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ENTREPRENEURIAL EDGE

Electronic Giants Lend Hand, and Cash, to Start-Ups

By JAMES FLANIGAN

WITH a brash confidence that recalls the early days of Silicon Valley, entrepreneurial companies in San Diego are pushing the technological frontiers of cellular telephones around the world.

Communications industries everywhere are challenged to meet demands from hundreds of millions of people, in Asia particularly, for phones that seamlessly combine voice, data and multimedia abilities, so that cellphone users can watch longer videos and mini-movies, play interactive online games and communicate worldwide.

The industry's revealing name for the cellphone these days is "the fourth screen," as in movie, television, computer and now cellphone screen. "The dream of total communications that are with you at all times is evolving into reality," said David R. Shepard, president of Sequoia Communications, a semiconductor company in San Diego.

It is an evolution carried forward by relatively small companies financed by larger electronics concerns and by venture capital funds. To be sure, the global communications industry is led by giants, including network providers like [China Unicom](#) and the largest telecom company in India, Bharat Sanchar Nigam Ltd., as well as [AT&T](#), [Verizon](#) and others familiar to Americans. The cellphone makers [Nokia](#), [Motorola](#), Samsung and others vie for a market that is now passing one billion devices worldwide.

But the heartland of technological innovation lies with venture-backed companies in San Diego, as they try to advance the limits of radio frequency technology, electronic circuitry and computer software.

One such company is the Continuous Computing Corporation, a developer of an Internet multimedia system that allows cellphones to receive and transmit voice, data and pictorial transmissions. The system is analogous "to a personal computer's ability to offer built-in functions for numerous applications," explained P. J. Go, president and co-founder.

Mr. Go, who came from the Philippines to study at Occidental College in Los Angeles and earned an electrical engineering degree from the California Institute of Technology, sees enormous potential in Asia.

Venture capital funds have invested \$52 million in Continuous, including [Intel](#) Capital, the division of Intel, the semiconductor giant, that backs start-ups in new technologies.

Intel is also backing the Peregrine Semiconductor Corporation, which says it recently achieved a breakthrough by implanting radio frequency in a single powerful microchip that can advance the capabilities of cellphones. The commercial product is adapted from technology developed for military satellites that Peregrine's chief executive, James S. Cable, worked on years ago for the military contractors Hughes Microelectronics Center and TRW Inc. To bring military technology to a commercial product that is smaller and sells for much less money, "was even harder than the original work," Mr. Cable said.

Peregrine continues to supply electronics for military and space satellite uses, but the breakthrough with cellphones could make it a much larger company. Mr. Cable and his senior staff believe that Peregrine could one day have \$1 billion in annual revenue, from \$50 million today. The company is backed so far by investments of \$141 million from nine venture funds.

Financing America's advanced technology with venture capital, which looks for big returns within five to seven years, is a departure from the last half-century, when the Defense Department and big corporations like Bell Laboratories, then part of AT&T, paid the bills. An expert on such times is Andrew Viterbi, a San Diego resident and the scientist who created the Viterbi algorithm, the computation that enables digital transmissions to avoid interference. That discovery not only contributed mightily to military communications but was responsible in part for the invention of the cellphone.

"Yes, for more than 30 years the military was a good supporter of research and development," Mr. Viterbi said in a recent interview. It helped him to found the Linkabit Corporation, a military contracting company, in 1968, and then to co-found [Qualcomm Inc.](#), a major source of cellphone operating systems, in 1985.

Yet such budgetary support for technology, which began after World War II, "might have petered out were it not for the cold war," Mr. Viterbi said. "Today we live in different times." Indeed, Mr. Viterbi, retired from Qualcomm, has become a venture capitalist through the Viterbi Group, a family investment firm that backs fledgling companies in San Diego and elsewhere.

The shift in support has not been that drastic — "basic research is still undertaken by universities and government laboratories," said James Montgomery, whose investment banking firm, Montgomery & Company, arranges financing for high-tech start-ups. "Venture capital mainly supports the 'D' in R.& D., the development of products and applications," he said.

It is a brisk business. Montgomery & Company's annual technology conference, held recently in Santa Monica, drew 150 small companies to make half-hour presentations to some 500 managers of institutional investment and venture capital funds.

One presenter was Sequoia Communications, founded by John Groe, an electrical engineer from the University of Southern California, who had worked on satellite communications at TRW and then at Nokia, among other places.

At Sequoia, Mr. Groe and fellow engineers have developed a microchip that can work with all the world's operating standards, thus eliminating difficulties in communicating between phones on global system mobile, originated in Europe, and code division multiple access, the standard in greater use in the United States.

To achieve that breakthrough, Sequoia has been backed by \$38 million from four venture capital funds and from Motorola, which uses Sequoia chips in its Razr cell handsets. "It makes sense for big companies to finance small firms trying for innovations," said Mr. Shepard of Sequoia. "A big firm can't take time and effort from the products it must turn out for its customers to pursue leads that may not pan out."

Still, there is no denying widespread anxiety about America's technological leadership, particularly as high-tech work seems to migrate inexorably to the growth markets of Asia.

Continuous Computing, for example, now has half of its 400 employees in India and China. "The architecture of our systems and marketing is done in San Diego," Mr. Go said, while software programming and circuitry — which he calls "implementation" — are performed in those countries.

For Mr. Go, and for Continuous's co-founder, Ken Kalb, it is a matter of the company benefiting at home from business in large markets overseas.

Mr. Kalb, a classic entrepreneur who is starting a new communications company called 4LikeMinded, sees America's continuing technological leadership as secure because of "our political institutions that support entrepreneurial people who can come here, raise money and start a business. No other country does that." As a prime example, he cited an early investor in Continuous Computing — Mr. Viterbi, who came as a child from Italy in 1939.

As if echoing the thought, Mr. Viterbi, noted that "information technology has propelled our economy for the last 50 years, and now we have competition.

"But still," he said, "I'm reasonably optimistic because we're the only ones who can effectively use talented people."

This column about small-business trends in California and the West appears on the third Thursday of every month. E-mail: jamesflanigan@nytimes.com

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