Regulating Railroad Innovation

Efforts to create and mold new technologies have been a central, recurrent feature of the American experience since at least the time of the Revolution. Many of the most tumultuous events in the nation’s history have, at their core, involved disputes over the appropriateness and desirability of particular technologies. In Regulating Railroad Innovation, historian Steven Usselman brings this neglected aspect of American history to light. For nearly a century, railroad technology persistently posed novel challenges for Americans, prompting them to reexamine their most cherished institutions and beliefs. Business managers, inventors, consumers, and politicians all strained to contain the forces of innovation and to channel technical change toward the ends they desired. Usselman traces their myriad struggles in rich detail. Moving through time from the first experimental lines through the polished but troubled railroad machines of the early twentieth century, he examines diverse forums ranging from legislatures, courts, and evolving corporate bureaucracies to laboratories, engineering societies, and world’s fairs. In the process, he develops a novel synthesis, one that at once situates technology within the dynamic history of an emergent industrial nation and elucidates its enduring place in American society.

Steven W. Usselman is Associate Professor of History in the School of History, Technology, and Society at the Georgia Institute of Technology. His study “IBM and Its Imitators” received the Newcomen Award for Excellence in Business History from the Business History Conference.
Regulating Railroad Innovation

Business, Technology, and Politics in America, 1840–1920

STEVEN W. USSELMAN
Georgia Institute of Technology
To Marion,
who sustains me,
and in memory of Lillian Walters Usselman,
who got me started
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Preface and Acknowledgments

Some two decades ago, when I was first tilling the soil that would ultimately yield this book, a group of graduate students at the University of Delaware met to welcome a new member of the faculty. In the fashion of academia, each of us by way of introduction offered a brief synopsis of our research. When my turn came, I eagerly discussed my imminent departure for Chicago and the Newberry Library. There, in the archives of the Chicago, Burlington and Quincy Railroad, I hoped to discover precisely how late-nineteenth-century executives had “managed” technological change. “Oh,” replied the bemused new arrival with devilish feigned innocence, “did they manage it?” As heart plunged toward rapidly tightening gut and mind sifted feverishly for a suitable response, I sensed for the first time the slippery indeterminacy of my subject. “Well,” I shrugged at last, “they certainly tried.”

This brief exchange has haunted me ever since. It did not, in fact, prove difficult to confirm that railroad executives sought in a variety of ways to make technological innovation more predictable and routine. My doctoral dissertation readily documented many of their efforts. It described how executives at the Burlington and several other lines developed managerial structures that helped them evaluate new technology and monitor its diffusion. It traced the increasing prominence of college-trained engineers and of engineering societies in the technical affairs of the industry. It evaluated the changing relationships between railroads and their suppliers, as suggested by the diminishing role for inventors of patented devices and the growing emphasis on negotiated specifications. Together, these measures marked a pioneering effort to reshape the process of technical change, one which anticipated similar attempts by managers in other industries during the twentieth century. Documenting that effort, which I have come to think of as “the engineering epoch” of American railroading, remains a primary goal of this study.

Yet as my gentle cross-examiner sensed, considerable doubt necessarily persisted about precisely how those efforts influenced the pace or character
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of railroad innovation. In attempting to contain innovation within a regular, predictable routine, railroad executives were in a sense trying to manage the unmanageable. Pressures to innovate came relentlessly, often from unexpected quarters. Railroad management could not possibly anticipate every demand or stem the flow of novel technologies opening new possibilities. Whatever success railroads enjoyed in keeping such disruptive forces in check during the late nineteenth century, moreover, took on a much different cast when considered in light of the subsequent difficulties railroading encountered in the early twentieth century and beyond. All of this suggested that the efforts to manage railroad technology needed to be set in a much broader context. They should be situated within a longer temporal framework, so that we might appreciate why techniques for managing technology flourished at particular times and not at others. And they should be linked more explicitly to broad forces in politics and economics that operated on the railroad industry across that longer span of time.

As I set about trying to comprehend the ties between technology, economics, and politics in a leading industry across nearly a century of American history, scholars from a variety of disciplines generated an impressive body of studies aimed at deciphering the mysteries of technical change. Much of this work emphasized the ways in which technologies are "socially constructed" by networks of actors, interests, and institutions. Such ideas resonated to considerable degree with my own focus on efforts to manage innovation. Like my early studies, however, this work frequently stopped short of connecting those people immediately involved with the technologies to a larger social and economic context. Too often, studies of social construction probed deeply into the inner workings of bureaucracies but shied away from the messy realms of popular politics and the marketplace. For this reason, I found myself drawn increasingly toward interpretative concepts advanced in recent years by political historians and economists. The former have greatly enriched our understanding of the complex interplay among political ideals, political parties, administrative structures, and government policy. The latter have examined the utility of market-based theories for explaining technical change, identifying their limitations and introducing important modifying concepts such as path dependency, technological trajectories, and asymmetrical information flows. I have tried in these pages to wear such theory lightly, taking care at every turn to ground my narrative firmly in the course of historical events. Still, this book can in some respects be read as an attempt to integrate insights from these various disciplines in order to develop a comprehensive set of tools for understanding the framework in which technical change occurs in the American context.

Yet in the end it is that context itself, not some set of case studies or abstractions regarding the elusive subject of technical change, that has ultimately come most to concern me. Somewhere in the course of my endeavors, this project evolved from a study aimed at documenting the dynamics of
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technology into a more general inquiry intended to shed light on fundamental elements of American history and culture. As I set about trying to situate my actors and events within a larger context, I came to appreciate how efforts to manage or regulate significant technical innovations such as railroading are not peripheral matters involving a few specialists or experts. Rather, such efforts are an absolutely central element of the American experience. Perhaps never has this been more obvious than in our own times, as the phenomenal pace of change in electronic communications and computing garners so much attention and occupies such a large share of our energies in seemingly every realm. But it was true as well two centuries ago, when citizens of the new nation first attempted to reconcile dynamic changes in technology with their revolutionary political inheritance, and it has remained true ever since. In examining how several generations of Americans attempted to come to grips with one transforming technical innovation, I have thus come to learn not merely about technology but about Americans and the institutions and values that bind them.

No writer can trace such an odyssey without ringing up enormous debts along the way. Among the many professional colleagues who have aided and inspired me over the years, one stands out above all others. David Hounshell, now of Carnegie Mellon University, arrived at the University of Delaware as a young assistant professor the same year I began my graduate studies. From those first encounters onward, he has remained the most loyal, patient, and supportive of mentors. I am proud to count myself among his pupils and grateful for his friendship. Our years at Delaware were enlivened by what I have come to appreciate was a very special community of faculty and students. Among faculty, I benefited especially from the teaching and counsel of Glenn Porter, who to my good fortune has remained steadfast in his support ever since. Eugene Ferguson, George Basalla, Richard Bushman, and the late Reed Geiger were also outstanding teachers who opened new worlds to me in their own distinctive fashions. Each profoundly shaped my thinking in ways that continue to inform my scholarship and teaching. My fellow students included such old hands as Stuart Leslie and Bruce Seely, as well as my contemporaries Bill Sisson, Mark Wilde, Kim Carrell, and my dear friend John Kenly Smith. The mix of fun, friendship, and intellectual passion we shared will always serve as my ideal of graduate study at its best. On either side of my experience at Delaware, I had the good fortune to come under the influence of an individual whose ideas and support inspired me to tackle problems I otherwise would not have. The first was Harry Scheiber, my undergraduate honors advisor, who drew me away from a career in engineering and gave me the confidence to pursue my interests in history and the railroads. The issues addressed in this book are the direct legacy of ideas raised in his classes in American economic and legal history some quarter-century ago. The other was Jim Livingston, now of
Rutgers University. During two marvelous years we overlapped as colleagues at UNC–Charlotte, Jim opened a challenging yet constructive dialogue that to this day stimulates and informs my thinking about business history and political economy. My decade at Charlotte was further enlivened and enriched by colleagues and friends Julia Blackwelder, John Diemer, Dan Dupre, David Goldfield, and Carole Haber. Each patiently guided me through unfamiliar terrain, historical and professional. Through years of treasured conversation, my Latin Americanist colleague Lyman Johnson taught me as much about the United States (among other subjects) as anyone ever has. John Smail, with whom I have spent many fruitful times discussing the business of innovation, remains for me a model of how to live an academic life. An unusually fine group of graduate students, including Craig Brashear, Jon De Klerk, Jennifer Galan, Fred Gates, Shep McKinley, and Craig Pascoe, helped me work through many ideas pertaining to American political economy.

The UNC–Charlotte Foundation provided financial assistance for several summers of research.

At Georgia Tech’s School of History, Technology, and Society, I have had the good fortune to join a community of colleagues and students who make studying the history of technology a rich and pleasurable experience. I appreciate the opportunity to discuss issues pertaining to the contents and production of this book with Mike Allen, Gus Giebelhaus, Ken Knoespel, Daniel Kleinman, Bob McMath, Greg Nobles, Helen Rozwadowski, Phil Scrantan, Bruce Sinclair, Andrea Tone, and Steve Vallas. At an especially critical juncture, Doug Flamming gave the manuscript the sort of careful, sympathetic reading every author craves. I am forever grateful to him for that kindness and for his gracious, sustaining fellowship during the final stages of the birthing process.

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Authors, especially slow ones, place extraordinary burdens on their families. Three treasured members of mine – Karen, Laura, and Nathan – have spent their entire lives sharing their father’s time and attention with this most demanding of rival siblings. Not only have they shown exemplary tolerance; their hopeful encouragement and abiding optimism have sustained and inspired me as only the wonder of youth can. My sisters Leann Drummond and Louise Maier and their families carried me through the long, trying ordeal of our mother’s death, graciously indulging their kid brother his frequent withdrawals into work. I appreciate also the continuing interest and support of my father, Leo Usselman. In what must be some sort of authorial record, four households of in-laws quite literally lived with this project for extended periods. I thank Anne and John, Phil and Pam, Myron and Marilou, and Phil and Dot for their generous hospitality and all members of the extended Curtis clan for showing such concern for me and my work. Anne deserves special mention for her unique matchmaking talents, which somehow helped secure me both her dissertation advisor as an undergraduate thesis supervisor and her sister as a spouse. For the latter, no words can capture my depths of gratitude. Marion is the rock of my life, an unwavering source of reason, encouragement, and love. She has stayed with this project from beginning to end, ever the ideal companion, in this as in all life’s adventures.