

BOOK REVIEWS

Power in Palo Alto

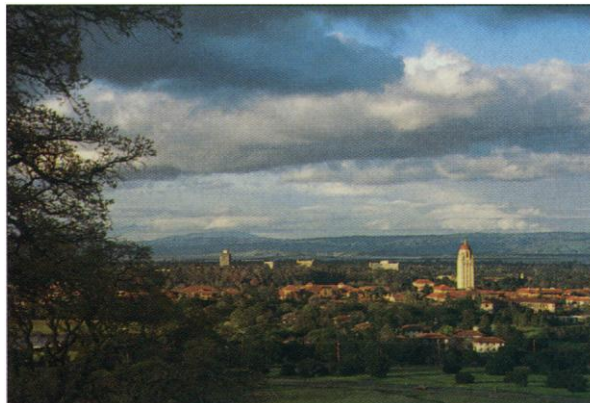
Creating the Cold War University. The Transformation of Stanford. REBECCA S. LOWEN. University of California Press, Berkeley, 1997. xii, 316 pp. \$45 or £35. ISBN 0-520-20541-3.

Stanford is one of the three or four universities that best exemplify the modern commerce between knowledge and power. Its name calls to mind semiconductors and gene splicing, wind tunnels and the great linear accelerator. Closely linked to scores of high-tech firms in the Silicon Valley—landlord, in fact, to many—Stanford is also among the leading recipients of federal funds for research. It is what many other universities aspire to become: a top-tier site for graduate study, a linchpin of regional development, and a place where—as the phrase goes—futures are imagined. But it was not always so. Before World War II, Stanford was a respectable school that was often overshadowed in research by more aggressive in-state rivals in Berkeley and Pasadena. The story of how Stanford emerged from these shadows during the first two decades of the Cold War provides the narrative core of Rebecca Lowen's book, and an engrossing narrative it is.

Narrative, however, is not Lowen's main purpose. Like many historians, she is interested in the more general phenomenon of how American institutions changed during that era of hostilities, hot and cold. Anxieties about national security, innovations in the technology of war, and massive increases in federal spending altered habits of thought and behavior, stimulated the invention of new institutions, and created motive and opportunity to reinvent old ones—not least important, universities. By studying Stanford in detail Lowen seeks to understand better the dynamics of what she calls "the cold war university." How did schools that often had only arm's-length relations to the federal government and industry before World War II become part of what may be fairly, if inelegantly, called a military-industrial-academic complex? How did the change affect the values and practices of the academy? And where did power reside in the emerging megaversities?

Lowen pursues these questions with vigor and intelligence. Mining archives and interviews, she makes a strong argument for

the active role of administrators and regents in steering Stanford toward new partnerships with external sponsors. In particular, she exhibits in telling detail how they used power over appointments and promotions to remold departments around specialties for which they anticipated strong market demand: microwave and solid-state electronics, physical metallurgy, high-energy



Stanford University, Palo Alto, California [Renee Lynn/Photo Researchers]

physics, statistics, biochemistry, and behavioral psychology. Frederick Terman, dean of engineering and later provost, was Stanford's most determined advocate of this entrepreneurial style. Like an academic version of New York's master builder Robert Moses, Terman bulldozed his way toward building "steeples of excellence." The process, as Lowen makes clear, could be wrenching for those who lived on what Terman might have called "the flats," that is, those who cultivated or defended fields that held less appeal for external sponsors—the biology of the whole organism, political theory, and geomorphology, among others—or were more interested in undergraduate teaching than research or simply valued the independence of the prewar university.

Lowen disavows any interest in taking sides in the debates over the university's role in society that tore campuses in the 1960s, but it is pretty clear that her sympathies reside with critics of the megaversity. Steeples of excellence were built at Stanford, and elsewhere, but she argues that

their excellence was often defined by the lights of external patrons, especially the research agencies of the Department of Defense. This was no Pentagon conspiracy. Rather, it was the natural outcome of tactical accommodations made by administrators intent on gaining a march on competitors and providing immediate services to the nation. One price of steeple-building was a loss of autonomy. Administrators could bring Stanford into new relations with sponsors but did not generally know how to maintain control once those relations were established. Departments dependent on outside funds for equipment and salaries could no longer chart their own courses; the university, identifying itself ever more fully with institutions of power, lost some of its capacity to nurture dissent

or simply intellectual eccentricity. Another price, in Lowen's telling, was balance: between undergraduate instruction and research, and between fields that had access to external funds and those that did not.

Not all readers will find the evidence for these conclusions compelling. Lowen pushes hard to extrapolate from the particular to the general, as when she argues for the central role of administrators in restructuring the university, but the circumstances that make Stanford such a good subject for narrative also limit its value as a

type specimen. Power was centralized at Stanford to an unusual degree and wielded by administrators with exceptional vigor. They coaxed and bullied the faculty to become more entrepreneurial. Yet the same outcome sometimes occurred in institutions under weaker management. Extramural funds for research afforded professors with strong ambitions ample opportunity to expand their laboratories and enlarge their influence on university campuses, with or without the enthusiastic support of administrators. Indeed, as faculty developed close relationships with external sponsors, power within many institutions tended to devolve from administrators to individuals and departments, prompting not a few complaints from presidents and deans about the ungovernableness of their universities.

More troublesome are some of the assumptions that structure Lowen's analysis of Stanford itself. Was good undergraduate teaching inversely related to the building of steeples? Perhaps, but it is hard to know since we are told little about undergraduate instruction at Stanford prior to World War

II and good teaching itself is notoriously hard to define. Was the balance among disciplines altered by external patronage? Of course. But universities were adapting to changing social demands long before the era of large-scale federal contracts. This is how institutions invented in the Middle Ages have managed to survive for so long. Lowen argues, with good cause, that the links between the academy and institutions of power became much thicker after World War II and that some of the natural insulation enjoyed by universities from external pressures was lost. She also goes on to suggest, however, that the effect was to impoverish the university intellectually. Here we enter a realm of "what ifs," where judgments depend upon our understanding of the "natural" course that disciplines might have taken in the absence of outside forces. Was the academy impoverished when resources were shifted from geomorphology to geophysics or from classics to the sciences? The answer, of course, depends on time, place, and the values of the observer. Lowen, to her credit, uncovers much evidence to indicate that some faculty during the Terman era themselves felt the university was being skewed toward goals extraneous to the best interests of science and scholarship. But even here it is a fine call to distinguish between farsighted critics and carpers who defined "balance" as the comfortable status quo ante.

Lowen might have been somewhat more critical of the defenders of autonomy and balance and somewhat more generous to Terman and his allies, whose efforts, after all, yielded more than just weapons, particle accelerators, and silicon millionaires. She might, that is, have worked a bit harder to extricate her analysis from the either/ors. Stanford had never been an ivory tower; it never became purely a service institution; it had never enjoyed complete autonomy and never became completely dependent upon external sponsors. The patrons it served, even at the height of the Cold War, were not so monolithic in their goals as to draw the university along a singular path that was consistently inimical to institutional or disciplinary interests. At her best, which is very good indeed, Lowen takes us past the binary options and illuminates the interplay of the multiple interests and traditions that constitute a complex institution. Even when this complexity is missing, she sustains interest with a narrative alive to the dilemmas of joining knowledge and power. This provocative and illuminating book merits wide attention.

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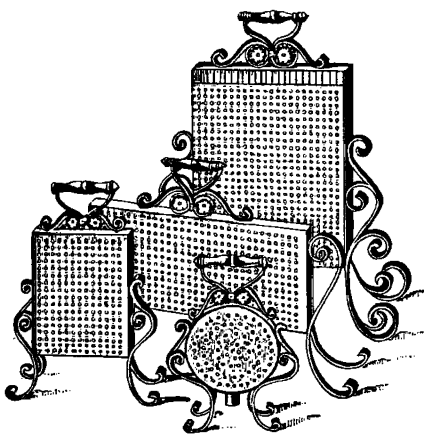
Marvels on Display

Exhibiting Electricity. K. G. BEAUCHAMP. Institution of Electrical Engineers, Stevenage, Herts, U.K., 1997 (U.S. distributor, IEE/IN-SPEC, Piscataway, NJ). xiv, 338 pp., illus. \$85 or £45. ISBN 0-85296-895-7. IEE History of Technology, 21.

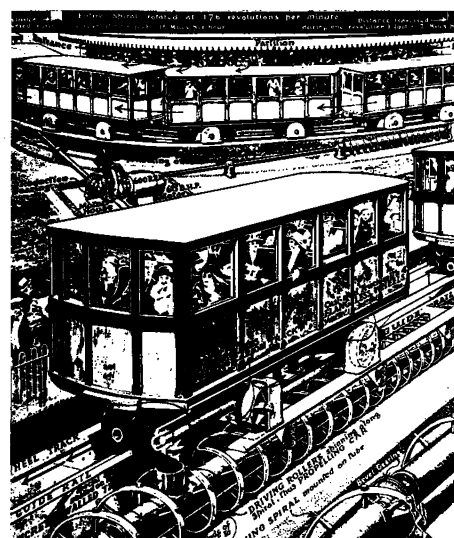
On 9 July 1851 Queen Victoria visited the fantastically popular "Great Exhibition" in London's Hyde Park. As she noted in her diary, "We went to the Exhibition and had the electric telegraph show explained and demonstrated before us. It is the most wonderful thing and the boy who works it does so with the greatest of ease and rapidity. Messages were sent out to Manchester, Edinburgh etc. and answers received in a few seconds—truly marvellous!"

Marvelous, indeed. Though initially dismissed by some exhibition organizers as mere philosophical instruments or toys, electrical technologies soon would command the respect of engineers and inspire the awe and delight of Queen Victoria and millions of lay persons. Beauchamp's book provides a lovingly detailed catalogue of the electrical wonders displayed at the hundreds of expositions, exhibitions, world's fairs, and trade fairs held in Europe, the British Empire, and the United States from the late 18th century to the present.

The marvels on display ranged from the time-honored "sparks and shocks" (including the suspect but popular family medical coil), to huge electrical generators like Thomas Edison's famous "Jumbo," displayed



"Portable generator at the Frankfurt Electrotechnical Exhibition, 1891." [From *Exhibiting Electricity*; "Allgemeiner Berichte über die internationale Elektrotechnische Ausstellung in Frankfurt am Main, 1891"]



"The 'never-stop railway' at the British Empire Exhibition at Wembley, 1925." The railway consisted of 88 cars "driven by a spiral shaft acting on rubber guide wheels, the mechanism of which can be seen" in this illustration. The train slowed down at stations to allow passengers to board, with the variation in speed achieved by altering the pitch of the spiral. [From *Exhibiting Electricity*; *Scientific American*, 1924]

at the 1881 Paris Centennial Exposition and named after a popular elephant from the London Zoo, to a plethora of consumer devices—electric cigar lighters, irons, pens, hair curlers, pianos, and even an "electrochemical bath."

The expositions were not just technological sideshows; they hosted the debuts of many history-making inventions. Alexander Graham Bell first publicly demonstrated the telephone at Philadelphia's Centennial Exposition in 1876. The "Edison effect" was first shown at the 1884 International Electrical Exposition in Philadelphia. Edison also arranged the first public display of the x-ray tube at an 1896 exposition. Some expositions provided occasions for early professional meetings of electrical engineers, leading to the founding of societies such as the Institute of Electrical and Electronic Engineers and the establishment of international electrical standards.

Electrical technologies also transformed the very processes of mass display. Spectacular nighttime illuminations, often combined with fountains, music, and fireworks, drew huge crowds and threatened to overwhelm the educational aspects of some expositions. Electric trams, "moving pavements" (first used in 1893 at the World's Columbian Exposition in Chicago), sound-equipped "chairveyors" (used in General Motors' "Futurama" at the New York World's Fair of 1939-40), and the more recent monorail and mag-lev transportation systems proved indispensable in