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From Vision To Product: IBM Research Closes Gap

By Norm Alster
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Stu Feldman has a degree from the Massachusetts Institute of Technology in the theory of spiral galaxies. There is little product development these days based on spiral galaxy theory. So Feldman, who works for IBM Research, is developing Internet technologies.

Like many other International Business Machines Corp. scientists trained in arcane theoretical disciplines, Feldman is now applying his talents to areas with more immediate revenue prospects.

This is a shift in agenda for IBM's famed research organization, founded more than 50 years ago on the campus of Columbia University. Over the years, IBM Research has made major contributions to technology industries in such areas as magnetic storage, relational databases, and reduced instruction set computing.

In '86 and '87, IBM scientists in Zurich, Switzerland, captured back-to-back Nobel Prizes, one for work on the highly sensitive scanning tunneling microscope used for defect analysis and the other for superconductivity, a method of moving current without resistance.

Those were the days when IBM could afford the luxury of pure research. Such work might not yield immediate revenue, but it could help IBM to discern and to defend itself against new technologies.

But when IBM ran aground financially in the early '90s, its massive research budgets came under question. Was the corporation really getting sufficient return on its investment?

Only an estimated \$500 million of IBM's \$6 billion research, development and engineering budget goes to IBM Research. But with budgets pressured throughout the firm in recent years, IBM Research has been more tightly tethered to the needs of commerce.

Paul Horn, senior vice president of research, is the physicist who heads IBM Research. Horn notes that roughly 40% of his 2,600 researchers now work in collaboration with product development teams within IBM. Another 20% work directly with IBM customers, developing business applications.

"Now we're much more proactive about focusing on solutions for a customer," Horn said. The idea is for IBM researchers to work directly with a customer to build a novel application. Once developed, these "first of a kind" solutions can be marketed to others within an industry.

One example is Med Speak/Radiology, which applies IBM's speech recognition technology. Med Speak/Radiology allows radiologists to dictate their reports directly into a personal computer, eliminating time-consuming transcription of tapes.

In another first-of-a-kind joint development, IBM and Chase Manhattan Bank developed a system for speeding auto loan applications. Kiosks placed in dealer showrooms allow auto shoppers to apply electronically for a loan on a touch screen.

But do these applications require doctoral degrees to build?

"The people who did (the loan application kiosk) are experts at human interfaces," Horn said. "The tools that are used to build the touch screen environment come out of our research lab. The feel of the product has a research feel to it."

But if IBM's first of a kind solutions are marketed to an entire industry, why would a specific customer want to participate? "In the business we're in and our customers are in, time to market is what really counts," Horn explained. Customers can get a jump on competitors by participating in these projects.

"We're not looking at science for science's sake anymore," observed Sharon Nunes, a senior manager at IBM Research. Nunes holds a degree in polymer science from the University of Connecticut and spent more than nine years doing research on materials used in packaging chips.

But when IBM cut back on materials research, she joined a team developing educational software.

Is focused development more or less stressful than basic research? "I think there is more stress, because we're faced with absolute deadlines," Nunes replied.

Feldman joined IBM Research just over a year ago after working at Bell Labs and Bellcore, famed research labs owned by phone companies. Like IBM, those labs have been trying to put more emphasis on translating research into products.

"Everywhere you look over the past half dozen years, there has been a clear change in

research to more provable corporate value as opposed to pure scientific good," Feldman said.

Feldman, who is department group manager for Internet research, says IBM is probably further along in the process than other companies. Feldman's group has just delivered software to the RS/6000 workstation division that should improve the quality of video transmission over analog modems.

But not everyone at IBM Research is pointed directly at a product. Ted Selker is an IBM fellow who has been given the freedom to pursue his own research interests.

Selker earned that status because his free-ranging style has already produced results. He developed TrackPoint II, a keyboard pointing device and mouse replacement that is now built in to IBM's portables.

"I'm a creator. I build things," Selker said. "In fact, I'm always going to the product teams and showing them things they never asked for." Selker says there is still a sizable number of researchers within IBM that is working on projects no customer or product division ever specified. But the ranks of the free spirits are shrinking.

"In the past, there were probably twice as many working without ties to product development," he noted.

Horn says he wants to encourage managers within IBM Research to allocate at least some of their budget to what he calls "exploratory research."

"I insist that all my VP's make some exploratory progress," he said. "There's a lot of pressure to work on short-term things. But I (also) make them come in and tell me how the exploratory work is going."

But even those working on the most theoretical planes are encouraged to incorporate incremental advances into product. Some scientists, for example, explore the properties and movements of single atoms. In the past, such researchers would only tear themselves away from the lab to publish papers. No more.

"The guy who's moving atoms — he thinks about how he might ultimately make an electronic switch," Horn commented.