Technology Review

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY JULY 1992 $3.00

ALSO IN THIS ISSUE:

Mathilde Krim on Fighting AIDS

•

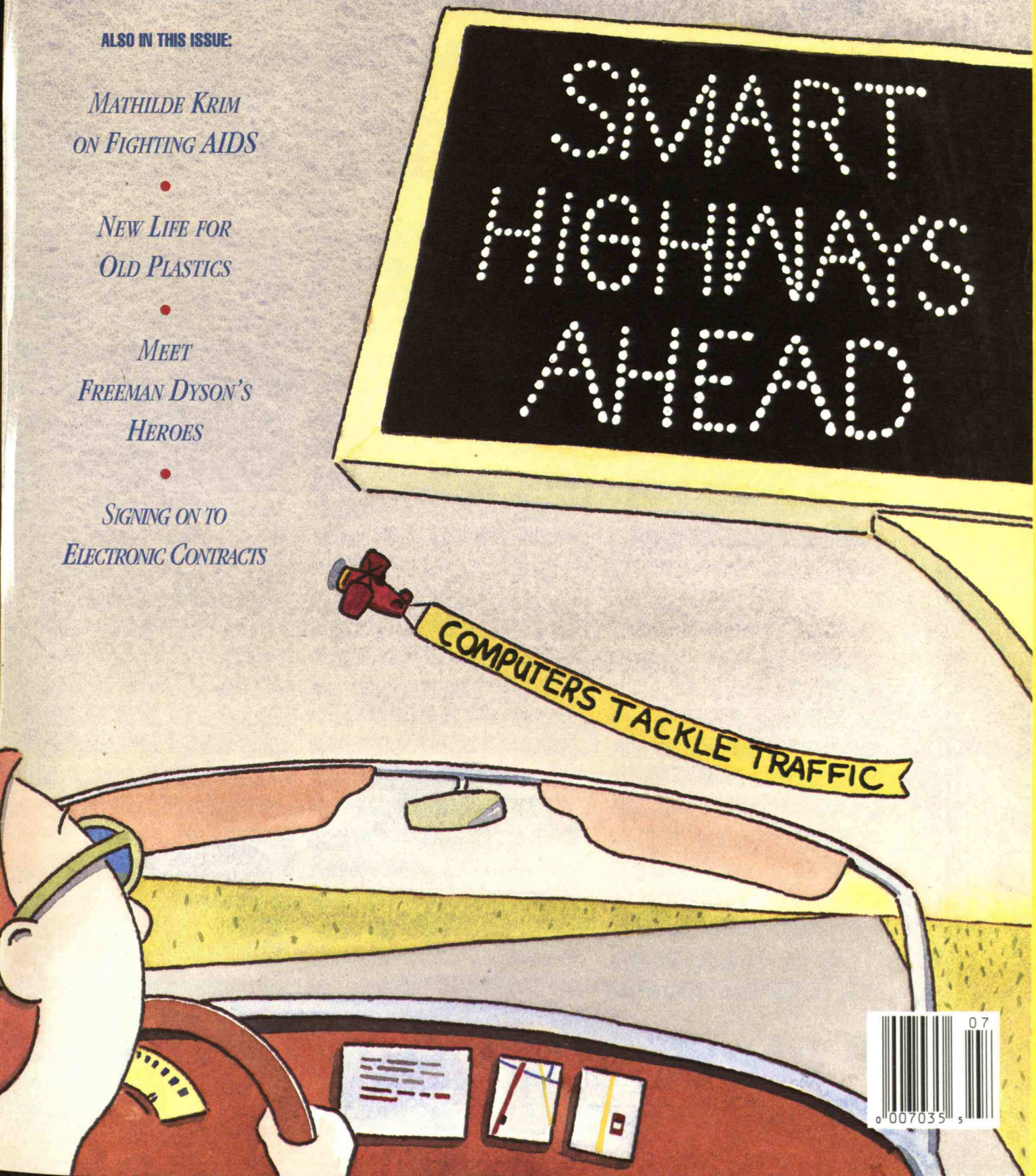
New Life for Old Plastics

•

Meet Freeman Dyson's Heroes

•

Signing on to Electronic Contracts



[redacted] DIGIT

SECURITY [redacted]

[redacted] solutions [redacted]

[redacted] to decide [redacted]

[redacted] don't want [redacted]

[redacted] give you [redacted]

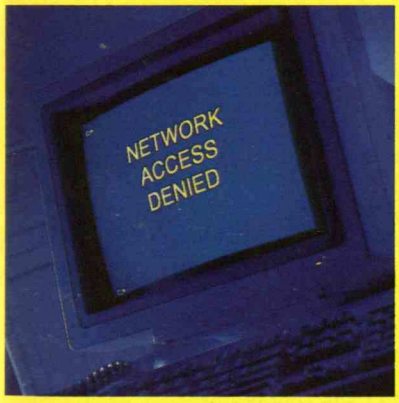
[redacted] what [redacted] people [redacted]

[redacted] you [redacted]

[redacted] the power [redacted]

DIGITAL. THE

AL'S [redacted]



[redacted]

[redacted] And what you do want them to know.

In today's competitive business environment, it's more important than ever to open your computer systems and networks. You need to open them between departments to make sure everyone's headed in the right direction. You need to open them to customers so they can access account information and place orders. And you may need to open them to a competitor if you're working on a joint venture.

But this openness poses a dilemma. Who gets to see what, what do they get to see and to what degree? Set too much security and opportunities may be lost. Set too little and one small incident could lead to disaster. So who do you see to secure your open systems? Digital, that's who.

As the company that established and secured the world's largest private data network of over 85,000 system-nodes, we have the most experience in securing global distributed systems. Experience that gives us an advantage in that we know security is more than just hardware, software and consulting. It's also practices and policies, to make sure employees know what to do with the information in your system and out of your system.

The one company that can open your systems is the one company that can help you decide who to open them to.

The best way to find out how you can get the Digital advantage is to get the most thorough briefing on security available. Call 1-800-DEC-INFO, Ext. 577 for your copy.

digital™

OPEN ADVANTAGE.

TECHNOLOGY REVIEW
JULY 1992

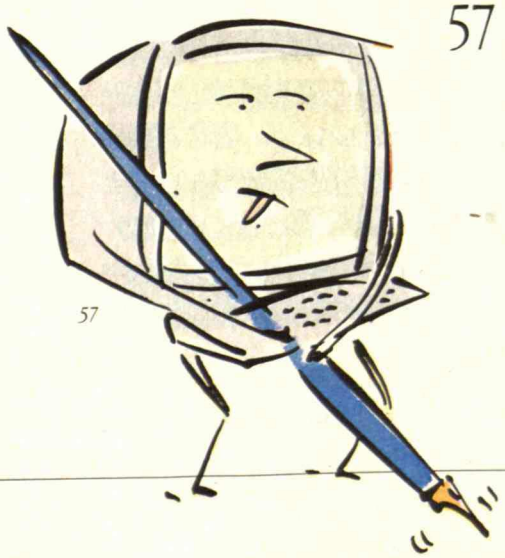
Contents

FEATURES

30

38

48



57

COVER ILLUSTRATION: GARISON WEILAND

TECHNOLOGY REVIEW
VOL. 95/NO. 5

12

14

66

DEPARTMENTS

Technology Review (ISSN 0040-1692), Reg. U.S. Patent Office, is published eight times each year (January, February/March, April, May/June, July, August/September, October, and November/December) by the Association of Alumni and Alumnae of the Massachusetts Institute of Technology. The editors seek diverse views, and authors' opinions do not represent official MIT policy. We welcome letters to the editor. Please address them to Letters Editor.

Editorial, circulation, and advertising offices: *Technology Review*, Building W59, MIT, Cambridge, MA 02139, (617) 253-8250; FAX (617) 258-7264. Printed by Lane Press, S. Burlington, VT. Second-class postage paid at Boston, MA and additional mailing offices. Postmaster: send address changes to *Technology Review*, MIT, Building W59, Cambridge, MA 02139.

Subscriptions: $24 per year, libraries and organizations $27. Canada add $6, other foreign countries add $12. Contact *Technology Review*, P.O. Box 489, Mount Morris, IL 61054, (800) 877-5230 or (815)734-6309; FAX (815) 734-4205.

Advertising representatives: Mark E. Lynch, Eastern Sales Manager, 9 Salem Drive, Saratoga Springs, NY, (518) 583-6086; The Leadership Network: SalesConcepts, Inc., 72 Spring Street, New York, NY 10012, (212) 941-8172; Detroit: Keith Olsen/Media, Birmingham, MI, (313) 642-2885.

MIT School of Management Executive Education Programs

The MIT Program for Senior Executives (changes effective 9/92)

An eight-week international program for a limited number of private and public sector senior executives from a wide variety of national backgrounds; includes two-weeks of high-level meetings in London and Washington.

An MIT core faculty provides an inter-disciplinary study of management practice and the changing economic, social and technological environment. Current and future concerns are addressed: global competition, human resource management, management of change, strategic management and information systems technology.

Offered twice yearly from March/April to May/June and from September to November. Class size strictly limited to no more than 50 participants.

The Alfred P. Sloan Fellows Program

A twelve-month program leading to the degree of Master of Science in Management, designed to broaden and develop outstanding international mid-career executives with approximately ten to twelve years' experience for more general and senior management responsibilities.

Applicants are nominated and sponsored by private and public sector organizations, selected by MIT, and appointed Alfred P. Sloan Fellows.

The Management of Technology Program

A twelve-month program leading to the degree of Master of Science in the Management of Technology, offered jointly by the MIT Schools of Engineering and Management, for engineering, technical, and science graduates with eight to ten years' technical work experience, who wish to understand, develop and manage technological resources in an increasingly competitive global economy.

For information regarding these and short summer programs in functional areas: Executive Education Programs, MIT School of Management, Cambridge, Massachusetts 02139. Telephone: 617-253-7166; Telex: 797961 (MIT SLOAN UD); Fax: 617-258-6002.
Participants are 50% non-U.S. nationals.

First Line

No Failure to Communicate

WITH the death of Isaac Asimov early last April, we lost one of the truly great science writers. "His response to the public's increasingly anxious interest in science was his clarity and integrity," wrote Gerard Piel, former editor of *Scientific American,* in the *New York Times.* "He leveled with his readers, never condescended, and never overheated the story."

We may not see Asimov's equal again, but fortunately he left descendants. An experience I had the following week reminded me that we are blessed with many writers who report on science and technology in plain English for the pleasure and benefit of the public.

The occasion was my service on the selection committee of the Knight Science Journalism Fellowships program, which annually brings eight North American science writers (plus a few more from overseas) to MIT for an academic year. Liberated from deadline pressures, they pursue their own study agendas, make contacts with scientists and technologists, and generally take what the program's literature describes as "an energizing step in their careers."

The interview process alone was an energizing step—for the interviewers. Representing virtually all facets of the business—newspapers, magazines, television, and radio; urban and rural locales; posts foreign and domestic—the applicants were smart, enthusiastic, versatile, poised, dedicated, thoughtful, and articulate professionals. They embodied what I've long advised aspiring science writers, and what I'm privileged to see every day among my colleagues at *Technology Review.* That is, the journalist must deliver neither a sermon nor a tutorial but a "story." He or she must address the general public, people who don't yet know the scoop but who are intelligent and willing to learn—and act. And the presentation must be clear in style and balanced in content.

Telling a story, and telling it well. One candidate, a newspaper reporter, had started his career as a novelist and therefore hit the ground running when he moved into journalism. "Fiction writing," he said, "taught me to tell a story, with structure, characters, and human dimension." Another candidate, a freelance writer, described a useful rule of thumb for identifying a good story. "I look for something with great verbs," she said, "an area that has motion and verve." And what are the earmarks of turning a good story, once selected, into a good read? "Reporting that's accurate," said another journalist, "coupled with writing that's simple, colorful, and clear."

Let me tell you about my science-journalist colleagues.

Addressing the public. Some scientists see journalism as an exercise in oversimplifying, and the more mass the market, the greater the trivialization. That's because the details of the science and technology enterprise—as opposed to its ultimate products—have been thought not to interest the public. Actually, the applicants maintained, people are willing and able to follow the ups and downs of scientific inquiry and the adventures of the players. "Being caught up in the romance of science," said one reporter, "I try to convey the drama to my readers."

A revelation was that mass-market publications such as women's magazines are good outlets for substantive science writing. They are "definitely not of the 'McNuggets' school," observed a freelance writer. "They provide more room, and they're also more accurate." Bevies of fact-checkers are employed to validate every word.

The come-on in such magazines, said the writer, is their "service orientation"—what ordinary people can do to protect themselves, say, from possible radiation hazards while differing experts battle it out. "Once they're in there," she noted, "readers don't mind getting into more depth."

Sparing us the sermons. Most applicants agreed that the journalist's job is to present information to the public, even help people decide what to do with it, but not beat readers over the head with his or her own world view. "I describe what the new technology is and why now," said a reporter/columnist. "But I play soothsayer with great reluctance." My goal, said another writer, "is to describe the details to get to the issues. When there's a point to make, experts do it for me."

A few interviews underscored the merits of American journalism—rich, almost to a fault, in expert sources and quotes—as opposed to the British press, for which some of the applicants occasionally wrote. Publications in the United Kingdom often suppress such detail for fear of burdening the reader and because they assume themselves to be "the authoritative voice."

During their year in academia, the Knight Fellows hope to find genuine authoritative voices and learn better how to translate and analyze them. These go-getters seem likely to obtain what they seek, and give as much as they get. That "energizing step" will be driven by an already abundant energy. "I'll eventually become an editor even though I love writing," said one prolific reporter, much to our surprise. "The reason is that I have so many ideas, I couldn't possibly pursue them all myself."

Of course, being charming in an interview is one thing and routinely delivering the goods for one's readers is another. Writers should be judged by the quality—the readability, accuracy, depth, and value—of their writing. And while it's nice to be acclaimed by colleagues, it is the public that must ultimately judge. Speaking as one of those colleagues, then, let me simply point out that the public has some smart and motivated science journalists vying to serve it. ■

—STEVEN J. MARCUS

How do you make the best minivans better?

Make them safer.

From day one, the first minivans have been the world's favorites.

We invented the minivans in 1984, and they became the preferred family vehicles almost overnight. By now we've sold over three million, and we continue to outsell all the competition combined.

If you own a Caravan, Voyager or Town & Country, you know why. The front-wheel drive, the handling, the ride, the room, the comfort, the warranty*—nobody has put the whole package together the way we have.

In the last 18 months we've made changes that our customers want and need. We lowered the front end for more visibility, and softened the lines for a more aero look. We improved the front suspension system for a more solid feel of the road. We gave you a choice of engines for the way you drive. We put a child-guard lock on the sliding door.

And during this period, we've been putting our brains and technology to work on an area of increasing concern: safety on the road.

The driver's minivan air bag. America asked for it, we were the first to deliver.

By now, it's an accepted fact that air bags save lives. A lot of lives.

First, we put an air bag in every production passenger car we build in the U.S.† Then we were the first to do it for minivans.

Today, a driver's minivan air bag is standard on every Caravan, Voyager and Town & Country. It's fully effective only when used with a seat belt. And it's the most effective protection against injury you can get today. And all our 1994 minivan models will have an air bag for the front seat passenger as well.

By the way, our driver's minivan air bag is probably the most thoroughly tested piece of equipment we've ever installed. And the test results show it works the way it's designed to work.

Holding the road is another reason why we're holding the lead.

Our engineers have pulled out all the stops to help you stop safely when the road is wet and slippery. An anti-lock braking system is standard on Town & Country, and available on Caravan and Voyager. It does what the driver can't do in a potentially dangerous situation.

Special wheel speed sensors detect lockup when it's about to happen. Then braking pressure is selectively adjusted, up to 15 times per second. If one front wheel starts to lock, only brake pressure to that wheel is reduced. If either rear wheel begins to lock, brake pressure to both rear wheels

is reduced. That helps you come to a safe, controlled stop.

Our ABS system went through more than a million miles of testing before it went into our minivans. So you can count on its reliability.

All-wheel drive also makes a major contribution to safety. It gives you much better traction than two-wheel drive on any kind of road surface. It helps keep you in control when you're taking a tight corner in treacherous weather. And you can get it on any of our minivans.

The inside story of minivan safety engineering.

Our safety engineers work with the most advanced technology available to reduce the chance of serious injury in the event of an accident.

"Occupant Kinematics" is one of the fancy terms they use. It's the study of motion during a collision. Using kinematics, restraint systems are analyzed before testing for maximum safety by a computerized three-dimensional model.

We also have a special safety feature for some very special passengers. The world's first built-in child-restraint seat, available on Caravan and Voyager. Our competition doesn't have anything like it.

Nobody likes to think about trouble on the road. But if it happens, you'll be glad our engineers spend every day thinking about it.

When it comes to safety, you don't play it safe.

When you build minivans, you make safety one of your top priorities. We do, because a lot of families are depending on us.

Over the years, Chrysler has added safety feature after safety feature to its minivans. We've met every government safety standard on time or ahead of time, and set new standards of our own. And we'll continue to do so.

The way we build our minivans, and the safety we build into them, has kept us number one.

The final step in the evolution of the minivan: ZEV.

That stands for Zero Emission Vehicle. In other words, the electric minivan. The world is ready for it. We've been planning it for years, and now we're bringing the plan to production.

This September we'll start building a limited number of electric Dodge Caravans and Plymouth Voyagers. Like our present minivans, they'll hold seven people and plenty of cargo. They'll be front-wheel drive, with electric-powered steering and brakes, and optional electric-powered air-conditioning. The range is 120 miles on the highway, 90 in city stop-and-go driving. Then you simply recharge the battery.

In the automotive business you lead, follow, or get out of the way. Our aim is to lead by building our minivans better, building them safer, building them cleaner. So we can reach the only goal that really matters: a satisfied customer.

ADVANTAGE: CHRYSLER

CHRYSLER · PLYMOUTH · DODGE · DODGE TRUCKS · JEEP · EAGLE

*See limited warranties and restrictions at your dealer. †Excludes Dodge Viper and vehicles built for Chrysler: Imports, Laser, Talon, Premier, Monaco, Summit.

Letters

Regionalism vs. Localism

Frank J. Popper is to be commended for his article "Thinking Globally, Acting Regionally" (*TR April 1992*). He captures the essence of an important idea, presents it to us with eloquence, and thus provokes us in ways few academics or social commentators can.

However, at the root of his argument is an unfortunate presumption about regional planning. He rightly points out that local planning as it is practiced in most places has failed—that its nature, if you will, is socially irresponsible. Local planning in the United States seems to be inevitably parochial in content as well as elitist in implementation. Furthermore, it's based on units of political subdivision that have no relationship to real ecological systems. But to address this failure, Prof. Popper simply puts forward a notion of responsible regionalism. He hopes to ameliorate everything simply by moving planning up one administrative level.

The problem here is two-fold. First, such a strategy does not acknowledge the possibility of irresponsible regionalism, a critique raised by some scholars, including Prof. Popper himself in earlier work. Second, the focus is on an administrative issue, when instead it should be on one that's political, social, and cultural. Both regional and local planning are bound to be plagued by an unresolved social ethos about the balance of individual and social rights and responsibilities.

In fact, when we can successfully confront that ethos, we might just as well construct a responsible localism as a responsible regionalism. If we can learn to think globally, then let us act locally, as the original phrase urges. It is not only preferable, because of the unique nature of land resources, but it reinforces a democratic tradition that, while seeming anarchic and out of date, has rhyme and reason to it, even in the late twentieth century.

HARVEY M. JACOBS
Department of Urban
and Regional Planning
University of Wisconsin-Madison

Computerized Civic Action

In "Electronic Democracy" (*TR November/December 1991*), Pamela Varley focuses on the extreme political views communicated through Santa Monica's Public Electronic Network (PEN). She doesn't describe how the network is making the city more livable.

As a resident of Santa Monica, I have used PEN for the past two years to address messages to city officials. I have improved electronic-mail reservations of books at the public library, prevented local hotels from dominating our public tennis courts, caught vandals at one of our public schools, and helped set specifications for the rewiring of our street lights. I have had a slippery stretch of street grooved to prevent skidding, and tried unsuccessfully to outlaw audible burglar alarms.

This is true electronic democracy.

MYRON KAYTON
Santa Monica, Calif.

Policy and Politics

In "Building a New Economic Order" (*TR April 1992*), Ann Markusen and Joel Yudken rightly conclude that the nation needs a visionary technology policy. Unfortunately, however, they propose no such thing, falling back on tired, old ideas. They assume that wars will go away and our international industrial competitiveness will return if only we would invest in socially useful areas instead of "wasting" money on defense. They are also under the impression that when the government mandates such changes as high-cost labor in foreign countries, America's economic, security, and social problems will all be solved.

The U.S. technology policy clearly should be socially responsible. But the difficulty will be to keep it out of politics, and Markusen and Yudken have followed the well-worn political path of trying to save the non-critical and dying industries where the current jobs (and, therefore, votes) reside. They do not face up to the difficult choices inherent in crafting a policy that's truly visionary—one focused on the critical technologies and industries of the future. Also, by including such areas as preventive health care, employment, and social welfare under the umbrella of a technology policy, the authors press technology well beyond the sphere in which it can be the dominant force. Much more than technology is required to solve America's problems, though the country does need a truly visionary technology policy.

JACQUES S. GANSLER
Senior Vice-President
The Analytic Sciences Corp.
Arlington, Va.

Stonewalling on Smoke

In " Keeping OSHA's Feet to the Fire" (*TR February/March 1992*), Charles Noble does an excellent job of reporting on the agency's failure to protect against occupational hazards. My own special interest in this area is environmental tobacco pollution. Since the surgeon general's report on environmental tobacco and health in 1986, there have been 1150 articles in the medical literature that address this issue, yet OSHA has done nothing.

In 1987 Action on Smoking Health (ASH) filed a citizen's petition to request OSHA to limit smoking in the workplace. Two years later, the organization's request for an emergency temporary standard was turned down, but the court did find for ASH in that it asked OSHA to develop some standards. In 1992 OSHA is to finally start its inquiry into the issue.

STEVEN A. PICKERT, M.D.
Thurmont, Md

Feelings for Animals

As Harriet Ritvo suggests in "Toward a More Peaceable Kingdom" (*TR April 1992*), the scientific establishment has done a poor job of enlisting public support for using animals in research despite the impressive array of advances—such as insulin and the polio vaccine—that can be called upon as examples. In part, this is because of the condescending attitude that she mentions. But another important aspect of the problem is that scientists have difficulty communicating how they themselves feel about animal suffering.