

Stalking the Wild Paradigm

I've recently gone over dozens of my more successful hardware hacking projects and hundreds of my failures over several decades, trying to fathom what's worked and what did not. I am convinced that one of the crucial underlying secrets is watching for and then profiting from what can be called *paradigm shifts*.

A *paradigm* is just the way people perceive things to be. And a *paradigm shift* occurs whenever someone upsets the apple cart. Which might happen whenever any vastly new way of doing things becomes obvious. Or if something becomes much cheaper or more widely available.

In general, hardware hacking doesn't do very well in the "business as usual" times. It is only when some sudden and dramatic change or other fundamental shift in values takes place that all of the new opportunities emerge.

Some ancient personal examples of paradigm shifts: The low priced silicon controlled rectifiers which blasted the thyatron out of the saddle and opened up psychedelic lighting. The triacs that made light dimmers and power tool speed controls possible. RTL digital integrated circuits that revolutionized counting and digital logic.

Ultra cheap nickel-a-bit shift registers and character generators which permitted my *TV Typewriter* (RE Sept 73) as the opening round fired off in the personal computer revolution. Simple active filters which were developed by theoretical types totally unable to communicate either coherently or intelligently.

Price reductions in CMOS chips. The 6502. The KIM-1 microcomputer. De-mathifying all those pseudorandom sequence generators. The Apple IIe. The monumental new stupidities now hopelessly crippling all of traditional publishing. CD ROM. That wonderfully superb PostScript language. Or the latest wavelet breakthroughs. Or dozens of other goodies coming down the pike.

Your key hacker opportunity: *The people who are doing the shifting of the paradigm usually do not have the slightest notion what they are really doing, since they will always end rearwardly focusing on the way things were.*

When the paradigm shifts, all sorts of new hardware hacking opportunities immediately open up. Especially if you are able to view things from a different perspective. Or can reduce the cost of something by 50:1, totally changing the marketing into something utterly foreign (and totally misunderstood) by "them" and the way things were.

The big trick is to recognize a paradigm shift when it happens. Or, better yet, try to guess when and where future shifts are going to occur.

Dealing With Shifts

We can identify three obvious cases here. In the first, a paradigm shift does not take place and things remain pretty much the way they were. We can call this one the *business as usual*, or the BAU case, and not very friendly to *Midnight Engineers*. Not in the least.

In the second, a paradigm shift takes place but you try to ignore it. This is the *Sucker Bet*, and, if you give it half a chance, it will eat you alive.

Finally, a paradigm shift can take place and you might be one of the first to take full advantage of it within a *Midnight Engineering* context. We'll call this one a *GoFer*, as in *Go For It*. This is the one you should seek out.

Let's pick up a few more details on these three paradigm shift cases...

Business As Usual

Business as usual takes place in the absence of a paradigm shift. Leaving the *status quo* right where it was. In BAU instances, there is simply not very much opportunity for *Midnight Engineers*. And to think otherwise can cause you grief. Let's look at an example or two of some typical BAU's which are best avoided. At least for now.

A few decades back, the *Peltier coolers* sounded like a wonderful deal. Small, compact, and potentially cheap solid state modules. You input electricity and one side gets cool to super cold, acting as a compact heat pump with no moving parts. But your big gotcha is that these end up horrendously inefficient. Since these have less than 1/50th the efficiency of most conventional freon refrigeration, they make the Faustian bargain with you "Yes, I'll cool it, but first you have to build a humongous bonfire."

And do so in precisely the wrong place.

With a typical cooler, to pump one watt of heat, you'll have to get rid of an additional six more. The "coolers" can easily end up heating instead. This happens whenever your hot side temperature gradient to ambient is too high.

For instance, you can easily have a twenty degree *drop* across your cooler and a thirty degree *rise* above ambient across your output heatsink. This is the fate of nearly all higher power Peltier ventures.

Assuming no paradigm shifts in the last week or two, there has not been one iota of improvement in the Peltier coolers in the past two decades. The very same devices sold then are sold today. Yes, Peltier modules do solve some rather arcane problems in unique ways. Things such as

microscope slide chillers, in dew point instrumentation, satellite thermal management, and for infrared imaging coolers. Places where tiny amounts of heat are involved and where superinsulation and an absolute thermal control is possible. The places where you can honestly ask "Uh—compared to what?"

But forget using these to make ice cubes or to keep a picnic cooler cold. They simply won't hack it. Most good uses for these devices have been thunk up long ago. And most were economic failures. Several times over.

Or alternate typewriter keyboards. That older QWERTY keyboard was originally designed specifically to *slow typists down*. Most totally random keyboards perform far better than QWERTY. The Dvorak keyboard only will move your fingers 1/20th as far at a considerably higher speed. But Dvorak is one dog that flat out will not hunt. QWERTY is too deeply culturally ingrained.

As a ferinstance, the Apple IIGS computer lets you instantly shift to a Dvorak keyboard with a few mouse clicks. The number of IIGs curiosity seekers who tried out Dvorak for fifteen seconds and agreed that it was faster and better: Lots. The number of those that still use Dvorak's key arrangement today: Zero.

Deep cultural ingraining can be far more subtle. Why don't we see more touch screens? And why has the touch screen technology not improved much in the past ten years, while mice and trackballs really took off? I think the simple answer is that most people don't want to touch computer screens. And if you try to make them do so, it probably will cost you time, money, and market share. I'd guess this has something to do with "Don't ever touch your eyes", "Don't go up to the screen at the movie theater", or "Keep your peanut butter and jelly fingers off that tv faceplate." Creeping Momism, fer sure. But it is definitely and unquestionably there.

BAU also takes place if you assume a market is larger or less fragmented than it really is. For instance, anything electronic that is "good for" the photo market is almost certainly doomed to failure. Timers for rodeos or sports events are additional examples of extremely specialized one-on-one sorts of things. Lower priced logic analyzers probably have zero market. Those swift enough to know what a logic analyzer is are probably working for a firm that can afford a name brand biggie instrument; the rest don't have the slightest idea what you are talking about.

Unless a paradigm shifts. If you can pick up a new and better way of doing it, then go for it. But avoid any BAU situations unless you do know *exactly* what you are getting into. Even then, deal with them in a traditional context.

It sure is fun to watch BAU carried to extremes. Recent examples of the whip-socket-on-the-car syndrome include electric vehicle recharging stations shaped like gas pumps with gas hose like cables. Or digital cameras shaped exactly like the older ones for no reason whatsoever.

Avoiding Sucker Bets

A *sucker bet* happens whenever a paradigm clearly shifts and that shift remains intentionally ignored. This usually happens whenever a larger and slow-to-react megafirm continues to try and force some ancient, inferior and second-rate product into any new or rapidly changing market. Millions of dollars have been and continue to be

lost on sucker bets. Especially when not-invented-here is a big factor. Or simple momentum.

As a *Midnight Engineer*, should you involve yourself in any manner with these has-beens, you are almost certain to lose out in the long run. Your own selection of the sucker bets probably differs from mine, but let's take a quick look here into several of the more blatantly obvious sucker bets that I personally have decided to avoid...

UNIX, of course. This seemed a dumb idea when the telephone company decided it was good for me a few decades ago, and it certainly hasn't improved any with age. Yet hundreds of millions of corporate dollars have been poured down this obvious rathole. With little visible effect. A computer operating system succeeds because individuals will make one-on-one decisions that any chosen operating system is a compact and personally useful convivial tool. Not because it gives meglomaniac standards committees lots of reasons to ceaselessly argue with each other over why a bloated corpse smells bad. The only thing that could save UNIX at this late date would be a new \$30 shareware version that runs on an unexpanded *Commodore 64*.

The NeXT Computer. Whenever a new product first gets created, certain design goals seem favored at the expense of others. A case can be made that two primary design goals for the NeXT machine did appear to be *revenge* and *spite*. Which could form the core to a logical explanation as to just why such really dumb technical and marketing blunders were ineptly committed on this machine. Blunders totally obvious to nearly any computer-literate seventh grader. The question that sorely needs asked here — Is the Emperor wearing any clothes?

DVI Video Animation Compaction This was ancient, overblown, and klutzy when RCA blatantly overpromoted it, and even more dated when *Intel* picked it up on the junk table at a yard sale. Four generations of technology have completely trampled this hoary beast. The software DCT (or Discrete Cosine Transform), which got superseded by those low cost hardware JPEG chips. Both instantly available cheaply to the end user. And both of whom are about to get shot clear out of the saddle by the Wavelet Mafia, who are coming on like Gangbusters. And it is an even bet today that Barnsley and crew could end up having their fractal compression ultimately being the big winner in the animation and HDTV sweeps.

PostScript Imitators and hangers-on. One thing that all the not-invented-here boys have yet to learn: PostScript flat out ain't broke! In fact, this is probably by far the most unbroke offering in all of computerdom today. And the reasons are simple. Besides being a completely device independent method of mixing high quality text and high resolution graphics, PostScript is a rather powerful and completely general purpose computer language that can hold its own against any modern challenger. Even more important, genuine PostScript feels right from the instant you first use it. Those vibes are overwhelming. PCL should have been flushed when the Babylonians upgraded to Cuniform on clay tablets.

Teletext. The end-user desirability for typical Teletext services seems to lie somewhere between Herpes and AIDS.

There are two main telecomm models active today. The Teletext, or *dictator* model says "You shall consume what we decide is good for you when and how we tell you to, on our special, outrageously expensive, and stupidly encrypted one-way hardware; and you will pay us through the nose for this privilege. Otherwise, you shall sit down and shut up." The UseNet or *anarchist* model says "We would like to serve as your two-way information broker. We will be happy to help you link your favorite computer setup to any and all of the worldwide telecomm resources on any basis that you feel appropriate." The supreme irony, of course, is that the two-way anarchist model is far cheaper to the end user and infinitely more powerful than the dictator model. Among all the leading information utilities, *CompuServe* and *GEnie* lean towards the anarchist model, while most of the out-of-tune managerial befuddlement and end user outrage of *Prodigy* is linked to its TeleText heritage.

UPDATE: The web essentially obsoleted most of those earlier online services, carrying the anarchist model to the max. See www.tinaja.com for much more on this topic.

Some GoFers

A GoFer is some situation where a paradigm has clearly shifted and others have yet to take advantage of that shift in a big or mainstream way. Herein is where the main *Midnight Engineering* opportunities lie. We've looked at lots of GoFer opportunities in past *Blatant Opportunist* columns and the primary focus of all these diatribes will continue to be trying to pin down any developable new opportunities. Stuff you can tap.

To refresh your memory, a few of the *Blatant Opportunist* GoFers that we have already looked at now do include Book-on-demand publishing, direct toner printed circuits, low pressure pneumatics, magnetic refrigeration, visible laser diodes, Navicubes, Santa Claus machines, low cost waterknives, Dildonics, shared SCSI comm, toner cartridge reloading, induction motor speed controls, and desktop finishing opportunities. And my GoFer for this week has to be *Wavelet Theory*, whose spread is explosive. There is no area of all computerdom or electronics that will not be impacted by wavelets.

More content on GoFers appears in our back *Midnight Engineering* columns, in my *Blatant Opportunist* reprints, and in my older *GEnie* PSRT uploads. These are currently being moved to my *guru's Lair* website at www.tinaja.com as time and [banner advertisers](#) permit.

We'll continue to explore all of these and other GoFers in future columns. What do you want here?









But for now, try to identify which paradigms that you can relate to are shifting in exactly what way. And see how you can profit or otherwise benefit from them. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 35 books and countless articles. Don maintains a US technical helpline you'll find at (520) 428-4073, besides offering all his own books, reprints and consulting services.

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