

Recession blurs outlook for corporate research

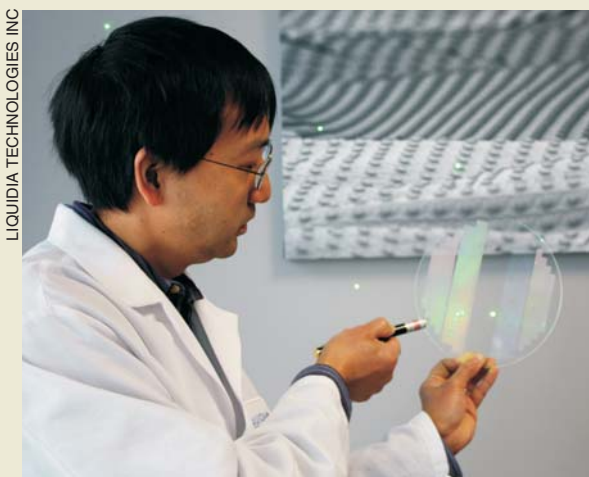
Companies are reducing costs by canceling high-risk R&D projects or moving them to alliances with academia, federal laboratories, and other companies.

Plummeting sales and a frozen credit market are forcing some high-tech companies to abandon long-term R&D projects and cease hiring in an effort to preserve their bottom line. Still, several prominent industry bosses threw their weight behind provisions for a significant infusion into federal science-funding agencies from President Obama's massive economic stimulus plan. The \$800 billion American Recovery and Reinvestment Act provides a \$21 billion boost to federal R&D, with lofty intentions not seen since the national effort nearly half a century ago to land humans on the Moon.

Industry support of ARRA derives from fears about the future competitiveness of the US and hopes of reaping some benefit: Many companies are moving their high-risk R&D focus to alliances with universities and federal laboratories, which are eligible for ARRA funds. But the trickle of federal dollars over to the industry sector may be too little too late for some companies. "We're not going to see that money anytime soon," says David Hughes, president of Chameleon Scientific, a medical devices startup in Minnesota. Nor will other companies, who, like Hughes's, have had to freeze hiring or cut or furlough their existing staff to stay afloat. The financial crisis is so severe, says Hughes, "a lot of companies with really exciting technologies may not survive."

Fighting for survival

More than 75% of the 494 global technology companies recently surveyed by consulting firm McKinsey and Co plan to either maintain or reduce their R&D spending. Even grimmer, only 6% of the 494 said they plan to do any hiring this year. A mix of hiring freezes, wage and benefit reductions, and outright layoffs



Discrete nanopatterns

that may improve the efficiency of solid-state lighting, photovoltaic devices, and drug delivery particles are illuminated by physicist Doug Mar at North Carolina-based startup Liquidia Technologies Inc, which continues to invest in R&D despite the economic downturn.

was reported by most of the industry-employed PHYSICS TODAY website visitors who responded to an e-mail survey in March (see the results at <http://blogs.physicstoday.org/politics>). "You don't appreciate the nature of a boom-bust tool industry until you work in one," wrote one physicist who had left a federal research lab to work for a now struggling company that manufactures semiconductor equipment. (See the story on page 24 for a discussion of the effect of the economy on universities.)

Happier but still mixed news came from physicists in the aerospace industry, which often lands large, long-term contracts from commercial and government clients and is not much affected by volatility in the financial market. Still, thousands of jobs will be lost at Lockheed Martin Corp if Congress approves the Pentagon's plans to cancel a multibillion-dollar contract with the company to build more \$150 million F-22 fighter jets. At the same time, the expansion of the F-35 fighter jet program and a rumored new \$10 billion

spy satellite program are expected to create new jobs at Lockheed Martin and other defense companies. Also, hiring for specific projects has ramped up in Lockheed Martin's space systems development laboratories, says company physicist Thomas Karras, who directs advanced photonics technology projects.

Outsourcing innovation

"Good ideas are still getting funded," says Joseph DeSimone, founder of Liquidia Technologies Inc, a North Carolina nanotechnology startup. "The credit crisis will flush out the not-so-good ideas from the good ones." The company, which is developing a nanoimprinting technology for energy and medical materials applications, has actually increased its scientific staff since the recession began. DeSimone has founded two other startups and is a research professor in chemistry and chemical engineering at the University of North Carolina and North Carolina State University. Academia and small companies will provide the impetus for innova-

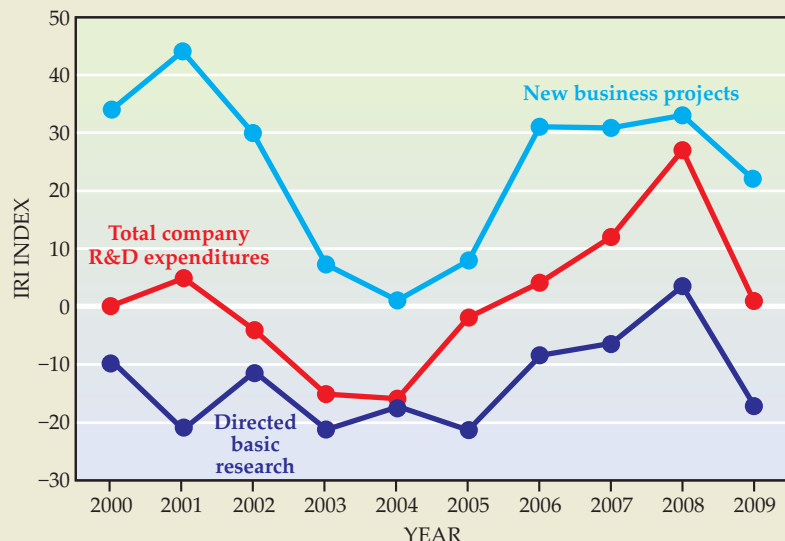
effect—it creates a holding pattern of postdocs." That, in turn, will increase the competition down the road, which could either make the job hunt harder for people who have remained longer in postdoc positions or hurt new PhDs as they compete against more experienced postdocs.

"It's obvious there will be fewer jobs. This makes me worried about our field," says Millis. "The rising generation will have a harder time finding a place than did the previous generation of scientists, and there is no systematic

plan for dealing with that." Adds Lars Bildsten, of the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara, "We are going to have a tragedy unfold if the community doesn't get together and do something. We've trained this cadre, and if there is a five-year hiatus, what happens to these people? In the long run we need them. People are talking about bridging positions"—where outside funding covers the first several years of a person's salary and the host university picks up later. "It's in the air, lots of peo-

ple are talking, but nobody is taking the reins on this." In canceling searches, he adds, "I think some institutions have overreacted. The smart institutions will see this is an opportunity. That requires a bit of boldness." Adds Shull, "No one can see around the corner, but so much of this is psychological."

The bright spot, of course, is the stimulus package, or the American Recovery and Reinvestment Act (ARRA), which was enacted in March. "The great hope is that the federal government will fund some university infra-



Total company R&D expenditures and directed basic research will fall sharply in 2009, according to the Industrial Research Institute index, which is defined as the difference between the number of companies forecasting significant R&D budget increases and those anticipating zero or negative growth. Less affected are new business projects; many companies say they will engage in joint ventures with academia, government labs, or other companies to save money. The index was derived from a survey of 84 IRI member companies. (Adapted from R. Cosner, *Res.-Technol. Manage.* 52(1), 19, 2009.)

tion, he says, "because large companies can't do R&D in this climate."

Collaborations among universities, federal labs, and companies are expected to increase significantly in the US in 2009, according to a recent survey of executives and R&D managers at 84 member companies of the Industrial Research Institute, which serves US industry. Many of the companies said they would expand their participation in R&D alliances. Companies with revenues greater than \$50 billion were much more likely to say they will outsource R&D projects to other companies. But those same companies were much less likely than companies with revenues under \$1 billion to say they will par-

ticipate in precompetitive university research or obtain contracts with federal laboratories.

Physicist Michael Current, recently retired after 30 years in the semiconductor industry, says he worries that the decline of competition brought about by corporate mergers and outsourcing will slow the pace of innovation. US policy that limits visas for foreign scientists and a "brain power shortage" in the US will worsen the plight of corporate research, he adds. And at least for the semiconductor industry, just outsourcing R&D to universities won't solve the problem, Current says, because "universities just can't innovate on industry's time scale." **Jermey N. A. Matthews**

structure. That would help a lot because it would bypass [budget] issues with the states," says UCLA's Peccei. "We are expecting highly competitive fields like physics and chemistry to bring in some money. And I think there will be significant money for things like renewable energy." NSF has announced that the bulk of its ARRA research money will go to grant applications that are already in-house, including some that were rejected since last fall. Says Shull, "It's wait and watch to see how fast these new grants can be translated into hires

for grad students and postdocs."

Despite the pervasive pinch, the mood in academe is of cautious optimism, says Caltech astronomer George Djorgovski. "I'd emphasize caution. There is an expectation that things could get worse—certainly no one knows the extent of things yet. But the good news is that the new administration is clearly pro-science. The prospects for the future are fine. But in the short term academia is suffering as much as anyone else."

Toni Feder

HIGH PERFORMANCE TABLETOP SPUTTERING AT AN INCREDIBLE PRICE

The Desktop Pro provides high performance sputtering in a compact and economical configuration requiring less than 36" of tabletop space.

Desktop Pro Features:

- Ability to sputter dielectric and metal films with up to (2) 2.0" magnetrons
- Available RF, DC, or RF + DC power supply.
- Optional magnetic gun to support sputtering of ferromagnetic materials
- Standard 65 lps compound turbomolecular pump
- Optional liquid nitrogen trap
- Color touchpad interface
- Manual operation and one button auto processes



DENTON VACUUM, LLC
Quality • Support • Value

Call us at: 800-666-6004
or Visit us at:
www.dentonvacuum.com