By Glenn C. Altschuler

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“A new idea comes suddenly and in a rather intuitive way,” Albert Einstein once declared, “but intuition is nothing but the outcome of earlier intellectual experience.”
Collaboration, Walter Isaacson points out, has characterized the creative process that has produced virtually all scientific “revolutions,” especially the digital revolution. In “The Innovators,” Isaacson provides a sweeping and scintillating narrative of the inventors, engineers and entrepreneurs who have given the world computers and the Internet.

“The Innovators” is the result of a near-perfect marriage of author and subject. The son of an engineer, Isaacson was an electronics geek who learned programming by using punch cards in college. He served as managing editor of Time magazine, where, for a time, he ran a digital division, and then was chairman of CNN. The author of biographies of Benjamin Franklin, Albert Einstein and Steve Jobs, Isaacson now serves as CEO of the Aspen Institute.

Isaacson begins his story in the 1840s, with Charles Babbage, the Englishman who built an Analytical Engine, and Ada Lovelace, the daughter of Lord Byron, whose speculations about a future in which machines would enhance and enrich the human imagination, he deems “profound and inspirational.” Isaacson then provides an informative and accessible account of the translation of computers, programming, transistors, micro-processors, the Internet, software, PCs, the World Web Web and search engines from idea into reality.

Although Isaacson’s analytical framework is by no means original, it is valid and valuable. Innovation, he emphasizes, comes from the accumulation of hundreds of small advances and “some larger imaginative leaps.” For ripe seeds to fall on fertile ground, he adds, rather vaguely, the time must be right. Equally important, a competent team must be assembled to implement the vision.

While John Atanasoff, a professor at Iowa State University, who was working virtually alone, could never get his punch card operator to function, and consigned his machine to his basement, for example, the group of engineers, mechanics and programmers at the University of Pennsylvania, led by John Mauchly and Presper Eckert, got ENIAC up, running and solving problems — and could legitimately lay claim to the title of inventors of the electronic digital computer. “Only in storybooks,” Isaacson concludes, “do inventions come like a thunderbolt, or a light bulb popping out of the head of a lone individual in a basement or garret or garage.”

Isaacson also lays out the contours of a major conflict of the digital era. Placing intellectual property in the public domain, where it can be freely shared, as it was by inventors of the Internet and the Web, he notes, increases the likelihood of innovation. On the other hand, protecting intellectual property, the path followed for hardware, electronics and semiconductors, provides financial incentives, capital investment and market competition that can promote research and development.
Both approaches, of course, generate risks as well as rewards. The proprietary model resulted in defensive companies that missed the potential market for personal computers in the 1970s. And in 2011, Isaacson reveals, Apple and Google spent more money on lawsuits and patent protection than on research and development of new products.

Recognizing that the conflict remains unresolved and is, perhaps, unresolvable, Isaacson moves on, filling his book with less cosmic, but frequently fascinating, information and insights. The terms “bug” and “debugging” became popular, he reveals, following the discovery that a large moth had smashed into the electromechanical relay of the Mark II version of a Harvard computer. Isaacson indicates that Larry Page and Sergey Brin chose the name Google when they discovered that the domain name for “googol,” the term for the number 1 followed by a hundred zeroes, was taken.
Isaacson also documents the important — and largely unrecognized role — of female programmers in the early days of the general-purpose computer, including Grace Hopper, “the dean of them all,” who translated mathematical code into machine language, enabling ordinary mortals to write programs. Ironically, he notes, women were given responsibilities for software because the bosses “believed that hardware was the most important task, and thus a man’s job.” Not surprisingly, then, the women were not invited to the celebratory dinner following the first public demonstration of ENIAC.

At the end of his masterful book, Isaacson strikes a note of uncertainty about whether progress in artificial intelligence will ever reach “singularity,” a term for the moment in which machines become smarter than humans and can program themselves to be even smarter. After all, he observes, the computers that won chess matches and defeated “Jeopardy” contestants are “brilliant idiots,” who did not really understand the questions or their answers. It may well be, he speculates, and hopes, that innovators will forge partnerships between computers and human beings rather than regulating the latter “to the dustbin of history.”

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The Innovators

How A Group of Inventors, Hackers, Geniuses, and Geeks Created the Digital Revolution

By Walter Isaacson

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