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Calculating a Natural World: Scientists, Engineers, and Computers during the Rise of U.S. Cold War Research. By Akera Atsushi. (Cambridge: MIT Press, 2007. 440 pp., 20 ill., bibl., index.. 23$ pb.)

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Calculating a Natural World: Scientists, Engineers, and Computers during the Rise of U.S. Cold War Research. **By Akera Atsushi.** (Cambridge: MIT Press, 2007. 440 pp., 20 ill., bibl., index.. 23$ pb.).

Based on the author's PhD thesis, this book is notable for its careful scholarship and ambitious analytical aims. The subject is the research culture that grew up around the computer in the early cold war era. It is an attempt to study and characterize the process of innovation, the invention and development of computers and their associated practices. Akera examines, through various case studies, the builders, users and sellers of computers in the period.

   The main mode of analysis is a traditional history of technology: careful detailing of events with copious references to archival sources and the secondary literature. The book is also situated in a tradition of the study of the process of innovation. Akera further augments his analytical toolbox with concepts and methods from the social studies of science. Chief among these tools is the idea of an ecology of knowledge, from the work of Charles Rosenberg as elaborated by Susan Leigh Star, and others. As Akera employs it, the ecology of knowledge is the complex set of interactions between the language of research, its practice, institutional cultures and specific organizations as well as the network of actors and artifacts. Akera makes a visually intriguing attempt to represent these interactions in the form of diagrams. Whether the diagrams ultimately aid understanding remains an open question.

   Akera attempts to concretely characterize cases where a body of practice is shaped by human action even as it shapes that action. In this aspect it is Akera's attempt to engage the debate about the meaning of the social construction of science. These deeper questions of social and historical theory are largely explicitly drawn out only in the introduction and conclusion of the book. However, the social focus of the book is clear throughout with Akera drawing our attention to how factors such as rhetoric, institutional politics and personal ambition interacted in cold war computer research, while never shying away from exploring the role of technical factors in the development of projects.

   Turning to the main content of the book a brief summary is in order. After the introduction the first chapter is a review of the period 1900-1945. This chapter draws on the existing histories of the origin of the digital computer. Strands of work from various disciplines fed into the creation of the computer, from mass produced calculators for business purposes, electronic counters for physics experiments to the analog machines created for engineering applications and including the methods of human workers performing arithmetic. Instances of recombination of

practices and artifacts across disciplines are key to Akera's account of innovation. Akera also relates the innovations of this era to the progressive ethos that sought new solutions to human problems. Institutional structures and officials, that emerged during the mobilization of the Second World War, cast a long shadow in this history.

The second and third chapters shift the focus to a human scale. Chapter 2 focuses on the early career of John Mauchly, up to the completion of the ENIAC, suggesting for example how his family background as the son of a research scientist shaped his ambitions. A peripatetic career in mathematical physics led Mauchly to hope that developing an electronic computer could be his great success. The chapter includes a somewhat detailed technical discussion of the design of the ENIAC to illustrate how the contingencies and requirements of war work and requisitioning shaped its design.

The third chapter looks at John von Neumann and his attempts as a European émigré to find a place in North American society. Akera focuses on his role designing the EDVAC and the Institute for Advanced Study (IAS) computer. Akera details how these design ideas came to represent for many a "blueprint" for future computer developments. He also details some of the friction between the abstract research culture of the IAS and the team responsible for building von Neumann's computer there.

The fourth and fifth chapters look at two government sponsored programs to build electronic computers and how organizational culture and structures shaped these efforts. Chapter four deals with the National Bureau of Standards computer construction program and parallel computer procurement efforts. Chapter five deals with the MIT project funded by the air force to construct what became the Whirlwind I computer. In both cases the project manager found it necessary to use rhetoric to manage the expectations of their superiors and minimize negative reports on and problems with the project. Technical and budgetary problems, for example, led Forrester at MIT to redefine the Whirlwind machine, originally intended as a small scale prototype to being a full-scale machine.

Chapters six and seven deal with IBM's relations with its user community. Chapter six deals with Cuthbert Hurd's creation of the applied science field men at IBM. These people had technical backgrounds and had to respect the culture of private and government research scientists, while still serving IBM's business goals and facilitating sales by IBM's regular sales force. Chapter seven deals with the IBM user group, SHARE. The new complexities of the computer industry and the diverse applications created a host of technical problems. SHARE acted as an intermediary between customers and IBM to delineate the customers

technical problems and requirements and attempt to organize solutions. SHARE became an early site where users could define a new discipline and expertise of computer use.

Chapters eight and nine deal with the attempts at MIT and University of Michigan to rationalize university computer services and later to create timeshare systems. The chapters contrast the MIT's approach as an elite private research university to Michigan's approach as a large public university. This not only depended on the way research and other activities were funded at the university, but also debates about the nature of engineering and the place of technology in campus and American culture. Timesharing proved to be a technology where expectations outstripped what could be delivered and this necessitated renegotiating objectives.

Akera's conclusion relates the narrative he has given to broader ideas in innovations studies and social constructivist accounts of knowledge. Akera's book is an excellent history of the events he chronicles and a fascinating glimpse at cold war era research. His emphasis on rhetoric and research culture allows him to trace a compelling narrative. The account is all the more impressive because it does not ignore more technical elements of the story. Also, he convincincly demonstrates how we can understand innovation in terms of the reapplication and modification of existing practices.

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***The Raftsmen of the Ottawa and St. Lawrence Rivers*. By Léon A. Robidoux.** (Sainte-Anne-de-Bellevue: Shoreline, 2008. 192 p., ill., maps, bibl. ISBN 978-1-896754-38-3 $22.95).

The Raftsmen of the Ottawa and St. Lawrence Rivers deals with the development of the logging and rafting industry on the Ottawa and St. Lawrence rivers between the 17th and 20th centuries. Its focus, however, is mainly the 19th century when this industry was at its apex. Léon A. Robidoux, author of two earlier works on aspects of the subject, *Les Cajeux* (1974) and *Le Vieux Prince* (1988), combines those previous French-language works to expand on the colorful and significant history of the individuals and companies that opened up the wilderness of Ontario and Quebec to develop a commerce in timber exported to Europe.

The book is divided into three sections. The first section, "The Early Days," sets the stage, discussing the forest industry after the British Conquest of Quebec, although the history of the industry's beginnings date from the tenure of Intendant Jean Talon in late-17th century New France. The