



## Citizens At Risk: Cultures of Modernity in the US and EU

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# CITIZENS AT RISK: Cultures of Modernity in the US and EU

SHEILA JASANOFF

## ■ NO COMMON RISKS

On 9 August 2001, US President George W. Bush delivered his first televised address to the nation. His topic was neither national security nor tax policy nor education—all of which had figured prominently in the 2000 election campaign. Rather, it was federal funding for stem cell research. Just the previous year, in March 2000, President Bill Clinton and UK Prime Minister Tony Blair had issued a joint statement calling for ‘fundamental information’ about the human genome to be made publicly available. Their declaration recalled an episode more than a decade earlier, in March 1987, when US President Ronald Reagan and French President Jacques Chirac signed an agreement to resolve the priority dispute over which country’s researchers had first identified the AIDS virus; in a bow to the discovery’s enormous economic potential, the two heads of state decreed that credit for it should be shared.

Clearly, science policy has become a matter of high politics, and world leaders are vying with one another to demonstrate support for research and development. This is consistent with the observation by sociologists of science and technology that a fundamental shift is currently in progress from the rusty industrial societies of the 19th century to the glistening, high-tech ‘knowledge societies’ of the 21st. In this new social configuration, knowledge has become the indispensable resource, and state policymakers correspondingly must scramble both to produce more knowledge and to nurture better skilled workforces to capitalize on this increasingly valuable commodity.

Yet divisions and ambivalence surface whenever governmental cheerleaders for science are asked to cope with the disruptive consequences of the knowledge revolution. As the marketplace for science

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and technology becomes global, major players seem far from certain how to cope with the multifaceted risks of technological change—not only risks to health and the environment, but to economic security, social solidarity, and psychological well-being. Public perception and policy responses reflect this ambivalence. Citizens, experts and policymakers, even in closely similar Western societies, cannot agree on the nature and severity of technology's risks, let alone on the measures that should be taken to control them. European countries, for example, are reluctant to accept genetically modified (GM) food held to be safe in the US. American citizens and regulators worry about minute quantities of chemicals in food and the environment but remain relatively unperturbed by the ecological concerns that have surfaced around biotechnology in Europe and many developing countries. The social and political costs of innovation have prompted less concern in the US than in most other parts of the world.

Why do such differences persist and multiply? World War II and the ensuing Cold War sensitized human societies around the world to the unexpected, sometimes inhumane, consequences of advances in technology. A variety of shocks, from chemical and nuclear accidents to environmental degradation, cemented the demand for prevention and control. Interest in forecasting technological trajectories and managing, if not eliminating, risk has grown. So too has the technical capacity for modelling, scenario-building and quantifying the probabilities of adverse outcomes—supported in recent years by an immense expansion in computing power. Closer integration of global markets has, if anything, intensified public and private sector commitments to harmonizing regulations and avoiding damaging accidents. Yet, in spite of these increases in our predictive and managerial capability, as well as in the incentives for controlling harm, reactions to technology still vary unexpectedly from one national and regional setting to another.

The life sciences and their associated technologies offer a striking example. In late July 2001, the US House of Representatives decided after vigorous debate to ban all forms of cloning, including therapeutic cloning. President Bush's address on stem cells less than two weeks later again sounded a cautious note, permitting the use of Federal funds only for research on 60 existing cell lines. On this issue, the abortion politics of the Republican party's right wing succeeded in steering US national policy. In sharp contrast, the

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environmental movement, so successful in its campaigns against chemicals, failed to influence American biotechnology policy in any dramatic manner. Attempts to control genetic engineering through legislation were dismissed in the 1980s and 1990s as manifestations of an ill-considered new Luddism. In a generally permissive regulatory environment, most areas of biotechnology flourished almost uncontrolled. As a result, the US now leads the world in the production of genetically modified crops, and neither Congress nor the US public appear especially concerned about risks to plants, animals or ecosystems from widespread genetic manipulation. Debate about the possible social consequences of 'green' (agricultural and environmental) biotechnology is even more muted. Similarly, ethical concerns about 'red' biotechnology (the application of genetic sciences in reproduction and biomedicine) remained mostly off the national political agenda until controversy erupted over cloning and stem cell research.

On the other side of the Atlantic, response to biotechnological developments took almost the opposite course, with green biotechnology generally drawing more opposition than cloning and stem cell research. In January 2001, for example, Britain's historically conservative House of Lords voted overwhelmingly to endorse the creation of embryos for research. The very step that the US House of Representatives rejected as contrary to public morality was seen in Britain as a natural extension of existing policies that placed embryos under 14 days of development in a different conceptual category from fetuses or human beings. By contrast, in 1998, despite the Blair government's firm support for agricultural biotechnology, a massive public reaction curtailed the marketing of genetically modified crops and foods. British consumers successfully blocked US imports and insisted that consumers had a right to labels that would fully inform them whether the products they were eating contained GM ingredients. Elsewhere in Europe and in many developing countries, both human genetic manipulation and GM foods continue to be regarded with scepticism and distrust, although there was no strong consensus, country by country, where exactly the lines should be drawn between permissible and unacceptable uses of rapidly developing knowledge in the life sciences.

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## ■ THE NEW POLITICS OF RISK

These examples indicate that modernity and modernization are not by any means the levelling, universalizing phenomena that they are taken to be in the grand narratives of history. Although projects of rational planning, classification, regulation and technological progress have been pursued in all Western countries, the result is not a formless political and cultural homogeneity. New technologies continue to produce striking differences in public response and receptivity across countries, with citizens sometimes opting for greater restraint than experts and elected governments. The life sciences, moreover, are not the only arena of cross-cultural variation in the politics of risk. A four-country comparison of US and European chemical regulation in the mid-1980s showed that European nations neither accorded the same priority to carcinogens as the US nor developed comparable programmes of testing and risk assessment (Brickman *et al.*, 1985). Differences in regulatory outcomes were observed even between the geographically and culturally contiguous policy systems of Canada and the US (Harrison and Hoberg, 1994). National strategies for controlling air pollution similarly diverged in priority setting, the timing and severity of controls, and the choice of regulatory instruments. European countries, for example, were markedly slower to regulate air-borne lead and chlorofluorocarbons than the US. More recently, Europe has led the US in cutting sulphur emissions regarded as a precursor of acid precipitation. Even when policy outcomes converge, as in the informal moratorium on nuclear power across much of Europe and the US, the underlying technical justifications are not necessarily the same. In less industrialized countries as well, shared technical knowledge does not lead to the same strategic choices. Large dams for example have aroused more sustained and vigorous protest in India than in China, although the 'facts' about dams are equally well known to experts in both countries.

Political leaders often seem baffled by these contradictions. For many, equating technology with progress is so much an article of faith that public opposition to technology seems scarcely comprehensible. If acceptance of technological innovation is deemed 'natural' and 'right', then caution and resistance become the phenomena that demand special explanation. Knowledgeable citizens, it is assumed, can have no good reason to hold out against new and beneficial

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technologies. Resistance, then, must be an outgrowth of public ignorance, superstition and irrationality. US Secretary of State Madeline K. Albright expressed these typical beliefs when she framed the European GM foods controversy as a struggle between science and fear. In an address to the American Association for the Advancement of Science in February 2000, Albright declared that 'science does not support the "Frankenfood" fears of some, particularly outside the United States, that biotech foods or other products will harm human health'. Fortunately, she went on to say, the United States had 'fought and succeeded' in basing the recently concluded Montreal Biosafety Protocol on 'good science'. Other nations, she implied, were less concerned with founding their policies on the bedrock of science. They (presumably unlike the US) were captive to politics, unconstrained by facts and reason.

Albright's observations point to a fundamental contradiction in the relationship between science, risk and governance in contemporary democratic societies. Her remarks underline, in the first place, the close coupling of science to politics: under her leadership, the US State Department was committed to pushing 'good science' as a political objective in international relations. At the same time, she sought to treat science as a neutral space from which politics—particularly the politics of popular fear and unreason—had to be strictly excluded. Keeping science free from politics while simultaneously using it for political ends is not, of course, a dilemma for US policymakers alone. The past 30 years or so have seen a proliferation of new institutions, both national and international, whose task it is to produce policy-relevant scientific knowledge in environments shielded from the most corrosive forms of political influence. Science, as this multiplication of expert bodies suggests, continues to perform as the most reliable guarantor of rationality in the policy process. Yet, scientific knowledge by these very means becomes continually re-entangled in politics, and all too often recourse to scientific rationality is spearheaded by officials who are suffering a loss of trust from the very publics they wish to reassure with policies founded on 'good science'.

Given the increasingly instrumental role of science in public policy, it is hardly surprising that the credibility of the science offered in support of public decisions is also increasingly on the line. This is the phenomenon of 'reflexive modernization' that the German soci-

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ologist Ulrich Beck identified in his influential analysis of the emerging global 'risk society' (Beck, 1992). A history of overconfident predictions, underacknowledged uncertainties and undisclosed value judgments has led publics to demand more accountability in the expert assessments that support policy decisions. Mere assertions of scientific soundness carry less and less weight with sceptical citizens, even when these statements come from acknowledged experts. While high officials such as Secretary Albright talk of the need to protect science against politics, there are growing demands for science's inner workings to be more completely displayed for public inspection. Increasingly, affected publics are asking to participate in the processes of knowledge production that are supposed to protect them against risks of widespread concern. Participation is a fundamental right of democratic citizenship. As technological risk rises higher on the agendas of national and international governance, the public expects to assert that right with respect to every aspect of risk control, including the production and assessment of science. But how should their demands be met?

### ■ A ROLE FOR COMPARATIVE ANALYSIS

For analysts of public policy, particularly policies for the management of risk, these altered political circumstances pose distinctive challenges. Mid-20th century assumptions regarding the appropriate relations between science, society and government appear drastically in need of review, and institutions reflecting older assumptions about the role of expertise seem in many respects seriously out of date. Three propositions that once were taken as almost axiomatic are now regarded as being of doubtful validity.

*Technical analysis of policy problems (risk assessment) can be meaningfully separated from the consideration of social values and economic impacts in decision-making (risk management).*

Instead, experienced policymaking bodies have acknowledged that values, interests and judgment inescapably enter into the initial framing of policy issues and that the public should therefore have a proactive role at the earliest stages of policy formulation (NRC, 1996; RCEP, 1998). Analytic judgments, according to this way of

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thinking, should never be completely cut off from political deliberation on the means and ends of decision-making.

*Disagreement between experts and laypeople reflects ignorance or lack of scientific understanding, and public resistance to technology can only be understood as a Luddite rejection of progress.*

Instead, lay judgments that seem more risk averse than those of experts or politicians are recognized as reflecting different framings of technology's social implications, different perceptions of the feasibility of control, different appraisals of the values at stake, and different judgments about fairness in the distribution of risks and benefits (Irwin and Wynne, 1994). Decisions that do not respect these public assessments may be profoundly undemocratic, even if they are supported by unimpeachable technical arguments.

*Cross-national divergences in risk policy or in public perceptions of risk are a consequence of self-interested protectionism or wilful disregard for science.*

Instead, differences between countries and cultures are now recognized as reflecting important differences in the values and commitments of democratic societies, particularly as regards the certification of public knowledge, the management of uncertainty and the distribution of benefits and burdens. It follows that the 'solution' to cross-national policy divergences is not necessarily to produce uniformly harmonized policies, since no single national perspective may legitimately claim to be unqualifiedly right or rational.

Should we be troubled by the waning of old modernist orthodoxies concerning science's separation from values and its power to rationalize politics or to produce universally valid solutions to social problems? Not if we allow ourselves to think historically and culturally. The challenge for risk policymaking today is not the same, after all, as when the world was recovering from the legacies of Stalinist and National Socialist totalitarianism or the build-up of nuclear weapons and the emergence of the Cold War security state. In a period when the greatest threats to peace and freedom came from the monolithic alliance of science and technology with the state, it made sense to insulate expert decision-making from state intervention. Subsequently, the rise of mega-corporations and the capture of

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politicians and decision-makers by industry made it important to protect science from subversion by powerful economic interests. The formal separation of risk assessment from risk management is a product of those over-riding concerns. Our era, however, offers its own distinctive political imperatives, with global science and global capital enjoying far greater levels of institutionalization and state support than non-governmental organizations and social movements. This time, it is the turn of civil societies to insist that the production of policy-relevant knowledge should be made available for public scrutiny and input. To politicize science in *this* way—that is, by making it publicly transparent and accountable—is not the same as allowing science to be captured by the special interests of state and industry. Public accountability, carefully institutionalized, can only promote the interests of democracy.

All this suggests that there is a newly important critical role for comparative politics in the academic exploration of risk. If we abandon the belief that there is a single rational approach to resolving complex risk management issues, then different social and political responses no longer need to be seen as deviations from the one ideal pathway prescribed by science and reason. Instead, most systematic approaches to risk management can be regarded as internally well-motivated, but historically and culturally circumscribed, ways of attempting to cope with uncertainty. Differences between approaches, then, can provide ways of uncovering perspectives and solutions that were placed in the background or made invisible in a given policy framework. Seen in this light, comparison becomes a useful diagnostic instrument. It reveals possibilities and alternatives that are hardly perceptible when policy analysis remains tightly circumscribed within its own cultural context. Comparison in short offers novel vantage points from which we can question the foundations of our own presumptions of rationality. For 21st century governments grappling with the limitations of the 20th century's modernist institutions, comparison is a tonic to liberate the imagination.

## ■ RISK AND CIVIC ENTREPRENEURSHIP: THE US CASE

More than two decades of comparative cross-national research have shown that the links between science and policymaking in a given

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country are constrained by aspects of its political organization and culture. Relevant structural factors include the distribution of power among the major branches of government, the institutionalized mechanisms for producing and validating policy-relevant science and, not least, the forms of legal and political participation. Cultural factors include preferred forms of evidence and proof, as well as dominant modes of policy discourse, such as law and economics. The trustworthiness of science in each policy context flows not so much from science's transcendental claim to delivering the truth as from the production and deployment of scientific knowledge within particular traditions of garnering credibility and maintaining trust. And the methods that promote trust in expert bodies advising public policy vary in important respects from state to state.

The United States offers a particularly interesting case study in this regard. Poll results routinely show that Americans have relatively high confidence in science and scientific experts; yet, as a practical matter, hardly any major US policy decision based on scientific or technical information is exempted from public challenge, usually through litigation. A drug or pesticide, for example, can be marketed only after it is approved as 'safe' by the relevant national authority. Nevertheless, parties who believe that they have been injured by the product may sue the manufacturer for damages. Regulatory agencies may set standards that accord, in their view, with the best available scientific knowledge and advice. Producers who see the standards as too stringent and public interest groups who see them as not strict enough may still challenge those very standards. In this way, court decisions can overturn the judgments of the government's most experienced technical advisers. It is tempting to conclude that, if Americans do indeed trust science as a basis for policy, it is precisely because they can so readily take issue with any specific outcome of policymaking based on science.

Where scepticism rules, one might expect a high premium to be placed on transparency. How, after all, could one challenge the decisions of political elites without gaining access to the information underlying their conclusions? Indeed, openness is one of the salient characteristics of the US decision-making culture. It is enshrined in the world's most generous laws granting access to government documents (Freedom of Information Act) and to meetings and records of advisory committees (Federal Advisory Committee Act).

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It finds expression in court rules and decisions that favour almost unlimited rights to discover material in the possession of adversarial parties. It has been invoked as a basis for penetrating even the deliberations of the prestigious National Academy of Sciences, whose committees offer non-binding advice to the government. Most recently, a little-noticed, but far-reaching and potentially costly, legislative enactment (the 'Shelby amendment' inserted into an omnibus appropriations bill in 1998) required data from all Federally funded research to be publicly disclosed. Intense pressure from the scientific community could not undo the provision—who, after all, could be against scientific disclosure?—though it succeeded in provisionally limiting the law's effect to research used in policy decisions. These formal transparency mandates, moreover, are accompanied by a constitutionally protected journalistic tradition that allows the media wide latitude to investigate and report on the errors and wrongdoings of public figures in or outside politics.

At first glance, we would appear to have here all the ingredients for the ideally democratic policy system: a legal and cultural framework that empowers citizens with full information and provides liberal opportunities for ordinary individuals to challenge the decisions of the powerful and the expert. Civic entrepreneurs thrive in this cultural setting. It is this constellation of opportunities that allowed a Ralph Nader, in the 1960s, to take on General Motors and force giant auto manufacturers to alter their philosophy of safety; this is the culture of individual initiative celebrated in such media blockbusters as *A Civil Action* and *Erin Brockovich*, two films in which activists successfully turned their private troubles into public causes. For citizens determined to redress perceived wrongs or to question apparent official misdeeds—in short, to act as policy entrepreneurs—transparency American-style offers something close to *nirvana*. For contrasts, one need only turn to Britain, where a combination of professional secretiveness, deference to expertise, and lack of investigative zeal allowed the rogue physician, Dr Harold F. Shipman, to kill as many as 300 patients between 1977 and 1998, when his crimes were finally detected (Shipman Inquiry, 2001).

But significant as are the achievements of US democracy in the politics of risk, we would fail as analysts if we observed only its brighter aspects and ignored its shadows. Transparency, to begin with, is not consistent but selective; it hides even as it discloses

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(Strathern, 2000). One large barrier is the practice of sealing the records of disputes when lawsuits are settled out of court. This legally sanctioned behaviour not only prevents the disclosure of evidence generated during litigation but also protects manufacturers of defective products against negative publicity from multiple lawsuits. In a country where so much policy happens under the prod of litigation, this is a major restriction on openness. Transparency does not extend to much of the science generated by companies in the course of product development, since the bulk of industrial research is covered by confidentiality rules. Openness provisions cannot by themselves generate missing information, unpack embedded assumptions or bring data together in formats that invite novel interpretations. Taking advantage of transparency, too, entails costs—in expertise, money and time—that cannot necessarily be borne by all those who have legitimate grievances. Indeed, if risks disproportionately fall on the poor and disadvantaged, as much evidence suggests, then the populations most at risk are precisely those with fewest resources to benefit from America's wealth of formal transparency mechanisms.

The US style of risk management also has important implications for the framing of issues, the construction of expert knowledge and the thematization of risk itself. Several characteristics have been securely established through prior research.

□ *The boundary between science and politics*

Compared with the situation in many other countries, the US policy process lays much greater stress on separating scientific (or factual) from political (or value-laden) judgments (NRC, 1983). It takes considerable work to maintain this separation, since the boundary between science and politics is in fact fluid and highly permeable in the context of risk decision-making. A favoured mechanism for shoring up the science–politics boundary is the expert advisory committee. These bodies are often carefully balanced to represent diverse social interests and are experienced in the politics of risk decision-making; yet their stated mission is to ensure the *scientific* reliability of policy choices. Labelled as scientific, their work serves in effect to produce the very thing—‘good science’—that they are ostensibly charged to evaluate. Thickly distributed across the US

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policy landscape, such bodies keep alive the politically useful fiction that science is apolitical and that scientific advisers are capable of 'speaking truth to power' (Jasanoff, 1990).

□ *The paradox of science and expertise*

America's open, adversarial and litigious policy climate promotes a special hunger for objective solutions to social problems. Science is widely seen as a powerful ally in dispute resolution and even demands for justice and equity are strengthened if accompanied by expert arguments. Thus, social science evidence about the effects of discrimination played a part in the historic school desegregation case, *Brown v. Board of Education of Topeka*, 347 US 483 (1954). An interesting example from the 1990s was the attempt to place claims of 'environmental justice' on a technically secure footing through formal 'equity analysis'. Given this reliance on science, much effort is understandably spent in cleansing it of overtly distorting influences, such as ties to corporate or political interests. Paradoxically, these efforts promote an almost unbounded scepticism toward particular expert arguments, with the result that even relatively solid scientific judgments are vulnerable to charges of political bias. A striking instance was the dismissal of global climate change predictions by Republican conservatives as merely a political ploy of their arch-rival, former Vice President Al Gore.

□ *The love of quantification and the predictive ambition*

The search for objective foundations in policymaking expresses itself in a preference for formal analysis and, where possible, quantitative estimation of risks. More than any other industrial society, the United States has sought to ground all kinds of policy judgments on a foundation of numbers: the danger of all-out nuclear war, the risk of chemical carcinogenesis, the probability of respiratory illness from exposure to fine particulates, and recently the loss of 'service' value from destroyed ecosystems. These exercises foster at their best a disciplined approach to analysis, but they also promote a kind of peripheral blindness toward uncertainty and ambiguity. Analytic attention focuses on the known at the expense of the unknown, leading to possible overconfidence in the power of prediction. Well-defined, short-term risks command more attention than indetermi-

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nate, long-term ones, helped along by a cultural lean toward technological optimism. Not surprisingly, the term 'precaution' is a late and uneasy import into US risk discourse, where it is still regarded with suspicion as being unduly vague and a possible cover for political expediency.

□ *The personalization of risk*

Risk controversies burst upon the US political scene in the 1970s in the form of NIMBY ('not in my backyard') conflicts. The framing of risk as a threat to individual health, property or well-being continues to dominate US policy. We may see this as the flip side of civic entrepreneurship, the casting of risk in terms that every individual can readily understand and as readily act on. Downplayed or even lost in the individuation of risk, however, are essentially non-individual threats: risks to landscape or esthetic values, risks to other species, risks to welfare or communal ties, risks to other nations, risks to human dignity and integrity. Who speaks for these risks, and how can their voices command attention? In the framework of civic entrepreneurship, there are no satisfying answers. The best that US political culture can muster is the issue-specific social movement, which collectively acts against risks that are individually felt by all of its members; a classic case was the successful mobilization by AIDS activists demanding more governmental attention and resources to meet their communal health care needs (Epstein, 1996).

■ **DRAWING LESSONS: IMPLICATIONS FOR THE EU**

In most nations of the world, technological risk is a relative newcomer to the agenda of politics. Issues of risk and public policy have been grafted onto older political traditions and institutions developed without awareness of technology's pervasive influence on human lives. Emerging European institutions must at one level cope with the consequences of this historical neglect, but they also enjoy some advantages. New institutions of risk management at the level of the European Union (EU) have the opportunity to take on board others' experiences and practices as they actively participate in forming a supra-national European cultural identity.

As the European Commission has recognized (EU, 2000), a major challenge for the EU is to find appropriate models for relating

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science to governance—models that are compatible with varying national approaches but that reject once and for all the simplistic notion that science universally ‘speaks truth to power’. Centralized bodies claiming sovereign expertise are unlikely to achieve credibility with the publics or governments of EU member states. Instead of imposing a top-down uniformity on science-policy processes, the EU apparatus would do better to serve as ‘translation agents’ among diverse national authorities and policy cultures, identifying and disseminating information about best practices among its growing array of member states.

EU institutions are in a position to benefit, in this regard, from two decades of US experience with risk and public policy. Equally, initiatives at the European level can gain from the energetic institutional experimentation underway in several member states in response to such recent shocks as the BSE crisis, foot and mouth disease, the contamination of the blood supply and the controversy over GM foods. In the UK alone, at least four new advisory institutions, including the long-awaited Food Standards Agency, were formed around the turn of the century to address the transparency, accountability and quality of biological research relevant to policymaking. By acknowledging and explicitly addressing the strengths and deficiencies of these sophisticated democratic experiments, EU institutions can position themselves to lead rather than follow policy developments elsewhere in the contemporary world, particularly in relation to risks of a transnational scale.

Among the areas in which leadership could be exercised, comparison with the US suggests that the following four may deserve the closest attention.

□ *Integration of science, knowledge and values*

US science and governance initiatives, as we have seen, are notable for drawing relatively sharp boundaries between science and other forms of knowledge and experience. A widely cited recommendation has been to separate risk assessment strictly from risk management. Separation has been viewed as the only means of protecting science from undue politicization. While this is a genuine concern, there is increasing awareness in contemporary knowledge societies that policy-relevant science can never be completely neutral. Values and

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judgment enter into the equation long before issues are isolated for technical analysis. Policy-relevant expertise, too, is known to be widely distributed, not only within but also outside the scientific community. Separatism, then, not only risks reductionism but also places too much political weight on the shoulders of science. Most important, it excludes from the politics of assessment precisely those whose interests the policies are designed to serve: the citizens who are at risk, and are so from hazards that are not in all cases amenable to technical analysis and control. How to create institutions that draw on the multiple knowledges and perspectives of citizens without sacrificing reason and rigor is a major institutional challenge of tomorrow.

□ *Technologies of humility*

In the US case, analytic ingenuity in the policy process has been directed for the most part toward devising what may be called 'technologies of hubris'. These predictive methods (e.g. risk assessment, cost-benefit analysis, climate modelling) are designed on the whole to facilitate management and control rather than to justify precaution. They achieve their power through claims of objectivity, but their limitations often go unrecognized. Accordingly, as a recent report of the European Environment Agency has concluded (EEA, 2001), they tend to overstate what is known about risks and to downplay areas of ignorance, uncertainty and conflict. Risk management strategies should seek to incorporate better, more systematic ways of coping with the unknown, undefined or uncertain aspects of science and technology. There is a need for 'technologies of humility' that incorporate the expectation of unforeseen consequences and acknowledge from the start the need for plural viewpoints and mutual learning. Appropriate focal points for such modest assessments, as I have suggested elsewhere (Jasanoff, forthcoming), are the interpretive questions through which citizens make sense of and attach normative weight to their subjective experiences of risk: *framing* (what is at stake?); *vulnerability* (who feels threatened and how?); *distribution* (who are the winners and losers?); and *learning* (what sense do people make of their prior experiences?).

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□ *Informed dissent*

Until recently, governments tended to assume that the management of technological hazards is most successful when diverse stakeholders can agree on the desired outcomes. Even in the adversarial US environment, there is considerable impatience with the inefficiencies of litigation and other zero-sum approaches that reward one party only by penalizing another. Much excitement has been generated about processes such as consensus conferences that aim to foster cooperation among disparate parties and to achieve win-win solutions. In the language of negotiation theory, 'getting to yes' has become a paramount goal. But as uncertainties mount and as science and technology impinge upon the most intimate, even sacred, aspects of human life, it is no longer wise to assume that societies will—or indeed should—always agree about the aims and instruments of governance. This is one of the prime lessons of comparative analysis. In politics as in ecology, a diversity of approaches and outcomes simply acknowledges that, within modernity's complex and interdependent socio-technical formations, safety comes from the very heterogeneity of our accommodations with risk. Rather than seeking consensus, therefore, it may be more fruitful for governing authorities to learn how to maintain a creative *dissensus* on issues of profound moral and ethical concern. How to foster 'informed dissent' about risk among knowledgeable publics and their governments is a task deserving our most serious attention.

□ *Reflective institutions*

Recent policy scholarship has turned toward considering how institutions learn and how they do (or do not) evaluate existing practices in the light of experience. Of particular interest are processes that encourage institutions to reflect on the assumptions underlying failed policies and to reframe their policy positions in this light. As yet, however, there has been little effort to operationalize emerging understandings about institutional learning. How can the institutions governing science-state-society relations become more reflective? Can experiences from other countries and cultures usefully be mobilized in achieving this goal? Cross-national research suggests that institutions may, at the very least, benefit from observing how issues of common concern are framed and addressed in disparate policy

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cultures. Supranational bodies such as EU institutions can play an invaluable role by identifying and encouraging reflective practices in the governance of risk.

These are, of course, abstract prescriptions, and they may appear difficult if not impossible to operationalize in bureaucracies subject to multiple political constraints and pressing timetables for action. It is important to keep in mind, however, that current, taken-for-granted institutional practices underlying the management of risk in Europe and the US are no less abstract in principle. It is only that *these* have been locked into place through decades of unexamined rule following, discursive inertia and uncritical habits of thought. Yet the opportunities for reflection are unlimited: there are openings for change whenever new risks are classified and evaluated, comitology rules revised, standards of evidence redrafted or participatory mechanisms redesigned. What is missing in most instances is the incentive to take a hard look at existing dispensations and—a point for scholars to note—a set of critical vocabularies with which to argue for something completely different.

In the end, just as no chain is stronger than its weakest link, the relationship between science, state and society in contemporary democracies can be only as robust as the strongest of its component parts. While US policymakers have devoted much attention to improving the scientific input to decision-making, they have arguably been less sensitive to the need for active reciprocity between science and society. Ironically in such a mature democracy, decision-makers in technical domains have come almost to depreciate and devalue the publics they are appointed to serve. In risk policy circles, one all too frequently hears of the public *misunderstanding* of science, technical *illiteracy*, *deficits* in risk perception, and *failures* of communication by experts to the public. By contrast, one seldom hears how positive societal resources—social cohesion, lay knowledges, tacit skills, shared symbols or communal values—could be mobilized to support responsive and responsible management of risks. The EU, with its enormous institutional diversity, its greater sensitivity to history and its core commitment to social inclusion, may enjoy a big comparative advantage over the US in mobilizing such reflective resources from its member states. This is the foundation on which the new Europe should seek to build a more democratic union between science and government.

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