

Finisar & “10 lessons”

In the white paper entitled *Commercializing technology: 10 lessons from the photonics bubble* (see www.tangiblefuture.com/articles_talks.html), Richard Caro describes a set of common errors made by photonics companies in the recent bubble era. As a follow-on to that article, this paper will present a real-life case study to observe how Dr. Caro’s 10 lessons were, or were not, followed and the subsequent impact. The subject of this case study is Finisar Corporation.

Finisar Corporation, headquartered in the heart of Silicon Valley in Sunnyvale, California, describes itself as “a technology leader for fiber optic subsystems and network test and monitoring systems. These products enable high-speed data communications for networking and storage applications over Gigabit Ethernet Local Area Networks (LANs), Fibre Channel Storage Area Networks (SANs), and Metropolitan Area Networks (MANs) using Fibre Channel, IP and SONET/SDH protocols.”

I was employed by Finisar from June 1998 until August 2003, a period which spanned the photonics pre-bubble, bubble, and post-bubble. For the purposes of this article, I will focus primarily on the fiber optic subsystems (optical transceivers) portion of Finisar as that is the vast majority of their revenue (~85%), and it was also the area in which I was primarily involved. When I joined Finisar in June 1998, my title was Manager of Sales and Marketing, but essentially I was the first (and only) full-time sales person for optical transceivers. Over the next five years my role expanded to Director of Sales and Marketing, Vice President of Sales and Marketing, and then President and COO. During that same period of time, Finisar’s optical transceiver revenue grew from ~ \$10M in FY 1998 to a peak during the bubble of \$158M in FY 2001. After two subsequent years of less than peak revenues, Finisar has projected the optical transceiver revenue to be ~ \$160M for FY 2004. During that same period, Finisar’s payroll grew from 60 employees to more than 2000.

1: Research or business creation?

During the photonics bubble when Finisar’s revenue was rapidly ramping, most people referred to the company as a “start-up”, but in fact, Finisar began in 1987, more than a decade before the bubble. And for most of those years, Finisar was essentially an engineering development company with annual revenues around \$1M. Performing against engineering development contracts allowed the company to engage in relatively basic research for several years. This effort eventually led to a technical breakthrough in the early 90’s. Finisar was the first company to demonstrate that low cost 850nm lasers could successfully transmit data at gigabit rates over inexpensive multimode fiber up to a distance of 500 meters. This innovative capability became the basis of much of Finisar’s subsequent revenue as well as the heart of the fiber optic Datacom explosion during the bubble.

It should be noted that Finisar had the freedom to devote many years to their research phase as Finisar was not funded by VC’s. Finisar was initially funded by the founder, Frank Levinson, and Jerry Rawls, the current CEO. Beyond this initial funding, Finisar’s development contracts provided sufficient revenue to keep them afloat. If their funding had come from VC’s, it’s unlikely that Finisar would have been granted the “runway” to develop this important technology.

2: Customers, needs, & products

Finisar’s disruptively low cost approach to fiber optic data transmission at gigabit data rates was very timely. Also in the early 90’s, the growing world of data storage was developing the Fibre Channel Standard. At that time, this Fibre Channel protocol called for a data rate slightly in excess of one gigabit per second. One can surmise that the Fibre Channel Standard might never have been successful if the industry had to rely on expensive single mode lasers and fiber. Given the opportunity to utilize a lower cost alternative, the Fibre Channel industry rapidly adopted the multimode optics. Today Fibre Channel is the default standard for data storage, and several million multimode transceivers are deployed throughout the world to transmit the Fibre Channel protocol. In fact, since its origination, the Fibre

Channel data rates have doubled and quadrupled, but the multimode technology has been able to keep pace with these increased rates. Given the constantly increasing need for data storage, there is no end in sight for this market.

Following on the Fibre Channel success, the Gigabit Ethernet Standard was created, and it too included the same multimode technology among its options for shorter transmission distances. As with Fibre Channel, today there are many more millions of multimode transceivers deployed throughout the world to transmit the Gigabit Ethernet protocol.

One could argue that not only did Finisar meet the needs of the Datacom photonics industry, in effect it enabled the industry to succeed. Subsequently, Finisar was able to capitalize on their innovation, and today Finisar is one of the largest pure-play optical components companies in the world.

3: Tomorrow's product not today's

The paragraphs under # 2 above make very clear the importance of developing "tomorrow's product not today's". If Finisar had focused on developing a single mode solution for the Datacom market, the market might not have materialized to the extent it has today. However, Finisar has consistently focused on "tomorrow's product".

Frank Levinson, founder and currently CTO of Finisar, has rightfully earned a reputation as a visionary. Dr. Levinson did not stop with the multimode innovation described above. Late in the 90's, Frank foresaw the need to offer a low cost solution for increasing the amount of data that could be transmitted over single mode fiber. The solution in the Telecom world was to employ Dense Wave Division Multiplexing (DWDM) using expensive, cooled lasers that could transmit wavelengths which were extremely close to each other. This technique enabled Telco's to transmit 40 or more wavelengths over the same single mode fiber, thus multiplying the capacity of the fiber by a factor of 40 or more. However, as the Datacom world began to incorporate some single mode fiber to capitalize on longer distance market opportunities, that market began to experience capacity limitations. But, the Datacom world did not need 40 wavelengths. Their capacity requirements were not nearly as severe as the Telecom world. The Datacom market would only require up to 8 wavelengths for the foreseeable future. Dr. Levinson's vision was to create a new concept of Coarse Wave Division Multiplexing (CWDM). His theory was to use lower cost lasers which did not have to be cooled

because with only a maximum of 8 wavelengths, the spacing between the wavelengths was "coarse" enough to allow the lasers to wander a nominal amount without impacting a neighboring wavelength.

Even though there was no existing market for these CWDM transceivers, Finisar launched into a full-scale development effort of low cost CWDM transceivers and associated "passives" for combining and splitting the various wavelengths. The net result was that Finisar was not only first to market, but Finisar essentially created the CWDM market. Today there exists an industry standard for CWDM; Finisar is the accepted leader of that market; and a large share of Finisar's revenues is derived from their CWDM products.

4: Superior solution required

One of Finisar's missions has always been to create photonic products which were equivalent to or better than their Telecom counterparts but at 20% of the cost. One can argue about the exact performance of Finisar's photonics relative to the Telco products, and the 20% cost ratio may be slightly overstating the case, but the point is that Finisar has always offered superb products at disruptive pricing. The net result is that Finisar is the industry leader today.

5: Being one of many is bad.

In the early years Finisar was one of very few, but the bubble prompted many companies to join the photonics fray, and the VC's, who were flush with cash, were only too eager to subscribe. So today per Dr. Caro, "there are over 20 companies attacking the space". With so many companies fighting over the available revenue, prices have dropped to the point that not one of those 20 companies is profitable today, and many others have gone bankrupt along the way.

What does this portend for Finisar? Their early efforts and innovative technology allowed them to become a very large, important player. And, even though Finisar is not profitable, if they can properly execute going forward, their unit volume will allow them a better chance for profitability than the majority of the competitors.

6: Advantage must be sustainable.

The advantage that Finisar has forged in their seventeen-year tenure in the industry is their reputation for innovation, the quality of their products, and their sheer size. New players in the photonics industry are

generally viewed with much skepticism due to the high fallout rate. For example, during my first three years at Finisar, the largest potential customer on the planet (Cisco Systems) would not entertain buying from Finisar because we were too small. Today, Cisco is by far Finisar's largest customer.

However, one's reputation can be severely damaged very easily by shipping inferior products, by product pricing that is either too high or too low, late deliveries, and any number of other variables that can come into play. To sustain the advantage that it has earned, Finisar must continue to (a) ship the highest quality products, (b) be one of the technical leaders, (c) offer their products at reasonable prices, and (d) ship on time.

7: Need an entire ecosystem

None of the transceiver products that Finisar invents and manufactures are sold to end users. Without exception, they are all sold to OEMs who incorporate these photonics into their system-level products. Typical customers for Finisar are Cisco, HP, Dell, EMC, Brocade, Emulex, QLogic, Extreme Networks, Foundry Networks, Ciena, Nortel, Lucent, etc.

As a result of being somewhat divorced from the end user, it is critical that the sales and engineering people at Finisar spend major amounts of time with the development engineers at the system-level OEMs listed above. If the OEM is working on a new system, it is critical that the Finisar team be closely involved with the design of that new system. Most new product ideas come from this type of interaction. These conversations also allow visionaries such as Dr. Levinson to gain insight into where the market might be heading even beyond the current systems under development.

It is not necessary for a given company to have the entire ecosystem in-house. There are thousands of successful companies which sell their products only to OEMs. In fact, developing both components *and* system-level products can potentially create competition with one's OEM customers, a situation which may negatively impact the sales of components.

8: Big investment needs big market

This lesson is a rather obvious one, but one must also keep in mind the corollary: a big market attracts many companies who want to play (See Lesson # 5).

9: Balanced execution is the key.

The landscape is littered with the bodies of photonics companies gone awry. Developing the next generation product is a massive effort that can cost months/years and tons of money. And the worst thing that can happen is to complete the project, but have no one buy the resulting product. The failure can be the fault of misdirection and/or bad timing. In either case, the development team must always, always, always collaborate with the sales team. It is the responsibility of the sales team to help with midcourse corrections, modifications, enhancements, etc. It is also the responsibility of the sales team to kill a project if it appears to be heading for failure. The problem with many projects is that once they have a head of steam, they seem to take on a life of their own, and everyone is reluctant to shut it down.

During my tenure at Finisar, I took it upon myself to kill a handful of important projects that had been started with all of the best intentions and supporting data. But as projects progress, not all end up going down the optimum path or with acceptable timing, or competition trumps you with a better mousetrap. When that happens, someone must step up and take responsibility for closing it down. Not an easy task, and certainly not a fun one.

10: Disruptive vs sustaining

There is no doubt that Finisar's primary success has been due to the ability to invent disruptive technologies and then persuade the market to accept them. Finisar has done that over and over again, the leading examples being:

- (a) gigabit data rates over multimode fiber utilizing short wave lasers
- (b) CWDM transceivers and associated passives
- (c) the smallest and lowest cost 10 gigabit transceiver utilizing a serial stream of electrons which are then converted into a serial stream of photons (and the reverse on the other end). All of these innovations were unheard of prior to Finisar's efforts, but today there are widely accepted industry standards which incorporate all of these products.

That is not to say that Finisar does not engage in sustaining innovation. A few examples would be:

- (a) First to market with digital diagnostics for optical transceivers
- (b) First to market with 850nm vertical cavity emitting lasers (VCSELS)

- (c) First to market with the “small form factor” transceivers (SFPS)
- (d) First to market with 2Gb/s SFP transceivers
- (e) First to market with DWDM GBIC transceivers

I would argue that disruptive innovation should not be the target of only new business initiatives. I believe that large established businesses should also target disruptive innovation. However, it seems as though it is a more difficult task for large companies to successfully tackle. The larger the business, the more there are pressures for improved production lead-times, lower costs, higher profits, higher stock valuations, organizational restructures, etc., etc. The trick is to manage the company in such a way as to promote disruptive innovation without allowing the day-to-day pressures to limit its success.

About the author



Mr. Woodrow most recently held the position of President and Chief Operating Officer of Finisar Corporation in Sunnyvale, CA. During his five year tenure with Finisar, Mr. Woodrow also served as Vice President, Sales and Marketing, as well as Director of Sales and Marketing. Mr. Woodrow has more than 36 years of experience in sales, marketing, operations and product management in an industrial high-tech environment. Prior to joining Finisar, Mr. Woodrow was the North American Sales Director for the Electronics Division of Raychem Corporation. He has also held various other sales, marketing, and product management positions during his tenure at Raychem, IBM, and American Hospital Supply. Mr. Woodrow holds a B.A. in Mathematics from Rutgers University.