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When I was asked to give this talk, it was suggested that my topic be "The Law Confronts Expanding Technology." This, I thought, was an inappropriate topic. However true it may be that the law is a static, backwards-looking force in our society, it simply is not true that the law confronts or in any sense resists technological advance. On the contrary, our entire legal system reflects a tolerant, indeed a benevolent, attitude towards technological advance. This is reflected in the patent system rooted in Article I, Section 8, Clause 8 of the Constitution to "promote the progress of science and useful arts," in our tax laws, and in our predisposition for political and economic freedom. Even our common law system has evidenced a disposition to balance pre-existing rights in the status quo against the benefits of technological advance, and generally to sacrifice the former in favor of the latter.

It is important to any discussion of this topic that there be a clear understanding of what "law" is. It is, first of all, a body of rules governing individual activity and relationships among the various actors in society. These rules are found in the vast body of judicial decisions applying the common law. They are also found in statutory enactments and the rules of administrative agencies, as well as in judicial and agency decisions interpreting these statutes and rules. The law is also a process of decision-making as lawyers representing clients with clashing interests seek to have their clients' interests

enhanced, protected, or vindicated before the courts, administrative agencies, and legislative bodies.

When a new technology emerges, it is brought forth into a social environment which includes pre-existing technology and is not necessarily applicable to the new technology or the peculiar social problems which the new technology may bring. For example, when the first automobiles came into existence, there was no law directly applicable to automobiles. There were, however, laws applicable to the use of thoroughfares, to the rights of pedestrians, and to the rights, duties, and liabilities of persons who used horses or horse-drawn vehicles. As the use of the automobile impinged on existing legally protected interests, it became necessary for the courts to consider whether, and the extent to which, existing law was applicable to the automobile. What were the respective rights of users of automobiles and users of horse-drawn vehicles? Were automobiles vehicles within the meaning of statutes written in contemplation of horse-drawn vehicles and bicycles? Were the rules of the road applicable to these new-fangled devices? The courts grappled with these problems on a case-by-case basis as lawyers representing the adversary interests of their clients argued pro and con on these issues, and ultimately, through a process of trial and error, a body of law directly applicable to automobiles began to emerge. Over a period of time the legislatures also began to take cognizance of the automobile, and statutes began to emerge providing for registration of motor vehicles, licensing of operators, inspection, traffic control, liability, etc.

Development of this new body of law directly applicable to auto-

mobiles could have operated as either a deterrent or an incentive to the growth of the automobile technology. We know in retrospect that the incentives, including development of highways, far outweighed the deterrents. Only in recent years, as our legislatures have addressed themselves to problems of safety and pollution, have there been indications that law may be moving in the direction of deterrence.

Let me now attempt a generalized description of the legal system as it confronts expanding technology.

The first response of the legal system to a new technology has characteristically been to deal with the problem entirely as a matter of private law. Legal problems are dealt with within the framework of disputes between private interests: The private parties who are using the technology versus the private parties who may be injured or threatened by the technology. Government, through its judicial processes, acts as the impartial umpire for the resolution of these disputes. As the principles and the wisdom of the past, found in judicial precedent, are applied on a trial-and-error basis to the new problems emerging from the new technology, the process of decision-making in specific litigations results in the emergence of new precedents specifically applicable to the new problems. The emergence of this new body of law creates legal rights and legal duties which become a part of the general legal environment in which the technology develops and is used. The existence of legal rights and duties operates to internalize the social costs of the technology and becomes, to some degree, a deterrent to the advance of the technology. The net result of this process is that our society permits the technology to

cause social disruptions and injury on the theory that the legal system will provide monetary compensation to persons whose legal rights have been violated.

There frequently comes a time, however, when society regards the existence of the disruptions and injuries caused by the technology as unacceptable, and the focus of law-making then shifts from the courts to the legislatures. Whereas the process of law-making by the courts is piecemeal, random, and highly indirect, legislative action is positive, deliberate, and direct. The legislative action may be in the form of new rules redefining the rights and duties of private persons with respect to the technology, or it may be in the form of positive regulation of the technology. It should be recognized, however, that the legislative process usually operates slowly and uncertainly. It is always characterized by inertia and usually also by considerable friction which arises from strenuous efforts by the sponsors of the technology to resist legislative action which will adversely affect their economic interests. As a consequence, the initial legislative action is usually based on political compromise and the enactment, viewed in retrospect, is rarely adequate and remains to be modified in later successive legislative actions as society reaches the conclusion that the disruptions and injuries remain unacceptable.

By and large the system I have described has worked reasonably well over most of the history of Anglo-American law. This is not to say that it has not permitted immense injury, which could have been avoided. Obviously, for example, automobile technology has produced

immense slaughter on our highways which could have been substantially lessened had our law-making institutions come to grips with the problem of automobile safety at an earlier date. On the other hand, there is little question in my mind that, had our current concern with automobile safety arisen in the 1920's or 1930's, our technological progress as measured by the present state of the automobile would have been substantially retarded. When I say, therefore, that the system has worked reasonably well, I am saying that it has provided a framework for enabling technological advance on the assumption that even considerable disruption and injury is an acceptable price to pay for this advance.

The present interest in technology assessment reflects the growing view in our society that such disruption and injury may no longer be acceptable. This view has come into being largely as a consequence of the recognition that the technologies of today and tomorrow may be producing disruptions and injuries which go to the question of survival itself, and that technological advance is occurring at so rapid a rate that intolerable and irreversible levels of injury may be sustained before we are even aware of the fact that the technology involves a capacity to produce injury.

As a lawyer, I see the function of technology assessment as being twofold: first, to provide for legislative action designed to channel technological advance along lines which are regarded as optimal from the standpoint of society's interests; and, second, to encourage and promote legislative action which will deal decisively with the potential disruptions and injuries caused by technology at

a much earlier stage of the growth of the technology than is feasible under the present legal system.

Implementation of the first of these objectives would involve the substitution of governmental decisions for the operation of the market as a determinant of the allocation of resources. Government would presumably discourage less optimum technologies through tax or restrictive regulatory actions and would encourage more optimum technologies through benevolent regulation, tax incentives, or subsidy. Government, as a benevolent big brother, would make a value judgment on what is good for society, and this decision would have the effect of limiting the present right of the public to vote with its dollars in the market place as to what products it wants and what negative consequences it is willing to accept in order to have the benefits it desires. If, for example, technology assessment should result in a legislative decision that cheap but dangerous lawn mowers are verboden, lawn movers would become unavailable to a segment of the public which can afford only cheap lawn mowers and is prepared to assume the risks in order to have the benefits.

Implementation of the second objective would involve a rigorous analysis of the potential benefits, costs, and risks of a technology and the striking of a balance on the basis of which the legislatures would make a judgment as to whether a green light or a red light should be flashed for further development and use of the technology, and if a green light, the manner in which the technology should proceed. Here again a value judgment would be made as to whether benefits outweigh risks and costs. In this connection, it should be

noted that the evaluation of both benefits and risks is based more on predictive judgments than on experience. Benefits, moreover, are usually much more obvious and immediate than risks, which, when considered on a predictive basis, tend to be remote, speculative, and subject to technological fixes (hoped for) that will minimize them. This concept gives me, as a lawyer, some concern. An explicit legislative judgment that benefits outweigh risks could well have the effect of impairing or limiting the right of members of the public to seek legal redress or relief if they regarded the risks as unacceptable to them. For example, a legislative determination that a certain level of aircraft noise is acceptable in the light of the social benefits of aircraft might well have the effect of precluding someone who is in fact injured by the noise from obtaining redress or relief in the courts.

In a large sense, there is really nothing unique or novel in consequences of this kind. Our legislatures have always made decisions of this nature and these consequences have in fact resulted. Still, technology assessment adds a new dimension which troubles me. Obviously no one could seriously question the desirability of our legislatures' having the maximum possible amount of authoritative information on benefits, risks and costs on the basis of which decisions may be made. It is institutionalization of the process of providing such information to the legislatures which troubles me. Most of the recent discussion of technology assessment seems to proceed on the assumption that there exist valid processes through which benefits and risks can be identified and quantified, and alternatives set forth, by specialized elite groups,

and that the legislatures can then make "correct" decisions in the light of value judgments. Indeed, some spokesmen for technology assessment go even further and talk as if the assessment exercise would be a waste of time if the legislatures did not reach the correct judgment indicated in the assessment. My own view is that neither benefits nor risks can be identified, let alone quantified, and that alternatives cannot be articulated, without some large value judgments on the part of the assessors as to what the public would regard as benefits and risks and the importance attached by the public to each item of benefit and risk. Thus, my concern is that the institutionalized technology assessment mechanism will serve to the legislatures a predigested body of information rooted in the value judgments of a small, narrow, elite group and that the result of the assessment process, if taken seriously by the legislatures, will greatly constrain the operation of the democratic processes in the ultimate decision-making exercise.

My concern in this respect is mitigated only by my confidence that technology assessments of this kind, no matter how authoritative the assessment body may be, will not in fact be accepted as conclusive by members of legislative bodies. The assessment will in all likelihood be just another informational input into the legislative process, and legislative enactments will still be based on political compromises reflecting the prejudices, interests, and responses by legislators to the interests of their constituencies.

In short, therefore, I believe technology assessment is a highly useful exercise in maximizing the information available to legislatures,

but I believe that those who regard it as a panacea, or even as an important form of therapy, are taking the concept much too seriously.

A final point I would like to make relates to the role of the law itself in technology assessment. Since legislation resulting from technology assessment will be new law superseding or supplementing existing law, it is important that existing law be considered in the process of assessment. Moreover, since new law always has a disruptive effect on expectations and commitments arrived at under old law, it seems to me to be generally desirable that new legislation should make the least possible change in the law consistent with accomplishing the desired objective. This means, I think, that proposed alternative courses of action set forth in a technology assessment should include an assessment of the first order and secondary order consequences of any suggested changes in the law. In addition, before a technology assessment flashes a green light for advance of a technology, consideration should be given to what legal changes may be necessary in the long run to regulate that technology. For example, one can visualize that some of the emerging biomedical technologies may require regulatory laws which could have a profound effect on traditional individual freedoms. The necessity for such laws is obviously a kth-order consequence of the technology and should be considered in the assessment process. Thus, the technological capability of predetermining the sex or the physical or mental attributes of a baby could well create social conditions necessitating the licensing and regulation of marriage, conception, or birth. Possibilities of this kind should be considered in technology assessments.

In this connection, I throw out a word of caution to those of you who believe that this a "lawyer-ridden world." Institutionalization of technology assessment could well lead to the massive intrusion of legalistic processes into the assessment function. There already is an example of how this could happen. It has been suggested that the National Environmental Policy Act involves something closely akin to technology assessment. NEPA became law on January 1, 1970. There is no indication that anyone thought it would give rise to a spate of litigation. In its 30 months or so of life to date, there have been well over 100 court decisions involving NEPA and its procedures dealing with such questions as when NEPA is applicable; what elements must be considered in NEPA statements; who and what interests must and may participate in the NEPA process; etc. The same thing can happen to technology assessment.

Finally, it should be recognized that the process of technology assessment discussed today is neither the beginning point nor the ending point in society's assessment of technology. Society has always had mechanisms for technology assessment. Today, the market place, the legal system, and the insurance mechanism all play an important role in technology assessment. If an institutionalized technology assessment mechanism is created, this will be superimposed upon and supplement the existing structure. The outputs of this assessment mechanism, assuming they are reflected in legislative action, will not be self-executing. They will merely change the rules of the game, and the marketplace, the legal system, and the insurance

mechanism will continue to perform their own assessment functions under the new rules.

It is interesting, I believe, to note that the legal profession has shown relatively little interest in technology assessment. This is perhaps due to the fact that those from other disciplines who have been immersed in the assessment problem have not adequately recognized the relevance of legal institutions in technology assessment and therefore have not called for the lawyers' help. On the other hand, it may be that from the standpoint of the legal profession, the old maxim is relevant: "The more things seem to change, the more they are the same."

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