



2015 State of the VITA Technology Industry



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State of the VITA Technology Industry April 2015

by: Ray Alderman, Chairman of the Board, VITA

This report provides the reader with updates on the state of the VITA Technology industry in particular and of the board and system industry in general, from the perspective of Ray Alderman, the Chairman of the Board 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 complete series of reports can be found at [Market Reports](http://www.VITA.com/MarketReports). (www.VITA.com/MarketReports)

Introduction

This issue of the “State of the VITA Technology Industry” recaps our current economic conditions. A closer look is taken at the situation in the middle east and how it impacts our defense spending. An analysis of the recent acquisition of Freescale by NXP and its impact is provided.

Business Conditions

In January, the International Monetary Fund (IMF) downgraded world economic growth from 3.8% to 3.5%,¹ the second downgrade in three months. It is highly likely that this number will be downgraded again, considering the economic situation in Europe, Japan, Russia, and China. Past growth numbers would indicate that the entire global economy is in a multi-year slump.² Deflation is hitting European and South American countries as well as Japan as commodity prices fall and economic activity slows in those nations.³

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2 Jim O’Neill, “Conventional wisdom on global growth is all wrong”, Market Watch, February 5, 2015, <http://www.marketwatch.com/story/conventional-wisdom-on-global-growth-is-all-wrong-2015-02-05?dist=afterbell>

3 Lucia Mutikani, “U.S. factory orders fall sharply, order books shrinking”, Reuters, February 3, 2015, <http://www.reuters.com/article/2015/02/03/us-usa-economy-idUSKBN0L71LG20150203>

The first estimates had Q4 U.S. Gross Domestic Product (GDP) at 2.6% growth⁴ but were later downgraded to 2.2%.⁵ The first three quarters of 2014 came in as follows: Q1: -2.1%, Q2: +4.6%, and Q3: +5.0%. We saw a slowing trend at the end of the year that has continued into Q1 of 2015. Total 2014 U.S. GDP came in at 2.3% growth, slightly better than the 2.2% growth rate of 2013.⁶

However, storm clouds can be seen on the economic horizon. Consumer spending fell in December, with disappointing holiday sales figures. That's unnerving because consumer spending is 65% of the U.S. GDP.⁷ U.S. factory orders fell 5% in December, the fifth straight month.⁸ The value of the U.S. dollar has risen as the price of oil fell 50% in 6 months, reducing U.S. exports and raising the trade deficit.⁹ Inflation in the U.S. is positive (but less than 1%) while inflation is absent in the EU, China, and Japan (all deflationary).

China grew at 7.4% in 2014, the slowest pace in 24 years.¹⁰ Additionally, China's exports dropped 3.3% in January, and their imports of raw materials dropped by 20%,¹¹ not a good sign. Meanwhile, China's total debt-to-GDP ratio is over 280% and rising.¹² A high debt-to-GDP ratio indicates an economy that produces and sells goods and services insufficient to pay back debts without incurring further debt.

Japan continues to rattle around with their debt-to-GDP ratio above 400%. Their Q4 GDP grew at an estimated 1.5%, after three preceding quarters of contraction. Japan may be coming out of their 20 year deflationary cycle, due to their version of quantitative easing (QE)¹³ (a type of monetary policy used by central banks to stimulate the economy when standard monetary policy has become ineffective). The analysts say that there is a knee in the curve of QE, where additional bond purchases have a diminishing return in GDP growth. We saw this happen in the U.S., as QE phase 2 and QE phase 3 had less and less positive effect. Economists say that knee of the curve occurred much earlier for Japan and Europe than we experienced in the U.S. We will have to wait to see if Japan can show positive GDP growth in Q2 before we know where that knee is located.

The EU came in at 0.3% GDP growth in Q4 of 2014.¹⁴ Germany led the pack with 0.7% growth. This was a surprise, considering the effects of the NATO sanctions against Russia, and the reciprocal Russian sanctions against NATO countries. France came in at 0.1% growth for Q4, another disappointment. What growth we see in Europe is anemic and vulnerable.

The European Central Bank (ECB) is pushing the euro lower, to spur exports and growth. The Swiss Central Bank dropped support of the franc against the euro and instituted Negative Interest Rate Policies (NIRP). The Danes have also instituted NIRP, but have not yet dropped the support of the kroner against the euro. In mid-February Sweden

4 "Gross Domestic Product: Fourth Quarter and Annual 2014 (Second Estimate)", Bureau of Economic Analysis, February 27, 2015, <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>

5 "U.S. economic growth in 4th quarter revised down to 2.2 percent", Omaha.com, February 27, 2015, http://www.omaha.com/money/u-s-economic-growth-in-th-quarter-revised-down-to/article_63ae2046-be9c-11e4-bc4b-873120234380.html

6 Paul Davidson, "Economy grew 2.6% in the fourth quarter", USA Today, January 30, 2015, <http://www.usatoday.com/story/money/business/2015/01/30/economy-4q-gdp-first-estimate/22548329/>

7 Paul Davidson, "Economy grew 2.6% in the fourth quarter", Reuters, January 30, 2015, <http://www.reuters.com/article/2015/02/02/us-usa-economy-spending-idKBN0L619N20150202>

8 Lucia Mutikani, "U.S. factory orders fall sharply, order books shrinking", Reuters, February 3, 2015, <http://www.reuters.com/article/2015/02/03/us-usa-economy-idUSKBN0L71LG20150203>

9 Lucia Mutikani, "Trade Deficit Widens; Weekly Jobless Claims Rise Modestly", Reuters, February 5, 2015, <http://www.dailyfinance.com/2015/02/05/trade-deficit-widens-weekly-jobless-claims-rise/>

10 Kevin Yao and Pete Sweeney, "China's 2014 economic growth misses target, hits 24-year low", Reuters, January 20, 2015, <http://www.reuters.com/article/2015/01/20/us-china-economy-idUSKBN0KT04920150120>

11 Craig Stephen, "Trouble for China as money flows out", Market Watch, February 9, 2015, <http://www.marketwatch.com/story/trouble-for-china-as-money-flows-out-2015-02-08>

12 Richard Dobbs, Susan Lund, Jonathan Woetzel, and Mina Mutafchieva, "Debt and (not much) deleveraging", McKinsey & Company, February 2015, http://www.mckinsey.com/insights/economic_studies/debt_and_not_much_deleveraging

13 Keiko Ujikane, "Japan hobbles out of recession with growth below estimates", Bloomberg News, February 16, 2015, <http://www.chicagotribune.com/news/sns-wp-blm-news-bc-japan16-20150216-story.html>

14 "GDP up by 0.3% in the Euro area and by 0.4% in the EU28", Eurostat, February 13, 2015, <http://ec.europa.eu/eurostat/documents/2995521/6625198/2-13022015-AP-EN.pdf/6f7a18eb-0b2a-466b-b444-4d240889a723>

instituted negative interest rates.¹⁵ Even German bonds are now selling at negative interest rates.¹⁶ Things do not look good going forward for the EU, except for lower oil and gas prices. If Greece defaults and leaves the euro, that could be seen as a positive event and actually drive the euro higher in value, the opposite direction the ECB wants to take it.

In South America there is not much to discuss except that Venezuela looks to be going bankrupt – again, and Argentina is wobbling. Countries who are heavily reliant on exporting their natural resources (oil, ores, metals, etc.) are faltering. This also includes Canada, where the Bank of Canada has reduced interest rates (to spur growth) and reduced their GDP forecast for 2015.¹⁷

To summarize, here are the global economic headwinds we face:

- **Deflation:** *Japan, Europe, and starting now in China, deflation has been increasing. Deflation makes it hard to pay back debt, prices fall, and GDP growth is flat to negative. (Deflation is an oversupply of commodities and unused industrial capacity.)*
- **Currency Wars:** *Interest rates in economically stagnant countries are moving to zero or lower. Japan and the EU are trying to drive their currency values lower to increase their exports. China is about to lower the value of the yuan for the same reasons. Canada is reducing interest rates, but with no need to devalue just yet.*
- **Debt:** *All the major world economies have high debt-to-GDP ratios, as their central banks print money to buy-up bonds. The EU is embarking on their own version of quantitative easing, to keep interest rates low and spur growth. The amount of money world governments are borrowing in 2015 is astonishing.¹⁸*
- **Jobs:** *While the U.S. unemployment numbers show some recovery at 5.7%, the unemployment figures for the EU hover at 11.5%. Japan's rate is at 3.4%. China is at 4.1%.*

The bigger question is this: Can the U.S. economy maintain GDP growth when all the major world economic players are sliding into recession and deflation as they devalue their currencies and while the falling price of oil continues to make the U.S. dollar stronger against other currencies? Exports are about 13.5% of U.S. GDP but as currencies fall, so will the exports. Betting on the consumer to pick up the slack if U.S. exports fall is a bad bet, considering the December and January retail sales numbers.¹⁹ Economically, things are very shaky in all the major economies except the U.S. right now. A major credit event (bankruptcy of Argentina, or the default of Greece and Grexit (Greece's exit from the euro)) could throw even the U.S. markets a financial curve ball. While things are mediocre in the U.S., they are much worse in the rest of the world.

Markets

Military and Aerospace

ISIS maintains their hold on Northern Iraq and Southern Syria. ISIS committed attacks on civilians in France, Australia, and Denmark, with a foiled attack in Belgium. ISIS attacks took place in Libya, which they want to use as a launching pad over the Mediterranean, to invade Italy and create chaos across Europe. Jordan bombed ISIS positions in Syria after one of their pilots was burned alive by ISIS terrorists. Egypt bombed locations in Libya after ISIS killed Egyptian Christians. Muslim residents of the U.S., England, and France are flying to Turkey, to cross into Syria, and join the fight

15 "Sweden joins growing group of countries with negative rates", Yahoo Finance, February 12, 2015, <http://finance.yahoo.com/news/sweden-cuts-key-rate-minus-0-1-pct-101137496--finance.html>

16 Virginia Harrison, "Yes, investors now pay to lend Germany money", CNN Money, February 25, 2015, <http://money.cnn.com/2015/02/25/investing/germany-negative-bond-yield/>

17 "Bank of Canada shocks markets with cut in key interest rate", CBC News, January 21, 2015, <http://www.cbc.ca/news/business/bank-of-canada-shocks-markets-with-cut-in-key-interest-rate-1.2921370>

18 Mike Bird, "Here's how much debt every major economy in the world will borrow this year", Business Insider, March 6, 2015, <http://www.businessinsider.com/heres-how-much-debt-every-major-economy-in-the-world-will-borrow-this-year-2015-3>

19 Lucia Mutikani, "U.S. retail sales data point to slower economic growth", Reuters, February 12, 2015, <http://www.reuters.com/article/2015/02/12/us-usa-economy-retail-idUSKBN0LG1ST20150212>

with ISIS. The number of ISIS supporters (read “whackos”) per square meter in Iraq and Syria is pretty high. Their objective now is to raise the number of supporters per square meter in Europe.

The U.S. planned a coordinated attack for the spring to take back Mosul, a town of over 1 million people in Northern Iraq, now controlled by 2,000 Sunni ISIS fighters. But that plan got delayed because the Iraqi army is not trained well enough. The president of Egypt called for a coalition of Arab countries to join forces and fight ISIS on the ground across the Middle East.²⁰ Now, the Shia Iranians are taking the lead, directing the Iraqi army, in attacks on the town of Tikrit.²¹ Do I see that the Shia Iranians are rescuing the Sunni and Kurdish Iraqis from Sunni ISIS? Iraq is a mostly Shia country, so I smell a rat here. At least the U.S. has no troops in this fight—yet. But the outcome could see the Iranians annex Iraq and oust the Sunni president along with the fledgling democracy the U.S. set-up. Iran’s involvement is very suspect here. Shia Iran is more interested in controlling Iraq than in destroying ISIS. If I were a Kurd or a Sunni in Iraq right now, I would be packing-up the family camel for a trip.

“If I were a Kurd or a Sunni in Iraq right now, I would be packing-up the family camel for a trip.”

How big is ISIS? Estimates range from 17,000 to 200,000 supporters/fighters. A good estimate could be at least 100,000 fighters,²² scattered around the middle east (ME) and Africa. The FBI says they have active investigations of suspected ISIS members ongoing in all 50 U.S. states.²³

Who is ISIS? It’s a radical Sunni sect, led by al-Baghdadi. He was captured by U.S. forces in Fallujah, Iraq in early 2004 and released as a “low-level prisoner” later that year. In 2010, he became the leader of al Qaeda in Iraq. In April of 2013, he declared the formation of ISIS (the Islamic State of Iraq and Syria), and rejected the ruling of emir al Zawahiri requiring that his Islamic State be confined to Iraq. Baghdadi declared himself caliph of the new Islamic State (ISIS), and adopted the name of Muhammad’s father-in-law (Abu Bakr) to make it appear as though he had the authority to become the Islamic leader through a tangential descendency from Muhammad (more about this later). He then broke-off any affiliation with al Qaeda. In November of 2014, reports emerged that U.S. airstrikes on ISIS positions in Mosul, Iraq had killed al Baghdadi, but he was only wounded. In January 2015, reports claimed that al-Baghdadi had been wounded again, in an airstrike on al Qa’im. After two close calls, he moved out of Iraq and into Syria, which was in the midst of a civil war, offering him a higher level of safety from U.S. bombing missions. He knows that the U.S. has restrictions on bombing Syrian targets while Bashar al-Assad hangs on to his presidential seat by his fingernails. Assad is supported by the Russians and the Iranians, keeping the U.S. from launching military missions very far from the Iraq border.

Al-Baghdadi is a problematic candidate for a SEAL mission like the Bin Laden raid, or a Predator assassination mission with Hellfires, as long as he remains in Syria. The Iranians and the Russians are perfectly happy to let al-Baghdadi and ISIS be a thorn in the side of the U.S., Europe, and the other ME countries. An expanded attack on Syria could bring Iran and Russia into a war with the U.S. in the ME. Iran is betting on the U.S. taking some action against them, so much so that they are practicing attacks on models of U.S. aircraft carriers in the Straits of Hormuz.²⁴

ISIS and al-Baghdadi are Sunni. Bin Laden and al Qaeda were/are Sunni. Saddam Hussein was Sunni. Taliban is Sunni. Gaddafi was Sunni. Boko Haram is Sunni. But, Iran is Shia, Assad is Shia, and Hezbollah is Shia (now you know why Iran supports Assad in Syria and Hezbollah in Lebanon). Even more interesting is that Assad (an Alawite version of Shia) is the president of Syria, a primarily Sunni country.

20 “Sisi calls on Arabs to field united force against ISIS”, The Jerusalem Post, February 24, 2015, <http://www.jpost.com/Middle-East/Sisi-calls-on-Arabs-to-field-United-force-against-ISIS-392018>

21 Tony Badran, “Iran is exporting its Islamic Revolution into Syria, Iraq and Yemen just as it did in Lebanon”, Business Insiders, March 6, 2015, <http://www.businessinsider.com/iran-is-exporting-the-islamic-revolution-into-syria-iraq-and-yemen-just-as-it-did-in-lebanon-2015-3>

22 Ross Keith, “How Many Fighters Does ISIS Have?”, Vocativ, February 19, 2015, <http://www.vocativ.com/world/isis-2/how-big-is-isis/>

23 Noah Rothman, “Good news: FBI is investigating ISIS aspirants in all 50 states”, Hot Air, February 25, 2015, <http://hotair.com/archives/2015/02/25/good-news-fbi-is-watching-isis-aspirants-in-all-50-states/>

24 David Blair and Robert Midgley, “Iran attacks replica US ship in military drill”, The Telegraph, February 25, 2015, <http://www.telegraph.co.uk/news/worldnews/middleeast/iran/11434660/Iran-attacks-replica-U.S.-ship-in-military-drill.html>

83% of the Muslim world is Sunni and about 15% is Shia (the rest are Kurdish or some other small variant). After a diligent web search, here is the Sunni-Shia population breakdown of the ME countries. The numbers are harmonized estimates from multiple sources. Taking an accurate census of people living in mud huts and chasing goats in 6th century countries is impossible.

This brings up the question: What is the difference between the Sunni and the Shia? The Sunni believe that the leader of the Muslim world must descend from Abu Bakr, Muhammad’s father-in-law, who ruled after Muhammad died in 632AD. Shia believe that the only rightful leader of Islam must be a direct decedent of Fatima, Muhammad’s only surviving child, and her husband Ali, the son-in-law of Mohammad, who didn’t rule until after Bakr (632-634), Umar (634-644) and Uthman (644-656). Ali was imam from 656-661. Then, there are the Kurds who are part Shia and part Sunni. The Sunni, Shia, and Kurds further break down into a host of other sub-sects, like Sufists, Alevis, Fayli, Sadrists, Salafists, Twelvers, Alawis, Shafi, and a few others. In the Islamic world, all the fuss is about who has the authority to succeed Muhammad. There are other geographical, religious, and historical differences, but succession from Mohammad is the primary difference.

Sunni/Shia Composition

Country	% Sunni	% Shia
Syria	74	13
Saudi Arabia	90	10
Egypt	98	2
Sudan	98	2
Somalia	99	0
Libya	97	2
Afghanistan	80	19
Pakistan	80	20
Jordan	95	2
Yemen	55	45
Kuwait	70	30
Oman	10	40
Lebanon	30	30
Iraq (with about 20% Kurds in the North)	20	60
Iran	9	90

The Sunni, Shia, Kurds, and sub-sects, persecute and kill each other on a regular basis, when they have the chance. Sunni leaders of Arab countries jail and kill Shia. Shia leaders of Arab countries do the same to Sunni. Both do it to the Kurds. A Muslim who does not believe in another’s version of Islam is an apostate. A non-Muslim is an infidel. They all despise past and present European and U.S. influence in their region. They all believe that they should be ruled by their own unique version of Islamic law, based on their sect’s unique interpretation of the Quran and the Hadith, as the only true Islamic religion.

To understand all this, we must look back at the fall of the Ottoman Empire, the colonization of the ME countries by Britain, France, and Italy, and how the borders of the ME countries were drawn after WW I and WW II.²⁵ This explains Bin Laden’s anti-colonialist comments and attitudes towards Europe and the West. What we have here is a mess created by many (mostly European) hands in the early 20th century. Now, the mess is getting worse as the U.S. (under Presidents Bush and then Obama) meddle with what the colonial Europeans left us, by trying to establish a democracy in Iraq, in hopes that peaceful democratic governments will spread across the ME like wildfire. Just look at the Sunni-Shia percentages of the countries listed, and explain to me how that’s going to work. The Sunni and Shia do not get along, based on fundamental religious differences going back to 632AD. A representative government in any of these countries would be biased towards the Sunni in most places, the Shia in others. Religion is politics in the ME, and to my knowledge, nowhere in the Quran or Hadith does it say anything about democracy.

Intervention in the ME by Europe and the U.S. has exacerbated these religious conflicts. Containment has not worked either, as we have seen with 9-11 in the U.S., and the attacks in Australia, France, Denmark, and Belgium. At this point, the only clear future for the unstable Middle East countries, as long as they present a threat to Europe and the U.S., will be their purpose as the world’s largest bombing range. If you want to understand the details of the ME conflicts, read Michael Gordon and Gen. Bernard Trainor’s new book on the history of the Iraq war, “*The Endgame*”. Better yet, read the article in The Atlantic Magazine: “*What ISIS Really Wants*”.²⁶ You won’t sleep for a week.

²⁵ Lisa Reynolds Wolfe, “History of Colonization in the Middle East and North Africa (MENA): Precursor to Cold War Conflict”, The Cold War, January 11, 2013, <http://www.coldwarstudies.com/2013/01/11/history-of-colonization-in-the-middle-east-and-north-africa-mena-precursor-to-cold-war-conflict/>

²⁶ Graeme Wood, “What ISIS Really Wants”, The Atlantic, March 2015, <http://www.theatlantic.com/features/archive/2015/02/what-isis-really-wants/384980/>

Now, the Shia Houthis are taking over Yemen (50% Sunni), right in Saudi Arabia's (Sunni) backyard. The Saudis are massing their troops on the border and initiating airstrikes against Houthi strongholds before they come across their southern borders. They seek to reinstate Hadi as the Yemen leader. Eight countries have joined Saudi Arabia in the coalition against the Houthis while Pakistan (Sunni) just joined with military support.²⁷ Iran is trying to become a regional power by supporting Hezbollah, Houthis, and Assad in Syria (all Shia) in the region, but fighting ISIS (Sunni) in Syria and Iraq. What we have here is a proxy war between Saudi Arabia (Sunni) and Iran (Shia). With the U.S. backing Saudi Arabia, the Russians could come in and support Iran, and then we would have a proxy war between the U.S. and Russia, with the potential for WW III.²⁸

Other Military Concerns

Fourth generation warfare (4GW) with terrorists in the Middle East is not our only problem. We must still deal with our 3GW enemies: Russia, China, Iran, and North Korea. *Military Embedded Systems* has published five insightful articles I have recently written on this topic.²⁹

- *Russia is flying bombers near the border of NATO countries.³⁰ Their subs have been spotted off the coast of Sweden.³¹ Russian bombers have been seen 50 miles off the coast of California.³² They have been sending troops and weapons into the Ukraine conflict. In November of 2014, a Russian fighter jet shut down all the defensive missile systems aboard a U.S. Navy Aegis destroyer in the Black Sea and buzzed the ship for 90 minutes with impunity.³³ U.S. and NATO sanctions over the Ukraine situation have crippled the Russian economy. Russia is a petro-economy, and the falling price of oil has heavily contributed to their financial difficulty. Yet, they are planning a new supercarrier for their navy.³⁴ The Russians have only one small operational carrier in their fleet now, the Admiral Kuznetsov built in 1985.³⁵ It was built at the Nikolayev South Shipyard on the Black Sea, in the Ukraine. Russia has no deep water shipyards in their country that can build such large ships, so that gives you a clue as to why the Soviets are hell bent on taking over the Ukraine.*
- *China increased their military budget by 10% for 2015, bringing their spending to \$145 billion.³⁶ Not to be outdone by the Russians, China, India, and Japan are embarking on building new aircraft carriers for their fleet.³⁷ China now has more submarines than the U.S. Navy. India is undertaking a program to increase their sub fleet, since they don't trust the Chinese.³⁸ But, before you decide that China has the upper hand, they have plenty of problems that make their warships less than effective. Corruption, bad management, flakey communications, and low quality all*

27 Nick Thompson and Inez Torre, "Yemen: Who's joining Saudi Arabia's fight against the Houthis?", CNN, March 30, 2015, <http://www.cnn.com/2015/03/27/world/yemen-saudi-coalition-map/>

28 Vikas Shukla, "Yemen Conflict Could Trigger World War 3", ValueWalk, March 30, 2015, <http://www.valuwalk.com/2015/03/yemen-conflict-world-war-3/>

29 Series of articles by Ray Alderman, Military Embedded Systems, <http://mil-embedded.com/author/rayalderman/>

30 Ben Farmer, "Russian bombers intercepted near British airspace", The Telegraph/Business Insider, February 19, 2015, <http://www.businessinsider.com/russian-bombers-intercepted-near-british-airspace-2015-2>

31 Con Coughlin, "Swedish hunt for Russian submarine sparked by interception of encrypted message, newspaper claims", The Telegraph/National Post, October 20, 2014, <http://news.nationalpost.com/2014/10/20/swedish-hunt-for-russian-submarine-sparked-by-interception-of-encrypted-message-newspaper-claims/>

32 Bill Gertz, "Russian Bombers Fly Within 50 Miles of California Coast", The Washington Free Beacon, June 11, 2014, <http://freebeacon.com/national-security/russian-bombers-fly-within-50-miles-of-california-coast/>

33 Kurt Nimmo, "Russians Disable U.S. Guided Missile Destroyer", Info Wars, November 13, 2014, <http://www.infowars.com/russians-disable-u-s-guided-missile-destroyer/>

34 Fred Weir, "Russian Navy plans new supercarrier, but will it ever float?", The Christian Science Monitor, March 4, 2015, <http://www.csmonitor.com/World/Europe/2015/0304/Russian-Navy-plans-new-supercarrier-but-will-it-ever-float-video>

35 "Kuznetsov Class (Type 1143.5) Aircraft Carrier, Russia", Navel-Technology.com, <http://www.naval-technology.com/projects/kuznetsov/>

36 Jeremy Bender, "China's military budget is booming", Business Insider, March 4, 2015, <http://www.businessinsider.com/chinas-military-budget-is-booming-2015-3>

37 Jeremy Bender, "This chart shows how China, India, and Japan are competing to develop their own aircraft carriers", Business Insider, February 25, 2015, <http://www.businessinsider.com/heres-a-chart-of-all-the-aircraft-carriers-in-asia-2015-2>

38 Jeremy Bender, "This chart shows the competition between India and China's submarine fleet", Business Insider, March 3, 2015, <http://www.businessinsider.com/india-china-submarine-fleet-comparison-2015-3>

discount China's military capabilities in anything but a local ground war.³⁹ A better view of this is the number of submarines by country provided by Global Fire Power.⁴⁰

- Iran is supporting terrorists all over the Middle East, but their primary ambition is to acquire nuclear weapons, not carriers and submarines. Meanwhile, they are developing defensive tactics against U.S. weapon platforms. In February, Iran's Revolutionary Guards staged an attack against a model of a U.S. aircraft carrier in the Straits of Hormuz, using small gunboats.⁴¹ They seem to ignore the fact that our carriers operate in battle groups, with destroyers, missile boats, and patrol aircraft screening that carrier. This is not surprising: since camels are the ship of the desert, they seem to be using the familiar camel strategy against real ships. Good luck with that.
- North Korea – what can I say? According to a 2014 DoD report, North Korea's weapons are rusting away, they cannot get parts for repairs, and they have no money to buy new weapons.⁴² The full report is very revealing on what North Korea's capabilities are. They have barely enough food to feed their army: North Korean soldiers are doing raids across the border into China, to steal food.⁴³ North Korea could probably fight a conventional 3GW war for only a few weeks, but then resort to their nuclear weapons. In one report I read, our intelligence people RADAR-tracked North Korean military aircraft on training missions. They observed that the planes were only in the air for 35-40 minutes during each exercise. A few intelligence analysts concluded that the North Korean air force was low on fuel and had to cut the missions short. After speaking with HUMINT (human intelligence) sources, another analyst concluded that the North Korean air force generals only put about 45 minutes of fuel in their planes to keep the North Korean fighter pilots from flying across the border to China or South Korea and defecting. North Korea could make a mess of South Korea, even in a short conflict. You can expect Kim Jung Un to continue to do outrageous and provocative things until his generals undertake a coup.

China is happy to let Kim Jung Un be a thorn in the side of the U.S. and South Korea. An attack on North Korea could bring China into a war with the U.S. in the Koreas. Kim Jung Un keeps lobbing rockets, torpedoes, and artillery shells at South Korean vessels and disputed islands. We can certainly expect the North Koreans to go bat-guano-crazy again as the U.S. begins joint military exercises with the South Korean forces in March.⁴⁴

“Since camels are the ship of the desert, they seem to be using the familiar camel strategy against real ships. Good luck with that.”

What is the U.S. doing?

The best way to look at where the U.S. is headed is to look at the roadmaps for the Department of Defense (DoD) weapon platforms. Considering that China, Russia, India, and Japan are undertaking new submarine and aircraft carrier initiatives, look at the Unmanned Systems Integrated Roadmap 2013-2038. The Unmanned Undersea Vehicle (UUV) roadmap is classified.⁴⁵ You will have to do some searching for articles on the latest UUV developments to piece together an idea of the progress. There are mini-autonomous submarines, smart torpedoes, and the planned

39 Bill Gertz, “China's military is riddled with weaknesses”, Business Insider, February 12, 2015, The Washington Free Beacon/ Business Insider, <http://www.businessinsider.com/bill-gertz-chinas-military-is-riddled-with-weaknesses-2015-2>

40 “Total Submarine Strength by Country”, Global Fire Power, February 17, 2015, <http://www.globalfirepower.com/navy-submarines.asp>

41 Babak Dehghanpisheh, “Watch Iran attack a model US aircraft carrier with speed boats”, Reuters/Business Insider, February 25, 2015, <http://www.businessinsider.com/r-iran-stages-war-games-boats-hit-mock-up-us-ship-2015-2>

42 “The North Korean Army Is Rusting Away—But Does It Matter?”, Medium.com, <https://medium.com/war-is-boring/the-north-korean-army-is-rusting-away-but-does-it-matter-ea33bb0576d>

43 Rosalind Mathieson, Andrew Davis, and Andy Sharp, “North Koreans Walk Across Frozen Border River to Murder Chinese”, Bloomberg Business, January 13, 2015, <http://www.bloomberg.com/news/articles/2015-01-13/north-koreans-walk-across-frozen-river-to-china-to-commit-murder>

44 James Pearson, “U.S., South Korea to start military drills amid tension with North”, Reuters, February 24, 2015, <http://www.reuters.com/article/2015/02/24/us-northkorea-southkorea-drills-idUSKBN0LS0FZ20150224>

45 “Unmanned Systems Integrated Roadmap”, U. S. Department of Defense, 2013, <http://www.defense.gov/pubs/DOD-USRM-2013.pdf>

Upward Falling Payload (UFP) systems.⁴⁶ Look at the Bluefin, then Blackghost AUV. While all the platforms mentioned in published articles are non-lethal, they might give you a hint as to why the master UUV roadmap is classified.

Next, take a look at the UAV roadmap.⁴⁷ We've stopped buying Predators and moved to the Reaper platforms. Look at the X-47b (Lockheed) and the Phantom Ray (Boeing), the next-generation of Unmanned Combat Air Systems (UCAS). The Phantom Ray made its first flight on April 27, 2011. The X-47b made its first carrier takeoff and landing on July 10, 2013. Then, look at the DARPA Falcon project, the Hypersonic Test Vehicle (HTV).⁴⁸ We have a number of new diabolical UAV platforms in test flight now.

Boeing is underway with the design concepts for the F/A-XX 6th generation fighter jet,⁴⁹ in both manned and unmanned versions. Very soon the Pentagon will be discussing the contracts for the next-generation Long Range Strike Bomber (LRS-B),⁵⁰ to replace the B-1 and the aging B-52.

There are many new programs in Intelligence, Surveillance, and Reconnaissance (ISR) platforms. For just one example, take a look at the high altitude anti-submarine warfare-unmanned targeting air system (HAASW-UTAS) carrying magnetic anomaly detectors (MAD) sensors.⁵¹ Submarines are big chunks of metal, and they distort the earth's magnetic field. MAD sensors find them, from high altitudes above the water, and send-in the appropriate weapons to neutralize them.⁵² If you want to understand the concepts of anti-submarine warfare (ASW), read Peter Huchthausen's book, "October Fury", an accounting of the hunt for Russian submarines during the Cuban missile crisis in October 1962. If China and Russia want to play games with submarines, we will play that game with ASW platforms and weapons.

Lockheed demonstrated a 30KW laser weapon taking-out a truck in early March.⁵³ New laser weapons are being installed on U.S. warships to defend against speedboat attacks. We are seeing the development of high-energy weapons and deployment on our ground, naval, and aircraft platforms.

The Army is tinkering with new helicopter designs for the battlefield, to move troops into position and provide air support. Some of these designs are interesting.⁵⁴

The CIA has created a new cyber espionage unit to counter cyber war in March. If you have no idea how bad cyber-attacks are today, take a look at the real time chart of attacks.⁵⁵



Photo courtesy of Lockheed Martin

46 Evan Ackerman, "DARPA Wants to Seed the Ocean Depths With Upward Falling UAV Pods", IEEE Spectrum, January 22, 2013, <http://spectrum.ieee.org/automaton/robotics/military-robots/darpa-wants-to-seed-the-ocean-depths-with-upward-falling-robot-pods>

47 "Unmanned Aircraft Systems Roadmap", Federation of American Scientists, 2005, http://fas.org/irp/program/collect/uav_roadmap2005.pdf

48 "DARPA Falcon Project", Wikipedia, http://en.wikipedia.org/wiki/DARPA_Falcon_Project

49 Dave Majumdar, "Boeing unveils updated F/A-XX sixth-gen fighter concept", Flightglobal, April 8, 2013, <http://www.flightglobal.com/news/articles/boeing-unveils-updated-fa-xx-sixth-gen-fighter-concept-384291>

50 Clay Dillow, "This single Pentagon program is going to upend the combat jet industry", Fortune, March 5, 2015, <http://fortune.com/2015/03/05/long-range-strike-bomber>

51 John Keller, "BAE Systems to develop MAD ASW drone to help Navy P-8A find submarines from high altitudes", Military & Aerospace Electronics, January 14, 2015, <http://www.militaryaerospace.com/articles/2015/01/bae-subhunting-drone.html>

52 Pierre Bienaimé, "How The Navy's New Anti-Submarine Aircraft Sees Under The Waves", Business Insider, November 21, 2014, <http://www.businessinsider.com/posieden-seeing-subs-under-waves-2014-11>

53 "Laser weapon blasts through truck", Fox News, March 7, 2015, <http://www.foxnews.com/tech/2015/03/06/lockheed-martin-demos-high-powered-laser-weapon-blasts-through-truck>

54 Dan Lafontaine, RDECOM Public Affairs, "Army engineers define future aviation fleet", www.Army.mil, March 2, 2015, http://www.army.mil/article/143354/Army_engineers_define_future_aviation_fleet/?con&dom=newscred&src=syndication

55 Norse, <http://map.ipviking.com>

There is a host of activity involving advanced Signals Intelligence (SIGINT), RADAR, SONAR, and Electronic Warfare (EW) systems. But that is all classified. Look at the new NVidia Tegra X-1 mobile super chip: Maxwell 256-core GPU, 8 CPU-core, 64-bit ARM® CPU, at 1 teraflop of processing power, can handle 12 camera feeds at the same time, and uses less than 10 watts of power. Consider what this super chip can do for advanced ISR algorithms. Advancements in processor technology continue to push the intelligence closer to the sensors.

We are moving toward 6GW systems where we will be able to manipulate space and time (from our enemy's perspective), a topic for the next report. When we can find a 3GW \$1 billion enemy submarine with our new 6GW \$1 million ASW systems, and take it out with a 6GW \$100K smart torpedo (a UUV), that's great value for our money in the defense budget. 6GW systems and weapons could make 3GW platforms totally obsolete and ineffective in war.

Semiconductor

The biggest news in both semiconductor and mergers/acquisitions is the recent announcement that NXP Semiconductor is buying Freescale Semiconductor.⁵⁶ This news comes on the heels of IBM literally giving their semiconductor division and fabs to Global Foundries, along with \$1.5 billion in cash, in 2014. NXP is the semiconductor remnant spun-out of Philips (Netherlands) in 2006. Freescale is the semiconductor remnant spun out of Motorola in 2004. Both were sold to private investor groups and later taken public.

There are both economic and technical reasons for NXP to buy Freescale. First off, the EU is going into deflation and the ECB is trying to devalue the euro to spur growth as we have discussed earlier. That makes anyone holding cash or assets in euro exposed to significant valuation losses in the future. It makes sense for NXP to move money out of euros and into U.S. dollars, with the purchase of U.S. assets. Second, Freescale has great market penetration in the automotive segment with their microcontrollers, where NPX processors are mostly used in low margin consumer products and cellphones. Third, NXP can borrow billions of euros to finance the transaction at near-zero interest rates. In the future they can pay off that debt with cheaper euros as they trade Freescale profit dollars for more euro, and actually get a discount on the purchase price of Freescale.

Among Freescale's flagship products are Power Architecture® processors, meaning this merger could have an effect on our embedded industry that is heavily dependent on those processors. About 95% of the VME installed base and upgrade market is Power Architecture-based. The U.S. Navy, followed by the Army and Air Force, selected the Power Architecture as their standard processor architecture for many applications years ago and have millions of lines of DO-178 qualified code, using the Altivec instruction set, running on critical embedded systems. If NXP were to fall out of love with the Power Architecture and focus on IoT (Internet of Things) and microcontrollers for automotive, and drop the Power Architecture, that could cost the DoD billions of dollars to rewrite and re-qualify all that code to DO-178 specs on another processor. The Power Architecture customer base is primarily networking and automotive, with only a small number of embedded developers in critical embedded applications.

When you look at the world economic situation today, the U.S. economy is the leper with the most fingers: not great, but better than the rest of the world. When you look at Freescale, they are the semiconductor leper with the fattest fingers, considering their design-ins in automotive and the Power Architecture installed base. Looking at it technically, even with Freescale's problems, they look better as a partner than the other semiconductor lepers with no fingers. So, NPX will keep what Freescale brings to the party, to generate free cash flow in U.S. dollars. Those dollars will buy more euros in the future, enabling them to pay-off their debt at a discount. This transaction looks to be based more on the declining fortunes of Europe than it does about Freescale's technology. The threat of the Power Architecture going away is not immediate but could rise in the future, depending on how well NXP manages the merger and the assets they are gaining. Keep in mind that IBM, the other Power Architecture processor vendor, gave their fabs and semiconductor product lines to Global Foundries, and you'll start getting nervous if you are sitting on a lot of Power Architecture code.

⁵⁶ Nadia Damouni and Suzanne Barlyn, "NXP to buy Freescale, create \$40 billion company"; Reuters, March 2, 2015, <http://www.reuters.com/article/2015/03/02/us-nxp-semicondtrs-freescale-m-a-exclusi-idUSKBN0LX1RU20150302>

The semiconductor industry is at a new threshold that is sure to change the way the industry operates.⁵⁷ It is being driven by the ability to connect things together. New partnerships are being created that look nothing like what we have seen in the past. Microsemi's purchase of Vitesse, Intel's search for a FPGA solution, and numerous changes in fab production partners by Apple and others is creating a lot of churn in the industry right now. The picture for the future is not clear yet but hang on for some big changes.

Mergers and Acquisitions

Besides the big news that NXP Semiconductor bought Freescale, BAE Systems bought Eclipse Systems, a maker of RF front-ends, from Esterline for \$28 million in December 2014.⁵⁸ If you remember, Esterline bought Eclipse for \$120 million back in January of 2011, this latest sale suggests a net loss of \$98 million. Eclipse made RF front-ends for signals intelligence and digital receivers, an active and promising segment of the MIL industry. So the big question is, what happened?

On the surface, there could be an explanation for the brief relationship between Esterline and Eclipse. In the RADAR/SONAR/SIGINT/COMINT/EW segments, the name of the game is to move the RF front-end as close to the back-end digital processing elements as possible, to increase performance and eliminate latencies. That requires expertise in FPGA-based DSP cores and algorithms, high speed A/D, and GPU processor technologies, and reducing the RF front-end subsystem to a board in a VPX chassis.

Recall that Mercury Systems bought Micronetics back in 2012. Micronetics also made RF front-ends for SIGINT, COMINT, and other RF systems, and that acquisition seems to be going well. Mercury Systems has all the elements, from both internal talent and through acquisitions. Possibly Esterline didn't have the skills in those areas of tightly-coupling RF to digital to make the Eclipse purchase work. Now, we will see if BAE Systems has those skills.

Summary

Let's see what we have here, from an economic standpoint:

- *Deflation is settling in across the globe, driven by falling oil and commodity prices, along with excess manufacturing capacity everywhere. Twenty-two country's central banks have lowered interest rates to spur growth.⁵⁹ Six EU countries are seeing bonds trade below zero percent interest rates at this writing.⁶⁰ In early March, Austria became the seventh to see negative interest rates.⁶¹ This is not only a bad sign for Europe, but for the entire world economy. There is a lot of scared money in Europe these days.*
- *Debt in this world is growing dramatically, especially sovereign debt and corporate debt.⁶² Debt is a bet on the future. European money is saying the future is not that bright right now, investors have shifted their goals from return on investment to capital preservation. Debt can be easier to pay back if the currency of that debt is devaluing: the debtor will be paying it back with cheaper currency in the future. These are definitely abnormal financial times,*

57 Ed Sperling, "Big Acquisitions, Big Changes", Semiconductor Engineering, April 9, 2015, <http://semiengineering.com/big-acquisitions-big-changes/>

58 John Keller, "BAE Systems boosts expertise in ISR signal processing and sensors with Eclipse Electronic acquisition", Military & Aerospace Electronics, December 15, 2014, <http://www.militaryaerospace.com/articles/2014/12/bae-acquires-eclipse.html?cmpid=EnlMAEspeJanu62015>

59 Edgar Su, "Factbox - How low can they go? Central bank policy easing in 2015", Reuters, February 5, 2015, <http://in.reuters.com/article/2015/02/05/central-banks-idINKBN0L90C120150205>

60 Matthew Yglesias, "Something economists thought was impossible is happening in Europe", Vox, February 26, 2015, <http://www.vox.com/2015/2/5/7981461/negative-interest-rates-europe>

61 Emese Bartha, "Austria sells bonds at negative yield", Market Watch, March 3, 2015, <http://www.marketwatch.com/story/austria-sells-bonds-at-negative-yield-2015-03-03-81035718?siteid=yhoof2>

62 David Leonhardt, "Global Debt Has Risen by \$57 Trillion Since the Financial Crisis", New York Times, February 5, 2015, http://www.nytimes.com/2015/02/06/upshot/global-debt-has-risen-by-57-trillion-since-the-financial-crisis-heres-why-that-is-scary.html?_r=2&abt=0002&abg=0

especially in Europe, and this is the game being played – take on mountains of debt now, at low interest rates, and pay it back later with a devalued currency – if all goes according to plan.

- Cheap money, created by artificially low interest rates, causes money to flow out of zero-yield bonds and into investments like real estate and over-priced stocks. The price/earnings (PE) ratio of Amazon (AMZN) is 775 today, while the PE ratio of the entire S&P 500 is at 19. Lots of scared European money has been coming into the U.S. stock markets and into other dollar-denominated assets, artificially driving up the prices. Cheap money creates bubbles in some asset classes, those bubbles can burst. Just look back at the dot-com bust, the mortgage backed security bank bust, and the Y2K bust for examples.
- Many world economic powers are in a currency war, trying to devalue their currencies to give them a price advantage in the global markets and create growth through exports.⁶³ With no growth in the global markets, it's now a zero-sum game. To grow, you take business away from another country, with your cheaper currency. That causes the losers to devalue their currency, creating a race to the bottom. This game has advantages for the larger economic powers. The smaller economic players go broke after a few rounds of devaluation--just watch Russia, Venezuela, and Argentina.

There is a lot of hysteresis in the levers of a country's monetary policy, with no meter attached to them that measures how QE/devaluation/interest-rate-reductions influence economic growth. As we saw in the U.S., the more we pushed on the QE lever, the less effect it had on GDP growth. Economic aberrations seem to move East to West, with some amount of lag time. Maybe Europe is now where the U.S. was about 3-5 years ago, they observed that experience and marked their meter dial accordingly, and they hope it's accurate.

No matter, though – globalization has connected all countries in this world through the banks. The insolvency of one country's banks can bring down another country's banks leading to a domino effect that can bring down yet another country's banks, ad nauseam. This effect is called "contagion", it can be avoided when the central bank of a failing country backstops their commercial banks by bailing them out with cash, as the Federal Reserve did in the U.S. in 2009 and the ECB did in both the Greece and Cyprus financial crises. Flooding the banks with money, if needed, is another part of the plan.

Economies are like rubber bands: once you wind them up with artificially low interest rates, QE, and monetary devaluation policies, they need to unwind and release that energy at some point, and get back to "normal". Pulling back on the monetary policy lever, slowly over time, should release that energy in an orderly fashion (a "soft landing"). Pull back too hard, and you burst the asset class bubbles that have been formed (a "hard landing"). How much, how soon, how late, and for how long you pull back on the lever is an economist's wild-ass guess.

It looks like Europe, Japan, and China are all pushing their monetary policy levers hard-forward, while the U.S. might start pulling back on its monetary lever in the summer (i.e., an interest rate increase by the federal reserve). This all reminds me of the Wizard behind the curtain in "The Wizard of Oz", pushing and pulling on his levers (but he had meters!). His goal was to show his power by distorting the reality of the people in front of the curtain. Economic reality, however, has a nasty habit of un-distorting itself quickly, in spite of human intervention.



“How much, how soon, how late, and for how long you pull back on the lever is an economist's wild-ass guess.”

Now, let's review the military situation:

- Iran has taken the lead in the war on ISIS in Iraq while American forces are out of the game for now. Since Iran is Shia, and President Assad of Syria is Shia (although Syria is a primarily Sunni country), there could be an ulterior motive here. Ultimately, Iraq could be broken-up into three segments: the southern Sunni part would ally with Sunni Saudi Arabia, the northern part would ally with Turkey and Kurdistan (the Kurds), and the western part could become part of Iran (Shia). Or, the whole country could become part of Iran. So much for the fledgling democracy in Iraq.

63 Trish Regan, "Regan: As currency war erupts, buy American", USA Today, March 2, 2015, <http://www.usatoday.com/story/money/2015/03/02/federal-reserve-strong-dollar-trish-regan/24257969/>

- *Russia, while their economy is collapsing due to falling oil prices and sanctions, is trying to regain satellite countries like Ukraine and is playing dangerous games with NATO. If oil prices continue to fall and the Russian economy does collapse again, the Russian people would not be happy and the Putin regime could be done. Who knows what would come next from the remaining Russian leadership.*
- *China is trying to become a regional power by playing games with Viet Nam (offshore oil rigs), Japan (over some worthless islands), and the Philippines (over fishing grounds). China wants to be a world power, but they have to become a regional power first. They do not have the navy or the air force to even become a regional power, but they are increasing their military spending to get those assets and exert their influence on surrounding countries. China is primarily investing in older 3GW platforms to confront their regional enemies, while the U.S. is investing in 5GW and 6GW platforms.*
- *North Korea is holding at two weeks away from starving to death, but they are still dangerous. They could do something stupid and start a destructive short-term skirmish with South Korea (and the present U.S. troops). Japan is also nervous about what North Korea will do. Any North-South conflict would initiate a response from both the U.S. and China. Internally, we could see a coup that ousts Kim Jung Un – a threat that is totally unpredictable.*
- *Due to the present administration's unexplainable efforts toward an agreement to allow Iran to keep their reactors, uranium enrichment centrifuges, and plutonium harvesting program, Saudi Arabia announced in mid-March that they have inked a deal with South Korean nuclear engineering companies to build two nuclear reactors in their country. The Saudis are Sunni, and like the Jews of Israel, they see the present U.S. administration's casual and lackadaisical attitude about Shia Iran gaining nuclear weapons as untenable. With that in mind, the Saudis are about to embark on their own nuclear weapons program.⁶⁴ The U.S. State Department is looking like an idiot on this one, as well as the White House looking like they are ignoring the consequences. Our closest middle eastern ally, Saudi Arabia, is now afraid that the present administration is cooking-up bizarre and dangerous deals with Shia Iran that will endanger the existence of both Israel and the other major Sunni countries.*

We'll have to wait and see what happens on both the economic and the military front in the next six months.

And now, our markets:

- *Military spending in the U.S. will continue slowly. High-end systems (RADAR, SIGINT, SONAR, COMINT, and EW) offer great opportunities: large complex systems have high prices and high margins, but low volumes. Upgrades will be an important part of our business for the foreseeable future.*
- *The industrial segment will suffer due to slower world economic growth and overcapacity in manufacturing. Local governments have no money for additional spending on transportation systems, that will hurt EU board vendors more than the U.S. Some vendors will run with reckless abandon into the IoT (Internet of Things) market and be starved by commodity margins, just like we saw happen to telecom board vendors. The collapse of the telecom board market could be seen from space. The collapse of the terribly over-hyped IoT board market will be visible from other universes.*

The gold is in high-end systems, especially in military applications. There is some silver in upgrades to existing MIL systems. There is a little here and there in the industrial segment as it adjusts to world economic conditions, with nothing in the oil and gas industry. If I were a board salesman in the industrial segment, I would be studying for the real estate license exam.

As George Bernard Shaw once said, "The secret to success is to offend the greatest number of people." I hope this report has accomplished that goal!

⁶⁴ Jay Solomon and Ahmed Al Omran, "Saudi Nuclear Deal Raises Stakes for Iran Talks", The Wall Street Journal, March 11, 2015, <http://www.wsj.com/articles/saudi-nuclear-deal-raises-stakes-for-iran-talks-1426117583>