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"The Chasm is where many high-tech fortunes have been lost...the Tornado is where many have been made."
—Steve Jobs, founder and CEO, NeXT Computer, Inc.

Marketing Strategies from Silicon Valley's Cutting Edge

INSIDE THE TORNADO

GEOFFREY A. MOORE
author of *Crossing the Chasm*

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MARKETING STRATEGIES FROM SILICON VALLEY'S CUTTING EDGE

GEOFFREY A. MOORE

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In memory of Patricia C. Moore, who loved literature, had a wonderful way with words, and did her best to pass these gifts on to her son.

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PART ONE

THE DEVELOPMENT OF HYPERGROWTH MARKETS

CHAPTER 1

THE LAND OF OZ

At the beginning of *The Wizard of Oz*, Dorothy and Toto are caught up inside a tornado, swept away from their mundane world of Kansas, and deposited into the marvelous land of Oz. This miraculous form of ascension is also reenacted from time to time on our own public stock exchanges.

Consider the following:

- **Compaq Computers**, which in recent years has overtaken IBM as the leader of the Intel-based PC market, grew from zero to $1 billion in less than five years.
- Ditto for **Conner Peripherals**, the disk-drive storage company who slipstreamed Compaq's hypergrowth by supplying it, as well as many of its competitors, with low-cost Winchester hard drives.
- Over a six-year period from 1977 to 1982, **Atari**'s home game business doubled in size every year, driving the company from $50 million to $1.6 billion in revenues.
- In successive years during the mid-1980s, **Mentor Graphics** grew from $2 million to $25 million to $85 million to $135 million to $200 million.
- For the *entire decade* of the 1980s, **Oracle Corporation** grew at an annually compounded rate of 100 percent.

- More recently, **Cisco Systems** and **Bay Networks** have appeared out of nowhere to become billion-dollar companies—leaders, respectively, in the network router and the network hub markets. We didn't even know what routers and hubs *were* until just a few years ago.
- In the seven years prior to 1992, **Sony** shipped their first ten million CD-ROM players. The next ten million were shipped over the following *seven months,* and the ten million after that in the following five months.
- **Hewlett-Packard**'s PC printer business, a $10 billion enterprise in 1994, shipped its first product a scant ten years earlier.
- And finally, **Microsoft** in less than fifteen years has grown from a boutique language software company focused on BASIC to the richest and most powerful software company in the world.

Such are the market forces generated by *discontinuous innovations,* or what more recently have been termed *paradigm shifts.* These shifts begin with the appearance of a new category of product that incorporates breakthrough technology enabling unprecedented benefits. It is immediately proposed as the natural replacement for a whole class of infrastructure, winning early converts and enthusiastic predictions of a new world order. But the market is a conservative institution, and it presses back against the new changes, preferring to stay with the status quo. For a long time, although much is written about the new paradigm, little of economic significance happens. Indeed, sometimes the innovation is never embraced, falling back into some primordial entrepreneurial soup, as did artificial intelligence in the 1980s and pen-based computing in the early 1990s. But in many other cases there comes a flash point of change when the entire marketplace, under the pressure of continually escalating disequilibrium in price/performance, shifts its allegiance from the old architecture to the new.

This sequence of events unleashes a vortex of market demand. Infrastructure, to be useful, must be standard and global, so once the market moves to switch out the old for the

new, it wants to complete this transition as rapidly as possible. All the pent-up interest in the product is thus converted into a massive purchasing binge, causing demand to vastly outstrip supply. Companies grow at hypergrowth rates, with billions of dollars of revenue seeming to appear from out of nowhere.

We have seen this happen again and again in our own lives. Take communications. After the better part of a century being content with letters, telegrams, and telephones, we have in the past thirty years adopted touch-tone phones, direct-dial long distance, Federal Express, answering machines, fax machines, voice mail, e-mail, and now Internet addresses. In every case, until a certain mass was reached, we didn't really need to convert. But as soon as it was, it became unacceptable not to participate. As members of a market, our behavior is invariable: we move as a herd, we mill and mill and mill around, and then all of a sudden we stampede. And that is what creates the tornado.

Nowhere has the tornado touched down more often in the past quarter-century than in the computer and electronics industry. In the domain of business computing, it began with the proliferation of the IBM mainframe, which won worldwide support as the first major computing infrastructure standard. Then, in the space of less than a decade beginning in the late 1970s, three new architectures arose to challenge and displace that paradigm: the minicomputer, the personal computer, and the technical workstation, and we came to know a whole new set of companies, including DEC, HP, Sun, Apollo, Compaq, Intel, and Microsoft. In conjunction with these three architectures came a communications networking paradigm shift that moved from the centralized hub-and-spokes approach of mainframe-centric computing to the decentralized world of Local Area Networks interconnected via Wide Area Networks, and we met companies like 3-Com, Novell, Cisco, and Bay Networks. And concurrent with both these shifts, virtually all of our software, from the underlying operating systems to the databases, to the applications and the tools that build them, was overthrown or reworked, in most cases more than once, driving companies like Oracle,

Sybase, Lotus, Ashton-Tate, and WordPerfect into our consciousness.

Yet during this same period we still bought most of our cars from General Motors, Ford, and Chrysler. And we flew United or American or Delta. And we drank Coke or Pepsi or Dr Pepper. While some sectors, in other words, were generating whole industries out of thin air, creating hordes of market leaders from early unknowns, others continued along relatively familiar paths—*because they did not introduce discontinuity into their infrastructure paradigms.* The car you drive today is not materially different from one driven forty years ago. Ditto for the air transportation and the soft drinks. By contrast, high tech's insistence on repeatedly swapping out all its infrastructure is exceptionally expensive, and more than one corporation has challenged the whole rationale behind this behavior. But there is a dynamic in operation that gives people little choice. All computing is built atop an underpinning of semiconductor-based integrated circuits, which has the remarkable property of dramatically increasing its price/performance far faster than anything else in the history of our economy. In the 1970s, the rate was already an astounding order of magnitude every ten years. In the 1980s it decreased to an order of magnitude every seven years. In the middle of the 1990s the time has compressed to three and a half years. By the end of the decade microprocessor-based systems will increase ten times in power every 2.5 years. And there is no foreseeable end in sight.

This phenomenon has an extraordinarily destabilizing effect on every industry within the high-tech sector. All high-tech products ultimately take their value from software, and the software written at any point in time must work within the power constraints of the current or soon-to-be-shipped hardware. But after only a few short years, another order of magnitude of additional power has come on the scene, making these same design constraints obsolete. New products, designed to the new performance vectors, incorporate software that simply blows away the old reference points. Their new capability translates into the kind of competitive advantages that stimulate virtually any business customer—better communications,

faster time to market, more efficient transaction processing, deeper understanding of their customers, earlier detection of trends. You name it, it now appears within reach.

To be sure, nobody currently enjoying success with their old paradigm really wants to change. Everybody agrees that there is already too much cycling and recycling of high-tech products, and that we would be better served if we could just take a brief time out and catch our breath. But all the while the semiconductor engine keeps rumbling beneath our feet, and at some point the attraction of dramatically escalated capabilities simply overwhelms the inclination not to change, and despite everyone's best intentions, yet another tornado gets under way.

Each one of these changes generates massive new influxes of spending, as if we were to build up and then tear down our cities over and over again. These new pools of capital, in turn, create some of the fiercest economic competition on the planet, in part because winning or losing is compressed into such a short span of time. And with each revolution, it seems, it is not the old guard but rather a whole new set of players who are swept into prominence, redrawing the boundaries of the high-tech marketplace and realigning the power structures that dominate it.

We're Not in Kansas Anymore

By anybody's standards, this is business played by a new set of rules, with upside potential to glut anyone but a venture capitalist's appetite. At the same time, we should also note that there is a dark side to this story, an information highway littered with bankrupt companies, massive layoffs, derelict buildings, obsolete products, crippled customers, and surly investors. It is not Easy Street where we have landed but more like Tombstone or Dodge City, a place where money and power change hands quickly, and the first order of business is not to end up on Boot Hill.

Given all this, given the cataclysmic and catastrophic impacts, and given that the distribution and redistribution of wealth on the planet is so deeply influenced by what is happen-

ing within this crucible of the high-tech marketplace, we simply must get a better grip on how the forces that drive these tornadoes operate.

For those who work within the high-tech sector, or who manage investments in these companies, this imperative translates into a series of deceptively simple questions:

- What can we do during a tornado to best capitalize on our opportunity?
- How can we tell when one is coming, and what can we do to prepare?
- How can we sense when it is ending, and what should we do then?
- Finally, going forward, how can we reframe our strategic management concepts to better accommodate tornado market dynamics in general?

It is the intent of this book to answer these questions in some detail, and to do so specifically in the context of examples drawn from current developments in the high-tech sector.

At the same time, there is another class of executives outside high tech who can also expect to profit from delving into these issues, those working in *high-change* sectors where discontinuous forces are driving an analogous kind of reengineering to their infrastructures. These include:

- **Financial services.** As the financial markets have learned in the harshest possible way, speculating in derivatives and other exotic financial instruments is a highly discontinuous innovation.
- **Insurance.** With competitors chipping away at their customers with innovative financial alternatives, regulators hounding them about premiums and profitability, and their sales practices under attack in court, reengineering has become the order of the day here.
- **Health care.** The story here is *capitation,* the limiting of reimbursement to fixed fees for procedures, creating a new goal of health care providers—not to get decapitated.

- **Aerospace and defense.** Downsizing in the aftermath of the cold war, along with broad redefinition of defense strategies, is forcing this sector to reengineer the old businesses and migrate others into the commercial sector—massively discontinuous changes.
- **Utilities.** What deregulation did to the airlines in the 1980s is now in the offing for the power companies in the 1990s. This will create tornadoes of opportunity and destruction.
- **Pharmaceuticals.** With revenues impacted by capitation, and new products dependent on a discontinuous source of innovation, biotechnology, this industry is undergoing high change.
- **Retailing.** The advent of an entire electronic back-office infrastructure is fusing the links of the retail supply chain as never before, driving reengineering of these relationships as well as providing huge data sources for analyzing market behavior.
- **Publishing.** This used to mean putting words on paper. Enough said.
- **Broadcasting.** The boundaries among broadcasting, telephony, computer software, publishing, and entertainment have all collapsed into a digital pool of images that will rewrite the rules in this industry over the next ten years.

Because the examples in this book come primarily from the consulting practices of myself and my colleagues, they are heavily weighted toward high tech. Readers involved in the industries noted above, however, will find the patterns in these examples familiar, and I hope you can glean from them insights you can translate into new approaches to your own industry's concerns. High tech, in other words, can be seen not only as a sector of interest in its own right but also as a crucible in which a whole new class of business strategies are being born.

A Map of Oz

This book sets out to build a map of the new landscape and then to explore its implications for setting business strategy.