

What I Missed

Richard Mateosian

Symbio Robotics

■ **WHEN I WAS** an undergraduate at RPI (1959–1963), one of my classmates (“Flam—F L 3 A M, the three is silent”) anchored an overnight broadcast on the campus radio station, WRPI. On Sunday nights he would bring out the “This Week at RPI” memo that the campus PR department had issued the previous Monday. He would start reading of each item with, “This week at RPI, you missed” The book I review in this column reminds me of that experience. So much went on while I was paying attention to other things.

The book is *The Code: Silicon Valley and the Remaking of America* by Margaret O’Mara (Penguin Press, NY, 2019, 506pp, ISBN: 9780399562181, <https://www.penguinrandomhouse.com>, 30.00). Margaret O’Mara is a professor of history and a veteran of the Clinton/Gore Whitehouse. In this book, she writes in the style of historical storytellers like David McCullough about events that many of us have lived through—some as recently as last year.

I came to Berkeley in 1963 as a math graduate student. By the end of 1970, I had my PhD and four years’ experience as a full-time programmer. In February 1971, just weeks after Don Hoefler coined the term “Silicon Valley,” I began a daily commute from Berkeley to Sunnyvale to manage software development for a firm that made cassette drives to replace paper

tape for minicomputer I/O. Out the back door of the warehouse we worked in was a huge onion field. P-3 Orion sub chasers went overhead every 15 min on their way to touch and go at Moffett Field. There were apricot orchards within a mile. I have worked at tech jobs in different parts of the San Francisco Bay Area ever since. Those who channel the thoughts of fish say that fish have no concept of water. Much of what O’Mara writes about affected me that way. Life just happened, and now, looking back with O’Mara’s help,

I’m amazed at how coherent—even inevitable at some level—it all was.

One function of historical writing is to give us insight into why things happened the way they did. That helps us predict the effects of decisions we make today. Another function is to help us see the forest, not just the trees around us. Historians look for broad trends and patterns. O’Mara sees the rapid ascent of the Northern California tech industry as arising

from a fortunate mixture of two incompatible elements. For much of its history, that industry was led by people who distrusted authority in general and big government in particular. The rugged individual (cowboy) mentality of the west stood in sharp contrast to the values and behavior of the eastern establishment. On the other hand, much of the industry’s funding came, directly or

One function of historical writing is to give us insight into why things happened the way they did. That helps us predict the effects of decisions we make today.

Another function is to help us see the forest, not just the trees around us. Historians look for broad trends and patterns.

Digital Object Identifier 10.1109/MM.2019.2935396

Date of current version 10 September 2019.

indirectly, from large amounts of government spending during World War II and in the quarter-century that followed. The arms race, the space race, and massive post-Sputnik investments in education helped to create fortunes that then fueled innovation through a decentralized system of entrepreneurship and venture capital.

The story of the last seven decades in Silicon Valley weaves together the stories of many people, companies, technologies, and trends. O'Mara breaks the story into four acts, which she calls—not entirely convincingly—Startup, Go Public, Product Launch, and Change the World. At the start of each act, she includes a section called “Arrivals,” in which she gives brief biographies of people who typify the era.

For example, the “Arrivals” section for the Change the World act features Taiwanese immigrant Jerry Yang, who went on to found Yahoo! O'Mara explains that at the time of Yang's arrival as a ten-year-old in 1978, the Asian-American population had grown to three million in the aftermath of the Hart-Celler Immigration Act of 1965, which abolished the quota system established in 1924. The 1924 law severely restricted immigration from Asia and Africa, while encouraging immigration from northern and western Europe. By 1990, when Jerry Yang left Stanford, 35% of Silicon Valley's technical workforce was foreign-born. The subsequent introduction of H-1B visas for high-tech workers reinforced that trend.

O'Mara points at the many failed attempts to replicate Silicon Valley elsewhere as evidence that it is an only-in-America phenomenon. The lone cowboy myth ignores a vast infrastructure that enables individual achievement. Distrust of government and of social hierarchy goes back to the American Revolution. Yet the American government has grown large, and its expenditures, especially on military projects since World War II, are enormous. It would be natural for those who pay the piper to call the tune, but Americans oppose central planning and distrust large government programs. Calling the tune happens only indirectly—mostly through the tax code and regulatory agencies.

Washington, DC, has long been home to a huge lobbying industry, designed to influence

government policies. Silicon Valley came late to that party, but since the 1980s, it has become much more influential. O'Mara devotes much of her book to the story of how the Valley developed that influence. Most of the people who were featured in O'Mara's “Arrivals” sections were key to developing that influence.

Silicon Valley's influence led to a hands-off policy toward Internet regulation during the exponential growth that began in the mid-1990s. Unfortunately, too few people saw the risks posed by bad actors in this unregulated space, and those who saw the risks were unable to mitigate them effectively. For the last decade or so, and certainly since the 2016 election, many more people have become aware of the downsides of a lightly regulated Internet industry. And because the industry is global and largely ignores national boundaries, other countries are joining the backlash.

The patterns O'Mara discusses are familiar, but the one she identifies that has generally gained less attention in similar works is the disparate treatment of men and women. In my review of George Dyson's *Darwin Among the Machines* (IEEE Micro July/August 1997), I identified the author as “son of physicist Freeman Dyson and mathematician Verena Huber-Dyson.” Shortly afterward, George sent me a note saying, in effect, that he appreciated having a review that he could show to his mother without causing her the

pain she usually felt at being left out of such phrases. The fact that such a highly accomplished mathematician/logician continually felt such slights reinforces O'Mara's point. Sexism in science and technology is widespread and harmful to those on the receiving end.

Those who perpetuate sexism usually do so without malice, not even noticing. Sometimes, however, it's more explicit. For many years, I was a member of the pool and tennis club at the Claremont Hotel. A popular feature of that club was the Jacuzzi spa, where people would relax and chat about many things. There, the late Adam Osborne would hold forth loudly to anyone within earshot. He had a hard and fast rule about never letting women be part of the crew on his boat, and he delighted in the outrage this caused

The story of the last seven decades in Silicon Valley weaves together the stories of many people, companies, technologies, and trends. O'Mara breaks the story into four acts, which she calls—not entirely convincingly—Startup, Go Public, Product Launch, and Change the World.

those around him. He also expressed his dislike of divorce lawyers, but that's another story.

O'Mara weaves many such incidents into her narrative. She does this by telling the stories of specific women and highlighting the obstacles they faced. For example, she follows Ann Hardy from her frustratingly slow advance up the IBM corporate ladder (and up and down the Hudson) to the Berkeley MBA program, the Livermore Lab, and then to Tymshare, where she contributed significantly to the development of timesharing.

Another example is Trish Millines Dziko, a gay black woman whose mother scrubbed toilets in New Jersey to ensure that Trish could go to college. She wound up at Microsoft in 1983, became a Microsoft millionaire, and started a foundation to help other minorities get into the tech career pipeline.

The book is already 500 pages, and no book can include everything that happened in the last 70 years. But in describing the role of Tymshare in the development of commercial timesharing, O'Mara leaves out an interesting story. Tymshare used the SDS 940 computer, which was developed for SDS by the ARPA-funded Project Genie (1964–1965) at UC Berkeley. Perhaps if she updates the book, she can describe the roles of Mel Pirtle, Butler Lampson, Peter Deutsch, Gary Hornbuckle, and others in developing, at government expense, the hardware and software that made commercial timesharing possible. In fall 1966, I attended a government-sponsored conference on the algebraic theory of machines at Asilomar (a conference facility in Pacific Grove, California). My wife and I got a ride home to Berkeley with Butler Lampson in his brand-new Corvette, the fruit of his consulting on Wall Street about the results of Project Genie.

O'Mara's narrative includes many people whose stories have been told before. Fred Terman, David Packard, Steve Jobs, Bill Gates, Ben Rosen, Esther Dyson, and Regis McKenna are examples, but my favorite character in this book is Lee Felsenstein. I have known Lee for about 35 years, but until I read the book, I had very little idea of what he had done before designing the Osborne One portable computer in 1981.

I could say a lot more about Lee. I could say a lot more about this book. It's a fascinating story, skillfully told. If you work in or are affected by technology, you should read this book.

I did not work in the semiconductor industry until 1980. In the mid-1970s, I worked as a programmer in Berkeley. I wrote programs in Microsoft Basic on a microcomputer called a DTC Microfile for a clinical laboratory. One program accepted insulin and glucose readings of samples taken during a glucose tolerance test. It generated graphs of the readings and offered diagnostic advice written in English sentences using upper- and lowercase characters. My computer science interests included Dijkstra's works on structured programming and Kernighan & Plauger's *Software Tools* (Addison-Wesley, 1976). I would not have considered spending an evening in the South Bay at a meeting of hobbyists. Looking back, I wish I had.

In the 1960s, Lee Felsenstein built tools to support campus protests at Berkeley. His motto was "to change the rules, change the tools." He automated printing and distribution of leaflets, built radios to listen to police communications, and designed more effective megaphones. In the mid-1970s, he built the Tom Swift Terminal—a CRT with a keyboard and a bus that enabled printed circuit boards to provide various functions. If

your board obeyed the traffic rules of the bus, you could plug it in. This is essentially the open architecture model that the IBM PC adopted in 1981. This is a great example of Lee's pragmatism. He thought you could change industrial society from within, and he saw the Tom Swift Terminal as a way to put inexpensive tools in the hands of ordinary people.

When the MITS Altair computer came out, MITS could not support the huge demand for it. Working through Processor Technology, a company started by a couple of his friends, Lee helped make the Altair more than a toy. When the Homebrew Computer Club formed in 1975, Lee soon took over running the meetings.

I could say a lot more about Lee. I could say a lot more about this book. It's a fascinating story, skillfully told. If you work in or are affected by technology, you should read this book.

Richard Mateosian is a technical writer for Symbio Robotics. You can reach him at xrmxrm@gmail.com.