William Charles (''Bill'') Norris

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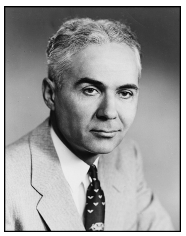

William C. Norris, circa 1950s. (Courtesy of the Charles Babbage Inst., Univ. of Minnesota, Minneapolis.)

In 1872 Bill's Grandfather Norris migrated from Pennsylvania and homesteaded a farm on the Republican River in south central Nebraska. He built a log house, planted corn and alfalfa, and raised cattle and hogs. Bill's father, William Henry Norris, eventually farmed a thousand acres.[1] He was a big, introverted, undemonstrative man. Norris remembered his father as ''a rather quiet fellow,'' with whom he ''didn't normally communicate so much.'' By contrast he remembered Mildred Norris as a very loving mother. ''I could communicate with my mother much better,'' Norris recalled. ''And my mother was always prone to encourage me to reach my goals.''[2]

Bill Norris looked back on ''an ideal boyhood.'' The river was so clear ''you could actually fish with your hand.'' The prairies, still marked by old buffalo trails, gave Bill opportunities to shoot squirrels and to trap. Lacking any brothers, he pursued most activities alone. ''I was left to my own devices to a considerable extent,'' he recalled, and became ''more of a loner than a socializer.''[3]

School years

Bill and his two sisters were among fewer than a dozen pupils who attended a one-room schoolhouse where their mother had been the first teacher. The disadvantage Bill found there was that the school's educational content was not as extensive as that in big-city schools.[2] There was a clear expectation, his twin sister Willa remembered, that they get good grades and go on to college.[1] Along with education, the most important value was keeping a good name for oneself. Bill's father stressed the importance of integrity, honesty, diligence, paying one's debts, and keeping one's word.[2,4]

As Bill grew older, he took on heavier farm chores, including herding several hundred cattle. He later attributed much of his success to the lessons of farm life: ''A successful farm embodies entrepreneurship. … We shared the rewards, and we shared the hardships.''[5]

The boy's love of technology developed early. The farm's relative isolation taught him how to improvise mechanically: ''You can't call up a local repairman and have him come out and fix something immediately, so you naturally develop some of your creative instincts by having to fix things.''[3]

Bill had to become ''an artist with bailing wire.''[5] In the farm's well-stocked shop building, he fixed equipment and pursued his own projects.[2] From an early age he subscribed to *Popular Mechanics* and would send away for many of its advertised items. The most important purchase was a big red book, *The Boy Mechanic*, containing plans for several projects that eventually led him to craft his own bellows and forge.[2]

When Bill was about 10, his father brought home a radio that could pick up both music and news from Kansas City. Bill was ''extremely interested'' in how it worked, and he soon built a crystal set from mail-ordered parts.[2]

In high school he did not work especially hard, bringing home neither textbooks nor homework.[1] However, his interest in radio burgeoned. Bill had long subscribed to the radio amateurs' magazine, *QST*, and he ordered plans and parts from its advertisers to build his own ham transmitter and receiver. They could reach as far as Australia, and while the coded conversations were usually very short, Bill's real excitement came in ''making the contact.''[2] His room became cluttered with models, wires, and test tubes, and its walls were covered with postcards and call letters from other ham operators around the country.[1,6] Ham radio gave him a sense of both power and potential—he ''could do things'' and ''had a chance to develop and be somebody.''[2] His goal was sharpening: ''I wanted to be an engineer.''[6]

College

By his senior year in high school, Bill's interest in radio had solidified his intention to study electrical engineering. That fall he enrolled at the University of Nebraska in Lincoln. He soon became involved with the Radio Club, and with other students spent much time building ham transmitters and receivers.[3]

A serious illness in his sophomore year affected his grades on some courses.[2] His academic performance may also have suffered because of his part-time work for a radio repair shop. His professors encouraged him by providing space for his radio work in a corner of the electrical laboratory, and ''other students were impressed.''[3] He recalled his job far more brightly than his classes. Looking back, he valued the electrical engineering department more for the encouragement he received than for its practical learning.[2]

Farming and selling

In 1932, a month before Bill was due to graduate, he faced his first real adversity—his father died suddenly of a heart attack. Nebraska agriculture was already afflicted by the Great Depression that undercut its prices and by the Great Drought that desiccated its fields. Bill quickly finished his course work and returned home to try to save the family farm. It proved ''an enormous

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struggle,'' and at one point the family was down to its last $5.[7]

Two incidents from that time deeply shaped his outlook. The first occurred when, on taking cattle to market, he was forced to accept a painfully low price. On the way home, his biographer relates, ''he vowed that he would never again be put in a position where he had so little control.''[8]

The second incident came his first summer back, when the drought killed the feed corn crop and many farmers had to sell off their breeding stock. Bill noticed that the abundant Russian thistle bushes in the fields were still green and growing. Although most farmers considered them poisonous, Bill recalled seeing cattle chewing on them, so he cut hundreds of acres of thistles and stored them for feed. His own cattle seemed to thrive, so ''I went around and bought additional cattle at distress sales. They went through the winter fine.''[3] His triumph was ''damned stimulating. There was a lot at stake, but I had taken the chance, and it worked. That added greatly to my sense of self-confidence.''[9]

He supplemented his income by working part-time for the local office of the Agricultural Adjustment Administration, the New Deal agency aiding distressed farmers, and it gave him an abiding sympathy for their plights. He also used some of his engineering training in laying out terraces and dams for AAA-assisted irrigation and soil conservation projects.[2,10]

After two years his mother could manage the farm alone, and Bill was free to pursue a career. He came to appreciate his forced detour. Job prospects for graduating engineers had been poor, but his family's adversity meant that ''at least I was able to be creative and develop skills.''[10]

Westinghouse offered Norris his choice of a part-time job as an engineer at $8 a month or a full-time job as a salesman at twice as much—and his need to eat prevailed over his strong preference to engineer.[11] He stayed with Westinghouse seven years, selling X-ray and other technical equipment across several Midwestern states. Although he became good at selling, he wanted ''to get out of it as fast as I could'' and back into engineering.[2]

US Navy

His chance came with the onset of World War II, when he went to work in Washington, D.C., for the US Navy. He began as a civilian employee doing routine wiring for gun mounts. Then he obtained a commission in the Naval Reserve and was assigned to work seeking better ways to intercept and decode enemy radio signals. It would become the springboard for the rest of his remarkable career.

He began by recording and processing the intercepts, then helping develop equipment to identify German U-Boats and find their locations. He was soon assigned to a high-powered research group of 200 physicists, mathematicians, and engineers developing better decoding equipment. It was headed by a Yale mathematics professor, Howard Engstrom. Initially, their most sophisticated tools were electromechanical punch-card tabulators and calculating machines. Massive amounts of information had to be gathered, sorted, and collated, so the navy contracted with several companies to build faster machines with more electronic components. Engstrom's group was charged with specifying what was needed and adapting what was produced.[12]

Norris had his name included on a couple of the group's patents, but his action orientation, forthright manner, and ability to sell his ideas moved him quickly into management. He was given responsibility for a large project to develop location-finding equipment. He had to take large risks, and it taught him that it is ''very important in life to be sure that you can handle failure. If you can, then you'll be willing to take much greater risks and accomplish things that you couldn't otherwise do.''[2,3]

Norris learned other lessons: to appreciate superior technical talent, to deal with the quirky behavior that sometimes accompanies it, and to set performance standards without destroying creativity. He also learned how to put together all the pieces of a problem and create a system for solving it. From the urgency

Background of William Charles (''Bill'') Norris

Born 14 July 1911, Inavale, Nebraska. Died 21 August 2006, Bloomington, Minnesota. **Education:** Univ. of Nebraska, B.Sc. (electrical engineering), 1932. **Professional experience:** Westinghouse, sales engineer, 1935–1941; US Navy, researcher, 1941–1946; Engineering Research Associates, founder and vice president, 1946–1951; Sperry-Univac, VP, head Univac Division, 1956–1957; Control Data, founder, president, and CEO, 1957–1986. **Selected honors and awards:** IEEE Founder's Medal, 1985; National Medal of Technology, 1986; Minnesota High Technology Council Lifetime Achievement Award, 1995; National Business Incubation Founders Award, 1998; Minnesota High Technology Association Tekne Lifetime Achievement Award, 2001.

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of the location-finding project, he acquired "a sense that it is possible to do these things" and to do them fast.[2] The work was top-secret to the outside world, but within the group "there was none of this business of hiding results in order to get credit. Everybody was working on a common goal, and they were very open" in sharing their results, which were "fantastic."[13]

In Washington he met and married Jane Malley from West Virginia, who, as an officer in the WAVES, was serving as administrative assistant in a related section. They would eventually have eight children together.[14]

ERA and Rand

By the end of the war, the Engstrom group had built some special-purpose "computer-like devices" with important new components—including an electrostatic vacuum-tube memory.[15] Engstrom and Norris led a group of several dozen code-breakers in attempting to go into business for themselves. Team members were convinced they could take the next step and build a general-purpose digital computer. They soon found that Wall Street did not consider computers a serious investment opportunity, despite the promise of US Navy business. Close to despair, through cocktail-party conversation they eventually made contact with a Washington, D.C., businessman, John E. Parker, who was seeking postwar use for a large plant in St. Paul, Minnesota, where his company had been making wooden gliders. Parker and other investors backed the technical group to start Engineering Research Associates in the plant. Each side owned half the shares. Parker was president; Norris began as a vice-president and directed marketing, but he soon also took charge of general operations.[16]

Although Norris never returned to the technical side of the business, he led ERA as it became the nation's technological leader in high-performance computing. For the US Navy, ERA developed a high-speed, general-purpose digital computer, which it attempted to market commercially. It also developed state-of-the-art memory drums, which it licensed to IBM. To exploit the growing market would have required major new investments, but, Norris recalled, Parker "was more interested in a fast buck."[17] In 1952, he sold ERA to Remington Rand for $1.7 million—giving investors a healthy profit on their $20,000 of seed capital but denying the firm its opportunity to dominate the nascent commercial computer market. Decades later Norris still bristled: "it was the chance of a lifetime, and we missed it."[18] ERA "might have been the IBM of the industry."[19]

Remington Rand had already bought the fledgling company that J. Presper Eckert and John Mauchly had started in Philadelphia to produce their new Univac computer. Norris and the ERA division remained in St. Paul, completely separate from the Philadelphia division. Norris was made a vice-president of the parent company and put in charge of both divisions, a recognition of his record of profitability. He attempted an ambitious development effort, but it was curtailed, and "we … watched IBM pass us as if we were standing still."[20] Only when Rand merged with Sperry Gyroscope in 1955 did the new leadership finally combine the two computer divisions under the well-known Univac name.[21]

Control Data

Frustrated by Sperry-Rand's continuing unwillingness to seize opportunities, Norris decided in 1957 that he'd had "a belly full of big companies."[22] He led a group of the company's employees to form the Control Data Corporation (CDC) in an old newspaper warehouse in Minneapolis. They financed it by personally selling more than a million dollars' worth of stock to themselves and the public. Norris was the largest investor with $75,000 of his and his wife's money. They mortgaged most of what they owned: he assured his family that, if all else failed, they could go back to the Nebraska farm.[23]

At the urging of former ERA engineer Seymour Cray, Norris focused on the needs of scientists and engineers for high-speed computers. Cray began designing one of the first transistorized computers, and when its costs threatened to drain the company's

resources, Norris halved all salaries—including his own—so work could proceed.[24] Cray's team succeeded in building the world's first supercomputer, and CDC soon established a profitable hold on this new niche market. Within six years of starting the company, Norris appeared on the cover of *Business Week*, with a story of how he "combined the precise planning of a Navy officer with the steady hand of a tough engineer."[25]

Norris led CDC to acquire small makers of computer peripherals—printers, tape drives, disk drives, and memories. These businesses eventually made CDC the largest supplier in the industry. By the early 1980s, it employed up to 60,000 people and enjoyed more than $4 billion in sales of equipment and services. It was briefly the third-largest computer company in the world. Largely because of the two companies Norris had founded and their many spin-offs, Minnesota ranked high among the states in numbers of computer industry workers.[22,26]

Farm boy as industrialist

The great strengths of William Norris' career—as well as its weaknesses—can be traced to his Nebraska years. "He's a farm boy," his deputy at CDC once observed. "The things that shaped his life, his value system, go back to his experiences on the family farm."[27]

His drive to achieve was prodigious. At executive meetings he often talked about how "our names will be carved in stone."[28] He was considered "almost a fanatical long-range planner,"[29] who shunned routine administration because "it bores the hell out of me."[30] He obtained, he noted, "an enormous satisfaction out of taking on risky—but important—projects and seeing them succeed."[27]

He was known to be "the first to arrive at work," and to work "longer and harder hours than any of his associates."[31] He took home two full briefcases and would arrive the next morning like "a whirling dervish," overwhelming staff members with new projects.[32] At age 70, one reporter noted, "there is still that air about him of damn the torpedoes, full speed ahead."[33] Even at age 75 he would walk up the 11 flights of stairs to his CDC office.[34] At home he would swim vigorously in his pool and walk several miles every evening, carrying a notepad to record any new ideas.[35]

One of Norris' pioneering projects at CDC was to lead more than a dozen other US companies in 1982 to create the Microelectronics and Computer Technology Corporation in Austin, Texas. The MCC's purpose was to conduct joint research to keep up with Japanese competition in such fields as software, artificial intelligence, and computer design.[36] He revealed his hope that his tombstone would read, "He worked like hell to foster cooperation."[37] Yet he also gloried in his reputation for independence. "I can't count the times I've been called crazy," he once said. "Whenever I see everybody going south, I have a great compulsion to go north."[38]

Norris shunned routine administration because "it bores the hell out of me."

Norris claimed that "having engineering capabilities" had proven "very important" to his success as a manager. CDC undertook "some rather daring projects," and "without the technical ability I don't believe I would have been comfortable" committing the company to them.[39] He would finance money-losing projects for long periods rather than repeat Sperry-Rand's mistake of exiting efforts prematurely. Many things got done that might otherwise have died on the drawing board, but some projects were undertaken on a large scale before all pitfalls had been identified.[40]

Norris' leadership of CDC was notable in at least four other ways.

First, there was the boldness with which he tackled new markets. He started producing computer peripherals because "if he didn't jump first, CDC would end up as someone else's customer."[41] He succeeded in dominating much of the industry.

Second, he stood up to IBM when it was killing many prospective sales of CDC supercomputers by promising better machines that it would never bring to market. In 1968 Norris sued, charging IBM with monopolistic practices, including the touting of "phantom computers." He won a settlement worth many millions of dollars.[42]

Third was his effort to maintain an entrepreneurial spirit even as CDC grew into a Fortune 500 corporation. He tried to delegate authority "as low as possible in the organization" and to stay responsive to ideas from below.[43] Several times, employees—eventually including Cray—left to form their own, sometimes competing companies, and Norris actu-

Figure 1. William C. Norris with two female employees at the CDC plant in the Selby-Dale section of St. Paul, 1978. (Courtesy of the Charles Babbage Institute, University of Minnesota, Minneapolis.)

ally had CDC provide some of their venture capital.[44]

Fourth was his increasing conviction that business must address social needs by defining them as "business opportunities"—a philosophy of social responsibility for which he became most widely known.[45]

Social responsibility

Norris believed "corporations have a deep obligation to meet the needs of society. Otherwise, what's your reason for existing?"[34] He felt that the seeds of this conviction were planted when he viewed farmers' plight in the Depression. It reached fruition, however, with the 1967 riots in Minneapolis and his company's later success in starting plants in inner-city locations (see Figure 1). He focused on social projects "to try to help the system survive."[46]

As befits an engineer, Norris' dream was developing and applying new techniques to solve social problems. CDC eventually became involved in projects like growing vegetables hydroponically, renting cars to ex-convicts, and providing health care on Indian reservations.[47] Norris devoted one wall of his office to photographs of farmers,[48] and several ventures reflected his desire to "help preserve the family farm."[49] Through an arm of CDC called Rural Venture Inc., he studied sheep-raising in the Midwest, farming on the Alaska tundra, and irrigation in Arizona.[50]

Norris believed that new technologies could capture the essence of the old one-room schoolhouse—teachers working one-on-one with pupils and pupils all learning at their own pace.[51] CDC spent nearly a billion dollars developing and promoting PLATO—a system of computer-based, interactive education and training.[47] Heavily based on long-distance communication with CDC supercomputers, PLATO proved too expensive for widespread use and was discontinued in 1986.[52]

More interested in achievement than in what money could buy, Norris drove a rusting Chevrolet, which during the company's early years was such an embarrassment that his colleagues finally persuaded him to trade it in for an Oldsmobile. He kept that for a dozen years.[10,53] He did not join a country club, and he wore old suits so long that his wife had to persuade him to buy new ones. The family lived for 25 years in the same modest house in St. Paul. When his wife talked him into building a larger one, he insisted that it be energy efficient, with an "earth-shelter" on three sides, a solar-heated swimming pool, and electric power from a 90-foot windmill.[54]

He repeatedly rejected stock options and bonuses for himself so that more was available for others.[55] At the height of CDC's success, when his shares were worth millions, he refused advice to sell. He later conceded the decision cost him millions, but said "I don't regret that for a minute, because money is not the most important thing. What is important is integrity."[2]

Life after CDC

After years of success, Norris' leadership of CDC ended in troubles. In the early 1980s, by one account, "the company's new products were constantly late, overpriced and out of touch with consumer demand."[56] By the mid-1980s, increasing competition from personal computers and newer supercomputer manufacturers inflicted huge losses on the company. Norris took increasing fire for his focus on socially useful projects.[57] In 1986, after 29 years as CEO, he stepped down from the chairmanship of the company he had founded.

Although Norris's chosen successor, Robert Price, shared much of Norris's idealism, financial pressures forced him to abandon most social-need projects. ETA Systems, created in 1983 as a spin-off to revitalize CDC's supercomputer business, was never profitable and was reabsorbed in 1989. When Price himself was replaced after only four years, CDC's new CEO would boast that "for the first time" the company had "a financial orientation," and "the only measurement that counts is earnings per share."[58] By 1992 the company, now greatly shrunken, was divided into two—Control Data Systems, which kept the remain-

ing computer business, and Ceridian, which handled information services.[59]

After retiring from CDC Norris continued to show, a reporter noted, ''a zealot's desire to enhance U.S. industry's ability to compete in an increasingly global marketplace.''[60] His work schedule loosened only a little: he attended an occasional play with his wife, and he worked one crossword puzzle a day.[2] His activity focused on the William C. Norris Institute, begun with an $8.8 million CDC grant. He worked to encourage consortia of businesses, engineering colleges, or school districts to explore innovative ideas. He also pursued development of computer-aided education and of computer-based courses for small businesses in Moscow.[61]

William Norris died on 21 August 2006, after a long battle with Parkinson's disease. Most of his concrete accomplishments—PLATO, MCC, even CDC itself—did not survive the man himself. His life demonstrated some of the possibilities—and some of the limitations—of fierce independence, self-confidence, and commitment to social responsibility. Perhaps had he not aimed so high and so widely he would have left a more durable legacy—but then he would not have been Bill Norris. As the world struggles to face social and environmental problems, to reconcile self-interest with community interest, he may yet be remembered as a prophet of an age of cooperation he did not live to see.

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