William & Mary Law Review

Volume 25 (1983-1984)
Issue 4

Article 3

May 1984

Jurisprudence or "Juriscience"?

Howard T. Markey

JURISPRUDENCE OR "JURISCIENCE"?

HOWARD T. MARKEY*

Jurisprudence: a system or body of law; the philosophy of law
Juriscience: a system in which judicial decisions are based on scientific fact

I. INTRODUCTION

For better or for worse, we are tending to scientize the law. In those instances when science and law interact, juriscience might displace jurisprudence. Before that happens, society should evaluate the costs and benefits of such a development. Whether the development should be halted is problematic, but it should not occur sub rosa. Although this Article cannot explore every aspect of the displacement of jurisprudence by juriscience, it can raise the issue and add to the concerns already advanced by others. Commentators have recognized that science itself is harmless, but that the application of science—technology—is not.[1]

This Article will examine the effect of the application of science to the law and the judicial process. Concluding that the threat posed by science should not be ignored, the Article proposes rules of technological adjudication which, if adopted, might prevent the displacement of our jurisprudence.

II. THE TENSION BETWEEN SCIENCE AND LAW

The displacement of jurisprudence by juriscience is not a recent development, but it is occurring at an accelerating pace and may be irreversible. No court, however, should base a decision solely on science if doing so would exclude the transcendental ethical values of the law. If a court accepts technological activity without evaluat-

* Chief Judge, United States Court of Appeals for the Federal Circuit. J.D. 1949, Loyola University of Chicago; M.P.L. 1950, John Marshall Law School.

1. Each reference in this Article to "science" includes the inexact sciences, as well as the exact sciences and technology.

ing fairness and justice to the litigants, juriscience has displaced the jurisprudence that should have governed the case.

The growing list of suggestions to train judges as scientists and technologists, bureaucratize the courts with staffs comprised of social and technical scientists, and make other changes to facilitate the judicial search for scientific truth accelerate this process.[2] Indeed, the suggestions reflect a view that the only real problem in cases involving scientific issues of fact is that the results may be unsatisfactory to scientists. If followed, the suggestions would ensure a wholesale displacement of our jurisprudence by juriscience.

If the development of science is viewed as a race for dominance between science and law, science appears to be winning. We perceive the infallible, objective, dedicated nature of the scientific method as the solution to all of man's problems—capable of eliminating poverty, disease, crime, and the need for labor. But much would be lost if juriscience were to displace our jurisprudence completely. Cold, hard facts would govern our society. Values recognized for centuries, such as mercy, compassion, freedom, and justice—the ethical, moral, and religious considerations that define our jurisprudence—would be ignored. If these values are to disappear from our society, its law, and its judicial process, their demise should not go unnoticed or unmourned.

The advance into the courts of the technological explosion that has permeated business, government, and education is not surprising. The invasion of science into other areas may raise legitimate problems, but when it enters the courts, science runs into an intricate system of values. To science, although certainly not to scientists, values are nonexistent. Values, however, are the very life of the law. Law is not a science, and the judicial process cannot remain judicial if subsumed by the value-free scientific process.

Science and law, however, need not be mutually exclusive. Both should serve society. They should complement each other, rather than conflict. The problem, however, is that science and law are inherently and irreconcilably different. Their purposes and methods are precise opposites. Both science and law seek truth, but

---

2. *See* Leventhal, *Environmental Decisionmaking and the Role of the Courts*, 122 U. PA. L. REV. 509 (1974); Nyhart & Jones, *What You Don't Know about Technology Can Hurt You*, 69 A.B.A. J. 1667 (1983).

they seek different truths in different ways. Science seeks truth through an analysis of physical facts and phenomena. It is based on the material and posits that which can be done. Science is mechanical, technical, value-free, and nonhumanistic. Science pronounces the law as supplied by nature. Law seeks justice through a philosophical inquiry. It is based on rights and duties and posits that which may be done. Law is dialectical, idealistic, nontechnical, value-laden and humanistic. Law, in the nonscientific sense, seeks to free society from the rule of science.

Law is the only tool that society has to tame and channel science and technology. Only law can simultaneously ensure the scientist's freedom to seek scientific truth and the individual's freedom to choose to live by his own moral, social, and religious principles. Thus, those who enact and interpret law bear a heavy burden. They must understand the relationship of science and law, and the manner in which that relationship affects society, its institutions, and its basic values.

Though science and law must coexist in this modern age of technology, their students and practitioners lack a mutual understanding. As different as science and law are, however, each must be channelled and employed to provide the maximum societal benefit. Neither can blindly dominate without injury to the other and to society. Neither can displace the other without destroying the dual goal of material progress and individual freedom.

III. The Threat

With federal civil suits increasing seven times faster than our population over the past two decades, one might assume that law is in the ascendency. The reality, however, belies the assumption. Experience indicates that the scientific juggernaut can turn us into what Thoreau called "the tools of [our] tools,"[3] and can threaten to overwhelm our jurisprudence. The strength and potential growth of the threat is debatable, but the existence of the threat is not.

Science in court is not a new phenomenon. Science and technology have long been present in criminal, product liability, and pat-

3. H. Thoreau, Walden; or, Life in the Woods 41 (1854).

ent cases. In cases where the law is clear and unchallenged, decisions appropriately may turn on a scientific fact.[4] Such cases must be distinguished, however, from those in which the law, rather than scientific fact, must control.[5]

The distinction between issues of law and issues of fact ensures that the values of law are preserved. The distinction does not require mistreatment of science in the courtroom, although examples of abuse of science and scientists do exist.[6] The adversary process can produce abuses of science, which is anathema to those who seek scientific truth, but that problem is different from the concern here. The present problem involves the reach of science into sensitive areas, such as fetal experimentation, personal surveillance, genetics, and the elimination of risk in an industrial and technical milieu. That reach threatens to replace a value-based system of law as the foundation of decisionmaking with a system based on value-free science.

A. The Evolution of the Threat

Technological advances in our complex and crowded society have produced sociopolitical health, safety, and environmental problems. These problems have spawned governmental regulatory efforts resulting in a new type of litigation which focuses on scientific, rather than traditional, legal issues. Unwilling or unable to trust one another, people have turned to government, and particularly to the courts, to resolve their disputes.

Recognizing the need to protect society against new dangers from an explosive technology, Congress has limited its role by enacting statutes that establish only laudable, noncontroversial goals.[7] These statutes assign to an executive or independent agency

---

4. For example, we often rely on the testimony of forensic scientists in deciding whether crimes have been committed, or whether a suspect was at the crime scene.

5. For example, in reviewing the risk-versus-benefit analysis underlying an agency's decision, courts often emphasize procedural regularity, although they sense a need to understand the scientific underpinnings of the agency's decision.

6. John Thornton notes that lawyers frequently abuse forensic science and forensic scientists by selecting and presenting only limited scientific evidence, thus distorting it in their efforts to win their cases. Thornton, *Uses and Abuses of Forensic Science*, 69 A.B.A. J. 288, 292 (1983).

7. Examples of such statutes include the Hazardous Substances Act, 15 U.S.C. §§ 1261-1276 (1982), the Consumer Product Safety Act, *id.* §§ 2051-2083, the Toxic Substances Con-

the duty to design and enforce regulations to achieve the identified goals.[8] The statutes vary widely in the decisional parameters that they provide, and weaken the constitutional principle prohibiting congressional delegation of legislative functions. Because the statutes are ambiguous and give broad discretion to the agencies, and because virtually anyone dissatisfied with an agency decision may obtain judicial review of the decision,[9] final regulatory policy is often established in the courts.

Many appeals of agency decisions involve science-related, sociopolitical disputes that courts are ill-equipped, unable, or unauthorized to resolve within the traditional judicial process. Unanswered and unaswerable questions abound. For example, will the court's decision be judicial, scientific, or political? Are the controlling principles legal, scientific, or political? What will be the consequences of the court's decision, not only to the parties, but to persons and groups not before the court? What is the true nature and probability of the risk? How reliable and complete are the scientific data presented? Is a scientific answer being sought when none exists? What does "safe" mean? Do animal test results apply to humans? These and similar questions indicate a technical uncertainty which, like a siren song, can attract so much attention that consideration and application of what Professor Tribe calls our "fragile" values is virtually impossible.[10]

B. Examples of the Threat

When questions arising from scientific or technical activities are presented to the courts under the artificial regime of bipartisan ad-

---

trol Act, *id.* §§ 2601-2629, the Highway Safety Act, 23 *id.* §§ 401-408, and the Air Pollution Control Act, 42 *id.* §§ 1857-1858 (1976).

8. For example, the Consumer Product Safety Commission is charged with enforcing the Hazardous Substances Act and the Consumer Product Safety Act, 15 U.S.C. §§ 1269, 2056, 2058; the Environmental Protection Agency is charged with enforcing the Toxic Substances Control Act and the Air Pollution Control Act, *id.* § 2605, 42 *id.* §§ 1857-1857*l*; and the Department of Transportation is charged with enforcing the Highway Safety Act, 23 *id.* § 402.

9. 5 U.S.C. § 702 (1982). "A person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action . . . is entitled to judicial review thereof." *Id.* Last year, 3,500 demands for judicial review of agency decisions were filed in the United States Courts of Appeal.

10. L. TRIBE, WHEN VALUES CONFLICT 61 (1975).

versarial litigation, value questions may seem indistinguishable from questions of scientific fact. Failure to make the distinction, however, would allow moral, philosophical, and political decisions to be based solely on the outcome of a purely technical debate between scientific experts. This result has already occurred in a variety of instances.

Sheila Jasanoff and Dorothy Nelkin have identified many examples of cases in which scientific fact determined the outcome.[11] In one example, the plaintiff sued a hospital for refusing her request for in vitro fertilization.[12] The court focused almost entirely on purely scientific considerations. It looked at the doctors' level of expertise, whether temperature charts reliably forecasted ovulation times, and whether test tubes or petri dishes were better fertilization vehicles. In doing so, the court virtually ignored the ethical issue of whether the woman's desire to have a baby by in vitro fertilization conflicted with the hospital's contractual agreement with the federal government not to engage in human experimentation. Jasanoff and Nelkin conclude that the court subordinated the traditional role of the judicial process—the weighing of competing values and interests—to resolution of purely scientific questions about the proper steps to follow and the equipment to use in conducting an in vitro fertilization procedure.[13]

In another example, the Consumer Product Safety Commission (CPSC) issued a regulation prohibiting the sale of all but the smallest firecrackers because of the potential for injury.[14] Opponents of the regulation focused their arguments on whether the safety record of firecrackers justified the regulation,[15] and on whether people have a right to use larger firecrackers in religious ceremonies.[16]

---

11. Jasanoff & Nelkin, *Science, Technology, and the Limits of Judicial Competence*, 214 SCI. 1211 (1981).

12. *See* Powledge, *A Report from the Del Zio Trial*, HASTINGS CENTER REP., Oct. 1978, at 15.

13. *See* Jasanoff & Nelkin, *supra* note 11, at 1215.

14. 16 C.F.R. §§ 1500.17(a)(3), (8), (9) (1983).

15. Opponents argued that few injuries resulted from the use of medium or large firecrackers, that injury occurred only to the careless, and that similar state laws had not had the desired effect of reducing firecracker-related injuries. *Proposed Curb on Explosive Content in Firecrackers: Comments Continue the Debate*, 1975-1977 CONSUMER PROD. SAFETY GUIDE (CCH) ¶ 43,044.

16. *Id.*

The court initially remanded the cases to the CPSC to correct procedural errors.[17] The court later approved the CPSC's amended order and the regulation, stating only that the CPSC had followed correct procedure and had adopted findings supported by substantial evidence.[18] Whether the federal government has the power under the Constitution to protect a citizen from self-injury appeared to play no role in the court's decision.

When the Department of Transportation decided to rescind its regulation requiring seatbelts or airbags in all new automobiles, a group of insurance companies sought judicial review. The United States Court of Appeals for the District of Columbia Circuit overturned the agency decision[19] and the United States Supreme Court affirmed,[20] primarily because the agency had not articulated adequate reasons for rescinding, rather than extending, compliance deadlines. The decisions are replete with statistics gleaned from surveys and studies concerning automobile accidents, injuries, costs to medical budgets, and the percentage of people that would voluntarily use seatbelts.[21] The agency had determined that an educational system that would allow citizens to make informed choices whether to purchase and use protective devices would not result in satisfactorily prompt and widespread use.[22] The courts dismissed as irrelevant both citizen fears of being trapped in an automobile after an accident and a study indicating that as many as forty percent of the people would refuse to wear a belt under any circumstances.[23] Neither opinion, however, discussed whether the forced prevention of self-injury was a proper role for the government to assume.

The state court decisions that interpret laws requiring motorcycle riders to wear approved helmets illustrate the dichotomy be-

---

17. National Soc'y for the Prevention of Blindness v. Consumer Prod. Safety Comm'n, 1975-1977 CONSUMER PROD. SAFETY GUIDE (CCH) ¶ 75,146 (D.C. Cir. June 23, 1977).

18. National Soc'y for the Prevention of Blindness v. Consumer Prod. Safety Comm'n, No. 76-1495, slip op. (D.C. Cir. Oct. 5, 1977).

19. State Farm Mut. Auto Ins. Co. v. Department of Transp., 680 F.2d 206 (D.C. Cir. 1982), *aff'd sub nom.* Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 103 S. Ct. 2856 (1983).

20. 103 S. Ct. 2856 (1983).

21. *See, e.g.*, 103 S. Ct. at 2861-72; 680 F.2d at 213-18.

22. 103 S. Ct. at 2872; 680 F.2d at 217-18.

23. 103 S. Ct. at 2872 n.18, 2873; 680 F.2d at 215 n.12, 217.

tween a basic value and the public interest. The vast majority of these decisions uphold the statutes as proper exercises of the police power.[24] The decisions are premised on statistics comparing head injuries received by those wearing helmets with the injuries received by those not wearing helmets,[25] and on the additional state costs for medical services that could accrue because injuries were received by someone not wearing a helmet.[26]

Defendants argue unsuccessfully that helmets themselves could cause injuries and accidents. One court reasoned that an unhelmeted motorcyclist might cause harm to others,[27] such as the injury to others involved in an accident caused by the motorcyclist,[28] or the potential suffering of a spouse and children if a motorcyclist were injured or killed. Such efforts to show a risk of injury to others because a motorcylist refuses to wear a helmet appear more frequently when the court is faced with a vigorous dissent addressing the fundamental question whether the state has the right to punish citizens because they choose to risk self-injury.[29]

The helmet-law cases demonstrate that, although many courts do not consider underlying values when making decisions, others

---

24. *See* State v. Lee, 51 Hawaii 516, 465 P.2d 573 (1970); Everhardt v. New Orleans, 253 La. 285, 217 So. 2d 400 (1968); Commonwealth v. Howie, 354 Mass. 769, 238 N.E.2d 373, *cert. denied*, 393 U.S. 999 (1968); State v. Anderson, 275 N.C. 168, 166 S.E.2d 49 (1969); State v. Odegaard, 165 N.W.2d 677 (N.D. 1969); State v. Fetterly, 254 Or. 47, 456 P.2d 996 (1969); State v. Lombardi, 104 R.I. 28, 241 A.2d 625 (1968); *Ex parte* Smith, 441 S.W.2d 544 (Tex. 1969); State v. Laitinen, 77 Wash. 2d 130, 459 P.2d 789 (1969); Bisenius v. Karns, 42 Wis. 2d 42, 165 N.W.2d 377 (1969). *But see* People v. Fries, 42 Ill. 2d 446, 250 N.E.2d 149 (1969); American Motorcycle Ass'n v. Davids, 11 Mich. App. 351, 158 N.W.2d 72 (1969).

25. *See Lee*, 51 Hawaii at 520, 465 P.2d at 576; *Everhardt*, 253 La. at 294, 217 So. 2d at 403; *Anderson*, 275 N.C. at 174, 166 S.E.2d at 53; *Fetterly*, 254 Or. at 48-51, 456 P.2d at 996-97; *Lombardi*, 104 R.I. at 30-31, 241 A.2d at 627; *Laitinen*, 77 Wash. 2d at 133-34, 459 P.2d at 791; *Bisenius*, 42 Wis. 2d at 50, 165 N.W.2d at 381.

26. *See Odegaard*, 165 N.W.2d at 679; *Laitinen*, 77 Wash. 2d at 134, 459 N.W.2d at 791-92.

27. *See Fetterley*, 254 Or. at 49, 456 P.2d at 996.

28. *See id.*

29. *See, e.g., Lee*, 51 Hawaii at 524-28, 465 P.2d at 578-80 (Abe, J., dissenting); *Laitinen*, 77 Wash. 2d at 135, 459 P.2d at 792 (Hill, J., dissenting). These dissents cite examples of everyday activities that states could prohibit if they have the right to protect citizens from the risks of self-injury, such as crossing the street, smoking, eating an improper diet, walking outdoors without a helmet and protective clothing, and driving without wearing a seatbelt.

do consider those values. One may quarrel with the philosophical balance struck between individual freedom and the state in any one case. The balance, however, must be struck. If a striking of the balance in courts and legislatures eventually results in a displacement of jurisprudence by juriscience, no one could then say that society had not exercised its right to choose between the two.

Thus, many regulatory decisions can be viewed as raising certain fundamental questions. Is the regulation premised on some underlying concept that the government effectively owns the citizen and therefore may prevent the citizen from risking self-injury?[30] Does a law that prohibits citizens from injuring themselves accord with the concept of individual liberty expressed in the Declaration of Independence and the Constitution? What is the legal rationale, as distinguished from the technical facts, that justifies the regulation? Are ordinary citizens too careless or recalcitrant to know and do what is good for them? Will informing the citizen of the risk associated with his behavior achieve the same result as the regulation? If we regulate because the injured citizen might require publicly supported medical treatment, thereby increasing the cost of governmental medical programs, should we not prohibit every activity that might cause an increase in the likelihood of added costs to the government's medical budget, or require citizens to undertake preventive measures so they will not add to the public burden?[31] Lastly, and perhaps most importantly, to what extent and under what circumstances should courts consider, or even raise sua sponte, such questions?

Asking these questions does not mean that one favors unrestrained freedom. The citizens of 1984 cannot live as the free-ranging cowboy lived in 1884. Indeed, most people recognize that many activities, such as drug addiction, promote criminal activity and therefore should be prohibited. Asking these questions, however, emphasizes the proposition that a major function of the law is to balance the citizen's freedom to do anything that does not injure another citizen—the swing of one's fist short of a neighbor's

30. The government does own some citizens, in at least one sense. The government may, and indeed must, require soldiers to avoid many risks of self-injury so that they will be combat-ready.

31. For example, should we prohibit the use of tobacco, alcohol, coffee, and "junk food," and require people to exercise, maintain a proper diet, and get plenty of sleep?

nose—against the interests of society and the state.

This Article does not suggest the appropriate answers to the above and similar questions. Its intent is not to quarrel with the outcome of any particular case. The intent is to caution that answering the fundamental questions raised requires full presentation, argument, and study. If the Orwellian social order, in which everything in life is either ordered or forbidden, is to prevail, it should be consciously chosen. It should not arrive as a result of courts making society's decisions solely on the basis of scientific fact.

IV. Responses

The problems raised here are not insurmountable. With some trepidation, this Article will make some limited suggestions. However society may respond, it should first evaluate the suggestions based upon the intended results, and then on the likelihood of achieving those results.

A. Restructuring the Courts

Many commentators have suggested improving the scientific competence of judges, embellishing court staffs with social scientists and technicians, and providing the judicial system with better technical input.[32] The primary difficulty with suggestions for restructuring court staffs and for retraining judges to improve their scientific competence lies in the assumption upon which the suggestions are based. The suggestions are predicated on the assumption that courts will decide increasing numbers of sociopolitical cases on a mixture of scientific and political grounds. Thus, the restructuring suggestions are designed to improve judicial competence in areas in which many believe the courts should not be involved at all. Transforming judges into scientists and technologists, and surrounding judges with scientists and technologists untrained in law, is unnecessary and unwise. Judges need only learn about science, scientists, and their empiric methodology, and the distinction between science and law. Furthermore, unnecessary changes could put the supremacy of law at risk.

---

32. *See supra* note 2.

Courts will continue to deal, as they always have, with technical evidence. The retraining and restructuring suggestions arise because technology is complex, the judicial workload is enormous, and cases in which courts must evaluate risk and benefits demand that judges determine whether technological predictions alone can justify enjoining otherwise legal action. Pointing to judicial decisions based on scientific data they consider inadequate, those making the suggestions appear to accept the premise that judges should decide scientific truth. Opponents of these suggestions would maintain that a court should look first to the law to find the relevant underlying values, and then should determine the manner in which the technical facts are affected by those values.

Suggestions for increasing the technological competence of courts so that they can decide cases on scientific evidence alone suffer from the same basic flaw as suggestions that courts should determine only whether a regulatory agency followed correct procedural and evidentiary rules.[33] The flaw in both suggestions is the absence of a specific requirement that traditional jurisprudential values assume primary importance in the decisional hierarchy. Experience indicates that the ordering of priorities must be conscious and expressed; it cannot be assumed.

That judges should not be retrained or courts restructured does not mean that the judicial review process is functioning perfectly. Some judicial soul-searching and self-improvement is appropriate. If judicial review is to serve its intended role in administrative law cases, for example, courts must not lose sight of their role. Both judicial independence and judicial process are diminished when courts undertake the social policymaking duties of legislatures.

The desire to increase judicial competence in highly technical matters arises in part from the belief that courts frustrate the goals of the complaining groups. Environmentalists view courts as subservient to industry; industry views courts as impediments to progress. Such a result is not unexpected because consistent application of the law to varying fact patterns invariably produces varying

33. The suggestions that a court should evaluate an agency decision only on the basis of procedural and evidentiary rules would ensure due process rights, but would also give the court's imprimatur to an agency decision that may have rested solely on scientific evidence and ignored our jurisprudential values.

results. Nonetheless, the embroilment of the courts in the essentially political contest between groups asserting conflicting views of the public interest, and the overlap of scientific and policy questions in many cases, blur the proper function of unelected federal judges in a representative democracy. The courts cannot maintain effectiveness if they attempt to enunciate solutions for all of society's problems.

B. Judicial Review of Agency Action

Judicial review of administrative agency action is inconsistent. Conscientious, dedicated judges struggle daily with various statutory and judicial standards of review. The distinctions among such standards as clearly erroneous, arbitrary and capricious, preponderance of the evidence, no substitution of judgment, rational basis, clear error of judgment, clearly unreasonable, and abuse of discretion are not always clear. Moreover, the scope of review applied by a court in any particular case is often uncertain. The apparent lack of consistency among decisions of different courts and even among those of different panels of the same court is not surprising.

Efforts to achieve symmetry by assigning different standards of review to legal and factual questions founder because the terms, "law" and "fact," lack clearly agreed upon definitions. Whether the question before a court is one of law or fact is up to the court alone. Thus, labeling a question as one of law can be a handy device to free a court from deferring to an agency's findings of fact. The mixed-question concept also enables the court to substitute its own policy for that of the agency while announcing, and perhaps believing, that it is not doing so. Unfortunately, busy judges, fighting the flood of litigation, may not notice the risk to the legitimacy of judicial review that can result from linguistic subterfuges. Conversely, complete deference to a challenged agency action because a question of fact is involved also can do substantial injustice. Indeed, limiting the court's review to consideration of the scientific fact determinations of an agency can be a ready means for converting jurisprudence into juriscience.

Concentrated efforts to divine a uniform yardstick for distinguishing questions of law from questions of fact would highlight the need for courts to consider the law first. Although the Administrative Conference of the United States has studied the matter,

little has been done to create a method of review that would be applicable to agency actions based on technical fact predictions and evaluations of risk versus benefit. If the courts are to remain guarantors of the individual freedoms envisaged in the Bill of Rights, the courts must continue to exercise their one function: the administration of justice. The courts can administer justice only if they maintain the respect of the people, the lifeblood of the judicial process. The courts can lose that respect by failing to emphasize and uphold our system's fundamental values.

C. Congressional Review

The Administrative Procedure Act[34] and every statute that establishes and assigns duties to an agency must be reviewed and revised. Review and revision is a monumental task, but no other project would aid our society more in its attempt to retain the rule of law amidst a burdgeoning growth of population and technology. Only Congress can bring order out of the chaos it has created. Congress in some instances has required the impossible by mandating almost complete elimination of risk. In other instances, Congress has prohibited the acceptance of inconsequential risks without considering the costs of eliminating the risk and the loss of other benefits. Often Congress has created an agency while ignoring the possible effects of the agency's mandated activities on the activities of other agencies, groups, and institutions. Statutes vary widely in expressing the scope of an agency's authority, the standards that govern agency action, and the standards of judicial review.

To protect its own interests, Congress should review and revise these laws. Congress should not be a mere way station on a problem's route to the courts. That situation has arisen partly because of confusion in the statutes, and partly because the public perceives that Congress has abdicated its role and that definitive decisions are available only from the courts.

A complete congressional review of the entire regulatory landscape may be too much to expect. If done, however, it could make a major contribution toward assuring the people that their system of jurisprudence will not be surreptitiously converted into a system

34. 5 U.S.C. §§ 500-559 (1982).

of juriscience.

D. Revision of Science and Pre-law Curricula

One critical impediment to maintaining a proper balance between science and law is the superspecialization rampant among scientists and lawyers. The barrier between science and law is maintained because each profession has its own jargon, each must remain abreast of its own specialization, and each tends to concentrate its time and draw its friends from that which provides its members with a living. Chances are slight that the gulf between scientists and lawyers can be bridged.

Superspecialization has had a detrimental effect on our decision-making process. Our national security, economy, environment, judicial process, and much of what happens in our daily lives depend on this process. In business, legislatures, schools, government agencies, and on the bench, decisions made within a narrow frame of reference by philosophically illiterate technologists and technologically illiterate lawyers lead to inconsistency and confusion in the affected institutions.

The answer lies with future generations and the type of preparatory education available to them. An interdisciplinary approach is needed in which those planning a career in law would learn about science and scientists, and in which science students would learn about law and lawyers. The National Conference of Lawyers and Scientists recently launched an effort to encourage such cross-training.[35] This idea needs and deserves academic support because the best hope for handling the interaction of science and law is the creation of a new generation of scientists and lawyers who understand and respect each other's role. That generation would have a better chance of maintaining a proper balance between material progress and individual freedom.

E. Regulatory Reform

Simon Ramo, former chairman of the President's Committee on

35. Thomas, *A Report from the Workshop on Cross-Education of Lawyers and Scientists*, 19 JURIMETRICS J. 92 (1978). The National Conference of Lawyers and Scientists is a joint organization of the American Bar Association and the American Association for the Advancement of Science.

Science and Technology, has suggested a comprehensive scheme of regulatory reform.[36] Ramo's approach separates the two functions of government in regulating technology: investigation and decisionmaking.[37] An investigative organization would be established, modelled after the Federal Bureau of Investigation.[38] It would be staffed with scientists and technologists equipped and funded to investigate any field of technology.[39] This organization would make no decisions at the end of an investigation, but would instead present its evidence and recommendations to the second organization, the decisionmaking body.[40]

The decisionmaking organization would be comprised of a number of boards that would process cases.[41] The boards would hold hearings and compare alternatives, balance the risks, costs, and benefits, and consider the case in light of other national interests. Finally, the board would decide whether to ban, limit, modify, or approve the challenged technological operation.[42] Ramo recognizes that some people will nonetheless seek judicial review, but he also recognizes that careful drafting of the legislation establishing the new organizations would diminish the number and nature of such demands.[43] The courts should retain only their traditional role of ensuring that government agencies act within the law.[44] The Ramo approach or similar suggestions deserve careful consideration.

V. Rules of Technological Adjudication

The tension between science and law must be mitigated. Trepidation aside, one should not merely identify a problem without offering some solution. This Article's response to the problem of preserving the supremacy of the law and its values when science enters the courtroom assumes that the tension will continue to in-

36. *See* Ramo, *Regulation of Technological Activities: A New Approach*, 213 Sci. 837 (1981).
37. *See id.* at 841.
38. *Id.* at 842.
39. *Id.* at 841-42.
40. *Id.* at 842.
41. *Id.*
42. *Id.*
43. *See id.*
44. *Id.*

crease. The courts are not likely to be restructured, and Congress is not likely to rewrite statutes that give rise to the tension. Academe is notoriously slow to change, and the Ramo recommendation has yet to receive enthusiastic support. Hence this Article's response is limited to action that can be taken by the group charged with the administration of justice, the courts.

The conduct of the judicial process, of course, is governed by many rules. These include rules of civil procedure, rules of appellate procedure, rules of evidence, rules of criminal procedure, bankruptcy rules, and local rules of court.[45] No rules, however, specifically facilitate judicial handling of technological issues while preserving the supremacy of legal and ethical values. Formulation of such a set of rules is fraught with difficulty. The many features of the adversarial process must be preserved. One must consider, moreover, whether a rule would impinge on established requirements for laying a foundation, or whether it would revise the burden of production or proof. The rules, therefore, should be created by a committee of judges, lawyers, scientists, and regulators. Thus, the final form of the rules would probably be quite different from any proposed at the outset of a rule-drafting process.

Presented here is a draft of Rules of Technological Adjudication. These are a mere beginning, but they might serve as a starting point for further discussion.

Rule I. *Judges Shall Be Receptive to Technology.*

Judges should create—if necessary, force—a personal welcome for technology. This should not be merely an acceptance or toleration, but an active, eager, receptive, and interested welcome. Judges should not be intimidated or scornful because they fear the unknown. The supremacy of the law can only be aided, not injured, if judges welcome technology in its proper role.

Rule II. *Lawyers Shall Educate Judges on the Technology in the Case.*

Judges should say, "I don't know." Judicial inadequacies

45. The MANUAL FOR COMPLEX LITIGATION (CCH) (1978) provides some assistance to judges and lawyers trying to sort out these rules.

should not be shielded. Lawyers should not assume or pretend that the judge knows.

Rule III. *A Technological Glossary Shall Be Supplied to the Court.*

The glossary should contain every technological term that will be used in the case with an easily understood definition for each.

Rule IV. *The Parties Shall Not Present Unanswerable Scientific Questions for Decisions.*

The parties should stipulate which scientific questions can be answered. Judges should not be frustrated because they are unable to find an answer when no answer exists.

Rule V. *The Court Shall Not Attempt to Decide "Scientific Truth."*

The court should initially confine itself to determining whether the law and justice require or permit a change in the status quo. If a change is required or permitted, then the court should decide whether the agency followed correct procedures.

Rule VI. *Experts Shall Not Testify "Past" Each Other.*

Expert testimony should be structured so that the experts meet on the same ground. Testimony of opposing experts should be alternated when necessary to achieve the intent of this rule.

Rule VII. *The Court Shall Be Entitled to the Best Available Expert Testimony.*

Courts should control adversary concepts and impugning of witnesses to overcome the distaste for the adversarial process that keeps outstanding scientific experts from consenting to testifying in court.

Rule VIII. *Counsel Shall Disclose Contrary Expert Evidence.*

Exercising the same candor and integrity that requires lawyers to disclose contrary precedent, counsel who are aware of expert evidence contrary to their position should disclose it to

the court.

Rule IX. *Simple and Complex Technical Fact Issues Shall Be Separated.*

Counsel should separate simple and complex technical fact issues before trial, and should delineate the issues for the court.

Rule X. *Summaries of Expert Testimony Shall Be Stated in Plain Language.*

The summaries, in plain language to the maximum extent possible, should be submitted to the court before trial.

Rule XI. *No Ex Parte Tests May Be Introduced.*

Neither the results of ex parte tests nor testimony about the tests may be introduced, unless opposing counsel declined an invitation to observe the tests.

Rule XII. *The Court May Order Technological Experiments During Trial.*

When the court decides that a conflict between experts on a material question may be resolved by an experiment, the court may, in its discretion, order an appropriate courtroom experiment.

Rule XIII. *Only the Technology Necessary for a Decision Shall Be Presented.*

Judges and juries need not become experts in a field to decide a case involving evidence from that field. They may, however, be expected to understand enough about the field to render a reasoned decision.

Rule XIV. *Technological Issues Shall Be Simplified.*

The technology should be broken into segments and analogized to readily understood phenomena and experience.

Rule XV. *Technical Jargon Shall Not Be Used in Court.*

To the maximum extent possible, technical jargon should not be used in the courtroom.

VI. Conclusion

The goal of law is justice as well as truth. Justice is not easily defined, but like obscenity, we know it when we see it. Moreover, we can recognize injustice even more easily when we see it.

The problem of preserving justice in a technological age is neither primarily legal nor primarily scientific. The problem lies in the field of ethical, moral, and religious values. The problem can be solved, or at least controlled, if we understand the nature of mankind and the purpose of government.

Attempts to remake the judicial process into a scientific tool, whether to solve a broad social problem, to achieve a socio-scientific goal, to promote a societal goal, or to compensate or adjust the status of whole classes of people, can distort and destroy the judicial process. Of equal importance, the public respect necessary to sustain courts as independent guarantors of human and civil rights may be lost if the judicial process becomes scientized.

The decisional process that a scientist employs in analyzing the costs and benefits of building a dam or a nuclear power plant is entirely distinct from the decisional process that a court employs in determining legal liability, assessing damages, or determining guilt or innocence. One problem stemming from judicial efforts to force risk-versus-benefit cases into the traditional judicial process is the tendency to allow science to overshadow the law's traditional values. The judicial process is designed to deal with events and conduct. The risk-versus-benefit cases involve broad policy questions that define the future direction of large segments of society. The answers are not found in the Constitution, but in policy choices that legislatures should make. If such cases are to continue to be decided by courts, care must be exercised to ensure that the judicial process remains judicial.

A set of Rules of Technological Adjudication might assist judges in integrating technology into the framework of transcendent legal values. Rules that help courts determine technological facts and their proper role in the decisionmaking process can forestall, if not foreclose, the possibility that juriscience will replace jurisprudence. Those blessed with the privilege of working at the heartbeat of a free society carry a special responsibility. In this technological age, that responsibility includes a duty to keep inviolate the values that only law can protect.