



Competitive Strategy Analysis

Marathon's Slow-Cycle Startup Strategy: A Study in Economic Time Draft

ABSTRACT

This is a study of a young technology company, Marathon Technologies Corporation, and its search for rents in the fault-tolerant computing market. This paper presents an analysis of Marathon's business strategy from inception to present using the framework of economic time. It examines their decisions and actions to see if, and how, they are consistent with slow-cycle ecologies. The paper also looks at their sources of advantage and the processes they employed to renew and sustain that advantage. What is discovered is that the strategy pursued closely parallels the recommendations and predictions of economic time and that this strategy was surprisingly effective. It is also learned that were Marathon to behave other than they did, they would not have experienced the same success. This further confirms the power of the economic time framework.

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Table of Contents

- Introduction 1**
- Slow-Cycle Behavior..... 1**
 - Define the Market 1
 - Gather the Artisans 2
 - Seek Ownership of Market Factors..... 3
 - Product Complexity 3
 - Intellectual Property Rights..... 3
 - Human Capital 3
 - Price at the High End 4
 - Develop Customer Lock-In..... 5
- Renewal through Staircase Strategies..... 5**
 - Specialized Product through OEM/VAR Channels 6
 - End-User Product through Direct Sales Channels 6
 - Partnerships with Major Systems Vendors 7
 - Fully Integrated Application-Specific Solutions..... 7
- Sustainability of Advantage 7**
 - Renewal 7
 - Challenges..... 7
 - Conclusion 8

Related Web Sites

Site	Description
www.marathontechnologies.com	Homepage for Marathon Technologies Corporation
www.stratus.com	Homepage for Stratus Technologies
www.compaq.com/tandem	Homepage for Tandem Computers
www.forbes.com	Business information for business leaders
www.startmag.com	IT technologies for manufacturing and engineering
www.networkmagazine.com	Networking technologies for the enterprise, executive focus
www.networkcomputing.com	Networking technologies, IT focus
www.hpworld.com	News about Hewlett-Packard Corporation

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- [4] "Manufacturing automation suppliers adopt Marathon Endurance as standard for assured availability for Windows NT," *Start Magazine*, October 26, 1998.
- [5] Online Alert, <http://www.amrresearch.com>, AMR Research, Inc., October 30, 1998.
- [6] "HP, Marathon 'Go the Distance' for NT-Based Internet, E-services," *HP World*, July 1999.
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Introduction

This is a study of a young technology company and its search for rents using the framework of economic time. Marathon Technologies Corporation was founded in 1993 to compete in an uncharted segment of the fault-tolerant computing market. This paper presents an analysis of Marathon's business strategy from inception to present which examines their decisions and actions to see if, and how, they are consistent with slow-cycle ecologies. It also looks at their sources of market advantage and the processes they employed to renew and sustain their advantage.

Marathon was founded on the idea that low-cost servers, derived from desktop personal computers based on Intel processors and running Windows, would lead enterprises to use them for an ever increasing number of critical applications. This dependency would then create a need for mission critical functionality more typically associated with high-end minicomputer and mainframe systems. Marathon's mission was to develop the lowest cost, fault-tolerant and disaster-tolerant technology for commoditized hardware and software and deliver these benefits to users of unmodified commercial off-the-shelf software. (Fault-tolerant is used throughout this paper in both its informal sense of continuous availability and in its technical sense of ensuring integrity of operation.)

Slow-Cycle Behavior

Despite operating in the fast-paced (and often fast-cycle) world of technology, fault-tolerant computing companies share more in common with slow-cycle companies like pharmaceutical manufacturers than they do with other technology companies. For example, both operate in an industry with extremely high stakes—human life—where trust and reputation are necessary components of success. They have long research and development cycles, rigorous testing and validation cycles, and slow product introduction and renewal cycles. Fault-tolerant vendors also share many other characteristics of slow-cycle companies including:

- Stable pricing with high profit margins and an ability to maintain them for extended periods.
- Market ownership through control of factors such as intellectual property and physical resources.
- Extremely complex products requiring a high degree of competence to develop.
- Staircase strategies of renewal to extend products and market.

Notably absent are characteristics of fast or standard-cycle ecologies. Products and technology do not change or obsolesce rapidly. Nor are there any economies of scale that could be exploited by a company with strong orchestration processes.

The lack of fast-cycle and standard-cycle value drivers may, at first glance, seem counterintuitive in the case of Marathon. After all, their product directly depended on Intel microprocessors and industry-standard servers from companies such as Compaq and Dell, fast-cycle companies all. And unlike Microsoft—whose ownership of the operating system standard allows it to behave as a slow-cycle monopoly—Marathon started out with no factors of market ownership. Add to this milieu the fact that Marathon's initial customer base was entirely standard-cycle companies, and there is much to unravel and discover. The story begins with the creation of a new market.

Define the Market

Fault-tolerant systems are extremely complex and very expensive. Before Marathon entered the market, fault-tolerant systems were used only for the most critical applications where the consequences of failure are unacceptable (such as the loss of life, property or significant revenues). The high-end of the fault-tolerant market was dominated by companies like Stratus and Tandem (now part of Compaq). These proprietary systems enjoyed almost complete dominance in a niche that represented a tiny fraction of the overall computing server market.

Windows NT was poised to become a major contender in the low-end, high-volume server market by capitalizing on Microsoft's ownership of the desktop operating system with Windows 3.1. A Windows NT server offered a much lower level of availability, 98-99%, than that available on fault-tolerant systems and could result in many days of downtime each year as shown in Table 1. In response, several companies developed products which improved the availability of Windows NT

Availability	Downtime
90%	36.5 days
99%	87.6 hours
99.9%	8.76 hours
99.99%	52.56 minutes
99.999%	5.256 minutes

Table 1: Availability Levels

using clustering technology. This allowed several servers to be loosely grouped together so one group member could take over the services of a failed member. Such techniques increased availability to as much as 99.9% and reduced the level of unplanned downtime to less than a day. However, this was still far from the 99.999% availability offered by fault-tolerant servers.

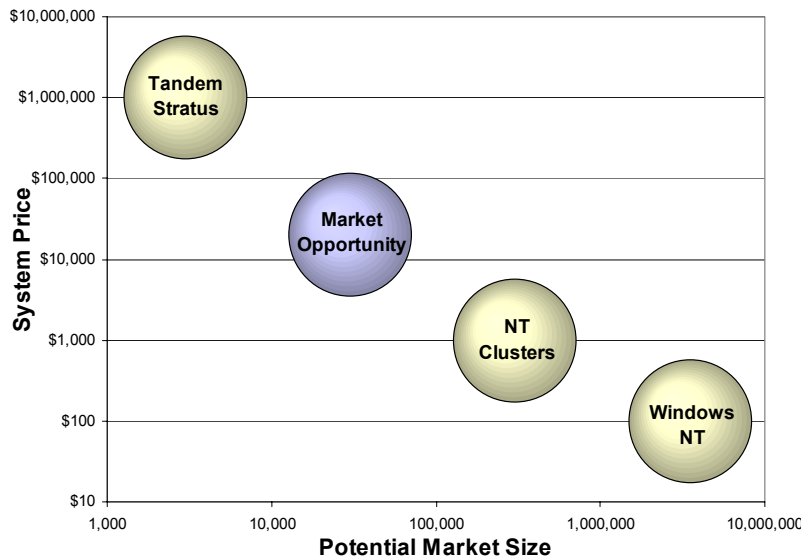


Figure 1: Market Opportunity in Fault-Tolerant and High Availability Market

This clearly left an opportunity, as illustrated in Figure 1, for a product that offered the highest levels of availability and yet had many of the advantages and appeal of a high-volume product. Marathon was the first company to identify and exploit this opportunity. They would leverage Windows NT as the bridge between high-end and high-volume solutions. They did not intend to obtain a large share of the overall server market, but instead hoped to dominate a very specific segment. That segment was initially chosen to avoid appearing too attractive to companies at the high-end. A company that routinely makes \$1M on a single product sale is not often interested in pursuing \$20-30K sales opportunities. The segment was also chosen to be out of reach of the technologies used in clustering solutions. Other factors that further refined and bounded the market segment are discussed in the section on product complexity below.

Gather the Artisans

In 1990, Digital Equipment Corporation reported its first quarterly loss ever and a net loss for fiscal 1991. What followed were numerous restructurings, massive layoffs, product cancellations and plant closings in an effort to remain competitive. Among those recently without jobs or projects were many senior engineers associated with Digital's move into the high-end of the computing market. These engineers represented a wealth of expertise and experience in fault-tolerant and high-availability computing systems. For the enterprising founders of Marathon—all former employees of Digital—the event was a unique opportunity to assemble a top-notch engineering team on the cheap. It was also the only chance to gather together engineers that could quickly master the kernel architecture of Windows NT.

Windows NT 3.1 officially debuted in July 1993, but its heritage stretched back many years to Digital's VMS operating system. It is a subject of debate whether ethical lines were crossed by Microsoft when they recruited Dave Cutler, a VMS architect, to head the development of Windows NT in 1988. What is undeniable is that the technical parallels between platforms made it a natural transition for Marathon's engineering team. Add to this many months of intensive studying and reverse engineering, and the result was the only group of Windows NT kernel-mode experts outside of Microsoft. This human capital advantage—twelve talented engineers—would be hard to duplicate without significant expenditure and significant time, far more than it had cost Marathon to create initially given the favorable conditions and timing. However, it was not necessary that this source of advantage last forever: it only needed to last long enough to establish ownership of other critical factors of success and market ownership.

Seek Ownership of Market Factors

Having defined a market opportunity, it was necessary that Marathon secure ownership of factors that were necessary to function in that market. There weren't any physical barriers that could be controlled. The software and hardware standards were already controlled by Microsoft and Intel, respectively. The factors that could be controlled were the very same ones that Tandem and Stratus used to protect their niche: complexity, intellectual property rights and concentrated industry expertise. Marathon faced the challenge of using these factors to secure a market from powerful and aggressive players.

Product Complexity

Marathon recognized that market opportunities that could be solved entirely in software were vulnerable to Microsoft's "embrace and extend" drive towards market hegemony. After an innovator has tested and developed a market, Microsoft could realign sufficient resources to invade and dominate the market. This did in fact happen with clustering software. Many companies—Vinca, Legato, NCR and Octopus—had developed Windows NT clustering solutions only to face Microsoft's move into the marketplace with their own cluster services a few years later. These companies disappeared, consolidated or were acquired as a result. For complexity to be an effective barrier, the solution would require a substantial proprietary hardware component, something that could not be obtained commercially. This would mitigate the risk posed by Microsoft which was primarily a software company.

However, solutions based primarily on hardware were also vulnerable to takeover from fast-cycle innovators such as Intel and PC manufacturers like Compaq and Dell. These companies were constantly in search of opportunities for renewal and would quickly bring to bear their development and manufacturing expertise. Fortunately a solution with software complexity was an effective barrier to entry by these companies.

Marathon's solution took almost five years to develop. The first product implementation comprised over a million lines of code, dozens of Windows NT kernel-mode device drivers, an NT hardware adaptation layer, and a proprietary hardware interconnect with thousands of lines of microcode and firmware. The software scale and complexity rivaled that of Windows NT itself; the hardware captured many of the innovations and could not be obtained from anything commercially available. Together the solution represented a formidable entry barrier, but one that could be overcome by a company with enough determination and sufficient resources.

Intellectual Property Rights

To safeguard the product from direct copying by those with the determination and resources, Marathon aggressively patented the innovations in their solution. They have been granted 10 extensive patents to date with several more pending. These patents protect not only the innovations, but the characteristics of most products that could conceivably function in the same segment of the market defined by Marathon. This was the buttressing of the fortress walls that slow-cycle companies build around their sources of market ownership.

Human Capital

One of Marathon's early advantages was in human capital: a uniquely qualified and talented engineering team. Protecting this asset was important, but so was nurturing it so that it could perform to its potential.

Protection took the form of an equitable compensation and incentive package. Once the company secured sufficient financing to pay its employees, the package was simple: everyone—CEO, management, operations, marketing and engineering—received an identical salary and a share of the company. This was unlike the hierarchical pay scales in standard and slow-cycle companies. The equality fostered feelings of teamwork and shared purpose. It was an important part of reinforcing a corporate culture.

In some sense, Marathon was born with a corporate culture; one that came directly from the many years at Digital most employees shared. It was a culture of informality and initiative which meshed well with the needs of a startup company. This was evident in "...the wonderful variety of things each person must do to make a company with minimal infrastructure work (for example, Tom is Chief Trash Officer, Jim is Chief Soda Officer and Dan, Mario, and anyone else, including me [CEO and founder, Bob Glorioso], can be seen vacuuming floors, making coffee,

changing light bulbs, building shelves, running errands, etc.) and, finally, there are no committees and, there is only one conference room!" [7] This flexible, familial culture is consistent with slow-cycle ecologies.

Slow cycle companies can benefit from tipping effects in which the market moves in favor of a single vendor. At some point, the cost to acquire additional market share declines while continuing to grow. This phenomenon is also known as increasing returns. Marathon experienced its own, albeit unusual tipping effect, one that had nothing to do with product or market share and everything to do with people. Creating the original engineering team was expensive in terms of time and funding. Growing that team through recruiting and interviewing was arduous. But at some point it became easy.

Shortly after Marathon's first product debut, its reputation as a haven of NT kernel-mode engineers blossomed. Its engineers were the ones to stump, the ones to beat in the newsgroups and at conferences. The industry had reached a tipping point where the best and brightest wanted to be part of the team. The difficulty of recruiting dropped dramatically; the cost of acquiring new talent vanished. The industry had tipped in favor of employment at Marathon.

This introduced a new problem, managing growth. Candidates had to be selected carefully for their technical prowess, contribution and compatibility with the established culture. The hiring and interview process was one of the first to be formalized amidst so many unwritten processes. It was important that this gateway ensure consistent rigor and comprehensive evaluation of candidates.

The tipping effect did have the unanticipated benefit of curtailing attrition. Employment at Marathon was a badge of honor and its employees took pride in being part of the team. That reputation still persists today and helps explain the very low turnover rate compared to other high-tech companies. Of the twelve members of the early engineering team, eight are still with the company. Of the four that left, two left for reasons unrelated to their employment.

Price at the High End

Like all products introduced at the top of the convergence curve, Marathon's Endurance products were priced at the very high end of the range acceptable to the marketplace. Unlike fast cycle markets where the ability to maintain this high-margin pricing quickly vanishes in a matter of months, Marathon was able to press their advantage as an effective monopoly in inexpensive fault-tolerant systems to maintain this pricing for many years. This can be seen in the following three quotations from 1997, 1999 and 2002 (italics added for emphasis):

Even though we had Marathon Technologies' Endurance 4000 in our lab for only a few days, we saw enough to be impressed by the engineering that went into this system. It differs from the other solutions we tested because it runs a single image Windows NT Server 4.0, unmodified except for the addition of device drivers; the others run a complete second copy of NT on the second server. *Take note, however: Endurance 4000 is not cheap—it's \$25,000, and that price does not include the four servers and multiple copies of NT.* [3]

The Endurance 4000 is around the top of the price chart for a high-availability NT system, so you will need to calculate just how much downtime will cost you. The alternative is software-based clustering, such as that offered by Legato Systems' Octopus HA+, Microsoft's Cluster Server, NCR Corp.'s LifeKeeper and Vinca Systems' Co-Standby Server. These vary considerably in price. While they generally require more expensive hardware because RAID arrays and other redundancies are more important, in the end, software clustering should be somewhat less costly initially. But while you save money, you'll lose the virtually instant failover and the ability to use any software, not just cluster-aware applications. [2]

These days, when tech departments are pinching pennies harder than ever, Marathon's low-cost "fault-tolerant" system looks better than ever. *Marathon's Endurance system costs only \$20,000 to \$100,000. An equally robust setup from Sun, IBM or Stratus runs from \$250,000 to well over \$1 million. Endurance now powers security systems at nuclear power plants, baggage-handling systems at airports and assembly lines at automakers. Marathon's 1,800 customers include Wal-Mart, ESPN, Eli Lilly, ups, DaimlerChrysler and Coors.* [1]

This pricing is consistent with the ability of slow-cycle companies to maintain stable pricing and long-lived profit cycles. There are few demands to reduce prices or costs because there is little competition. Marathon's product pricing has remained essentially unchanged despite dramatic cost reductions and profit compression in the hardware

and software upon which the product depends for its market: Intel-based servers and Windows operating systems and applications. In fact, Marathon's profit margins have actually improved during that time as the company has reengineered its products with systems that are less expensive to manufacture and support. In terms of economic time, Marathon's product half-life is at least seven years and very likely much longer.

Develop Customer Lock-In

Marathon pursued a strategy of locking in small segments of the market and using them as a base to grow. The first segment targeted was manufacturing customers using process control systems. Customers in this segment tended to be standard cycle companies where scale orchestration of their manufacturing processes represents a major competitive advantage. Pursuit of "no surprises" execution and delivery in these companies allows them to assign a dollar figure to every problem, every delay, and every moment of downtime. When a minute of downtime costs thousands of dollars, it isn't difficult to justify \$25,000 on a product that reduces corporate liability from millions of dollars to a just a few thousand.

Despite the potential easy sell, it is important to remember that Marathon was still an unproven startup that lacked the relationships with which to move into this segment, much less establish lock-in. Instead, Marathon sought out the vendors that supplied many of the process control systems to these large customers. These companies had long established trust relationships with the target market segment. For over a year, Marathon developed relationships and partnerships with each of the major process control companies. The timing was again in Marathon's favor since many of these companies were evaluating Windows NT as a platform to replace the aging DOS-based systems (yes, these were still systems based on MS-DOS in 1997). Marathon offered custom development and migration assistance as well as the logical replacement platform with the required availability. This culminated an industry-wide commitment and endorsement of Marathon as the standard platform for process control systems:

Marathon Technologies Corp., Boxborough, Mass., announced a series of partnerships that makes its Endurance 4000 nonstop computing array the de facto standard for assured availability for Microsoft Windows NT. At a press conference held on the second day of the ISA conference in Houston, a "who's who" of manufacturing automation affirmed Marathon's position by announcing partnerships and solutions, Marathon reports. Marathon partners participating in the press conference included Fisher-Rosemount (DeltaV), Gensym (G2), Honeywell (TotalPlant), Intellution (FIX Dynamics), ObjectAutomation (OAenterprise), Rockwell Software (RSView 32), Sequencia (OpenBatch), USDATA (FactoryLink ECS), and Wonderware, (FactorySuite). [4]

Customers in the target manufacturing market were effectively locked-in to Marathon's technology through a strategy of locking in those companies' suppliers. The problem is that many of the customers in the manufacturing space weren't aware that Marathon was the provider of the technology behind the products they used and trusted. This was similar to the conundrum that Intel faced with competition from Cyrix and AMD, a problem they successfully addressed with the "Intel Inside" branding and a multimillion dollar advertising campaign. Marathon also instituted a "Marathon Inside" campaign but lacked the resources to follow up with pervasive advertising. So instead of differentiation through branding, they developed a different strategy that would expand their market and increase their visibility.

Renewal through Staircase Strategies

Marathon employed a staircase approach to product and market expansion which allowed them to extend their advantage beyond their original source of market ownership. This entailed introducing new products with steadily increasing levels of integration with non-Marathon hardware and software, and simultaneously expanding the types of sales channels to best deliver these products to their intended market. The steps in this strategy are illustrated in Figure 2. Each step represents expansion without abandoning the market or channels of lower steps. Each step was an important means of renewal that capitalized on growing market visibility and customer trust relationships.

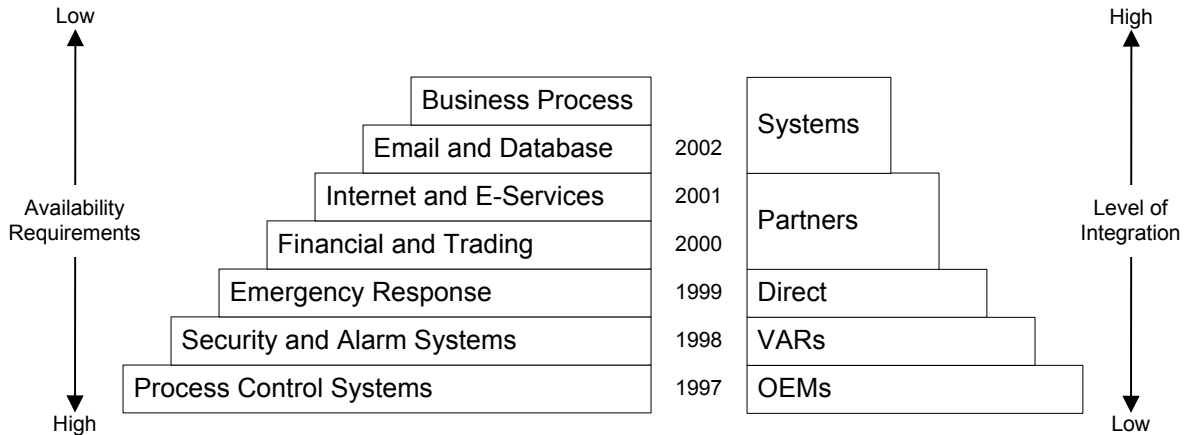


Figure 2: Staircase Expansion of Product, Market and Channels

Each step can also be thought of as a move towards increasing vertical integration of the product. Marathon originally added value in research and development; just about all other activities necessary to produce and deliver a product were outsourced (or didn't exist). As the company matured, more of these activities were brought in house. This allowed Marathon to increase prices by eliminating VAR and OEM discounts and charging for higher levels of integration. It also allowed them to ensure proper application of their technology.

Specialized Product through OEM/VAR Channels

We've already seen the first step in this strategy: Marathon's hardware and software was sold to process control companies who packaged it in their own solutions for the manufacturing market. Cementing this base was critical because slow-cycle companies such as Marathon depend on trust relationships. Marathon needed to prove their product flawlessly delivered the levels of availability promised. A new fault-tolerant systems vendor has a "no surprises" requirement that is not typical of established slow-cycle companies. The first year, in fact, was spent primarily in placing product with original equipment manufacturers for 6-12 month testing and evaluation cycles.

With a track record of performance and unblemished reputation, Marathon was able to establish market ownership and lock-in of a portion of the process control systems market. This provided a base from which they could expand into the security, monitoring and alarm systems market. These systems were not as tightly integrated as process control systems: the server was a visible component running a custom application. To reach these customers, Marathon sold their product through value-added resellers who would package it with application-specific hardware and software and market it to the security and alarm vendors. Marathon provided little integration or support directly to end-users.

End-User Product through Direct Sales Channels

The next step up the staircase was a push into the emergency response market by selling directly to these customers. This market is typified by 911 call dispatch centers. The applications used are standard Windows NT applications running on commercially available server platforms. Dispatch centers had dedicated IT staff to manage the servers and tried to meet their availability requirements through a hodgepodge of redundant backup systems, clustering and replication products. Marathon had the right solution, but the wrong product.

The product had undergone many incremental improvements to maintain performance commensurate with increasing processor speeds, but was still fundamentally the same. What changed at this step was the packaging. The product transitioned from specialized components to an end-user kit. It was redesigned to reduce the visible complexity (number and types of connections, parts, installation and configuration) so that it could be installed on site by a typical Windows NT administrator.

Partnerships with Major Systems Vendors

The next major expansion was into markets that could tolerate (and did) lower levels of availability and were hesitant to go with unfamiliar technology unless backed by a major vendor. These were end-users of general-purpose computing servers who provided financial services, online trading, Internet and e-commerce applications. They were customers of major systems vendors such as IBM, HP and Compaq. Marathon pursued a strategy of becoming the exclusive provider of Windows NT fault-tolerant services to these system vendors. This allowed them to enter the general-purpose server market with the cachet and clout of industry leaders. The following quotation describing the partnership with HP was typical of this expansion.

HP's blooming partnership with technology firm Marathon Technologies Corp. is aimed straight at delivering more fault-tolerant, NT-based HP NetServers for running mission-critical Internet, e-commerce, and coming e-services applications. Under an agreement announced this summer, HP's NT Server Division is incorporating Marathon's Endurance technology into an enterprise server product line called the HP NetServer Assured Availability solution. [6]

Unlike the process control market, there was no lack of visibility. The servers were clearly based on Marathon's unique technology, endorsed and supported by a recognized vendor and hosted on a familiar platform.

Fully Integrated Application-Specific Solutions

The most recent expansion in Marathon's staircase strategy has been the selling of fully integrated application-specific systems directly to customers: plug and go fault-tolerant solutions for database, email, network, storage and web services. These systems include Marathon's technology with all necessary server hardware, operating system software and the desired application such as Microsoft's Exchange Messaging Server, pre-configured and sized for a given number of users. These solutions are vertically integrated both in terms of activities (research and development, systems integration, marketing, distribution, sales and support) and in terms of components. This allowed Marathon to extract the most rents from the market while ensuring quality and improving responsiveness.

Sustainability of Advantage

Marathon successfully aligned their capabilities and strengths with the needs of a market they helped define. The vision of the founders had become reality as seen in the following quotation from AMR Research in 1996.

As more of the world of critical applications migrates from VMS, UNIX, and other traditional high-end operating systems to Windows NT, users are going to demand the highest possible level of availability and reliability. Marathon is clearly the leader in this area and any competitors will be measured against the standard it has set. [5]

Marathon's strategy paralleled that of many other slow-cycle companies and allowed them to renew their advantage many times over by leveraging their source of market ownership.

Renewal

Stable profit margins and pricing were possible through renewal in the form of staircase strategies for product and market expansion. Each innovation allowed them to move into markets that were previously inaccessible, but each remained grounded in the technology for delivering low-cost fault-tolerance on industry-standard hardware and software. Tipping never occurred because the market was defined and dominated by Marathon. The fact it was a relatively small market shielded Marathon from intense competition. Part of sustaining their advantage was to ensure the market never became too big or too attractive too early. The steady pace of renewal was slow enough that by the time they were seeking systems partners, they had secured their market.

Challenges

It remains to be seen whether Marathon will be able to sustain its advantage. They have clearly followed an effective strategy to this point, but they are also straining at the very barriers they erected to secure their market.

They have reached the limit of renewal through vertical integration and now must broaden their base if they are to grow. The dip in IT spending has seriously hurt the company's revenues and the bursting of the IPO bubble dried up a needed source of capital. Compounding Marathon's difficulties is the fact Stratus introduced its first Windows NT fault-tolerant server to directly compete with Marathon's products. Renewal is necessary; innovation is critical.

Marathon could transfer their technology to a new platform such as Linux. But this lies outside their human capital advantage in Windows NT expertise—and well within the expertise of UNIX vendors such as Stratus, Sun and IBM. Any such move outside their boundaries is fraught with risk. Marathon's stealthy rise to dominate a market can never be repeated: other companies are watching and will react, quickly and with far greater resources. Renewal must instead come from an understanding of Marathon's core competencies and not be bounded by their existing sources of market ownership.

Conclusion

Marathon didn't set out to follow a slow-cycle strategy. They were making what they hoped were good business decisions and pursuing a strategy that would be successful. The alignment with the recommendations and predictions of slow-cycle ecologies illustrates and confirms the power of the economic time framework.

Postscript

I was the tenth engineer to join Marathon, and also a former Digital employee. There I discovered the most brilliant group of people I have ever had the pleasure (and honor) of working with developing some of the most amazing technology I have ever seen. I used my knowledge of events from the inside to structure this paper but have made an effort to support this analysis with information that is publicly available.

In the course of reevaluating our corporate behavior over many years, I was surprised at how well what we did could be understood in terms of economic time. Things clicked. I could enumerate the strategy of a slow-cycle company simply by listing what we did. I also saw risks and barriers to growth that I never could before—and possible means of managing around them. I shouldn't really have been surprised.