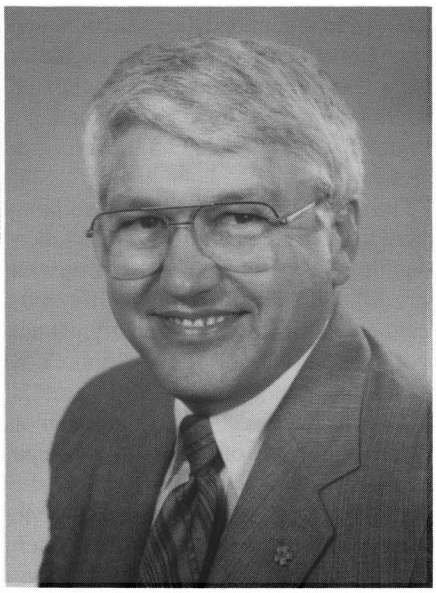
Pilots and Pioneers

Eight SU alumni making a difference in high tech

BY ALEXANDRA EYLE



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PATRICK A. TOOLE

Man in Charge

In this technological age, a new discovery results not from the work of a lone, diligent scientist, à la Thomas Edison, but rather from the coordinated efforts of dozens of scientists hailing from a multitude of specialties.

A research team may include individuals with different specialties who are unable to communicate clearly across fields. How, then, does an international team of scientists manage to work together toward a shared goal? They do it through a consummate manager who is skilled in the sciences but who is also a talented communicator and organizer.

Patrick A. Toole, IBM vice president and group executive of the IBM Information Systems Technology Group, is just such a person. Toole joined IBM 27 years ago as an engineer after earning a bachelor's degree in engineering from Detroit University. In 1967, he earned a master's degree in engineering administration from Syracuse, and his career in research management was underway.

Today, he is in charge of developing and producing all the integrated circuits and circuit boards used in IBM products. Most recently, Toole's group—made up of 30,000 people stationed in IBM offices around the country—designed, developed, and manufactured the ground-breaking circuitry that runs IBM's new generation of personal computers, the Personal System/2.

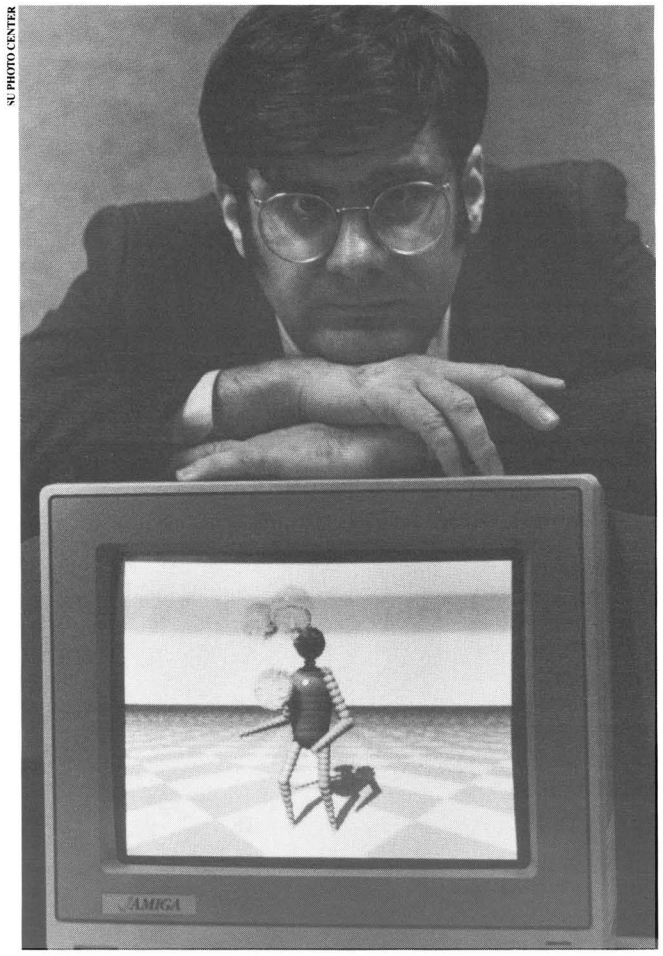
Although this system has received much attention of late, Toole is proudest of a project he and his team completed seven years ago. Toole coordinated hundreds of experts in physics, chemistry, materials sciences, and engineering in an intensive effort to develop what is still considered to be the most advanced circuit board in the world.

The board is as large as an easel chart—four times larger than its predecessors. It is made up of 20 layers, versus the normal 6, and it contains 330,000 circuits, each linked via 100,000-plus microscopic interconnections. Equipped with these boards, the IBM 3091 computer, for instance, can perform any work from artificial intelligence to airplane design.

It took Toole's group of scientists, who hailed from universities around the world, one-and-a-half years to develop the board.

"Every single process and every design parameter were pushed to the limit with these boards," Toole explains. "It was as radical a breakthrough in the packaging area as transistors were from semiconductors in the circuit area." These powerful boards are used in all of IBM's large computers and most of their intermediate computers.

"It was an enormous technical project," Toole recalls. "In a small way, it was like putting a man on the moon."



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ROSEBUSH VISIONS CORPORATION 25 WEST 45 STREET NEW YORK NY

JUDSON ROSEBUSH

Getting Graphic

A grid floats across a woman's flowing hair, illustrating the cleaning power of Silkience shampoo.

An otherwise ordinary Comet logo floats inches away from the can, encircling it in midair.

Sections of a shoe fly onto a proffered foot and assemble themselves piece-by-piece into a Reebok.

While these visual wonders look like trick photography, they are the product of computer graphics wizard Judson Rosebush, president of the Judson Rosebush Company. One of a small group of computer graphics pioneers, Rosebush was the first to take computer graphics out of the realm of science and apply it to advertising.

Rosebush, who earned a master's degree in television and radio from Syracuse in 1970, stumbled upon his vocation in college, when he saw his first computer-animated film. Computer animation was still in its most primitive stage at the time—two-dimensional drawings were generated on paper from instructions punched onto IBM cards. There was no way to see what drawings looked like until they came out on hard copy; television screens that allowed one to see and alter images, then used almost exclusively by scientists, cost some $200,000.

Seeing the possibilities of computer animation, Rosebush read a book on the computer language FORTRAN and spent three years perfecting a sophisticated animation program called Visions, which he still uses today. He also built his own graphics monitor for $20,000 and began making three-dimensional color pictures. Then he and some friends formed Digital Effects, went to New York City, and made the rounds of advertising agencies.

"We said, 'Look, we are able to make—believe it or not—objects that can actually tumble in three-dimensional space and spin around,'" Rosebush recalls. "People had never seen anything like it. This was revolutionary."

Since then Rosebush has created logos for NBC, CBS, and TV Asahi in Japan; advertisement graphics for such firms as AT&T and Ford Motor Co.; and sequences for documentaries and the movie *Tron*. In the course of his career, Rosebush dissolved Digital Effects and created the Judson Rosebush Company, whose services include conceptualization, script writing, and production.

Rosebush also hopes to become a pioneer in the film world. If the right script comes along, he would like to make the first feature film done exclusively with computer graphics.

"We can make things that are both realistic and incredible looking," says Rosebush. "We can lead a viewer down a corridor that metamorphoses into something else. A series of gates appears before us and opens up, and in front of us another space appears, then it turns itself inside out and becomes something else. You can do with computer graphic animation what you cannot do with models, 2-D animation, or real actors. That's where our medium excels."

ARTHUR ROCK

Something Ventured

In 1961, Arthur Rock left his job as a Wall Street investment banker and moved to San Francisco to embark on what was then an almost unheard-of career: venture capitalism. The move promised great personal gain *and* risk, but the decision had repercussions far greater than anyone could have imagined. It spawned the revolutionary electronics community that has since been dubbed Silicon Valley.

For the past 20 years, Rock has backed the leading high-tech firms that make up Silicon Valley. In 1984, he was hailed by *Time* magazine as the "cornerstone of the Silicon Valley investment community."

Rock planted the first seed for Silicon Valley in 1957, quite by chance. A 1948 graduate of Syracuse and 1951 Harvard Business School alumnus, Rock was working as an investment banker for the firm Hayden Stone & Co. when eight scientists asked him to arrange financing for a semiconductor company they wished to form.

Rock convinced Fairchild Camera & Instruments to back the new company. Fairchild Semiconductors became the first manufacturer of silicon chips and is now known as the mother of Silicon Valley.

Rock went on to help finance Teledyne, whose products range from Water Piks to jet engines. One year later, he set up the San Francisco venture capital firm Davis & Rock. He now operates as Arthur Rock & Co.

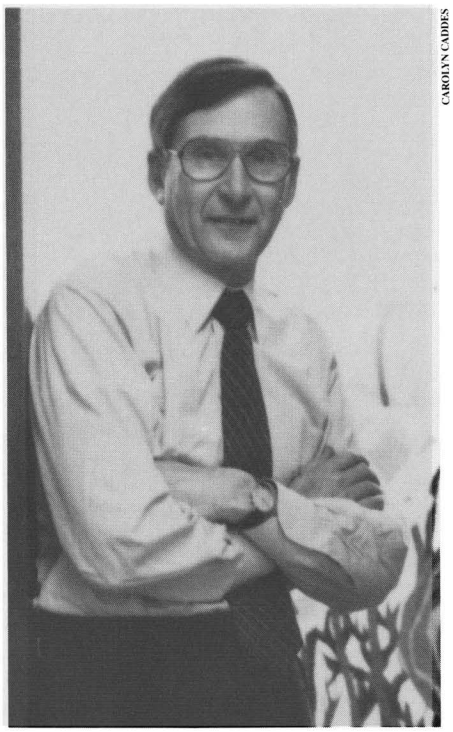
Over the years Rock has helped launch such companies as Scientific Data Systems, a mainframe producer acquired by Xerox for $950 million in 1969; Intel, the first company to make a computer on a chip (and the company for which IBM paid $250 million to gain a 12 percent interest); and Apple Computers, which spawned the lucrative personal-computer industry more than a decade ago.

The four or five companies Rock backs each year get much more from him than financing, however. They also receive guidance. As director of Intel, Diasonics, Ridge Computers, Apple, Rational, and Teledyne, Rock cultivates an understated management style. As Joseph Rizzi, of ELXSi International, a Rock-financed company, told *Time,* "Arthur has the uncanny ability to say one or two things that can get you pointed in the right direction."

If Rock works well with his companies, it is because he believes in their founders. Each year hundreds of proposals find their way into Rock's modest, unmarked office in San Francisco's Russ Building. In reviewing them, Rock looks for feeling.

"Does he have the burning desire to succeed in the pit of his stomach?" Rock asks. To answer this question he spends months talking to prospects and quietly investigating their background.

"I would rather have an A person and a B idea than a B person and an A idea," he says. "Nearly every mistake I've made has been because I picked the wrong people, not the wrong idea."



CAROLYN CADDES

BILL NATION/PICTURE GROUP

metaphor

seeq

Optotech, Inc.

E. FLOYD KVAMME

Friendly Advice

In the early 1960s, E. Floyd Kvamme entered the world of high technology as an engineer. Today, he is more likely to call himself a coach.

As a general partner of the venture capital firm Kleiner Perkins Caufield & Byers, Kvamme helps choose new companies that the firm will back. Yet he and his firm do much more than provide start-up money; they also guide the companies they support through the competition, management difficulties, and marketing decisions that can threaten even the most promising firms before they sail smoothly.

"We're trying to create successful companies," Kvamme explains, "not necessarily successful products. A product is only one aspect of a company. Companies also need management, service, support, and marketing."

Currently, Kvamme serves as director to an impressive roster of companies, including Seeq Technology, a semiconductor manufacturer; Optotech, a leading supplier of optical disc systems; and Metaphor Computer Systems.

Kvamme, who joined Kleiner Perkins in 1984, draws on 25 years of experience in engineering, marketing, and sales as he guides new firms from start-up to going public. After earning a bachelor's degree in engineering from the University of California, Berkeley, in 1959 and a master's in engineering from Syracuse in 1962, Kvamme joined Space Technology Corp. as an engineer, and designed circuits for an orbiting geophysical observatory. One year later he joined Fairchild Semiconductors, where he directed the custom integrated circuits division and represented Fairchild in the development of the Apollo and Polaris computers and the Poseidon missile.

As a rising star at Fairchild, Kvamme, with four other Fairchild engineers, was invited to save National Semiconductor Corp., which was foundering. Kvamme spent 16 years at National, expanding its products to include watches, calculators, and grocery store checkout equipment. He also directed the worldwide marketing of the company's semiconductor products; headed the semiconductor division, which made up 90 percent of National's business; and founded National's wholly owned subsidiary, National Advanced Systems Co., a mainframe computer manufacturer. By the mid-1970s, National's international sales exceeded $600 million.

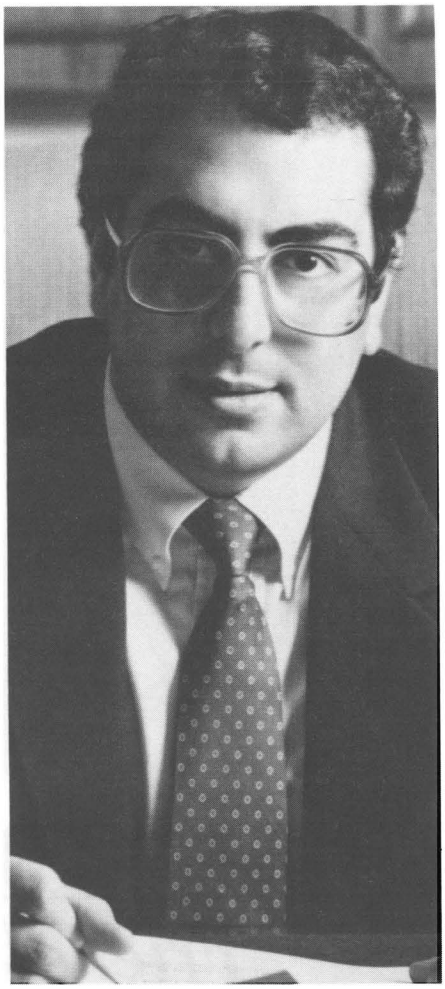
In 1982, he joined Apple Computers as executive vice president for international marketing and sales and launched Lisa and Macintosh computer systems. But, yearning to start new companies, he left after 15 months to join Kleiner Perkins, where he thrives on "turning a good idea into something that can be practical in the marketplace."

Looking back, Kvamme sees his evolution from engineer to venture capitalist/coach as natural.

"If you develop the skills to manage many different kinds of products," says Kvamme, "you probably are pretty good at encouraging other people's creativity—at being a counselor or coach. And you probably have what it takes to be a venture capitalist."

EDWARD M. ESBER JR.

Try, Try Again



Some people call Edward M. Esber Jr. the street fighter of the software industry. If by street fighter they mean someone who can bounce back from defeat, they're right.

In 1983, Esber resigned as an executive vice president of the software company VisiCorp. At the time, VisiCorp stock, valued at $9 a share, would have brought $20 if it had gone public. But VisiCorp didn't go public. It went into the ground and took Esber's 1.4 million shares with it.

"I lost $12.6 million or more," Esber says. "If we had gone public, it would have been $28 million. It was a lot of money."

Yet Esber took the loss lightly. "I was 31," he says, "and had plenty of working life and earning power left."

Indeed. Today, Esber is president, chairman, and chief executive officer of Ashton-Tate, a leading developer and marketer of microcomputer software. Shortly after Esber became Ashton-Tate's president in August 1985, its stock fell to $2⅞, but by spring of this year it reached $24; sales jumped from $40 million to more than $200 million.

Today Esber says he owes much of Ashton-Tate's success to VisiCorp's loss. "I learned plenty of lessons from that experience," he says. "One was that in high-technology businesses you can crash and burn faster than you rise. The second was learning the value of humility; our company was being very arrogant in its success. The third was the value of listening to your customers."

It is the third lesson that Esber has most obviously applied to Ashton-Tate. Early on, Esber began listening to customers and testing Ashton-Tate products on himself. He also acquired three businessess—Forefront Corp., MultiMate International, and Decision Resources. Now, Ashton-Tate, which once produced only its dBase line (advanced data-base management systems used in offices nationwide), also offers word processing and graphics software.

Ashton-Tate also owes its success to Esber's wealth of microcomputer software experience. After earning a bachelor's degree in computer engineering from Case Institute of Technology in 1974, Esber joined IBM as an engineer. There he created and taught the first course for IBM engineers on how to design computer systems around microprocessors. The new option of designing with externally manufactured microprocessors led to, among other things, the development of the IBM personal computer family.

During his tenure with IBM, Esber also earned a master's degree in electrical engineering from Syracuse in 1976. He left IBM to earn a master's from Harvard Business School and from there joined Texas Instruments as a personal-computer marketing manager in 1978. The following year he joined VisiCorp as vice president of marketing and sales and started the first marketing and distribution network in the microcomputer software industry.

Today, Ashton-Tate is ranked third among publicly held software companies, but success with Ashton-Tate has hardly dulled Esber's competitive drive.

"No one," he says, "is satisfied until he's number one."

PHILIP COOPER

Higher Intelligence

For years, artificial intelligence (AI) expert systems have been expensive to develop, purchase, maintain, and learn—and therefore inaccessible to the general public.

Philip Cooper, chairman of the board, chief executive officer, and cofounder of Palladian Software, has changed all that. Palladian has created the first AI expert system that is easily accessible to professionals. It's called Management Advisor.

Management Advisor helps managers solve existing problems or project the profitability of a new product or investment. At $66,000 per copy, it is beyond the reach of most individuals but easily affordable for major businesses. It is also a cinch to learn—no manual is needed.

Management Advisor is designed as the ultimate helpmate for managers of the 1980s. It draws on a wealth of information collected from a team of financial advisors, thus pulling into a single program more wisdom and expertise than any one individual brings to bear on a problem. Management Advisor will address a range of corporate concerns—from the effects of new tax codes on revenues to the improvement of production—once users have provided their company's financial and operating information.

"This program offers the advice and judgment of eight or so experts in the financial and related fields for a price equivalent to less than a year's salary for one of them," Cooper explains.

Management Advisor has had a rave reception—several copies were sold in advance of its April 1986 introduction, when the system was called Financial Advisor—and companies are now ordering additional copies for more managers to use. "One of our customers," says Cooper, "used Management Advisor to better manage work flow in a manufacturing plant and saved $1 million in the first year." With this system well-established, Palladian is now developing expert systems in marketing and equity-liability management.

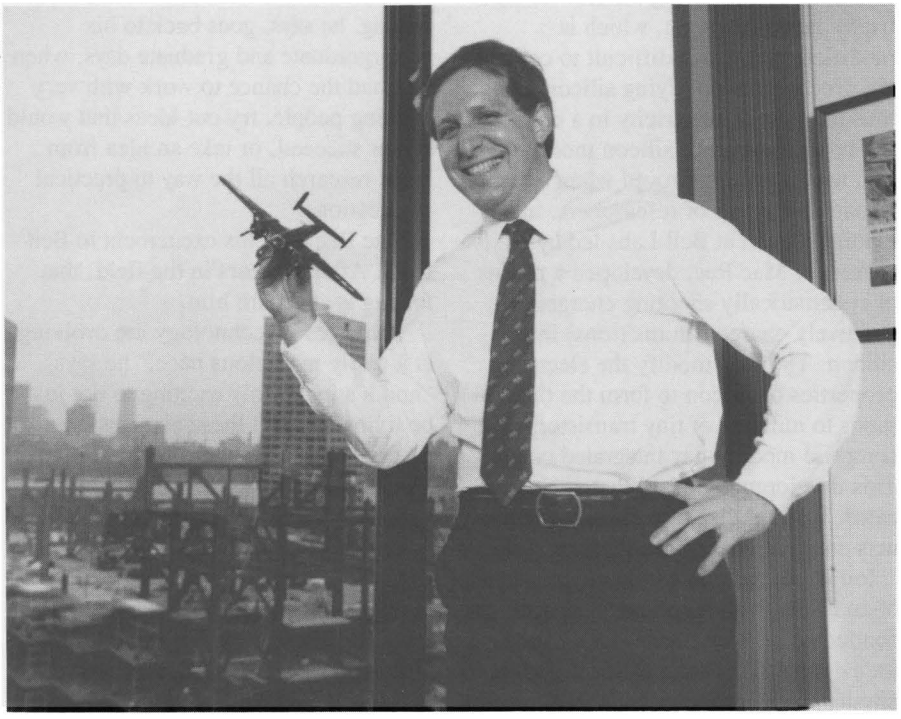
A 1973 Syracuse communications graduate, Cooper became a computer entrepreneur out of pure frustration. As a New York advertising account supervisor, he had to decipher computer printouts of incomprehensible columns of numbers. Couldn't the computer present information through charts and graphs?

Finding that no such program existed, Cooper decided to make one. He moved to Boston, hired computer specialists, and formed Computer Pictures Inc., which spawned a program that used pie charts and bars to provide financial information at a glance. Cooper deemed it ready when he could use it on the first try. Launched in 1980, it took off. Two years later, Computer Pictures was acquired by Cullinet Software for $14 million.

Instead of stopping there, Cooper became a Sloan Fellow at MIT in 1983, where he studied advanced techniques of management science. He formed Palladian as a result of discussions with AI experts he met at MIT. Today, Cooper maintains his fresh outlook. Businessmen tell him what they'd like a system to do, and he sees that it's easy to use. Is Cooper ever amazed at being an AI leader?

"Every day," he says and then laughs, "Only in America."

STELLA JOHNSON



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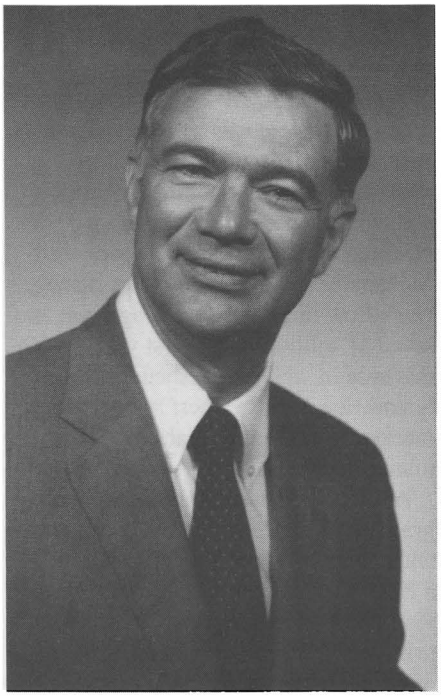

ALFRED MAC RAE

Positively Charged

Today, such electronic wonders as pocket-size calculators that remember bank balances, digital touchtone phones that memorize and automatically dial and redial, ultrafast computers a fraction of the size of their laborious vacuum-tube predecessors, and video telecommunications satellites that link Ted Koppel with Mikhail Gorbachev on ABC's *Nightline* are things that young Americans take for granted.

Yet such electronic products did not always exist. Up until the late 1960s, it was difficult to systematically design and mass-produce the sophisticated integrated circuits that run the products we now take for granted. Integrated circuits perform many complex electrical functions by regulating the flow of electricity through silicon, which is modified. But it was difficult to control the process for modifying silicon and thus the flow of electricity in a circuit.

The technology of silicon modification was greatly improved when an international group of researchers, including a team at Bell Labs led by Alfred U. Mac Rae, developed a means of systematically shooting energetic, positively charged atoms (ions) into silicon. The ions modify the electrical properties of silicon to form the thousands to millions of tiny transistors that comprise modern-day integrated circuits. This development meant that sophisticated, high-quality new electronic products could be mass-produced.

Ion implantation techniques grew out of an in-depth study of basic physics, conducted by Mac Rae. With a bachelor's degree (1954) and Ph.D. (1960) in physics from Syracuse, Mac Rae joined Bell Labs in 1960. For almost nine years he investigated the basic principles of physics, focusing on the atomic structure and behavior of surfaces before developing ion implantation techniques.

"It was necessary to develop a basic understanding of this technique before practical applications could be realized," he says. "That evolution is something I'm personally proud of."

Since 1969, Mac Rae's research has resulted in 17 patents on ion implantation and integrated circuit fabrication techniques.

It has also contributed to his being named director of Bell Lab's Satellite Communications and Signal Processing Laboratory. Working with groups ranging in size from 5 to 50 scientists and engineers, Mac Rae develops new satellite communications technologies, including long-distance voice, data, and video telecommunications systems.

When Mac Rae talks about his work, he exudes excitement and wonder. That feeling, he says, goes back to his undergraduate and graduate days, when he "had the chance to work with very exciting people, try out ideas that would fail or succeed, or take an idea from basic research all the way to practical applications."

Mac Rae took his excitement to Bell Labs. After 27 years in the field, that feeling is still with him.

"Changes in technology are evolving at a really marvelous pace," he says, "and it's incredibly exciting to not just be living through these changes but to be participating in them. I'm excited every day."

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RICHARD DULUDE

Glass, Plus...

Fiber optics. Auto emission filters. Photogray lenses. Microwave cookware. Industrial enzymes. If you think these high-tech products have nothing in common, think again. They have Corning Glass Works and Richard Dulude.

Contrary to its popular image, Corning produces much more than cookware. In fact, two-thirds of Corning's business is in technology. And for the past 30 years, Dulude, now group president in charge of telecommunications products, electronic products, and European operations, has helped bring Corning inventions out of the lab and into the daily lives of Americans and Europeans alike.

It was Corning scientists who, for instance, invented the silica material that lets light pass through a single, miles-long fiber, thus making fiber optics a reality. Dulude was a key figure in the testing and trial installation of fiber optics in Europe and the marketing and manufacturing of fiber optics in America.

Similarly, Dulude, who earned a bachelor's degree in mechanical engineering from Syracuse in 1954 and attended the senior executive program at the Massachusetts Institute of Technology, was responsible for producing the honeycomb pollution-control device that is now a standard part of every new automobile. To meet the deadline of the 1970 Clean Air Act,

CORNING

Dulude had three years to oversee the creation of a new material, develop its manufacturing process, and build a new factory to produce the device.

"There were three months in the middle of that three-year period," recalls Dulude, "when there were myriad problems—with the new material, the product, the factory. If we didn't solve those problems, we could have shut down the whole automotive industry." Dulude's ability to listen to people, understand and break down their problems, and then address each aspect of the problem allowed Corning to avoid that crisis.

Dulude is also valued for his ability to identify markets for new high-tech products. For instance, he and his team spotted the customer need for Photogray lenses and for the high-tech cookware line, Visions. Visions is made of a transparent material that withstands stove-top heat and microwave cooking. A hit in Europe, Visions is the fastest-selling cookware on the American market.

Dulude also develops new Corning businesses—he cofounded and became the first board chairman of the new biotechnology company, Genencor, for instance. Genencor, a leader in the creation, production, and application of industrial enzymes, is the product of a joint venture between Corning and Genentech, known for its recombinant-DNA research and gene-splicing technology.

The variety of high-tech products that Dulude has helped develop and launch since joining Corning in 1957 can boggle the mind. But not Dulude's.

"The variety is what I like best about my job," he says.

ALEXANDRA EYLE, a former staff writer, recently began work on a biography of conservationist Charles Lathrop Pack.