management studies. He recently edited Big Business and Dictatorships in Latin America *(with Victoria Basualdo and Hartmut Berghoff; 2021) and* Historia empresarial en América Latina *(with Andrea Lluch and Martín Monsalve; 2021).*

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The Train and the Telegraph: A Revisionist History. *By Benjamin Sidney Michael Schwantes*. Hagley Library Studies in Business, Technology and Politics. Baltimore: Johns Hopkins University Press, 2019. xix + 199 pp. Illustrations, map, notes, bibliography, index. Hardcover, $54.95. ISBN: 9781421429748.

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Reviewed by Bruce Seely

This slim volume sets out to explore the interactions of the telegraph and railroads in the United States during the nineteenth century. Benjamin Schwantes opens by discussing the famous painting *American Progress* by John Gast (1872), which shows an angel carrying telegraph wire leading settlers and the railroads into the American wilderness. The implication, Schwantes comments, is that the railroad had made the telegraph an integral element of its management and operations strategies. Further, he notes that business historians, following the lead of Alfred Chandler, similarly assumed that the telegraph was at the center of the management innovations pioneered by railroad officials after the 1830s. Schwantes's revisionist thesis is that an easy integration of two emerging and vastly important technologies did not take place.

Both of these pivotal technological systems emerged during 1830s, meaning that no one was sure of the best way to link them—or even if they should be linked at all. Schwantes's account unfolds from the railroad side of the story, since railroad managers had a controlling voice in addressing that question. English railroads had adopted telegraphic communication as an operating tool, but American railroad managers never accepted the English model, in part because of the prohibitive capital costs of building telegraphs alongside their rails. Schwantes traces, through six substantive chapters, the slow American efforts to integrate telegraphic technology into nineteenth-century U.S. railroad practices. "Expediency, more than any other particular factor," he argues, brought the two systems together (p. 3).

Schwantes shows that after telegraph companies found railroad managers uninterested in their technology, telegraph promoters sought access to railroad rights-of-way, as a means of lowering their construction costs. These first tentative connections through the 1840s were

often troubled and difficult and occasionally resulted in legal wrangling and safety concerns. The second chapter suggests that the challenges after 1850 of operating the first long-distance rail lines presented opportunities for an integration of telegraphs and railroad management. Daniel McCallum of the Erie and J. Edgar Thompson of the Pennsylvania, among other railroad leaders, explored how to do so. Safety concerns, mainly related to collisions on single-track lines, became especially significant as a result of the greater geographic distances covered by these lines and would remain so for the remainder of the century. But rather than dispatching and controlling train movement via telegraphed messages, railroads officials developed a tight operating rules–based approach to train dispatching. Telegraphs often seemed most useful for ensuring that the clocks at all stations on a line reflected the same time.

The demands of the Civil War, which included not only safety but also the need to focus railroad activities on the immediate logistical needs of the Union army, created another chance for railroad management to rely more directly upon telegraphs. The U.S. Military Railroad system afforded opportunities for operational comparisons of rules-based operation and telegraphic dispatching, personified by the competition between McCallum, who favored central control via telegraph, and Herman Haupt, another Pennsylvania Railroad engineer, who stressed tight rules. Each approach had its advantage, so while telegraphs often demonstrated their value during the war, they were not always the perfect answer to the problems of time and space, in Schwantes's words. Thus, railroad managers still had not universally accepted the telegraph as an operational tool by war's end, but the question was becoming how, not whether, railroads should utilize the telegraph in operating far-flung railroads.

The last three chapters explore this process in detail. During the 1870s, American railroad managers developed what came to be called the American system of train dispatching, which included local telegraph operators and train dispatchers operating firmly within the rules-based approaches developed before 1860. By the 1880s, the operation of trains over ever-longer systems, and especially the interchange of cars across those systems, increased the pressure to rely more heavily upon real-time information from the telegraph in dispatching trains.

Schwantes's discussion of these efforts moves into territory well covered by Steven Usselman's study of railroad management of other safety systems. For example, Schwantes, like Usselman, emphasizes the central role played by the Pennsylvania Railroad's managers in developing standard practices and technology. And as reform movements related to railroad safety gained momentum in the 1890s, Schwantes describes how telegraphers' demands for better working conditions and pay led in large part to the Hours of Service legislation finally

passed in 1907. That act, ironically, clearly prompted railroads to consider adopting the telephone as an alternative to the telegraph for train dispatching.

Schwantes's book provides a useful addition to the literature on the adoption and management of technology within corporate settings. He research is very thorough, drawing especially upon the archives of several large nineteenth-century American railroad companies. Schwantes certainly sheds new light on the process through which railroads came to adopt the telegraph for day-to-day operations. The first chapters document the managerial responses to the challenge and opportunities of a new technology, while the final sections focus on the telegraph—or more accurately, telegraphers—during the emergence of the Progressive reform era. The last chapter somewhat narrowly examines the question of railroad safety reforms and public policy but also explores that issue from the perspective of the telegraph, an angle not represented in most accounts of railroad safety legislation. In the end, Schwantes's most important finding is that railroad managers took a long time to figure out how to use telegraphic communication to run their business and never were completely satisfied with the situation. Given the many existing studies of technological change by historians of business and technology, that might not seem an earth-shattering conclusion. But Schwantes's book demonstrates there is value in historians reexamining issues we thought were well understood.

Bruce Seely is a historian of technology whose research interests have included transportation and public policy, among other topics. He is coauthor of The Best Transportation System in the World: Railroads, Trucks, Airlines, and American Public Policy in the Twentieth Century *(with Mark Rose and Paul Barrett; 2006). He spent much of his career at Michigan Technological University and is now retired.*

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Spectacular Flops: Game-Changing Technologies That Failed. *By Michael Brian Schiffer*. Clinton Corners, NY: Eliot Werner, 2019. xii + 308 pp. Illustrations, references, index. Paper, $32.95. ISBN: 978-0-9898249-9-6.

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Reviewed by Howard Schneider

Technology can advance and enable societal changes in many ways. The successful inventors Henry Ford and Thomas Edison are two examples of individuals who transformed society with their technological breakthroughs. Michael Brian Schiffer, the Fred A. Riecker