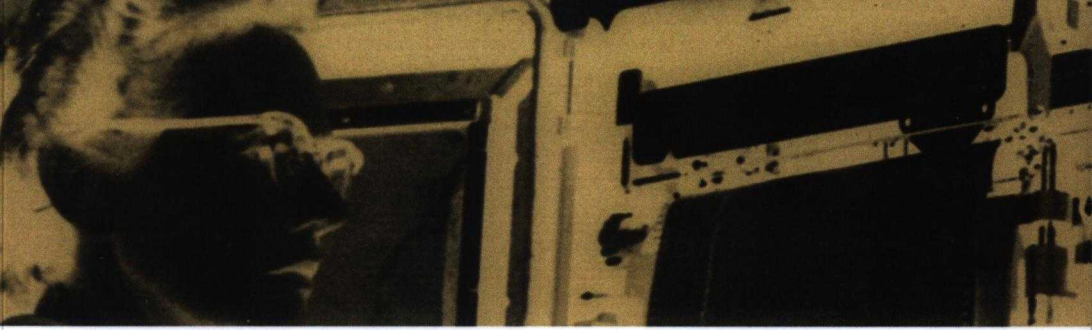

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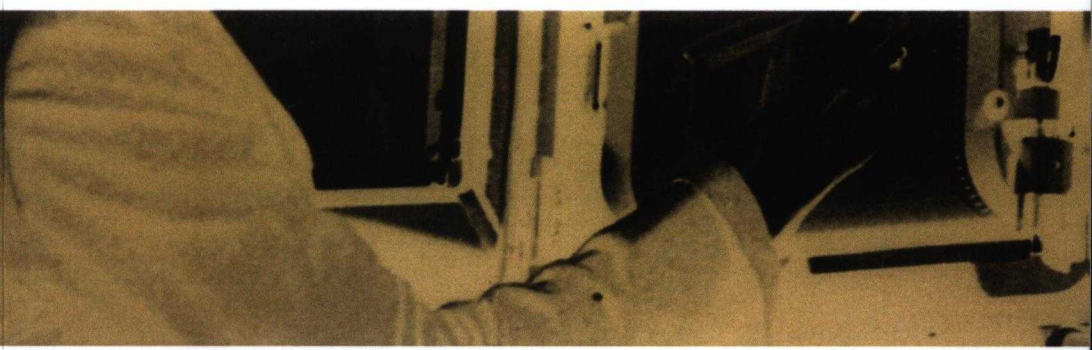

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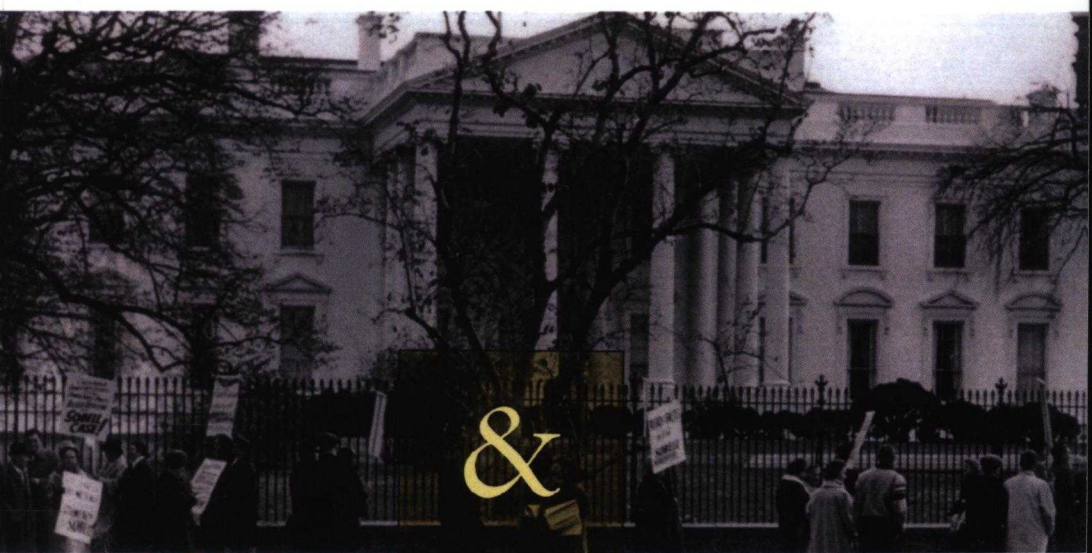

# & DEMOCRACY

Edited by Daniel Lee Kleinman

2

# Town Meetings on Technology

## *Consensus Conferences as Democratic Participation*

RICHARD E. SCLOVE

In a democracy, it normally goes without saying that policy decisions affecting all citizens should be made democratically. Science and technology policies loom as grand exceptions to this rule. They certainly affect all citizens profoundly: the world is continuously remade with advances in telecommunications, computers, materials science, weaponry, biotechnology, home appliances, energy production, air and ground transportation, and environmental and medical understanding. Yet science and technology policies are customarily framed by representatives of just three groups: business, the military, and universities (Sclove, 1998; Dickson, 1984/1988). These are the groups invited to testify at congressional hearings, serve on government advisory panels, and prepare influential policy studies.

According to conventional wisdom, the reason for this state of affairs is that nonexperts are ill-equipped to comment on complex technical matters. It seems unimaginable that citizens who can't even program their VCRs could ever contribute constructively to complex scientific and industrial issues. But a wide range of emerging social innovations flatly contradict traditional attitudes. Among them is the consensus conference.[1] This organizational form was pioneered during the late 1980s by the Danish Board of Technology, a parliamentary agency charged with assessing technologies, and its successful utilization in Denmark has led to recent experiments with the practice elsewhere in Europe and in Japan. In 1997 the nonprofit Loka Institute, which I direct, initiated and co-organized a pilot consensus conference in the United States.

Consensus conferences are intended to stimulate broad and intelligent social debate on technological issues. Not only are laypeople elevated to

positions of preeminence, but a carefully planned program of reading and discussion, culminating in a forum open to the public, ensures that they become well-informed prior to rendering judgment.

Both the forum and the subsequent judgment, written up in a formal report, become a focus of intense national attention in Denmark—usually at a time when the issue at hand is due to come before Parliament. Though consensus conferences are hardly meant to dictate public policy—indeed, their judgments are nonbinding—they do give legislators some sense of where the people who elected them might stand on important questions. They can also help industry steer clear of new products or processes that are likely to spark public opposition.

Since 1987, the Danish Board of Technology has organized about twenty consensus conferences on topics ranging from genetic engineering to educational technology, food irradiation, air pollution, human infertility, sustainable agriculture, telecommuting, and the future of private automobiles.[2] Ironically, the popularity of the process began to grow and diffuse internationally just as the U.S. Congress was eliminating its Office of Technology Assessment (OTA) in 1995 (Bimber & Guston, 1997). The establishment of the OTA in 1972 helped motivate Europeans to develop their own technology assessment agencies. But the truth is that when the OTA faced the chopping block, those rallying to its defense were primarily a small cadre of professional policy analysts or other experts who had themselves participated in OTA studies—hardly a sizable cross-section of the American public. By contrast, a consensus conference format, which engages a much wider range of people, holds the potential to build a broader constituency familiar with and supportive of technology assessment. Building such a constituency, and the widespread implementation of processes like the consensus conference, will be crucial to limiting the negative and often unintended consequences that can result when technologies are deployed without widespread social consideration. Moreover by increasing citizen involvement in civic life, consensus conferences can play a role in combating cynicism and rebuilding a vibrant democratic culture in the United States.[3]

## Framing the Issues

To organize a consensus conference, the Danish Board of Technology first selects a salient topic—one that is of social concern, pertinent to upcoming parliamentary deliberations, and complex, requiring judgment on such diverse matters as ethics, disputed scientific claims, and government policy. The board has also found that topics suited to the consensus conference format should be intermediate in scope—broader than assessing the toxicity of a single chemical for instance, but narrower than trying to formulate a

comprehensive national environmental strategy. The board then chooses a well-balanced steering committee to oversee the organization of the conference; a typical committee might include an academic scientist, an industry researcher, a trade unionist, a representative of a public-interest group, and a project manager from the board's own professional staff.

With the topic in hand and the steering committee on deck, the board advertises in local newspapers throughout Denmark for volunteer lay participants. Candidates must send in a one-page letter describing their backgrounds and their reasons for wanting to participate. From the 100 to 200 replies that it receives, the board chooses a panel of about 15 people who roughly represent the demographic breadth of the Danish population and who lack significant prior knowledge of, or a specific material interest in, the topic. Groups include homemakers, office and factory workers, and garbage collectors as well as university-educated professionals. They are not, however, intended to comprise a random scientific sample of the Danish population. After all, each panelist is literate and motivated enough to have responded in writing to a newspaper advertisement.

At the outset of a first preparatory weekend meeting, the lay group, with the help of a skilled facilitator, discusses an expert background paper commissioned by the board and screened by the steering committee that maps the political terrain surrounding the chosen topic. The lay group next begins formulating questions to be addressed during the public forum. Based on the lay panel's questions, the board goes on to assemble an expert panel that includes not only credentialed scientific and technical experts but also experts in ethics or social science and knowledgeable representatives of stakeholder groups such as trade unions, industry, and environmental organizations.

The lay group then meets for a second preparatory weekend, during which members, again with the facilitator's help, discuss more background readings provided by the steering committee, refine their questions, and if they want, suggest additions to or deletions from the expert panel. Afterward, the board finalizes selection of the expert panel and asks its members to prepare succinct oral and written responses to the lay group's questions, expressing themselves in language that laypeople will understand.

The concluding public forum, normally a four-day event chaired by the facilitator who presided over the preparatory weekends, brings the lay and expert panels together and draws the media, members of Parliament, and interested Danish citizens. On the first day each expert speaks for 20 to 30 minutes and then addresses follow-up questions from the lay panel and, if time allows, the audience. Afterward, the lay group retires to discuss what it heard. On the second day the lay group publicly cross-examines the expert panel in order to fill in gaps and probe further into areas of disagreement.

Once cross-examination has been completed, the experts and stakeholder representatives are politely dismissed. The remainder of that day and on through the third, the lay group prepares its report, summarizing the issues on which it could reach consensus and identifying any remaining points of disagreement. The board provides secretarial and editing assistance, but the lay panel retains full control over the report's content. On the fourth and final day, the expert group has a brief opportunity to correct outright misstatements of their testimony in the report, but not otherwise to comment on the document's substance. Directly afterward, the lay group presents its report at a national press conference.[4]

Lay panel reports are typically 15 to 30 pages long, clearly reasoned, and nuanced in judgment. The report from the 1992 Danish conference on genetically engineered animals is a case in point, showing a perspective that is neither pro- nor antitechnology in any general sense. The panel expressed concern that patenting animals could deepen the risk of their being treated purely as objects. Members also feared that objectification of animals could be a step down a slippery slope toward objectification of people. Regarding the possible ecological consequences of releasing genetically altered animals into the wild, they noted that such animals could dominate or out-compete wild species or transfer unwanted characteristics to them. However, the group saw no appreciable ecological hazard in releasing genetically engineered cows or other large domestic animals into fenced fields, and endorsed deep-freezing animal sperm cells and eggs to help preserve biodiversity (Consensus Conference, 1998).

Portions of the lay reports can be incisive and impassioned as well, especially in comparison with the circumspection and the dry language that is conventional in expert policy analyses. Having noted that the "idea of genetic normalcy, once far-fetched, is drawing close with the development of a full genetic map," a 1988 OTA study of human genome research concluded blandly that "concepts of what is normal will always be influenced by cultural variations" (OTA, 1988, p. 85).[5] In contrast, a 1989 Danish consensus panel on the same subject recalled the "frightening" eugenic programs of the 1930s and worried that "the possibility of diagnosing fetuses earlier and earlier in pregnancy in order to find 'genetic defects' creates the risk of an unacceptable perception of man—a perception according to which we aspire to be perfect" (Consensus Conference, 1989, pp. 6, 14, 17). The lay group went on to appeal for further popular debate on the concept of normalcy. Fearing that parents might one day seek abortions on learning that a fetus was, say, color blind or left-handed 14 of the panel's 15 members also requested legislation that would make fetal screening for such conditions illegal under most circumstances (Consensus Conference, 1989, pp. 17–18, 26).

This central concern with social issues becomes much more likely when expert testimony is integrated with everyday citizen perspectives. For instance, while the executive summary of the OTA study on human genome research states that "the core issue" is how to divide up resources so that genome research is balanced against other kinds of biomedical and biological research (OTA, 1988, p. 10), the Danish consensus conference report, prepared by people whose lives are not intimately bound up in the funding dramas of university and national laboratories, opens with a succinct statement of social concerns, ethical judgments, and political recommendations. And these perspectives are integrated into virtually every succeeding page, whereas the OTA study discusses ethics only in a single discrete chapter on the subject. The Danish consensus conference report concludes with a call for more school instruction in "subjects such as biology, religion, philosophy, and social science"; better popular dissemination of "immediately understandable" information about genetics; and vigorous government efforts to promote the broadest popular discussion of "technological and ethical issues" (Consensus Conference, 1989, pp. 28, 29). The corresponding OTA study does not even consider such ideas.

When the Danish lay group did address the matter of how to divide up resources, they differed significantly from the OTA investigators. Rather than focusing solely on balancing different kinds of biomedical and biological research against one another, they supported basic research in genetics but also called for more research on the interplay between environmental factors and genetic inheritance, and more research on the social consequences of science. They challenged the quest for exotic technical fixes for diseases and social problems, pointing out that many proven measures for protecting health and bettering social conditions and work environments are not being applied. Finally, they recommended a more "humanistic and interdisciplinary" national research portfolio that would stimulate a constructive exchange of ideas about research repercussions and permit "the soul to come along" (Consensus Conference, 1989, pp. 7, 17–25).

Not that consensus conferences are better than the OTA approach in every possible way. While less accessibly written and less attentive to social considerations, a traditional OTA report provides more technical detail and analytic depth. But OTA-style analysis can, in principle, contribute to the consensus conference process. For example, the 1993 Dutch consensus conference on animal biotechnology used a prior OTA study as a starting point for its own more participatory inquiry.[6]

### Timeliness and Responsiveness

Once the panelists have announced their conclusions, the Danish Board of Technology exemplifies its commitment to encouraging informed discussion

by publicizing them through local debates, leaflets, and videos. In the case of biotechnology, the board subsidized more than 600 local debate meetings. The board also works to ensure that people are primed for this whirlwind of postconference activity. For example, the final four-day public forums are held in the Parliament building, where they are easily accessible to members of Parliament and the press.

Nor is it any accident that the topics addressed in consensus conferences are so often of parliamentary concern when the panelists issue their findings. The board has developed the ability to organize a conference on six months notice or less largely for the purpose of attaining that goal. This timeliness represents yet another advantage over the way technology assessment has been handled in the United States: relying mostly on lengthy analysis and reviews by experts and interest groups, the OTA required, on average, two years to produce a published report on a topic assigned by Congress. In fact, one complaint leveled by the congressional Republicans who argued for eliminating the agency was that the process it employed was mismatched to legislative timetables. On learning about consensus conferences and their relatively swift pace, U.S. Congressman Robert S. Walker—at the time Republican chair of the House Science Committee—told a March 1995 public forum that if such a process can "cut down the time frame and give us useful information, that would be something we would be very interested in" (Walker, 1995).

The Board of Technology's efforts do seem to be enhancing public awareness of issues in science and technology. A 1991 study by the European Commission discovered that Danish citizens were better informed about biotechnology, a subject that several consensus conferences had addressed, than were the citizens of other European countries, and that Danes were relatively accepting of their nation's biotechnology policies as well (INRA 1995). Public opinion surveys performed in 1995 reveal that, as a cumulative result of organizing successive consensus conferences over the course of a decade, approximately 35 percent of the Danish public is now acquainted with the process (Joss, 2000). Significantly too, Dr. Simon Joss of the Centre for the Study of Democracy in London, who has conducted interviews on consensus conferences with Danish members of Parliament, has found the legislators to be generally appreciative of the process—indeed, to the point where several eagerly pulled down conference reports kept at hand on their office shelves.[7]

And although consensus conferences are not intended to have a *direct* impact on public policy, they do in some cases. For instance, conferences that were held in the late 1980s influenced the Danish Parliament to pass legislation limiting the use of genetic screening in hiring and insurance decisions, to exclude genetically modified animals form the government's

initial biotechnology research and development program, and to prohibit food irradiation for everything except dry spices (Klüver, 1995, p. 44). Manufacturers are taking heed of the reports that emerge from consensus conferences as well. According to Dr. Tarja Cronberg, in a report issued by the Technical University of Denmark, Danish industry originally resisted even the idea of establishing the Board of Technology but has since had a change of heart (Cronberg, n.d.). The reasons are illuminating.

In conventional politics of technology, the public's first opportunity to react to an innovation can occur years or even decades after crucial decisions about the form that innovation will take have already been made. In such a situation, the only feasible choice is between pushing the technology forward or bringing everything to a halt. And no one really wins: pushing the technology forward risks leaving opponents bitterly disillusioned, whereas bringing everything to a halt can jeopardize jobs and enormous investments of developmental money, time, and talent. The mass movements of the 1970s and 1980s that more or less derailed nuclear power are a clear example of the phenomenon.

By contrast, early public involvement and publicity—of the sort that a consensus conference permits—can facilitate more flexible, socially responsive research and design modifications all along the way. This holds the potential for a fairer, less adversarial, and more economical path of technological evolution (Sclove, 1995, pp. 183–184). A representative of the Danish Council of Industry related that corporations have benefitted from their nation's participatory approach to technology assessment because "product developers have worked in a more critical environment, thus being able to forecast some of the negative reactions and improve their products in the early phase" (quoted in Cronberg, n.d., p. 11).

For example, directors of Novo Nordisk, a large Danish biotechnology company, reevaluated their research and development strategies after a 1992 consensus conference report deplored the design of animals suited to the rigors of existing agricultural systems but endorsed the use of genetic engineering to help treat incurable diseases.[8]

### A First: Boston's Consensus Conference

In 1997, residents of the greater Boston area made history, participating in the first ever consensus conference in the United States. The conference, dubbed a "Citizens' Panel," was initiated by the Loka Institute.[9] The principle organizers included Loka, the staff and students of the Education for Public Inquiry and International Citizenship (EPIIC) Program at Tufts University, the Massachusetts Foundations for the Humanities, and MIT's *Technology Review* magazine. Other supporting or assisting organizations included the

Jefferson Center based in Minneapolis, the University of Massachusetts Extension Program and the School of Behavioral and Social Sciences at UMass-Amherst, the National Science Foundation, the John D. and Catherine T. MacArthur Foundation, and the Benton Foundation. The topic was telecommunications and the future of democracy, and the 15-member citizens' panel issued a call for protecting First Amendment rights and personal privacy on the Internet, mandating community involvement in telecommunications policy-making, and returning a percentage of high-tech corporate earnings to communities and nonprofit organizations.

Selected by random telephone calling and supplementary targeted recruitment to be broadly representative of wider Boston's population, the Citizens' Panel members included an auto mechanic, the business manager of a high-tech firm, a retired teacher/farmer/nurse, and an industrial engineer. There was also an arts administrator, a 1996 innercity high school graduate, a consultant, an unemployed social worker, a writer/actress, and a homeless shelter resident. Eight of the panelists were women; 7 were men. Five of the 15 were people of color, and their life stages ranged from teenager through elder.

During February and March, the panelists met together over two weekends to discuss background readings and introductory briefings on telecommunication issues. Then on April second and third, all fifteen panelists braved a city-crippling, two-foot snow storm to hear ten hours of expert testimony from computer specialists, government officials, and business executives. Among those giving testimony were the president of New England Cable News, an official of Lotus Development Corporation, the Congressional Liaison to the United States Department of Commerce who helped draft the 1996 Telecommunications Reform Act, a school superintendent, and representatives of public-interest groups.

After deliberating and drafting their own report, the lay panel reconvened on the morning of April fourth to announce their findings at a press conference organized at Tufts University. A WCVB/CNN television crew was on hand to record their performance. Lay panelists, who had been presented with expert testimony that included a string of vigorous business perspectives, came out in favor of a judicious but far-reaching public-interest agenda—a more ambitious program than anything embodied in the 1996 Telecommunications Reform Act. Their report urged governments to establish more forums for citizen participation in policy issues, even on highly technical matters like telecommunications. And the document argues that:

> Business interests, profit motives and market forces too often dictate public policy to the exclusion of the interests of the people (an example of which is the 1996 Telecommunications Act). The new

technology creates an even greater risk of the abuse of power. (Consensus Statement, 1997)

The timing of the panel's report was strategic, because this is a watershed period in U.S. telecommunications policy-making. For instance, at the time of the Boston consensus conference the Federal Communications Commission (FCC) was—as required by the Telecommunications Reform Act—working on recommendations for implementing universal Internet access, and had just completed the auctioning of digital audio broadcast licenses. The Supreme Court had just heard arguments for and against the free speech-inhibiting Communications Decency Act. And the Clinton administration had recently appointed an advisory committee on the public-interest obligations of digital broadcasters and was in the midst of its initiative to wire all schools to the Internet.

The report of the Citizen Panel included a number of specific recommendations. Among them were:

- Protecting privacy and First Amendment rights on the Internet and affirming a standard of personal responsibility in using online material;
- Establishing volunteer citizens' groups at the local level to address appropriate restriction of access to certain (e.g., pornographic) Internet sites at public libraries, schools, and community centers;
- Encouraging businesses to return a percentage of their profits to the local communities they serve;
- Legally prohibiting the use of private individual data without prior notification and approval;
- Making Internet-connected school computers available to the general public for lifelong learning outside school hours; and
- Extending "universal access" beyond infrastructural development to encompass "universal service," in order to insure that the general public has both facilities and the opportunity to log on. (Consensus Statement, 1997)

This first ever U.S. consensus conference was important for several reasons. It constituted the first systematic attempt in the United States to solicit informed input from ordinary citizens—including six who had never previously used the Internet, half of whom had also never used a computer—on the complexities of current telecommunications policy. Telecommunications aside, this was also the first time in modern U.S. history that a diverse group of everyday citizens—none previously expert on the policy issues under discussion, none a representative from an organization with a direct stake (not even from a public-interest group)—gathered to learn and deliberate

on a scientific or technological topic of this breadth or complexity.[10] What is more, the topic investigated by panelists—"Telecommunications and the Future of Democracy"—was broader than topics that have been addressed in Danish and other European consensus conferences, suggesting that the methodology may have wider applicability than previously understood.

## Some Observations

I spent three years working toward this event. During that time, innumerable doubters contended that a participatory process invented in Denmark (where, as the stereotype would have it, "everyone is white, tall, blond, educated, affluent, and civic-minded") could never work in the United States. Americans are too apathetic, too ill-educated, and too different from one another. For instance, a project director at the OTA (when it still existed) insisted that the agency had tried repeatedly to involve ordinary citizens in its report review process, but that citizens simply refused to participate.

Our consensus conference proved the skeptics wrong. On a first try we were able to assemble a lay panel more diverse than any gathered as of that date in Europe.[11] All 15 members attended both background weekends and the final forum. Watching the lay panelists both listen to and interrogate expert witnesses, I saw no yawns, no wandering eyes, no fussing with hair. The panelists listened closely and asked one astute question after another. Indeed, because the background weekends effectively brought lay panelists up-to-speed on telecommunications issues, their questions were sometimes more technical than the experts' testimony.

We were also able to undertake this endeavor on a relative shoe-string. The budget for this pilot program was about $60,000. European consensus conferences have typically cost between $100,000 and $200,000. Some of this expense reflects the fact that European consensus conferences have been nationwide, and consequently organizers had to pay for participants' travel and lodging. A nationwide panel undertaken in the United States would cost somewhat more—probably on the order of $500,000. That is a lot of money, but still trivial compared with the expenditures and social impacts that are at stake in major technology policy decisions—for example, annual U.S. expenditure on R&D, from public and private sources, currently tops $200 billion (National Science Board, 1998, p. A-121). If a small nation like Denmark can routinely afford $100,000 for consensus conferences, I find it incredible that we cannot afford just five times that. We are after all a wealthy nation, and our population is more than 50 times that of Denmark.

If this initial effort was cost-effective, it was also efficiently organized. From the time of assembling the initial institutional partners for the Boston event, it took just five months to do the preliminary planning, assemble the

minimal necessary funding, and hire a project manager.[12] From the date of hiring our manager until the concluding public forum took another five months. This was swift—about the same time required by the Danish Board of Technology, and that body has a great deal of experience, having organized many consensus conferences over the past decade. By comparison, the first British consensus conference, which concluded in November of 1994, took about a year and a half to organize.[13]

Beyond the substantive successes of the conference, lay panelists' comments suggest that their work helped built a sense of community and foster feelings of citizenship. One panelist noted that working together "tore down walls." "You don't usually speak to such diverse other people in daily life, like when you're riding on a bus," continued this participant. At the final press conference, another panelist concluded that, "We need more panels like this, to give us the opportunity to learn and to take what we learn back to our communities." Finally, another participant in the Boston consensus conference said:

> I became proud of my sense of citizenship. I began to identify with the people of ancient Athens. . . . There was a wonderful sense of belonging, and of being able to make a difference when a group convenes.

For a pilot project, I think ours was a tremendous success. Nevertheless, there were difficulties and shortcomings, and attentiveness to these could make future consensus conferences in the United States even more successful.[14] First, there was not enough time and staffing to support adequate consultations between the project manager and the project steering committee, a diverse group of knowledgeable stakeholders chosen to help ensure impartiality in the organization. Second, while the expert panel was reasonably well-balanced between academics, industry, government, and public-interest groups, imbalances in outlook did surface. For example, in the case of one subtopic—computers in schools—the lay panelists heard three very similar upbeat presentations by outspoken proponents of computers in education and not a single off-setting critical perspective. Whether the lay panel would have reached different conclusions had they heard a more diverse set of views is difficult to know. However as a rule of thumb, I believe there should be a minimum of three very different expert opinions presented on each contested issue. Such diversity enhances the likelihood of provoking nuanced, reflective discussion on the issue among the lay panelists.

A third difficulty arose from institutional and budget constraints. While the procedural and substantive results from this initial U.S. consensus conference were impressive by many measures, lacking government sponsorship or a budget to pay expert honoraria, we were unable to secure a commitment

from many of our expert witnesses to attend for two days. Thus, we had to omit a key component of the Danish consensus conference methodology: the lay panelists' open cross-examination of all the expert witnesses assembled together on a second day. Cross-examination gives the lay panel a chance to play off expert witnesses against one another, and thus to take their own knowledge and judgment to a higher level of integration.[15] Finally, while covered on one local television station, in the *Boston Globe* newspaper, and in *Technology Review* magazine (Flint, 1997; Hackman, 1997), the consensus conference did not receive as much media coverage as an event of this importance deserves. Some of the explanation for this can be attributed to the freak April first Boston snowstorm that closed down Logan airport for two days and forced a number of national reporters to cancel their plans to attend. Beyond this, however, nonpartisan or bipartisan government sponsorship, or a budget to bring in more high profile expert witnesses, would presumably also help improve media attentiveness.

## Conclusion

United States science and technology institutions and decision-making processes stand out among many industrialized nations for systematically excluding lay citizen voices. The ordinary argument for ceding judgment and influence to elite representatives of the *producers* of science and technology—while excluding everyone else who will be affected—is that lay citizens have neither the competence nor the passion to be involved.

Against this argument stands the brute fact that given a chance, our Boston-area Citizens' Panelists, like their counterparts in consensus conferences throughout Europe, competently assimilated a broad array of written and oral expert and stakeholder testimony, and then integrated this information with their own, very diverse life experiences to reach a well-reasoned collective judgment. Their conclusions pass a "reality test"—a groundedness in the daily experience and concerns of everyday people—that expert conclusions routinely fail. To me, this stands as strong evidence for both the need and the practicality of democratizing U.S. science and technology institutions and decisions across the board.

At least in the abstract, we Americans are fiercely proud of our democratic heritage and our technological prowess. But it is striking that we do virtually nothing to ensure that these twin sources of national pride are in harmony with one another. Consensus conferences are not a magic bullet for all that ails democracy or for ensuring that science and technology are responsive to social concerns. But they do reawaken hopes that, even in a complex technological age, democratic principles and procedures can prevail and, indeed, extend into the technological domain.

**Acknowledgments**

This essay includes material previously published in Sclove (1996) and (1997); it also draws on interviews and correspondence conducted throughout 1994–1996 with Johs Grundahl, Danish Board of Technology, Copenhagen; Anneke Hamstra, Institute for Consumer Research, The Hague; Simon Joss, Science Museum, London (now with the Centre for the Study of Democracy, London); Lars Klüver, Danish Board of Technology, Copenhagen; Lydia Sterrenberg, Rathenau Institute, The Hague; and Norman Vig, Carleton College, Northfield, Minnesota. To receive future updates on the author's activities and publications involving the democratization of science and technology, including information about upcoming U.S. consensus conferences, subscribe to receive the free online newsletter *Loka Alerts* by sending an e-mail request to <Loka@loka.org>. Previous Loka Alerts are archived on the Loka Institute web pages at <www.loka.org>.

**Notes**

1. For other recent participatory innovations in science and technology decision-making see, for example, Sclove (1992); Renn et al. (1995); and Sclove, Scammell, and Holland (1998).

2. A growing list of the consensus conference that have been organized by the Danish Board of Technology may be found on the World Wide Web at <http://www.tekno.dk/eng/>.

3. I have discussed the importance of democratic community and its relationship to technology in Sclove (1995); see also Putnam (1996).

4. For more information about the organization of European consensus conferences, see Joss and Durant (1995).

5. OTA (1988, p. 85). This and other OTA publications are available via the World Wide Web at <http://www.wws.princeton.edu/~ota/>.

6. Lydia Sterrenberg, The Rathenau Institute, The Hague, The Netherlands and Anneke M. Hamstra, Institute for Consumer Research, The Hague, The Netherlands interviewed together by Richard Sclove, October 11, 1994. The lay panel report of the Dutch consensus conference on genetically modified animals is Public Debate (1993).

7. Simon Joss, telephone interview with Richard Sclove, July 14, 1995; see also Joss (2000).

8. Lars Klüver, Director, Danish Board of Technology, personal communication August 2, 1995.

9. We called the process a "Citizens' Panel" rather than a "consensus conference" for two reasons. First, the U.S. National Institutes of Health (NIH) already use the term "consensus conference" to refer to a process that seeks

consensus among medical experts, rather than among laypeople (e.g., Veatch, 1991); thus we wanted to avoid confusion with the expert-based NIH process. Second, we have found that the term *consensus* can be unnecessarily controversial in the U.S. political context, where for some people it harbors connotations of group or state suppression of individual points of view.

10. The nonprofit Jefferson Center in Minneapolis (on the World Wide Web at <www.usinternet.com/users/jcenter>) has organized related "Citizen Jury®" processes on several complex social issues, including national health policy and priority-setting in the federal budget.

11. One year after the Boston consensus conference, a first Swiss consensus conference was organized on the topic of "Electricity and Society" (PubliForum, 1998). While the Swiss lay panel was socioeconomically and racially less diverse than the Boston lay panel, it broke important new procedural territory in selecting lay citizens who spoke three different languages (French, German and Italian), thus necessitating the use of simultaneous interpreters and translators. This Swiss event thus opens intriguing possibilities for the future practicability of organizing consensus conferences transnationally; see also Andersen 1995.

12. Project manager Laura Reed and her assistant, Kerri Sherlock, were terrific, as were our professional facilitators, Kagan Associates of West Newton, MA.

13. See the final report "UK National Consensus Conference" (1994). For critiques of the first British consensus conference, see Purdue (1996) and Joss (2000).

14. See also Guston (1999) for an independent evaluation of the Boston-area Citizens' Panel.

15. Despite this shortcoming, however, my guess is that the lay panelists knew more than the average U.S. congressman who voted on the Telecommunications Reform Act in 1996. Members of Congress must focus on so many issues at a time that few are able to provide the attention to any particular issue that the panelists in Boston gave.

## Bibliography

Andersen, I.-E. (Ed.). (1995). *Feasibility study on new awareness initiatives: Studying the possibilities to implement consensus conferences and scenario workshops.* Luxembourg: Directorate-General XIII/D-2, European Commission.

Bimber, B., & Guston, D. H. (Eds.). (1997, February–March). Technology assessment: The end of OTA. Special Issue of *Technological Forecasting and Social Change,* 54(2–3), 125–286.

Consensus Conference. (1989). Consensus conference on the application of knowledge gained from mapping the human genome: Final document. Copenhagen: Danish Board of Technology.

Consensus Conference. (1992). Consensus conference on technological animals: Final document (preliminary issue). Copenhagen: Danish Board of Technology. Also available on-line: <http://www.tekno.dk/eng/publicat/92teaneo.htm>.

Consensus Statement. (1997). Consensus statement of the citizens' panel on telecommunications and the future of democracy, April 4, 1997. [online]. Available: <http://www.loka.org/pages/results.htm>.

Cronberg, T. (n.d.). Technology assessment in the Danish socio-political context. Technology Assessment Texts No. 9. Lyngby, Denmark: Unit of Technology Assessment, Technical University of Denmark.

Dickson, D. (1988). *The new politics of science.* Chicago: University of Chicago Press. (Reprinted with new preface; original work published 1984)

Flint, A. (1997, April 5). At Tufts, No wonks need apply: Citizens panel formulates policy. *The Boston Globe,* September 3–6, pp. B1, B6.

Guston, D. (1999, Autumn). Evaluating the first U.S. consensus conference: The impact of the citizens' panel on telecommunications and the future of democracy. *Science, Technology and Human Values, 24,* (4), 451–482. Also available on-line: <http://policy.rutgers.edu/papers/>.

Hackman, S. (1997, August/September). First line: And now a word from your neighbors. *Technology Review, 100,* (6), 5.

INRA. INRA (Europe) and European Coordination Office SA/NV. (1991, June). *Eurobarometer 35.1: Biotechnology.* Brussels: European Commission; Directorate-General; Science, Research, Development; "CUBE"—Biotechnology Unit.

Joss, S. (2000). Participation in parliamentary technology assessment: From theory to practice. In N. J. Vig & H. Paschen (Eds.), *Parliaments and technology: The development of technology assessment in Europe* (pp. 325–362). New York: State University of New York Press.

Joss, S., & Durant, J. (Eds.). (1995). *Public participation in science: The role of consensus conferences in Europe.* London: Science Museum.

Klüver, L. (1995). Consensus conferences at the Danish Board of technology. In S. Joss & J. Durant (Eds.), *Public participation in science: The role of consensus conferences in Europe* (pp. 41–49). London: Science Museum.

National Science Board. (1998). *Science and engineering indicators—1998.* NSB-98-1. Arlington, VA: National Science Foundation. Also available on-line: <www.nsf.gov/sbe/srs/seind98/start.htm>.

OTA. U.S. Congress, Office of Technology Assessment. (1988, April). *Mapping our genes— Genome projects: How big, How fast?* OTA-BA-373. Washington, DC: U.S. Government Printing Office.

Public Debate. Public debate: Genetic modification of animals, Should it be allowed? (1993). The Hague: Netherlands Office of Technology Assessment.

PubliForum. PubliForum "Electricity and Society," (1998, 15–18 May). Bern: Citizen Panel Report. Bern, Switzerland: Technology Assessment Programme, Swiss Science Council.

Putnam, R. D. (1996). The strange disappearance of civic America. *The American Prospect, 24,* (Winter), 34–50.

Renn, O., Webler, T., & Weidemann, P. (Eds.). (1995). *Fairness and competence in citizen participation: Evaluating models for environmental discourse.* Dordrecht, Boston and London: Kluwer Academic.

Sclove, R. E. (1995). *Democracy and technology.* New York and London: Guilford Press.

Sclove, R E.. (1996, July). Town meetings on technology. *Technology Review, 99,* (5), 24–31.

Sclove, R. E. (1997). Citizen policy wonks. *Yes!: A Journal of Positive Futures, 3,* Fall: 52–54.

Sclove, R. E. (1998, February 27). Better approaches to science policy, *Science, 279,* 1283. Also available on-line under the Publications section of the World Wide Web pages of the Loka Institute at <www.loka.org>.

Sclove, R. E., Scammell, M. L., & Holland, B. (1998, July). *Community-based research in the United States: An introductory reconnaissance, including twelve organizational case studies and comparison with the Dutch science shops and the mainstream American research system.* Amherst, MA: The Loka Institute. Also available on-line as a free download via the World Wide Web pages of the Loka Institute at <www.loka.org>.

*Technology and democracy: The use and impact of technology assessment in Europe.* (1992, November 4–7). *Proceedings of the 3rd European Congress on Technology Assessment, Copenhagen.* 2 vols. Copenhagen: Teknologi-Naevnet (Danish Board of Technology).

UK national consensus conference on plant biotechnology: Final report. (1994). London: Science Museum.

Veatch, R. M. (1991). Consensus of expertise: The role of consensus of experts in formulating public policy and estimating facts. *Journal of Medicine and Philosophy, 16,* 427–445.

Walker, R. S. (1995, March 2). Democratizing R&D policymaking. Lecture and discussion presented at the 10th Annual Meeting of the National Association for Science, Technology and Society, Arlington, VA.