Leonardo to the Internet: Technology and Culture from the Renaissance to the Present. *By Thomas J. Misa.* Baltimore: Johns Hopkins University Press, 2004. xx + 324 pp. Illustrations, photographs, tables, figures, bibliography, notes, index. Cloth, $56.95; paper, $19.95. ISBN: cloth 0-801-87808-X; paper 0-801-87809-8.

Reviewed by Robert MacDougall

Thomas Misa begins his ambitious and engaging history of technology with Leonardo da Vinci's career in the courts of Renaissance Florence as an inventor, architect, and engineer. Though hailed in later centuries as a prophet of automation and industrialization, Leonardo—and the Medicis, Borgias, and Sforzas who paid for his work—showed little interest in labor-saving "industrial" technologies. Leonardo's great innovations, Misa argues, and indeed most of the characteristic technologies of the Renaissance, were not wealth producing but wealth consuming: they were instruments of war making, city building, and courtly display.

This idea launches Misa's swiftly moving survey of the changing relationship between technology and society from the fifteenth century to our own times. Eight chapters sketch the outlines of eight distinct "eras" of technology, each defined by what, in the broadest sense, drove technological innovation in that time and place, or by what that society judged technology to be for. Misa explores, for instance, the wealth-consuming architecture and theatrical spectacles of the Renaissance court and the wealth-producing factories of Britain's industrial revolution, the nineteenth century's instruments of empire, and the twentieth century's implements of war. Each era is illustrated with case studies of a few representative technologies. Misa demonstrates how all these innovations were shaped by the cultures in which they arose and how technology shaped, and even constituted, those cultures in turn. This is a recurring theme in Misa's work. It appears most notably in his 1995 history of the American steel industry, *A Nation of Steel: The Making of Modern America, 1865–1925*. Nonspecialists will probably come away from *Leonardo to the Internet* impressed with the many ways technologies have been shaped by social and cultural factors. Historians of technology, who have been struggling to get that message out for years, may be more struck by the reverse. Misa

argues boldly for the influence of technology on society in a way that his colleagues, wary of technological determinism, have often been reluctant to sustain. His is a refreshing and powerful perspective. Surely the interaction of technology and culture, to the extent that they are separate entities at all, should be seen as a two-way street.

Business historians will find in this book many fascinating insights on the interaction of commerce and technology, both in those times and places when economic factors took the lead in shaping invention and innovation, and in other eras when political imperatives like war or empire held greater sway. Often, Misa treats business itself as a kind of technology. An excellent early chapter describes the globe-spanning trading networks of seventeenth-century Holland. The key innovations, or "technologies," of the Dutch Republic included not only sturdy cargo ships and factory-like herring busses—large fishing vessels whose crews were equipped to gut, salt, and pack their catch right on board—but also sophisticated stock and commodity exchanges, futures contracts, and maritime insurance. The Dutch technological style was capitalist without being industrialist, Misa argues, and remarkably successful. A broad cross-section of Dutch society took part in this global economy and shared in its profits. To the question, "Why didn't the Dutch industrialize like Britain?" Misa answers, essentially, "Why should they have wanted to?" A later chapter, somewhat less compelling, considers three representative technologies of our own global economy: the fax machine, the Internet, and McDonald's—Misa sees the fast-food chain as an innovative technological system in its own right.

Misa has a knack for telling details, and every reader will find his or her own favorite story here. I was charmed, and persuaded, by Misa's case for beer as a prototypical product of Britain's industrial revolution (and, in an earlier chapter, as an essential social lubricant for inspiring the Dutch tulip mania). I was also fascinated by his description of the Manhattan Project, which deemphasizes the famous research laboratory at Los Alamos in favor of the U.S. Army's two mammoth factory complexes in Tennessee and Washington State. Every reader will probably also find some anecdote that does not quite carry the weight Misa asks it to bear. Teenagers eating at McDonald's restaurants in Hong Kong apparently linger over their Big Macs for an average of twenty to twenty-five minutes, which is twice as long as their American counterparts. This local

variation is interesting, but it is not really enough to convince me of Misa's argument that McDonald's, and global commerce in general, do not constitute powerful homogenizing forces. *Leonardo to the Internet* is perhaps the sort of wide-ranging book where one finds every section unimpeachable except the one nearest to the topic of one's own expertise.

Misa's final chapter offers some conclusions on how to think about technology in general and also about some of the technological problems and choices facing the world today. While his concerns about poverty, privacy, and the environment are laudable, his final thoughts are tentative and diffuse, and this chapter is thin soup compared with the rich stew of description, detail, and analysis in the book's earlier pages. Still, Misa should be praised rather than faulted for the boldness of his project. *Leonardo to the Internet* surveys five hundred years of Western civilization in an ambitious comparative framework. It synthesizes the histories of technology, science, business, and culture with little sacrifice of rigor or detail. It is an accomplishment worthy of a true Renaissance man.

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