



2011 State of the VITA Technology Industry



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by: Ray Alderman, Executive Director, VITA

This report provides the reader with updates on the state of the VITA Technology industry in particular and of the board industry in general, from the perspective of Ray Alderman, the executive director of VITA. VITA is the trade association dedicated to fostering American National Standards Institute (ANSI) accredited, open system architectures in critical embedded system applications. The entire series of reports can be found at www.vita.com.

Business Conditions

During the last six months economic conditions have deteriorated both at the macroeconomic and microeconomic levels. The European sovereign debt crisis expanded to Italy as all major EU banks lost capitalization and their stock prices plummeted threatening insolvency. Gross Domestic Product (GDP) numbers in Europe came in low for Q2, especially in Germany (0.1% growth). In the U.S., GDP numbers were downgraded for Q1 and Q2 (down to 1.3% and 0.6% growth respectively). World GDP growth is declining, across the board. Best-case GDP numbers for 2011 are 2% growth in the U.S., and 1 percent growth in the EU. Unemployment remains high in both the U.S. and Europe, inspiring demonstrations and unrest in both regions. The recently announced U.S. 2.5 percent GDP growth for the third quarter is a bright spot compared to most news coming out now.

Macroeconomic conditions look tough for the next two quarters, raising additional uncertainty. Consumers have decreased spending in the U.S., lowering tax income and forcing governments to reduce spending. Businesses are reluctant to hire, expand, build new facilities, or acquire more inventories due to the uncertainty.

The massive debt levels of both the EU and the U.S. are at the root of the problems. For decades, both areas have grown their GDP through debt-based spending, which moves future expenditures into the present. Governments, people, and businesses are all trying to de-leverage themselves now, by paying-off debt rather than spending. This will continue for several more years, depressing any significant GDP growth.

The Arab Spring continues in the Middle East, with Libya falling and Syria in turmoil. Concerns exist that civil war may occur as those countries in revolution try to establish new governments and democracy. Reductions in oil production in many involved countries have raised fuel prices and contributed to unstable economic conditions both in Europe and in the U.S.

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At the microeconomic level, we have seen the beginning of massive consolidation in the cellphone industry. Google bought Motorola Mobility in August (to gain their 17,000 patents). Hewlett-Packard announced the termination of their tablet PC and cellphone products. They had earlier considered spinning out their PC division (their largest revenue division, but the lowest in profitability) setting it up for possible sale but they have recently abandoned that idea under new CEO Meg Whitman. Moreover, they announced that they had bought Autonomy, a database software company, for \$12 billion to compete against IBM, SAP, and Oracle (good luck on that plan). Dell announced poor and declining sales of PCs in August. If the top two PC makers are announcing declining PC sales, that may not bode well for the fortunes of Intel and Microsoft in the near future as they scramble to find other markets for their products, primarily in embedded applications.

Two of the remaining cellphone makers are in trouble: RIM (Research In Motion) and Nokia. Wall Street analysts say that Dell, HTC, or Samsung must buy the remaining cellphone makers (RIM and Nokia) to remain viable, but that makes no sense when you consider that Google and Apple will prevail with their patents and drive the remaining players out of the market. Therefore, it makes little sense to buy RIM or Nokia, and get into an expensive patent suit that cannot be won. So, RIM and Nokia will both continue to decline in value and market share until they go away, or are bought for pennies on the dollar.

“It makes little sense to buy RIM or Nokia, and get into an expensive patent suit that cannot be won.”

“Dead telecom companies can do massive amounts of damage from the grave.”

A bankruptcy judge in Canada sold the remaining assets of Nortel, the patent portfolio of 6,000 patents, to a group of companies (Apple, EMC, Ericsson, Microsoft, RIM, and Sony) for \$4.5 billion (U.S.) in July (this consortium beat out Google and Intel, who were bidding for the patents and lost). Note the cellphone players in this group trying to gain patents to defend themselves. In fact, this purchase may have inspired Google to pay the premium price of \$12.5 billion for Motorola Mobility in August. Meanwhile, the Nortel retirees must have been jumping with joy that \$4.5 billion was coming in to shore-up their pensions and medical benefits. That joy was short-lived when the judge explained that the \$4.5 billion would be used to pay back the bondholders in Nortel. Bondholders are the first secured creditors in bankruptcy proceedings. The judge also explained that Nortel retirees will see additional 18 to 21 percent reductions in their pensions (previously reduced during the bankruptcy process), and higher out of pocket costs for their medical coverage. Dead telecom companies can do massive amounts of damage from the grave.

While on the topic of dead telecom companies, a number of cities are wrestling with unfinished and inoperable municipal Wi-Fi networks as small fly-by-night telecommunication companies go bankrupt and disappear.¹ Many thousands of Wi-Fi nodes sit abandoned on city light poles with no possibility of ever working in the future. In fact, the cities that got into these deals must now remove these telecommunication boxes at their own expense, and trash the systems (the equipment has no residual value, since most of it was 802.11g, and we are at 802.11n speeds today). We are still cleaning-up after the telecom elephants ten years after their collapse.

In the medical segment, GE announced they would relocate their diagnostic equipment division (X-ray, imaging, and Computer Tomography) to China in July. The massive scrutiny of health care costs in the U.S. and Europe have depressed the markets for such equipment while China is just beginning to equip their hospitals with advanced imaging gear. GE is seeking long-term growth in China with their latest moves, and does not see adequate growth opportunities in the U.S. and the EU. The medical equipment industry is still stuck in the mud as developed nations strive to reduce healthcare costs, adding additional uncertainty to those markets.

The industrial markets are completely commoditized, but two board companies (as presented in the March 2011 State of the VITA Technology Industry report) logged sales of about \$700 million (U.S.) each in 2010. Both companies sell worldwide, and have found growth outside the EU and the U.S. How they will fare this year and next may have more to do with the world macroeconomic situation than anything directly related to their target markets.

¹ Esme Vos, “Court awards Tempe \$1.8M, ownership of citywide WiFi network”, City & County WiFi Networks and MuniWireless.com, May 31, 2011, URL: www.muniwireless.com/2011/05/31/court-awards-tempe-ownership-of-citywide-wifi-network

The military market has endured a significant increase in uncertainty in the past six months. The U.S. congressional fight over increasing the debt ceiling and the federal budget for the coming years have exposed the DOD to significant cuts in military spending. The budget committee is slated to turn over their U.S. budget recommendations (with massive cuts in military and entitlement spending) to Congress by November 23. Congress has until December 23 to pass a budget. If they fail to do so, military spending must fall by 50% immediately according to the new debit ceiling law passed by Congress.²

“The military market has endured a significant increase in uncertainty in the past six months.”

Several military programs have been terminated, with few new ones approved and funded. Nearly 4,000 layoffs at the primes have occurred in the past few months, and 50 plus associated layoffs in our industry, at the board and system vendor level. Unfortunately, as the budget cuts reach the primes, we will see more downsizing at the primes and in our industry.

In July, the government of India removed Boeing and Lockheed from the bidder list for their acquisition of 126 new fighter planes needed for their plan to modernize their air force.³ Numerous analysts speculate that they eliminated the U.S. fighters from competition because they suspect that the U.S. puts back-doors in the fighter electronics exported to other nations, and the planes (and weapons) could be disabled if they were used to attack Pakistan or other U.S. allies. At this point, it seems that India will buy the Eurofighter, they feel that the European manufacturers are less likely to put back doors in their fighter electronics.

China launched their first aircraft carrier, an old Russian design, and sent it to sea trials in August. In addition, concept pictures of China’s advanced aircraft carrier designs were leaked on the internet in July.⁴ One of the few nuclear subs in the Chinese navy (an old Russian design) was the source of rumors in July that a nuclear accident had occurred while in port. China’s weapon platforms have been seriously deficient for decades. Nevertheless, if they continue to design, upgrade, and test new ideas, they may actually gain some ground in the near future.

While this outlook is disconcerting, there are bright spots where we can focus. In addition, we can be successful this year and next if we focus and concentrate on the opportunities we have now, and those that will develop in the near future. So, buckle-up, put on your helmet and flack-jacket, and keep your powder dry. Just remember it is always darkest before the dawn, problems are just opportunities dressed in work clothes, and when the going gets tough, the tough get going. In fact, just forget all the motivational clichés too: they will not help you in the coming months.

“While this outlook is disconcerting, there are bright spots where we can focus.”

Markets

MIL/Aero

We are all wondering what the DOD budgets will look like in 2012 and what programs will be viable. In 2011, everyone in Washington has been hesitant to sign a contract, with a few exceptions. We did see the DOD award the new Ground Combat Vehicle (GCV) contract to General Dynamics and BAE Systems.⁵ SAIC has protested this award, since they had the GCV contracts during the Future Combat Systems (FCS) days, and are not happy.⁶ We went through

2 Baker Spring, “Debt Ceiling Defense Cuts Will Happen”, The Foundry, August 8, 2011, URL: blog.heritage.org/2011/08/08/debt-ceiling-defense-cuts-will-happen

3 “India’s M-MRCA Fighter Competition”, Defense Industry Daily, October 9, 2011, URL: www.defenseindustrydaily.com/mirage-2000s-withdrawn-as-indias-mrca-fighter-competition-changes-01989

4 “China’s New Aircraft Carrier”, TruthorFiction.com, July 27, 2011, URL: www.truthorfiction.com/rumors/c/China-New-Aircraft-Carrier.htm

5 Kate Brannen, “U.S. Army Picks BAE, GD for Ground Combat Vehicle”, Defense News, August 18, 2011, URL: www.defensenews.com/story.php?i=7425569

6 Michael Hoffman, “SAIC Protests GCV Contract Award”, Defense News, August 26, 2011, URL: www.defensenews.com/story.php?i=7498264

this same process with the KC-135 (KC-46) tanker replacement program between Boeing and EADS (Boeing finally received the contract in early 2011).⁷

We saw the DOD/Navy award contracts for two new DDG-100X destroyers in September.⁸ However, we saw the DOD cancel the Army MULE vehicle program in January. This program was the last bastion of the old FCS program.⁹ In addition, we are seeing a new upgrade (optical boards and harnesses) underway in the F-35 fighter. After enduring a tremendous reduction in new contracts this year, things will be uncertain for a while, especially on large new platforms.

According to Army research released in June the services spent 35 to 42 percent of their test and evaluation funding on programs that were canceled, consuming \$35 billion per year.

Overall, how do things look in this segment? First, we can expect a reduction in military spending, due to U.S. economic and federal budget woes forecast for 2012. Did the primes become bloated during the FCS extravaganza? Yes. Did the primes become bloated during the NASA and space era? Yes. But, the DOD cannot afford to decimate the ecosystem and infrastructure of the primes and the sub-primes. Therefore, they will squeeze the infrastructure, to de-bloat them, and feed them enough programs to keep them alive. The primes must shrink through lay-offs and consolidation for the next year or so. In addition, that action will have some effect on us in the board/systems/integration segment.

Secondly, the DOD is shifting priorities and funding, away from big new platforms, to upgrades of existing platforms, to lighter and cheaper, and to new intelligence systems. We have the most advanced deadly precision pinpoint weapons in the world. What we need now are...TARGETS! We are at least 3 generations ahead of our closest enemy with our conventional weapons today, but our targeting/intelligence systems have not caught-up with what our weapons can do.

The UAV Genesis

"In an imperfect manner it is practicable, with the existing wireless plants, to launch an aeroplane, have it follow a certain approximate course, and perform some operation at a distance of many hundreds of miles. A machine of this kind can also be mechanically controlled in several ways, and I have no doubt that it may prove of some usefulness in war." ---Nikola Tesla, 1898. (O'Neill, John J., *Prodigal Genius: The Life of Nikola Tesla*, pp171-172)

"A manless airplane was developed near the close of the First World War. It rose from the ground, flew 100 miles to a selected target, dropped its bombs, and returned to its home airport, all by wireless control..."

"This Tesla-type robot was developed in the plant of the Sperry Gyroscope Company where Elmer Sperry invented a host of mechanical robots controlled by gyroscopes, such as the automatic pilots for airplanes and ships" (Ibid, pp173-174)

Tesla defined the construction and operation of UAVs in 1898, and Elmer Sperry built and flew one, in combat conditions, in 1918. Frederick William Lanchester wrote his seminal book, *Aircraft in War, the Dawn of the Fourth Arm* in 1916, after observing the first use of biplanes in WWI as weapons platforms. So, why did it take so long to develop modern UAVs? It was not until WWII that the development of advanced aircraft occurred, to support the sea-land battle strategy. Then, the emphasis shifted to missiles in the cold war for decades.

Today, we have shifted back to the air-land battle strategy, as seen in the Gulf wars, and UAVs are critical to that new shift. In the future, we will see UAVs at the heart of the continuing air-land battle plan. Ultimately, we will have UAVs in the air, and robotic soldiers (SWORDS and Talon) on the ground before any significant number of "boots" are introduced into a war zone. We are automating warfare, and this trend will continue for decades to come. At the core of these platforms are advanced electronic systems, much more power-efficient and more computationally powerful than what we have today. This is where we will see significant use of VPX and the new advanced rugged SFF technologies. We are on the cusp of automating warfare, to a degree never seen in world history.

Source: Ray Alderman

7 Marc Selinger, "Boeing to build U.S. Air Force tankers", Boeing, February 24, 2011, URL: www.boeing.com/Features/2011/02/bds_tanker_announcement_02_24_11.html

8 Christopher P. Cavas, "U.S. Navy Awards DDG 1000 Contracts", Defense News, September 15, 2011, URL: www.defensenews.com/story.php?i=7694431

9 "U.S. Army MULE Put Down", Strategy Page, January 19, 2011, URL: www.strategypage.com/htmw/htarm/20100119.aspx

While new weapons platforms and large contracts will be scarce in 2012, there are some weapons being tested for fielding. The new High Energy Laser Technology Demonstrator (HEL TD) is being tested now.¹⁰ This is a 150KW laser intercept weapon that takes out mortar rounds and rockets fired at our troops, aircraft, and facilities. The Navy is testing HEL weapons on their ships now, for future deployment.¹¹ There is new advanced weapons research ongoing, but deployment will be some years off.

“New weapons platforms and large contracts will be scarce in 2012.”

UAVs will continue to be a major platform market in the military segment. Today, we have 6,000 UAV drones in operation. They have carried out attack missions in six countries so far: Iraq, Afghanistan, Pakistan, Yemen, Somalia, and Libya. The DOD is now negotiating UAV bases in Turkey, Southern Africa, and in other parts of the Arabian Peninsula.

In the next few years, we will see continuous steady growth in the construction of new UAVs. Newer drone platforms like the Northrop Grumman X47B and the Boeing Phantom Ray could see service in only a few years. This segment is a large target market for VPX-based systems, both today and for many years to come.¹²

“We will see rapid growth in VME sales in 2012-2013 as older weapons platforms go through refreshes and upgrades.”

We will see rapid growth in VME sales in 2012-2013 as older weapons platforms go through refreshes and upgrades. Many of these upgrades will simply replace PMC/XMC/FMC mezzanine cards with newer faster I/O interfaces, raising that market to well over \$200 million. Other systems will replace older CPU cards and A/D or D/A cards with newer faster versions. The VME chassis and VME64 backplanes are already in place, and do not need replacement.

Radar applications are driving a number of VPX design-ins today. According to a new market report from Frost and Sullivan, the radar systems and subsystems market will be \$2.47 billion in 2011, an increase of \$212 million over 2010. Across all services and platforms, radar systems are 5.7 percent of the total military spending, with the largest segment of military spending on command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR).¹³

For 2012, VME sales will be about equal to VPX and PMC/XMC/FMC sales combined. The total market number will be near \$1 billion for 2011. Companies trying to grow sales this year had a tough time. Moreover, 2012 will be similar, but with some good business in refreshes and new VPX design-ins. Compared to other market segments (like industrial and telecom), the MIL/Aero market will be more prosperous in 2012. Nevertheless, the business will be fragmented across VME, VPX, and PMC/XMC/FMC opportunities.

China's New Aircraft Carrier!

These aircraft carriers look formidable and of ultra-modern design. There are reports that the first Chinese aircraft carrier is under construction and could enter service around 2015 or earlier. It might not be long before we see the real thing. Defense analysts are waiting — watching anxiously.

This is a quantum leap above anything we have on the drawing board. They have thought “outside the box” on this one. Better speed, larger capacity, much more stable, etc. Definitely a “blue-water” long reach vessel.

10 Tim Hornyak, “Zap! Boeing builds truck-mounted laser weapon”, CNET, June 27, 2011, URL: news.cnet.com/8301-17938_105-20074802-1/zap-boeing-builds-truck-mounted-laser-weapon

11 Geoff S. Fein, “MLD Test Moves Navy a Step Closer to Lasers for Ship Self-Defense”, Office of Naval Research, April 8, 2011, URL: www.onr.navy.mil/Media-Center/Press-Releases/2011/Maritime-Laser-MLD-Test.aspx

12 Addison Wiggin, “Playing Hide and Seek With Libyan Missiles”, The Daily Reckoning, September 28, 2011, URL: dailyreckoning.com/playing-hide-and-peek-with-Libyan-missiles

13 “U.S. DoD Radar Markets”, Frost and Sullivan Research, 2011, URL: www.frost.com/prod/servlet/report-brochure.pag?id=N84A-01-00-00-00



Plus they can service their nuclear sub fleet in between the twin hulls (sight unseen) or even launch amphibious operations from the same. It will be launched in half the time it takes the USA at just one third the cost. Add the new Chinese stealth fighter bomber (naval version already flight testing) in the mix and you have the makings of a formidable weapons system indeed.

Telecom

The telecom markets continued to be questionable during the past six months, especially at the cellphone level. In the past 3 months, about 40,000 telecom patents changed hands. Google bought Motorola Mobility with their 17,000+ patents.¹⁴ A group of companies (Apple, RIM, Microsoft, Sony, EMC, and Ericsson) bought the last remaining assets of Nortel (the patent portfolio of about 6,000 patents).¹⁵ Mosaid bought Core Wireless and also gained access to 400 "patent families" owned by Nokia, equal to nearly 17,000 patents.¹⁶ Mosaid is an NPE (non-practicing entity), or as we know them, patent trolls. Mosaid keeps one third of the fees and royalties they collect on the Nokia patents.

It is clear that the group of companies who bought the Nortel patents, and Google with their Motorola acquisition, needed the patents to protect themselves from lawsuits in today's patent-rich and unstable telecom and cellphone environment. But, Mosaid is a different story, they only make money when they collect fees and royalties for the Nokia IP. Some of these patents actually go all the way down to the communications protocols, the backplanes, and the components in telecom equipment. Depending on how aggressive Mosaid becomes, we could see some patent assertions against telecom board and box vendors as they seek revenue from those Nokia patents.

Sony Corporation and Telefonaktiebolaget LM Ericsson announced that Sony will acquire Ericsson's 50 percent stake in Sony Ericsson Mobile Communications AB, making the mobile handset business a wholly-owned subsidiary of Sony.¹⁷ This gives Sony ready access to smartphone technology that they can integrate into their broad array of network-connected consumer electronics devices. The transaction also provides Sony with a broad intellectual property cross-licensing agreement and ownership of five essential patent families relating to wireless handset technology.

In April, France Telecom and Deutsche Telecom entered into a joint purchasing agreement that will save them a billion Euros on telecom equipment purchases.¹⁸ This move indicates that both service providers are buying less gear, and the prices on those low volumes are too high. Collectively, they can consolidate their volumes and negotiate much

14 Robin Wauters, "Google Buys Motorola Mobility For \$12.5B, Says "Android Will Stay Open"", Tech Crunch, August 15, 2011, URL: techcrunch.com/2011/08/15/breaking-google-buys-motorola-for-12-5-billion

15 Steve Musil, "Apple, RIM in group buying Nortel patents for \$4.5B", CNET, June 30, 2011, URL: [news.cnet.com/8301-1001_3-20075977-92/apple-rim-in-group-buying-nortel-patents-for-\\$4.5b](http://news.cnet.com/8301-1001_3-20075977-92/apple-rim-in-group-buying-nortel-patents-for-$4.5b)

16 Ben Dummett, "Nokia Sells 2,000 Patents", The Wall Street Journal, September 2, 2011, URL: online.wsj.com/article/SB10001424053111904716604576544441441198816.html

17 "Sony to acquire Ericsson's share of Sony Ericsson", Sony Corporation, October 27, 2011, URL: www.sony.net/SonyInfo/IR/news/20111027.pdf

18 Matthew Campbell and Cornelius Rahn, "Deutsche Telekom, France Telecom Set Up Purchasing Venture", Bloomberg, April 18, 2011, URL: www.bloomberg.com/news/2011-04-18/deutsche-telekom-france-telecom-agree-on-procurement-venture.html

lower prices. There are now several Joint Purchasing Agreements (JPAs) among other EU telecom service providers in different countries. Each of these JPAs removes a customer from the telecom equipment supply chain and drives down prices and margins.

Weak demand for telecom boards and boxes in Europe is being caused by austerity measures. In most of the EU countries, government spending is 50 percent or more of those countries' GDP and they already have serious financial problems trying to avoid sovereign debt defaults and major bank failures. The EU must focus on shoring-up their banking system with government money (Das TARP and Le TARP are the common terms for this move) instead of bailing-out the financially irresponsible countries. In the U.S., the macroeconomic situation is also depressing demand for telecom gear.

Nokia has laid-off 10,000 people so far this year as they shift out of hardware and focus on low-level software.¹⁹ In addition, Nokia has licensed their patent portfolio to a patent troll to gain some revenue as stated previously. With the austerity plans and macroeconomic deterioration occurring around the world, anyone left in telecom in the next 18 months will wish they had packed their bags earlier.

Industrial

The industrial segment is very exposed to the declining macroeconomic conditions in the U.S. and Europe today. In the EU, the Euro is falling in value against the dollar and other currencies. At the same time, European inflation hit 3 percent in Q3 as businesses increased their prices in Europe to offset the loss in the Euro's value against other currencies. Competition is fierce in the industrial Small Form Factor (SFF) and motherboard markets, yielding low margins, and the falling Euro is putting yet another financial squeeze on the EU board vendors.

“The industrial segment is very exposed to the declining macroeconomic conditions in the U.S. and Europe today.”

Kontron introduced a new family of ARM-based industrial boards in September.²⁰ This will help them to find new customers and avoid the impending price war for Intel-based boards as world economic conditions continue to erode. This move is a great strategy: innovate and create new cost-effective products as economic conditions deteriorate and previous-generation Intel-based technology products are subject to a price war as other less innovative vendors fight for survival.

We are also seeing electronic product exports from China and Taiwan diminish, as those country's growth rates slow to 5 percent or less, and demand for electronic products decline. This will also put the Taiwanese and Chinese SFF and motherboard vendors in a financial squeeze, and they could be the ones who start the price war to raise their volumes. From a financial perspective, the industrial board segment is looking more like the telecom segment every day.

Healthcare/Medical

The continuing uncertainty of Obamacare and the rising costs of treatment in the U.S. have dampened medical equipment sales for several years now. In July, General Electric announced they are moving their medical imaging business headquarters and focus to China.²¹ That is a clear sign that the markets for high-end diagnostic imaging equipment in the U.S. will be depressed for some time to come, and GE sees better growth and opportunities in China. China has not transitioned from film to digital images as the medical industry has done in the developed nations (U.S. and Europe particularly). In addition, China has not built-out their hospitals and medical centers like countries in the western world.

19 Nathan Olivarez-Giles, “Nokia to cut 3,500 jobs by 2012 in latest round of layoffs”, Los Angeles Times, September 29, 2011, URL: latimesblogs.latimes.com/technology/2011/09/nokia-to-layoff-3500-employees.html

20 EE Times staff, “Kontron adopts ARM across the board”, EDN, September 8, 2011, URL: www.edn.com/article/519313-Kontron_adopts_ARM_across_the_board.php

21 Rachel Layne, “GE Moves 115-Year-Old X-Ray Unit's Base to China to Tap Growth”, Bloomberg, July 25, 2011, URL: www.bloomberg.com/news/2011-07-25/ge-healthcare-moves-x-ray-base-to-china-no-job-cuts-planned.html

Additionally, the impending austerity plans for the EU countries will depress medical imaging equipment sales across Europe. Established markets for medical equipment are mature and saturated. Political and financial problems in the U.S. and Europe hinder opportunities for upgrading to next-generation machines. That means that medical equipment vendors must focus on undeveloped countries for growth, which is what GE has done. Other medical equipment companies will likely follow in the coming months.

Ex-Ante Update

A lawsuit was recently filed against three telecom companies for antitrust behavior, and the complaint implicates two standards developer organizations (SDOs), 3GPP and ETSI. VITA has *ex-ante* procedures, which guards VITA from being enjoined in such a lawsuit. The outcome of this trial will take the FTC/Rambus decision to a new level. The FTC only chastised JEDEC for the poor enforcement of their procedures. This trial could actually fine an SDO and make them liable for anti-trust behavior, for their inadequate procedures and lack of enforcement. At any rate, it is not good for any SDO to be implicated in an anti-trust lawsuit. So, we did the right thing when we got *ex-ante* approved at DOJ, and adopted in the VSO. The outcome of this trial could also inspire ANSI to adopt VITA's *ex-ante* policies and procedures, if these SDOs are convicted.

"HYDROLEVEL DOCTRINE REEMERGES THREE MONTHS AGO: TRUEPOSITION, INC. V. ERICSSON, QUALCOMM, ALCATEL-LUCENT, 3GPP AND ETSI, U.S.D.C. PA, COMPLAINT FILED JULY 20, 2011"

"By their failures to monitor and enforce the SSO Rules, and to respond to TruePosition's specific complaints concerning violations of the SSO Rules, 3GPP and ETSI have acquiesced in, are responsible for, and complicit in, the abuse of authority and anticompetitive conduct . . . of Ericsson, Qualcomm, and Alcatel-Lucent and have joined in and become parties to their combination and conspiracy." Complaint 100.

"Defendants 3GPP and ETSI each failed in their respective obligations to ensure compliance with the SSO rules, and knowingly permitted defendants Ericsson, Qualcomm, and Alcatel-Lucent to violate these rules, procedures, and due process requirements so as to achieve anticompetitive and unlawful objectives in restraint of trade. They thereby joined in and became part of the illegal combination and conspiracy among Ericsson, Qualcomm, and Alcatel-Lucent." Complaint 129.

Source:

Robert A. Skitol

Drinker Biddle & Reath LLP

Washington, D.C.

Mergers & Acquisitions

We have experienced some acquisitions in our industry in the past few months. In May, Eurotech Group bought Dynatem as they continued their efforts to expand in the military and aerospace markets.²² Eurotech Group owns Parvus and was set to buy Radstone before it was purchased by GE in 2006.

In July, Curtiss-Wright bought Acra Controls as they expanded their presence in the MIL/Aero segment.²³

According to John Keller at M&AE magazine, he counted 21 acquisitions and mergers in the last quarter, mostly at the component level.²⁴ As the uncertainty about DOD budgets and programs continues, we will see more merger activity, possibly in our board and box industry.

Companies with active and funded programs will be the primary targets of M&A activity in the coming months and years. In particular, companies with VME upgrade contracts and those with new VPX design-ins will be the most attractive targets for acquisitions and mergers.

²² PR Newswire, "Eurotech: Acquisition Of California Company Dynatem Inc.," The Street, May 23, 2011, URL: www.thestreet.com/story/11129863/1/eurotech-acquisition-of-california-company-dynatem-inc.html

²³ "Curtiss-Wright Acquires ACRA Control Ltd", Curtiss-Wright Corporation, July 28, 2011, URL: ir.curtisswright.com/releasedetail.cfm?releaseid=594906

²⁴ John Keller, "Aerospace and defense electronics industry consolidation proceeding at a rapid pace", Military & Aerospace Electronics, October 9, 2011, URL: www.militaryaerospace.com/index/blogs/john-kellers-blog/blogs/military-aerospace/john-keller-blog/post987_6183777026390339001.html?cmpid=EnIIMAEOctober122011

Parent	Target	Market Focus	Date
Kontron	Thales Computer	MIL/Aero	January 2008
Curtiss-Wright Controls	Pentland Systems	MIL/Aero	February 2008
Adlink Technology	Ampro Computer	Industrial control	March 2008
Interconnect Systems Inc.	Nallatech	MIL/Aero	May 2008
Finmechanica	DRS	MIL/Aero	May 2008
Curtiss-Wright Controls	VMETRO	MIL/Aero	August 2008
Kontron	Intel rack mount server group	Telecom	October 2008
Elma Electronic	ACT/Technico	System integration	January 2009
SIE	Carlo Gavazzi-Mupac	Packaging	April 2009
IDT	Tundra Semiconductor	RapidIO chipsets	April 2009
Intel	Wind River Systems	Embedded	July 2009
Mentor Graphics	Embedded Alley	Linux	July 2009
Kontron	Digital-Logic AG	Rugged computers	September 2009
Cavium Networks	MontaVista Software	Linux	November 2009
Curtiss-Wright Controls	Skyquest Systems	MIL/Aero	December 2009
Curtiss-Wright Controls	Specialist Electronics Services	MIL/Aero	June 2010
Parker Hannifin (Aerospace)	SprayCool	Technology	March 2010
Advantech	Dlog GMBH	Industrial	March 2010
Kontron	AP Labs Group	System integration	May 2010
Curtiss-Wright Controls	Hybricon	Packaging	June 2010
Advantech	ACA Digital	Industrial	November 2010
Advantech	Innocore Gaming Ltd.	Gaming	November 2010
Mercury Computer Systems	LNx Corporation	MIL/Aero	January 2011
Esterline	Eclipse Electronic Systems	MIL/Aero	January 2011
Molex	Luxtera's active cable operations	Technology	January 2011
Curtiss-Wright Controls	Predator Systems Incorporated	MIL/Aero	January 2011
Eurotech Group	Dynatam	Technology	May 2011
RadiSys	Continuous Computing	Telecom	June 2011
Curtiss-Wright Controls	Acra Controls	MIL/Aero	July 2011

Market Estimates

VPX markets

Talking with VITA members who design and manufacture VPX boards and systems, and with connector vendors, gives some insight into how VPX is doing this year. While VPX shipments are just getting off the ground, a very large number of designs and evaluations are in process. In 2011, we will probably ship 10,000 to 15,000 VPX boards. That will double in 2012, and more than double again in 2013. Two orders were placed in 2011 for 1,000 VPX systems each, but they do not start shipping for 12-18 months and they will be in production for 3-5 years. In 2011, VPX is estimated to be close to \$200 million in market size, considering the 15,000 boards, the packaging, and the power supplies. Next year, as programs go into deployment and we see significant growth in VPX sales, the market will probably go up to \$300 million or better. In early 2013, we will hit the inflection point in VPX sales, and should see the market move to \$500 million or more.

PMC/XMC/FMC Markets

When you consider that the PMC mezzanine specification was approved by the IEEE back in 2001, we have ten years of deployed sockets in the market today. Other board formats have adopted PMC, including telecom, motherboards,

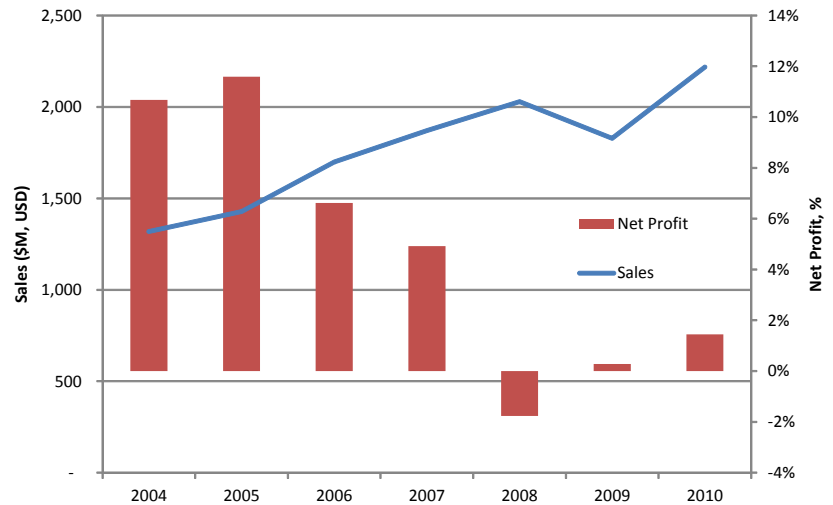
and industrial form factors. Newer VME and VPX boards are implementing the XMC and FMC mezzanine sockets today, as are many custom motherboard designs. Assuming two sockets per SBC, we are probably adding more than 200,000 PMC/XMC/FMC mezzanine sockets per year. If you make some reasonable estimates about how many PMC-socketed SBCs were shipped over the past ten years, you come up with between three and four million sockets deployed. In 2011, we are looking at a PMC/XMC/FMC market somewhere near \$200 million.

The \$1 billion Market

The VME market is close to \$500 million this year, and rising to about \$600 million as the upgrade cycles continue in military applications. The PMC/XMC/FMC market is close to \$200 million and growing. The VPX market is close to \$200 million and rising. That says the VITA members are in the middle of a \$1 billion market that is growing significantly.

VITA Market Basket

To help us better track the health and size of the market, VITA has established a market basket of public companies. Their annual revenue can help us track market dynamics. The current basket consists of ADLINK Technology, Advantech, Eurotech Group, Kontron, Mercury Computer Systems, and RadiSys. These six companies are estimated to represent 25 to 30 percent of the total market for embedded computing platforms of the VITA technology class. 2010 revenue was back on track after the dip in 2009. Net profits have started a slow recovery but still have a long way to go to double digit profits. Early reports for 2011 are still mixed with strong sales but weak profits.



Source: Embeddify LLC, 2011

VME vs. VPX

There have been some articles published in the industry trade press claiming that VPX is replacing VME. This is a half-truth and needs to be clarified. First, VME is used in applications that are event-driven. These applications, controlling motors and actuators, moving gun turrets and missile launch-frames into position, are control system applications. VME's interrupt structure is the only architecture that can handle these kinds of applications in real-time. No other architecture, especially the fabrics and parallel PCI bus-based systems, can handle the requirements. Therefore, VME will remain the primary architecture in these platforms for many years to come. VPX cannot replace VME in these closed-loop feedback systems: none of the fabrics have the needed real-time response capabilities.

Secondly, there are over 400 programs in the military using VME. The card cages, backplanes, and power supplies are already in place. With the reductions in the DOD budgets, VME upgrades and refreshes will be funded, from a cost justification standpoint, much more easily than a forklift upgrade requiring new backplanes, packaging, and power supplies. In addition, all the new hardware and software (for the fabric-based systems) will have to go through expensive and extensive testing (millions of dollars). Just the qualification and testing of the fabric-based software will cost more than the price of the hardware in many cases.

Third, VPX is a data-driven architecture, not an event-driven architecture like VME. VPX will be used in data-driven applications where VME was once used with add-on packet-based enhancements like Raceway and Sky Channel. Radar and sonar are only two of the VME applications now moving to VPX because they are heavily data-driven. You will also see VME replaced by VPX in SIGINT/COMINT/ISR sensor-based applications that create high volumes of streaming data to be processed.

Fourth, we will see a number of refreshes and upgrades accomplished by changing-out PMC/XMC/FMC mezzanine modules as DOD budgets shrink. The VME cards stay in place, and the upgrades occur with only mezzanine card replacements. That process will keep the foundational VME cards in the system and keep the original backplanes and packaging. There are many VME-based systems in military platforms that do not need tremendous increases in processing power or bandwidth. They simply need to solve the obsolescence problems associated with older chips.

The people writing these articles, about VPX replacing VME, have created numerous examples of outrageous falsification through the process of oversimplification and omission of the facts. The complexity of the financial and technical issues surrounding the technological transition in military systems has been conveniently avoided by these authors as they help you understand the wrong thing: they generalize, showing their ignorance and ineptitude about military systems, and they manipulate arbitrary abstractions arriving at haphazardly constructed conclusions. VME will continue to be the primary architecture for military systems, in event-driven applications. Only segments of military systems that are data-driven applications can benefit from VPX. The dangerous half-truths in these articles are the *coin of the realm* for companies with little or no understanding about how military systems actually work. We continue to see new VME design-ins every month, in new military systems. That fact alone destroys the error-laden poorly conceived detail-sparse arguments in these articles.

VME Celebrates 30 Years of Excellence!



**30 Years
of Excellence!**

John Black and Jack Kister (both of Motorola) pinned-out the 68000 microprocessor bus on an edge-card connector, on a pizza-box size board format back in 1979, and created VERSAbus. In 1980, Max Loesel and Sven Rau (Motorola-Europe) took that pin-out and put it on a new pin-and-socket DIN connector and a 6U card format. Using the 6U DIN connector implementation, John Black, Craig MacKenna (Mostek) and Cecil Kaplinski (Signetics) created the first draft of the VMEbus specification in 1981. In October of that year, at the System '81 trade show in Munich, Germany, Motorola, Mostek, Signetics/Philips, and Thompson-CSF announced VME to the world.

A little more history: Along the way, many others were involved in the development of VME. Wayne Fischer (Motorola and then Force Computers) and Shlomo Pri-Tal (Motorola) ushered the VMEbus document through the IEEE process and final approval in 1987. Eike Waltz (Schroff) worked out all the mechanical packaging for the air-cooled boards in chapter seven of the specification. Later on, Kim Clohessy (DY-4) chaired the mechanicals for conduction-cooled boards (IEEE 1101.2). In 1989, John Peters (Performance Technologies) came-up with the concept of VME64 (64-bit wide data and address buses added to VME). Kim Clohessy and I chaired the VME64 document and took it directly to ANSI (ANSI/VITA 1.0) in 2002. Chau Pham (Motorola) came up with the source-synchronous transfer (SST) mechanism, that enhanced performance of VME data transfers and took that document to ANSI for approval in 2003 (ANSI/VITA 1.5). Drew Berding (an independent consultant) then created VME320: a method of making the SST transfers run at even faster speeds. Hundreds of people, too many to name here, were involved in the creation and enhancements to VME over the years.

The first vulnerable market that VME exploited was the replacement of the expensive and cumbersome DEC PDP-xx minicomputers in the '80s, used in industrial control applications. The processor board, I/O board, and packaging/backplane infrastructure grew quickly, and VME was well established in the market by 1987. Hundreds of companies were designing and making VME cards in the late '80s.

In the early 90's, the military was looking for a standard computer architecture for their platforms, and the contenders were VMEbus and Multibus II. But, military applications needed more bandwidth and functionality than either architecture offered, so VITA started the Futurebus+ efforts with the IEEE. This went on for several years, but Futurebus+ became unwieldy and fragmented across form factors, protocols, application segments, and "profiles." It was clear that Futurebus+ was out of control by 1993 and was not being picked up by any of the leading developers. In that year, VITA gained ANSI certification, and re-instituted work on the VME64 platform.

More on the history of VME and VITA can be found on the VITA website at www.vita.com/home/AboutUs/History.html.

Summary

As you can see, we have some difficulties in front of us. But, we have some great opportunities too...

- *Avoid commodity market segments and the coming price war for Intel-based products (particularly in telecom and industrial segments). Low margins are the reward for low value-added. Focus on markets that demand high value-added in the products they use.*
- *Focus and concentrate on opportunities for VME, VPX, and PMC/XMC/FMC in military systems. We will see companies who were trying to expand out of low-margin telecom and industrial segments, who went after military programs, abandon the MIL/Aero markets and become small commodity-based contract manufacturers this year. The MIL/Aero markets have their problems, but the opportunities and margins will be infinitely better than what happens in the telecom and industrial segments this year and next.*
- *Continue to innovate, with new processors, fabric chips, and new FPGA's, even though things look uncertain. The only way to grow your way out of a down-cycle is to innovate. When other companies cut their R&D, to cut costs in the downturn, they will be at a severe disadvantage as the markets settle.*
- *Ignore as much of the macroeconomic news as you can (unless you are a Euro-based company). Focus on the microeconomic conditions and exploit the profitable growth niches (in new technologies, growing application segments, and specific geographic areas).*

It's ironic, on VME's 30th anniversary, that sales of VME boards are increasing dramatically in spite of industry pundits reporting VME's demise. VME sales will be greater than VPX sales for about another two years. In 2013, VPX design-ins will go to deployment and shipments should increase significantly in data-driven applications.

In 2014, we will see VPX eliminate bandwidth-limited copper-based connectors and move to optical links. But even in 2014, VME will still be a vibrant and significant market for VITA members.

Thank you John Black, Craig McKenna, and Cecil Kaplinski for all the excellent engineering work you did on VME some 30 years ago.

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