THE DEADLY EMBRACE OF 1994

Our money management consulting team calls the present a lull before the next storm of innovation as the industry pauses for the communications infrastructure to catch up.

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Complex software systems can wait themselves to death. One program holds onto file A while it waits for file B. Meanwhile, another program is holding onto file B while it waits for file A. The result is a halt, a deadlock, the dreaded deadly embrace.

As every student of computer science learns, this is an event to be avoided. Some external force -- the operating system, usually -- has to intervene to get the system moving again. Mostly, the external force is simply the passage of time. After so many ticks of the clock, a program "times out" and has to let go.

When we look ahead to 1994, we see something of the deadly embrace in the market for technology issues -- if not exactly a deadlock, then a time of transition and hesitation. The overall computer industry appears to be waiting upon developments in telephony and interactivity. Meanwhile, interactivity is waiting upon FCC rulings in the telephone and cable industries. And the whole market pauses while it waits to see where and when the next uptrend will unfold.

To get a clearer view of this transition period, we decided to step back and take a long-range view of the market for technology issues. This month, we look at technology from the vantage point we used in our first article for *The Red Herring*: the view from the long wave. We examine the long-term cycle that began in October, 1990.

Since October, 1990, technology issues have risen dramatically, with ***The Red Herring* Tech 200** increasing 243% between 10/31/90 and 12/14/93. During the same period, the S&P 500 rose a much less dramatic 52%. Will the technology uptrend continue? We think so, but not immediately. In our work, 1994 marks the completion of the up portion of the first long cycle in the new computer industry.

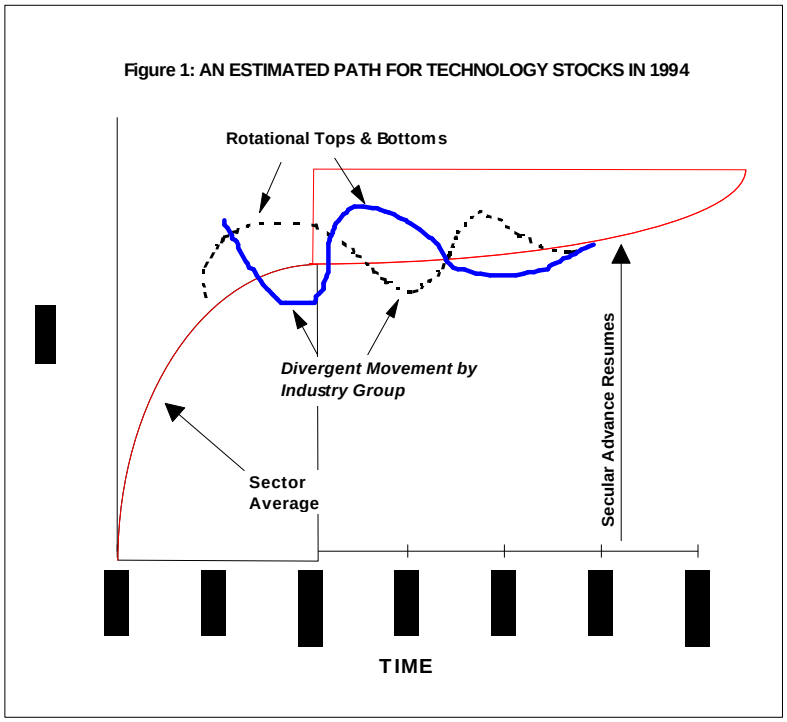
End of the First Uptrend

As we discussed in our first piece for *The Red Herring*, the period 1987-90 marked the emergence of a virtually new computer industry. Since that emergence, the computer industry has been in a steady, steep uptrend. But cycle theory (and common sense) tells us that nothing goes straight up forever. And so our uptrend in technology is indeed consolidating. But, unlike the popular wisdom, which dictates that what goes up must come down, cycle analysis has another view: what goes up only goes down as far as the generation-long *secular trend* will allow.

Like all markets, the overall market for technology issues is under the influence of a generation-long cycle we call the secular trend. This encompassing cycle affects the shape of the shorter market cycles -- the 4- to 4 1/2-year long cycle (roughly coinciding with the business cycle) and the short-term 6- to 9-month cycle. Mathematically, the secular trend skews the bias of slope of the shorter cycles. Instead of going up half the time and down half the time in a classical sine wave pattern, the sine wave under the influence of secular trend is biased in either the up or down side of the cycle.

In technology, the secular trend is rising. This rising secular trend means that the downside of a trend will be shorter and less persistent than the upside. Instead of falling like a stone under the influence of gravity, the fall of stock prices is buoyed by the rising secular trend, more like a ball falling into a pool of water.

As Figure 1 shows, we place 1994 on the shoulder of the uptrend in the first long cycle since 1990. We are at the cycle top looking forward to a transition to the downslope. But the "down" side of the cycle barely descends. Because of the influence of the rising secular trend, we expect to see something more like a flattening of the wave than a true downturn. We believe that technology issues, on average, will then go sideways until the end of the first long cycle, which could come in late 1994 or early 1995. At that point, we see the beginning of the second long cycle, with prices beginning to rise again on average.



Investing in the 2nd Half

We should emphasize that the flattening we see is an average. There may be high drama on the level of individual stocks: some may drop precipitously, some may rise, while the overall sector goes sideways. In this rotational situation, we don't believe you can use short-selling as an overall investment strategy. To sell short, you would have to know the individual issues very well. But, as an overriding strategy, it may not be a good idea to sell short into a strong secular uptrend like the one we see in technology.

A more profitable approach to investing during this flat period is to view it as an opportunity to buy industry leaders. Our research indicates that the first issues to rise out of any cyclical downturn or transition are the entrenched leaders, the first-tier companies in each subsector or group. The leaders come out first and most strongly. Therefore, we are looking for corrections in the prices of these leaders. (Figure 3 shows some of the issues we are watching for buying opportunities, including a profile of their current intermediate trends.) After buying on correction, we can then ride their prices up with the ascending curve of the second long cycle.

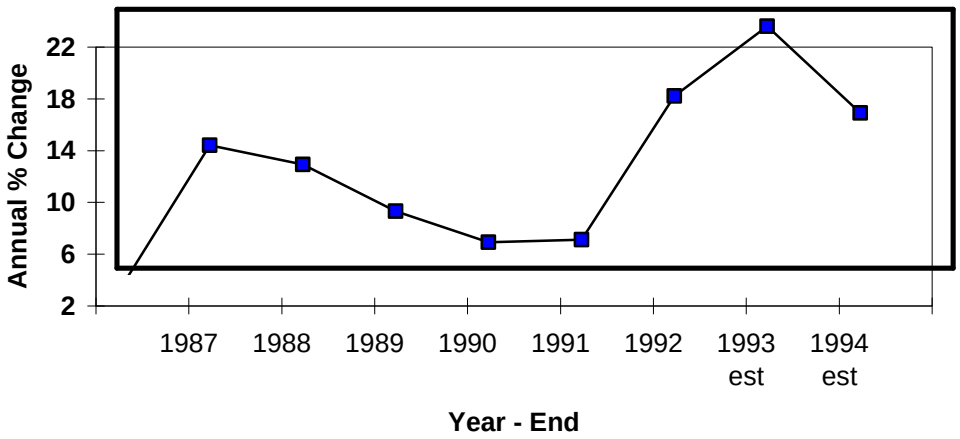
As always, our investment approach combines cycle analysis of stock prices with evidence from other sources, including our understanding of the underlying technologies and products. From those sources, we find support for our idea of a transition period through 1994-95.

Support for Cycle Analysis

The most striking agreement comes from the numbers on U.S. business capital

expenditures for high technology equipment (Figure 2, from U.S. Dept. of Commerce - Survey of Current Business - September 1993, cited in *NAE International Perspective*, by Roger Cass.) The trends in these figures track our stock price trends almost exactly. The percent of growth in expenditures falls off markedly from 1986 to 1989-90, paralleling the terminal period of the declining secular trend in the computer industry. Then expenditure growth rises dramatically from 1989-90 through 1992-93, like the first upcycle in the new long wave. At 1993-94, expenditure growth is projected to slow but still expand by a healthy 14%. Again, these projections support our cycle analysis, indicating a consolidation in the period 1993-94 but not a precipitous decline.

Figure 2: U.S. Business Capital Expenditures for High Technology Equipment



When we take a look at the underlying technologies and products, we see further evidence of a transition in the computer industry. The transition is occurring because of one overriding factor: the emergence of multiple new, high-end technologies. The affordable upper limit of computing power is being raised dramatically. The general buyer will soon be able to choose among several competing products that start to blur the distinctions between PC and workstation, client and server, power computing and supercomputing.

The first major shift has come in chips. At a recent conference sponsored by Hambrecht & Quist, AMD CEO Jerry Sanders called the Intel 486 "the last single architecture for large volumes." Sanders no doubt wanted to tout his own company at the expense of rival Intel, but he inadvertently hit upon the truth in foreseeing a fragmented chip market, one driven by customers' applications not by raw processing power. That market fragmentation is indeed beginning to appear. This year has seen the slow release of the Pentium and DEC's Alpha chip. By the middle of next year, buyers will get their first looks at the much-anticipated PowerPC chips from Motorola and IBM. For high end applications, there will be a choice among three very powerful chips, instead of one dominant solution from Intel.

The situation is similar in operating systems. Microsoft has owned the desktop operating system market, and Novell the network, but that easy division also appears to be fracturing. Microsoft's NT was released but has not taken the market by storm. Users and independent software vendors have turned their focus instead to Chicago (Windows 4.0), not slated for release until later next year. Meanwhile, Sun has purchased a license to NextStep, muddying their plans for a future object-oriented operating system, and IBM is working on WorkplaceOS, the successor to OS/2.

Again, we are witnessing a period of transition as new operating systems are poised to extend the power of computing available to the general user.

The Software Deadly Embrace

With all these new and promised systems, buyers must sort out the hype and try to divine which platforms will be both effective and popular enough to ensure a good supply of software. At the same time, software vendors are waiting on the decisions of buyers, not committing to creating software for a particular platform until they're sure a good-sized market is there. The result is a true deadly embrace: buyers waiting for software developers, software developers waiting for buyers. Until some event releases this deadlock, we can expect a lull in software.

Suddenly, where there was one chip and one architecture for the high-volume desktop systems -- the Intel 486 running DOS and Windows -- we will have a variety of proposed solutions. In the short term, this means a period of transition until the competitors have all brought their products to market and buyers get a chance to size them up. On a longer-term basis, however, these competing solutions are good news for the industry. What Sanders called an applications-driven market means we will see new, more powerful platforms specialized by customer need. And this specialization is an opportunity for vendors to differentiate their products on criteria other than price -- to free themselves from the relentless commoditization that is stalking the industry.

In sum, our overall technology scenario supports a period of transition followed by renewed growth. While buyers are waiting to see and evaluate the multiple new platforms, we will see a pause in industry growth -- the sideways motion of our long cycle. Then, as vendors offer platforms specialized for customer applications, vendors can once again differentiate themselves from other solutions, fueling expansion -- the uptrend in the second cycle.

What About the Superhighway?

But what about the information superhighway, several people have asked us, won't it bring renewed growth to the computer industry? Recently, an analyst at a large California corporation told us that he expects the superhighway theme to "reinvigorate Silicon Valley." And that analyst is certainly not the only one expressing this idea. There is a general belief, we sense, that anything technical means growth for the computer industry by definition.

However, there is a problem in this reasoning. The problem comes in the difference between the huge conglomerates creating the so-called information superhighway and the popular idea of Silicon Valley as a place where some guys in T-shirts can start a business and create great wealth. The superhighway companies are telephone companies with enormous cash reserves, cable companies that are part of large media conglomerates, and entertainment companies that are also part of large media conglomerates. Do these sound anything like the small cap companies that created Silicon Valley? The superhighway project is one of infrastructure, cash and muscle. The ideal of Silicon Valley is creativity, innovation and daring. *Something* will indeed be reinvigorated by interactivity, but it won't be Silicon Valley as we know it.

In fact, some companies in today's Silicon Valley could be adversely affected by the information superhighway. Software companies that create interactive applications risk becoming something like today's novelists: revered for their creativity yet pauperized and controlled by publishing companies (except for a few blockbuster writers). On the hardware side, we will at first see proprietary set-top boxes, not more Compaq computers in the hands of consumers (why buy a new computer when you can get interactive applications on your TV?) The initial beneficiaries of interactive computing are not the traditional computer companies. To study one segment of the new interactive market -- content providers, which we discussed in last month's issue -- we created an index of approximately 150 companies, only a fraction of which is currently in ***The Red Herring*** **Tech 250**.

However, the entire computer industry can eventually benefit from the emergence of interactive computing technologies. A case in point is Kaleida Labs, Inc., an Apple/IBM joint venture.

Kaleida is working with Motorola and Scientific-Atlanta to put a powerful graphics controller inside a set-top box. Analysts believe that if IBM paired the controller, a chip named Malibu, with the new PowerPC in forthcoming Power Personal Systems, the company would have a major graphics workstation that could compete with those from Silicon Valley. But Kaleida is not interested. Quoted in the trade paper *Computerworld*, Kaleida president Michael Braun said, "All the money is in the consumer markets now."

Figure 3:

A Profile of Leading Stocks by Industry Group	*Performance: (1990 -1993) Up Cycle*	*Current Price (as of 12/14/93)*	*Current Intermediate Trend Profile*
Client/Server Enterprise Software			
Oracle (ORCL)	1,448%	$34.50	DECLINING
Computer Retail/Wholesale Distributors			
Merisel (MSEL)	1,038%	$17.25	ADVANCING
Computer Storage Systems			
Emc Corp (EMC)	2,652%	$15.875	BOTTOMING
Design Automation Software			
Parametric Technology (PMTC)	1,690%	$38.50	DECLINING
Desktop Computers/FileServers			
Silicon Graphics (SGI)	427%	$45.00	TOPPING
Digital Information Services			
First Financial Management (FFM)	515%	$53.25	DECLINING
Enterprise Computers			
Hewlett Packard (HWP)	259%	$76.125	ADVANCING
Host Era Enterprise Software			
Computer Associates (CA)	911%	$41.00	TOPPING
Internetworking			
Cabletron (CS)	1,514%	113.50	ADVANCING
Cisco (CSCO)	2,461%	$59.25	ADVANCING
Newbridge Networks (NNCXF)	4,825%	$52.75	BOTTOMING
Computer Peripherals			
Creative Technology (CREAF)(IPO 8/92)	258%	$24.75	ADVANCING
Intervoice (INTV)	1,163%	$16.75	BOTTOMING
Entertainment/Education Software			
Electronic Arts (ERTS)	2,645%	$32.75	DECLINING
Personal Computer Software			
Lotus (LOTS)	370%	$52.625	TOPPING
Microsoft (MSFT)	245%	$80.00	DECLINING
Semiconductor Equipment			
Applied Materials (AMAT)	869%	$35.25	BOTTOMING

Lam Research (LRCX)	1,737%	$27.875	BOTTOMING
Semiconductors			
Adaptec (ADPT)	725%	$34.875	ADVANCING
Intel (INTC)	432%	$57.50	BOTTOMING
Linear Technology (LLTC)	802%	$38.25	ADVANCING
Motorola (MOT)	369%	$90.125	DECLINING
Wireless Communications			
IDB Communications (IDBX)	1,195%	$47.25	BOTTOMING
Mobile Telecom (MTEL)	721%	$22.75	BOTTOMING

Kaleida is currently putting its entire focus on the emerging consumer interactive market, even if it means IBM's main product lines won't benefit immediately. This strategy may prove profitable for Kaleida, but set-top boxes represent a tiny proportion of IBM's overall business. Sooner or later, however, Malibu may indeed find its way into IBM graphics workstations, and IBM can benefit as new interactive technologies "trickle down" to its more traditional product lines. The information superhighway may indeed reinvigorate IBM over time.

The operant word here is "time." As the case of Kaleida shows, there will be a time lag between the development of new technologies and their expansionary effect in the wider computer industry. New technologies, both "traditional" and interactive, need time to prove themselves in general use. The computer industry needs time to realign itself around the revitalized axis of telephony. And the market for technology issues needs time to consolidate before beginning a new phase of growth.

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