

Visible Hand

America's high-tech edge will require as much investment to maintain as it did to build.

By Clyde Prestowitz

MOST AMERICANS are convinced that high technology is America's special preserve—the marvels of computers, memory chips, the Internet, miracle drugs, Mars exploration, and much between. Many believe that because of an innate pioneering spirit and a uniquely entrepreneurial system, it will always be the United States that produces that next new thing.

The whole notion of highly trained professionals chucking status and security to go for the gold with a chancy new company, of mere children or old geezers who have failed two or three times being given big money to try or try again, is definitely American. Companies like Intel, Apple, Microsoft, Cisco, Dell, and Google exemplify the protean nature of the system and the extraordinary value it has produced.

Yet all is not necessarily well in the U.S. high-tech establishment. The media focus on charismatic business leaders and hot new companies means that most people don't understand the real sources of technological leadership, particularly the entrepreneurial role of the U.S. government and the extent to which U.S. tech leadership is the result of government efforts. Nor do people understand that technological advance usually does not come from a flash of insight but is rather the fruit of an ecosystem. If you don't have a camcorder industry, you probably won't make digital cameras.

Do you know why Bill Gates is the world's richest man? I'll bet you think he had a fabulous idea for a new kind of software company that would get a virtual monopoly on the heart of the per-

sonal computer. Good guess, but wrong. Gates and most of the U.S. technology industries owe their leadership as much to U.S. victory in World War II, defense policy, and overall industrial primacy as to entrepreneurial virtuosity.

Preliminary development of computers took place during the war as part of the effort to break the German and Japanese codes and to calculate artillery firing sequences. The first modern computer was demonstrated on February 15, 1946, shortly after the war ended. It covered 1,800 square feet, and when it ran, the room temperature rose to 120 degrees.

After the war, there wasn't a lot of interest in monsters like this. Great Britain had the interest but not the money. In the United States, the smart guys at GE, RCA, and other major companies anticipated a commercial market, but it would take time to develop. IBM CEO Tom Watson said, "I think there is a world market for maybe five computers." The U.S. government was the only entity with both an interest and the resources to pursue computer development. They saw the potential and poured in the bucks.

IBM, then a maker of office and data-processing equipment, successfully bid to get a big share of the money. Through the 1950s and early 1960s, the U.S. government paid over half of IBM's R&D expenses. Based on this, IBM developed its revolutionary System 360 mainframe computer. Introduced in 1964, the 360 made the computer indispensable to corporate America. By the early 1980s, IBM controlled over 70 percent of the global computing market.

Then a small cloud appeared in the form of the Apple II personal computer. IBM initially dismissed the Apple II as a toy, but when it developed an enthusiastic following, word went out that something had to be done to put the upstart in its place—fast.

IBM had always produced its own components and software, thereby maintaining proprietary control over the sources of the technology. Now IBM's top executives wanted to get a personal computer into the market in a year and a half, so they opted for a skunk works operation detached from IBM that would use parts and software made by others and already on the market.

IBM's Management Committee convened in August 1980. Seated at the point of the V-shaped table, Chairman Frank Cary could survey an empire not unlike that of 19th-century Britain: the sun never set on IBM's offices sprawled around the globe. Decisions made at this table could rock governments and affect millions. But the decision made on this day would eventually rock IBM itself. Skunk works head Bill Lowe made the presentation and asked for a go-ahead on his program. He got it after only a little discussion.

Lowe had actually started in early July when one of his executives, Jack Sams, talked software with Bill Gates, a 24-year-old college dropout. When the discussion got to the operating system, Gates did not have one to sell but bought one from a Seattle programmer for \$75,000 and arranged to license it. IBM agreed to pay Microsoft \$80,000 and not to restrict Microsoft from licensing to

other firms. That anyone would be able to duplicate the IBM PC or that the arrangement would give Gates the power to control a new technology standard was unimaginable.

At first IBM seemed vindicated. By 1985, IBM had an 80 percent share in the personal-computer market. Apple had been put in its place. Or so it seemed. Compaq was the first clone in 1983 and was followed by hundreds of others. Bill Gates, who collected royalties on them all, was on his way to becoming the world's richest man as IBM's market share gradually fell to 10 percent.

The point is not how good a negotiator Gates was, or how myopic IBM was, although Gates was really good and IBM was really blind. The point is that the U.S. government created the world's dominant computer industry. If IBM had not moved boldly and shrewdly to seize leadership, another American company would have been the industry leader. There was never a chance that it would be a European or an Asian company.

The U.S. electronics, aerospace, and telephone industries are equally in the government's debt. RCA was created when Woodrow Wilson recognized the significance of radio communications at the Versailles Conference. He directed

invented the airplane, American aircraft manufacturers were lagging seriously behind their European competitors by 1915. To reverse this situation, Congress established the National Advisory Committee for Aeronautics and gave it the mission of ensuring aeronautics leadership by developing and freely disseminating aerospace technology to U.S. industry. Boeing was launched in 1916 with a \$575,000 Navy contract for 50 trainer seaplanes, and it prospered for the next 40 years mainly on defense contracts for bombers. The Boeing 707 that gained fame as the first American commercial jet was just a version of the KC135 Air Force tanker.

Finally there is the example of AT&T and its Bell Laboratories. Early telephone was hampered by incompatible standards. To overcome this discrepancy, the government agreed to make AT&T a regulated monopoly on the condition that it provide universal service. As a result, Bell Labs became a unique national asset. For over 50 years, the labs regularly turned out new inventions and Nobel Prize winners.

After inventing the semiconductor along with John Bardeen and Walter Brattain, William Shockley returned from the labs to his native Palo Alto to establish

nological superiority. Domination had nothing to do with market forces and everything to do with targeted policy decisions. Additionally, America was the world's first mass market. U.S. manufacturers used government grants to expand their plants during the war in order to fulfill government materiel contracts. After the war, these essentially free plants turned to satisfying a continental market in which long pent-up demand was suddenly unleashed. A virtuous circle was created in which new technology led to new products that could be produced in America at far lower cost than anywhere else, even as American workers were paid more than anyone else.

Second, these industries and technologies were all tied up with manufacturing. Manufacturing in 1948 accounted for about 28 percent of GDP. It paid nearly 8 percent more than the general wage level. It was the source of enormous wealth and technological progress, and the great momentum of that time is still felt today. Yet early harbingers of changes to come were also present.

American technological supremacy bred a carelessness about its nurture along with overconfidence that led to missed opportunities. Japan recovered quickly from the war and developed a voracious appetite for new technologies. At the same time, the collaboration between U.S. industry and government began to give way to mutual suspicion and a new economic trend toward *laissez-faire*. Linkages between one industry and another and the role of manufacturing were increasingly de-emphasized. Finally, research and education expenditures began to be cut as spending on consumption increased.

In 1944, Alexander M. Poniatoff founded Ampex Corporation to make electric motors for the Navy. But demand collapsed at the war's end, and the company had to find something else to make. At about this time Masaru Ibuka, an engi-

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his assistant secretary of the Navy, Franklin D. Roosevelt, to use Navy funds, contracts, and influence to create a new corporation to achieve American leadership in radio. Subsequently RCA not only took leadership in radio but pioneered television and founded the global consumer-electronics industry.

The U.S. aerospace industry likewise owes its dominance to a generous government. Although the Wright brothers

Shockley Semiconductor Laboratories. Most of the American semiconductor industry traces its lineage to this lab.

My point is twofold. First, the apparently effortless technological supremacy Americans assume as a birthright is significantly based on special, transient circumstances. The two World Wars and the Cold War stimulated a massive and, for Americans, unnatural collaboration between government and industry to develop tech-

neer who had spent the war making electrical parts for the Japanese navy, and his friend Akio Morita had just formed Tokyo Telecommunications Engineering Corporation (later known as Sony). They too were looking for something to make.

What both companies were looking for was actually in Germany. During the war, U.S. soldiers were astonished to hear the Munich Philharmonic Symphony Orchestra playing at 3:00 AM. What were these people doing giving concerts at that hour? They weren't. To make people think Hitler was speaking at one place when he was actually elsewhere, the Germans had developed the magnetophon, a magnetic tape recorder that could duplicate sound and retain it far better than any other device of the time. Once the war was over, officer Jack Mullin recovered a couple from a German radio station and brought them to San Francisco. Poniatoff knew immediately that he had found what he was seeking. It was powered by three electric motors similar to those Ampex was already producing.

He worked out a deal with Mullin, and the two cloned the German machine. After experts from General Electric and Stanford Research Institute advised that the device had no future, the two showed it to Bing Crosby. He loved it. Because the sound quality was so good, he could record his shows instead of doing them live and could spend more time on the golf course. With Bing's backing, the recorder and Ampex took off. The product line was quickly extended to include precision recorders for a variety of military, scientific, and industrial applications.

Meanwhile, in Tokyo, Ibuka was inspired to develop a clone. The Japanese market was then protected by high tariffs and restrictions on investment by foreigners. Ampex could not produce or sell there, and Sony's new recorder quickly dominated the Japanese market. Then, on one of his trips to the United

States, Ibuka made another discovery—the transistor, which had just been invented at AT&T's Bell Labs. With this device AT&T could have controlled the future of the entire electronics industry. But as a regulated monopoly under U.S. law it was required to license the technology to all comers, foreign or domestic. Ibuka bought a license for \$25,000. While American competitors slept, Sony introduced the first transistor radio in 1955. It immediately became a huge hit, especially in the open American market, where competitors were self-satisfied, tariffs low, and customers willing.

BARRIERS BADLY HURT U.S. COMPANIES BY PREVENTING THEM FROM EXPLOITING THEIR ADVANTAGES IN THE JAPANESE MARKET.

Television, pioneered by RCA, became the big new thing in the 1950s, but time-delay broadcasts were expensive, complicated, and unreliable. RCA chairman David Sarnoff put up \$50 million and called on his engineers to develop within five years a video recorder. Poniatoff also sensed the potential of video recording and gave his engineers \$15,000 to try to beat RCA. It worked. When the convention of the National Association of Radio and Television Broadcasters met in 1956, it was the upstart Ampex rather than the giant RCA that stunned the audience with a perfect video playback. Ampex had exclusive ownership of the key patent rights and, at this moment, controlled the destiny of video recording.

Sony, meanwhile, was not asleep. As part of a consortium organized and funded by the Japanese government, it was able to produce a near copy within a few months. Although other Japanese companies soon followed, all faced the problem of infringing the Ampex patents. Ampex, however, faced problems of its own. Not only did it need transistor technology to enable further miniaturization,

but it also was barred by Japanese government policy from entering the growing Japanese market without a partner.

No one in the U.S. government saw any strategic value in a video recorder, but the Japanese did. On top of that, the United States viewed Japan's trade barriers as hurting only Japan by preventing Japanese consumers from buying superior U.S. products. But the barriers also badly hurt U.S. companies by preventing them from exploiting their advantages in the Japanese market and by forcing them to transfer their technology in order to gain market entrance. A Sony-Ampex joint

venture was concluded in 1958. Sony got this deal not because Ampex wanted it, but because it was the only way for Ampex to get into the Japanese market.

After a financial hiccup, Ampex named Bill Roberts as its new CEO. He unilaterally canceled the deal in 1960 because of suspicion that Sony was misappropriating Ampex intellectual property. Sony sued for breach of contract and won a fully paid-up license for the Ampex technology. The race was on.

None of this dampened Wall Street's enthusiasm for Ampex. It joined a select group of favored technology stocks, and there was great pressure on Ampex to match them in growth and profitability. Unsure of his company's ability to keep up with the rest of the glamour fraternity simply by growing its core business, Roberts went on an acquisition binge. Meanwhile, Sony and the other Japanese makers were sticking to their knitting. By the late 1960s, Sony was the leader in Japan and had made significant inroads in the U.S. market.

To fight back, Roberts presented an "Instavideo" prototype to the board in

early 1969. The new recorder was unveiled before 300 reporters at the Americana Hotel in New York on September 6, 1970. It was a smash hit. Heroic Ampex seemed once again to have used its entrepreneurial and technological virtuosity to throw a Hail Mary and beat the big guys in the last minute of play. Ampex's stock price jumped 50 percent in two days.

Then it all fell apart. Instavideo should have been manufactured in Chicago close to the R&D team, but Toshiba was willing to fund a new plant if the product was produced in a joint venture in Japan. Turning down a plan to produce it jointly with Motorola or Magnavox, Roberts said he didn't need any more U.S. competitors and opted for the Toshiba deal.

Three years later, Sony launched Beta-max as the first commercial consumer VCR, and in 1976 JVC launched its VCR. Over the next 15 years, the VCR became the biggest consumer product ever. While Ampex struggled to survive on royalties from the licensing of its old patents, Sony became a \$50-billion company with dominant positions that made it a formidable challenger even to the most powerful American technology companies. The VCR became a Japanese monopoly, and the United States was out of the business altogether.

Ampex was not the first U.S. company to fall victim to inappropriate U.S. trade policies and its own poor management. By 1972, the textile and steel industries were failing to compete with the Japanese and losing market share. RCA and the rest of the U.S. television industry had given up on black-and-white television, and within four years the Japanese had 50 percent of the color market, on their way to 100 percent. Radio production had long since moved to Japan, and stereo sets would soon follow.

The 1980s saw continuous trade conflict between Japan and the United States as Western manufacturers fought to survive the flood of high-quality, low-cost

The U.S. government has been co-operating with the Libyan intelligence service on the issue of terrorism and al-Qaeda.

Last month the notorious Libyan intelligence chief Musa Kusa and a group of associates flew from Tripoli to Guantanamo Bay to meet with Libyan prisoners captured in Afghanistan. Most of the "enemy combatants" are expected to be "rendered" to Libyan custody soon for more intensive interrogation. The U.S. has also agreed to provide counterterrorism training to Libyan intelligence officers. The collaboration, approved at the White House level, will almost certainly be controversial if surviving family members of Libyan terrorism victims find out. Musa Kusa was the organizer behind the Libyan downing of Pan Am Flight 103 in 1988 that led to the deaths of all 259 persons on board and 11 people on the ground. The training agreement is a *quid pro quo* to reward the Libyans for their help in closing down Pakistan's A.Q. Khan nuclear trafficking network.



A Homeland Security Customs Enforcement Department top-secret audit of contracting in Iraq is beginning to reveal a level of corruption and fraud that is crippling both reconstruction and self-defense efforts.

Water and electricity supplies are at lower levels than one year ago, while the lines at gas stations have become longer. A weapons procurement of more than \$5 billion for the Ministries of Defense and Interior under interim Prime Minister Iyad Allawi has reportedly completely disappeared, while a \$300 million purchase of 24 military helicopters from Poland bought obsolete aircraft, many of which had already been stripped for parts. Work has never started on hundreds of millions of dollars in infrastructure-improvement contracts given to ministry cronies. Several deputy ministers who balked at signing multimillion-dollar fictitious contracts have been fired and replaced by more amenable appointees. Meanwhile, the disproportionate number of Kurds in the Defense Ministry is diverting funds and equipment to *pesh-merga* militia units preparing to seize Kirkuk. On the other side of the Green Zone, the Interior Ministry's police commandos provide cover for anti-Sunni hit teams from the Iranian-supported Badr Brigade and from rogue Shi'ite radical Moqtada al-Sadr's Mehdi Army. The Potemkin-village Baghdad government is increasingly irrelevant to the future of Iraq.



The Department of State is becoming Secretary of State Condoleezza Rice's Dreamworks on the Potomac,

with oversized offices stuffed with high-paid bureaucrats churning out lots of images and celluloid action but little of substance. The highly touted Public Diplomacy office has yet to begin operations, with Karen Hughes apparently preferring to spend her time in Texas. A major reorganization is shifting resources to deal with rogue regimes, transnational terrorist groups, and weapons proliferators. A new Bureau for International Security and Nonproliferation will be formed and will include an office focused exclusively on efforts by terrorist groups to obtain weapons of mass destruction. How it will co-ordinate with the FBI, CIA, and Homeland Security, all of which are already doing the same thing, is unclear. A second new bureaucracy promoting democracy around the world will include a Deputy Assistant Secretary for Democracy.

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