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THE GREEN BOOK

Our Comprehensive Guide for Growth Equity Investing

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VENTURE CAPITAL SPOTLIGHT

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VENTURE CAPITAL SPOTLIGHT: IRWIN FEDERMAN, GENERAL PARTNER OF U.S. VENTURE PARTNERS, AND GARY MORGENTHALER, GENERAL PARTNER OF MORGENTHALER VENTURES

Irwin Federman has been a General Partner at U.S. Venture Partners since 1990. He was a founding lead investor in Crescendo Communications, Power Integrations, SanDisk, TelCom Semiconductor, Resumix, CheckPoint Software, MMC Networks, Centillium Communications, Netro, Nuance Communications and QuickLogic. Irwin was president and CEO of Monolithic Memories from 1978 to 1987, where he shepherded the company through a turnaround that ended with its acquisition by Advanced Micro Devices.

Gary Morgenthaler has been a General Partner at Morgenthaler Ventures since 1989. He sits on the Board of Directors at Catena Networks, Nuance Communications, Versata, Westwave, and Yotta Networks. Gary cofounded Illustra Information Technologies and served as a director on its Board until it was acquired by Informix in 1995. He also founded Ingres Corporation (formerly Relational Technology), which was sold in 1990.

David Readerman: Let's start with a basic grounding: Where do you believe we are in the tech cycle? Irwin, you first.

Irwin Federman: I don't know. I think it might be important for everybody to recognize that, in the macro scheme of things, cycles are a concomitant of life. There are cycles of the moon. There is the menstrual cycle. The moon controls the tides. The only time a metronome sticks in the middle is when it's broken. Cycling, undercorrection and overcorrection are just part of the human condition.

What is clear is that we are not at the beginning of the cycle. We may not be at the end, but we are not at the beginning. The beginning started at least two years ago and possibly three or four, unbeknownst to us. So, we have been in this declining part of the cycle for some time, and the odds are that we're more through it than we are at the beginning of it.

In my opinion, attempting to quantify how much inventory is in the pipeline is impossible. No one knows how much was or is out there; that information has always been elusive.

What we do know is that if inventory stays in the pipe long enough, it becomes worthless. And that is what saves us. We can't predict when inventory is going to be used, but we can all prognosticate with pretty good accuracy when it is going to have no value whatsoever. And this burning up of the excess is the platform of recovery. The older it gets, the less valuable it becomes and the more it's going to be written off, and that's how you build the cycle. I think that building is going on right now, but I don't know how long it will take to get there.

Gary Morgenthaler: I agree with Irwin's observations and would add only a couple of comments. As you know, we're in a business cycle on the one hand and in a product adoption cycle, a major wave of network computing, on the other. Those cycles are independent but also intertwined.

As Irwin said, no one knows with precision when the current business cycle will end. History suggests that these cycles typically last six quarters, so if this cycle began in 1H01, we logically should emerge from it in broad scale later this year.

However, most 20th century history suggests that recessions are not single dips but double dips. I think five of the last seven have been double-dip recessions. Therefore, I don't know that we are necessarily out of this or will be until 2003.

Having said that, I would note that the broad cycle of adoption around network computing and the Internet is still in its early days in North America and in much earlier days around the world. The components are client-to-server, server-to-server and business-to-business communication around protocols such as XML and .NET. These drive a portion of the semiconductor cycle and drive demand for incremental MIPS and memory, and they are soaking up the associated additional processing power and storage availability.

The concurrent revolution in storage enables vastly greater amounts of information to be stored very, very economically. As it does so, the very availability of that information drives demand to process it and to communicate it to others. So the network computing and storage revolutions are intertwined and feed on one another.

David: What kinds of opportunities are you seeing on the venture side in terms of semiconductors?

Irwin: There is a range. The semiconductor business has become terribly application-specific. Technology is enabling more and more density on a chip, more and more parallel processing, very high-speed processing, clever use of CMOS to get a lot done for much less of a power budget. Device companies are acquiring greater understandings of how their components are used.

I believe the venture community is being exposed to a panoply of new types of switch fabrics. New configurations of dedicated processors are emerging, as general-purpose processors become "Swiss Army knives," with too much for everybody and not enough for some.

New materials are popping up. Indium phosphide promises to become a serious new substrate for device integration in optoelectronic devices in a way that silicon germanium, lithium niobate or CMOS can't. It may be a long time before indium phosphide is widely adopted, but my guess is that it will be, because the natural evolution of device technology, which calls for greater and greater integration, demands it.

We may see different composite materials, different substrates, besides indium phosphide. GaAs has proven to have a longer life and more applications than some had thought. Silicon germanium has not insinuated itself as broadly as it will.

Gary: New materials will certainly emerge, but I think there is a lot of life left in CMOS. We just saw some shockingly good results on 10 Gigabit transceivers done in CMOS where the I-diagrams are as pretty as you could ask for. So there is a lot of life in CMOS and a lot of good technology at that level. New materials may be required at 40 Gigabits per second, but CMOS seems to be doing just fine at 10.

My broader observation is that business-to-business communications and networking drive a different set of architectures than are required within the business. Security is a manageable issue within a business. But hackers and terrorists become an issue as you expose your enterprise to the outside world, so firewalls, intrusion-detection and other types of security are critical, and the amount of computing necessary to deal with them and the sophistication of that computing, as the hackers grow more sophisticated, is an ever-increasing burden on an Internet and information technology enterprise.

The silicon necessary for this, with respect to authentication, firewalls, encryption, and communicating around standards and protocols, represents major new opportunities.

The venture business is necessarily focused on new, innovative technologies. These innovations allow our companies to price to value in the early stages of markets rather than to cost in the late stages of mature markets. Irwin and I spend our time trying to understand how information technology is shifting in the world of network computing and how semiconductors need to evolve and adapt to this new world.

Irwin cited the move to massively parallel architectures to deal with increased processing power requirements and increasing computing loads. New kinds of semiconductors that process more and more information in parallel are also needed now for encryption and authentication, firewalls, load-balancing, virtual private networks and the like. The proliferation of one-box-per-function can't continue. We need to combine these functions into fewer boxes that perform more and more functions to simplify the jobs of data center managers.

David: Irwin, how do you see the chipsets playing a role in that new computing architecture?

Irwin: Gary is right on. We are going to have to move to a consolidation of functions if only because of space limitations and the difficulty of cobbling together different brands. We are moving to consolidation because the market wants it. Those responsible for firms' communications infrastructures would get rid of all their different boxes if they could and install just one that takes care of security, routing, everything.

Yet the move to consolidated boxes will form the basis for a move back to specialized boxes since the consolidated boxes will develop inefficiencies that give rise to more sophisticated, cost-effective individual boxes. And then the cycle begins again. That process is a fundamental driver of our business.

I think devices are inevitably going to become more flexible, with more programmable circuits in every serious application. The ultimate applications have serious custom requirements, and hard-wired silicon at these levels of complexity is not going to get you there. So the insinuation of flexibility in ever more complex circuits is going to accompany consolidation.

Kevin Vassily: Do you think we will ever see another great, large, dominant semiconductor company that controls the price/performance curve, like **Intel** does in microprocessors, in an environment of fixed functions?

Gary: Intel has succeeded because it has chosen a basic core element of the computation equation, the central processing portion, which grows in scale but not in kind. Now look out across the semiconductor landscape, at processing, storage, memory, peripherals or data, and ask who can carve out a significant segment and grow in scale but not in kind. The player that comes to my mind is **Broadcom**. I think

Broadcom is positioned to compete in scale and grow consistently as we move to 10 Gigabit Ethernet and beyond. There will always be room for value added at the next level, so you need to keep moving up the food chain and yield the lower-margin, commodity portions of the market.

Irwin: In an unregulated society, for a company to achieve the dominance that Intel has is a rather unnatural act. As a consequence, it shouldn't be a model. It's an aberration.

But will there be opportunities to create multibillion-dollar revenue companies? You bet. **Qlogic** is going to be a billion-dollar company. Broadcom is a multibillion-dollar company. **Marvel** is going to be a multibillion-dollar company. **nVIDIA** is over $1bn. We'll see gaggles of them.

I think it's going to be a wonderful space in which to create companies of consequence whose lifespan will be determined by the mental scalability of their managements. They won't be technologically constrained. They'll be imagination-constrained or execution capability-constrained. Doing what they start out to do, in most cases, will not necessarily scale. They are going to have to figure out where the branches on the trunk have to come from in order to scale themselves.

In the semiconductor arena, Intel was the inventor of solid-state memory. This is a DRAM company that went wrong. But management has had the wisdom and the insights to pick directions mostly correctly. Nothing they did inherently made them scalable. Gordon Moore, Bob Noyce and Andy Grove came together to make Intel into a scalable enterprise.

Gary: I think Intel has a unique advantage in that is it has evolved its business model to include the impact of increasing returns to scale and network economics such that it can price to value as opposed to doing cost-plus pricing in a commodity-based market.

By controlling the architecture and having that architecture be the platform on which a universe of software value-add is based, Intel can leave its competitors a step behind in each generation of processors and extract the gross margin from those processors as they are first introduced to market. Look at where the profits of the entire PC industry go: They go disproportionately to Intel and **Microsoft**.

Irwin: However, as we move to more and more embedded computing requirements, the position that Intel has is not the same, and it's going to be put to a different test.

Gary: That's a good point. The embedded computing market is up for grabs. Intel is attempting to address it with its X-scale architecture, but it is by no means assured that Intel will fall heir to that market. We will see whether or not management has the prowess to convert X-scale into a leadership position in the embedded computing systems market, absent a Microsoft committing to drive the architecture as ably as it has done it at the desktop.

Irwin: Also, when it comes to embedded applications, not only doesn't Intel have a franchise, but it also faces a market that is not eager to embrace it. Gary noted that all the profit in the platform space goes to Intel and Microsoft, and that fact is not lost on the folks making embedded systems. They are disinclined to be as dependent on Intel as their platform brethren are, so Intel is going to have to be very imaginative, thoughtful and clever.

David: What is the role of pure-play manufacturers in new tornado markets like Voice-over-IP and wireless LAN?

Gary: The pure-play-versus-broadline supplier question is interesting. There is a tension between aggregation of functionality and getting best-of-breed functionality and another between buying from a small number of suppliers with whom you have relationships and buying from viable suppliers in a time of market correction and conservatism.

The broadline suppliers have an advantage to the extent that they are well capitalized and not over-leveraged. But point products can have a significant advantage in certain areas, and there is always a chance to establish a new company and form a new position in the market. Right now that is more difficult than it was 24 months ago, and it probably will remain difficult over the next year or two.

Irwin: The tensions Gary describes have always existed, but they are hugely exacerbated during down times. It should be noted, however, that the desire to have fewer suppliers is the desire of the purchasing department, while the desire of the engineers is to have the best of breed. An innovative technology company is selling to engineers. There is always going to be room for you, if you are making the right product.

David: Gentlemen, thank you both for your insights.

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Buy	Advise current purchase. Expected to outperform the broad averages over the coming 6-12 months and longer term.
Attractive	Attractive long-term holding. Advise purchase on price weakness, or upon events that are possible but not certain, or contingent upon specified changes.
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Source: Thomas Weisel Partners LLC

Stocks mentioned in this report:
Broadcom[1,3] [BRCM: Buy $24.54]
Intel[1] [INTC: In Transition $27.01]
Marvel [MRVL: Not Rated $35.17]
Microsoft[1,3] [MSFT: Buy $50.05]
nVIDIA[1,2] [NVDA: In Transition $31.88]
Qlogic[1] [QLGC: Buy $46.18]

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