



"I know I asked for ice, but this is ridiculous." The words are John Jacob Astor's, uttered while sitting in the bar of the SS Titanic, but they could as easily have come from a harried designer trying to cope with the impacts of the digital

revolution. And it isn't just designers, for the waves of digital change are sweeping through every corner of society, toppling cherished old structures from nation-state and corporation to the very shape of daily work and interpersonal relations. And though plenty has happened already, the digital revolution has barely begun.

Consider how most graphic designers use computers today, as powerful digital substitutes for x-acto knives and rapidographs — new tools pressed into creating what designers have always produced — dead information stuck to paper. Designers are, for the most part, idea embalmers, loving undertakers preserving and displaying bits of data like so many butterflies pinned to felt in a box.

The future of design lies in working with information that remains alive and interactive in a digital form. Designers can finally get out of the embalming business, and design will become vastly more important to society. But there will be a price: the business of design will change beyond recognition over the next few decades.

The good news is that there is a pattern to this change. The consumption of paper in the U.S. has grown at a rate greater than the growth in gross national product for every year since World War II. Of course, the use of new electronic media for communications has increased much more rapidly, and each technology intended to replace paper has merely generated more paper than ever.

The relationship between our use of paper and electronics parallels the relationship between the surface area and the volume of a sphere. As a sphere expands, its volume inside increases more rapidly than the surface area. The information industry today is like a huge electronic piñata, comprised of a thin paper crust surrounding an enabling electronic core.

The core technologies also can be arrayed concentrically. Xerographic copiers lie just beneath the surface of the piñata, for they convert paper images into electronics only long enough to make another copy. Copiers duplicate, but they don't manipulate. In contrast, desktop publishing systems are a deeper ring because they enable manipulation and the creation of entirely new images. Deepest yet are sophisticated custom publishing and telecommunications technologies.

Designers must pursue two seemingly divergent goals to survive in this turbulent period: leverage paper in interesting ways, and explore the new world of paperless media. In fact, these goals are less different than they seem. Keep in mind that the word "publish" has nothing to do with paper; its origins are from the latin "publi-care," to make public. The issue isn't paper versus electronics, but which medium is best suited to delivery of a particular message.

Meanwhile, though, larger changes are afoot. A strange paperless future is waiting in the wings, for we are living in a moment between two revolutions: one of print, four centuries old and not yet quite spent; another of electrons, barely two decades old and scarcely underway. All the abundance in our local bookstores and office magazine racks is merely the terminal moraine of that first revolution. And meanwhile, the digital chaos and confusion is still rising as we struggle to turn raw, untamed technologies into compelling media capable of touching and changing our lives.

The most volatile elements of this revolution are the new devices delivering digital technology to our offices and homes. The PC and the microprocessor shaped the last decade, or rather, the PC was an incarnation of processors cheap enough for everyone to have one on their desk. In fact, processors are now cheap to the point of disposability. Each time you toss out a "singing" greeting card, you are disposing of more computing power than existed before 1950.

And the personal computer itself is dead — the wake for the personal computer was held two years ago in San Francisco when Apple and IBM announced their alliance to build an entirely new class of desktop machines. PCs will stick around, but the microprocessor is no longer the driver of change in the digital revolution. Just as the '80s were shaped by the microprocessor, the '90s are being driven by a different foundational technology: the communications laser. There are lasers lurking everywhere, hidden in everyday devices from compact-disc music players to the optical-fiber long-distance lines that carry our phone conversations every day.

Back in 1980, nobody in Silicon Valley knew what the hell a "personal computer" was. But our ignorance wasn't a bug, it was a feature; the term's sheer vagueness made it an intellectual lightning rod for people trying to figure out what microprocessors were good for. Today's vague new terms like "multimedia" are nothing more than shorthands for exploring the implications of laser-enabled optical storage and optical-fiber bandwidth.

The earliest implication is always cost. Microprocessors were revolutionary because they were cheap. Today, CD-ROMs are vastly cheaper as a storage medium than paper, and optical-fiber communications cost a fraction of what copper wire could deliver. So cheap

# The Electronic Piñata

*In these times of "creative destruction," can designers turn raw, untamed technologies into compelling new media?* By Paul Saffo

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weeks before the first academic journal carried an article about the controversy. Publishers are continuing to print ever more expensive and irrelevant journals, but the real action is in cyberspace. Other examples abound. More electronic encyclopedias were sold in the last year than paper encyclopedias. Before this decade is out, the only place you will find paper encyclopedias is at a garage sale.

However, paper is most definitely not obsolete. Technology is killing the print order, but not directly. The biggest changes are occurring in the periodical publishing industry. Most periodicals exist because of a triangular relationship between the publisher who prints, the reader who reads and the advertiser who pays the bills. Readers have failed to be tempted by direct electronic substitutes, but advertisers are being lured away by electronics. Reader-customized direct mail, for example, is an electronic medium that just happens to be reduced to paper for delivery.

Thanks to the advent of new media, we are entering a world where publishers still want to publish, readers still want to read — but the advertiser no longer wants to foot the bill. Publishing is in a very delicate position right now where very small changes at the margins can drive publishing economics completely nonlinear. Lose a few advertisers or cut rates, and they could quickly be out of business. Newspapers are already feeling the crunch, but my hunch is that the newsweeklies will be the next publications peering into this electronic black hole, threatened by new media in the same way TV knocked off *Life* and *Look* decades ago.

There is a general sense in the publishing industry that print media are being directly threatened by electronic substitutes. The reality is likely to be much more painful, for the depressing fact is that we are stuck between two orders: a print order already in decline and an electronic order that will take some time to emerge. Between the two, a media gap will open up during the latter part of this decade and into the next one, wherein very important sources of information will disappear and not be replaced. This has already happened with local newspapers — ask anyone living in a small town where the local paper disappeared, and the regional daily doesn't cover the missing local news.

This media gap carries an important lesson. Designers worry about change, but, in fact, the real enemy is the slowness of change, even in this high-technology world. Another enemy is an attachment to quality, which may cause some designers to sneer at important opportunities presented by new media. For example, the average quality of CD-ROM titles today is scandalously low, but this was also true of newspapers a century ago, and of books in 1500. Quality will improve, and new media desperately needs the

intervention of designers in order for this to happen.

But the ultimate enemy of designers in this new world may be habit. There's a wonderful story about railroad executives in the '50s. They knew the Interstate Highway Act would allow truckers to grab their most profitable freight. And they knew the infant airline industry would steal a few of their fanciest customers. Survival depended upon transforming their railroad companies into transportation companies, doing everything from renting right-of-way for phone systems to creating new transport forms like piggy-backing trailers on flat cars. They did these things, but they still failed. They failed because though they knew the answer intellectually, in their hearts they still loved trains too much to let go of the old order.

In their hearts, designers are deeply attached to fiber. And that's why it's so important for them to really roll up their sleeves and dive into cyberspace. Otherwise, just like those railroad executives, they will go to their business graves completely unaware of what drove them out of business.

We are living in what the economist Joseph Schumpeter has described as "a wave of creative destruction." And that's good news, because change creates opportunities. But designers will have to walk a very narrow path to survive. Don't try to live in the future before it arrives, but at the same time don't continue to live in the past for longer than it survives. Knowing when to jump from one curve to another is an art, and the essence to that art is perspective.

It's hard to step back and get a larger perspective, but another story is instructive. Just under three decades ago, a microwave engineer in the West looked up from his desk and realized that the microwave circuits he was making were a good substitute for the phone company's copper phone lines. The proverbial light bulb went off above the engineer's head. In a flash of inspiration, he decided to acquire mountaintops. He sat down with a map, figured out the optimum route for microwave networks between major urban areas, negotiated 100-year leases for the best mountaintops for a song — his only competition being university astronomy departments. The engineer retired soon after, clipping rent checks from the phone companies who paid for the privilege of building their long-distance transmission towers atop his mountaintops.

Now, thanks to the arrival of the digital revolution and the gales of creative destruction sweeping through the world today, a whole new mountain range is appearing on the horizon. Designers are closer to the foothills than anyone else. The question to ask is: will they seize the mountaintops, or simply be content to wander through the valleys while others shape the media that will affect us all in the decades to come? ★

**What's happening with e-mail today is identical to what happened in London in the 1700s with the arrival of a reliable postal service.**