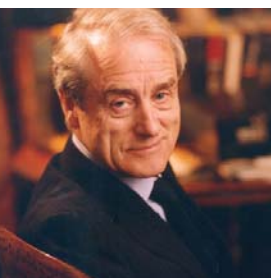


“Innovate or Die”

Lessons from the Groundbreakers Who Changed America

by SIR HAROLD EVANS



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The Annual Essay

Each year, The Conference Board publishes in its Annual Report an original and timely commentary by a leading economic or management thought leader. Past essayists have included Nobel prize winner Douglass C. North, Warren Bennis, Jim Collins, Peter Drucker, Dale Jorgenson, and Paul Volcker.

When I recently conducted a Google search for “American chief executives and innovation,” I received 9,850,000 entries in just 40 seconds. By now, it may be up to 10 million or more. Obviously, no such search was possible when The Conference Board was established in 1916. Back then, I would have had to dedicate the rest of my life to discovering a fraction of what is now instantly on offer via the Internet, which is just one of the innovations undreamt of then that are now in the tissue of our everyday lives. Others include e-mail, antibiotics, television, statewide banking, FM radio, personal computers, the uplift brassiere, helicopters, instant cameras, cell phones, synthetic fibers, radio tuners, MRI scanners, scheduled airmail, transatlantic flights, fish fingers, microwave ovens, transistorized hearing aids, artificial insulin, lasers, jet planes – not to mention the introduction of container shipping that effectively initiated globalization.

Another Google search indicates that there has also been a subtle shift in American business thinking. When “innovation” is replaced with “efficiency” in the search string, only half as many entries appear. Efficiency, once the be-all and end-all, is no longer considered enough for survival in the world economy. **F. Mark Gumz**, CEO of Olympus America, keeps telling all of his staff (and not just the top managers), “Innovate or die.” To be sure, efficiency is essential, but, in a global marketplace, efficiency – and the cost-cutting associated with it – may not be enough. So our future will more likely depend on groundbreaking innovation. Yes, we must implement and develop efficiency, but without forgetting the animating vision that created the initial innovation. The mountain ranges of innovation are littered with the skeletons of the great corporations that lost sight of the summit they set out to conquer. **Jack Welch’s** law applies – when the rate of change in a company becomes slower than the rate of change outside, the end is in sight.

Federal Express is one of the organizations that has managed to keep its focus. For three decades, **Fred Smith** has inspired his organization with his

passion to make sure, absolutely positively sure, that the parcels are truly delivered overnight. As Smith says, “You’re delivering someone’s pacemaker, chemotherapy treatment for cancer drugs, the part that keeps the F-18s flying, or the legal brief that decides the case.”¹ His efficiency drives have not been allowed to obscure the founding vision.

The Potential Downside of a Concentration on Efficiency

Michael Dell, who conceived of mass customization of personal computers through direct selling to consumers – especially businesses and just-in-time manufacturing – has been every bit as innovative as Fred Smith. Because of the company’s consumer focus, Dell’s customers have felt they have an almost personal relationship with him. This relationship was hurt, however, when the company hired cheaper temporary workers for its five call centers rather than continuing with full-time staff imbued with the founder’s sense of mission. **Ro Parra**, a senior vice president at Dell, identified call-center turnover rates as high as 300 percent as one cause behind flattening sales. He told the *Wall Street Journal*, “We were very efficient and we made those decisions that work with the short term, but they were really damaging to us over the long term.”² Such openness and contrition indicates that Dell will soon regain its momentum.

Not all businesses are able to regroup after such an event. **Tony Ridder**, for example, is no longer running Knight Ridder, an organization whose commitment to editorial excellence and innovations in newspaper technology helped it become America’s second-largest newspaper group. When Ridder told the editorial staffs his highest priority was increasing the profit margins from 19 percent to 21 percent, he was viewed as introducing a morale-lowering change in the corporate culture at the expense of a commitment to quality journalism. This perception was no doubt unfair, given his need to reconcile costs with the downturn in newspaper advertising. In any event, setting financial targets invited a financial judgment,

¹ Harold Evans, with Gail Buckland and David Lefer, *They Made America: From the Steam Engine to the Search Engine: Two Centuries of Innovators*, (New York: Little Brown, 2004), p. 643.

² Christopher Lawton, “Consumer Demand, Laptop Growth Leave Dell Behind,” *Wall Street Journal*, August 30, 2006.



and shareholder pressure led to Knight Ridder's sale to the McClatchy Company.

Defining the Values of Innovators

In writing my recent book *They Made America*, I spent five years trying to identify and describe the great change-makers in the business history of the United States. As a result of my research, it became clear that America's progress over the past two centuries – from the steam engine to the search engine – has been very much related to the values of the innovators. Wealth was not at the center of their lives. To be sure, none of them sought penury in the service of the public, but immersion in their lives suggests that making money was not a sustaining motivation. Something else drove them – intellectu-

occurred to me.... Wouldn't it be great if my trailer could simply be lifted up and placed on the ship without its contents being touched?"³ It took 20 years for McLean to move from this initial inspiration to organizing the voyage of *Ideal X*, his first container ship, from Port Newark, New Jersey, on April 26, 1956.

Why didn't anyone else see what McLean saw? Here is a hallmark of innovation – the imaginative association of ideas previously considered separate: the cell phone that takes stills and video and plays music. Auctions and yard sales had been around a long time when **Pierre Omidyar** put them together on the web to create eBay. **Jean Nidetch** stitched together the communal support idea of Alcoholics Anonymous with a diet invented by the New York City Department of Health to create Weight Watchers.

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al curiosity, vanity, genuine altruism – and then the money followed. I see these primary innovators as democratizers: **Henry Ford**, **Amadeo Giannini**, **George Eastman**, and **Pierre Omidyar** come to mind, but there are lesser-known people like **Raymond Smith** (founder of the first family of gambling in Nevada and the F.W. Woolworth of chance) and **Martha Matilda Harper** (creator of retail franchising) who deserve to be better known.

As the preceding list suggests, the individual dominates the story of American innovation. The research departments of major corporations (e.g., Bell Labs and Dupont) have not been unproductive, but can anyone have had more impact on our world than **Malcom McLean**? In 1937, McLean was a 23-year-old trucker who became frustrated after spending a day waiting on a noisy pier in Hoboken, New Jersey, to have his cotton bales unloaded from his truck, loaded onto a cargo ship, and then unloaded and loaded again at the other end. Recalling that frustrating experience, McLean said, "The thought

Ida Rosenthal did not invent the brassiere or even the famous Maidenform "I dreamed" campaign, but she put all the pieces together in production and marketing so that her husband's invention reached millions of women. Henry Ford summed up this aspect of innovation with admirable candor when he said, "I invented nothing new. I simply assembled into a car the discoveries of other men behind whom were centuries of work."

Business and Innovation: A Sometimes Uneasy Relationship

A quick survey of those Google hits reveals that there is some confusion about the true definition of innovation. Much of what are described as innovations are really techniques of managing an existing business or improving it at the margins. These may be very useful, but they have nothing to do with innovation or change. Instead of parsing how the concept of innovation has changed from its initial conception in the 17th century to the refinements of modern commentators like

³ Evans et al., *They Made America*, p. 482.





Peter Drucker, Clayton Christiansen, and Eric von Hippel, I would argue we should reserve the terms “innovation” and “innovators” for real change and not confuse it with different functions. While there is a fairly common acceptance of **Joseph Schumpeter’s** definition of innovation as entrepreneurship, the reality is that entrepreneurship, the assumption of risk, may not be innovative at all. You assume risk if you open a new auto dealership, but you are not innovative unless you are the first.

Some entrepreneurs have even been the enemy of innovation. **General David Sarnoff**, the black-belt bureaucrat who was the head of RCA and was heavily invested in making AM radios, was a classic entrepreneur, but he was also the relentless and unscrupulous foe of the introduction of the innovation of FM radio. Even though he had the right of first refusal of **Edwin Howard Armstrong’s** invention, he did his best to sabotage Armstrong’s efforts to broadcast in this new medium. As a result, Armstrong, the inventor of so much in the technology of transmitting sound, was forced to start his own company and began broadcasting music flawlessly from WQXR in New York on July 18, 1939. (Interestingly, the 425-foot radio tower he built in Alpine, New Jersey, for WQXR was the salvation of NBC, and many others, when the antenna on top of the World Trade Center was destroyed in the September 11 attacks.)

Sarnoff also sought to stymie **Philo T. Farnsworth’s** attempts to make the most of his invention of electronic television, although, in the end, he had to pay Farnsworth for his groundbreaking patent. Later on, Sarnoff did become a genuine promoter of innovation, pioneering a system of color TVs compatible with black and white that defeated the non-compatible electromechanical system pushed by **Bill Paley** of CBS. But he was also a promoter of a number of myths about himself, including claiming credit as “the father” of television. When innovators such as Armstrong or Farnsworth are overlooked or their innovations misrepresented, it is more than a personal injustice; it is also a distortion of the essence of innovation and the essential qualities of the innovator.

Change Doesn’t Always Come from the Laboratory

As we try to understand what true innovation is, we must not misunderstand a figure like **Bill Gates**. He is not an inventor. *BusinessWeek* has referred to him as the “software whiz kid” and *People* magazine has likened him to **Thomas Alva Edison**, whose photo-

graph Gates keeps in his office. Gates is brilliant all right, but not at all in the way that Edison was brilliant. The criteria that elevate Bill Gates into the ranks of innovators are not in the realm of science and technology but in his genius for business organization and developing from scratch a standard-setting mass market company. He did not invent the operating system he licensed to IBM for its personal computer – he bought it from another company.

The true Edison of software is unquestionably **Gary Kildall**, who, entirely out of his own head and without the backing of a research lab or anyone, wrote the first language for a microcomputer operating system and the first floppy disk operating system. Kildall did it, moreover, in such a manner that programmers were no longer restricted by hardware compatibility. In Kildall’s system, anybody’s application could run on anybody else’s software. It was the genesis of the third-party software industry.

But, while the breakthrough was Kildall’s, Gates was able to see more sharply how a deal with IBM could be the foundation of a whole new industry. He understood better than IBM the importance of owning its PC operating system. He also figured out how to set up a tollbooth to computer technology, collecting half of every dollar generated by the PC industry. In all these respects, the proper parallel for Gates is not Edison but **John D. Rockefeller**, who controlled 90 percent of the nation’s oil refining capacity by 1879, just as Microsoft Windows controls 90 percent of all personal computers.

The Entrepreneur as Innovator

Innovation in these areas of organization does not have the drama of Edison watching a filament fight for its life or **Edwin Land** finding himself split in two in the Polaroid color prints from his first experiments with the SX-70. Like Bill Gates, **Juan Trippe**, chairman of Pan American, was not an inventor. In the early 1950s, the activities in Pan Am’s Park Avenue offices may have seemed boring when compared with the struggle of Pratt & Whitney engineers to secretly create the monster J75 jet engine for the U.S. Air Force. But appearances can be deceiving. For Trippe was determined to make cheap mass air travel a reality and was ultimately responsible for introducing nonstop jet flights that carried hundreds of passengers from New York to Europe, first with the 707 and then the 747. At the time, the common presumption was that international air travel was the privilege of the rich and, moreover, the leaders of the airline



industry considered jets too noisy, heavy on maintenance (a fallacy), too big for most airports, and too expensive. **Cyrus Smith**, the tough Texan who ran American Airlines, expressed the attitude of all airlines when he said, “We can’t go backward to the jet.”

But Trippe could not have reached first base with this idea without persuading Pratt & Whitney to let him order J75 engines. At a lunch in 1955 with them, he put \$40 million on the table, when he had no airframe and, indeed, did not have the \$40 million. How he raised the money and induced both Douglas and Boeing to build the airframes exemplifies the courage – and the cunning – of the innovator in action, willing to risk all on something nobody had conceived of before. Trippe has yet to receive the recognition he deserves. The most recent portrayal of him in Martin Scorsese’s otherwise fine film *The Aviator* represents

to have commercial importance, according to a study for the Lemelson-MIT Program, and less than 1 percent have the seminal importance of, say, **Douglas Engelbart’s** 1970 patent for the computer mouse or **John Vaught’s** inkjet for Hewlett Packard in 1975.

Those who come up with the best ideas for new companies were not always ready to run them. As **Georges Doriot**, leader of the first venture capital company on the New York Stock Exchange, observed, “There have been many fine scientists desperately trying to become poor businessmen.”⁶ For others, bringing their invention to market was not their primary motivation. **Leo Hendrik Baekeland**, the inventor of Bakelite (the first true plastic), had no wish to develop his discovery. He was repelled by the idea that it would mean becoming “one of those slave millionaires in Wall Street.”⁷ It was only when

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him as standing in the way of progress in the form of **Howard Hughes** and TWA. Hughes was no mean innovator himself when it came to airplanes, but he did not have Trippe’s early democratizing vision of the future of commercial aviation.

A Good Invention Is Not Enough

Another important confusion about innovation stems from regarding it as synonymous with invention and discovery. An invention/discovery does not become an innovation until it is put to use. This is not to devalue inventiveness.⁴ *Juice*, a recent study of inventors by **Evan I. Schwarz**, vividly highlights how some inventions have scaled upwards, “spanning continuous and endless improvement.”⁵

The millions of patents that currently exist are hallmarks of invention, crucial in some industries and not in others, but they are not a reliable index of innovation. Less than 10 percent of patents turn out

the licensees failed to manufacture his revolutionary synthetic properly that he felt he had no choice but to lead his own manufacturing and distribution corporation. **Theodore Maiman**, having invented the first working laser on May 16, 1960, described it as “a solution looking for a problem” because so few appreciated its manifold possibilities. He too ended up founding his own company. He was first an inventor, then an innovator.

Other inventors have even walked away from the innovative potential of their achievements. The world would not be connected by telephone if it had been left to the inventive **Alexander Graham Bell**. Bell’s 1876 discovery of how sound waves could be converted into undulating electric current was critical, but his telephone was useful only if you had a good pair of lungs. It was Thomas Alva Edison (with **Charles Batchelor**) who invented the carbon button transmitter to solve the problem of indistinct and

⁴ The Ewing Marion Kauffman foundation is sponsoring a national week of invention and entrepreneurship for young people from February 24 to March 2, 2007. Their website (www.EntrepreneurshipWeekUSA.com) already teems with stories of achievement.

⁵ Evan I. Schwarz, *Juice: The Creative Fuel That Drives World-Class Inventors*, (Boston: Harvard Business School Press, 2004)

⁶ Evans et al., *They Made America*, p. 372.

⁷ Evans et al., *They Made America*, p. 217.





muffled sound in Bell's phone. But it was **Theodore Vail**, an early supporter of The Conference Board and the organizational genius behind the formation of AT&T, who spearheaded the true innovation of establishing a private enterprise, integrated national telephone service. In doing so, Vail confronted a myriad of technical, political, and bureaucratic obstacles, including the threat of nationalization.

Innovation Cannot Be Accomplished Alone

Schumpeter tells us that invention + capital = innovation, but this neat formula rather understates just what is needed for an idea to proceed from a brain wave into the bustle of the marketplace. As well as money, my case studies suggest the importance of the innovator having a clear vision to communicate to others and a reservoir of patience few of us have. Success is more likely if one has an aptitude to lead a creative team in different disciplines. And let's not forget the largely silent craftspeople who love and understand machines and systems and, by constant improvements in their operations, make innovations cheaper and faster. These qualities of leadership are manifest in **Dean Kamen's** long development of the IBOT, a self-propelled chair on wheels that can navigate rough ground using gyroscopes and microprocessors. This is just the latest in a series of inventions associated with Kamen that, in the words of one profile, were initiated because "he decided [they] ought to exist."⁸ Again, here is an innovator inspired by moral values.

The richly varied demands on an inventor who aspires to innovation is the reason we see many innovators flourishing in partnerships of complementary skills or, as **Pete Peterson**, the chairman of Sony United States, calls them, a marriage of "interlocking neuroses." In the early 1970s, **Herbert Boyer** was a brilliant molecular biologist happiest in his lab trying to induce *E. coli* bacteria to reproduce human DNA. **Robert Swanson**, part of a new breed of venture capitalists, was happiest reading balance sheets. With his heart set on building a practical business in the infant science of bioengineering, Swanson started cold-calling scientists who had written pieces in technical journals.

When Swanson dropped in on Boyer's lab at the University of California-San Francisco in 1976, the distance then between biology and business was immense. One scientist remembers, "We were

all standing in the hallway laughing at this guy in the three-piece suit. We just didn't get people like that visiting us."⁹ Swanson asked for 10 minutes to pitch Boyer on the idea of making a commercial application of his discoveries. It was convincing enough for the two young men to walk to Churchill's, a local hangout for molecular biologists, for a beer. They wound up talking for a couple of hours and put down \$500 each to start a pharmaceutical company to explore the proteins that bacteria could be induced to make. They called their putative company Genentech, the forerunner of a rollercoaster \$430-billion industry that has saved and improved so many lives.

The Grand Legacy of Thomas Edison

The truly great innovators go beyond bringing a single product or service to the marketplace. They are notable systemizers who set the stage for an efflorescence of new products and whole industries; artificial insulin and then biotechnology; electric power and then cheap and universal electricity; the elevator and then the skyscraper; the transistor and then computers and software.

The invention of the incandescent light bulb that illuminates Edison's name for posterity is not really his signal achievement. The innovative genius of Edison was to build out from the bulb to the creation of the electrical industry. He had to conceive a system down to its very last detail – and then manufacture everything in it. To give some idea of the enormity of the task, he had to:

- design and support a factory that would mass produce delicate filaments and preserve a vacuum in thousands of bulbs a day;
- build a central power station;
- design and manufacture his own original dynamos;
- ensure an even flow of current;
- connect a 14-mile network of underground wiring, insulating the wiring against damaging moisture and the accidental discharge of electricity;
- install safety devices against fire;
- design commercially efficient motors to use electricity in daylight hours for elevators, printing presses, lathes, etc.;

⁸ Scott Kirsner, "Breakout Artist," *Wired*, September 2000.

⁹ Evans et al., *They Made America*, p. 568.



- design and install meters to measure individual consumption;
- invent and manufacture a plethora of switches, sockets, fuses, distributing boxes, and lamp holders;
- convince New York’s Democratic aldermen of its utility against the sabotage of the gas companies; and
- raise much of the initial capital.

Now there’s innovation!

Yet, while Edison introduced electricity into cities, it was his immigrant clerk **Samuel Insull** who found a way to make cheap power available to everyone. And Insull, in turn, depended on the brilliant **George Westinghouse’s** innovation of alternating

how many thriving businesses owe their prosperity to Edison – from the production and consumption of electricity to records and movies – it is hard to believe that this American treasure lacks proper funding. It should be supported – financially and not with words – by all who care not just about America’s heritage but its future, too.

By the same token, companies new and old would do well to cherish their archives. One of the surprises of the research for *They Made America* was how few bother to do it really well. United Technologies, which has taken meticulous care to preserve documents about the origins of its Otis elevators, is one of the few that does. It also kept the diaries of **Elisha Otis**. A sentence in one of his

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current. As this chain shows, an innovator is both an explorer and a legatee, and we still have much to learn from them.

Protecting America’s Heritage of Innovation

One of the curious features of a country supposedly dedicated to business, and certainly one enriched by business innovation, is that political innovations and personalities are endlessly studied and rightly exalted, but, by comparison, the workshop and office revolutionaries are taken for granted in the boardrooms and neglected in the classrooms. Few innovators have touched so many areas of modern life or left such a stunningly complete record of their work as Edison. Today, a team of researchers at Rutgers University is seeking to make an immeasurably rich archive of Edison’s writings accessible to all through books, microfilm, and the Internet.¹⁰ Considering

entries is suggestive of a major truth about America and innovation: “Machines [are] the tools of liberty.”

America’s business success in promoting innovation is related to the idea of America itself. Without the ideals that have animated this country, the innovations born here would never have so swiftly reached fruition. As society has progressed or retreated in achieving its ideals, and in resolving tensions between capitalism and liberal democracy, innovation has also progressed or regressed. America’s emergence as a preeminent economic power can never be explained by the access to physical resources or a large population, since Russia, China, Australia, Canada, Brazil, the Argentine, and South Africa were similarly well-endowed.

Freedom remains our most precious resource.



¹⁰ For more information on the Edison Papers Project, visit edison.rutgers.edu.

