Appendix for Edgar H. Schein "DEC is Dead, Long Live DEC"

Berett-Koehler Publishers, San Francisco, 2003.

What happened?

Every time I meet a DEC alum that I haven't seen for a decade or two, after the moment of silence, comes the inevitable question: What happened? This book gives a fine understanding based on Ed's perspective of corporate cultures, especially Digital's. His observations, together with the various memos and reference interviews, stimulated me to elaborate, yet state simply what *I believe* happened. Hopefully it will be a guide for other companies that will be tested and judged by these same laws that govern computing.

Although I left the company in 1983, I maintained communication with Digital, including reviewing its portfolio of all of its failing startup ventures. In 1986 while leading the government's effort to build what became the Internet, I encouraged Digital to compete to build it[1]. In 1991, as an Intel consultant, I attempted to create a merger of the Alpha and Intel architectures, but unfortunately *especially for everyone connected with Intel's Itanium aka Itanic,* HP took on the role. In 1995 while keynoting the first InternetWorld conference, I made and won a *never paid* $1000 bet with Tom Richardson, Marketing Director of the Digital's Internet Business Group, working for Rose Ann Giordano, an Officer and long-time Vice President. The bet was: "DEC would come in last behind Sun, HP, and IBM in Internet product sales" despite its research lead with Web tools, products, and services including AltaVista[2]. Internet products were perfect for DEC—they had all the pieces including: servers, software and networking. However, DEC didn't understand how to organize to engage in a new market.

Clayton Christensen invariably starts his talks about his 1997 book, **The Innovator's Dilemma**, with DEC as the example of his technology observation. DEC, *or more precisely its top leaders including its ineffective board,* were found guilty of violating Moore's Law and sentenced to Compaq in 1998, and HP in 2002. The extra ordinary

[1] IBM and the University of Michigan won the first contract.

[2] An attempt was made to create a spin-off from DEC in 1995. However the spinoff failed because AltaVista was a prized asset of a financially-troubled DEC, who was in talks with Compaq. Eventually Compaq purchased DEC for $4.5 billion in June 1998. In June 1999, Compaq sold AltaVista to CMGI for $2.3 billion in cash and stock. In February 2003, CMGI sold AltaVista to Overtune for $140 million.

price shift resulting from Moore's Law was clearly known in 1975, when VAX (figure 1), was planned; furthermore this is the law that creates a new paradigm in computing about every decade! A common belief for failure was it failed "to get the PC". These explanations fail. Otherwise SUN, being tried by the same law and events in 2003 on its 21st birthday[3], would have failed to get started. HP and IBM should have floundered and died.

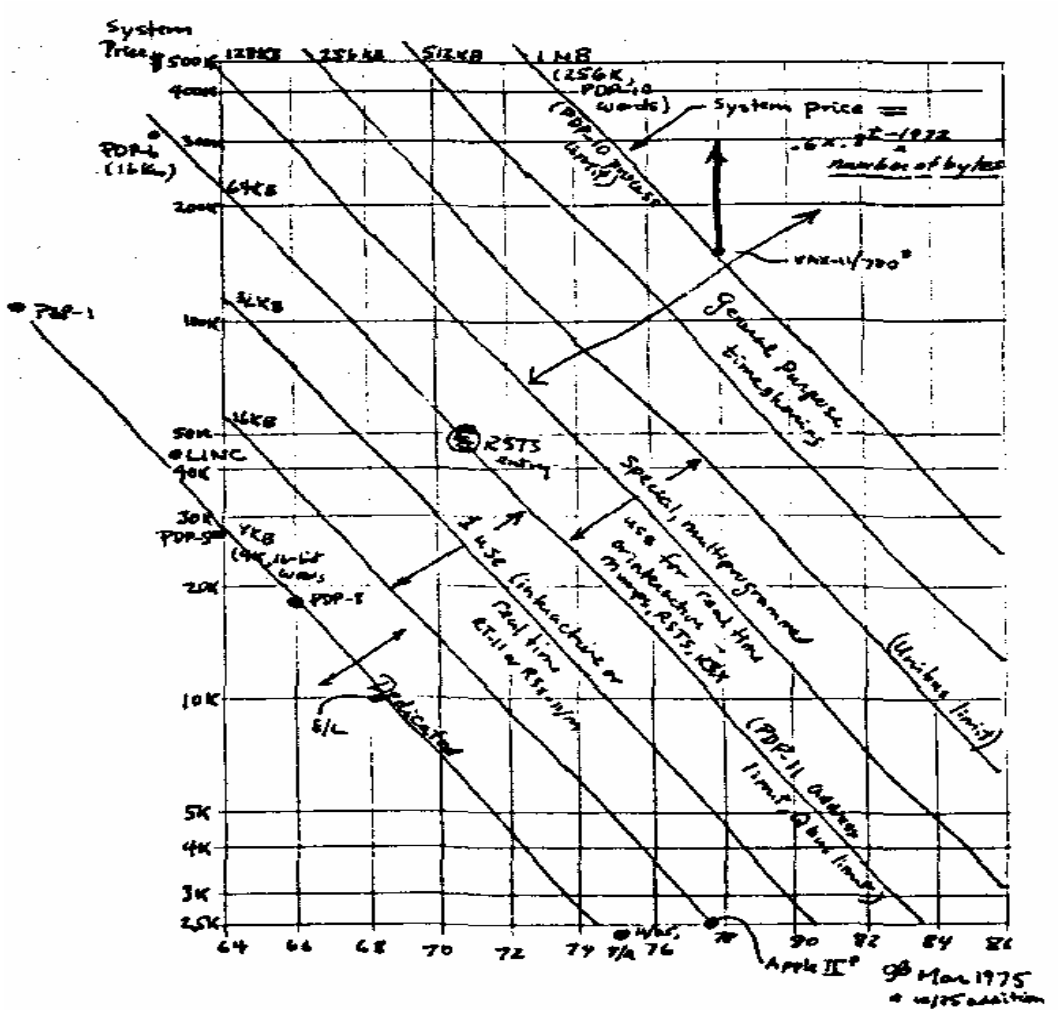


Figure 1. 1975 product planning graph showing the 1966-1986 decline of various priced computers in the VAX price and performance class.

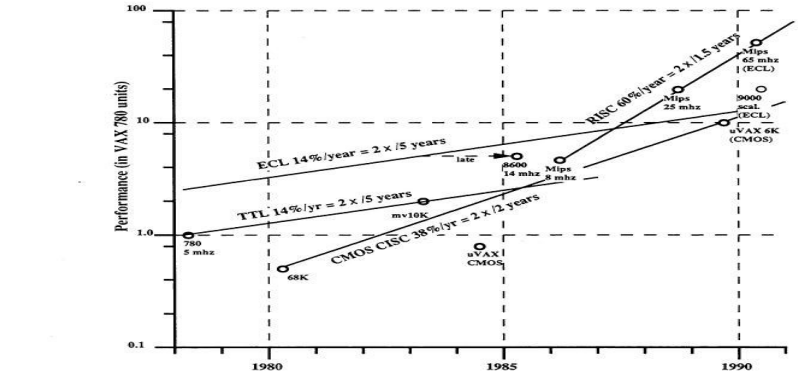
Failure was simply ignorance and incompetence on the part of DEC's top 3-5 leaders and to some degree, its ineffective board of directors that in removing Olsen made an even worse mistake in appointing Palmer. Given the DEC culture of openness, honesty, letting

[3]The reader is invited to substitute SUN, "all the wood behind one arrow", SPARC, Solaris, and the 2001 economy for DEC, VAX Strategy, VAX, VMS, and the early '90s economy to observe the outcome.

the data decide, and taking personal responsibility—this straight-forward explanation should suffice and hopefully over-ride other explanations. The data clearly supports the need to take individual responsibility for DEC's problems[4], rather than believing that it was the "events and the culture that made us do it". These leaders, lacked understanding of the nature of the computer industry in nearly every critical technology and product area:

- **Moore's Law.** In 1989 Ken demonstrated his lack of understanding that a $300 CMOS NVAX microprocessor would equal and shortly exceed the $300,000 ECL Aquarius performance. Figure 2 from 1981 shows that ECL would have a short life when I had proposed the purchase of a part of Trilogy (my 1982 optimism was a costly mistake that required killing the project). Not building an ECL computer was a clear and easy decision when the technology failed to materialize in a timely fashion. The market rejection confirmed the decision.

  As Ed shows in this book, Ken loved having many options, yet disliked killing projects implied with many options – he was too much an engineer[5]. Ken's unilateral decision to continue the project eroded the culture by going against the data and the technical community. In an earlier era, when Ken was a great CEO, data would have made such an important and costly decision—not Ken.



Notes:
Circuit Technologies
ECL = emitter coupled logic (bipolar semiconductor)
TTL = transistor-transistor logic (bipolar semiconductor)
CMOS = complementary metal oxide semiconductor (field effect)

Computer Architectures
CISC = complex (or complete) instructor-set computer
RISC = reduced instruction-set computer

Figure 2. Performance for semiconductor and processor architectures in the minicomputer class, c1981 showing the inevitability of CMOS to overtake TTL and ECL from High Tech Ventures, Bell and McNamara, Addison Wesley, 1991.

[4] When Lou Gerstner came to IBM, it was in the same relative position as when Ken Olsen resigned from Digital – demonstrating leaders are responsible for success or failures.

[5] I refuse to believe that DEC lacked the money gene! The second rule in the company beliefs after honesty, is profitability. I personally wrote a program that analyzed sensitivity to cost, price, schedule slips for all planned products that product managers ran.

- **The Hardware × Software platform, levels of integration that structure the computing industry, and the resulting costs.** Computers are built up in a layered fashion and include[6]: hardware components (e.g. microprocessor, disk), integrated hardware platform (e.g. MAC, PC, System \360), operating system (e.g. Palm O/S, Windows 2000, UNIX name/version), generic and vertical applications (e.g. Office XP, Acrobat, SAP), and finally user-specific customization, data, and content.

  Each hardware platform that hosts a specific operating system requires development, training, inventory, distribution, sales, support, customer knowledge, and *an implied commitment of eternal support*. Ken's predilection for many alternatives and to "let the customer decide" is clearly impossible to profitably support. In 1992 Digital's VAX, MIPS, PC, and Alpha hardware and various versions of UNIX amounted to 10 unique platforms. MIPS was adopted as an expensive, interim architecture, and delayed response to SUN. Cutler's Prism architecture, had been delayed two years by being reviewed to death. A subterranean version of Prism emerged from the semiconductor group as Alpha.

  By the mid 80's DEC had become a classic, well-run vertically integrated industry. By the mid-80's, the industry had become disintegrated and a completely horizontally structured industry. Digital did not need to manufacture its own disks, tapes, and especially semiconductors and microprocessors! Bob Palmer built up substantial semiconductor facilities. The make-buy policy that I posited to prevent inventing and building everything, was "Make what you sell, NOT what you buy". Alternatively, "if you make something it has to be competitive at that level of integration, otherwise buy it." DEC used its own components under a protective systems price umbrella –a classic management failure.

- **Customers buy software solutions to their problems, not hardware.** What computing customers actually buy are solutions to problems, or application tools supplied by an Independent Software Provider industry segmented by use e.g. small retailing, manufacturing. Few organizations build their tools, unless they sell them. Through a series of reorganizations, the industry marketing organization that focused on the acquisition of application software was eliminated, thereby eliminating exactly those products that customers buy. Who needs a computer that doesn't provide a solution to a problem?

- **Standards *interconnect the components of each level of integration*.** Because of the legacy and always increasing complexity of computing systems, standards are critical. Building all computing systems requires this understanding. As such, being able to invent a new standard or supply products that don't quite fit is perilous, and a culture that cannot be tolerated.

[6] Ignores the increased complexity when a database is added to a platform.

The policy I managed was: "Either make the standard, or follow the standard." If you fail to make the standard, you usually get to develop the product twice. Alpha is an expensive example. Ethernet, a DEC, Intel and Xerox-developed standard, allowed Sun to start-up and to distribute the workstation, typifies DEC's role as an industry standards setter.

While DEC is perpetually faulted for "missing" the PC, this was not the case. In 1982, when IBM, Intel, and Microsoft established the standard for the PC, DEC introduced three potential personal computers: a PDP-8 for word processing; a proprietary PDP-11 PRO (internal name, KO for knockout) unable to be cloned[7]; and an Intel 8088 that ran a version of DOS. It tried, but simply failed to establish the standard. Then it failed to follow the standards of the IBM PC once established by Intel and Microsoft, and the resulting PC industry. In 1987 Ken sent a DEC PC for me to test and use. If failed to run standard software, even though its cabling was simple and elegant. Even the cabling was "better", but incompatible. Was it arrogance or ignorance to believe that Digital could deviate from a well-established five-year old, standard?

Similar stories describe Digital's misunderstanding of exploiting its unique UNIX position.

- **Control based on comparable industry metrics.** Over time, every high-tech product protected by patents, know-how, or market position becomes a commodity. In this situation, cost structures are comparable across the industry. DEC's per employee revenue was twice as low as competitors in a horizontally integrated industry. Downsizing was long-overdue. It wasn't the economy that initially masked the lack of revenue. Where was the CFO et al?
- **Over-confidence and belief in an omnipotent and omniscient VAX Strategy.** The VAX strategy established a patent protected proprietary product and marketing plan. This worked well for a decade. However, DEC's leadership didn't update the VAX strategy to include the transition to 64-bits. Instead, they ignored the problem after Dave Cutler left[8].

  Just as bad, DEC ignored the computer industry's movement to UNIX. Ken called UNIX "snake oil," believing that the VAX operating system, VMS, was far superior technologically. Perhaps he was right—I think so, but so what. Again it failed to recognize customers wanted standards, albeit a faux and fragmented standard—not a technically superior system.

  Why did Ken and the other company leaders so love the VAX strategy even though it was counter to Ken's belief by putting all the eggs in one basket?

[7] PDP-11 microprocessors weren't available since architecture was considered to be a corporate jewel, albeit an obsolete one that needed to be exploited or face its inevitable extinction.

[8] Dave went to Microsoft and built NT. Computing is far better off because of his truly unique engineering ability.

The VAX strategy was simple and elegant because it allowed the whole company to focus in a single direction. The company didn't have to think about its direction! When proposed in 1979, it was one page, with six backup pages of tactics including those regarding IBM and Unix. The VAX strategy stated:

"Provide a set of homogeneous, distributed-computing-system products so that a user can interface, store information, and compute, without reprogramming or extra work from the following computer sizes and styles:

- via [a cluster of] large, central (mainframe) computers or networks;
- at local, shared departmental/group/team (mini) computers [and evolving to PC clusters];
- with interfaces to other manufacturers and industry standard information processing systems; and
- all interconnected via the local area Network Interconnect [Ethernet] in a single area, with the ability of interconnecting the Local Area Networks (LANs) to form Campus Area and Wide Area Networks."

Simple, elegant and it focused a multi-billion dollar company around a single architecture. DEC's leadership was hooked and it couldn't let go!

- **IBM Understanding.** In 2002, about 50% of IBM's revenue came from service. This gives IBM complete control of corporate computing environments because customers pay for IBM personnel, that lock customers into unique software and eternal support. A direct attack on this eco-system is doomed, especially based on hiring from the IBM sales organization that required an extensive and expensive infrastructure. DEC had been successful in various niche markets, e.g. R&D, manufacturing, communications as a low cost, technology platform supplier. After DEC, HP and SUN took over this role.

  In 1987, an IBM vice president told me that the VAX Strategy had really eroded their mid-range AS 400 business and was giving them heartburn in all fronts –just as we planned. Within five years while DEC hired IBM sales people who are generally unable to exist outside of the IBM environment, IBM built all the DEC marketing-sales channels, especially the third-party software providers. Unlike the "laissez-faire" era of DEC product lines, where every conceivable, often competing, channels of distribution were developed: OEMs, VARs, ISVs, System Integrators, stores, direct sales, and so forth were used. Jack Shields, who built DEC's service was in charge. Service requires absolute control and certainty. The new sales and distribution structure had to be under control and just one way.

- **Organizational complexity.** Ed Schein makes a strong point about the Digital organization. Prior to the PC, the Operations Committee had talked incessantly about divisionalizing the successful terminal business. No

consensus could be reached because the revenue of each product line contained revenue from terminals and no one was willing to give that up. In addition, Ken was fond of saying: "I don't trust anyone" *left alone without checks and balances*. Divisions implied making new, autonomous companies.

The push in engineering to simplify through autonomy was the opposite: get the organization outside of Maynard to avoid new committees and task forces that impeded progress, re-organization, new plans, and perpetual re-optimization. Disk engineering and manufacturing went to Colorado, terminals were engineered and manufactured in Taiwan, and Dave Cutler went to Redmond, Washington (as Ed discusses) in order to simplify, yet formalize communication. Overall, the Ed Schein points out the failure of the organization to scale, especially to interpret rules like "do the right thing". Rightness for: self, supervisor, colleagues, department, company, customer, or shareholders?

Failure to Act on Opportunities

Was Digital's inevitable death caused by top line failures or just errors that affected present and potential earnings?

Various analyses including this one, enumerate failures: the PC (DEC tried, but another standard was adopted and it took too long to embrace that standard. It never became a proficient supplier); having too many platforms that confused sales and customers; misallocation of resources to support a mainframe; destruction of a marketing organization and the plethora of channels of distribution; replacing one P & L responsibility dimension with three (products, market segments, and field sales); the fatal focus and direct attack on IBM; or a costly, un-sustainable semiconductor manufacturing organization[9], and so forth..

It is more positive to look at the missed opportunities that DEC's vast array of technology should have yielded to sustain and grow a technology company. DEC lead all computer companies in the transition from other technologies to custom CMOS microprocessors where the company maintained a lead (including with Intel) extending beyond 2003! In a similar vein, DEC's terminal business pre-PC included introducing one of the first laser printers—a business that HP ultimately claimed and that sustained their profits well into the early 2000s. With the introduction of the Ethernet, a communications products and

[9] Bob Palmer had been allowed to build a very large, captive facility. In spite of having not being involved in computing and never have run a successful company, his reward was becoming CEO during 1992-1998. He was successful at being acquired by Compaq and being provided with a plentiful severance package.

services division could have exploited Digital's lead in distributed computing. DEC could have exploited its position with UNIX as HP did in parallel with VMS, instead of being ambivalent and somewhat hostile.

The Long, Final Days, 1992-1998

In 1992, Ken resigned and the board appointed Bob Palmer, CEO. With no experience in computing or running a successful business, downsizing an out-of-control company was a no brainier for a semiconductor manufacturing person. Unfortunately, Bob provided no leadership[10] for the critical top line, missing the biggest computing market of all time – supplying tools to build the world-wide web (www). Palmer's severance from the acquisition by Compaq made him the first prize winner. The board came in second. Employees, customers, and stockholders all lost.

As Digital's leaders and board continued to make bad ill-informed decisions, it hired consultants and outsiders to advise and paralyze. Instead, they only needed to look inward. DEC's talented employee base did have the answers… but no one was upstairs or listening. Digital Equipment Corporation employed some of computing's brightest and motivated people who came to work to design, manufacture and market world-class products and services. Thus the greatest and fatal flaw was failing to draw on its intellectual capital.

[10] A comment by a key Senior Consulting Engineer validates the board's final error: "Palmer would come to the engineering committee meetings all slicked up and sit against the wall. He never sat at the main table. He said nothing. Contributed zilch. Had no ideas. Had no vision. Had no strategy. Seemed to worry more about how he looked than what was going on. His participation was zero. Bob Palmer was no visionary charismatic leader that could have saved DEC."