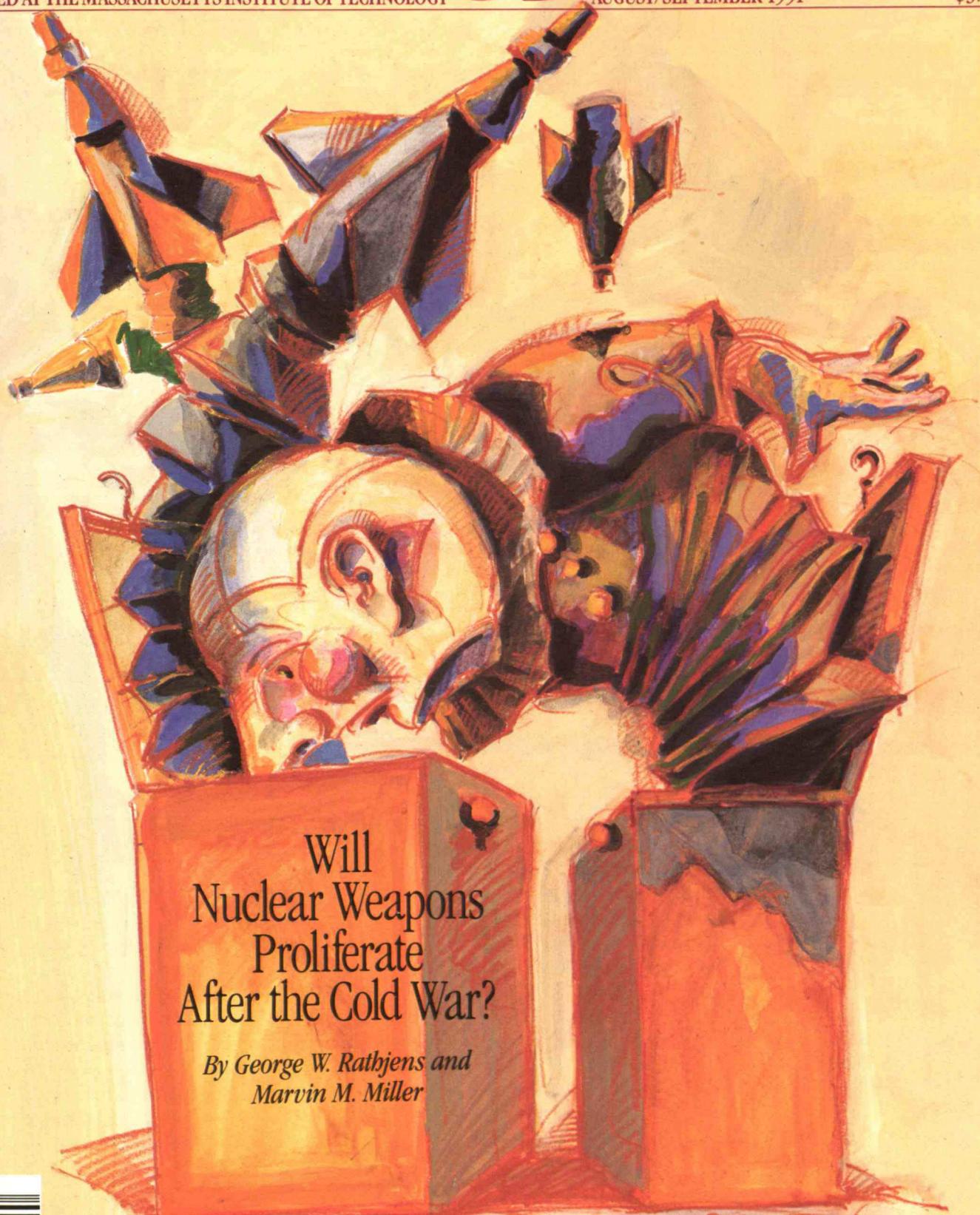


# TechnologyReview

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## Will Nuclear Weapons Proliferate After the Cold War?

By George W. Rathjens and  
Marvin M. Miller

ALSO: THE GREENING OF INDUSTRY ♦ NORMAN AUGUSTINE: WHAT'S OUR FUTURE IN SPACE ♦  
BUILDING A PEACETIME ECONOMY ♦ THE SAD TALE OF THE INVENTION THAT GOT AWAY ♦



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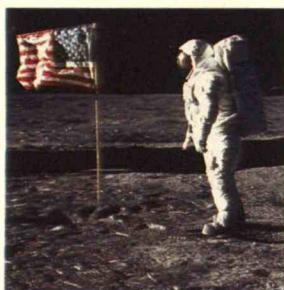
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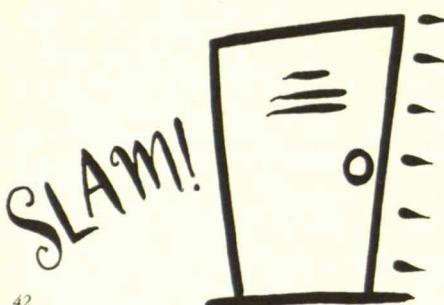
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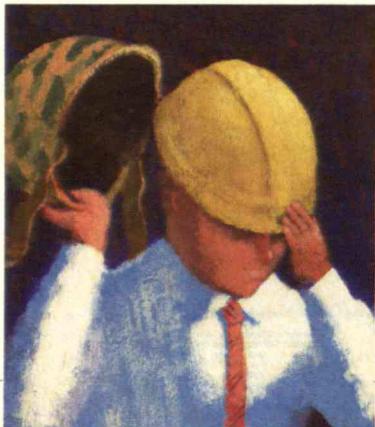
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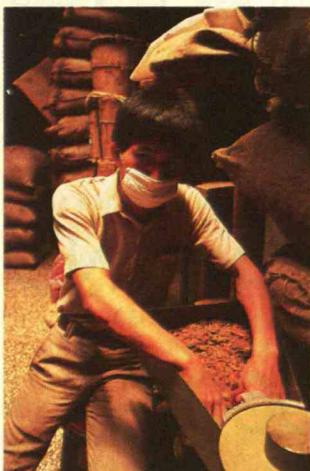


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# FirstLine

## An Economic Transition

**C**LAUDETTE Munson crafts the printed circuit boards that form the brains of some of the most sophisticated weapons in the U.S. arsenal, including the Navy's Trident missile. A highly skilled machine operator for nearly 20 years at Unisys Corp., the nation's fourth-largest computer manufacturer, Munson was laid off for nine months last year because of declining defense sales.

She is far from alone in her fate. Over the past several years Munson has watched some 3,000 of her fellow defense employees lose their jobs at the company's St. Paul plant because of cutbacks in the nation's military budget. The Pentagon's Office of Economic Adjustment anticipates that a modest 10 percent defense cut over the next five years will throw 650,000 people out of work—with a ripple effect displacing at least that many in related industries. The end of the Cold War clearly stands to bring economic hardship to millions.

Advocates of a smaller military budget have long argued that the nation must plan for the day when defense workers will need other employment. As the desperate pleas of the numerous communities now facing base closings attest, waiting until the axe falls does not work. The first step in making any such transition is to find civilian goods that need producing. This is not an easy task given the worldwide glut of consumer items, as John E. Ullmann points out in this issue (see "Building a Peace-time Economy," page 56). A second crucial ingredient in shifting to peacetime work is drawing on the expertise of both managers and workers.

Unisys is a case in point. As layoffs mounted in the late 1980s, Munson and her union, Local 2047 of the International Brotherhood of Electrical Workers, decided to survey Unisys employees for civilian goods the company could pursue. Engineers, production

workers, and machine operators at the St. Paul plant suggested over 120 products from VCRs to fiber optics. How to choose which ideas had practical merit?

The employees formed an Alternative Use Committee, which hired a market consulting firm to narrow the list of products to those that could both fill a commercial niche and apply the skills the workers, largely women, had honed during decades of fabricating precision military hardware. At the same time, the committee focused on new markets for the advanced computer systems the company—the product of a 1986 mer-

### *The end of the Cold War stands to bring economic hardship to millions.*

ger of Burroughs and Sperry—had long specialized in making.

The consultant's report, issued in June 1990, targets the central computers needed to monitor and analyze road conditions for intelligent vehicle highway systems (IVHS), as well as computers to run high-speed rail. Remote-sensing systems and technologies for aiding disabled people, including robotic hands and environmental monitors, also made the list, among others. Many of these technologies rely on rugged computer processing developed for the military and made possible by Munson's specialized circuit boards.

Although community support for the project has been strong (Mayor Jim Scheibel and former governor Rudy Perpich have actively campaigned for it), Unisys's response has been tepid. Managers have participated only reluctantly in meetings of the Alternative Use Committee, and they have evinced little interest in its proposals. However, the company did recently announce plans to produce a satellite tracking system similar to that needed to run an IVHS. While Munson believes the move proves

the validity of the workers' proposals, the announcement disappointed: the system will be made in Salt Lake City. Meanwhile layoffs in Minnesota continue.

Both the Pentagon and defense firms have long opposed efforts to make military-civilian planning mandatory. Managers seem to fear, as Unisys division director Bill Marberg attests, losing their prerogatives to determine what a company produces. Munson insists, however, that her committee is not interested in shoving production decisions down anyone's throat—if, indeed, employees had such power. She simply wants managers to tap the knowledge and experience Unisys employees have accumulated.

In the absence of strong federal leadership, efforts by states and local authorities to plan for defense-related job losses are gaining momentum. Washington state is surveying companies to determine their defense dependency and find out what alternatives they are considering. Maine may assist firms wanting to retool for the commercial sector. And seed money can be crucial: the Minnesota Office of Economic Dislocation has provided \$10,000 to the Unisys Alternative Use Committee to complete the third phase of its market analysis.

Such efforts will best succeed with a clear mandate for advance planning at individual firms. For conversion to work, managers will have to both give up their opposition to planning and listen to their workforce. Such listening, after all, would simply build on the move toward greater shop-floor democracy now touted as the key to productivity. If the nation refuses to draw on the accumulated knowhow of its defense employees, much of the potential technological spinoffs from decades of military buildup will be lost.

Clearly, those who have devoted their working lives to ensuring the success of that policy deserve help in making a transition. As Claudette Munson says, "I just want the chance to try."

SANDRA HACKMAN

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# Letters

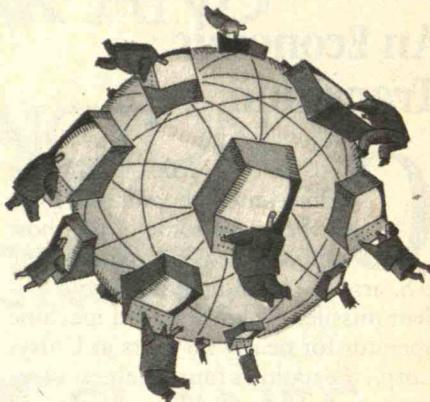
## INFORMATION INTERSTATES

I congratulate Michael Dertouzos ("Building the Information Marketplace," TR January 1991) and Jonathan Schlefer ("Building the Information Highway," TR First Line February/March 1991) on a clear and interesting vision of electronic infrastructure issues.

I do not agree, however, with Mr. Schlefer's view of the relationship between the public and private sectors. Most economic activity in our society is organized by the private sector, and major federal government initiatives to develop information infrastructures must work within that situation. There is a growing consensus that the government should make information it has gathered available to the public, but the government should not ordinarily invest in information gathering or distribution that is unnecessary for its functioning and that has historically been left to the private sector. An example is large public dialup bulletin boards and the communications support, such as packet networks, needed to place them within the reach of everyone.

I do believe the government should actively promote development of formats that enable people to exchange information freely. I also think the government should support pilot projects that would demonstrate different ways of organizing electronic publishing and its markets. We also need new regulatory and legal concepts to fit new technologies—the government could help there, too, focusing on pricing, usage metering, and billing and collection techniques, as well as associated intellectual-property, antitrust, and economic regulation issues.

Beyond that, however, I am skeptical. Most of the great successes of the microcomputer revolution have been entrepreneurial and market-driven, not artifacts of a national plan. In fact, a national plan more likely would enshrine tomorrow's equivalent of mainframes, remote time-sharing, and hundred-thousand-dollar software packages at the expense of desktop computing, lo-



cal area networks, and competing \$500 user-friendly word processing and spreadsheet products. Furthermore, I see no reason why the First Amendment should prohibit the telephone company, which Mr. Schlefer calls a "powerful local monopoly," from competing with the *Boston Globe*, which looks to me like another powerful local monopoly. What we need are regulations that encourage vigorous innovation and competition—not a national straitjacket.

Political reality makes it extremely unlikely that a system such as the one Mr. Dertouzos proposes will be funded in one fell swoop. The cost is too high and the competition with the private sector too broad and too fundamental. The vision of an information highway can become a reality only if government people work with the private sector on some carefully crafted experiments.

HENRY H. PERRITT  
Villanova, Pa.

In arguing that a national information network should be developed by the government rather than entrepreneurs, Jonathan Schlefer would have done well to find a more persuasive model than the interstate highway program. The history of that program shows only how easy it is for the government to dole out money and how hard it is to oversee the outcome.

The legislation for interstates reflected the theory that what's good for General Motors is good for the country, and it was in fact good for General Mo-

tors and the other companies in the automobile, tire, and petroleum industries that lobbied for it. With the end of World War II, these companies shared a valid concern that the demand for their products would stop growing. To ensure that nothing so crass as price would dissuade people from consuming more, the interstates were made toll-free. The entire system was thereby insulated from the discipline of the marketplace.

Unfortunately, the result has been congested urban highways and overinvestment in rural highways. We might be better off today if entrepreneurs had been in charge. That way the requirement to turn a profit would have tempered the tendency to overbuild in rural areas, and market pricing and investment standards would have better matched capacity to demand in urban areas.

Interstate highways have facilitated urban sprawl, which has translated into low off-the-job productivity for American workers. A well-known symptom is resource consumption per capita, which is greater in the United States than anywhere else—even countries where the standard of living is as high or higher. American workers must be paid more to maintain their lifestyle than their counterparts in societies where off-the-job productivity is better.

Without the interstate program, industries other than motor vehicles, rubber, and petroleum would have flourished. As Schleifer himself suggests, our environment might be less threatened. We might be less dependent on imported oil. Our central cities might still be healthy. Our society might be less divided between the poor, who cannot afford cars, and the rest of us. And our children might enjoy better chances of success in a competitive world.

The interstate highway program is like bread production in the Soviet Union—bread there has been priced so far below cost that farmers find it cheaper to feed bread to their pigs than grain. Now that Soviet central planners have realized the error of their ways, they face

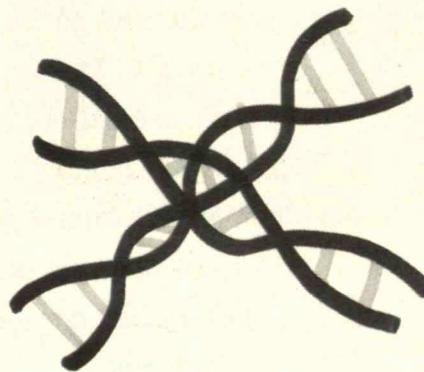
consumer riots against price increases. American motorists, who have been driving toll-free for three decades, would be equally ready to riot if threatened with charges sufficient to cover the full costs of highway use.

ROBERT R. PIPER  
Berkeley, Calif.

### GENETIC DETERMINISM

As a member of the lay public inclined toward genetic determinism, I found Robert Weinberg's dread as expressed in "The Dark Side of the Genome" (*TR April 1991*) a little extreme. He writes defensively, "Environmental variations can cause genetically similar individuals to develop in dramatically different ways." Of course this is true: they are only similar. But what about genetically identical individuals?

An ongoing study at the University of



Minnesota suggests an incredible correlation in the behavior of identical twins raised apart compared with those raised together. If the data continue to hold up, one could conclude that as much as 70 percent of all human behavior is directly controlled by genetic make-up—right down to the choice of toothpaste.

An interesting point I believe Mr. Weinberg missed is that if genetic determinism is as real as the twins study suggests, what difference does it make whether the public believes in it or not? Mr. Weinberg is afraid that people would put their faith in genes and lose their "spunk, ambition, and passion,"

but actually there would still be plenty of people who exhibit those admirable qualities: since they'd have the genes for them, they'd have no choice. The important question is, If genetic determinism is real, what role will it play in determining which genes survive? Will it accelerate natural selection or destroy it? It might do neither.

One especially interesting aspect of genetic determinism is the theory of the "selfish" gene. This theory, which says people are disposed to prefer their own kind, indicates that even with complete genetic diagnostic information and power to manipulate genes, parents would still choose to have offspring who are pretty much like themselves. Thus the overall genetic picture would remain basically the same.

I believe that instead of expressing dread at the spectre of genetic diagnosis and selection, we could celebrate it. After all, we'll have meaningful power of free choice for the first time in human history.

KEVIN MAGINNIS  
Chicago, Ill.

Robert Weinberg's article raises deep questions. The call to "craft an ethic that cherishes our human ability to transcend biology" is well taken, but another aspect of the problem, which Weinberg ignores, is the reductionistic way of thinking that's implicit in trepidation over "genetic determinism" in the first place.

Genes, in and of themselves, do not "cause" anything. Genes interact with the environment to produce their effects. No section of any chromosome, in and of itself, causes Huntington's disease (as the diagram on page 51 of the article may lead one to suppose). It may be more convenient to discriminate against individuals with certain genes than it would be to modify the environment within which they work and live. Hence the issues at stake are as much political and economic as they are "ethical."

MICHAEL BRADIE  
Bowling Green, Ohio

*A fuming smokestack is the perfect symbol of our national dilemma. On one hand, it means the jobs and products we need. On the other, it means pollution. ☺ Some think having one without the other will take a miracle. We think it will take natural gas. ☺ Because gas, the cleanest of all fossil fuels, can reduce emissions across the board. You name it—CO, CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, particulates—and natural gas combustion produces none or substantially less. ☺ But gas is more than clean. It's extremely efficient as well. So even fewer pollutants are created since less fuel is expended to do a job. ☺ Which also reduces costs. And that's another argument favoring gas. It makes the fight against pollution more affordable.*

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