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PC visionary can't bear the weight of history

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The Dream Machine

J.C.R. Licklider and the Revolution That Made Computing Personal

By **M. Mitchell Waldrop**

VIKING; 502 PAGES; $29.95

The history of personal computing isn't like the conquest of polio or the invention of the light bulb. It involved not just a lone genius but an enormous number of people and a stunning breadth of disciplines, all of which had to interact over many years to bring about what networked computers have just begun to achieve.

M. Mitchell Waldrop, a talented science writer with an encyclopedic knowledge of his subject, made the fateful decision to cast the enigmatic **J.C. R. Licklider** as the central figure in "The Dream Machine," an exhaustive history of computing's march from the brute force of number crunching to the ubiquity and personality that the machines exhibit today.

Licklider was a sweet and brilliant visionary whose insights, along with those of many others, helped put the computer on the road to becoming potentially the world's greatest communications device. A successful cognitive psychologist, Licklider daringly threw aside his safe career to pursue a passion for computers and, building on his understanding of the human mind, considered how people and machines should interact.

According to Waldrop, he knew instinctively that the idea of computers as data-processing fortresses surrounded by armies of engineers and technicians, with whom one dropped off one's project, was all wrong. People and computers, Licklider believed, must work in symbiosis. Computers had to respond to their users, work in real-time and be shared so that lots of people could use them at once. And they

must talk to one another; in Licklider's evolving view, they were communications devices.

Indefatigably curious and generous to a fault, Licklider as an academic helped the embryonic discipline of computing to advance, mostly at the **Massachusetts Institute of Technology and Bolt Beranek Newman**, the nearby firm that played a pivotal role in what would later become the Internet. Licklider also headed computer and behavioral science research at the **Defense Department**'s **Advanced Research Projects Agency** for a couple of years. He did a fine job getting the ball rolling there, but his successors, particularly **Bob Taylor** and **Larry Roberts**, were much more important in developing the early ARPAnet that would evolve into the Internet. And Licklider had some serious failings; he hated writing papers, for instance, and was a dreadful administrator.

In short, he doesn't seem quite big or strong enough to bear the weight of such a large history. And as if the author sensed this, Licklider appears in a relatively small proportion of the book. Indeed, Waldrop says in his acknowledgments that he had "nearly two full years of fits, starts and blind alleys, as I tried to figure out what story I actually wanted to tell," before settling on Licklider as our way through this tale.

Fortunately, Waldrop is an able writer whose understanding of science is profound compared with most journalists', and the result is a strong intellectual history of the rise of modern computing in America, albeit one that emphasizes events in the Cambridge, Mass., area where Licklider spent most of his career.

Waldrop audaciously aspires to encompass all of the intellectual movements that helped shape computing, and to a large extent he succeeds, showing how the ideas of mathematicians, acoustics experts, electrical engineers, psychologists, economists and others contributed. He's especially good at bringing to life the major theoretical players, including Vannevar Bush, **John von Neumann**, **Claude Shannon**, **Alan Turing**, Norbert Wiener and others.

He doesn't forget context either, taking time to vividly describe the social and political backdrop of events. Computers, and certainly the Internet,

would not exist as we know them without the Cold War and the government's open checkbook for

technology, as Waldrop makes plain.

Yet the book doesn't wholly succeed. Aside from the dubious choice of Licklider as a sort of guardian angel drifting amiably through its pages, "The Dream Machine" reads for long stretches like a bureaucratic history, dragging the reader right along with its cast of thousands through long-ago academic battles, personal feuds and funding competitions. Despite Waldrop's capable prose, the going gets heavy at times. And for all his command of the deep thinking that led to the computer revolution, he doesn't explain many of these insights in terms a layperson can easily grasp.

All that said, "The Dream Machine" works admirably as an exploration of the intellectual and political roots of the rise of modern computing. It's an ambitious and worthwhile addition to the history of science.