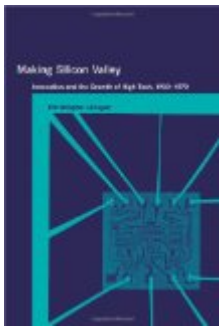
H-Net Reviews
in the Humanities & Social Sciences



Christophe LÃ©cuyer. *Making Silicon Valley: Innovation and the Growth of High Tech, 1930-1970.* Cambridge: MIT Press, 2006. x + 393 pp. $40.00, cloth, ISBN 978-0-262-12281-8.

Reviewed by Dan Holbrook

Published on H-Urban (August, 2007)

Silicon Valley's history can illustrate almost any approach to explaining technology regions, technological innovation, university-industry relations, management theory, or economic development. It also accommodates almost any historiographical or theoretical approach--Chandlerian investments in manufacturing, management, and marketing, Scrantonian diversity, Schumpeterian creative destruction, Saxenian regional culture--in economic geography, business history, economic history, management history, and the history of technology. The story has everything: pioneers, a long record of technological frontiers conquered, brilliant personalities, science, engineering, the military, universities, private enterprise, competition, victories, defeats. The story is complex, with a diversity of things going on, battles fought, demands made, problems posed, solutions pursued, visions fulfilled. And it seems so "American"--hard work, inventions, perseverance, technology, military, lots of money. For the presentist, it offers the foundations of the current changes being wrested out of society by computerization. Whew.

What Silicon Valley lacked, until now, was its historian. In the last ten years or so scholars of various sorts have tackled particular technologies, personalities, and regional dynamics, but until Christophe Lécuyer's *Making Silicon Valley*, none attempted to explain the success of the region over the long period from the 1930s to the present. The author emphasizes the development and elaboration of related sets of knowledge and skills in "manufacturing, product engineering, and management" (p. 5) that transcend specific technologies over a fifty-year span. Spawned by successive generations of technologists, based on technological (and ideological) enthusiasm and a focus on manufacturing, the skill and knowledge sets infiltrated the region's industrial culture. A thriving vacuum tube business--financed in large part by military needs--established the beginnings of electronics manufacturing in the valley. Isolated somewhat from the big eastern tube firms, the upstarts in the San Francisco peninsula defied convention and learned how to manufacture high-power, high-frequency, ultra-reliable vacuum tubes. Motivated by their excitement about the new technology, ham radio enthusiasts

William Eitel, Jack McCullough, and Charles Litton started two foundational firms, Eitel-McCullough (Eimac), and Litton Engineering Laboratories (later Litton Industries). These men were fiercely competitive but also aware of the benefits of sharing expertise. Lécuyer draws masterful portraits of them, emphasizing not only their technical prowess, but also their ideological bents, which led them to establish innovative management practices. Their technical focus remained on innovative, high-performance products and constant improvements in manufacturing. The emphasis, in other words, was on *making* products, not just designing and selling them.

That military needs powered the region's electronics industry from early on is clear. Radar, developed in the 1930s, grew to depend on tubes developed by Eimac and Litton; large procurement contracts provided the funds for expansion and research and development. This pattern of military funding continued into the postwar era, aiding the semiconductor industry. Though the product and its underlying technology and science changed, the culture of invention established earlier persisted.

The economic and geopolitical upheavals of the mid-1960s forced semiconductor firms to seek new markets. Fairchild Semiconductor, the first successful firm that actually used silicon in the valley, played a central role in establishing both the industry and its technology and culture in the valley. As a result of the technical, managerial, and marketing innovations generated, adapted, and adopted by Fairchild and its "Fairchildren," semiconductor devices infiltrated many new systems and markets, and cemented the valley's central place in the modern technological regime, real and mythological.

Having read widely in and contributed modestly to the historical literature on this industry, I am deeply impressed with Lécuyer's efforts here. His research is deep and broad--trade literature, company records, personal papers, and an extensive list of oral history interviews with virtually every living person of importance to the story--and his writing is never less than excellent. He compellingly portrays the times, the people, the challenges, and the technical details of a wide array of companies and individuals. The only time the books lags is in chapter 7, where people play a smaller role, and the dynamics of commercial expansion, spin-offs, and macroeconomic conditions are at the center of the narrative.

Lécuyer challenges parts of the Silicon Valley myth, while moving other parts of it toward firmer historical ground. For example, while some historians place Frederick Terman, a Stanford University administrator, front and center, Lécuyer recognizes his importance but gives him a peripheral role of providing education to many of the participants. On the other hand, the roles of individual entrepreneurs as well small groups of individuals with complementary skills remain fundamental; they are the generators and maintainers of the knowledge and culture that Lécuyer emphasizes. His prosopographic approach provides a much richer portrait of the valley's history than is available elsewhere.

This is a generational story as well. At least three generations of entrepreneurs have thrived in the valley: the tube makers, the silicon pioneers, and the spin-offs thereof. Lécuyer stops his story in 1975, before software and internet-related companies dominate. The biggest technological development in this tale is the planar process-based integrated circuit, which Lécuyer points to as "arguably the most important innovation in twentieth century technology" (p. 297). The biggest social development was the focus on manufacturing knowledge and the people who "pursued, captured, and leveraged this knowledge over the whole period" from the thirties to the seventies, and presumably beyond (p. 297). Links between generations, technological and human, become clear in this book, and indeed revolve around the sorts of expertise in manufacturing,

design, and, in the silicon phase, marketing, that emerged from the intense enthusiasm to make devices and money. The social reformist impulse of some of the tube pioneers, however, was lost across generations, replaced with more bluntly economic motivations.

If there is anything problematic about this book and its argument, it lies in the very squishiness of the concept of regional culture. Lécuyer's argument is essentially about regional and corporate core competencies, which raises fundamental questions of where knowledge, skills, and competencies reside. In individuals? Certainly, and this is clear from Lécuyer's examination of the inner workings of companies here. Individuals as well serve as disseminators of knowledge and skills, moving sometimes swiftly among a dizzying number of firms, spinning off new ones and invigorating existing ones, if temporarily. In company policies and practices? Again, this seems obvious, but policies and practices--institutional deposits of culture--serve more often to ossify culture than allow it to shift with technological changes. Lécuyer does not specify how regionalism affected the developments in Silicon Valley. The reader is left to assume that the "region-specific bodies of knowledge that were crucial for the commercial success of local firms" reside in the agglomerations of people, manufacturing firms, suppliers, and financers (p. 301). Perhaps that's the crucial point, that dissecting regions, focusing on single aspects, cannot unlock secrets. It should also provide ample warning to those seeking to replicate Silicon Valley's success; good luck plays a huge role. Particular assemblages of people, places, technologies, and larger social and economic forces, at particular times, form technology regions, and are thus very difficult to duplicate.

Lécuyer has done a truly exemplary job. While Silicon Valley certainly will retain its allure for scholars of all sorts, and will no doubt continue to spur inquiries into technology regions, ***Making Silicon Valley*** is the mandatory starting place for anyone interested in any of its many dimensions.

Citation: Dan Holbrook. Review of LÃ©cuyer, Christophe. *Making Silicon Valley: Innovation and the Growth of High Tech, 1930-1970.* H-Urban, H-Net Reviews. August, 2007.

URL: https://www.h-net.org/reviews/showrev.php?id=13494