

Journal of Dispute Resolution

Volume 2001 | Issue 2

Article 3

2001

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Recommended Citation

Erik S. Knutsen, *Science-Policy Disputes: Resolution through Data Mediation*, 2001 J. Disp. Resol. (2001)
Available at: <https://scholarship.law.missouri.edu/jdr/vol2001/iss2/3>

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Science-Policy Disputes: Resolution Through Data Mediation

Erik S. Knutsen*

I. INTRODUCTION

An increasing number of important and influential legal disputes are relying on the interpretation of complex yet uncertain scientific information in coming to a resolution. Parties involved in obstetric and gynecological medical malpractice claims often require cutting-edge medical evidence to make difficult determinations of fault or cause.¹ Parties in toxic torts like asbestos-related claims² also rely on somewhat ambiguous scientific research in order to establish a myriad of facts regarding liability, from latency periods to future impact on childbearing.³ Products liability cases like those involving defective breast implants,⁴ the Dalkon Shield intrauterine device,⁵ the Agent Orange defoliant,⁶ and most recently tobacco⁷ typically require judges and juries to make difficult and controversial policy conclusions from highly technical scientific data. The resolution of environmental resource allocation disputes also rests on speculative interpretations of sometimes indefinite biological and ecological data. Most of the disagreement within these types of disputes stems from differing understandings and perspectives about seemingly innocuous hard science. In fact, scientific information in complex disputes is often anything but innocuous. It is subject to interpretation, error, bias, and the whims of competing policy goals of the disputants. Disputes that involve policy conclusions from uncertain scientific information are therefore difficult to resolve because of the reliance on human interpretation of data. These disputes often involve controversial, time-sensitive issues, affect great numbers of stakeholders, are expensive to resolve because of their complexity, and are unpredictable in outcome.

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1. See e.g. Paul C. Weiler, *Medical Malpractice on Trial* (Harv. 1991).

2. See e.g. *In re School Asbestos Litig.*, 789 F.2d 996 (3d Cir. 1986); *Hardy v. Johns' Manville Sales Corp.*, 681 F.2d 334 (5th Cir. 1982).

3. See Linda S. Mullinex, *Resolving Aggregate Mass Tort Litigation: The New Private Law Dispute Resolution Paradigm*, 33 Val. U. L. Rev. 413 (1999).

4. See e.g. *In re Dow Corning Corp.*, 211 B.R. 545 (Bankr. E.D. Mich. 1997); *In re Breast Implant Cases*, 942 F. Supp. 958 (S.D.N.Y. 1996); *In re Silicone Gel Breast Implant Prods. Liab. Litig.*, 1994 WL 114580 (N.D. Ala. 1994).

5. *In re N. Dist. of Cal. Dalkon Shield I.U.D. Prods. Liab. Litig.*, 693 F.2d 847 (9th Cir. 1982).

6. *In re "Agent Orange" Prod. Liab. Litig.*, 611 F. Supp. 1223 (E.D.N.Y. 1985), *aff'd*, 818 F.2d 187 (2d Cir. 1987), *cert. denied*, 487 U.S. 1234 (1988). See also Peter H. Schuck, *Agent Orange on Trial: Toxic Disasters in the Court* (Belknap Press of Harv. U. Press 1986).

7. *Castano v. American Tobacco Co.*, 160 F.R.D. 544 (E.D. La. 1995), *rev'd*, 84 F.3d 734 (5th Cir. 1996).

It is the aim of this article to propose a novel system of dispute resolution for disputes which turn on interpretations of complex but uncertain scientific evidence. Part II identifies a specific subset of legal disputes that can only be resolved through policy judgments from ambiguous scientific data. Recognizing the underlying commonalities of these science-policy disputes offers an opportunity to craft a single dispute resolution mechanism which may be utilized for a wide variety of disputes. Part III outlines the benefits of using a mediation-based dispute settlement mechanism, as opposed to the traditional adversary-style litigation system, for these specific types of disputes. Part IV proposes a model mediation system for disputes turning on policy-based interpretations of complex scientific information. Part V concludes by applying the model to a fictional products liability dispute which involves conflicting scientific determinations from technically complex data.

II. CLASSIFYING THE SCIENCE-POLICY DISPUTE

Disputes involving controversial scientific conclusions from ambiguous data exhibit a number of common characteristics and present common challenges to disputants and factfinders alike. When designing dispute settlement mechanisms, it is therefore possible and indeed practical to craft solutions which can be portable to a variety of complex scientific disputes.

A. The Science-Policy Dispute

Disputes which turn on the interpretation of complex and sometimes uncertain scientific data are often difficult to manage and even more difficult to settle.⁸ Judges and juries are required to make conclusions from highly technical data. They will likely not agree on the conclusions reached from the data. They may not even agree on what, in fact, is the relevant data. The divergence of opinions about the scientific information is greatest when there may not be one clear answer stemming from the science, but rather many answers. Interpreters of the data, often experts in the field, are then required to use their professional judgment to choose what they believe is the most likely answer from the range of answers. Important elements of a scientific dispute like cause, fault, and risk potential may not be apparent but may exist on a continuum of cause, fault, or risk potential. Different experts may choose different points on that continuum for different reasons. That choice may be both highly controversial and based more on policy considerations than on accepted scientific methodology.⁹

8. See Connie P. Ozawa, *Recasting Science: Consensual Procedures in Public Policy Making* (Westview Press 1991) for a thorough outline of the unique qualities that set the science-policy dispute apart from other disputes.

9. Indeed, Lawrence Susskind notes that the key barriers to most agreements in science-based disputes are "inappropriate responses to scientific uncertainty." Lawrence Susskind, *Barriers to Effective Environmental Treaty-Making*, in *Barriers to Conflict Resolution* 293, 303 (Arrow et al. eds., 1st ed., W.W. Norton 1995).

For example, a power company wishing to construct a new hydroelectric dam must be approved by governmental agencies before it can proceed with construction. Often, concerned parties like local citizens' groups, aboriginal communities, and environmental interest groups participate in the approval system. A dispute emerges. In order to pass approval, the power company must determine the effect of the dam on the water quality, fish, wildlife, and soil condition, as well as the dam's noise and pollution potential. The results of the ensuing risk assessment depend on the way the proffered scientific evidence is interpreted. Some scientists may make a more conservative estimate than others as to risk potential.¹⁰ Divergent views from the same data are likely to clash. Different scientific experts may utilize different methodology, different theoretical frameworks and may have different underlying political interests in allowing or halting the building process. Indeed, the data may be skewed toward furthering the power company's economic interests and an independent data collector may be required. There is also no guarantee that an independent data collection will rule out bias, as scientific conclusions must still be drawn from the data. Impasse occurs because the disputants cannot agree on the deciphering of scientific data.

The challenge in resolving these types of situations is to gain consensus on the policy behind the interpretation of uncertain scientific information. Relevance of data, research methodologies, theoretical perspectives, professional experience, as well as error and bias all affect the outcome of a scientific interpreter's conclusions. Because these disputes rely not on objective measurements from scientific data, but on interpretive judgment of that data, they are more science-policy disputes¹¹ than purely scientific disputes. Their often controversial and competing conclusions further heighten their policy underpinnings. Therefore, these science-policy disputes are unique in that they deal with gray policy conjectures rather than black and white scientific facts. They require sensitive treatment throughout the entire dispute process.

B. Complexity, Expense, and Unpredictability

Disputes turning on interpretations of scientific information are usually very complex. Many factors and considerations affect the various conclusions that need to be made from the scientific facts. Often parties may not even agree on what is a relevant scientific fact. The amount of technical information can seem overwhelming. For example, in tobacco products liability disputes, medical information regarding chemical toxicity levels to humans of second-hand tobacco

10. For example, Lawrence Susskind describes a *Boston Globe* survey which asked scientific experts their opinions about the global warming debate. Of those interviewed, thirteen percent stated an unstoppable greenhouse effect was likely, thirty-two percent believed a greenhouse effect was possible, and forty-seven percent said the effect was unlikely. *Id.* at 303 (citing David Chandler, *Fear Expressed of Runaway Greenhouse Effect*, *Boston Globe* § 3 (Feb. 10, 1992)).

11. Milton R. Wessel discusses scientific disputes that incorporate sociological factors into the decision-making process. He dubs them "socio-scientific controversies." Milton R. Wessel, *Adversary Science and the Adversary Scientist: Threats to Responsible Dispute Resolution*, 28 *Jurimetrics J. of Law, Science & Tech.* 379 (1988).

smoke is juxtaposed with information about other carcinogenic risk factors in a smoker's environment like pollution, diet, and genetic susceptibilities. Expert scientists must make predictions on the likelihood that the product is inherently dangerous to smokers and those who are around the smoke. Sorting out the potential risk factors to determine accurate and acceptable readings of the risk levels is a Herculean task because so many interdependent scientific factors are involved.

The outcome of a science-policy dispute is often hard to predict, especially if the dispute enters the litigation system. The complex scientific subject matter is difficult for lay juries and judges to understand. When coupled with conflicting expert testimony, the unpredictability increases. Litigation costs are prohibitive. Information exchange through fact-finding and discoveries involve complicated information and research, requiring expensive scientific expertise. Trials may go on for months or years. Appeals are nearly always automatic. With expenses so high, the outcome so unpredictable, and the policy conclusions from the scientific information so important, a litigated science-policy dispute becomes a high-stakes gamble for all parties involved.

C. Controversial Nature

Science-policy disputes tend to be controversial in nature. Often, one competing scientific theory or method must be chosen over another. Conclusions about the uncertain scientific information may in fact be made through competing choices of scientific, economic, cultural, and ethical policy. Not all disputants may share the same perspectives about choices of applicable interpretive policy. Determining whether a certain chemical is carcinogenic, or whether the harvesting of a section of forest harms endangered species involves enormous scientific, economic, cultural and ethical policy considerations beyond just reading hard data. The ramifications of choosing one interpretation may be controversial as well as wide-reaching. Injured plaintiffs may be precluded from compensation, manufactured products may be banned from consumer usage, whole industries may be put out of business, and precious natural resources may irreparably suffer. A high degree of emotional and political heat usually accompanies these disputes.¹² There is therefore a great deal of power and responsibility involved in resolving science-policy disputes ethically and fairly.¹³ The impact of policy conclusions based on scientific information may shape future disputes relying on similar science.

12. See Deborah R. Hensler, *A Glass Half Full, A Glass Half Empty: The Use of Alternative Dispute Resolution in Mass Personal Injury Litigation*, 73 Tex. L. Rev. 1587, 1596 (1995).

13. For an understanding of the power dynamics involved in science-policy disputes, see generally Ozawa, *supra* n. 8.

D. Multiple Parties

Science-policy disputes typically involve more than two parties, further complicating the disputing process. Party participation, and sometimes even party identification, can become difficult to manage. A medical malpractice action may involve not only the patient and primary care physician but other medical specialists, the hospital, and the hospital staff. There may be large numbers of plaintiffs in toxic torts and products liability cases, which is the primary reason why most of these disputes are litigated as class actions. Indeed, some affected plaintiffs may not even know they have a valid claim.¹⁴ Environmental resource allocation disputes can involve parties from government and industry, as well as aboriginal groups, concerned citizens' coalitions, and environmental interest groups. The multi-party nature of the dispute makes the dissemination of scientific data an important step in the resolution process. A stakeholder in a science-policy dispute cannot fully participate without adequate access to information. Settlement option generation depends on this informational exchange. Furthermore, informed settlement decisions depend on an understanding of the conclusions based on the scientific information, whether those decisions are made through an adjudicatory or consensual process.

E. Timeliness

Time is usually of the essence in these types of disputes. In injury cases such as medical malpractice and toxic torts, plaintiffs can wait years for needed compensation and usually require immediate financial assistance to cope with their injuries. In products liability cases, the importance of timeliness is heightened by the fact that there may be dangerous products still in public use. Any disputes involving the computer and high technology industry have an added time pressure as the technology progresses at a breakneck rate and a prolonged dispute over technical information is strategically threatening to the business parties involved.¹⁵ Environmental disputes are extremely time-sensitive as environmental harm can be accumulating and resources depleting while parties dispute. Therefore, science-policy disputes benefit from an efficient and early resolution.¹⁶

14. Many science-policy disputes, in particular products liability and toxic torts, affect a great number of people. Long periods of latency are often common in these cases. Potential plaintiffs may not know that they have a valid legal claim unless they are informed of the possibility through either the media or class action notices. Richard Delgado identifies this "indeterminate plaintiff" phenomenon in *Beyond Sindell: Relaxation of Cause-in-Fact Rules for Indeterminate Plaintiffs*, 708 Cal. L. Rev. 881 (1982). The mediation process may be more conducive to coming to an agreeable method of communicating with potential plaintiffs. The number of plaintiffs seeking compensation from defendants may be more reasonably defined through guidelines developed in a consensual process. At the same time, the parties can balance the preservation of the rights of those plaintiffs as yet unidentified but still deserving compensation.

15. See e.g. Clive V. Allen, *Comparative Aspects of Dispute Resolution in Technology Matters*, 17 Canada-U.S. L.J. 309 (1991). Allen notes that early resolution is vital to scientific disputes in the computer industry, as the technology undergoes massive changes in five to six month intervals.

16. See e.g. Thomas J. Klitgaard & William E. Mussman III, *High Technology Disputes: The Minutrial as the Emerging Solution*, 8 Santa Clara Computer & High Tech. L.J. 1 (1992).

F. Required Expertise

Science-policy disputants also require some technical expertise in order to assist with fact finding and interpretation of scientific information. Expert witnesses are usually involved to assist with this, though the disputing stakeholders themselves may also hold expertise. It is the experts who usually advance the policy conclusions from the data; therefore, they tend to exhibit a great deal of informational power in science-policy disputes. Lay disputants are captive to their determinations. Experts also function as educators of the parties, drafting opinion reports and assisting with fact-finding processes. Partisan parties will often involve their own experts in the dispute, usually hiring one expert for each relevant field of science. The experts' facts and conclusions are weighed against those of the other experts in an attempt to discern viable conclusions from the scientific data. Some expert opinions may be discounted and other opinions upheld. Measuring credibility of an expert is difficult because most parties lack the technical expertise to evaluate an expert's findings. There is a constant danger of valuing the best spokesperson over the best scientist.¹⁷

G. Informational Imbalances

Information imbalances usually exist among the parties and make the entire disputing process more frustrating, more unpredictable, and more prone to unfairness.¹⁸ A patient in a medical malpractice dispute usually has no medical knowledge and must rely on experts and her counsel to assist in this regard. Unlike the physician or hospital defendant, the patient usually has difficulty in locating an expert willing to testify against a fellow medical professional.¹⁹ Consumers in products liability cases are at an extreme informational disadvantage compared to manufacturer defendants who have access to all the manufacturing information, product history, and product testing research. Lay citizens and aboriginal groups who may be stakeholders in environmental disputes do not have ready access to the same scientific expertise as do industry and governmental stakeholders. Aside from immediate access to scientific information and expertise, the economic disparities existing between parties enable some parties to gain needed information and expertise, while keeping others from accessing the same advantages because of lack of financial resources.

17. E. Lyle Gross warns of the "hired gun" perception of expert witnesses in a traditional litigation setting and advocates the incorporation of experts into the mediation process in order to avoid this adversarial taint to the expert's involvement in the dispute. E. Lyle Gross, *The Expert Witness and Mediation*, 34 Alberta L. Rev. 69 (1995).

18. See Robert B. Wilson, *Strategic and Informational Barriers to Negotiation*, in *Barriers to Conflict Resolution* 108 (Arrow et al. eds., 1st ed., W.W. Norton 1995). Wilson analyzes game theory and economic models of litigation, mediation, and arbitration situations to demonstrate that lack of information and information imbalances can prevent settlements and create costly delays. Mediation is the better forum for overcoming this difficulty with differing parties' access to information.

19. See e.g. Joseph Kelner, *The Silent Doctors - The Conspiracy of Silence*, 1 U. Rich. L. Rev. 119 (1967); Weiler, *supra* n. 1.

H. Importance of Causation

Many science-policy decisions involve findings about causation.²⁰ Causal determinations usually hinge on interpretation of scientific information. Often, cause is uncertain and many multiple causes for a certain event or injury may seem apparent. Because the available science may not point to one clear cause, causation may actually exist on a continuum. Difficulty arises when disputants must pin down one source of cause on this continuum in order to resolve the dispute. For example, obstetrical and gynecological medical malpractice claims typically hinge on determining whether or not the physician's negligence actually caused the patient's injury. To make that determination, parties must interpret complex medical information about potential causes of the injury and the resulting likelihood that one or more of the causes stemmed from the physician's negligent behavior. It may be impossible to definitively prove with current science which potential cause was the actual cause-in-fact of the patient's injury. Toxic torts, such as asbestos poisoning cases, also turn on scientific information about causal latency and causal potency. Products liability cases demand that disputants analyze scientific data about the potential of harm caused by a defectively manufactured product. The cases involving breast implants, the Dalkon Shield intrauterine device, Agent Orange defoliant, and tobacco all involved voluminous amounts of controversial causal information. And even environmental resource allocation disputes require that parties analyze and interpret scientific information about cause and effect of stresses on natural resources. Causal judgments based on ambiguous causal science become prone to the policy judgments and differing opinions of those who have the power to interpret and understand the science.

III. BENEFITS OF EARLY MEDIATION

Science-policy disputes are usually resolved through the litigation system. Because the scientific conclusions from uncertain information are controversial and malleable, plaintiffs and defendants often believe that each has a valid case. Litigation becomes lengthy, protracted, and expensive. The adversarial nature of fact-finding can result in unpredictable and sometimes even incorrect conclusions being made from the scientific data. Expert witnesses are pitted against expert witnesses and their theories are challenged and subjected to incompatible legal, non-scientific standards of proof. Lay juries and judges are forced to interpret complex technical information which they often do not fully understand. And most often, success lies in who has the most dramatic expert witness as his or her spokesperson.

Early mediation of the scientific issues in the dispute may help to alleviate much of the shortcomings of the litigation system. Mediation may in fact be an ideal process for dealing with controversial disputes that must grapple with uncertain science-policy conclusions.

20. See e.g. Deborah R. Hensler, *Science in the Court: Is There a Role for Alternative Dispute Resolution?*, 54 L. & Contemp. Probs. 171 (1991).

A. Reducing Complexity, Expense, and Unpredictability

Early mediation may help to narrow the issues in dispute, assisting the parties in reaching settlement sooner by focusing efforts and resources on the critical areas of impasse. It may also foster some agreement early on in the dispute. Scientific process issues can be resolved before major interpretations of the evidence occur. Disputants can determine what information is still required, what criteria will be used for information evaluation, what research methodologies are acceptable, and what margins of error are tolerable. Unlike litigation, the mediation process also allows disputants to carve up various scientific issues in a flexible way, isolating important factors and making determinations in the order the parties wish.²¹ The consensual, problem-solving ideology of mediation is ideal for driving group efforts in fact-finding, which may propel resolution of science-policy disputes.

Mediation may also be a less expensive alternative to litigation. There is less opportunity to sabotage the process with costly legal procedures and delays. And parties can construct the process, keeping cost considerations in mind. This kind of cost control is non-existent in a litigated court case in the public justice system.

The mediation process deals more effectively with uncertainties in fact-finding. Because science-policy disputes involve conclusions from ambiguous scientific data, a consensual approach to making science-policy conclusions may make for more opportunity to construct flexible, contingent solutions. Parties are not required to come to one final answer, as they are in the litigation system; rather, answers to scientific questions can remain on a continuum of possibilities, providing parties agree on the ramifications of fact-finding in this manner. Fact-finding does not have to be based on absolutes but can proceed despite the fact that analyses may sometimes point to several answers. The only limits to the fact-finding process are imposed by the parties themselves and their ability to come to agreement.

B. Managing Controversy

The mediation forum is better suited to dealing with policy conclusions that can spark controversy, emotion, and political turmoil. Unlike the courtroom, mediation provides an outlet for emotion and heated debate. With the assistance of a skilled mediator, parties can explore the non-legal and non-scientific emotional, ethical, political, and cultural aspects of the dispute. For example, in a medical malpractice claim, apology may play an important transformative role for both patient and physician.²² There is also greater opportunity for understanding the

21. *Id.*

22. See e.g. Ann J. Kellett, *Healing Angry Wounds: The Roles of Apology and Mediation in Disputes Between Physicians and Patients*, 1987 J. of Dis. Res. 111 (1987); Catherine S. Meschievitz, *Mediation and Medical Malpractice: Problems with Definition and Implementation*, 50 L. & Contemp. Probs. 195, 197 (1991). See also Robert A. Baruch Bush & Joseph P. Folger, *The Promise of Mediation: Responding to Conflict Through Empowerment and Recognition* (Jossey-Bass 1994). Bush and Folger believe that mediation can have a transformative effect for disputants, empowering them to understand the dispute on their own while at the same time allowing them to recognize the root of the conflict. Apology is one of the ways the authors note this transformation can occur.

unique cultural perspectives of aboriginal groups affected by environmental disputes when the parties can hear the concerns of the affected groups themselves. Reading complaints on paper is never the same as hearing the complaint from the party. The ability of a party to verbally vent its concerns may spur the dispute closer to settlement by offering further insight into the true nature of the dispute. Skillful use of caucuses by the mediator may enable communication between parties who were previously unwilling and unable to communicate.

Creative solution generation which incorporates emotional, ethical, political, or cultural concerns can also be pursued in a mediation setting. The control of information through both confidentiality agreements and agreed monitoring of the news media may help to quell concerns about the controversial aspects of the dispute. Communication and information exchange agreements amongst parties may also help alleviate some emotional and ethical fears about whether or not the relevant data will be divulged.

C. Involving Multiple Parties

A more participatory setting like mediation may be better suited to disputes which involve multiple parties, each of whom must address complex and technical scientific issues. The mediation process can be specifically designed to accommodate the participation and interaction of a variety of parties. The parties themselves have an opportunity to air concerns and listen to opposing views. Most importantly, parties can be present to hear each others' conclusions about the relevant scientific data. Criticisms and commentary can help unite some divergent interpretations of scientific information and can educate parties about differing perspectives.

Early mediation may help break down positional bargaining and build consensus among the parties. Where appropriate, relationships among the parties may be better maintained through a consensual problem-solving forum like mediation, as opposed to an adversarial proceeding like a court.²³ For example, stakeholders in an environmental resource allocation dispute often have to continue to work together in a cooperative fashion after settlement is reached. A patient in a small community may still have to continue to attend a hospital that patient has sued for malpractice.

D. Efficient Use of Time

Early mediation may also force parties to assess the viability of the dispute before too much time passes and before formal dispute processes like litigation are initiated. Earlier agreement may be prompted by the mere fact that parties are forced to both assess the viability of their claims and communicate with one another. Furthermore, the mediation process can be streamlined to address the most contentious issues first, increasing the chances that a major portion of the dispute will be resolved without parties initially getting bogged down in trivialities.

23. See Hensler, *supra* n. 20, at 188.

E. Required Expertise

Mediation is much more conducive to the open forum of scientific inquiry.²⁴ Scientists can explore possibilities and hypotheses in an environment that fosters information exchange and debate. Allowing scientists to remain in a comfortable, non-inquisitorial environment may actually lead to more accurate policy prescriptions from scientific data because data may be subjected to scientific standards of proof rather than less rigorous legal standards of proof.²⁵ Experts who wish to avoid the adversarial setting of the courtroom may be more agreeable to participation in a mediation forum. Their credentials will not be challenged as in open court. They will not be subject to typical courtroom-style cross-examination. And the testimony they give will not be torn apart or twisted in a way they do not wish without affording them an opportunity to clarify their ideas.

F. Informational Imbalances

Informational imbalances between parties can be better addressed in a mediation setting. Parties can be encouraged to actively participate in the process and a mediator can assess whether or not there exists an informed understanding of the relevant scientific information. Because parties can be present to listen to differing perspectives, and because they can ask questions and challenge those perspectives, informational gaps have a greater tendency to close in mediation. Parties may be encouraged to more readily bring scientific information and conclusions to the table in mediation. In litigation, the adversary nature fosters an environment of concealment and ambush.²⁶

IV. A MEDIATION SYSTEM FOR SCIENCE-POLICY DISPUTES

In order to address the unique challenges facing disputants in science-policy disputes, early mediation should be incorporated into the disputing process. The proposed model is a flexible, context-sensitive two-step mediation. The first step involves a preliminary data mediation stage²⁷ where data is gathered, issues are

24. *Id.*

25. See generally Thomas B. Metzloff, *Alternative Dispute Resolution Strategies in Medical Malpractice*, 9 Alaska L. Rev. 429 (1992).

26. Elizabeth Sherowski cautions that, in order to submit some disputes to a mediation-type process, a trial lawyer culture change must occur. Lawyers must change tactics from a winning at all costs approach to an approach more conducive to finding a functional solution to the dispute. This culture change may be most difficult in personal injury science-policy disputes that are steeped in the adversary tradition, like medical malpractice claims or products liability class actions suits. See Elizabeth Sherowski, *Hot Coffee, Cold Cash: Making the Most of Alternative Dispute Resolution in High-Stakes Personal Injury Lawsuits*, 11 Ohio St. J. on Dis. Res. 521, 529 (1996).

27. See generally Lawrence S. Bacow & Michael Wheeler, *Environmental Dispute Resolution*, 27-103 (Plenum Press 1984) (discussing data negotiation in environmental disputes); A.J. Pirie, *The Lawyer as a Third Party Neutral: Promise and Problems*, in *Commercial Dispute Resolution: Alternatives to Litigation* (D. Paul Emond, ed., 1989) (suggesting data mediation procedures to break deadlocks over

narrowed, and criteria for information evaluation are developed. Policy conclusions from the data are initially discouraged at this stage.²⁸ The second step involves a mediation of the dispute which incorporates the findings and agreements of the data mediation. Parties can now begin to develop and debate interpretations of the data. Depending upon the nature of the dispute, this second mediation could either involve a neutral expert witness as educator of the parties, or sets of adversary experts present at the mediation. The dispute resolution mechanism centers around facilitating fair and efficient information flow while ensuring participation and education of the parties.

A. Step One: Data Mediation Stage

The first step in the science-policy mediation process is a preliminary data mediation confined to exploring the scientific issues of the dispute. This mediation is refined in scope as it does not canvass solutions for all issues in the dispute but is constrained to a distillation purpose only. It attempts to consolidate efforts to interpret the uncertain scientific information.²⁹

Data mediation is a process restricted to narrowing scientific issues and establishing common ground about the scientific information involved in the dispute.³⁰ Parties and their experts come together through the assistance of a neutral mediator. Information gathering and information sharing is fostered through the consensual, problem-solving environment of mediation. Data mediation is designed to break deadlocks over:

- relevancy and accuracy of data;
- means of determining what data will be used;
- criteria for evaluating data;
- differing perspectives on research design;
- methods of communicating data and conclusions; and

relevancy and accuracy of factual information to be used in the decision-making process).

28. This two-step mediation process is similar to the concept of pre-settlement settlement, or PreSS, as discussed by J.J. Gillespie & Max H. Bazerman in *Pre-Settlement Settlement: A Simple Technique for Initiating Complex Negotiations*, 14 *Negot. J.* 149 (1998). PreSS involves using a formal, initial mediation process before the main mediation in an attempt to resolve a sub-set of important issues contained in the dispute. See also Scott Forehand, *Helping the Medicine Go Down: How a Spoonful of Mediation Can Alleviate the Problems of Medical Malpractice Litigation*, 14 *Ohio St. J. on Dis. Res.* 907, 919 (1999) (advocating for mediation as a first step in medical malpractice claims); Jeffrey S. Brenner, *Alternatives to Litigation: Toxic Torts and Alternative Dispute Resolution – A Proposed Solution to the Mass Tort Case*, 20 *Rutgers L.J.* 779, 814 (1989) (calling for a bifurcated fact-finding process akin to data mediation, where screening panels first gather information about the dispute and then parties proceed to a summary trial).

29. Francis McGovern recounts three varieties of science-policy disputes which involved an initial process for narrowing scientific issues with the assistance of experts: an environmental resource dispute involving the Great Lakes waterways, an energy crisis dispute, and a dispute involving asbestos litigation. See Francis McGovern, *Toward a Functional Approach for Managing Complex Litigation*, 53 *U. Chi. L. Rev.* 440, 456-93 (1986).

30. For a discussion about the importance of consensus in agenda setting, problem formulation, identification of solutions, and choice of decisions when attempting to resolve science-policy disputes, see Ozawa, *supra* n. 8.

- appropriate policy frameworks for data interpretation.³¹

It is also useful in narrowing issues in dispute by identifying common ground amongst the parties. Furthermore, the process can uncover workable alternative solutions to help settle the dispute.

The process works best for disputes like science-policy disputes which contain a sub-set of debatable issues. Before a science-policy dispute like a toxic tort can be resolved, there is usually disagreement about how various technical facts will be evaluated. Data mediation can streamline the disputing process by resolving these preliminary concerns about scientific information before the greater issues of cause, fault, and damages are addressed. Data mediation is also useful when parties reach a costly impasse. When they are hopelessly countering each other, parties may be made no worse off by attempting a data mediation, especially when the alternative is to have no agreement at all.³² Finally, data mediation holds the potential to facilitate agreement before the full mediation even takes place by bringing the parties and information together earlier in the disputing process.

1. How Data Mediation Operates

Disputing parties appoint a mutually agreeable mediator.³³ In the alternative, a court-appointed mediator may suffice, if necessary. The parties meet together with the mediator and bring to the mediation whatever relevant scientific information they presently have. Some parties may wish that their experts attend the mediation as well. This should be encouraged, owing to the highly technical nature of these disputes.

31. The data mediation process may benefit from using a customized form of established legal evidentiary guidelines for evaluating scientific evidence. The United States Supreme Court outlined five factors for determining the quality of expert scientific evidence in *Daubert v. Merrill Dow Pharm., Inc.*, 509 U.S. 579, 593-95 (1993). Disputants should use *Daubert*-type criteria as a baseline in assessing validity of a fellow disputant's scientific information. The *Daubert* factors require a court to determine the following: (1) whether or not the scientific methodology has been, or can be, tested; (2) whether the methodology has been subject to peer review and publication; (3) what the known or potential rate of error is for the methodology; (4) what is the availability and use of standards to control the methodology's operation; and (5) to what extent the methodology is generally accepted in the relevant scientific community. *See generally id.* These factors are easily adaptable to a consensual mediation process and offer a framework for discussions about the relevance and quality of the proffered data. They can also easily be expanded to include other criteria important to the resolution of the dispute. For doctrinal analyses of the *Daubert* decision and its gatekeeping effect on scientific evidence, see Bert Black, *The Supreme Court's View of Science: Has Daubert Exorcised the Certainty Demon?*, 15 *Cardozo L. Rev.* 2129, 2137 (1994); Kenneth R. Foster & Peter W. Huber, *Judging Science: Scientific Knowledge and the Federal Courts* 115-30 (MIT Press 1997).

32. J.J. Gillespie & Max H. Bazerman, *supra* n. 28. Gillespie and Bazerman note that pre-mediation processes work best when their utilization is Pareto-superior. In other words, parties should attempt to use pre-mediation processes when it is clear that entering into the process will not be detrimental to any parties and will likely make at least one party better off than it is without attempting data mediation.

33. Whether the mediator should be skilled in the scientific subject matter of the dispute is debatable. *See e.g.* Gross, *supra* n. 17, at 69 (canvassing the benefits and detriments of the expert mediator); Metzloff, *supra* n. 25 (arguing that the alternative dispute resolution community should be providing mediators who are knowledgeable in the types of issues that arise in mediation).

An initial agenda for the data mediation should set out the realistic goals of this pre-mediation process as well as reasonable timeliness to reach those goals. Next, parties must determine what information is required to settle the dispute, what information is readily available at present, and who is required to help interpret that information. Parties may invite further scientific experts to the mediation table and the fact-gathering process begins. Experts from all sides of the dispute may present their conclusions and question each other. They should, however, refrain from making controversial policy conclusions from uncertain scientific information. That activity will be accomplished in the second mediation stage. The presence of the parties as well as their experts adds an important participatory element in this group fact-finding process. This, in turn, fosters ownership on the part of the disputants of any agreements reached.

Once the differing perspectives of the parties are aired, the parties must then work together to determine how they will proceed with the scientific information and conclusions presented. Evaluation criteria must be developed. Issues should be narrowed. Common ground should be identified. What is known and knowable should be separated from what is unknown and unknowable. Often, the fundamental disagreement between parties is not on the scientific facts themselves but on the methods of analysis of those facts.³⁴ Competing scientific theories and methodology mesh with opinions of various experts and stakeholders to create disagreements of not only scientific accuracy but of personal, political, and ethical bias. Parties must attempt to reach some consensus about how they will interpret the scientific evidence. At a minimum, parties can agree to disagree about some subjective elements of the dispute, including what policy frameworks each party will use in interpreting the scientific information. Once relevant data is located and criteria for its evaluation are developed, the parties may agree on how to proceed with the rest of the disputing process despite facing fundamental disagreements about data interpretation.

2. Problems with Data Mediation

A preliminary data mediation stage is not without its weaknesses. Its utility must be evaluated in each case before it is applied to a science-policy dispute. Data mediations may add extra expense and delay to the disputing process. That expense may be unnecessary if the dispute is headed to litigation in any event. Expert witness time is extremely costly and it may take some time for any agreement to be reached. However, disputants must carefully evaluate the possibilities that agreements reached in the data mediation stage may save costly discovery time and avoid procedural legal battles in the future. The process also allows a valuable preliminary look at the other party's information and positional stances.

Data mediation also requires full and frank disclosure of sometimes controversial scientific information. Parties may lose valuable tactical advantages in exposing their information. For example, a manufacturer will be reluctant to turn

34. See Lawrence Susskind & Jeffrey Cruikshank, *Breaking the Impasse* 160 (Basic Books 1987).

over its secret product test results unless it is forced by a court to do so. This difficulty may be somewhat alleviated by a confidentiality agreement incorporated into the data mediation which compels all parties not to use the data gleaned from the process for litigation purposes. Furthermore, no party is forced to give up his or her right to sue regardless of the outcome of the mediation. The data mediation process may actually indicate that the litigation system³⁵ is the only appropriate forum for the dispute. Because the data mediation process is flexible and can be designed around the unique challenges of science-policy disputes, it should often be the case that science-policy disputes will derive a benefit from the process that is at least worth the extra time and cost involved in attending.

B. Step Two: Policy Mediation Stage

After the data mediation stage, parties should next proceed to the main mediation component which is not limited to preliminary data management. The issues identified and conclusions reached at the data mediation should now be brought forward and discussed in the context of the entire dispute. The policy conclusions and prescriptions from the scientific information can now be debated in this forum, tempered only by the limits agreed upon at the data mediation stage. This stage is a typical full-blown mediation with one necessary addition: scientific experts.

1. The Importance of Experts

The importance of including the scientific experts in the policy mediation stage cannot be overstressed. The experts likely played a crucial role in the data mediation but are still necessary to the process in resolving a science-policy dispute. The parties require the presence of experts in order to further interpret, validate, and educate. Experts may still need to interpret scientific data that has become relevant after the data mediation. They may also still present their differing perspectives about technical issues that were not resolved in the previous stage of the process. They will be called upon for their policy conclusions based on the agreed relevant scientific facts and boundaries from the data mediation. Experts will need to assist parties in assessing various settlement options and predicting outcomes of potential future actions. Most important, experts are vital to continuing the educational efforts of the data mediation. The presence of experts can also help overcome the informational imbalances among the parties by acting as both educators and disseminators of information.

35. For cautions about relying too heavily on mediation and neglecting the potential utility of the current litigation system in complex disputes like science-policy disputes, see e.g. Judith Resnick, *Procedural Innovations, Slashing Over: A Comment on Deborah Hensler, 'A Glass Half Full, A Glass Half Empty: The Use of Alternative Dispute Resolution in Mass Personal Injury Litigation'*, 73 Tex. L. Rev. 1627 (1995); Kenneth R. Feinberg, *Response to Deborah Hensler, 'A Glass Half Full, A Glass Half Empty: The Use of Alternative Dispute Resolution in Mass Personal Injury Litigation'*, 73 Tex. L. Rev. 1647 (1995). See generally Owen M. Fiss, *Against Settlement*, 93 Yale L.J. 1073 (1984).

2. Incorporating Experts Into the Policy Mediation

There are two possible ways experts could be incorporated into the policy mediation stage. The first involves choosing a mutually agreeable neutral expert to act as both policy prescriber and educator of the parties. Alternatively, the second involves using adversary experts. Each method has advantages and disadvantages. The decision to proceed with one neutral expert or with adversary experts rests with the disputing parties. They must be able to accurately weigh the benefits and potential risks of proceeding with either option. The proper forum for making this decision may be in the data mediation.

Option 1: The Neutral Expert

If possible, a neutral expert agreed upon by all parties could serve the process best.³⁶ Conflicting expert reports and testimony from the data mediation could still be tendered by the parties. The third party neutral expert would read and evaluate the conclusions and facts and come to his or her own policy conclusions based on his or her professional judgment, the reports and findings of the parties' separate experts, and the agreed findings of the data mediation. These policy conclusions would then be debated amongst the parties who have been present at the data mediation. The expert would assist in educating the parties about the technical aspects of the case and would be available to explain his or her policy conclusions.

Several advantages exist with utilizing a single neutral expert in this fashion. If a single expert can be agreed upon, the expert can play a more actively facilitative role in the dispute. For example, the expert can ask questions of the parties directly, can engage in educating the parties about his or her policy conclusions from the scientific information, and can even make inquiries to other experts present at the data mediation. Having a single, neutral and knowledgeable source control what happens with the scientific information allows the mediation to proceed efficiently and with cohesion.

Choosing the best expert available may also avoid the 'hired gun' syndrome of expert witness shopping that is so prevalent in litigation today.³⁷ Perhaps more experts who are not comfortable in a courtroom environment would lend themselves to a policy mediation as they avoid the unpleasant experience of adversary cross-examination. This practice may also break down the stereotype of experts being plaintiff or defense sensitive and may attract better qualified experts who exhibit less courtroom showmanship but are more learned in their field. The policy mediation process is also akin to the free-flowing, scientific inquiry process in which many academics are used to working.

36. If there is more than one major scientific issue involved in the case, two or more neutral experts may also be necessary but this option should be avoided if possible. However, these neutrals will be responsible only for the issues pertaining to their particular areas of expertise. See *infra* Option 2: Adversary Experts.

37. See Gross, *supra* n. 17.

However, it is likely that parties may not be able to agree on one particular expert despite the advantages. The second option of using adversary experts may therefore be necessary. It may also be difficult to choose one neutral expert if the science-policy dispute involves a number of areas of scientific inquiry. An environmental dispute, for example, could touch on areas of biology, ecology, and chemistry, and various sub-specialties like ornithology, ichthyology, and dendrology. Products liability disputes may involve chemists, medical experts, and engineers. A drawback in choosing a single neutral expert is the fact that the expert represents only one theoretical perspective on the scientific issues. The parties are subject to the expert's biases and policy perspectives. This may be tolerable, indeed sometimes desirable, if the parties are fully aware of the expert's goals and perspectives. If the parties do not know enough about the expert, there is a risk that the expert's policy conclusions from the scientific information may be skewed against one party due to unarticulated theoretical or political preferences.

Option 2: Adversary Experts

If parties cannot agree on a single neutral expert, they must then resort to adversary experts chosen by each party individually. While the adversary experts can still function in many of the same beneficial ways as a single neutral expert, their inclusion has some added challenges to the mediation process. Adversary experts should still operate in an educative capacity. They are still required to make policy conclusions within the parameters of the results of the data mediation; however, they do so in a more partisan way. Each party's expert presents his or her policy conclusions separately. Experts can then challenge the conclusions of fellow experts. The mediator's most important task is to mediate between the experts. The mediator can help identify commonalities among the differing perspectives. He or she can ask for clarification or assist in posing hypothetical situations to the experts.

The parties, too, are involved in the evaluation of each expert's policy conclusions. Each party can question its own expert or the experts of other parties. Again, it is up to the mediator to maintain a facilitative environment as the information is exchanged. With both parties and experts present, the mediation should be able to effectively address the disagreements about even the most technical scientific information. And with the data mediation having preceded the policy mediation, parties are free to debate the difficult and controversial subject matter of the dispute without getting mired in debating the technical qualities of the scientific data.

Adversary experts inject a different tone into the mediation environment. There are more opportunities for disagreement among the parties and experts as the different players will advance conclusions that benefit their interests. Furthermore, it may be impossible to avoid the 'hired gun' syndrome and perhaps whoever has the expert most skilled at presentation may succeed in swaying other parties with his or her policy conclusions, regardless of the scientific validity comprising the substance of the presentation. Parties and their experts must be mindful of this tendency and must critically evaluate any solutions posed. The scientific method is often accepted too easily by the average disputant, who may not realize the underlying role of non-

objective judgments and personal bias in scientific disputes.³⁸ While this danger exists in the neutral expert option, it is increased due to the greater number of experts present in a multiple adversary expert mediation where various experts are competing for parties' attention.

V. SCIENCE-POLICY MEDIATION IN PRACTICE

The following fictional example demonstrates the effectiveness and flexibility of the two-step mediation process for science-policy disputes.

A. The Defective Jaw Implant: The Facts

Mand-tech, a prosthetic device manufacturer, invented and marketed the Mand707 partial jaw implant. The implant was designed to replace the lower portion of the mandible bone in the jaw. The implant was tested in Mand-tech's laboratory and believed to be safe. About one thousand Mand707 implants have been surgically inserted into patients. Only one documented case of implant rejection exists and reinsertion of the implant was successful. The implant is marketed throughout the United States to surgeons and hospitals.

Martin Lucent received a Mand707 jaw implant to replace a bacteria-diseased portion of his jaw bone. He suffered trauma to his jaw in an automobile accident and bacteria had badly damaged his lower mandible. Since implantation, he has suffered from nausea, headaches, dizziness, and constant jaw pain. He had to be prescribed a specific, powerful anti-inflammatory which eased the pain while not causing him further adverse side effects. After a visit to three local implant specialists, it was discovered that the implant had disintegrated in his jaw, likely through no negligence of the operating physician. Lucent sued Mand-tech in a products liability suit. Lucent's counsel knows of one other patient who is having similar trouble with the implant. The counsel is looking to begin a class action.

Mand-tech insists its jaw implant is safe and that Lucent's surgeon negligently installed the implant. Alternatively, Mand-tech asserts that Lucent's unique enzymatic makeup, coupled with the mixture of powerful prescription drugs he takes, is negatively affecting the jaw, causing Lucent's body to reject it.

B. The Data Mediation

Representatives of Mand-tech, Mand-tech's counsel, and Lucent and his counsel agreed to mediate the dispute through the science-policy mediation process. At the data mediation stage, Mand-tech produced all clinical trial research for examination by Lucent. Mand-tech also brought its top research scientists and a

38. See e.g. Lawrence Susskind, *Environmental Mediation: Theory and Practice Reconsidered*, in Stephen B. Goldberg, Nancy H. Rogers & Frank E.A. Sander, *Dispute Resolution: Negotiation, Mediation, and Other Processes* 1, 495 (3d ed., Aspen Law & Business 1995).

specialist in implant surgery to the mediation. Lucent hired a local expert in jaw implant surgery, at the recommendation of his counsel.

The parties and experts agreed to proceed by first examining the validity of Mand-tech's clinical trials and then gathering information about other jaw implants generally. Mand-tech's experts agreed to exchange a scientific opinion report with Lucent. Lucent's expert did the same. The reports conflicted as to the precise cause of the implant disintegration. Mand-tech's report stated the cause was due to the negligence of Lucent's surgeon in installing the implant. Mand-tech asserted that the surgeon must have created a non-sterile environment, splashing some unknown chemical agent on the implant or mishandling it in some fashion which eventually caused its breakdown. Lucent's expert report claimed the implant was defectively manufactured in that the chemical composition of the implant was unstable and unfit for human implantation. Both obvious and perceived bias seemed to taint the reports. The mediator had some difficulty in controlling the positional bargaining nature of the dispute and the parties seemed deadlocked in their opinions. However, the mediator was able to point to common ground: the heart of the dispute itself. Both parties were meeting impasse at the same issue.

It quickly became clear that the dispute rested on the cause of the implant's failure. If Mand-tech's jaw implant was soundly built, then Lucent would have no claim against the manufacturer. Mand-tech's clinical research trials appeared valid, and its scientific experts seemed credible. However, neither party could specifically point to the direct cause of the failure. The experts could only offer conjecture.

The parties agreed to narrow the mediation to the distinct issue of whether or not there was any reasonable possibility of biomechanical failure of the implant. The proper scientific sphere concerning the dispute was agreed to be not surgery but biochemistry, specifically the interaction of high-impact plastics with the human body and bacterial agents. Any theories for the implant failure had to pass a number of criteria formed by the parties' consensual agreement. A theory must be statistically significant of more than one in ten thousand to be considered relevant, it must come from a credible, mutually trusted source, the data used in the theory creation must be the data agreed by both parties to be valid, and the conclusions of the theory were not to be made public unless the parties mutually agreed to do so.

The mediator was able to convince the parties to disclose all information gathered at the data mediation to Swedish biochemist Dr. Lars Olafson, the leading expert in the biochemistry of implant rejection. Dr. Olafson was a respected and world-renowned expert who refused to testify in court, not wishing to subject himself to unpleasant cross-examination and his theories to unscientific methods of legal proof. Both Mand-tech's and Lucent's experts agreed he would be most knowledgeable on the subject. Indeed, much of his research was cited in both Mand-tech's and Lucent's expert reports. Dr. Olafson appeared to be a neutral expert and was therefore asked to produce an opinion report on the matter and to attend the policy mediation to debate his conclusions.

C. The Policy Mediation

At the policy mediation, Dr. Olafson presented his conclusions in the presence of the parties and their experts. He based his conclusions on the submitted data which included product specifications of the implant as well as medical history of Lucent. Dr. Olafson believed that the same bacteria that caused Lucent to lose his lower jaw in the first place was also capable of destroying even high impact plastic, providing the plastic was weakened with a specific anti-inflammatory drug like the kind Lucent was prescribed. He said the combination of these factors caused the Mand707 to disintegrate within Lucent's jaw. He estimated that, in an implant recipient who had not yet contracted the bacteria until after the implant installation, the chances of contracting the bacteria and being prescribed that specific anti-inflammatory were extremely low, about one in five million. However, in those recipients who had contracted the bacteria before, especially those who required the jaw implant because of bone loss caused by the bacteria, the chances they would be prescribed the anti-inflammatory were relatively high, about one in seven hundred. Furthermore, Dr. Olafson surmised that there was little that could happen during the operation itself that would cause the breakdown of the implant. He did not believe surgical negligence was a factor worth considering.

Mand-tech and Lucent questioned Dr. Olafson about his conclusions, specifically his statistical predictions. Mand-tech believed the probabilities to be too high; Lucent believed them to be too low. The mediator was able to get agreement on a middle ground probability after Dr. Olafson carefully explained his methodology to both parties and experts alike. The mediator reminded the parties about the uncertainty of the science and the greater uncertainty of success for either party if the issue proceeded to litigation. The mediator also pointed out that the information gleaned through Dr. Olafson benefited not only Mand-tech but Lucent as well, who now understood a possible reason for his suffering.

Realizing that it faced potential liability exposure, Mand-tech agreed to settle with Lucent for a large sum of damages. Furthermore, it agreed to recall the Mand707 implant and send out a notice to implant recipients, warning them of the dangerous combination of bacteria and anti-inflammatory drugs. In exchange, Lucent would agree to keep the findings of the mediation confidential.

VI. CONCLUSION

Using the science-policy dispute resolution process enabled the parties to effectively deal with highly technical scientific information. It also afforded room to cope with the uncertainty of the science and allowed the parties flexibility in crafting possible explanations based on the agreed upon facts. The process prompted the parties to focus on the salient issue of the dispute and attempt to come to a mutually agreeable solution. Different science-policy disputes may proceed differently from the above example. Environmental resource allocation disputes may require adversary experts at the policy mediation stage and a more prolonged data mediation stage, perhaps even multiple data mediations for each scientific issue in debate. Regardless of the precise category of scientific dispute, the science-policy

mediation process offers a practical and portable methodology for resolving controversial, high-stakes scientific disagreements.