

Amid economic gloom, semi execs chart encouraging future

By Brian Fuller, Contributing Editor -- 3/12/2009

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SCOTTSDALE, Ariz—Against a backdrop of a deepening recession, electronics industry executives plotted emerging changes in mindset, markets, and technology they said will propel future growth and boost the global economy.

At a surprisingly and remarkably upbeat Semico Summit conference here, executives said lessons of previous downturns, particularly 2001, have laid the foundation for more nimble thinking, even as the recession radically alters the industry’s landscape.

Already, more than 70 companies have shuttered since the financial meltdown began in October, and the cash or investment funds for dozens of other may not last long enough for them to stay viable through a protracted downturn, according to data from the Global Semiconductor Association.

“I’ve never seen anything like what we’re going through today,” said former AMD Chairman Hector Ruiz (pictured, right), who is now chairman of **GlobalFoundries**, a spinout of AMD’s manufacturing operations. “It’s my eternal optimism that makes me get through this.”



The changes are forced by confluence of factors. As electronics systems become more ubiquitous, they solve more problems but in markets where cost is extremely sensitive. At the same time, manufacturing and design costs escalate unabated.

The semiconductor industry, for example, grew 16% from 1983 to 2008, but fab costs soared 25% in the same period, according to Hans-Jurgen Straub, CEO of **X-Fab Silicon Foundries**, which provides mixed-signal manufacturing. Additionally, there has been a 15x increase in costs over five process nodes, from 350 nm to 65 nm. The cost per manufacturing company to develop a process at the 65-nm node is estimated at a half-billion dollars, he added.

“There’s an increasing pressure to consolidate,” Straub said. “In the digital arena, only a few companies will continue to invest in wafer-manufacturing facilities. Even large IDMs will go fabless. In analog products, it’s the same idea—it’s better to go with a foundry.”

The downturn’s impact is leaving no type of company unscathed as a form of Darwinism takes hold, according to Moshe Gavrielov, CEO of FPGA market leader **Xilinx**. Tier-one semiconductor vendors are quickly moving from fabbed, to fab-lite, to fabless and rationalizing their operations accordingly. Second-tier companies that had banked their money on application-specific standard products are finding fewer markets to support their business models. Those models have required \$100 million investments in products on the hope that they would generate good margins in billion-dollar markets, but there are few billion-dollar markets left today, he said.



The most challenging environment may be for the start-ups, which are the industry’s life blood of innovation—engineers going out on their own from established companies that wouldn’t fund their great ideas. Venture capital has slowed to a trickle, with series A funding falling 82% from 2000-2007, noted Gavrielov (pictured, left). Through Q3

2008, just two chip companies received funding, totaling just \$12 million. And it's unlikely venture capitalists will change their outlook on ROI (return on investment) or their model—from investing a large amount in a couple of companies to investing smaller chunks in a dozen companies. That scale becomes unmanageable, he said.

At the same time, chip customers are pouring over their supplier lists to try to predict which companies might not survive, just as chip vendors and doing the same to their tools, IP, and services providers.

“Capital drought is changing the entire landscape. It's accelerating a forced rationalization,” Gavriellov said.

R&D is a challenge, as well. At a basic level, a gap is widening between the amount of money spent on research and what the industry needs to spend to help tackle its problems. That gap, estimated at \$2.3 billion, is twice what it was just five years ago, said Larry Sumney, president and CEO of **Semiconductor Research Corp** (SRC).

What now?

So against this seemingly dire backdrop, what's a 50-year-old industry to do? Forge ahead, executives agreed.

Markets continue to evolve as they begin to or continue to exploit electronics technology to bring new functionality or lower costs to customers. The medical-device industry is embracing new forms of remote medicine that electronics enables; the smart grid, to which Congress has targeted \$11 billion in stimulus money, is sorely in need of a makeover after 100 years; increasing connectivity and the social Web are driving greater use of high-bandwidth media, such as video.

In January alone, 15 million new subscribers got mobile phones in India, Gavriellov noted, and for the first time in history, according to *The Economist* magazine, half the world's population is considered middle class, with fresh new disposal incomes.

Green engineering is clearly an emerging area of interest, and Semico devoted a panel session to it for the first time at the summit. Mike Noonan, senior VP of global sales and marketing at **NXP**, pointed out that improving the design in 2D color dimming in an LCD backlight could save 39 terawatt-hours a year and that only 10% of TVs now have this function. In addition, 85% of a car's energy is wasted as heat, while only 15% goes to performance, he noted.

“Our opportunity to reduce energy consumption is huge,” he said.

Put more bluntly, **SiGe Semiconductor** CTO Peter Gammel, said, “If there's something our engineers can do to improve energy efficiency, it's immoral not to.”

Mark Pinto, longtime research guru at Bell Labs, Lucent, and Agere, served as an emblem of changing industry mindset, appearing in his current role as **Applied Materials**' CTO and general manager of the equipment company's energy and environmental solutions.

Semiconductor learning-curve economics is beginning to drive cost the costs of solar PV (photovoltaic) devices and thereby expand market opportunity, especially as consumers become more aware of volatile energy prices. In 1980, costs averaged more than \$1 per kilowatt-hour, but today, the learning curve has driven that down to \$1 per 100 gigawatt-hours on the manufacturing side, Pinto said.



The PV module price has been falling at 20% per year. In 1980 the biggest solar farm provided 1 megawatt production per year. It took 20 years to get to 10 megawatts per year, but only and five years to jump to 100 megawatts a year. Gigawatt farms are just a few years away, said Pinto (pictured, left).

At retail, prices are down to \$4 a watt (including installation costs), and that's helping the market is growing 30 percent per year, noted Pinto.

“As you bring scale and gain learning from building more units you can reduce costs,” he said.

Jobs creation is estimated at two per megawatt on the manufacturing side and up to 10 jobs per

megawatt when considering the entire food chain, from manufacturing to installation, he added.

Consumer not standing still

The consumer markets could continue to afford enormous opportunities, even in challenging times, according to Behrooz Abdi, president and CEO of processor vendor **RMI** (formerly Raza Microelectronics Inc).

Content is king and people are consuming more of it in the home, in their cars and on mobile devices than ever before. The amount of data coursing through the network doubles every 18 months, and bandwidth-hogging video is 35% of that content, moving to 50% in the coming years, he noted.

The automobile is maturing as its own electronics platform; the home Internet/media gateway architecture is starting to find its sea legs; cell phone sales, even in recession, are expected to grow by as much as 15% this year and the devices themselves get more complex as users demand functionality, such as mobile video and GPS. This will disrupt products that have come to market based on those features but which likely will get integrated into increasingly sophisticated mobile products.

Unleashing a blizzard of optimistic data, Abdi (pictured, right) noted that 11 million people watched mobile video in Q4 2008; 30 million touchscreen devices were sold in 2007 and that market is expected to soar to 230 million by 2012; and that there will be 1.8 billion Internet users next year and, by 2012, almost a third of them will be broadband subscribers.



“A lot of people [in] this business seem to be mourning the death of the consumer. I’m convinced it will come back,” he said.

Technology train chugs on

As the markets may prove hopeful, technological innovation continues unabated, based on presentations at the Semico Summit. While arguments may continue about whether Moore’s Law is grinding to an economic halt, advancements in feature sizes, packaging, power optimization, battery life, and cost continue.

Quantum Sphere, a Santa Ana, Calif.-based start-up, is attacking issue in the \$71 billion battery market on a nano scale. The company sells spherical nano catalysts, in the 2- to 5-nm range—iron, manganese, copper, nickel, and cobalt among them—that help double battery capacity, so battery vendors, in turn, can better serve existing and go after new markets.

“There is no clear winner on the horizon in the race for rechargeable batteries,” said Kevin Maloney, CEO and co-founder of Quantum Sphere.

As wireless solutions and networks like femto cells proliferate, the pressure increases to move to more cost-effective technologies to support new designs. SiGe Semiconductor, a company that has evolved from materials supplier to RF front end vendor, is trying to drive the move to all-silicon, system-in-package solutions for RF but do it with a fabless model, unusual for RF vendors.

“RF has traditionally been indium phosphide [InP] or gallium arsenide [GaAs] solution,” said SiGe’s Gammel. “This year will be the first year where we can do it in an all-silicon solution. Between 100 Mhz and 10 Ghz and 300 mW and 2 to 3 W, we can do all of that in silicon germanium and silicon SOI.”

Mark Melliar-Smith, CEO of **Molecular Imprints**, noted that engineers in the storage sector continue to reduce size and tackle other issues to make affordable, denser memories.

Companies with solid-state solutions are looking at everything from phase change memory and programmable resistors to vertical cell stacking. And magnetic memory makers “aren’t standing still,” he noted. They’re driving a real density up to several gigabits per square inch through smaller memory elements, tinier read-write heads, and perpendicular recording as they battle super paramagnetic effects the deeper they dive.

Molecular Imprints attacks the problem by using a nano-printing system that begins with an imprint mask, coats the wafer surface with a low-viscosity monomer and lowers the mask into the liquid. The liquid fills in the features using capillary action—the smaller the features, the better the action, he said. The system

illuminates everything to make it solid, and the mask is removed. The process can be done as whole wafer or as step-and-repeat, he added.

Other executives inevitably turned to their own technology as a salve for industry woes. Dan Mahoney, president and CEO of **Renesas Technology America**, said his company's approach to embed MRAM with microcontrollers improves performance and eliminates standby power.

Gavriyelov touted the benefits of "targeted design platforms," such as FPGAs that are flexible enough to adapt to a multiplicity of applications and offer fast time to market, performance, and potentially lower overall costs.

SRC's Sumney (pictured, right) noted the biggest challenge to innovation though comes in research because companies for more than a decade have been squeezing R&D as a percentage of revenues and the federal government has cut back support for basic research.



"We must invest now [in research], otherwise we will become stagnant as an industry," said Sumney, who called for better cooperation between industry, government, and universities to fund and drive innovation from the ground up.

"Has the industry turned mature? I don't think anybody can claim it has. No, there's plenty of road ahead if we share the wheel and reduce the costs," he said.

The road ahead

It was Ruiz, kicking off the conference, who illuminated the need for a change in thinking. He related a story of the turkey, which is born and fed a regular diet at regular intervals each day. This enables it to grow day after day, remarkably consistently, until one day just before Thanksgiving when it all ends abruptly.

His point: "If you only extrapolate the future based on what happened prior to this downturn, you're going to be very disappointed," he said.

Chi-Foon Chan, president and COO at EDA vendor **Synopsys**, punctuated the tone of the conference with a warning: "There's no success in just trying to be secure," he said. "Successful companies have their own time. Successful companies, like people, don't live forever."

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