Silicon Snake Oil – Second Thoughts on the Information Highway
by Clifford Stoll
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Ten years before Kevin Mitnick and Tsutomu Shimomura waged their recent battle of wits in cyberspace, Clifford Stoll was uncovering, tracking, and eventually helping to apprehend a group of German hackers who were stealing computer secrets via the Internet and selling them to the KGB. Readers of his 1986 book, The Cuckoo's Egg, remember it as a tense thriller that elucidated the personalities as clearly as it explained the technical intricacies of the chase.

Stoll's latest book, Silicon Snake Oil, is in an altogether different genre. A meandering collection of essays on computers, the Internet, electronic mail, education, and libraries (in the introduction, he calls it a "free-form meditation"), its primary purpose is to exhort its readers to challenge the prevailing wisdom about computers, networks, and our technological society.

Recently, I saw Stoll on CNN, delivering a lecture on the future of computers and the Internet to a business group in the Bay Area. I'm sure this genteel club wondered who they'd hired for their after-lunch entertainment. He hopped around the stage, jumped, screeched, pulled his hair and rolled his eyes, but, more audaciously, he challenged the right of some of the audience’s businesses to exist.

Likewise, Silicon Snake Oil challenges you to decide for yourself whether computers are as important to the future as their manufacturers and evangelists would have us believe. Stoll begs us not to take the pronouncements of the technophiles at face value, to challenge such sweeping statements as these:

"Tomorrow's businessman will have the information necessary to do his job, right at his fingertips, due to the growing acceptance of ________ as the solution to the information explosion."

The book is about as organized as Stoll’s CNN talk was, which is to say not very, but the points it raises are critical to our future. More people need to question the assumptions we are asked to accept about the benefits of computers, or we will relive the historical mistakes of some of our other technological developments. So Stoll believes, at least, and his arguments are strong.

The first part of the book examines some of the prevailing myths about computers and the Internet. While it doesn't debunk each one completely, it does raise enough uncomfortable questions to suggest that people are swallowing the conventional wisdom about technology far too easily. Let me summarize a few of these myths and Stoll’s version of their reality, in order to give you a sense of the issues that feed his worry.

Networks are fast

Anyone who's tried to download a large graphic from the World Wide Web can attest that the Internet can be maddeningly slow. It's actually faster, Stoll asserts, to send
a CD-ROM full of digital data across the country by way of Federal Express than it is to
download its contents over a very fast modem.

**Electronic mail is cheaper and more efficient than paper mail.**

To use electronic mail, you must own a computer system, a modem, and
communications software, many more dollars' worth of stuff than the $.32 cent stamp you
need to mail a letter. Many people read e-mail no more often than they read paper mail,
one a day, and the systems for sending and receiving electronic mail are utterly
unstandardized. Different programs require different software, networks, commands, and
addresses. Not only that, electronic mail gets lost far more often than paper mail.

**The Internet is an egalitarian place.**

Women, people of color, the elderly, and the poor are not well represented on the
Internet. This is partly because of the price of access and partly a lack of exposure and
interest. The majority interest in the Internet seems to be among young white males.

**The Internet provides a cheap way of publishing, a true democracy.**

Aside from the issue of who can afford the equipment necessary to surf the
Internet, there is so much undifferentiated information floating that it is difficult to track
down particular data that interests you. It’s also difficult to judge the quality of the data.
There are too many people publishing and too few people reviewing the information for
consistency or accuracy. In that sense, the Internet is less efficient than other media. Can
we call it communication if no one is listening?

**Online commerce will revolutionize our buying habits.**

Sending your credit card number over the Internet is no more dangerous than
giving it out over the phone, though the perception is the opposite. However, that's not
what's slowing the acceptance of online commerce. It’s difficult to comparison-shop
online, it's hard to get questions about products answered, and the variety of goods and
services isn't anywhere near as wide as we already have with mail order shopping.

**Computers promote easy learning.**

True learning is slow and difficult, something we must work at. What computers
do best is collect data. To learn, we have build contexts for the data, understand how it is
derived, be able to judge its validity. Computers and the Internet encourage us to think
we are learning when all we're doing is gathering information.

This last point about learning sets Stoll off into the second part of the book, a
discussion of what computers and the Internet mean for the future of education and
libraries. As you might expect by now, he’s worried.

“I believe that the _______ is destined to revolutionize our
educational system and that in a few years it will supplant, if not entirely, the use of
textbooks.”
At least as compelling as Stoll's concerns about the myths of the technological society are his worries about the implications of such a society on education and libraries. He argues persuasively that computers and software reward people who think the same way software designers and developers think. People with different types of creative minds, non-linear thinkers, are either ignored or treated like idiots.

Promoting one type of thinking at the expense of other valid modes narrows the potential of our educational processes. Computer programs are someone else's logic for solving a problem, not our own. What can we learn from them except to think like someone else?

Stoll reserves his deepest worry for what the focus on technological solutions might do to education. He makes a point that educators will embrace and parents, especially those enamored of technology, need to remember.

Computers don't inspire. Teachers do. Education is, at its core, people communicating face-to-face with people, teachers teaching students. Everything else is only a weak substitute.

He reminds us, then, that true education is not just finding the right answer, but knowing how to find answers. Online research provides factoids, but the student has to supply the context, make the connections. Otherwise, he or she isn’t learning, but memorizing. We seem to have forgotten that, in his words, "(I)solated facts don't make an education."

Worse, computers and networks draw money away from other important educational spending, on textbooks, teachers, libraries, and librarians. I heard a local educational software vendor say two weeks ago that his goal is to increase the educational software in classrooms until it is as common as textbooks, and decrease the number of textbooks concomitantly. Do you want his business goals to set the agenda for your child’s education?

The Internet has also, according to Stoll, had a deleterious effect on academic research. (He is a research astronomer.) Because researchers tend to use information that's easiest to get, more research now employs Internet-derived data, that online information of dubious quality. Because of this, the quality of our conclusions may be declining. It’s another example of how reliance on computers diminishes the importance of direct experience. I've used multimedia software that teaches about sea life and I've stroked the skin of a ray at Sea World. Which experience taught me more? We are in danger of allowing computers to be surrogates for our experiences.

Not to skip past any aspect of creative endeavor, Stoll even discusses the effect digital drawing and painting have on learning how to create art. The ease with which you can draw something on a computer provides what he calls a "glib certainty," a feeling I recognize from the first few times I used word processing and desktop publishing software. The words I wrote suddenly looked like pages in a published book, but that didn't make them literature.

He closes the book with an examination of how the trends and generalizations our technocrats propound will affect our oldest public institution, the library.
Much of the discussion about computers, networks, and libraries assumes that eventually everything will be on-line. Unfortunately, that’s not as simple as scanning material into a computer. Either the publisher or the writer owns republishing rights to published material. Unless basic copyright law is restructured, libraries won't be able to copy all this information without paying someone royalties.

And converting information to digital form is expensive, on the order of $0.50 to $3.00 a page, not to mention the fact that storage formats become extinct. Remember the progression from 78 to 45 to LP to cassette (to DAT or CD)? Nothing in the assumptions about the networked library of the future acknowledges the fact that the data may have to be reformatted every few years to keep up with new storage technologies. And libraries, Stoll argues quite convincingly, are far more than stored data. They contain physical artifacts, community spirits, and human help. He pleads against the vision of a library as a warehouse of CD-ROMs.

Though I found the rambling style engaging and his arguments believable, I have mixed opinions about the book. If you're not a seasoned cybernaut, you’ll have to take many of Stoll’s assertions at face value. I can attest that most of his facts are accurate, but it is contrary to the spirit of the book for you to believe him (or me) blindly. On the other hand, if you are well-traveled on the Internet, you are likely to favor the technocratic view of the world yourself and view most of what he worries about as problems that the technology can solve.

If you’re in the latter camp, I urge you to rethink. I've worked in software development for more than fifteen years, and the standing joke and standard answer when a customer asks when a feature will be ready is: "Real Soon Now." It amazes me, as it does Stoll, that an industry that has consistently delivered so much less than it's promised (while it has delivered much) is being entrusted with nothing less than the future of our educational, knowledge- and culture-sharing systems.

Very few people are comfortable questioning authority in the field of computers; the general feeling seems to be that you must be an expert to have a voice. Silicon Snake Oil forces you to think and question that assumption, too, something no machine or graphical user interface or World Wide Web page is going to do. In fact, Stoll’s book does what every good teacher does, forces you to question the easy, conventional answer. This book could have a salutary effect on the discourse about the digital world, if only because it forces you to pay attention to the man behind the curtain.

One of the reasons I enjoyed Stoll's book is that he is addicted to quotations, the sound bytes for the literary mind.

In 1974, Walter Steele made the following pronouncement.

"Tomorrow's businessman will have the information necessary to do his job, right at his fingertips, due to the growing acceptance of microfilm as the solution to the information explosion."

The quotation just before the discussion of education comes from Thomas Edison, circa 1922.
“I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant, if not entirely, the use of textbooks.”

The hyperbole is as familiar as the wrongness of the sentiment and the misapprehension of how the technology was going to develop.

Silicon Snake Oil reminds us that our unremembered history will doom us all. It is a serious, entertaining, rational, and humane book. I urge you to buy it and read it and give it to friends.

And, courtesy of Stoll, I'll leave you one more pithy quotation, from the dean of the road warriors, Charles Kuralt, speaking about the virtual pathways that will link all our worlds one day.

“Thanks to the interstate highway system, it's possible to travel across the country without seeing anything. I wonder if the information superhighway will offer a corollary -- a dulling impact on our cerebral cortex.”