Open Standards and the Digital Age: History, Ideology, and Networks by Andrew L. Russell. New York, NY: Cambridge University Press, 2014. 316 pp. ISBN-13 978-1107612044.

In the early 1970s, the U.S.A. and European countries each pursued separate experiments in electronic computer networks. In this pre-Internet era, France had Cyclades, the U.K. had Mark 1, while America's Arpanet, funded by the Department of Defense (DoD), was considered by many the most politically nimble, independent as it was of the levels of government oversight borne by European efforts. A group of computer scientists called the International Network Working Group (INWG) convened to inter-network these separate projects through an internationally agreed-upon standard that would stand up to the old-guard telecomm industries – a standard that allowed computer users, via the new packet-switching protocols, to configure their terminals and applications as they wished. Andrew Russell, author of *Open Standards and Digital Age: History, Ideology, and Networks* (2014) concentrates on this international community and its ongoing pursuit throughout the 1970s and 80s of open standards-making – that is, of standards allowing diverse equipment that are arrived at through inclusive, consensus-oriented, and transparent efforts. Russell is consequently not interested in the well-trodden, self-congratulatory story of American network innovation found in most Internet historiography. What his narrative offers instead is a parallel history of an alternative Internet that never came to be.

Alongside competing American design efforts, international consensus standards committees gathered ranks to define protocols for the new computer networks and critique the closed, centralized corporate models of AT&T and IBM, championing open systems as new engineering solutions. The American computer scientist Vint Cerf was a member of this community for a time, spending five years working with INWG towards its open standard until he abruptly left, disillusioned with the committee's conflicting national interests and democratic consensus process. While Cerf turned his back on the wider international community to coordinate the work of ARPA-funded computer scientists, France's Louis Pouzin of Cyclades and others further developed the international standard, Open Systems Interconnection (OSI), over the next ten years.

Cerf instead pursued an American networking standard, the transmission control protocol (TCP) that he had designed, along with Robert Kahn, for the Advanced Research Projects Agency (ARPA), the financially flush American military agency that developed Arpanet. Sped along by designers who were unconcerned with international agreement, ARPA's TCP overtook the democratically designed OSI protocol to become the standard adopted by industry. OSI did not progress fast enough, crushed in the early 90s by its

commitment to open governance, its complexity, and competition from TCP. As Russell argues in the book's crucial sixth and seventh chapters, despite current and historical depictions of electronic networks as "open" technologies that are inherently decentralized and democratic, the Internet we inherited ultimately derives from this autocratic setting of DoD sponsorship within a closed U.S. military-industrial-academic complex. In the book's eighth chapter, Russell relates how Cerf, Kahn, and colleagues developed their own institutions such as the Internet Engineering Task Force, a group of volunteers who used a rough direct consensus process to shepherd TCP as today's de facto Internet standard.

Russell's story of alternative networking standards and designs is the book's central and key contribution to Internet scholarship, yet his story begins with several painstaking chapters on industrial and telecommunication standardization in America – perhaps a surprise for a book with "digital age" in the title. A meticulous account drawn from extensive archival sources, four of these chapters paint the backdrop for a distinctly American system of standards-making that arose in the late 19th century, when industrial standards were a new, often ad hoc venture. These standards committees relied on voluntary, cooperative groups of engineers and electrical scientists representing several firms and government agencies, all forging "a middle ground between unfettered capitalism and outright nationalization" (p. 34). Critics of monopoly during the telegraph days – most often Western Union – saw this consensus committee method of internal due process, and only a light hand of government regulation, as a middle ground between public ownership (the common European model) and unregulated capitalism. Russell focuses most closely on the American Engineering Standards Committee (AESC), a body that created electrical, photographic, building, transportation, and automotive standards. AESC's consensus-oriented values – openness, inclusiveness, transparency, and efficiency – predate electronic networks. Russell argues we are mistaken, then, if we think these ideals are specific to today's digital infrastructures, a claim that counters much first generation Internet historiography.

The book also catalogs a straightforward parade of white, gentleman experts who form committees, write memoranda, and debate the sizes, shapes, speeds, terms, and interconnectivity of a variety of crucial infrastructures. Russell's thorough, chronological telling of such material does not always make for an absorbing read, perhaps because there is little perspective of outside voices to be found in committee proceedings, annual reports, and professional journals written by and for this technical elite. The voluntary cooperative forms of industrial engineers, for instance, may have been inclusive to a wide range of industry representatives and government-appointed officials, but elected officials, lay people, and labor are largely absent. Russell recognizes as much, but even so, neither labor nor any other minority has a voice in this account.

The book's core strength lies in extensive original research that establishes how network standards have shaped our current affairs and values – interdisciplinary work that should benefit media, information, and communication studies scholarship. In the introduction, Russell positions the book within literature on the social construction of technology, concerned as it is with how ideas shape technology through a mutual constellation of economic, political, and cultural forces. Here, technology is ideology put into practice; for example, networks and their standards derive from organized critiques by engineers and designers of the monopolistic status quo. Russell faintly traces these committee dynamics to conceptual links of many of the 20th century's intellectual foundations of open systems. This legacy ranges from the rejection of the British Stamp Act by American colonists, to the U.S. "open door" policy towards China, Karl Popper's open society (1945), and open systems theorists such as Talcott Parsons, Ludwig von Bertalanffy, and Norbert Wiener. Political freedom, personal autonomy, and free market economies appealed to these thinkers, who naturalized these concepts as the best way forward for human advancement.

What Russell's engineers largely shared with these intellectual and political precedents is a "critique of centralized control" (p. 14). Ultimately, this critique fed into industrial designs and international standards-setting for computer networks, and even into the process of settling these, by opening standardization itself to the resolution of diverse interests. It is the latter efforts that had been largely left out of our histories of today's digital networks. *Open Standards in the Digital Age,* then, is a first major historical work that has enough distance from its subject matter to decenter America and ARPA from the story of the Internet, giving equal space to other, often more elegant and egalitarian efforts.

References

Popper, K. (1945). *The Open Society and Its Enemies. Vol I. The Spell of Plato.* London: Routledge.

Reviewer

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