



2009 State of the VME Technology Industry



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by: Ray Alderman, executive director, VITA

This report provides the reader with updates on the state of the VME Technology industry, in particular, and a view 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/mktoverview.html

“We are enduring the simultaneous occurrence of three crises, somewhat out of phase with each other: a financial crisis, an economic crisis, and a political crisis.”

Economic Conditions

Hot off the press are the results of the 12th annual global CEO survey by PricewaterhouseCoopers¹. Just in time for the World Economic Forum, company chiefs are concerned that business won't pick up for three more years and most have shifted their focus from growth to survival.

In my opinion, we are enduring the simultaneous occurrence of three crises, somewhat out of phase with each other:

- a financial crisis - instability of the banking system worldwide and the inability to access capital through loans or stock and bond issuance,
- an economic crisis - a decline in general economic activity and demand for products and services,
- a political crisis - new administration in the U.S. with different priorities.

These concurrent crises are interrelated, interdependent, and destructive to world economic conditions and to our industry. I am sure that the readers of this report are familiar with the macro-economic conditions, so there is no need to recap the present situation. However it may be instructive to explore what the macro-economic conditions may hold for us in this industry at the micro-economic level.

Managing Cash Flow

The inability to get loans or lines of credit and to issue stocks or bonds is having a negative economic effect on much of our industry. Smaller private companies and small public companies will be growth-limited by their inability to gain capital. Larger board companies, especially those who are divisions of large multinational companies, will have an advantage since they can get capital from the mothership if it is available.

¹ PricewaterhouseCoopers. 12th Annual Global CEO Survey. [Online] January 2009.

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The inability to gain capital will stop most of the merger and acquisition activity in our industry, it will deter new company entries into our industry, and it will cut off the oxygen to weak companies causing them to falter. Cash flow is the life-blood of this industry.

Since all companies are hoarding cash in such tight economic conditions, I would expect to see the collection period for invoices to jump out to 90-120 days, possibly more. In my previous positions at board companies, and in better times, my average collection period on invoices would run about 45 to 50 days. Today, I expect it is twice that amount.

Receivables management will become a major issue with vendors in these present conditions. Cash flow management will become more important than any growth strategies across our industry.

How long to recovery?

A general slowdown in worldwide economic activity means reduced sales for the players in our industry. Some players may have short-term immunity to this slowdown in sales, especially those who have design-ins on numerous military programs. But those companies who have an industrial and telecom product portfolio will have greater exposure and lower sales in 2009, even those companies who have some amount of diversification into other markets (like medical and military). This industry has shown amazing resilience to economic cycles in the past. But this present recession is significantly different; it seems to be much broader and deeper than previous recessions.

“This industry has shown amazing resilience to economic cycles in the past.”

December released studies of this economic cycle are interesting. The Philadelphia Federal Reserve said that this recession started in May 2008, will last for 14 months, and that positive GDP growth in the U.S. will return by July 2009. A university study states that the recession started in December 2007, peaked in Q4 of 2008, and U.S. GDP growth will resume in Q3 or Q4 of 2009. However, the primary question remains; is this recession a V-shaped curve (fast recovery, in months), a U-shaped curve (a somewhat slower recovery, in years), a W-shaped curve (ups and downs over the years) or an L-shaped curve (a very long recover period, in decades)?

Previous recessions have been V-shaped, lasting for months with an occasional few that have been U-shaped, lasting for a few years. Japan is an example of the L-shaped curve; they have been in recession since the mid 1990's and their economic situation is referred to as “The Lost Decade”.

“I believe that the new administration will have difficulty making such a spending shift quickly.”

New Administration

The Obama administration has different priorities than the previous administration. While the Bush administration prioritized military spending (based on 9/11), an Obama administration will focus on domestic social spending (based on his campaign statements and the observations of the political pundits). If our economic situation had not declined so dramatically, I believe that the Obama administration would have made those government spending shifts rapidly. Now I believe that the new administration will have difficulty making such a spending shift quickly. The huge amounts of government funding of the banking, mortgage, and bail-out of the auto industry may preclude the planned radical transitions to social spending for the incoming administration (particularly plans for national health care insurance, infrastructure projects like roads and bridges, education, elderly care, mortgage assistance, etc).

Critical Embedded Systems Markets

Let's dive into the key markets for VME Technology and see what is developing.

MIL/COTS

We have general indications of what effect an Obama administration will have on military spending. We do know that he wants to reduce our presence in Iraq and Afghanistan. That would directly affect the present spending levels on boots, bullets, and butter. But what specific platforms and programs he will cut are still unknown. The new administration will be preoccupied for some time with the economy, with stabilizing the financial system, with unemployment, with the housing/mortgage crisis, and with health care.

I believe that the new administration will focus on the new major programs, those with costs in the billions of dollars, and will target them for reductions early on. Programs in that arena include the DDG-1000, the F-22, and the F-35. I believe that the money spent on upgrading (refreshing) existing tactical platforms and weapons systems will increase as the funding on new strategic platforms is reduced, giving a net reduction in the total military budget. As I have said before, I believe that spending on SIGINT, intelligence monitoring, and data gathering systems will increase as the new administration reduces our military presence in Iraq and Afghanistan. If we are not actively engaging terrorist nations with military force we still need to know what they are doing.

According to an article in Military & Aerospace Electronics², a recent ITAA/GEIA Group report says that UAV (Unmanned Aerial Vehicle) purchases will decline 3% per year for the next 10 years. But those reductions will be in the smaller unit-level battlefield UAVs. The programs for Global Hawk, Predator, BAMS (Broad Area Maritime Surveillance UAV), UCAS-N (Unmanned Combat Air System-Navy), UCAV (Unmanned Combat Air Vehicle), and the TUAV (Tactical Unmanned Aerial Vehicle) are going forward. Some of these systems are slated for operational capability by 2019.

That scenario suggests that UAV platforms, satellite intelligence systems, RF intercept devices, advanced radars and sonars, and communications equipment budgets will increase. This transition from weapons systems to intelligence systems will take significant time.

In some instances, terminating (unfunding) a major existing military project is more expensive than continuing the program with reduced funding (and a lower number of units to be delivered by the prime contractor). To buy-out all the tooling costs and subcontracts on an existing program can be very expensive. I believe that we will build a few DDG-1000 destroyers, take a few more F-22 and F-35 fighters into service, and slowly reduce funding of these programs over time. At the same time, spending on new intelligence-oriented systems will increase. The net effect will be an overall reduction in military spending, which is being predicted by industry pundits.

If there is a military spending shift under the Obama regime, away from weapons platforms and to SIGINT and intelligence-gathering platforms, the established SIGINT board vendors should be prepared for an onslaught of ragtag industrial and telecom board makers, covered in flaming financial napalm, rushing into the MIL/COTS board market. They will slap a DSP chip or an FPGA on some board form factor, certify that it has passed some convoluted testing level, and represent it to the primes as "good

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"Board vendors should be prepared for an onslaught of ragtag industrial and telecom board makers."

² Military & Aerospace Electronics. "DOD to cut unmanned aerial vehicle procurement by one third over next decade". [Online] December 2008.

to go" for critical MIL applications. I've already seen some motherboards advertised at extended MIL temps. In addition, they claim to be RoHS compliant. I don't think you can use the words "Military" and "RoHS compliant" in the same sentence.

We have already seen some unreliable small form factor PC-based products used in critical MIL systems. They fail regularly at low temperatures in the field. I know of at least one program, now in redesign, that used PC-based small form factor products. The supplier of those small form factor boards had the shortest history on record as a MIL board supplier. I expect to see more of this happen as commodity products, made by commodity board vendors in survival mode, are represented as MIL application capable.

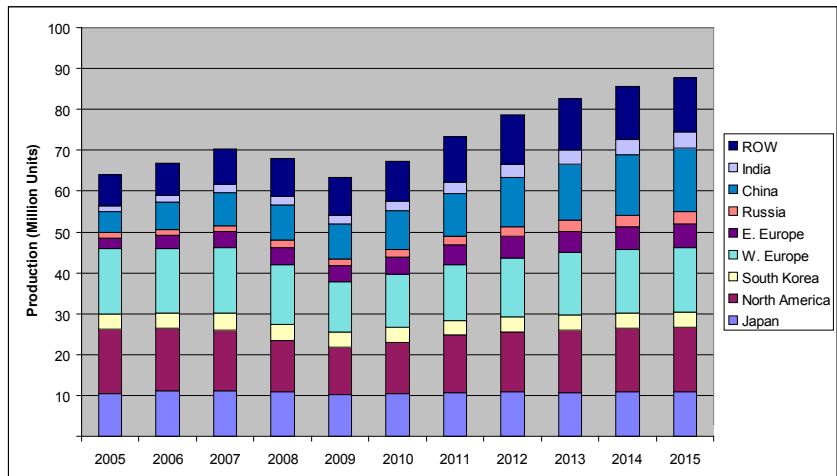
"I don't think you can use the words "Military" and "RoHS compliant" in the same sentence."

This will have the effect of tarnishing the good reputation for reliability we have developed for COTS product usage in military applications, especially for VME, VPX, VXS, and our mezzanine board products. Hopefully, field testing by the primes and the services will reveal these trashy products for what they are and flush them (and those manufacturers) out of the military supply chain. The combination of tough economic times for industrial and telecom board vendors and reduced military spending will definitely contaminate the respected MIL/COTS supply chain in the near future.

Industrial

The industrial markets are the ones most in flux today. The collapse of the U.S. automakers, the severe decline of the European automakers, and the low sales of Japanese automakers have taken a severe toll on board sales to that sub-segment. In the "good ol' days", board vendors sold many millions of dollars of board products for use in dynamometers, test stands, and automated manufacturing equipment. The U.S. demand for new cars declined from 17 million units per year in 2007 to about 15 million in 2008 according to industry reports. Forecasts predict sales as low as 10 million in 2009. With car loans difficult to get and demand for new cars falling, this market sub-segment for boards has nearly disappeared.

Global Light Vehicle Production



Source JD Power and Associates, 4Q2008

The semiconductor equipment industry declined significantly in 2008. There are many large board users in this segment (i.e., Applied Materials, Keithley, Lam Research, Speed Fam, Kulicke & Soffa, Grass Valley Group, Mattson, etc). In a December Gartner report³, they predicted a 31% decline in semiconductor equipment sales for 2008 and an additional 32% decline in 2009, the lowest CAPEX spending level in that industry since 2003. Many semiconductor companies have closed their own fabs and now have their chips made by foundries like TSMC and Charter. As a result, the demand for semiconductor manufacturing and handling equipment has declined for several years.

This trend has created a glut of cheap semiconductor handling equipment on the used market. This sub-segment may show some life as the last remaining fabs move to 450mm wafers. But I cannot find reason for hope here, not for any significant board orders from this sub-segment, for many years to come. I lost all hope when I recently

³ Gartner. "Gartner Says Worldwide Semiconductor Capital Equipment Spending to Decline 32 Percent in 2009". [Online] December 18, 2008.

read that SEMI, the trade body for vendors of semiconductor manufacturing materials and equipment, called for the European Union to bail-out the European semiconductor equipment makers⁴.

The oil and gas distribution industry would like to expand, but we are seeing a decline in demand for fuels as consumers and business cut back on energy spending during this economic slowdown. A recent report on MLPs (Master Limited Partnerships) in oil and gas pipelines from Citibank shows that these companies cannot raise capital (through the issuance of secondary offerings) to expand their energy distribution systems, not in today's equity markets. Many board-level products are used in monitoring systems on these pipelines. Sales to this segment will suffer until energy use increases and capital markets allow further investment.

With consumer and business demand for many manufactured products depressed, there is little incentive to automate factories or processes. Until we see an increase in general demand for manufactured products, board level sales in the industrial segments are likely to remain low. The strategy that makes some sense in these times is for industrial board vendors to become integrators of PC-based motherboards and I/O systems.

Medical

While health care is fairly recession-proof, the medical industry as a whole is not immune to the economic downturn. Hospitals are slowing down capital improvements and reducing staffing. Construction projects will be slowed down where possible. Fewer equipment upgrades will be made while the economy suffers. Companies focused on this segment need to be prepared for delays in programs.

Traditionally board-level products are used in PET/CAT/MRI medical modalities. From what I have seen, most of the products used in these machines are motherboards. One medical equipment maker buys \$50 million in motherboards per year from a distributor who integrates them into the packaging with the power supplies and wiring.

This exposes another observation; the top distributors are expanding their focus on PC-based motherboard products and doing integration for targeted market segments. Both Arrow and Avnet have expanded their board integration operations here in Phoenix. Arrow is focused on medical with Avnet⁵ increasing their focus on defense applications.

Telecom

The market for telecom-targeted board products is the same in 2008 as it was in the previous few years: a disaster of Biblical proportions.

Even the industry press has stopped writing about telecom boards and boxes. Whether it is hardware or services, anything associated with telecom is a consumer product in my opinion. And consumer spending has declined precipitously during this economic

	2007	2008	2009	2010	2011	2012
Semiconductor Capital Spending	63,319	46,056	30,356	34,589	43,733	51,824
Growth (%)	5.4	-27.3	-34.1	13.9	26.4	18.5
Capital Equipment	44,743	31,056	21,204	24,957	31,363	36,482
Growth (%)	6.4	-30.6	-31.7	17.7	25.7	16.3
Wafer Fab Equipment	36,005	24,868	16,643	19,352	25,009	29,727
Growth (%)	10.6	-30.9	-33.1	16.3	29.2	18.9
Packaging / Assembly Equipment	5,182	3,699	2,565	3,232	3,690	3,935
Growth (%)	-3.7	-28.6	-30.7	26	14.2	6.6
Automated Test Equipment	3,557	2,489	1,997	2,373	2,664	2,820
Growth (%)	-13.7	-30	-19.8	18.9	12.3	5.9
Other Spending	18,575	15,000	9,152	9,605	12,243	15,103
Growth (%)	3.1	-19.2	-39	5	27.5	23.4

Source: Gartner (December 2008)

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“The top distributors are expanding their focus on PC-based motherboard products and doing integration for targeted market segments.”

⁴ **ElectronicsWeekly.com.** “SEMI asks EU to help semiconductor industry”. [Online] December 10, 2008.

⁵ **Avnet Electronics Marketing Technology Review.** “Design For Time: It's About More Than Technology”. [Online].

downturn. Consumers are not spending hundreds of dollars on new cellphones or expensive faddish services. They are worried about their jobs, their retirement savings, their mortgage, and their children's education. Consumers have lost confidence in their financial future and that has reduced consumer spending on telecom fads to record low levels.

The present economic conditions have precluded any significant investment in 3G and 4G cellular systems worldwide. Why upgrade those systems when consumers and business are not willing to pay for them?

Recent forecasts predict significant declines in cellphone sales even though sales of high-end web-enabled smart phones are increasing. But the high-end cellphone market is very small so any high growth percentage is exaggerated by the law of small numbers. The primary market for cellphones is for voice-only devices and services in emerging undeveloped nations and economies. According to the Consumer Electronics Association, worldwide mobile phone sales are forecasted to slow to a 2.1% in 2009. Most of this growth will be in developing regions with a contraction expected in developed nations.

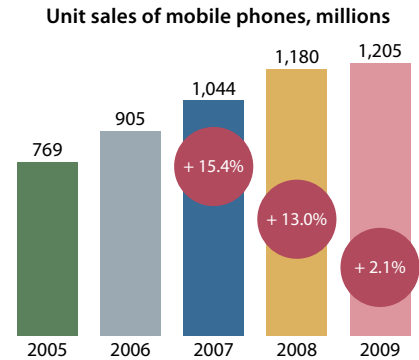
Even with the previous massive consolidation of the telecom equipment providers, the CEMs, the telecom component supply chain, and the telecom service providers, we will see more telecom-focused companies in trouble in the near future. Motorola continues to make cuts while still trying to spin-out their cellphone division⁶. Several other cellphone makers are also in trouble, some major telecom base-station equipment makers may file for bankruptcy soon.

My confidence in this industry segment declined more when I read a press release from the Telecommunications Industry Association (TIA)⁷ asking Congress to consider an economic stimulus package for the telecom equipment makers and service providers. After bailing out the banks and brokerages, the automakers, and the mortgage industry (with the government takeover of Freddie Mac and Fannie Mae), I doubt that congressional leaders and the new administration will consider any assistance to the telecom industry.

While auto industry executives are disdained in Washington for their poor management of the automakers, many of the top executives in telecom are in jail or under indictment for criminal activity. The telecom industry's reputation for nefarious and illegal behavior precludes any government assistance to ease their problems in these challenging economic conditions.

Any telecom board specification is a recipe straight out of "The Donner Party Cookbook". The sales of Motorola's telecom board group to Emerson and the sale of Intel's telecom board group to RadiSys in 2007, at 0.67 and 0.50 times sales, prove that. Additional evidence comes from the sale of Pigeon Point Systems (the primary source of systems management software for telecom boards) to Actel in July of 2008.

I do not see much opportunity in this market segment for board vendors for many years to come. Volumes and margins are too low, growth opportunities are non-existent, and further consolidation and bankruptcy of telecom equipment players are about to occur.



Source: Consumer Electronics Association (January 2009)

"I doubt that congressional leaders and the new administration will consider any assistance to the telecom industry."

6 Motorola. "Motorola Announces Third-Quarter Financial Results". [Online] October 30, 2008.

7 Telecommunications Industry Association. "Telecommunications Industry Association (TIA) Urges Congress to Consider Broadband Deployment for Economic Stimulus". [Online] October 31, 2008.

Impact of the Semiconductor Industry

In my last report I stated that the semiconductor industry was predicted to consolidate rapidly over the next few years. A few of the semiconductor companies transactions in 2008 were: ON Semiconductor bought Catalyst and part of Analog Devices, Jazz Semiconductor merged with Tower Semiconductor, and Apple bought PA Semiconductor. Near the end of 2008 a number of cellphone chip makers announced that they were selling those divisions (NXP and Texas Instruments are examples). These sales are primarily for the older generation cellphone chip groups. Forecasts for cellphone sales and shipments have been downgraded over the past year and are probably the primary driver for the divestiture of those product groups.

I believe that the rampant consolidation of the semiconductor industry will be put on hold due to economic reasons. Semiconductor shipment forecasts across the board have been downgraded throughout 2008. Gartner⁸ forecasts 2009 to be the first time there has been a back-to-back revenue decline in the semiconductor industry.

All semiconductor companies are hoarding cash in a tight credit market. M&A activity will slow dramatically in spite of previous industry predictions. Many semiconductor companies have been closing and shedding fabs as they go to fabless strategy, most of them can survive a major downturn since they have reduced their fab-based fixed costs.

We are seeing a dramatic increase in inventories in the electronics supply chain due to much lower demand according to iSuppli⁹. As this inventory continues to pile-up, it will take many months to work it off. In the short term that means that most semiconductor products are readily available and the prices of those components will drop in order to move that excess inventory. Once the inventory is worked off we will possibly go into another cycle of short supply and rising prices. Lead times could jump out to 30-40 weeks, and prices spike up radically. We have been through these semiconductor cycles many times before. The pendulum in the semiconductor industry always seems to swing to the extremes from over supply to under supply and seldom stops in the middle. These semiconductor cycles strain our industry (i.e., excess inventory creates more price competition among board vendors, and longer lead times and higher prices on components delay shipments and reduce margins).

My bigger concern is how the economic downturn might affect innovation and new products from the semiconductor industry. Newer, faster, more highly integrated ICs are the lifeblood of new products in the board and box business. If innovation and new product releases slow, as the semiconductor industry works off the excess inventory, it will cause more competitive pricing in our business (due to lower prices on those components and companies seeking to gain market share based on price). Consequently, these cycles in the semiconductor industry will create some serious effects in our industry. This could begin as early as Q1 of 2009.

According to some of my market research friends, there is a direct relationship between semiconductor cycles and other component industry cycles. Capacitors, connectors, resistors, and other components all seem to follow the semiconductor cycles and exhibit

“Every telecom board spec, whether large or small form factor, is just an updated version of The Donner Party Cookbook.”

“I believe that the rampant consolidation of the semiconductor industry will be put on hold, due to economic reasons.”

8 Gartner. “Gartner Says In 2009 Semiconductor Industry Will Experience Consecutive Years of Declining Revenue for the First Time in Its History”. [Online] December 16, 2008.

9 EDN. “Excess inventory likely to triple in Q4, could delay semiconductor industry recovery, iSuppli reports”. [Online] December 17, 2008.

the same inventory and shortage swings, slightly out of phase with the semiconductor cycle. 2009 will bring some tough challenges for our industry based on the cycles and inventory swings of our component suppliers.

M&A Updates

In 2008 I logged seven transactions in our technology space and one already this year.

The multiple (selling price over annual sales of the acquired company) in these transactions is running about the same as in past transactions, with one exception in industrial. The MIL/COTS companies sold for up to 1.6 times sales. The industrial company was sold for 0.57 times sales. I do not have the numbers for the telecom company sale (history shows telecom board companies are selling for less than 0.7 times sales).

At this point I doubt we will see any interest in acquiring telecom board companies in 2009; the vast majority of the market shares in that depressed industry segment have now been sold (Intel and Motorola). With Intel's sale of their rack mount server business (to Kontron), that removes Intel from the telecom board market altogether, after spending billions of dollars acquiring telecom-oriented companies during the first half of the decade. The January bankruptcy of Nortel proves the continuing downward spiral in telecom. Some other telecom equipment makers will probably follow the path Nortel has blazed into financial oblivion.

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The exception here is the Adlink/Ampro transaction that seems to indicate that the multiple for industrial companies has declined in value to about the same multiples as telecom companies. The decline is probably being driven by the low gross profit margins on PC-based motherboard sales into the industrial markets, the complete fragmentation of the industrial board market by so many form factors now being offered, and the declining worldwide economic situation. This decline in valuations is putting industrial companies on par with telecoms in the 0.5 multiple range.

Another interesting point is the fact that most of the acquired companies were bought by companies headquartered outside the United States. This says that those foreign companies want a position in U.S.-based markets more than they want positions in Europe or other locations. This is not surprising for the MIL/COTS acquisitions since the U.S. is the primary military market in the world. This may be the reason that the MIL/COTS acquisitions maintained their high valuations again in 2008. When you buy a MIL/COTS company, you are buying an annuity. When you buy a telecom or industrial board company, you are buying a lottery ticket.

M&A activity in 2009 will most likely be very depressed, showing few transactions. Companies are hoarding cash, stock prices are too low to use common stock to make acquisitions, and the world economic forecast is deteriorating. Any M&A activity in early 2009 will probably be from fire sales of troubled companies. I do expect to see continued interest in acquiring MIL/COTS companies since that is the only stable and highly profitable market segment left in the board business. Because of the severe market fragmentation by form factor and the declining economic conditions worldwide, I anticipate that

Parent	Target	Market Focus	Date
Kontron	Thales Computer	MIL/COTS	January 2008
Curtiss-Wright	Pentland Systems	MIL/COTS	February 2008
Adlink Technology	Ampro Computer	Industrial control	March 2008
Interconnect Systems Inc.	Nallatech	MIL/COTS	May 2008
Finmechanica	DRS	MIL/COTS	May 2008
Curtiss-Wright	VMETRO	MIL/COTS	August 2008
Kontron	rack mount server group from Intel	Telecom	October 2008
Elma	ACT/Technico		January 2009

2009 could be an active year for industrial board company acquisitions; companies seeking to buy distressed industrial board vendor assets at very cheap prices as their sales and margins decline.

If world economic conditions improve by 3Q 2009, as forecasted by the economists, we may see a resumption of M&A based on value rather than fire sales. This prediction assumes that economic conditions improve, loans become more readily available from banks, and the stock prices of public board companies rise. Without at least two of those factors improving significantly, M&A activity is likely to be very light for the entire year of 2009.

Risk Factors

There are several risks and challenges for board vendors as we enter 2009. Let's look at some of the key risks.

Cash Flow

Money is still tight in all financial markets. Lines of credit to companies are being unilaterally reduced by the banks to reduce their exposure to bad business loans. That means that all companies, board vendors and customers alike, are hoarding cash. Those conditions suggest that collection periods for invoices will increase. That will create cash flow problems for many board companies. Every company in the electronics supply chain will use their suppliers as a bank in 2009, unless the financial markets stabilize and we see more normal conditions.

Inventories

Right now we have a huge surplus of component inventory, especially semiconductors. Few components have any lead time for delivery today. That has reduced prices, giving the board vendors a lower cost and higher margins in the short term. Component factories are going idle for weeks at a time, shutting down facilities altogether, or reducing output to work-off their excess inventory. When this inventory surplus is worked-off component suppliers will be very slow to increase capacity or reopen closed facilities. Look for lead-times on components, especially semiconductors, to increase dramatically after the present excess inventory is sold-off. That will affect how fast board companies can ship orders and gain cash flow. Long component lead times mean rising component costs, squeezing margins even further for commodity telecom and industrial board vendors. I expect to see this parts shortage germ infect board companies in mid to late 2009.

Currency Exchange

The present unstable conditions in the world financial markets are causing large swings in the valuations of world currencies. The U.S. dollar fell dramatically against the Euro in 2008, began to rise in Q4, and now it is falling again. This instability will create concerns for international companies with business in foreign nations. Many companies hedge against the currencies of their invoices sent to customers from other countries for protection, especially when the collection cycles on those invoices could run 3-4 months. This will be particularly problematic for those telecom and industrial board vendors selling commodity products at 6-10% gross profit margin. What profit they made on the sale could easily be lost in currency exchange.

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US Dollar to Euro Currency Exchange Rate
Past Trend Present Value & Future Projection



Source: The Financial Forecast Center

Inflation

With every industrial nation putting trillions of government dollars into their economies to spur growth and ward-off a deep recession, we will see serious inflation problems around the world in 2010, according to the economists. This money has been created out of thin air by the governments of those nations. In the U.S., the money was used to buy securities (loans covered by bonds, common stocks, preferred stocks, etc) in Fannie Mae (FNMA) and Ginnie Mae (GNMA), as well as Chrysler and GM, and the banks and brokerage houses. If inflation does increase, the government can sell those securities, taking the money back out of the economic system, reducing the money supply, and thwarting the inflationary pressures. That is the theory anyway. When we make it through this set of present economic circumstances, we could be faced with a worse problem down the road - inflation.

Intense Competition

As this economic scenario unfolds, the board markets will not produce enough business to support all the vendors active in the markets creating intense competition, lower prices, and lower margins. Many segments are already suffering from low volumes and low margins and many vendors have been in survival-mode for several years. Companies selling to these stressed segments will have to downsize and lay-off people to survive.

Patent Assertions

I would not be surprised, as certain companies look for easy ways to generate revenue in tough economic times, to see companies who hold undeclared patents on the essential elements of certain open standards, assert them against compliant product makers to gain fees and royalties. Just before the big downturn in telecom equipment sales in 2000, a telecom equipment maker asserted patents against VITA's members on the RFI finger gaskets and the injector/ejector mechanism used on VME64 boards. They demanded huge licensing fees and royalties. VITA found prior art and broke both those patents protecting our members from this revenue-enhancement program initiated by the struggling telecom equipment maker. As business conditions deteriorate in certain segments, patent assertions against makers of open standards-based board products could increase. We have not seen many patent disclosures concerning fabric-based architectures for the past few years. I believe there are hundreds of patents on those technologies, architectures and implementations that we don't know about just waiting to be asserted.

Diversification

The objective of diversification is to protect a company from declining sales and market conditions in one particular segment and allow it to grow and be profitable from business in other segments. Telecom and industrial are both declining rapidly. The MIL/COTS market segment is growing and prosperous but requires very specialized products, talents, and skills to succeed. Many companies dropped their interest and products in MIL/COTS years ago to pursue the over-hyped telecom board markets or the motherboard and small form factor board products in industrial applications. Others maintained a footprint in each segment to some degree. Present market conditions have eradicated any protection that a diversification strategy promised.

In general terms, those companies who have focused on certain industry segments like telecom and industrial will suffer the most in today's economic situation. Those companies who are diversified across market segments will certainly suffer, but not as badly. Those companies who are focused on certain segments like MIL/COTS and medical

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“Present market conditions have eradicated any protection that a diversification strategy promised.”

will suffer the least. Prosperity and misery will be unevenly distributed across the board industry in the coming months depending primarily on how a particular company has been focused over the past few years. Companies in survival-mode, trying to change their segment focus, will find stiff resistance from those already entrenched in those prosperous and protected segments.

Summary

Alderman Axiom

Today's situation leads me to another "Alderman Axiom": *Abnormal conditions foster abnormal actions and those actions produce abnormal results.* Some of the possibilities:

- **Margin erosion:** *As competition for fewer orders heats up in certain segments, competitors will reduce prices (and their margins) to get those orders.*
- **A decline in speculative R&D:** *Companies will design new products for a specific customer and then do a general release of the product for the market. This approach has been ongoing for some time but will become more prolific.*
- **Alliances and partnerships:** *I expect to see many companies develop alliances and relationships with other companies, sometimes with competitors. This has also been ongoing for some time but will increase in the present economic circumstances.*
- **Trade associations and standards developers will become a primary information-delivery mechanism for their members:** *Marketing is getting tougher every day. Companies will rely more upon their standards developers and trade associations to expose their products, particularly through standards based web product directories. Standards-based marketing will become more prevalent. Technology by itself does not create markets. The standards for compliant implementations of that technology create the markets. Customers for a new technology demand standards for the implementation of that new technology to reduce risks.*
- **Enhancements and extensions to existing standards will increase:** *This action will supposedly open new market sub-segments. We are already seeing this action with the numerous connectors being integrated into the VPX and XMC specifications.*

Medicine for all these Germs

The only way to survive, prosper, and grow will be to "innovate" your way out of this mess. I have seen this scenario before; companies tell their people to "sell what you've got!" That is a sure-fire plan for failure. In intensely competitive market conditions I would rather sell a new advanced product against a competitor that is trying to sell older products. Companies in telecom and industrial segments will try to sell their older commodity products into new markets (MIL/COTS) and that will also fail. The only strategy that will work in these difficult times is to INNOVATE your way out, you cannot SELL your way out.

*"Alderman Axiom":
Abnormal conditions foster
abnormal actions, and those
actions produce abnormal
results*

*"The only strategy that will
work in these difficult times
is to INNOVATE your way
out, you cannot SELL your
way out."*

This industry is actually just a big game. You cannot win the game, only play it. Each year, if you play the game well, you “win” the opportunity to play it again for another year. (If you play badly and “lose”, you get to sell out to Kontron, RadiSys, Curtiss-Wright, GE Fanuc, or Mercury Computer for 0.30 to 0.50 times sales). That is the nature of our business. You cannot win, you can only play or go away.

If you look back in history, no company has ever achieved \$1 billion in annual sales in the board business. The fact that no company ever reached \$1 billion in sales or that any company has ever maintained \$500 million in sales in this industry for more than a few years seems to follow the theory set forth by Garrett Hardin in his article titled “Tragedy Of The Commons”, written in 1968¹⁰. Motorola’s board group came the closest, back in 2001, with shipments of about \$750 million. Those sales were across telecom, industrial, medical, and MIL/COTS market segments. Intel never shipped more than \$500 million in Multibus

“History says this industry cannot support a company doing \$500 million in sales more than a couple of years.”

I and Multibus II combined (according to Gnostic Concepts and other market researchers back in the 70’s and 80’s). They never shipped more than about \$100 million in their foray into the telecom board business in the last 10 years, including system and board-level sales. The largest board vendor in the market today is shipping about \$600 million worldwide but I suspect that number will come down as we enter 2009 and endure this worldwide slowdown. History says this industry cannot support a company doing \$500 million in sales more than a couple of years. That has been proven time and again whether it was changing market conditions or bad management direction that undermined them. Large companies with huge resources (Motorola, DEC, and Intel) could not create a billion-dollar division in the board business.

Valuable Lessons

- *The telecom market is not a viable market for board vendors. The low-margin/high-volume board strategy is not viable. Rapid growth strategies are not viable in these economic conditions. Indications are that the industrial board segment may be following the telecom segment into obscurity with PC-based commodity motherboards and small form factor board products.*
- *Niche players are doing better than the industry market share leaders, even in tough economic times. Niche strategies are viable because they are based on innovation (intellectual value-added) and not price/volume advantages (manufacturing value-added).*
- *The MIL/COTS segment is the only stable segment of the board business, even with a new administration in office. MIL/COTS may ultimately become the only remaining viable segment of this business, depending on the economic conditions in 2009.*

Conclusions

- *Those companies who are innovative will fare well in 2009. Those companies are in the MIL/COTS segment, doing products with FPGAs, with advanced cooling techniques, designing to higher levels of shock, temperature tolerance, vibration tolerance, and targeting avionics and space applications.*
- *Companies who maintained their older VME product lines will fare well in 2009. A large number of refresh programs, for existing platforms in MIL/COTS, will pay great dividends for the companies who maintained their legacy product lines.*

You cannot “sell” your way out of these market conditions and transitions. You can only “innovate” your way to prosperity under these circumstances. The cornucopia of existing standards and the new committees within the VITA Standards Organization (VSO) are the foundation for this period of innovation. VME, VPX, VXS, FMC, XMC, and the other technologies created in VSO are the keys to increasing sales and margins in the upcoming year for VITA’s members. And I predict that those who follow these standards will do well, both in 2009 and beyond.

¹⁰ Science Magazine. “The Tragedy of the Commons”. [Online] December 13, 1968.