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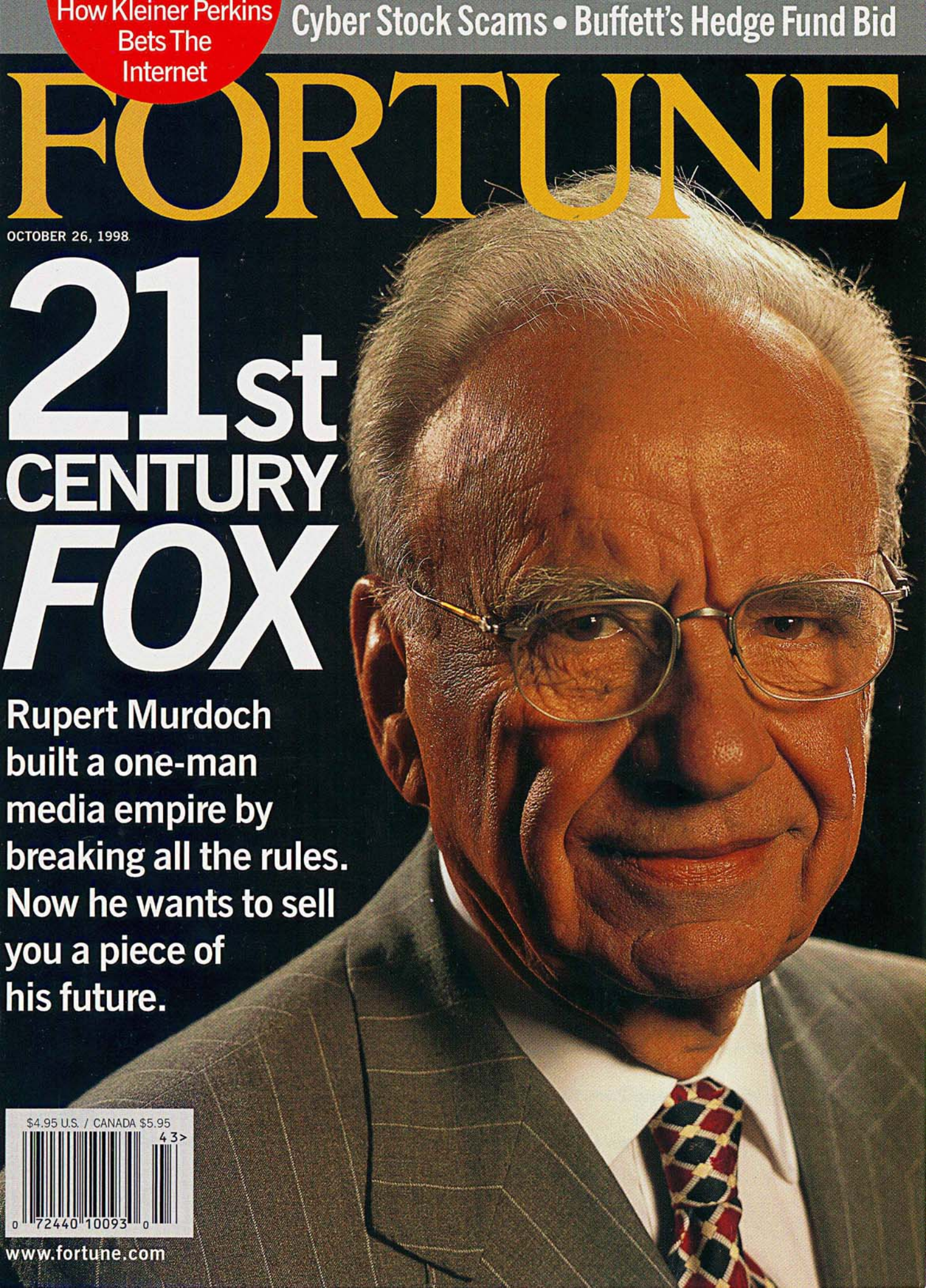

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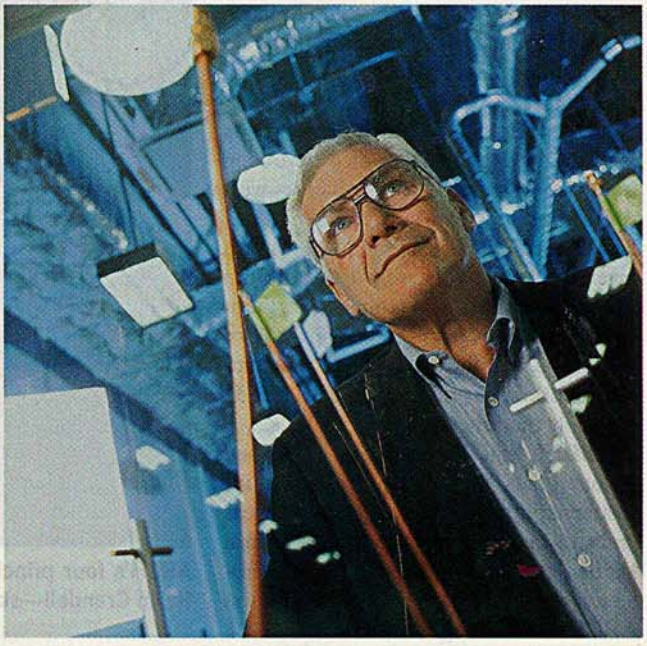
Extreme Venture Capital

ARCH VENTURE PARTNERS UNEARTHS IDEAS FOR STARTUPS WHERE MOST VCS DON'T CARE TO TREAD: THE IVORY TOWER.

BY DAVID STIPP

The Lamont-Doherty Earth Observatory is only 18 miles north of Wall Street, but it runs on an entirely different clock. At the abbey-like research center overlooking the Hudson River, events that unfold in less than a century barely register—Lamont's cloistered scientists ponder things like the movements of continents and the genesis of ice ages.

Yet when the contrarians at ARCH Venture Partners heard about Lamont, they were eager to explore it for seeds of new companies. They soon found one: a scheme to take a navigational device for nuclear submarines and transform it into a divining rod for oil. Bell Geospace, a company ARCH formed in 1994 to pursue the idea, stumbled at first—not surprising, given that it was trying to commercialize an ultrasecret military technology glimpsed in *The Hunt for Red October*, Tom Clancy's 1984 thriller about a defecting Soviet submarine. But now Bell is starting to take off—in September, Texaco awarded it a contract to probe 4,500 square miles in the Gulf of Mexico.



TOM MADAY

ARCH managing director Steven Lazarus at Illinois Superconductor, a spinoff from nearby Argonne National Laboratory

Chalk up another improbable hit for ARCH, a Chicago venture firm that specializes in ferreting out hidden treasure in the nation's ivory towers. Kleiner Perkins and other venture capitalist giants occasionally dip into academia. But "ARCH is the only good example of a firm I know of whose institutional format is incubating companies from academic labs," says Larry Bock, a venture capitalist in San Diego whose firm, CW Group, has worked with ARCH in funding early-stage companies.

"We've found most of our projects by walking the halls at universities," says Steven Lazarus, one of ARCH's four managing directors. The list of schools ARCH explores includes more than a dozen off the venture industry's beaten track—the universities of Michigan, Washington, and Chicago, for instance, and even City College of New York. ARCH also walks halls at federal laboratories, another venue seldom visited by VCs.

THE PLACES ARCH GOES AREN'T "ALL THAT FRUITFUL" FOR US, SAYS ONE VC.

Most venture capitalists regard such places as byzantine backwaters populated by fractious eggheads. "We just haven't found [the places ARCH goes] all that fruitful," acknowledges John Mumford of Crosspoint Venture Partners, a Woodside, Calif., firm known as a leading seed investor. "Entrepreneurial people typically aren't in those institutions, and you need entrepreneurs to start and run companies."

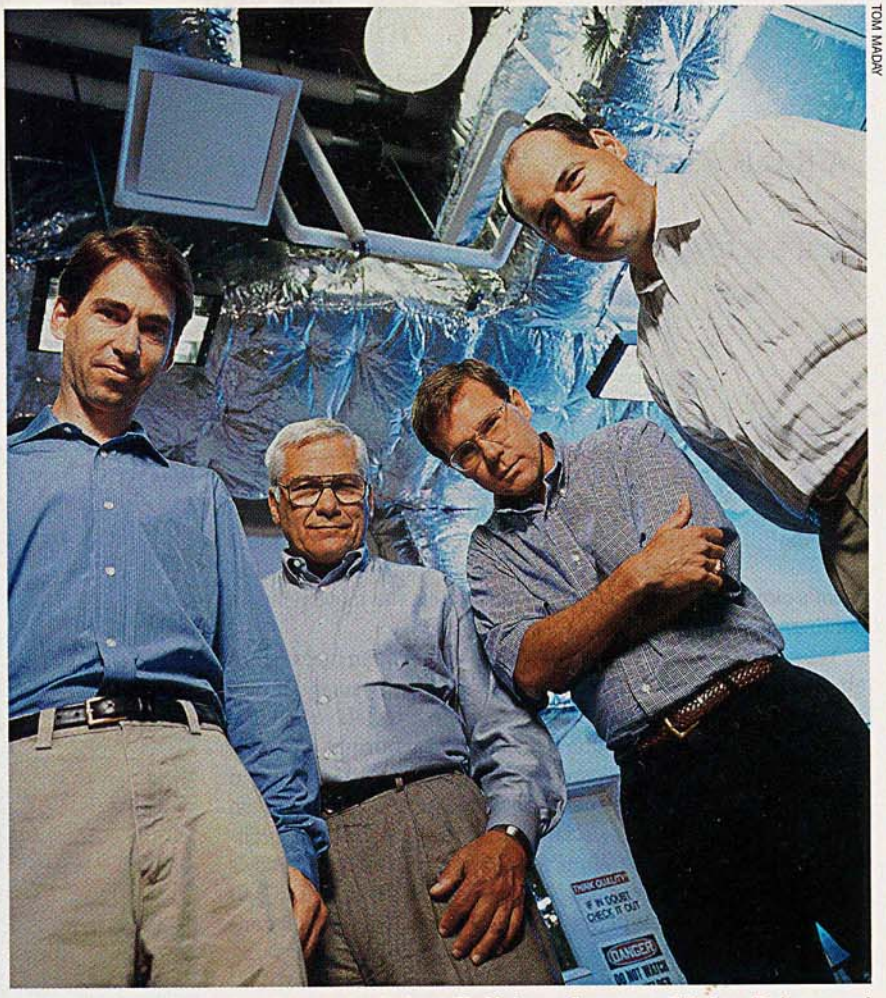
There are two prominent exceptions: Stanford University and the Massachusetts Institute of Technology, which have long traditions of spinning off businesses with venture money. Not surprisingly, about half of the nation's $13 billion of venture investments last year went to California and Massachusetts companies—Northern California firms alone pulled in 28% of the total, according to Venture Economics Information Services, a Newark, N.J., company that tracks the VC business.

ARCH's hinterland hunting has turned up one of its industry's most diverse investment portfolios. "The venture business tends to be narrowly focused," says Josh Lerner, a Harvard Business School professor who wrote a 1993 monograph on ARCH. "For a long time, more than 80% of its disbursements have been in just two fields, information technology and health care. ARCH has been more willing to look outside the box." Its startups include companies involved in electronics repair, oil exploration, lasers, and materials science (for a selection, see table).

ARCH's focus on seed investing also runs counter to an industry trend. Since the mid-1980s, the average size of U.S. venture funds has more than doubled, reaching $76 million last year, thanks to inflows from pension-fund managers and other institutional investors seeking a piece of the next Microsoft before it goes public. As a result, VCs have increasingly invested at later corporate stages than they used to; only about a quarter of venture disbursements last year, or $3.1 billion, went to early-stage companies, says Venture Economics. The reason: It's a lot easier to administer a $100 million fund disbursed as, say, $4 million chunks in established companies ramping up to go public than as $200,000 seed investments. Venture firms typically derive much of their compensation from fees geared to the total capital they manage—so why bother breaking it into teeny bites for corporate newborns?

"The idea of VCs rolling up their shirtsleeves and starting companies out of a garage is really a myth," says Jesse Reyes, Venture Economics' research chief. There are still a lot of venture capitalists who do early-stage investing, but even those "tend to wait until there's actually a product shipping." While the Internet craze has bumped up seed funding over the past few years, he adds, "it's not a bad joke to say that many VCs have become investment bankers in sheep's clothing."

All the more reason to invest where



TOM MADAY

ARCH's four principals—from left, Robert T. Nelsen, Lazarus, Clinton Bybee, and Keith Crandell—started by walking the halls at the University of Chicago.

other VCs ain't, says Lazarus. A surfeit of money is now chasing high-tech wonderkids in Silicon Valley and around Boston. Their best ideas often spark auctionlike bidding among rival VC firms. In the offbeat places ARCH looks, commercially promising ideas are harder to find. But making seed investments in them is cheaper, potentially yielding higher returns.

It remains to be seen whether this logic will play out as Lazarus hopes. Since 1993, ARCH has handily raised two sizable venture funds, mostly from institutions such as State Farm Mutual Automobile Insurance Co. and John Deere Pension Trust, and is now disbursing the $107 million in its second kitty. Most of the payoffs are at least several years away.

Still, ARCH is getting a reputation for prizing valuable nuggets from ivied walls. The University of Washington, for instance, "has proved to be a Comstock Lode," says Lazarus. ARCH's first bet there paid off in just a few months. In 1996 it led seed investing in NetBot, a company that sprang from research at the school on software "agents" to aid online shoppers. Less than a year later, Internet search company Excite bought NetBot for $35 million in stock, giving ARCH a $9.9 million return on a $1.3 million investment.

With its wide purview, ARCH has proved adept at cobbling together startups that buy patent rights from different institutions' labs, none of which may have enough intellectual property to go it alone. For instance, Caliper Technologies, a Palo Alto company that ARCH co-founded in 1995, has rolled together patents from Oak Ridge National Laboratory, the University of Pennsylvania, Harvard, Princeton, and other schools to develop technology for fast, automated chemical analysis with miniature "lab on a chip" devices.

ARCH's main claim to fame may be its ability to deal with university bureaucracy, a rapport traceable to its academic roots. Worried about U.S. competitiveness and frustrated by a dearth of commercial spinoffs from federally funded research, Congress in 1980 passed two bills to promote technology transfer from universities and national labs. But problems persisted—for instance, an ambitious plan for a $100 million tech-transfer fund at the University of California was killed by faculty critics.

MANY VCS HAVE BECOME "INVESTMENT BANKERS IN SHEEP'S CLOTHING."

In 1986 officials at the University of Chicago and Argonne National Laboratory thought they saw a way to break the tech-transfer logjam and commercialize their researchers' work. They set up a nonprofit company called ARCH Development Corp. and chose Lazarus, a former Baxter International executive, to head it. The company had a shoestring budget and two employees—Lazarus and a secretary. To boost his credibility with professors, the university named him an associate dean at its business school and gave him an office there.

Other schools had mounted similar efforts, but most focused on licensing professors' patents to established companies. Lazarus was more ambitious: He wanted to spawn companies based on such patents, since licensed inventions often wither on the shelf at big companies—the not-invented-here syndrome. But he would need a lot of help, especially with the never-ending chore of sorting through the academic haystack to find golden needles worthy of funding.

Imitating fellow academics, Lazarus brought student power to bear. "In the first year, I got 20 MBA students working for me free," he says. "They were sentinels walking the halls looking for seed ideas. They looked and spoke like post-docs, and scientists felt more comfortable talking with them than with gray-haired guys in suits." Most had worked at corporations, he adds, and were aiming "to transmute themselves from worker bees into general managers of their own enterprises." Three of Lazarus' most eager understudies, Keith Crandell, Robert T. Nelsen, and Clinton Bybee, stayed on as ARCH partners after getting their MBAs.

With $9 million cobbled together from investors with ties to the university and from the university's endowment fund, ARCH invested in a dozen startups. The results were mediocre. Says Crandell: "Two years into our first fund, we had eight or nine companies on the verge of running out of money. It was hard to get out of bed in the morning." Five went under or were sold at a loss to ARCH's investors. The fund's cumulative return was 14%—ho-hum by VC standards at the time. Says Lazarus: "We made mistakes we won't make again," mainly misjudging market potential and underestimating the amount of money some startups needed.

Still, ARCH had developed a formula

ARCH startup Bell Geospace helps find oil with this formerly top-secret device.

it felt basically worked. Importantly, it skirted a land mine that blew up similar efforts to bridge business and academia—professors' resistance to enterprises they regard as diverting university research to corporate ends. Part of the trick, says Lazarus, is keeping a high profile: "We disclose what we're doing to the entire faculty." That doesn't prevent academic purists from dismissing ARCH's staffers as meddling minions of Mammon, but it prevents imbroglios about covert conflicts of interest, such as professors' quietly using their university labs to do R&D for a company they have on the side. While its startups engage professors as consultants, ARCH avoids leaning on them too much—it generally seeks business veterans to do most of the work.

ARCH also stresses that it doesn't hinder academic publishing. That's usually not an issue, says Lazarus, thanks to the firm's sentinels—they tend to pick up on important discoveries very early, enabling ARCH to orchestrate patent filings before beans are spilled in scientific journals. With their varied interests, ARCH's scouts also help maintain the unusual diversity of its portfolio, letting the firm spread its risks in a way that more specialized venture funds can't.

Inspired by inquiries from other universities hoping to emulate ARCH, Lazarus and crew in 1993 reformulated the firm's operations to seek deals at far-flung schools and national labs. They raised $30 million, then set out for new places. One was Columbia University, whose vice provost, Michael Crow, had recently been asked to invigorate the school's technology-transfer program. Facing the usual bureaucratic inertia, Crow knew just what to do. He says, "I called the guys at ARCH."

One of its hall walkers, William Doyle, was soon installed at Columbia's business school as an adjunct professor. On Crow's advice, Doyle dropped in at one of the university's little-known satellites, Lamont-Doherty, the earth-science center north of Manhattan. What followed was a classic instance of ARCH's calculated serendipity.

Doyle soon found himself talking with researchers Roger N. Anderson and Robin Bell about the U.S. Navy's classified technology for helping submarines run silent and deep. As Tom Clancy fans know, subs' navigational tasks are complicated by the need to traverse the murky depths with minimal use of sonar—its pings might reveal their positions to the enemy. In the 1970s the Navy launched a top-secret program to tackle the problem with the help of a technology called gravity gradiometry.

The basic idea wasn't new—in fact, it's mentioned as a historical curiosity in geology textbooks, says Bell, who recently wrote about it in *Scientific American*. In the 1890s a Hungarian physicist invented a device that could detect tiny variations in gravity's tug. His gradiometer—essentially a metal beam, with weights at both ends, suspended by a wire—was so sensitive that it could register the gravitational force exerted by a person standing near it.

Geologists after World War I put the invention to work finding massive underground deposits of salt often associated with oil—gradiometers can detect them because salt is less dense than rock and therefore exerts an infinitesimally gentler tug. But using the finicky instruments required removing swaths of trees and other confounding gravity sources all around, and painstakingly protecting the instruments from wind or temperature changes. By the 1930s, the oil industry had switched to less precise but far easier ways to get a window on the subterranean world.

ARCH ENLISTS GRAD STUDENTS TO DIG FOR ACADEMIC IDEAS WORTH FUNDING.

Fast-forward 50 years: After expending more than $200 million on development, engineers at Textron's Bell Aerospace unit achieved their goal: a compact, computerized gradiometer that could be used in ships or even aircraft. Technically known as a full-tensor gradiometer, it measures how gravity varies in three dimensions, revealing much more about objects of scrutiny than did earlier gradiometers. Despite showing the way for the Soviet sub in Clancy's novel, though, the technology was never deployed in nonfiction subs—the U.S. version was still only in test mode at the end of the Cold War. "The Navy was using it to build navigational maps of the sea floor," says Anderson, "but they kept seeing things they didn't understand. We were consulting with them, and they would say things like, 'This crazy gravity machine says there's a mountain, and the sonar shows there's nothing there.' "

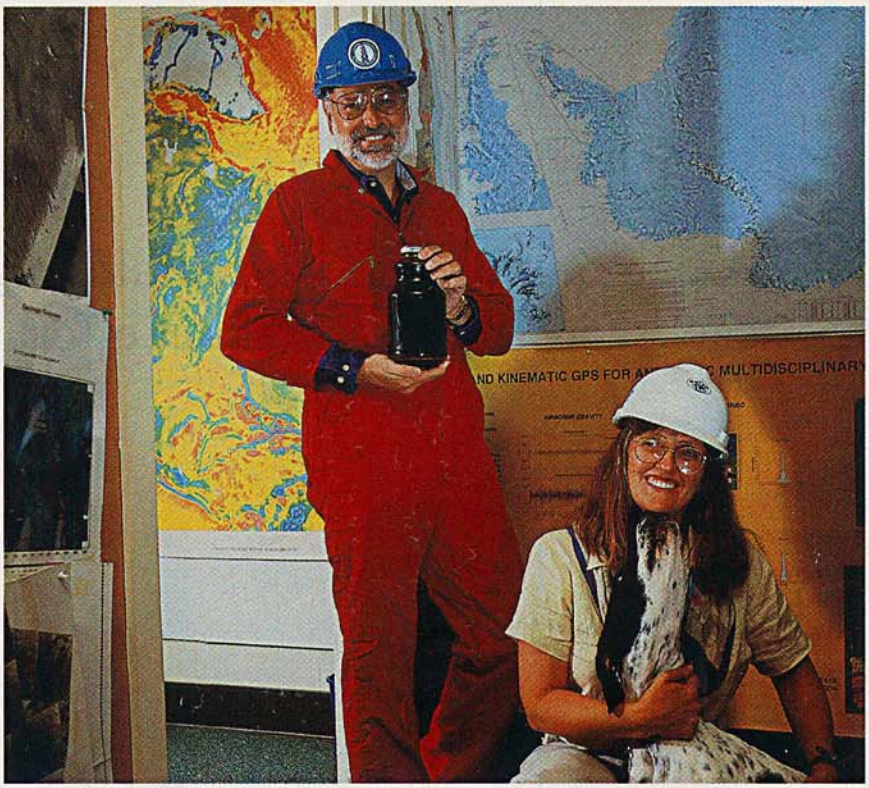
That was actually good news to the Lamont researchers; it suggested the device was registering masses under the sea floor—just what geologists want to do. Shortly before the man from ARCH showed up, the scientists at Lamont had

SELECTED STARTUPS FUNDED BY ARCH

COMPANY Location	FOUNDED	TECHNOLOGY	SOURCE OF PATENTS	ARCH INVESTMENT in thousands
Nanophase Technologies Burr Ridge, Ill.	1989	Ultra-fine ceramic materials for cosmetics and electronics	Argonne Natl. Laboratory, Northwestern University	$1,500
Optobionics Wheaton, Ill.	1990	Artificial vision for the blind	Founding scientists	$306
R2 Technology Los Altos, Calif.	1993	Computer-aided diagnosis based on mammography analysis	University of Chicago, Sandia National Laboratory	$1,000
IDUN Pharmaceuticals La Jolla, Calif.	1993	Anticancer and other drugs	University of Chicago, MIT, Washington University	$500
Caliper Technologies Palo Alto	1995	Lab on a chip for miniaturized biochemical analysis	Oak Ridge Natl. Laboratory, Harvard, U. of Pennsylvania, and other schools	$876
Appliant Seattle	1997	Computer programs for troubleshooting corporate software	University of Washington	$2,100
Disposition Services Group San Diego	1997	Service for repairing and reselling consumer electronics	Founders	$1,300

learned something else. "For a long time I'd wanted to use the technology for research, but the guys at Bell Aerospace always shoved me away," says Bell, who had tried a relatively primitive gradiometer to study Antarctic geology. "Then one day, one of them asked if I knew of any applications." Hint, hint: With defense funding on the wane, funding for the gradiometer had been cut, and the Textron unit was desperately trying to emerge from the dark side. With ARCH's help, the scientists showed a way: Their new company, Bell Geospace, would license the machine for use in the oil patch.

There was a hitch: The technology was still classified. "Looking at that, 99 out of 100 VCs would have taken a pass" on investing in it, says Crow, the Columbia vice provost. Plowing ahead, ARCH added a potent player: John Brett, a retired Singer Co. executive and former



ANDREW GARN

ARCH formed Bell Geospace with scientists Roger N. Anderson and Robin Bell.