels of government, ASPA recommends that federal, state, and local governments take the following actions:

1. Establish and enforce policies and procedures that clearly describe the ethical bases for public employment and the penalties for violating them. This should result in a concomitant decrease in the need for whistle blowing aimed at exposing criminal activity, abuse of process, waste, withholding or distortion of information, and other unethical or illegal behavior....

3. Establish and enforce policies and procedures for internally reporting, investigating, assessing, and acting on allegations of illegality, mismanagement, waste, or unethical behavior....

4. Establish and enforce policies and procedures that permit and encourage legitimate dissent and constructive criticism and protect dissenters from retaliation.

Many public employees take an oath of office to uphold,

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obey, and enforce the law in accordance with their sworn responsibilities. Therefore, perceived violations of that oath which result in differences of opinion about wrong-doing should be viewed as manifestations of accountability, rather than as rejections of supervisory authority unless proven otherwise.

5. Create and support dissent channels to permit contrary or alternative views on policy issues to be reviewed at a higher level.

Where disaffection grows not from allegations of wrong-doing but from honest professional disagreement over policy decisions, what converts the grieved dissenter into an angry whistle blower is often the lack of any channel for additional senior review of the policy dispute. Good public administration in any institution includes provision for such open review at higher levels. Equating productive dissent or constructive criticism with disloyalty violates democratic principles of free speech and tends to discourage accountability, creativity and standards of excellence.

6. Establish and enforce policies and procedures that require management to focus on the messages rather than the

messenger when an employee expresses either substantive dissent as a professional difference of opinion or makes an allegation of wrong doing....

CSIT Dinner Meeting Washington DC Section

When: Wednesday, October 29, 6:30 PM

Where: Chase II Restaurant, 4400 Jennifer Street NW
Washington, DC

Speaker: Rosemary Chalk

Staff Director, AAAS Committee on Scientific
Freedom and Responsibility

Topic: The Engineer's Interaction with Society and
Government

The charge of \$11 per person includes dinner (RSVP October 15). The meeting itself will be held at a nearby location and will begin at 8:00 PM. The talk will be followed by an informal discussion. If you wish to attend the meeting only, or for more information, please contact Susan Thomas, (703) 836-2356 or Richard Labonski, (202) 637-1934.

We Need Your Help

Readers may have noticed from the last few issues that the editorial staff has been striving, with some success, to upgrade the quality of *Technology & Society*. This may be reflected in the fact that the number of subscribers has continued to go up. Unfortunately, even with the larger number of subscribers, we have been forced to raise the annual subscription rate for 1981 to \$3. (See page 2.) We can improve the economics of publishing *Technology & Society* dramatically, and thus hold the line against future price increases, if we can increase our paid circulation. In turn, the increased circulation will provide the thrust for further improvements in quality.

To reach these goals, we need your help. You probably have IEEE member friends or colleagues who might be interested in subscribing to *Technology & Society* but who, somehow, seem unable to find time to send in the subscription form. We urge each of you to facilitate the process by inviting such individuals to subscribe to *Technology & Society* via the subscription form on the reverse side of the page (or a photo copy of the form). If you wish, you may combine the payments for several subscribers (at \$3 per subscription) into a single check. Be sure to include all membership numbers on the check. If you act fast enough, your friends will receive the December 1980 issue free.

If only half of our readers can each get two additional subscribers, we will double the circulation! We are depending on you.

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As an IEEE member, I wish to enter a new subscription to *Technology & Society* for 1981. (Enclosed is my \$3.00 check to IEEE.) I understand that I will receive the December 1980 issue free of charge, if this form reaches IEEE Service Center in time (before mailing the issue is processed).

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Letters

To The Editor:

In *Engineering Ethics and the IEEE: An Agenda* appearing in the June 1980 issue of *Technology & Society*, Stephen Unger noted that a legal defense fund should be part of that agenda and that the San Francisco (Bay Area) Council (SFBAC) was in the process of establishing such a fund on a local basis.

As the originator and still lead man of the project, I would like to clarify the nature of this "fund," to bring your readers up to date and give some of the history of this project. Although it has been discussed by higher echelons within IEEE, at times those who have discussed it have not been well-informed about our goals and procedures. One member of the IEEE Board of Directors (BoD) who expressed some reservations felt that after the present members of our ad hoc committee or the initial elected members of the "Fund's" directors would leave, no one else would have interest enough to accept a position.

The idea originated in my mind while I was reading a monthly periodical published by the Nation Association of Social Workers (NASW). For several years NASW has had a *Legal Defense Service* (LDS) which has helped many members who availed themselves of that service. In the geographical area served by the SFBAC there have been two situations in the recent past where a Legal Defense Service could have been useful to members if IEEE had had such a service. (The SFBAC is the coordinating body for three IEEE sections: the Oakland-East Bay Section (OEB), the San Francisco Section (SF), and the Santa Clara Valley Section (SCV), Total IEEE membership in the area is eleven to twelve thousand.)

The BART case is familiar to everyone so I will not mention it any further. A case which is not so well known is the Whalley case. It was discussed at great length by the SFBAC and even went up to the BoD and was bounced back. Briefly, Wilfred Whalley sought, and was given permission by his superiors at the company in which he is employed, to give a talk to a local technical group. The talk was scheduled and publicity went out. A day or so before the event, his employer got an injunction from a municipal court to forbid his giving the talk. Mr. Whalley then hired an attorney, had the injunction overturned, and went on to give his talk. For exercising his "freedom of speech" he incurred expenses of approximately \$3,000. He sought the assistance of IEEE to help defray those expenses but was unsuccessful because IEEE has no machinery in place to help him. His petition occupied many hours of the time of officers of the SFBAC as well as of the IEEE BoD but there was nothing anyone could do.

With these two cases in mind and with the precedent of the NASW, just after publication of the 1977 Survey, I asked the SCV Section Professional Activities Committee (PAC) to begin the process of setting up some kind of legal defense system. We felt that all three local sections should participate, with general oversight from the SFBAC. Each

section was asked to appoint two members, not necessarily PAC members, to an ad hoc committee.

I was appointed Chairman of the committee by Frank Lord, SCV Section PAC Chairman. The Committee made a thorough study, including the procedures of NASW, and wrote a set of recommendations in a report which was sent to the new officers of the SFBAC at the end of 1978. We were informed that any entity within IEEE which uses IEEE in its name must be approved by the BoD. Consequently, a digest of our report was made by a member appointed by the SFBAC and sent to the BoD. Our Ad Hoc Committee has been going ahead on its own and with the help, both moral and financial, of the SFBAC will be presenting a final plan later this year. Until that final report nothing definitive can be said.

Two ideas are firm, however. These are: (a) our charter or goals and (b) the need to be separate from the line organization of IEEE. This latter idea arises from the practices of NASW and from the fact that within our organization precedents exist for this separateness. Our Council (the SFBAC) and the Los Angeles Council are 50% owners of the group that put on WESCON. That corporation is separate from IEEE but has IEEE members and members of the Electronic Representatives Association running it. The SFBAC gets a substantial part of its budget from this separate corporation.

Our goal will be to assist members of the sections within the SFBAC whose adherence to the IEEE Code of Ethics results in a need for legal assistance or whose legal difficulties present some landmark in career development. We are calling the entity to be set up a *Legal Defense Service*, and not a *Legal Defense Fund*, deliberately. It is not always money that our members will need, but other types of assistance. Among the services being considered are: (a) maintaining a roster of attorneys who are skilled in handling cases involving professional ethics, (b) establishing an ad hoc group of members with experience who can provide lay (nonlegal) advice as to the ethical issues involved in a case, (c) entering legal cases as *amicus curiae*. A fund to assist in legal defense will also be part of the LDS. It has not yet been decided whether to establish a Trust, as NASW has done, or a nonprofit corporation like Electrical and Electronic SHOWS, Inc.

As to funding for the LDS, we believed it should come from donations from individuals or from groups within IEEE. The SFBAC has already made a financial commitment which will be in the form of office and clerical services. My suggestion for those who have an interest is to wait for us to finalize this service for our members. Copies of our final documents will be available.

Alfred H. Barauck
Chairman, PAC
Santa Clara Valley Section

To the Editor:

My article "Stereotyped Images in the Technology/Society Debate" (June, 1980) contained several typographical errors (including my name). Fortunately, most of these errors were simple enough to be interpolated across to obtain a meaningful reading. The last quote from Mr. Leo Marx, however, was mutilated to such an extent as to be indecipherable. The last portion of this quote, reference 12 in the article, should read: "To change the situation we require new symbols of possibility, and although the creation of these symbols is in some measure the responsibility of artists, it is in greater measure the responsibility of society."

Robert J. Whelchel

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AAAS. In addition to providing forums for discussing issues, CSIT played a major role in the development of IEEE's ethics code and procedures, and CSIT has established an award for "Outstanding Service in the Public Interest."

Why a Society?: A Society can: (1) publish transactions and/or a magazine (which can be sold to libraries and to

nonmembers); (2) more easily organize conferences and workshops; (3) form local chapters; and (4) have affiliate-grade members. An archival publication would attract more high-quality papers than does a newsletter. The affiliate mechanism would attract participation (and dues) from the large number of non-EE's who have an interest in this field. All four factors would interact to generate a quantum increase in publication circulation, active member participation, quality of output, and revenues.

The paid circulation of *Technology and Society* is 2500, which is equal in size to many existing IEEE Societies and is 50 times larger than any of the four other TAB Technology Committees. Transforming CSIT into a *Society* would be administratively straightforward and would coincide perfectly with the needs and composition of CSIT's established constituency of 2500 IEEE members. In contrast, forming a *Council* would entail building a whole new organization and subscriber list from the ground up because a Council cannot have any direct individual members. Also, a Council cannot form local chapters.

In 1972 the IEEE amended its constitution to affirm that the social implications of technology were an area of vital importance to the IEEE. CSIT has made a good beginning toward translating these words into action, and we ask you to give us the tools we need to take the next step forward.