

# Betting the Company: Joseph Wilson and the Xerox 914

from *Forbes Greatest Business Stories of All Time* by Daniel Gross, et al.



Joseph Wilson, president of Xerox.

“Since the editors of *Forbes* are pretty fast when it comes to criticizing other people’s business blunders, we’ll use this space to tell a beauty on ourselves,” the magazine’s editors wrote in 1965. They recalled that in 1957 Joseph Wilson, then president of the Haloid Corporation, had visited their offices to tell them of his company’s plans to create a new kind of copier. “The *Forbes* men were impressed,” the magazine continued. “The president was a sincere, enthusiastic, extremely articulate man. He believed in what [the company was] doing. He had the facts and figures right at his fingertips. He understood finance and he understood technology. The president handled all our questions beautifully, professionally. And what did *Forbes* do with the story? Nothing.”

There was good reason for that: At the time, Haloid was a small manufacturer of photographic papers, with minimal earnings and few employees. Its plans to “found a whole new industry” seemed wildly optimistic. In fact, virtually no one predicted the staggering success that the company, which was renamed Xerox in 1961, would achieve. Not even Joseph Wilson.

By 1957, Wilson and his colleagues had spent a decade developing the commercial possibilities of the then-primitive copying technology that had been rejected by many of the country’s largest companies. As it developed the technology, the company protected the exclusivity of its rights by trading stock and anticipated revenues for access to its patents. Years before Haloid was ready to market its product, management had risked millions of dollars and years of their lives on an uncertain future.

In 1959 the gamble started to pay off: the company introduced the 914 copying machine. Weighing in at 648 pounds, the first modern copier occupied the floor space of a large desk, ground out copies at the excruciatingly slow pace of six per minute, and cost a whopping \$29,500. But the 914 left existing copying machines in its dust and, just as the visionary Wilson promised, marked the beginning of a brand-new industry. Yet it wasn’t technology alone that turned the 914 into the most successful commercial product of the 1960s. Haloid implemented a creative sales strategy that made the 914 affordable and worry free: the company decided to lease and maintain the machines rather than sell them.

## Frustration Leads to Innovation

When the 914 was introduced, there were other copying devices on the market. Thomas Edison himself had invented a mimeograph machine, and the A.B. Dick Company had a copier of sorts on the market as early as 1887. But mimeography was a far cry from modern duplication. It involved typing a document on carbon paper, placing the carbon in a machine, and “running off” copies in a laborious, messy process. The state of the art improved somewhat in the 1930s with the proliferation of offset printing presses, but they were massive, expensive, slow, and impractical for average businesses.

An imaginative and restless patent attorney changed all this. Chester Carlson was frustrated by how long it took to make photocopies of patent documents. “There must be a quicker, better way of making these copies,” he said.

The twenty-nine-year-old Carlson, who had studied physics at the California Institute of Technology before going into law, started tinkering with photographic technology in 1935. Like another technology pioneer, David Sarnoff, Carlson turned first to one of the world’s great research resources: the New York Public Library. There he learned about a Hungarian scientist who used powder and static electricity to duplicate pictures. Believing he could use these discoveries as a basis for an efficient paper copying process, Carlson set up a make-shift laboratory in an apartment above a bar in Astoria, Queens and began his own experiments with “electrophotography.” With the help of Otto Kornei, a physicist and German refugee, Carlson spent the better part of three years mixing chemicals and testing different methods. After a great deal of trial and error, he ultimately devised a complex five-part process that used electric charges, powder, and heat to create images. It was revolutionary because it required no chemical reaction and could be done without messy ink. On October 22, 1938, he successfully tested his new process by making an image of a piece of paper bearing the words “10-22-38 Astoria.”

Carlson tried to peddle his discovery to the giants of American technology, but executives at companies like IBM, Kodak, and RCA regarded the young inventor more as a home-spun mad scientist than a prospective titan of industry. Twenty-odd companies backed away. “How difficult it was to convince anyone that my tiny plates and rough image held the key to a tremendous new industry,” Carlson later said.

Finally, someone listened. Dr. R. M. Schaffert, the head of the Graphic Arts Division at Battelle Memorial Institute, a nonprofit research outfit in Columbus, Ohio, saw the potential of Carlson’s process: “Mr. Carlson’s invention of electrophotography appears to have possibilities, and if it can be made to work in a usable manner, broad commercial application can be expected. This process looks like a good research gamble.” Battelle bought a 60 percent interest in Carlson’s findings and in 1944 Carlson, now working with a team of Battelle scientists, began to further develop the technology.

## **Out of the Lab, into the Marketplace**

In 1944 the Haloid Corporation in Rochester, New York, faced a crisis. Founded in 1906 to sell photographic paper and supplies to companies like Eastman-Kodak, Haloid had experienced steady growth over the years. During World War II, when the army’s extensive use of reconnaissance photography sparked a boom in the photographic paper industry, Haloid thrived. By 1947, it was a modestly profitable company with revenues of over \$7 million and earnings of \$138,000. But demand for its products diminished as the war wound down, and the company was left to fight for a share of the smaller market.

Joseph C. Wilson, a grandson of one of Haloid’s founders and son of the man who was the company’s president when it went public in 1935, ascended to the position of president in 1945. He realized that the company had to diversify in order to survive. “We’ve got to stop relying wholly on photographic paper,” he said. “We’ve got to come up with new products for the market.” Ideas surfaced for new kinds of photographic paper and for developing products for seismic recordings, among other things, but none had the breakthrough potential Haloid needed.

John Dessauer, Haloid’s head of Research and Engineering Division, scoured hundreds of technical journals in search of new possibilities. In an article in Kodak’s *Monthly Abstract Bulletin*, Dessauer found a summary of an article about Battelle’s work on electrophotography. Because the process was akin to photography and used treated paper, Dessauer saw a potential new area of business. Wilson was immediately intrigued: “It was crude, but to me it had extra exciting potential.”

The two men immediately set off for Columbus. They liked what they saw when they got there. “Of course, it’s got a million miles to go before it will be marketable. But when it does become marketable, we’ve got to be in the picture,” Wilson said. The man was nothing if not a big thinker. An inveterate reader, he peppered his speeches and presentations with quotations from philosophers and poets. He saw business as a noble quest and urged his colleagues to press on with lofty rhetoric. Perhaps this gave him the endurance and determination to travel the “million miles” between the Battelle laboratory and commercial success.

Wilson called Sol Linowitz, a Rochester lawyer who had long sought Haloid’s business. In their first collaboration, they negotiated for the rights to the technology that so many other larger firms had rejected. In 1946 they reached an agreement: Haloid would pay \$25,000 to Battelle each year, plus 8 percent of future electrophotography revenues, in exchange for the right to develop Carlson’s technology.

## **Patience, Patents, and Predictions**

Knowing a long, expensive, and massive research and development process was necessary to achieve their goal, Wilson and his team focused on short-term objectives. First, the process needed a name. In 1948 a Battelle researcher and an Ohio State University classics professor coined a new word: *xerography*, from the Greek meaning “dry writing.” The executives at Haloid liked the word. “It was short, startling, unlike anything else ever seen in advertisements,” John Dessauer later wrote.

In an effort to show the public that it had tapped into an exciting new development, Wilson hastened to set a deadline for xerography’s first demonstration: October 22, 1948, the tenth anniversary of Carlson’s first copying effort. On that date, at a conference of the Optical Society of America in Detroit, Wilson, along with Battelle scientists, explained the process and displayed a red box that produced a single copy within a minute. Soon after, Wilson’s father, Joseph R. Wilson, made a bold prediction: “The first commercial adaptation of xerography, the Xerox Copier Machine, Model A, will be made in 1950.”

But this prediction proved fanciful. Haloid scientists couldn’t produce a workable machine by 1950—or even by 1955. Each of xerography’s many steps proved complex, and getting them to work in a foolproof, seamless, and reliable process was difficult. As his company labored toward the larger goal, Joseph C. Wilson took several steps to insure its short-term survival. In 1950, Linowitz and Wilson renegotiated Haloid’s contract with Battelle to become the sole licensee, thereby prohibiting other companies from gaining access to Carlson’s discoveries. But that didn’t allay the company’s fears. Carlson’s basic patent was set to expire in 1957, at which time firms with greater resources than Haloid would be able to use the technology with impunity. Wilson soon realized that the only way to guarantee Haloid’s investment and any future was to boost research and development and gain new patents. “If we own the rights to the new facets of xerography, our position will be less vulnerable,” he said. In 1953 alone, Haloid received ten new patents in xerography. The following year Linowitz, the lawyer originally hired for a one-shot deal, became vice president in charge of a new department of licenses and patents.

Since they were unable to produce a functioning copier quickly, Wilson and Haloid’s scientists contented themselves with incremental progress. The research yielded profitable applications in the form of new products, based at least in part on the xerographic technology. In 1955, for example, Haloid introduced Copyflo, the first totally automated xerographic machine, a tool that could make prints from microfilm.

## **Money and Morale**

Between 1947 and 1960, Haloid spent \$75 million—twice its operational earnings—on xerography research. To raise funds, the executives borrowed, issued stock, and generally scraped by. In 1951, the company borrowed one million dollars from Lincoln Alliance Bank, and many employees bought stock as an expression of support. “The members of our team were all gambling on the project,” Dessauer told the *New Yorker* in 1967. “I even mortgaged my house.” And Wilson insured that those who didn’t purchase stock also had a personal stake

in the company's future: he started a profit-sharing plan in 1945. As Dessauer later wrote, "The challenge of the administrator is to channel the effort of the revolutionary into productive endeavors that advance corporate objectives."

Although there was a strong family-like feel to Haloid, the 1950s were difficult years for the company. "Various members of our own group would come in and tell me that the damn thing would never work," said John Dessauer. Maintaining morale among the crucial research staff became a difficult task. But Wilson held the enterprise together. "Haloid is on a soul-size search," he liked to say. He remained intently focused on his goal and showed a remarkable loyalty to his employees, refusing to fire or lay off people.

The chief executive also monitored the research closely. "Wilson had a capacity for viewing projects and problems in their broadest context, yet he seldom neglected the details in small print," wrote former Xerox employee Blake McKelvey in an unpublished biography of Wilson. "After each of their frequent trips to Battelle, he would prepare, or ask Dessauer to prepare, a summary report of the matters discussed, the decisions reached, and the actions planned."

Keeping on top of the company's progress was necessary because larger outfits, like Kodak, 3M, American Photocopy Equipment, and Smith-Corona Marchant, were all developing and producing copying machines. But thanks to Haloid's patent strategy, none of the others employed xerography. Haloid believed this crucial difference would prove its ace in the hole.

Staking his company's future on the process, Wilson kept Haloid independent rather than enlisting larger firms as partners. He wanted to reap the entire windfall should xerography prove profitable. As a result, Haloid was forced to borrow and barter in order to gain crucial necessities. In 1954 the company received a \$3-million loan from Massachusetts Mutual Life Insurance Company to build a new factory on the 100 acres of land Haloid had purchased in Webster, a rural farming town about fifteen miles outside of Rochester. Two years later, in 1956, Haloid bought the four basic xerography patents and licensing rights on improvements of them from Battelle. It paid for this transaction with the only currency it had: some cash, its stock, and its promise. Battelle received 25,000 shares, \$500,000 cash for each of the next three years, plus a guarantee of 3 percent of xerographic sales through 1965.

## **Preparing the Ground for the 914**

In the mid-1950s the mythical copier, dubbed the 914 because it could duplicate copies on paper up to nine inches by fourteen inches long, was still a few years away. Even though other products were entering the steadily growing copying market, Wilson didn't rush the 914, for he knew his product had to be perfect. In 1958, Haloid spent nearly \$2 million of its \$27.5-million revenues on continuing research. Officially changing its name to Haloid-Xerox, Inc., the company issued a promising report: "During the next few years, we will market copying devices, microfilm enlargers, computer printers. A continuing flow of xerographic products is anticipated for many years to come." In 1956 the company created a partnership with the Rank Organization, a British conglomerate. Rank-Xerox, as it came to be known, would sell xerographic products outside North America. Meanwhile, Wilson began to lay the groundwork for the 914's debut. But the efforts sometimes literally backfired. When Wilson and other Haloid executives took a prototype for a demonstration in London, the copier started to smoke and nearly caused a fire at the Piccadilly Hotel.

Even while the 914's imminent availability was announced, Haloid's scientists continued to toil in the firm's laboratories. The 914 ultimately required 1,260 components, all of which had to move together in harmony. At the push of a button, a bar of light would scan a document and then transmit the reflected image to a selenium-coated revolving drum charged with static electricity; the drum, having been charged in a pattern identical to the image on the document, rotated through a chamber of powdered ink (or toner) which clung to the charged image; then, the drum pressed the image onto paper; and finally, heat and the pressure of a roller sealed the image neatly.

Simply describing this process would not turn customers on to the new machine. So Wilson invested the 914 with a great deal of importance. In 1959, speaking before the Philadelphia Securities Association, Wilson called xerography “a fundamental new way of visual communications.”

## The 914 Creates an Industry

In August 1959, Wilson wrote an exhortatory letter to division heads, “We are about to give birth, either to our greatest success or to our greatest failure—the 914.”

The painstakingly developed product Haloid-Xerox had an initial sticker price of \$29,500—an enormous sum for a piece of office equipment. Realizing that such a price would prohibit mass sales, Haloid-Xerox adopted the strategy that made the product successful. It would lease the machines rather than sell them. Xerox set a monthly rental rate of \$95, which included 2,000 free copies. Clients would then pay four cents for each copy beyond the initial 2,000, which were tabulated on meters installed on every machine. Wilson described the leasing tactic as “the most important decision we ever made—except for backing xerography itself.”

In addition, Haloid-Xerox guaranteed maintenance of the 914s, which, despite the years of research and testing, could be temperamental creatures. As the business chronicler John Brooks later wrote: “It has to be fed and curried; it is intimidating but can be tamed; it is subject to unpredictable bursts of misbehavior; and, generally speaking, it responds in kind to its treatment.”

The first 914, shipped on March 1, 1960, entered a crowded field. Thirty companies, among them 3M and Eastman Kodak, were vying for positions in what had grown to become a \$200-million market. But the 914 was simpler and faster than its competitors, and it was much easier to use. Instead of creating a master page, users could place the document to be copied face down on the 914’s glass surface. Moreover, it produced copies on ordinary paper, while many of the others only copied onto treated paper. The 914 was a different animal. “What other copying machines were to carbon paper, the 914 is to other copying machines,” trumpeted a piece of promotional literature.

Through clever marketing moves, like a demonstration in New York’s Grand Central Terminal, the product became an immediate success. The company’s revenues almost doubled from \$31 million in 1959 to \$59 million in 1961. By 1961, 10,000 copiers had been installed. Peter McColough, who had risen to vice president of sales, rapidly expanded the existing sales and maintenance staffs, opening new offices in major cities across the country. And on April 18, 1961, just weeks before the company’s stock began to trade on the prestigious New York Stock Exchange, its shareholders approved an official name change to the Xerox Corporation.

The following year, when sales surged to \$176 million, *Forbes* heralded not only the company’s arrival, but its future. “Potentially, Xerox is not so much a company as an industry.” By 1962 the office copying business was worth \$400 million, up from \$40 million a decade before. And the 914 was, as *Financial World* put it, “the Cadillac of the copier machines.”

The virtual overnight success of the 914 didn’t change Joe Wilson. Rather, the company’s success created a more visible platform for his unique business style. In 1961 a *New York Times* reporter covering his appearance before a group of securities analysts noted, “Wilson sounded more like a college professor lecturing a fairly advanced class rather than a salesman making a pitch. He quoted at considerable length from Lord Byron’s *Don Juan* . . . and reminded his forum of various perceptions of Dostoyevski and Montaigne.”

Many chief executives would have been content to sit back and watch their product take off. Not Wilson. “Ours is a business with infinite potentialities, because we serve all industries, all professions, every kind of enterprise,” he said. Indeed, the company regarded itself as its own greatest competition. “Our philosophy is that no product line of any company, including ours, is going to last forever,” said Peter McColough. “We feel we should be the ones to obsolete our products ourselves, not leave it to someone else.”

Even as the 914 gained widespread acceptance, Xerox's scientists labored to replace it. The next card Xerox dealt was the 813, which could make copies on paper measuring eight inches by thirteen inches. The machine itself, developed at a cost of \$20 million, was smaller than the 914. With the 813, which was more expensive than the 914, Xerox essentially used the same technology and process employed to such great effect in the 914, but it compacted the parts so the package could fit on a desktop.

Despite the introduction of new products like the 813, which was also leased, the convenient and affordable 914 was still Xerox's mainstay. And by 1965 it had helped the company become one of the nation's largest. But Xerox's top officers didn't behave much like their counterparts at other blue-chip firms. "Unlike other half-billion-dollar companies, Xerox is still run at the very top by entrepreneurs, the risk-takers who built it up from next to nothing," *Forbes* said in 1965. Joe Wilson remained at the helm until 1968, always striving to maintain a sense that his company marched to the beat of a different drummer. He remained on a first-name basis with most employees and took a full day around the Christmas holidays to shake hands with every Xerox worker.

In 1964, Wilson quoted Robert Frost in a speech before a Rochester civic group, which accurately summed up his management style: "Two roads diverged in a wood, and I—I took the one less traveled by,/ And that has made all the difference." The same philosophy that helped sustain him while he made xerography a commercial reality led Wilson to form a unique vision of the world. "Businessmen must stop casting themselves as salesmen for business and start revealing themselves as people who are as interested in the affairs and programs of mankind as the teacher, the scientist, or the welfare worker," he said. Having played a central role in local organizations like the University of Rochester (an early investor in Haloid), Wilson transformed Xerox into a model corporate citizen. Wilson and other top executives spoke forcefully on improving social conditions. Long before other companies began to do so, Xerox made efforts to hire minority workers. It also gave employees paid leave to do volunteer work.

## **Staying on Top Through Customer Service and Research**

Wilson could not have afforded to be such a solid citizen if not for the sound and efficient business organization he had built. By 1965, Xerox employed a 4,000-person sales force spread throughout eighty-five cities, which worked closely with headquarters and maintenance staff to keep customers happy. To give its sales force the incentive to stay in touch with customers, the company dictated that salespeople receive an initial commission on sales plus a continuing interest in the annual rental fees. In addition, the company had a profitable formula. In 1965 it spent about \$2,400 to manufacture a machine. By then, customers were charged only a \$25 monthly rental fee, plus four cents per copy for a minimum of 2,000. Since the average user made about 8,000 copies monthly and Xerox sold paper and other supplies to customers, it collected about \$4,500 in annual revenues on every copier in place.

Customer satisfaction assumed a higher priority as Xerox's success attracted potential rivals like Pitney-Bowes, Litton Industries, and Olivetti Underwood. In all, some forty companies offered copiers by the mid-1960s. But their offerings could not produce copies as efficiently as the 914. In 1965, some 60,000 914s had been installed, earning 62 percent of Xerox's \$392.6 million in revenues. The following year, when sales topped \$500 million, Xerox owned 61 percent of the total duplication market—an amazing figure given the number of competitors.

Wilson adapted to the transformation of the marketplace with typical savvy. Recognizing the competition, he and Dessauer continued to authorize massive research expenditures. As Sol Linowitz said in 1965, "Patents are our guts, rather than just an appendage." In 1966, when it was awarded its 500th U.S. patent relating to xerographic products, the firm spent fully \$40 million of its \$500 million in annual revenues on research into new products. And the investment paid off. In 1965, Xerox introduced the high-volume 2400 (it could crank out 2,400 copies an hour). Like the 914, the 2400 was leased, not bought, and copies were paid for on a similar sliding scale, with the per-copy cost eventually falling to a half cent.

Xerox was a cultural phenomenon. As the estimated number of copies made in the United States rose from 20 million in the mid-1950s to 14 billion in 1966, the words “Xerox” and “copy” became interchangeable. Cheap and reliable copying allowed for the rapid dissemination of information. But even as it revolutionized communications, the copier inspired spasms of fear and loathing in certain quarters. “Xerography is bringing a reign of terror into the world of publishing, because it means that every reader can become both author and publisher,” the media critic Marshall McLuhan wrote in 1966.

Still, Xerox managed to boost its profile, locally and nationally. In 1967 it completed work on Xerox Square, a thirty-story office complex in downtown Rochester, complete with sunken ice-skating rink in the middle, à la Rockefeller Center. The building lent an air of urban glamour to a company already accorded such status in the marketplace. Between 1960 and 1970, Xerox boasted an astonishing 47 percent annual increase in earnings per share. In the same period, the stock rose to a value of sixty-six times that of its 1960 price. As it soared, a whole class of “Xerox millionaires” was created. Not all of them were company executives, though. In 1942 a Rochester cab driver invested \$1,000 in Haloid; thirty years later, that stake was worth more than \$2 million. In 1969, Xerox had 38,000 employees, and its total stock market value was \$8.2 billion. Virtually the entire increase in shareholder value could be ascribed to the 914.

## A Struggle to Duplicate Early Success

Wilson realized the good times couldn’t last. If Xerox continued to grow at the rapid pace it had set in the 1960s, its sales would exceed the U.S. gross national product in a few decades. At the 1966 annual meeting Wilson announced: “Our future from this point forward depends on what we do in fields other than copying.”

### **Making an Expensive Product Affordable**

Xerox’s decision to lease, rather than sell, the 914 was both crucial and controversial. Some company executives felt that selling the machines, which retailed at \$29,500, would bring huge revenues into the undercapitalized company. But Joseph Wilson typically took a longer view. He had observed the success of other companies—like IBM—that leased office machines, and he realized that any short-term gains reaped from sales would be offset by a slower rate of proliferation. And events showed that his intuition was correct. The pricing strategy allowed the machines to spread quickly throughout companies large and small, establishing the 914 as an office necessity.

In addition, Xerox was able to take advantage of favorable tax provisions. The tax code permits companies to take deductions for depreciation of machines and equipment they own. Since Xerox maintained ownership of all the machines it produced, the company could amortize the cost of all its production.

This strategy proved profitable. Thousands of Xerox copiers were leased to clients in the 1960s, and each year, Xerox could subtract a percentage of each machine’s total value from its taxable income. By 1967, when an estimated 190,000 Xerox machines were in use, the company reported \$239 million worth of rental equipment and related inventories. Xerox was thus able to reduce its taxable income substantially and boost its cash flow, which in turn allowed it to invest even more money into research and new products.

Xerox had started to diversify as early as 1962 when it moved into the education business by acquiring University Microfilms Inc. And in the following years, the company added several profitable textbook publishers to its holdings. But it was left to Peter McColough to lead the company into uncharted and choppy waters. He took over as chief executive when Joseph Wilson stepped down in 1968 and sought to move the now-established company in several new directions simultaneously. McColough moved the headquarters from Rochester, New York, to Stamford, Connecticut, because he believed the company’s headquarters needed to be closer to New York, the nation’s technological and financial capital.

And when IBM began to develop a commercial copier, McColough foolishly decided to tackle Big Blue on its home turf: computers. Rather than replicate Xerox’s successful but painstaking development of the 914, McColough sought the easier route of buying an existing company. In 1969, Xerox acquired Scientific Data Systems (SDS), a mainframe computer company, for \$900 million in stock. But SDS’s best days were behind it, and six years later Xerox shut down SDS, and wrote off the entire investment as a loss. McColough also set up a research center in Silicon Valley in California to develop new computer technology. In the mid-1970s, the brilliant

computer scientists assembled there created what could have been among the first major personal computers to hit the market. But the executives at headquarters, who had grown distant from the researchers, decided against introducing the machine, thus missing a crucial opportunity. What they abandoned contained the seeds that would later grow into the Apple Macintosh.

Aside from facing failures in these new areas, Xerox had a hard time with its traditional business. Its next-generation copier, the 9200, was developed at a cost of \$300 million, and was introduced in 1971. But this time the Xerox product was not markedly better than new products made by competitors, and its sales were disappointing. Even so, in 1972, the Federal Trade Commission (FTC) charged Xerox with illegally monopolizing the office-copier business. According to the FTC, Xerox accounted for 86 percent of the \$1.1-billion worldwide office-copier market. The company spent three years fighting off the charges and eventually reached a settlement. The FTC charges seemed particularly gratuitous given how Japanese companies like Canon, Minolta, Ricoh, and Sharp flooded the U.S. market with high-quality, low-cost office copiers in the 1970s. These imports were so successful that by 1982 Xerox's share of worldwide copier revenues had shrunk to 41 percent.

David Kearns took over Xerox's helm in 1977 and went on to engineer a comeback. Focusing on its core copying businesses, and backing away from computers, the ailing company fought back and regained a sizable market share. Today, Xerox remains the major power in the copier industry. In 1994 the corporation had \$17.8 billion in revenues, \$15.1 billion of which came from business areas related to document processing. The technology Chester Carlson cooked up in a Queens apartment today brings the company revenues equivalent to the gross national product of Guatemala.