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Valley firms boost apps, at cost of basic research

Modern tech companies focusing on clever devices rather than useful inventions

BY DAVID MARCUS

Facebook Inc.'s acquisition of WhatsApp Inc. is perhaps the most extraordinary deal of the year so far, since Mark Zuckerberg agreed to pay \$19 billion for a 50-person company whose only product is an instant-messaging application for smartphones. But the WhatsApp deal and the stratospheric valuations accorded other social media companies have stoked concerns that the prospect of the riches to be made by developing the next clever app is diverting American intellectual and financial capital from basic scientific research.

"I'm encouraged about the growth of software innovation and the electronic device apps," said Steven Currall, the dean of the business school at the University of California–Davis and co-author of "Organized Innovation: A Blueprint of Renewing America's Prosperity."

"I wish we would see a greater commitment to funding basic research that develops technology platform," he said. That commitment needs to be a public priority, he said: "Federal government has always led the way on basic research and needs to continue."

Davis' concern has a long history in the U.S.

"The support for disinterested research—research that aims to find out how things work—has always had an uncomfortable place in a democratic societies," said Steven Shapin, a professor of the history of science at Harvard University. Frenchman Alexis de Tocqueville posited in "Democracy in America" that democratic societies value useful research, while aristocratic ones like his own were more apt to support advances in theoretical knowledge.

With the success of the Manhattan Project, that dichotomy was resolved, at least for a few decades. Theoretical physicists had developed the atomic bomb that ended World War II, which gave the discipline unprecedented credibility with the public and politicians and legitimized large-scale government spending on scientific research. Vannever Bush, then the president of the Massachusetts Institute of Technology and the de facto head of military research and development in the U.S. during World War II, aimed to capitalize on the opportunity by writing "Science, the Endless Frontier," in which he lobbied successfully for what eventually became the National Science Foundation, which was founded in 1950 and dedicated to supporting basic research.

The corporate analog to the NSF was Bell Labs, the research arm of AT&T Inc. and a major center of basic research during World War II. In the years thereafter, Bell Labs scientists William Bradford Shockley Jr., John Bardeen and Walter Houser Brattain invented the semiconductor, for which they won the Nobel Prize



FACEBOOK CEO MARK ZUCKERBERG

in 1956. Shockley moved to Palo Alto, Calif., and started a company from which all of Silicon Valley sprang, and the semiconductor became a classic example of the linear model of innovation, in which advances in basic research lead to ones in applied research and ultimately to commercial applications.

The chip also showed the powerful stimulus that government spending on both basic research and military technology could provide. "It's not an overstatement to say that without the Cold War and Uncle Sam, Silicon Valley wouldn't look the way it looks now," said Patrick McCray, a historian of science at the University of California-Santa Barbara.

BUT THE LINEAR MODEL proved inapplicable to the then-new field of computer science, which by its nature is a discipline where advances in applied research can have key theoretical implications, according to Fred Block, a sociologist at UC-Davis. The small companies of 1960s and 1970s Silicon Valley couldn't afford to underwrite basic research, which remained the province of large corporations such as AT&T and **IBM Corp.** As Silicon Valley became an economic power in the 1980s, an ever-increasing focus on shareholder return made it impossible for even the largest companies to sponsor basic research on anything like the scale that had been possible in the decades after World War II, though Silicon Valley's new elite do engage in some basic research.

Google Inc., for example, is trying to develop a driverless car and is strengthening its ties with NASA by spending money to fix up Moffett Federal Airfield near San Jose, Calif., the home to NASA Ames Research Center.

Beyond the corporate sector, "[t]here's lots and lots and lots of fundamental research in the U.S., some of it absorbing vast amounts of money," said Cyrus Mody, a historian of science at Rice University. He pointed to the LIGO project, in which the NSF spent \$365 million in a multiyear experiment aimed to detect gravitational waves. The federal government has also poured billions of dollars into nanotechnology research over the past decade.

Block said he worries that political polarization in Washington is endangering such research. "I do think they're getting close to the point that the innovation system is going to be damaged, because it's getting harder for everyone to get funding," he said. "Corporations including the big corporations are increasingly dependent on the universities and the labs and what comes out of them but they've been slow to come out and defend the big R&D budgets." ■