Bottom, left to right: Bill Gates and Paul Allen of Microsoft, Bob Frankston and Dan Bricklin of Software Arts, Tony Gold of Lifeboat Associates, Gary Kildall of Digital Research, and Dan Fylstra of Personal Software. In college dorm rooms, backyard toolsheds, and apartment-house basements, these seven built a booming industry from scratch in only five years.

THE BIRTH OF AN INDUSTRY

Working in their attics, basements, and garages, seven entrepreneurs tacked together a totally new industry.

By Steve Ditlea & Joanne Tangorra

In 1976, Bill Gates, then 20, and Paul Allen, 23, were running a company they had started the year before in Gates's college dorm in Boston. That same year, Gary Kildall, 34, was starting a company in his backyard toolshed in California. Tony Gold, 30, was still a credit officer at a New York City bank. Dan Fylstra, 25, was starting at the Harvard Business School. Dan Bricklin, 25, was getting ready to apply to business schools in Massachusetts, and Bob Frankston, 27, was working as a computer programmer near Boston.

All seven of these people started and now run companies that produce and/or

Top row, left to right, photos by Charlie Nye/Gamma Liaison, Marjorie Nichols, Andrée Abecassis; bottom row, left to right, Doug Wilson/Black Star (2), Peter Jones (2)

Top, left to right: software author Paul Lutus, Mitch Kapor of Lotus Development Co., Mike Belling of Stoneware, Bill Baker of Information Unlimited Software, and Dick and Jill Miller of Miller Microsystems. Now a dozen or so entrepreneurs are sitting on top of an industry that's literally exploding and are wondering how to stay there.

publish software for personal computers. All five of their companies—whose combined revenues just missed $50 million in 1981—are doubling or tripling in size each year. All of these entrepreneurs are, or soon will be, millionaires. All are likely to be the leaders of the personal-computer software industry—quoted during economic crisis, looked up to by future business-school students.

The five companies they founded have created a new industry from scratch. And now they've been joined by as many as 1,000 more companies offering for sale some 5,000 software programs. The pressures to stay on top in the industry are intense. Some of the biggest companies in the country have turned their attention to micro software in recent months. Professional investors are scrambling to pour millions of dollars of venture capital into the leading companies. And the independents—only a dozen or so had sales of more than $1 million in 1981—are straining to stay out in front.

"It's a tremendous business to be part of," says Mike Belling, 32, who bought the three-month-old Stoneware Inc. in June 1980 with his partner, Kenneth Klein, 42. "But it has its pitfalls, like cars used to. It's all so brand new that there's nothing to go by yet. There's no history to tell you how many copies of a program to produce, for instance."

Five years ago, the micro-software industry didn't exist. The first "personal computers" were introduced in 1975, but they were sold as kits and had no keyboards or video monitors: You used them by flicking on-off toggle switches and watching flashing red lights. In 1977, though, both Apple Computer Inc. and Tandy Corp.'s Radio Shack Division introduced preassembled and attractively packaged personal computers. And last October, the $26-billion com-

Top row, left to right, photos by Andrée Abecassis, Marjorie Nichols (2); bottom row, left to right, Steven Mark Needham, Andrée Abecassis (2).

puter giant, IBM, started shipping its own personal computers.

Now the installed base of personal computers has passed the 1 million mark and is forecast to grow as much as 50% a year for the next decade. The demand for programs, or software, to run these machines has mushroomed. In 1981, sales of micro software totaled about $500 million. By 1985, forecasts suggest that sales will range between $1 billion and $5 billion.

The beginnings of this now-hot industry were inauspicious. Late one night in January 1975, Bill Gates was playing poker in his Harvard dorm. He was losing heavily, when a friend showed him that month's issue of *Popular Electronics*. The cover featured the first personal computer, called an Altair. "I decided that I better buy one," says Gates, who had been planning to go into law despite an extensive background in programming. "I thought it was a better use of my money than losing at poker."

Gates did buy an Altair. With his good friend Paul Allen, who was working at Honeywell Inc.'s Boston facilities, he began writing a programming language. The two of them had decided that these little machines needed a simple, "high-level" language with which users could write programs. (High-level means that it's easy for people rather than machines to understand.)

Gates's dorm room at Harvard became the site of weeks of what Gates fondly calls "working in the hard-core mode." They named their finished language Microsoft BASIC and started Microsoft Inc. to market it. They've since sold more than 600,000 copies of Microsoft BASIC, and the company, which they moved first to Albuquerque, N.Mex., and then to Seattle, had revenues of $15.8 million last year.

Like most of the other industry leaders, Gates likes to think of himself as a pioneer. Microsoft BASIC, he says, proved that high-level languages could be written for personal computers and opened up programming to nontechnical people. "We turned software into an independent industry," says Gates.

At about the same time that Gates and Allen were working in the hard-core mode in Boston, Gary Kildall was trying, without success, to sell his own program. In 1975, Kildall was teaching computer science at a small naval college in California and was consulting for Intel Corp., manufacturer of the first microprocessor used in personal computers. On his own, Kildall had developed an operating system (the program that controls how different parts of the computer work together). He called it CP/M, short for Control Program for Microcomputers.

Kildall offered the program to Intel, which turned it down. So in 1976, he and Dorothy McEwen, now his wife, formed Digital Research Inc. in his toolshed in Pacific Grove, Calif., and set out to persuade manufacturers to use the program in their computers. The operating system is now used in a number of major brands, including Xerox, Vector Graphic, and Zenith Data Systems. Because it allows users to switch easily from one brand to another, CP/M has become the industry standard.

In 1981, Digital Research had revenues of $6 million; for 1982, it forecasts revenues of $20 million. The company, which now employs 75 people, has acquired two other software firms and was one of the first in the industry to accept venture capital. "It feels good to know that my program has inspired other authors to write best-sellers," says Kildall. "But with all the other overnight successes, people tend to forget that you're bound to have some flops. I wrote 18 programs on speculation before I came up with my first hit."

Lifeboat Associates' early life wasn't promising: The *Yellow Pages* listed the company under "Marine Equipment & Supplies." It still does, but the company had more than $10 million in 1981 sales.

By early 1977, two of the four building blocks of the industry were in place. Microsoft BASIC broadened the base of programmers who could work with personal computers. CP/M promised a large, standardized market for those programs. Two elements were missing, however: a way to distribute the programs widely and a popular application program (the program that actually tells the machine how to execute specific tasks) to show people how useful the machines could really be.

Development of the distribution system began in 1977. Tony Gold was responsible for analyzing corporate reorganizations for Citicorp in New York and had to both write reports and crunch numbers. He started using a small computer at home to help him with both tasks. "I quickly became aware that there was very little software readily available," says Gold.

That year Gold formed Lifeboat Associates in the basement of his partner's apartment house (which he called "the dungeon") and set out to rectify the situation by distributing nonproprietary software. Lifeboat's early life wasn't promising. The Manhattan *Yellow Pages*, for instance, still lists Lifeboat Associates under "Marine Equipment & Supplies." Gold persisted, however, and his company now has a catalog of more than 200 programs for personal computers and has begun to produce some of its own programs to fill in the gaps. In 1981, Lifeboat Associates had revenues of around $10 million and offices in six countries, including Japan.

The last element of the industry—the popular application program—didn't begin to fall into place until a meeting occurred between Dan Bricklin and Dan Fylstra in Boston in 1978. Bricklin, who was working on an M.B.A. at Harvard Business School, had an idea for a program to make financial analyses easier. His professor told him to show it to Dan Fylstra, who was already running a company, out of his apartment, called Personal Software Inc., which sold a computer-chess program.

Fylstra thought Bricklin's idea might work as a home-budgeting program and encouraged him to write it for the Apple computer. Bricklin got together with an old friend, Bob Frankston, who knew more about programming, and the two started a company called Software Arts Inc. (See "Software Arts wrote the first best-seller," page 71.)

The program, which they named VisiCalc and introduced in October 1979, turned into the best-selling application program in history, with about 200,000 copies sold to date. "VisiCalc may well be the most important program to have appeared since FORTRAN," wrote *Datamation* magazine recently, "because it sells otherwise unapproachable computers to people without any technical training."

In the last year, as VisiCalc's unit sales topped 100,000 and as observers began to realize that the program was actually selling machines to nontechnical people, the software business really turned into a business. All the elements had dropped into place, the media began to notice the exponential growth, and serious money started to pour in. And the seven founders plus another dozen or so entrepreneurs found themselves sitting on top of an explosive industry wondering how they were going to stay there. "It's still a crapshoot," says Fred Gibbons, who founded Software Publishing Corp. in Mountain View, Calif., with $250,000 in venture capital in 1980. He recently sold 35,000 copies of his first program, PFS (Personal Filing System), to Apple Computer to use for a special promotion.

It's the lack of history that makes this business and the people in it so fascinating. While the computer business has

been around in various forms for 30 years, it has never been a consumer business. By definition, personal computers appeal to a consumer market, although it's the business segment that's hottest right now. All of a sudden, there are programs whose potential customers number in the millions; there are some 4,000 stores selling just computers; and there are dozens of computer magazines with a collective circulation reaching well above 2 million. The whole thing is growing by leaps and bounds.

What kind of company is going to survive? What kind of people will run those companies? Will the market always be trying to catch up with new products, meaning that the successful companies have to focus on product development? Will the industry be constantly spewing out products to meet still-unrecognized needs, meaning that the companies have to focus on marketing strategies? Or will the hardware manufacturers and book publishers make it all academic by publishing their own software and forcing out the independent companies?

Mitch Kapor bought a computer on impulse and decided to forget about his Ph.D. in psychology. He recently sold a program for more than $1 million.

These are life-and-death questions for the entrepreneurs struggling to establish themselves as future industry leaders. They have the opportunity to build truly important companies, but they won't have it for long at the rate the market is growing. So they have to decide now, without any history to base their decisions on, how to structure their companies, what products to make, and how to sell those products.

On one side of that crucial decision are the marketing people, the ones who think that the selling of the product is more critical than the making of the product. "The companies that become really big businesses won't be generating their own software for the most part; they'll package and distribute it. Those who create software will remain a cottage industry," says Adam Osborne, an industry expert who recently introduced his own low-priced, portable computer.

"Programming is one of the few things in life that cannot be automated," says Paul Lutus, who wrote the popular Apple Writer word-processing program in a plywood cabin atop a mountain in Oregon some 23 miles from the nearest town. (He had to string up a 1,300-foot extension cord to get electricity to run his computer.) "It's hard to get good programmers to sit in a factory atmosphere and have them be truly creative on demand."

On the other side of the question are the product people, the ones who think that the making of the product is more important than the selling of it. "I'm like George Lucas, bringing together a creative team that will come up with a unique, well-crafted product," says Mitch Kapor, who founded Micro Finance Systems Inc. in his Watertown, Mass., apartment after he bought an Apple computer on impulse, decided to forget about his Ph.D. in psychology and started programming computers instead. He recently sold his VisiPlot/VisiTrend program to Personal Software for more than $1 million, and used the money to start a new software development firm called Lotus Development Co.

The costs of team development range from $250,000 to $500,000, says Kapor, so fewer independent authors will be able to compete. "A number of pioneers in this industry," he says, "have gotten rich in the past few years by being merely competent and very lucky."

Sitting solidly on the fence are the entrepreneurs who will likely turn out to be right. "It's not as simple as authors and publishers," says Dan Fylstra of Personal Software. "You have to bring to-

HOW SOFTWARE IS MANUFACTURED

It is important to distinguish between software authors and publishers, though they may overlap. The author writes the program itself, which involves a dogged attention to detail that may require long stretches of 18-hour days until a program is completed.

The author writes step-by-step instructions telling the computer exactly how to execute a task. Computers operate by recognizing either the presence or absence of an electrical impulse, so they can only manipulate long strings of yes or no commands. That means the programmer can't leave anything to the imagination. Each step in a task must be spelled out in excruciating detail. The finished program ends up as a series of encoded lines of computer instructions that, if written out line by line, would fill dozens of pages of text; it's usually stored on a compact 5¼-inch magnetic disk.

Once a program is completed to the programmer's satisfaction, he typically submits it on a disk to a publisher, "much like a recording artist submits a tape to a record producer," says Harris Landgarten, director of software applications at Lifeboat Associates. The program, along with the documentation (the manual that describes the program and how to use it), is evaluated for its sales potential, its probable markets, and its user-friendliness.

The author and publisher then negotiate a contract, in which the author assigns the publication rights to the publisher for either a flat fee or a royalty of 15% to 30% of the retail price of the program. If they can come to an agreement, both parties work on perfecting the program (called working out the bugs, in the jargon of the trade). The software is tested, usually by both an in-house staff (called alpha-testers) and by outsiders (called beta-testers), and the manual is typeset and printed. Finally, the program is mass-produced on disks or tapes in formats compatible with the operating systems of different microcomputers.

A software author may opt to self-publish. A number of authors have been successful enough to establish and build companies that specialize in writing programs and have started to publish their own products. And, with sophisticated programming languages like Microsoft BASIC and the increased accessibility of personal computers, many nontechnical people have learned how to program computers well enough to create useful software for specialized purposes. Duplicating a diskette is a simple operation: In minutes, just about anybody can turn a blank $2 disk into a $50 to $500 program disk.

But newcomers should beware: There are numerous pitfalls in self-publishing. To be as successful as VisiCalc or WordStar, a program not only needs very well written—and therefore expensive—documentation, but also needs to be marketed aggressively. And because reproduction is so easy, piracy of successful programs is a mounting problem. Electric Pencil, for instance, was the first word-processing program written for personal computers. A young filmmaker named Michael Shrayer wrote the original program in 1975. He started publishing Electric Pencil himself. By 1978, he discovered that, for every legitimate copy he sold, about 10 copies were being made by software pirates. Now he's signed on with IJG Inc. to publish Electric Pencil. IJG has cut the retail price and expects to overwhelm the pirates with aggressive marketing and superior documentation.

gether under one management the whole process: the concept, development, documentation, marketing, and technical support. It's the control and determination of standards that's important. That's what we're doing, and it's the direction the industry must take."

Although most of the companies in this business will survive whatever decisions their founders make now, mere survival is not what these people are dreaming about. That's the crux of this question: Just surviving in a business growing so fast really amounts to failure. When the industry shakes out in the next few years, as all new industries do, these entrepreneurs want to be on top of the rubble, not under it.

There's a better-than-even chance that the software-only companies will survive as an independent industry, particularly if IBM's actions mean as much as most people think they do. Before the computer giant moved into the personal computer market this fall, it had never gone to outside suppliers for software products. When it announced its new machine in August, however, the company revealed that it had signed software-development agreements with at least five of these tiny companies, including Microsoft, Personal Software, Digital Research, Peachtree Software of Atlanta, Ga., and Information Unlimited Software of Berkeley, Calif.

"The software business is growing so fast," says Mike Belling of Stoneware Inc., "that all you've got to do to stay in business is hang on to your tail. Other people are making mistakes, too, so you can afford to run a company by the seat of your pants."

The fact that the companies are trying to face up to the central defining question of their existence amidst the explosive growth and the mundane, day-to-day chores of running a business makes it a very challenging business indeed. New concepts are articulated almost weekly and discarded nearly as quickly. And the money is pouring in as fast as the entrepreneurs will allow it. "There's not one week that goes by," says Belling, "that at least one venture capitalist doesn't talk to us. We haven't gotten a good enough offer yet."

"We turned down an offer of $1 million in venture capital," says A. Richard Miller, who with his wife, Jill, runs Miller Microsystems Inc. out of their suburban Natick, Mass., home. "If you have to work, working at home is the most pleasant way to do it."

Not all of the software companies have been able to resist such temptation. Microsoft, Personal Software, Software Publishing, and Digital Research have all taken in venture money. Gary Kildall saw giving up a small piece of Digital Research as the price he had to pay to get access to the venture capitalists' advice and management expertise. Fred Gibbons gave up only 25% of Software Publishing to get the money he needed to develop programs subsequent to PFS.

The money is important. Although most of the software companies have been successful so far at financing their hypergrowth out of earnings, they are beginning to face some very heavy competition. The toughest competition may come from the very hardware vendors for whose equipment the software companies have been providing programs. While VisiCalc, for instance, may have been responsible for the sale of as many as 20,000 Apple II computers, Apple Computer Inc. is devoting considerable resources to developing its own software line. "We're very much in the software business ourselves," says Rob Campbell, Apple's product manager for software. "Four or five years ago, the question was, 'Does the hardware work?' Now everyone's making computers that work, so it's become much more of a software solution."

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Radio Shack also develops software for its own machines, particularly because the $1-billion giant doesn't like to sell independently published programs through its own stores. "In the next few years, we'll be producing more of the sophisticated business software in-house, and the lower-end products will come from outside," says Jon Shirley, vice-president of merchandising of computer products at Radio Shack.

Most of the independents say the hardware companies are "too fixed on the iron" to represent a serious threat to the software companies. But some major book publishers are also becoming very active in the field. Addison-Wesley's Business and Professional Division, for instance, has come out with a financial modeling program, the first of the publisher's Practical Computing Series. "The publishing companies have to get into this area if they want to stay competitive," says a spokesperson for Hayden Book Co., which bought out Programma International, publisher of the Apple Pie word-processing program. "We plan to be very aggressive."

"Things are definitely getting much more competitive," says Bill Gates of Microsoft. "There are the small software companies that won't prosper, the larger independent software companies that will do well, and the hardware companies that still consider hardware and software one industry."

Another major trend in the business is toward conglomeration. In the last few months, a number of the industry's leading companies have been acquired by or have made acquisitions of smaller companies. This summer, for example, Management Science America Inc., a supplier of software for larger computer systems, acquired Peachtree Software of Atlanta, Ga., a major publisher of accounting programs for personal computers. "Financially, the acquisition raises our level of ambition and allows us to make long-term plans," says Peachtree's president, Ben Dyer. "We have the resources now to explore new areas."

"When you're large enough to market products effectively," says Dan Fylstra, "you can really increase the value of a company by acquiring it and then using your distribution system and financial resources to market their products. I would expect that trend to continue in this industry."

As a rule, participants in the microsoftware industry tend to be sanguine. Clouds on the economic horizon, for example, are regarded with equanimity: "Recession?" asks Bruce Van Natta, vice-president of operations at MicroPro International Corp., publisher of the WordStar word-processing program. "What recession? Our industry won't notice any general downturn in the economy, because when times are hard the first thing businesses do is try to improve their productivity. Owners of microcomputers will just add more software to an existing system."

The increased demand for product does not mean, however, that all will be rosy in the future for micro-software producers. "We won't see anything different from other high-tech industries," says Van Natta. "We've already had a number of firms sell out or merge in this field. I don't see how the industry can avoid acquisitions by conglomerates. But I think independent software houses that are innovative and growth-oriented will thrive and continue to be on top in the long run." □

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