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THE EDITORIAL VIEW

TOUGH TIMES BRING CHANGE

By Tom R. Halfhill {6/29/09-02}

Recessions and depressions are national or global in scope, like epidemics and pandemics. But among individuals, the experience varies. Most people don't lose their jobs in an economic downturn or get sick when a disease breaks out. In tough times, wealth and health accrue

even more value. For people who didn't lose their money in the 1930s, the Great Depression was the Great Opportunity. The same is true of today's Great Recession.

So it's no surprise to see changes afoot. Of course, the semiconductor industry is always changing, but I think some recent changes were accelerated, if not actually caused, by the recession. Examples:

- Intel buys Wind River Systems
- Intel and Nokia make a deal
- Netlogic buys Raza Microelectronics
- NEC Electronics merges with Renesas Technology
- Texas Instruments buys Luminary Micro
- Oracle buys Sun Microsystems
- MetaRAM and SiCortex shut down
- ARC International changes top management
- MIPS Technologies sells Chipidea
- Layoffs, cutbacks, pay cuts, and unpaid furloughs almost everywhere

Some are bad endings, others are new beginnings. In some cases, we don't know yet if the changes are good or bad, or for whom. Let's run down the list and make some educated guesses.

Intel Wades into the River

Would Intel be acquiring Wind River if the economy hadn't crashed? Yes, probably. Since introducing the Atom processor last year, Intel has aggressively expanded its role in the

embedded market. (See [MPR 3/30/09-01](#), "Intel Will Customize Atom.") But financial analysts say Intel's \$884 million offer is a relative bargain, given Wind River's revenues, cash positions, and market outlook. In good times, Intel probably would have paid more. Intel has money and is seizing an opportunity.

At *Microprocessor Report*, we are technology analysts, not financial analysts. It matters little to us whether Intel is getting a bargain or not. But the technology aspects are interesting. Why does Intel need an embedded system-software company?

By now, everyone is familiar with Intel's ambition to push x86 processors into mobile phones and other consumer electronics. And these days, OEMs want integrated system platforms so they won't have to mix and match too much hardware and software from different vendors. Therefore, Intel's purchase of a system-software company seems to make perfect sense.

Except that Wind River has relatively little presence in mobile phones and consumer electronics. Wind River's operating systems and other products and services are more commonly found in the networking, automotive, industrial, military, and aerospace markets. Figure 1, from Wind River's most recent financial report, tells the story.

The "digital consumer" category (Wind River's term), which includes mobile phones and consumer electronics, accounts for only 13% of Wind River's business. That

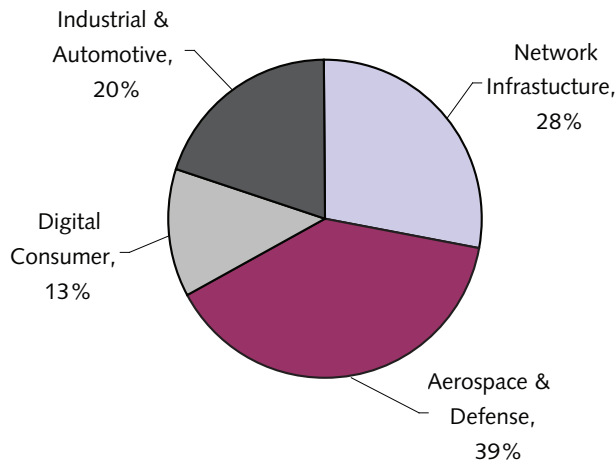


Figure 1. Wind River's first-quarter revenue bookings, by market category. With only 13% of its business in the consumer market, Wind River probably won't be a major factor in Intel's pursuit of mobile phones. (Data source: Wind River)

is largely ARM country. Wind River isn't a major player in low-power, popularly priced consumer products.

However, Wind River does compete strongly in bigger embedded systems. Today, those systems typically use MIPS, Power Architecture, and x86 processors. They are particularly suitable for Intel's Atom processors. Atom is low power by x86 standards, though not yet as power-stingy as ARM's cores. Acquiring Wind River should help Intel push the x86 into more high-end embedded systems.

As my colleague Max Baron says, Intel's move looks less like an offensive maneuver against ARM than a defensive maneuver to prevent ARM from penetrating those markets with its latest high-performance cores.

Nokia Deal Threatens ARM

Of course, Intel can steer Wind River in a different direction now. But the world doesn't really need another mobile-phone operating system, unless somebody can invent one that's significantly better than today's platforms. More likely, future x86 low-power processors will host an existing mobile operating system.

On June 23, Intel made a more threatening move against ARM by announcing a new relationship with Nokia, the world's leading cellphone maker. As part of this deal, Intel will develop new x86 processors and chipsets for "high-bandwidth mobile broadband communications and ubiquitous Internet connectivity."

In other words, Intel and Nokia are joining forces to make products that Intel calls MID—mobile Internet devices. Intel sees MIDs filling the gap between smartphones and netbook computers. (Critics question whether such a gap exists; In-Stat and MPR analysts are divided on the issue.)

Essentially, everything depends on whether Intel can reduce x86 power consumption much further without

sacrificing a significant degree of performance or software compatibility. If Intel can reach ARM's power levels, x86 processors might finally make their way into mobile phones. But it's all up to Intel's engineers. Without their magic, deals with companies like Nokia and Wind River will come to naught.

Mergers and Acquisitions

Netlogic Microsystems' acquisition of Raza Microelectronics (RMI) and Oracle's acquisition of Sun Microsystems could be described as "industry consolidation"—the kind of shrinkage that typically happens when times are tough. The same for NEC's coming merger with Renesas and TI's acquisition of Luminary Micro. Almost nothing is harder to sustain than a fabless-semiconductor company.

Shortly before Netlogic's announcement, we had heard that RMI was on the block. One rumor was that Cavium Systems was interested. It seemed to make sense, because Cavium is a fast-rising competitor in networking and communications processors, and both RMI and Cavium are MIPS licensees. But on June 1, Netlogic announced a deal for \$183.4 million in stock, with additional considerations.

RMI should strengthen Netlogic's position in a consolidating market. RMI's high-performance processors use custom MIPS-compatible cores with multicore processing and multithreading. (See [MPR 5/17/05-01](#), "A New MIPS Powerhouse Arrives.") Among the competitors most likely to be affected are Cavium and Freescale Semiconductor. Netlogic's move also heats up the battle between the MIPS and Power architectures in this market.

The NEC-Renesas merger appears to be driven by pure survival instinct. Chip sales have slowed to the point where both companies may become endangered species if they don't join forces.

However, we expect many of their microcontrollers to face extinction. Renesas is the world's leading MCU supplier, and NEC is third, ranking a notch behind Freescale. Both Renesas and NEC have thick MCU catalogs, and many of their parts will become redundant. Consolidating their sales, marketing, and fabrication technology won't be easy, either. We think this merger will take time to fully digest—precious time that competitors will exploit to gain market share.

One of those competitors is TI, which has acquired Luminary Micro, whose Stellaris MCUs were the first to use ARM's Cortex-M3. Now TI faces the same challenge as NEC and Renesas—weeding out the redundant MCUs or explaining to customers why the overlaps make sense.

In one way, this task will be easier for TI. The Stellaris product line brings the first Cortex-M3 devices to the company, and they are affordably priced, starting at only \$1. (See [MPR 6/5/06-02](#), "32 Bits for a Buck.") On the other hand, TI now has four different MCU families. Three of them are 32-bit architectures, and two of those use ARM cores. (The TMS570 family uses the Cortex-R4.) Fortunately for

TI, its existing ARM-based MCUs are intended mainly for the automotive market, whereas Stellaris MCUs are aimed at the broader embedded market.

SPARC Flickers But Stays Lit

Much has been written elsewhere about Oracle's \$7.4 billion bid for Sun. *MPR* is interested mainly in the SPARC angle. We very much doubt that SPARC was a motivation for buying Sun. Indeed, papers recently filed with the Securities and Exchange Commission suggest that SPARC was unwelcome baggage at first—Oracle's initial bid was only for Sun's software business.

As this editorial goes to press, it seems likely that Sun will kill or sell the much-anticipated Rock project. Once seen as SPARC's savior, the multithreaded Rock processors have been under development for more than five years. (See [MPR 3/8/04-02](#), "Sun Rolls Forward With Rock.") Recent roadmaps showed their debut later this year. However, *MPR* suspects that Oracle is requiring Sun to spin off or terminate this costly project as a precondition for acquiring Sun's hardware business.

Although Oracle CEO Larry Ellison has said in interviews that he supports Sun's hardware business—including SPARC—we think the acquisition endangers both operations.

For years, debate has raged over SPARC's role at Sun. It's difficult and expensive to keep SPARC competitive with IBM's POWER, Intel's Itanium, and the increasingly powerful x86 server processors from AMD and Intel. (See [MPR 1/20/09-01](#), "Server Processors: Chapter 2008, Part 1," and [MPR 1/26/09-01](#), "Server Processors: Chapter 2008, Part 2.")

Critics ask, why should Sun bother? Sun could build boxes more cheaply with someone else's processors. But others say that Sun shouldn't become another Dell. SPARC helps differentiate Sun from the commodity players. (See [MPR 2/27/06-03](#), "Processor Innovation Is Not Dead.")

Keeping SPARC competitive will be even more challenging now that chief architect Marc Tremblay has departed to Microsoft. (He left shortly before Oracle announced its intent to acquire Sun.) IBM is preparing to unveil POWER7, and x86 multicore server processors are getting seriously big. Frankly, it doesn't look good for SPARC. However, Larry Ellison is a highly unpredictable variable. He's an empire builder with a strong ego, and he may view Sun's hardware business and SPARC as useful weapons against IBM and other competitors.

One possibility is that Oracle will sell the Rock project or Sun's entire SPARC business to Fujitsu, the only other SPARC vendor. If Fujitsu keeps the architecture alive, Sun could continue designing and selling SPARC servers without the burden of developing new processors. If Fujitsu is open to this arrangement, it would let Sun and Oracle focus on systems, software, and services.

But, as we said, Ellison is unpredictable. No matter what he says publicly, we suspect that SPARC is on



SiCortex designed a custom MIPS-compatible processor for its line of high-performance computers. The biggest system was the SC5832, which had 5,832 processors and 8TB of memory, delivering 8.2 teraflops.

probation and will be exiled to Japan if it doesn't show signs of rejuvenation soon. Without Rock, that rejuvenation will have to come from Sun's existing UltraSPARC T2 line (Niagara).

MetaRAM and SiCortex Fold

Smaller companies are feeling the pinch as well. Two recent victims of the Great Recession are startups MetaRAM and SiCortex.

MetaRAM shut down after an unsuccessful search for additional venture capital or a buyer. MetaRAM was a fab-less company whose technology improved the performance and capacity of industry-standard DRAM. The company was cofounded in 2005 and headed by Fred Weber, the former chief technology officer at AMD who presided over development of the first Athlon and Opteron processors. (For a while, Weber also sat on the *MPR* Editorial Board.)

SiCortex, too, ran dry of venture funding. A skeleton staff is supporting existing customers, but the company shuttered the rest of its operations on May 27 and put its assets on the block.

Founded in 2003, SiCortex designed and manufactured supercomputers for high-performance computing applications. SiCortex is notable for trying to revive the MIPS architecture in this field. The company developed a custom MIPS-compatible chip with innovative interconnects instead of using the standard-part x86 processors or GPUs that are gaining popularity in supercomputers. Even MIPS Technologies stopped developing high-end microprocessors about ten years ago and turned its attention to embedded-processor cores.

In a blog post, former SiCortex chief engineer Matt Reilly defended his company's choice of MIPS. "In seven years of talking to end users and system purchasers, the non-x86 nature of the machine rarely presented much of an obstacle," he wrote. "...If the architecture is attractive and there is sufficient market opportunity, ISVs will port codes (often for a fee). SiCortex didn't fail because of the x86 instruction

set. There were a few prospects that shied away because of instruction-set issues, but these were few and far between.”

Instead, Reilly concluded, SiCortex simply ran out of funding and couldn’t raise more money in the current economic climate.

But it’s hard not to reach a different conclusion: SiCortex ran out of money because it shouldered the heavy burden of developing and manufacturing its own microprocessors, much like Sun. In effect, SiCortex competed with AMD, Fujitsu, IBM, Intel, Nvidia, Sun, and other CPU vendors that sell microprocessors for high-performance computing—while also competing with other supercomputer vendors whose systems use readily available off-the-shelf parts.

In one sense, we agree with Reilly. The MIPS architecture didn’t sink his company. If SiCortex had developed its own x86-compatible processors, the result probably would have been the same—the company would have run out of money, just as x86 startup Montalvo Systems did last year. (See [MPR 5/27/08-02](#), “A Tale of Two Companies.”) From the outset, the SiCortex business model was handicapped by a higher cost structure that competitors avoided by using commodity parts.

Since the 1990s, the general trend in supercomputing is to build massively parallel systems using lots of ordinary microprocessors. Naturally, there are exceptions. In 2004, IBM designed a custom Power Architecture chip for its record-breaking BlueGene supercomputers. But IBM isn’t a startup with shallow pockets, as SiCortex was, and IBM’s custom chip was a relatively simple dual-core extension of the PowerPC 440 embedded processor. (See [MPR 10/11/04-01](#), “IBM Makes Designer Genes.”)

Another exception is China, which is building a new supercomputer with its own MIPS-compatible Godson-3 processors. However, U.S. export restrictions prevent the Chinese from buying the fastest American microprocessors, and China has national strategic reasons for developing native technology in this vital field. (See [MPR 11/3/08-01](#), “Godson-3 Emulates x86.”)

Our sad conclusions are that SiCortex underestimated the costs of bucking a historical trend, and that its demise will make bucking the trend even harder for any who dare to follow.

Management Shakeups at ARC

Meanwhile, big changes have been underway at ARC and MIPS, two companies that compete with ARM by licensing microprocessor intellectual property (IP). ARC has new management, and MIPS has divested a fairly recent acquisition.

Remarkably, ARC has been fueled for nine years not only by revenues but also by cash raised from its initial public offering in 2000. (Note: I worked at ARC from 2000 to 2002.) Since then, ARC has concentrated on offering application platforms that integrate hardware and software for specific types of embedded systems. ARC’s latest platform

is for media phones—enhanced landline phones that bring the Internet into kitchens, offices, and other environments.

Now ARC has revamped its management, too. Gone is CEO Carl Schlachte, who came to ARC in 2004 from RMI. (See the sidebar, “New CEO Brings Varied Background to ARC,” in [MPR 3/8/04-01](#), “ARC 700 Aims Higher.”) Schlachte’s replacement is Dr. Geoff Bristow, an ARC board member since 2003. Other new managers are Michael Franzi, vice president of worldwide marketing, and Dr. Akash R. Deshpande, chief technology officer. Deshpande came to ARC in 2007 with the acquisition of Teja Technologies. (See [MPR 4/23/07-01](#), “Embedded Systems Conference Highlights,” and [MPR 4/3/06-02](#), “Teja’s FPGA Play.”)

Schlachte is respected and was instrumental in refocusing ARC’s strategy on integrated platforms, particularly in audio and video. Today, ARC is much more than a processor-IP company. However, ARC, MIPS, and Tensilica all share the same problem—ARM. No matter what they do, ARM is the only company that consistently thrives in this market.

MPR has long believed that only one or two of these companies besides ARM will eventually survive. Good arguments can be made for or against each company. The Great Recession could become the deciding factor. (Hmmm... sounds like a topic for a future editorial.)

Was Chipidea a Badidea?

Meanwhile, MIPS is going through changes of its own. Last month, MIPS sprang a surprise by announcing the sale of Chipidea, an analog and mixed-signal IP vendor in Lisbon, Portugal. The sale was surprising because MIPS had acquired Chipidea less than two years earlier, in August 2007. Even most celebrity marriages last longer than that. What’s worse, MIPS paid \$147 million to buy Chipidea and sold it to Synopsys for \$22 million.

Afterward, recriminations flew. Disgruntled Chipidea employees told *EETimes* that MIPS had botched the merger, partly by integrating the sales forces of the two companies, despite their different businesses and customers. To the bitter end, MIPS CEO John Bourgoin defended the merger, calling it a “strategic move” derailed by a weak economy.

Both views are probably true. The real world is analog, and mixed-signal designs are rampant, so acquiring Chipidea wasn’t necessarily a bad idea. But management problems that are merely annoying during good times can be grievous when economic conditions are less forgiving.


Whatever caused the breakup, it’s good that MIPS admitted the marriage wasn’t working and is willing to endure the public embarrassment of an expensive divorce. Some companies stubbornly refuse to acknowledge a problem and let it drag down the whole enterprise. (We aren’t necessarily talking about AMD and ATI.)

As always, change brings opportunity. MIPS recently announced support for Google’s Android mobile operating system—a wise move—and hired James Hakewill, the

engineer who was instrumental in designing ARC's first configurable processor core in the 1990s.

In addition, MIPS has finally convinced the Institute of Computing Technology at the Chinese Academy of Sciences to obtain official licenses for the MIPS32 and MIPS64 architectures. This deal, announced June 15, removes all

remaining legal obstacles to making the Chinese Godson/Loongson processors full members of the MIPS-compatible family. (See [MPR 11/3/08-01](#), "Godson-3 Emulates x86.")

The more things change...the more they *don't* stay the same. 

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