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To the Cloud: Big Data in a Turbulent World. By Vincent Mosco.

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Book Review

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In a scholarly milieu eager to understand and perhaps use big data analytics, it is refreshing to encounter a book that shifts focus (despite the title) to the political economy and cultural representation of the infrastructures that are central to the big data movement. Consumers increasingly take for granted cloud services, such as word processing applications, on-demand access to one's photos, and the synchronization of files across devices. Meanwhile, the needs of governments for massive but secure data storage and computation encourage stronger ties with the commercial cloud industry, with worrisome implications. In *To the Cloud*, Vincent Mosco illustrates and raises legitimate concerns about the disconnect between ephemeral cultural representations of "the cloud" as "invisible" and the consequential materiality of the cloud industry—"physical structures that make significant material demands on resources and that call to mind the factories of the earlier era" (37). Specifically, Mosco argues that the current hegemonic discourses about "the cloud" portray it as a technology of "infinite promises" (33) via a variety of channels, thus occluding the potential for harm and any consideration of alternatives.

In *The Digital Sublime* (2004), Mosco developed his analytical framework for connecting cultural inquiry with political economy. He argued for the need to understand the mythologies of cyberspace, particularly those myths that render cyberspace transcendent of the status quo, in order to grapple with the political economy of information and communications technologies (ICTs). *To the Cloud*

applies that framework to cloud computing technologies. Using a social shaping perspective (see, e.g., Mackenzie and Wajcman, 1985), Mosco argues that "technology results from the mutual constitution of objects, labor, and language" (78). He analyzes how the very imagery used to promote the cloud industry as the answer to diverse political and economic challenges ultimately occludes how those considerations shape the industry, as well as how cloud computing impacts the environment, privacy and security, international labor divisions, and politics. After an overview of the book's organization in Chapter 1, Mosco develops this argument across four chapters. In Chapter 2, he reviews the history of cloud computing from the 1950s concept of computer utility to current data centers, as well as the organization and main players of the cloud computing industry. In Chapter 3, he examines how various channels promote cloud computing. In Chapter 4, he critically analyzes the harms of cloud computing with particular focus on environmental stress, privacy threats, information security risks, and challenges to the IT labor market. The final chapter takes up the cultural significance of cloud computing and the assumptions behind big data analytics, concluding with an analysis of four different ways to imagine "the cloud" artistically and philosophically, from ancient Greek satire to modern art.

The integration of cultural inquiry and political economic analysis is best illustrated in the contrast between Chapters 3 and 4—two chapters that, in my opinion, constitute the critical payoff of the book. Chapter 3 examines how laudatory narratives about cloud technologies originate from various interested sources, including advertisements, blogs, private think tanks, research reports, lobbying, and celebratory trade show keynotes. These narratives share a common rhetoric emphasizing how the use of cloud computing will enable a win-win situation and a "smarter planet" with seamlessly integrated devices and flawless synchronization, all the while encouraging new experiences for consumers. In Chapter 4, Mosco examines how the metaphor of the immaterial cloud is put to shame by the serious harms of e-pollution, the commercialization of privacy and erosion of citizen rights, and increased structural unemployment. His discussion of how environmental characteristics, for example the presence of naturally cooling waters, inform the choice of server farm sites was genuinely eye-opening. With this chapter, Mosco makes a solid case for unpacking the material underpinnings of cloud computing's hegemonic "stories" as well as the implications of uncritical reception of those stores for democratic values. In combination, Chapters 3 and 4 beautifully illustrate the strength of Mosco's analytical approach.

Less clear is the logic of Chapter 2, which attempts to do much sometimes at the expense of organizational clarity. To be sure, Mosco proposes a multi-disciplinary inquiry; the purpose of the book is to analyze "the political, social, and cultural significance" of the cloud (4). Legitimately, as part of the brief cultural history that starts the chapter, Mosco explores the idea of computing utility as an

Popescu: To the Cloud: Big Data in a Turbulent World. By Vincent Mosco.

Book Review | *To the Cloud* | 89

early take on the advantages of ubiquitous access that would later become one of the major selling points of the cloud. Indeed, late 2000s marketing journals made much of the connection between current cloud storage, on the one hand, and early time-sharing (sharing of computing resources among several users) and "computing as utility" ideas, on the other; these journals presented the cloud as a "low-cost, centralized way of working and connecting with all the people that you have to work with…" (Marshall, 2009, 56). The references to Soviet central planning and the Chilean ideal of central computing for democracy are fascinating; one does wonder, however, if those examples demonstrably constitute a source of inspiration for current cloud computing in the same way that, for example, time-sharing did.

For the sake of symmetry, one would also wish that Chapter 2 contained a similar genealogical exploration of key technologies that made cloud computing possible (virtualization comes to mind first). Mosco seems more interested, though, in presenting cloud computing as a cultural construction whose promises are better understood by inquiring into the aspirations which motivate it. For that reason, it is somewhat surprising that this cultural history of the cloud is paired with a rather technical discussion of cloud characteristics (such as resource pooling and rapid elasticity) and the types of cloud computing (such as IaaS, PaaS, and SaaS), before ending with an overview of the major players in the industry. Similarly, it is unclear how the exploration of four broad metaphorical treatments of "the cloud" the ends Chapter 5 relates to the preceding critique.

To the Cloud's major contribution rests in its excellent multi-faceted analysis of the cloud industry, particularly the relationship between cloud computing business strategies and industry structure, efforts to reshape the reception of cloud technologies through myth-making, and cloud computing's host of environmental, economic, and political harms. We might ask for a clearer statement of the relationship between cloud computing and big data analytics (was cloud computing essential in the development of big data epistemology, or did it simply make big data tools more widely available?). An explication of "digital positivism"—one that goes beyond Mayer-Schönberger and Cukier's (2013) oft-quoted and criticized work—would also be helpful. Nevertheless, *To the Cloud* occupies a previously unclaimed niche in the critical political economy of ICTs, and it provides an important and well-documented contribution to that area.

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