

# Democratizing Science

## Science shops are tackling research for and with communities

By JANET RALOFF

In the early 1970s, the Center for Urban Affairs at Northwestern University was contacted by the Christian Action Ministry. This coalition of 13 Chicago churches, which ran medical clinics in its low-income neighborhood, wanted to prevent disease and injuries. Instead, it seemed stuck doing little more than dispensing treatment.

So, the university center recruited Scott Bernstein and 19 other students on its Evanston, Ill., campus to scout for root causes of the neighborhood's medical problems. They began by sifting through a year's worth of medical records—some 22,000 files—from the west-side community's two hospitals.

The students eventually identified the top 10 reasons for hospital visits, a list that allowed the community to focus on projects that held the prospect of quick payoffs for relatively small investments.

Such as the number-two health problem: traffic accidents.

The ministry's neighborhood, home to 80,000 people, averaged almost 55,000 traffic accidents per year. The Northwestern students pored over police records to identify the hot spots and then monitored those intersections.

"We witnessed a system out of control," Bernstein says. "Nobody was keeping up the stop signs, traffic lights were mistimed or not working, curbs were crumbling, and potholes were everywhere." Armed with site-specific data, community leaders met with the city's traffic-safety commission not only to address specific problems but also to change how the city channels traffic through the neighborhood. Local traffic-accident rates fell.

More importantly, Bernstein argues, the community learned it could take charge of local problems.

A quarter-century later, Bernstein has become famous in Chicago for attacking many of the same types of problems on a metropolitan scale through his Center for Neighborhood Technology. He's still mapping problems and analyzing their underlying causes—though now with a

paid staff of 20 and an annual budget of about \$2 million. Working with government and industry power brokers, the center is also helping devise low-cost incentives for reinvestments in inner cities beyond Chicago.

It's but one of dozens of small centers that have sprung up around the country



*Though Dutch science shops usually conduct literature searches, field research—such as the analysis of soil samples like those being collected here—sometimes becomes necessary.*

using community-based research to address local problems. The Netherlands, home to several dozen such research centers, is widely credited with pioneering this type of institution and its generic moniker: the science shop. Its model has spawned centers in France, Northern Ireland, and Austria, but most of the centers in the United States developed independently.

Until recently, most of these groups have toiled in relative obscurity, notes Richard E. Sclove, president of the Loka Institute in Amherst, Mass. His organization hopes to change that by knitting them all into a worldwide network and

"increasing their public profile so that people who could benefit from them can also find them."

The first Dutch science shop opened in 1974 at the University of Utrecht. Others quickly followed, evolving into politically popular centers through which federally funded institutions of higher learning could fulfill a social-service mission.

Collectively, the Dutch centers now perform about 2,000 research projects annually for community groups, unions, schools, and individuals. Some have developed into the equivalent of consulting companies, undertaking contract work, even for industrial customers. While public projects are conducted free of charge, commercial commissions must be financed by the client.

The larger shops, often staffed by 4 to 10 people, serve as centralized doorways to a university's research community. They work with neighborhood groups to hone public inquiries into something students can address, then find faculty members who will supervise the student investigators. The more numerous smaller shops tend to be thematically focused and more likely to oversee directly any research project that they accept.

The University of Groningen has nine such decentralized science shops. In even its biggest, the Chemistry Shop, a typical project lasts only about 4 weeks and usually amounts to little more than an intensive state-of-the-art literature search, explains its director, Henk A.J. Mulder. Yet, these projects can prove practical and substantive, he says.

Among the "green chemistry" projects undertaken by Dutch chemistry shops are research that identified vegetable oil-based substitutes for harmful organic solvents and a literature search that uncovered methods to produce polycarbonate window plastics without chlorinated chemicals.

Danish universities have embraced many aspects of the Dutch model for their federally funded science shops—such as relying on students to perform research. At the Technical University of Denmark, outside Copenhagen, research needs are publicized in an annual catalog mailed to all students and faculty members, notes Michael S. Jorgensen, who runs the university's science shop. Though student participation is voluntary, he says, perhaps 25 of about 35 projects described in the catalog are completed each year. In addition to receiving university credit for their work, "students receive real-life experience in problem solving," he observes.

U.S. science shops, in contrast, have developed individually, usually at arm's length from any university—and without any explicit government



Quigley/Nuc. Risk Mgmt. for Native Communities Proj.

*This remote Nevada tribe recruited a Massachusetts science shop to help investigate whether local cancers might stem from early atomic-bomb testing.*

encouragement. Moreover, notes Sclove, until 3 years ago, most were "virtually clueless to each other's existence."

It was at about that time that he described the Dutch centers in an article in the March 31, 1995 *Chronicle of Higher Education* and challenged educators to create a U.S. community of science shops. He then received letters from several dozen people who noted that they were affiliated with something that might be considered a science shop. In pursuing each lead, he created the first catalog of U.S. community-based research centers, some 50 institutions.

Last July, Loka published a report contrasting these centers with their Dutch counterparts. Most of the U.S. science shops are young and affiliated only loosely with a university, but they have little else in common. Some are made up of scientists who respond to research requests from the local community; others have scientists who collaborate with communities around the country to conduct research; and a few are populated exclusively by people who have been drawn into research within their own communities.

The Alaska Boreal Forest Council in Fairbanks is an example of the last of these. It began 5 years ago as an ad hoc group of families living in the Tanana River Watershed, an area about the size of Pennsylvania. As the state and federal governments negotiated deals that would allow commercial timber companies to log the area, residents raised questions about whether the programs would employ methods to sustain the forests.

"We aren't against logging," explains Jan Dawe, the council's executive director. "We just want to get more jobs per board foot cut" and ensure that the logging is done in a way that won't unleash another "boom-and-bust cycle" that plunders the environment.

So, over the past few years, this group of some 120 families has recruited volunteers to interview experts. Their goal has been to understand the big picture, learn

what questions to ask the logging companies and leasing agents, and know how to evaluate any answers they give. Though the council "initially focused on identifying information gaps," Dawe says, "more recently, we've been trying to help fill those gaps" by doing surveys and ecological field research.

**T**he Childhood Cancer Research Institute (CCRI) that Dianne Quigley runs also has a very narrow focus: empowering communities near U.S. mili-

tary facilities, especially Native American tribes downwind of the Nevada Test Site, to investigate risks they might have incurred from exposure to radiation.

Though affiliated with Clark University in Worcester, Mass., Quigley's 10-year-old science shop—with a staff of three half-time employees—performs most of its work at distant sites, such as Ely, Nev.

When area tribes noticed what seemed to be an unusually high incidence of cancers and thyroid disease, they contacted the shop to help them probe a possible link to fallout from decades of above-ground, nuclear-weapons tests. Using federal grants, CCRI set up the Citizen Advisory Committee in Ely, staffed by Native Americans.

The committee has begun training some members of the local Shoshone and Paiute tribes to teach others about radiation—such as explaining that boiling did not detoxify foods that were contaminated by fallout in the 1940s and 1950s, as was widely believed. The committee is also interviewing tribal members about former cultural practices that might have resulted in an exposure to fallout. CCRI and the committee are also planning to investigate jointly whether perceived excesses of disease reflect actual excesses.

Which they may not—as residents of one community learned with the help of the JSI Center for Environmental Health Studies. This 9-year-old Boston science shop was created by epidemiologists



It may be small. But the Bose® Acoustic Wave® music system is definitely an overachiever. The unit features a compact disc player, an AM/FM radio, a handy remote control, and our patented acoustic waveguide speaker technology. And it produces a rich, natural sound quality comparable to audio systems costing thousands of dollars. We know that's hard to believe. So we're ready to prove it. Call or write now for our complimentary guide to this award-winning system. Because, like the system itself, it's available directly from Bose.

Call today. 1-800-897-BOSE, ext. G3724.  
For information on all our products: [www.bose.com/g3724](http://www.bose.com/g3724)

Mr./Mrs./Ms. \_\_\_\_\_  
Name (Please Print) \_\_\_\_\_ Daytime Telephone \_\_\_\_\_  
Address \_\_\_\_\_ Evening Telephone \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Or mail to: Bose Corporation, Dept. CDD-G3724, The Mountain, Framingham, MA 01701-9168.

**For FREE shipping,  
order by  
December 31, 1998.**

**BOSE®**  
Better sound through research®



who met while serving as expert witnesses for plaintiffs in litigation alleging that polluted water in Woburn, Mass., triggered a cluster of leukemia deaths. The case has been described in the book *A Civil Action* (1995, Jonathan Harr, Vintage Books) and will be the subject of an upcoming movie.

When residents of another Massachusetts town became alarmed that "they were going to too many funerals" and that most of the deceased had lived downstream of a landfill where industrial wastes had been buried, neighborhood volunteers began systematically plowing through their town's death records. After jotting down addresses for all town residents who had succumbed to cancer since 1969, "they came to me to find out how they could analyze the data to see if cancer rates around the landfill were higher than the town's average," recalls Richard W. Clapp, who heads the science shop's staff of six.

Meeting with community residents, who called themselves the "Death Squad," Clapp encountered a retired engineer who offered to enter the data into a spreadsheet program on his home computer. Clapp helped him figure out how to compute the odds of dying from leukemia relative to where a person had lived.

"And that answered their question," Clapp says. "It turned out that there was no excess of leukemia deaths around the town landfill."

**B**ecause the Death Squad volunteered so much of its labor, the science shop's financial burden was relatively small. Many projects, however, prove quite costly. Without grants or benefactors to cover them, such projects are usually rejected by science shops.

Though many European science shops get at least minimal federal funding, often channeled through a host university, their U.S. counterparts are largely independent of the federal research and development enterprise.

Research needs of communities "tend to be very problem oriented," observes Loka board member Daryl Chubin of the National Science Foundation (NSF) in Arlington, Va. Moreover, he points out that while community concerns tend to be small and multidisciplinary, federal research agencies prefer to focus on "big problems that come neatly packaged by discipline."

Sclove sees another reason for science shops' low visibility to funders. "Only the producers of science and technology get representation in R&D policy decisions," he says. "It is a bizarre aberration of the democratic process." Putting more money into community-based research could help redress the inequity, Sclove believes.

In fact, "we have been dithering around trying to figure out what the post-Cold War [federal] research agenda should be,"

observes Anne C. Petersen, senior vice president for programs at the W.K. Kellogg Foundation in Battle Creek, Mich. "Many have been arguing that there's a great need to focus on societal issues. I can't think of a better way to do that than to invest in community-based research," she says.

Indeed, she'd like to see for community research the creation of "something analogous to the agricultural extension service."

**C**hubin thinks U.S. universities should also consider making support for science shops an explicit part of their mission. Because every university is part of its local community, he says, "One might ask, how it is serving that community?" At a minimum, he argues, it should consider making its staff available to the public.

An advantage of a strong university tie for science shops is the credibility it can confer, says Gabriele Bammer of the Australian National University in Canberra. It's something she learned the hard way as a founder of Australia's first science

shop—a \$20,000 venture that lasted just 27 months.

"Starting a science shop is not that hard," she maintains, "because there's often seed money available." The challenge is securing its future. The center her team started in Canberra tried to remain independent of a university. In retrospect, she says, "I think if we were tied to the university, we would have looked more respectable to funding agencies." Certainly, she says, "If we were foolish enough to try and start something like this again, we'd look for bigger grants" and higher-profile projects—ones that could be widely publicized upon completion.

These are lessons Bernstein, of Chicago's Center for Neighborhood Technology, learned long ago. He is now working on a three-city project in conjunction with the Federal National Mortgage Association (see sidebar).

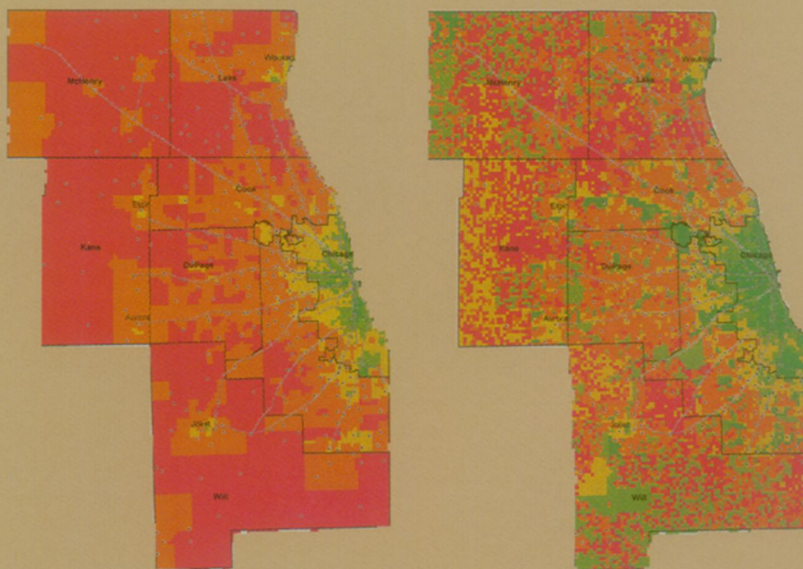
Sclove says networking science shops could be the most important lesson of all. "Once they begin sharing such hard-won experience, they won't have to make the same mistakes." □

## Coming: 'Green' Mortgages

To illustrate the costs of transportation to residents of the Chicago metropolitan area, the Center for Neighborhood Technology sifted through and mapped area-specific data on car ownership and use. By pairing these maps with data on the availability of mass transit, stores, and other amenities, the center can predict how much money a household in any half-square-mile zone will spend on transportation.

A new pilot program, debuting next week, will permit home buyers to get "green" mortgages. Explains Scott Bernstein, the program will allow lenders to key the address of a home into a computer and find out its location's rating. This index recognizes that people living in the greener zones of the maps will need to pay less of their income for transportation—leaving more for housing costs. In fact, Bernstein says, lenders might suggest tradeoffs, such as: "If you were moving just nine blocks closer to this transit stop or activity center, I could lend you an extra \$25,000."

Or, qualifying home buyers can set aside up to \$2,000 of any unused credit to buy a prepaid, 3-year Chicago Transit Authority pass for unlimited bus and rail rides throughout the area, which is a savings of roughly 40 percent. —J.R.



Average number of cars per household (left) and auto costs per household (right). In both cases, red shows the highest numbers and green, the lowest.