

The Historical Philosophies of Some High-Tech Companies

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I have been told that if you use the phrase, “it was better in the past,” you are viewed as a conservative cliché person. However, stating that “the future is not as good” brings about a different perception. In this editorial, I will give some personal reflections based on my 30 years of experience working in industry. Historically, some companies in high-tech industries seem to have had great start-up concepts 30 years ago. However, given the drastic downsizing of recent years, something essential must have changed.

When I first became involved with dynamic measurement instrumentation at the end of 1970, two main companies dominated the business: Hewlett-Packard with a focus on vibration, and Brüel & Kjær with a focus on acoustics. Both companies tried to expand somewhat into each other’s business segment, but kept mainly to their focus. The two companies shared many similarities. They were founded during the same time period – HP in 1939 and B&K in 1942. Each had two strong leaders with clear visions and dynamic business development strategies. They knew and thoroughly understood the core technology and business needs of their respective companies in great detail. Since then, as the companies have grown, many things have changed. Hewlett-Packard has been divided into HP and Agilent Technologies (about 38,000 people today), with the latter handling the “Test & Measurement” legacy of HP.

Neither Agilent nor HP had fired people until last year, when more than 8000 employees had to leave in several rounds of downsizing due to the declining telecom business. B&K has also downsized from 3200 employees during its heyday to less than 500 today, according to sources within the company. It is a challenging time for both organizations but out of this substantial downsizing there have emerged several new companies founded by former employees, many of which are very successful. The total market has not decreased but the original industry leaders have been divided into many separate companies, each one with its own focus and specialty.

I developed deep contacts with HP in the early 1980s and began working for them in 1983. HP had a strong position in the dynamic measurement instrumentation business at the time. I became acquainted with the founders of the International Modal Analysis Conference (IMAC) early on since the HP Lake

Stevens’ Instruments Division (LSID) was heavily involved in this new venture. LSID was an extension of the Santa Clara team that developed the HP Dynamic Signal Analyzers (DSA). When HP decided to move the DSA business from Santa Clara in California to LSID, many Californians decided to remain in the sun and start their own companies. As a result, there are now several excellent companies in the DSA business, building on the HP legacy. Through IMAC and Professor David Brown at the University of Cincinnati (UC), I became involved in mechanical engineering applications, though my background is really electrical engineering (applied signal processing and measurement technologies). UC and HP had a lot of collaboration and UC received several large donations from HP, including a substantial suite of HP analyzers and computers.

I first met Dr. Per Brüel and Dr. Viggo Kjær at the beginning of 1980, before I started working for Hewlett-Packard. It is interesting to mention that I never heard Dr. Kjær say a word in real life! When we had meetings, Dr. Kjær listened and then both of them left the room. A few minutes later, Dr. Brüel came back alone and delivered the final result. Bill Hewlett and Dave Packard talked more but that might be an American virtue. While attending the HP neophyte training programs in Palo Alto, CA, Bill and Dave came to welcome the new employees and learn more about us. HP was a very flat organization at the time, a fundamental philosophy they shared with B&K. Both Per and Viggo took part in the day-to-day work and experienced their company from within.

Bill and Dave (HP) called that style “The HP Way,” implementing “management by wandering around.” Per and Viggo (B&K) did the same. In fact, this was such a natural part of the Nordic management style that it was not even given a name. I was born and raised in Småland in Sweden, famous for its entrepreneurial spirit and numerous small companies. The Småland area has the lowest level of unemployment in Sweden but also the lowest level of formal education, an interesting contradiction in itself. It is quite rare to find the CEO of a company in Småland wearing a business suit. Most often, he is among the workers in the factory, wearing a “blue worker’s suit” and operating a machine, rather than at his desk in the office. The CEO listens and ‘lives’ his company together

with the employees, but when “push comes to shove,” they all know that he is the boss. It seems like this management philosophy must have some good merits to it, since HP, B&K and so many other companies with the same flat organization concept became so successful. I have been told by friends at both B&K and HP that those companies have lost a bit of that “old spirit,” and the good connection between management and implementers has somewhat disappeared. Having too many “mid-level” managers made the decision process complex and many good ideas got lost in the shuffle. I can only speculate whether that is correlated to the substantial change in downsizing of the companies.

In the last few years, several companies in the Småland region have been purchased by British, American or French firms. Very few have survived the new management style, with their success often declining shortly after the take-over. When talking to ‘old-timers’ in these companies, they all mention the same factor: “We have too many management levels, often people with a financial education and no technical experience, and we never reach the decision managers. We are just a number on the balance sheet.” Perhaps a better system would incorporate managers with a technical background as well as a financial understanding and a good feel for the business, to make sure that the highly competent technical employees can give their most valuable feedback directly to the key decision makers without going through a “distorting filter.” It worked for HP in 1939, it worked for B&K in 1942 and it still works for many other companies today.

I invite the nonbeliever to visit companies in the Nordic countries that are still using this flat organizational structure. IKEA, one of the world’s most successful and famous furniture companies, was founded by Småland’s entrepreneur Ingvar Kamprad. You rarely will find him in a business suit. Even today, Kamprad “lives his company” with his “IKEA Family.”

It is also interesting to note that when I first started to work in the dynamic measurement instrumentation industry, there was a focus on algorithms and methods and how to make computer programs more efficient. Since computers have become so much faster, it seems that we have almost forgotten the elegant solutions of algorithms and methods. The

“brute force” method of simply using more computer power seems to be the melody, instead of trying to “be smart and clever” with the programming. In the old days (when I was young), optimization was a necessity to performing the calculation at all. Some examples: At the time, HP’s Ron Potter did a great job on Windows for FFT analysis, optimized for a 70 dB dynamic range. Not surprisingly, his article, “Compilation of Time Windows and Line Shapes for Fourier Analysis,” is now famous.¹ Today, there are A/D-converters that can yield 120 dB dynamic range or more but no new window to fully utilize this dynamic range is currently used by the industry. Potter’s window article is an excellent reference for the interested reader and his ‘windows’ are frequently used by many vendors. When Potter came back to HP after many years as a consultant, he invented the Dervish order-tracking algorithm and a better flattop window (HP/Agilent proprietary window). That was about ten years ago. Some other algorithms have been developed since then but their usage has not been as extensive as expected.^{2,3}

Today, Runge-Kutta numeric solvers are used by many programs, with low dynamic range and stability problems as a possible consequence. Very few new basic methods have been presented but numerous papers on applying and using the current tools are commonly presented at conferences. The article by Brandt and Ahlin⁴ in this issue is an exception, not the rule. Are we so focused on using the computer’s horsepower that we have forgotten the principles of good quality engineering? “Brute force in terms of computer power will not counteract a bad approach, but will more quickly generate tons of garbage output data.” Maybe if we have more garbage data than we can practically analyze, we start to believe in it? It certainly makes nice graphics, excellent for the management teams that often neither understand nor care enough about the engineering issues. Are these factors a risk in high-tech engineering companies today:


1. Management does not always have a clear understanding of what the technology in the company is really about, since the balance sheet – rather than the ‘real’ company strategy – is often more important to them.
2. Engineers are often using brute computer force to produce tons of nice graphics to satisfy their managers, but do they really solve the essential problems in an efficient way?

Maybe we should focus more on methodology, linked to the absolute accuracy that we need. We tend to calibrate our sensors within a percent or so but when it comes to computer calculations and/or

measurement methodology, we are allowed to generate errors that can reach 100,000% (1000×) but produce nice graphics.^{5,6} Our good judgment is often blinded by powerful computers and managers that would like something that looks nice without “engineering explanations and background.” Are we trapped in the day-to-day balance sheet management?

I would like to see more high-tech companies dare to focus on a team effort using flat organizations and allowing methodology and “classical engineering issues and approaches” to be of greater importance. While a good balance sheet is essential to keep the company on track financially, the business idea and concept should always be the guiding star. With a flat organization, the chances are higher that valid inputs will not be missed by the decision maker. The ‘team’ will better enable the company to follow the ever-changing business world, with the team members complementing each other while developing and inventing new, more powerful approaches. The flat management concept has worked well in the past and still works for many companies. It will be interesting to follow some of these classic dynamic measurement instrumentation companies that were extremely successful in the past, to see what the future holds for them. I also look forward to seeing more fundamental methods and principles being utilized and developed instead of just huge simulations and pages of nice graphics without a clear level of global accuracy and methodology.

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