Science, Inc. versus science-for-everyone

Dick Sclove

According to a recent New York Times editorial, "Novel ideas conceived by American patent holders depend far more on research paid for by government than on research paid for by private industry....The implication is that proposed cutbacks in Federal research would damage the economy." The editorial is based on a new study prepared for the National Science Foundation by CHI Research, Inc.

THE RAPTURE OF SCIENCE/THE CAPTURE OF SCIENCE

Scientific leaders are predictably ecstatic at the latest evidence that what they do is vital to American industrial performance. "It's a watershed," Dr. Martin Apple, director of the Council of Scientific Society Presidents, told Times' reporter William Broad. "It's a wake-up call for federal investment policies."

Charles Larson, executive director of the Industrial Research Institute concurs that the CHI Research study is "going to make people realize...that public investment in academic science through government-funded programs pays dividends to society....It pays off handsomely."[1]

But the rest of us should think twice before agreeing to pour more tax dollars into a science system that's become coupled much more tightly to business than to civil society, democracy, or the broader public good.

The new CHI Research report suggests an historic deepening in the relationship between science and industry. Of course, this isn't entirely surprising, given a two-decades-long trend in which university researchers have increasingly traded time at the lab bench for power lunches with venture capitalists and patent attorneys. But from a societal standpoint, what does this trend really mean?

DOES PUBLIC SCIENCE DRIVE PRIVATE INNOVATION?

Those already touting the new study to justify increased federal funding for science are making several arguable assumptions. The first is that patenting provides indisputable evidence of industrial innovation. In reality many corporations use patents to suppress inventions that compete with their existing product lines or to protect slight improvements, not to support real technological breakthroughs [2]. Indeed, while qualifications such as these are omitted in the new CHI Research study, even CHI's own glossy corporate brochure explains that:

"All patents are not alike. Most are, in large part, enhancements built upon previous patents....A rare few actually break entirely new ground and form the foundation for inventions that follow."

Moreover, while the Times' editorial cites the new CHI study as proof that government-funded science far outstrips industry- funded science in spurring industrial innovation, here the Times was led astray by ambiguous wording in the CHI study. By examining the research footnoted in recent American patents, CHI found that "many of the cited research papers are supported by governmental and other research support agencies," such as the National Science Foundation, the National Institutes of Health, and the Departments of Defense and Energy.

But when I checked with Dr. Francis Narin, principal author of the new CHI study, he concurred that a key ambiguity here is that modern scientific research often has multiple sources of support, both public and private. Thus CHI's finding that much of the research cited in patents is "government funded" doesn't tell us whether it was funded by government entirely, partially, or only marginally. For example, one can imagine a university research project in microbiology that is funded 60 percent by pharmaceutical companies, 40 percent by the National Science Foundation, and that receives further industrial subsidy in virtue of being conducted in an industry-funded university lab building. Until this ambiguity concerning multiple funding sources is resolved, one can't really draw any definitive conclusions about the relative commercial influence of government versus private science.

DOES PRIVATE INNOVATION SERVE THE PUBLIC GOOD?

But assume for the sake of argument that government funded science does markedly accelerate commercial innovation. Is the obvious conclusion that we should increase public funding of science _as it is presently organised?

Only if you believe that commercial innovation is tightly correlated with the overall public good. Of course, we all know that commercial innovation delivers many useful products--non- stick skillets, E-mail, contact lenses, pacemakers, and antidepressant drugs, to name a few. But it also contributes to plenty of social results we don't want (cardboard-flavoured tomatoes, toxic wastes, global climate change, unneeded military weapons systems, job insecurity, and everyday stress and speed- up), while failing to deliver other results we do want (a just and environmentally sustainable economy, vibrant communities, healthy families, adequate leisure time, humane medical care, deep insight into social problems, etc.).

How could we get more of the knowledge, innovation, and social results we want, and less of what we don't want? Rather than showering more money on science as it is presently organised, we might start allowing Americans from all walks of life a say in decisions that profoundly affect them.

After all, today key decisions about science and innovation are determined by just three social groups: business, the military, and elite academic scientists. All the rest of us can, of course, vote our preferences in the market, and that is precisely why a decent portion of commercial innovation winds up scratching where we itch.

But as a mediator between social need and the production of new knowledge and commercial products, the market is highly imperfect. As consumers in the marketplace we can't vote for products that are never made available; we can't vote on military, infrastructural, workplace, or business-to-business technology decisions; we can't vote on social science research priorities; we can't vote influentially if we're poor; and we can't affect the unintended social results that our individual purchases combine to produce.[3] Thus to recouple science to the public good, we need to reorganise our research-and-innovation

system so that it becomes more responsive to democratically decided social and environmental concerns.

DEMOCRATIZING SCIENCE & INNOVATION

Sound absurd that citizens who can't even program their VCRs could ever contribute constructively to complex scientific and industrial issues? There are proven institutional innovations through which everyday citizens can do just that.

Just last spring a demographically balanced and diverse group of non-expert citizens assembled near Boston to cross- examine experts in information technology, deliberate among themselves, and then announce their own cogent policy recommendations at a national press conference on "Telecommunications and the Future of Democracy." The National Science Foundation, which sponsored the CHI Research study, also supported this first, pilot U.S. emulation of a time-tested European participatory institution. (In Denmark, for example, such citizens' panels have influenced the Parliament to place strict controls on the use of genetic information in insurance and employment decisions, while influencing industry to redirect its animal biotechnology research away from socially controversial areas.)[4]

There's plenty of evidence to suggest that a democratised science agenda would lead to different (I would argue more sensible) research priorities. For instance, while Congress and the Administration last year awarded $12.7 billion to the National Institutes of Health (NIH), less than one-thousandth of that amount trickled down to NIH's diminutive Office of Alternative Medicine. Yet a 1993 study published in the New England Journal of Medicine found that Americans--evidently fed up with uncaring mainstream medical bureaucracies--now make more visits to practitioners of alternative medicine (such as acupuncturists, chiropractors, homeopathists, and teachers of relaxation techniques) than to primary care physicians. "Expenditures associated with use of unconventional therapy in 1990 amounted to approximately $13.7 billion, three quarters of which ($10.3 billion) was paid out of pocket [i.e., not reimbursed by insurers]." Nor should one imagine that the clients of alternative medicine are ignorant dupes; in fact they are disproportionately affluent and well-educated.[5]

On the basis of this and related evidence, it's not hard to guess that if the American public had any say in the matter (which currently they

don't), we'd see less research directed toward chemical- and machine-intensive medical interventions, job-displacing factory and office systems, military weaponry, user-discomfiting computer upgrades, and hypertension-inducing/ civil-society-eroding information overload. Conversely, I'm willing to bet there'd be more research on alternative and preventive medicine, women's health concerns, organic and community-supported agriculture, public transit, job-preserving/ quality-of-work-enhancing workplace innovations, and local economic self-reliance. We might also see more inquiry concerned with redressing the gross imbalance between civic efforts to enhance community life versus the relentless corporate drive to expand personal consumption.

As Carolyn Raffensperger, executive director of the non-profit Science & Environmental Health Network, puts it:
"Increasingly corporations decide the budget for research and development. The United States promotes a corporate science agenda rather than a 'people's science agenda.' By setting the agenda, they steer available money away from public health, sustainable agriculture and environmental protection and into product development."

Another way to couple research to societal need would be to support the effort of the Loka Institute and its non-profit partners to establish a transnational Community Research Network through which universities and other non-profit organisations would conduct more research collaboratively with grassroots, public-interest, and worker organisations. This would provide a healthy counterbalance to universities' deepening ties to industry, while offering participating students salutary education for citizenship and civic responsibility.[6]

As Daniel Sarewitz writes in the latest Issues in Science & Technology:

"Numerous European nations are experimenting with ways to more fully involve the public in the science and technology policy process....Nascent efforts along these lines in the United States, such as those recently launched by the non-profit Loka Institute, deserve the strong support and co-operation of U.S. scientists."[7]

Annual U.S. expenditure on research and development is currently $180 billion. (Two-thirds of this is paid for by the private sector, the remaining one-third by the federal government). Given the magnitude of that expenditure, a straightforward way to pay for vitally needed initiatives to involve citizens, workers and communities in science and

technology decisions would be to place a one percent levy on all R&D expenditure. (There is precedent in the budget of the federally funded Human Genome Project, five percent of which is earmarked for studies of the social implications of genome research.)
So what will it be? A new Science-For-Everyone or the emerging, more narrowly focused Science, Inc.? If the latter, the clearest implication of new evidence that government funded science is vital to commercial innovation would be to tax--and thus return to the public coffers--a heftier fraction of the private profits resulting from this munificent public subsidy. But far better than acceding to an industrially dominated Science, Inc. would be to recreate science as a democratic force serving the broader public good. Only then should we start heeding scientific leaders' clamour for increased government funding.

AFTERWORD: MEDIA COVERAGE OF SCIENCE

The New York Times' flawed coverage of the CHI Research study highlights another necessary step for democratising research and innovation: systematic introduction of diverse critical perspectives into science and technology reporting.

The Times and other "serious" news outlets don't cover new movie releases, restaurant openings, or even proposed corporate mergers by simply accepting at face value whatever is written in the unsolicited press releases they receive. E.g., media executives hire reporters to investigate and critics to interpret. Why isn't there a corresponding tradition of serious science and technology criticism?

In the case at hand, the Times' editors failed to catch a key ambiguity in the CHI research study and thereby leapt to unwarranted policy recommendations. Times' reporter Bill Broad's original story about the CHI study is carefully written and even took the added step of soliciting "expert reaction" to the CHI findings. Yet the experts chosen were a business professor, an industrial economist, and an industrial spokesman--not a group calculated to ask deeply probing questions about the validity and social significance of the CHI study.

A moral of this fable is that it is incumbent upon those of us concerned with the social significance of science and technology to press news media to introduce diverse critical viewpoints. One healthy start would be for news outlets such as the New York Times to

augment their routine science coverage with a science-and-technology op-ed section open to critical social perspectives.

[1]. The CHI Research study is: Francis Narin, Kimberly S. Hamilton, and Dominic Olivastro, "The Increasing Linkage Between U.S. Technology and Public Science," 17 March 1997. The study is forthcoming in -Research Policy-, and available in the interim from Chi Research Inc., 10 White Horse Pike, Haddon Heights, NJ 08035, USA; Tel. +609-546-0600; Fax +609-546-9633; E-Mail <73302.1036@compuserve.com>. The Times editorial appeared as "The Leverage of Federal Research, _New York Times_, 15 May 1997, p. A36. The quotes from Apple and Larson appear in William J. Broad, "Study Finds Public Science Is Pillar of Industry," _New York Times_, 13 May 1997, pp. C1 and C10.

[2]. Richard Dunford, "Is the Development of Technology Helped or Hindered by Patent Law--Can Antitrust Laws Provide the Solution?," _University of New South Wales Law Journal_, Vol. 9 (1986), pp. 117-135; Thomas Parke Hughes, _American Genesis: A Century of Invention and Technological Enthusiasm, 1870-1970_ (New York: Viking, 1989), pp. 54, 139-180). A further problematic feature of the new CHI study is that it's aggregate statistics on the commercial influence of "basic" science are skewed by the biological and biomedical sciences, in which--over the past two decades--any meaningful distinction between basic versus applied research has effectively vanished.

[3]. On the "unintended social results that our individual purchases combine to produce," see Richard E. Sclove, _Democracy and Technology_ (New York: Guilford Press, 1995), pp. 164-168.

[4]. For more information on the Boston Citizens' Panel, which was spearheaded by the Loka Institute and organised with the help of half a dozen other institutional partners, go to <http://www.amherst.edu/~loka/panel/panel.htm> on the World Wide Web or send an E-mail request to <Loka@amherst.edu>.

[5]. David M. Eisenberg et al., "Unconventional Medicine in the United States," _New England Journal of Medicine_, Vol. 328 (Jan. 28, 1993), pp. 246-252.

[6]. On the Community Research Network, go to <http://www.amherst.edu/~loka/ncrn/ncrn.htm> on the World Wide

Web. An up-to-date article on the Community Research Network is: Richard Sclove, "Research by the People," in _A World that Works: Building Blocks for a Just and Sustainable Society_, ed. Trent Schroyer (New York: Bootstrap Press, 1997), pp. 278-290; a lightly modified version of this article is also forthcoming in _Futures_, August 1997.

[7]. Daniel Sarewitz, "Social Change and Science Policy," _Issues in Science and Technology_, Vol. 13, No. 4 (Summer 1997), p. 32.

ABOUT THE LOKA INSTITUTE

The Loka Institute is a non-profit organisation dedicated to making science and technology responsive to democratically decided social and environmental concerns. TO FIND OUT MORE ABOUT THE LOKA INSTITUTE, to participate in our on-line discussion groups or to help, please visit our Web page <http://www.amherst.edu/~loka> or contact us via E-mail at <Loka@amherst.edu>.

PROJECT UPDATES:

COMMUNITY RESEARCH NETWORK: We have recently published a report on our July 1996 national planning conference for the Community Research Network (CRN), and have in press a new introductory collection of readings about community-based research. We are also at work creating a World Wide Web- accessible directory of community research programs world-wide, as well as a set of comparative case studies of community research centres in the United States. (For information on these resources, email us at Loka@amherst.edu). Finally, we have initiated a strategic planning exercise to chart the next steps in establishing the Community Research Network. Included will be new institutional partnerships for expanding public accessibility to the CRN and creating several new community research centres, as well as a follow-on to last summer's inaugural CRN planning conference.

PILOT CITIZENS' PANELS: Following our successful April 1997 Pilot Citizens' Panel on "Telecommunications & the Future of Democracy," Loka Director Dick Sclove was invited to Washington, DC, to brief government officials, including representatives of the White House Office of Science & Technology Policy, the Council on Environmental Quality, and the Commerce Department. We are currently assembling

institutional partners to plan and organise several follow on citizens' panels at the national level.

TO PARTICIPATE MORE ACTIVELY in promoting a democratic politics of science and technology, please join the Federation of Activists on Science & Technology Network (FASTnet). Just send an e-mail message to <majordomo@igc.apc.org> with a blank subject line and "subscribe FASTnet" as the message text.

You will receive an automated reply giving more details. FASTnet is now a moderated discussion list, which protects subscribers from receiving posts inappropriate to the list's purpose.
This article and details of the Loka Institute have been extracted from "one in an occasional series of electronic postings on democratic politics of science and technology, issued by the Loka Institute. If you would like to be added to, or removed from, the Loka Institute's E-mail list, please send a message to: <Loka@amherst.edu>. "

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