The Future of Software

An opinion as to the relative merits of investing in optics vs. software.

Growth in software will not only continue but it will accelerate. If you believe what Ray Kurzweil has to say, not only are things happening faster but as systems get organized time itself accelerates. *The Age of Spiritual Machines* by Ray Kurzweil.

According to the chronology that Kurzweil presents, it took a very long time from the Big Bang to the formation of galaxies, the solar system and the earth. Then, in much less time, life appeared. At ever shorter intervals mammals appear, then apes, then Man [intelligence], then agriculture, then industry, then computers and software. The logical next step are robots, very special robots, Spiritual Machines having all the intellectual and emotional capabilities of Man but without the drag of the complicated and fragile biological housing. Biology takes a long time to evolve from one organism to the next. On the other hand, intelligence can build ever more intelligent agents at a much faster clip. First we designed and built computers and robots. Now computers design computers and robots. Now computer controlled robots build them for us.

Anyone who has read Isaac Asimov knows about humanoid robots with Positronic brains that had the three laws of robotics built into them. Very romantic and entertaining but that is not the way robots are being created. You are being served by all manner of robots today and you probably don't even think about them as such. Installer wizards, help wizards, search engines, crawlers and hundreds of other software agents. They are nothing but disembodied robots. Then there are viruses, Trojan horses and lots of other pathogenic robots as well.

From the CGI Bible

Robots, Spiders, and WebCrawlers [Chapter 23]

The useful information returned by search engines on the Web doesn't just come out of nowhere. Rather, it is laboriously gathered by software automatons that cruise the Web, with either broadly or narrowly defined objectives, that read through all the HTML documents they encounter, and harvest or calculate all the information that meets their programming criteria.

These programs are called Web robots, or simply robots. Sometimes you'll hear them called spiders or WebCrawlers. No matter what they're named, these programs all perform similar tasks: They pick up selected pieces of information from Web documents they find -- at least the URL and the title, if not more -- and report their findings back to a logging program on the originator's server. This log is massaged, inspected, and digested to create the database from which search engines pluck their responses to your queries.

Don't be surprised if one of these days robots create more Web traffic than humans do!

Two more authors confirm my thinking. The first essay in *Being Digital* by Nicholas Negroponte, professor of Media Technology at MIT and Founding Director of the Media Lab starts as follows:

The DNA of Information

Bits and Atoms

The best way to appreciate the merits and consequences of being digital is to reflect on the difference between bits and atoms. While we are undoubtedly in an information age, most information is delivered to us in the form of atoms: newspapers, magazines, and books (like this one) [Denny's comment: this was written in 1994 or 95]. Our economy may be moving towards an information economy, but we measure trade and we write our balance sheets with atoms in mind. GATT is about atoms.

*I recently visited the headquarters of one of America's top five integrated circuit manufacturers. I was asked to sign in and, in the process, was asked whether I had a laptop computer with me. Of course I did. The receptionist asked for the model and serial number and for its value. "Roughly, between one and two million dollars," I said. "Oh, that cannot be, sir," she replied. "What do you mean? Let me see it." I showed her my old PowerBook and she estimated its value at $2000. She wrote down the amount and I was allowed to enter the premises. **The point is that while the atoms were not worth that much, the bits were almost priceless."** [Emphasis mine]*

The other author, of course, is Brian Arthur, Citibank Professor at the Santa Fe

Institute. Arthur contrasts the two main economic laws: increasing returns and decreasing returns. In general, the more atoms a product has the more likely it is governed by the law of diminishing returns while the more bits, a.k.a. knowledge, it has, the more likely it is governed by the law of increasing returns. Any way you slice it or dice it, the optics industry has more atoms in it than software will ever have. Software is pure though, pure NAR (No Atoms Required! :-)

I'm sure you have heard about the bandwidth glut. Even if there is no such thing, it refers to a physical entity made up of atoms. You have heard of excess inventories of ICs and optical components. Have you ever heard of an inventory problem with software?

Yes, the risk of software might be higher than that of optics but the risk/reward ratio is more rewarding.

The more difficult question to answer is where to find the up-and-coming winners. Ross Perot has a sign in his office: "Eagles don't flock, you have to catch them one by one." In his case it was a reference to hiring top notch people but it applies to investment opportunities as well. The best I can do is to provide a link to an information mine and let you do the digging:

[Software Magazine - free searchable database](#)

Do searches by categories. In each category look at the big ones. They had to be good to get big, right? Look for revenue growth. They must have good stuff for people to be lining up to buy it. When you find some likely candidates, let me know about them.

Denny
"Demand creates queues. Supply gets rid of them."
Software Times