



2022 State of the VITA Technology Industry



October 2022

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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/Market_Reports). (www.VITA.com/VITA_Technology_Industry)

Introduction

From COVID-19 to Monkeypox and then to polio; that is the new medical reality. From lockdowns and negative GDP growth under COVID-19, to inflation, energy shortages, high interest rates, factory lockdowns, lower world GDP, and layoffs; that is the economic picture. From Russia invading Ukraine to Ukraine invading Russia (if they choose to take back Crimea); that is the military situation. I said things did not look good going forward in the last white paper. And I was right. So, it is time to make you aware of silicon-based extraterrestrial life here on earth.

Economic Conditions

On the medical news front, COVID-19 was upstaged by Monkeypox, that got replaced by the polio virus, recently found in the New York city wastewater. Winter is coming, so we will see if the next medical crisis in the news headlines reads "A virulent version of the flu virus is discovered!"

At the macro level, the International Monetary Fund said that world GDP grew 6% in 2021. They forecast 3.2% world growth for this year, and a drop to 2.7% growth in 2023. The war in Ukraine, energy shortages, inflation, and disrupted supply chains are weighing heavily on global GDP growth.¹

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¹ Hannah Ward-Glenton, "IMF cuts global growth forecast for next year, warns 'the worst is yet to come'", CNBC, October 11, 2022, <https://www.cnbc.com/2022/10/11/imf-cuts-global-growth-forecast-for-2023-warns-worst-is-yet-to-come.html>

Now, let us take a look at the Q2 numbers. Q2 USGDP declined 0.6% after declining 1.6% in Q1.² The U.S. inflation rate, driven by food, housing, and energy prices declined to 8.3% in August, down from 8.5% in July and 9.1% in June. The U.S. unemployment rate increased to 3.7% in August, up from 3.5% in July.

The Federal Open Market Committee (FOMC) has raised interest rates five times this year for a total of 3%. The last rate hike was in September (0.75%), and they said to expect further raises in November and December (0.50% each time). That would put the Federal Reserve rate at 4% by year's end. That has strengthened the dollar and weakened other currencies. The Euro has fallen to parity with the U.S. dollar, and the UK Pound is not far from parity.

Further, the Fed said that they expected to see USGDP growth come in at about 0.2% for this year, with a rise in unemployment to 4.4% by the end of the year.³ To them, reducing inflation is more important than economic growth or low unemployment.

The Fed wants to lower the inflation rate to 2%, but the hammer they are using (higher interest rates) will smash other parts of the economy at the same time. Mortgage rates are already above 6%, reducing the demand for homes and mortgages. And higher interest rates are clobbering the stock markets. The S&P 500 is down about 21% so far this year. The Dow Jones Industrial Average is down about 14%, and the NASDAQ is down about 30%.

China's Q2 GDP declined by 2.6% after growing 1.4% in Q1, with an inflation rate of 2.4%. Russia's GDP fell by 4.1% in Q2, with an inflation rate of 14.3%. Both countries will have a tough time for the rest of the year. Russia will suffer more from the sanctions over their invasion of Ukraine, and China has locked down over seventy cities and their factories for COVID-19 outbreaks.

In Europe, EUGDP grew 0.8% in Q2, after growing 0.6% in Q1. Inflation in the EU hit 9.1%, driven by high energy and food prices. Unemployment in the EU was 6.6% in July. In the UK, their GDP fell 0.1% in Q2, after growing 0.8% in Q1, and their inflation rate is hovering around 10%. In Germany, their Q2 GDP grew 0.1% after seeing 0.8% growth in Q1, August inflation was 7.9%. In France, their GDP grew at 0.5% in Q2, after declining 0.2% in Q1. Their inflation rate was 5.8% in August, down from 6.1% in July. The bright spots for the EU in Q2 were Netherlands and Spain (GDP growth of 2.6% and 1.1% respectively). Supply chains across the world are still a mess and it is not likely that will be resolved anytime soon.

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But things look bleak for the EU going forward. Russia has turned-off the gas pipelines that heat their homes, power their factories, and generate their electricity. Several countries have put price controls on natural gas and electricity, pushing their local energy providers into bankruptcy. France nationalized their largest power generator (EDF).⁴ While Germany has nationalized a local gas supplier (Uniper).⁵ Additionally, Germany took control of a local Russian oil refinery, to keep gasoline flowing in Berlin.⁶

Germany has passed new energy use laws: sections of public buildings will not be heated, homes must turn thermostats down, all illuminated advertising signs must be turned off at night, hot water heaters in public buildings will be turned off, doors on shops must remain closed all the time.⁷ There may not be enough gas and electricity to get through the winter without interruptions. Germans realize that their comfort could be jeopardized, so they went out and bought-

2 Lucia Mutikani, "U.S. economy contracts mildly in second quarter; no sign of recession in underlying data", Reuters, August 25, 2022, <https://www.reuters.com/markets/us/revision-shows-mild-us-economic-contraction-second-quarter-2022-08-25/>

3 Paul Davidson, "Fed hikes interest rate 0.75 percentage point to tame inflation, and sees aggressive increases ahead. What's it mean for you?", USA Today, September 24, 2022, <https://finance.yahoo.com/news/fed-hikes-interest-rates-0-180020745.html>

4 Francois De Beupuy, Ania Nussbaum, and William Horobin, "France to Nationalize Debt-Laden EDF as Energy Crisis Mounts", Bloomberg, July 6, 2022, <https://www.bloomberg.com/news/articles/2022-07-06/french-premier-says-state-wants-to-own-100-of-edf>

5 Kirsti Knolle and Anne Kauranen, "Germany takes over Uniper, raising rescue bill to \$29 bln", Reuters, September 21, 2022, <https://www.reuters.com/business/energy/fortum-sells-uniper-stake-germany-05-billion-euros-2022-09-21/>

6 "Germany takes control of Russian-owned refinery", CNBC/Reuters, September 16, 2022, <https://www.cnbc.com/2022/09/16/germany-takes-control-of-russian-owned-refinery-.html>

7 Rina Goldenberg, "Germany implements energy-saving rules", Deutsche Welle (DW), September 1, 2022, <https://www.dw.com/en/germanys-energy-saving-rules-come-into-force/a-62996041>

up all the wood-burning stoves and firewood on the market.⁸ So much for their “green energy” push in Germany. People would rather stay warm and bathe in hot water than save the planet.

Many German companies are already reducing their production, due to high electricity and gas prices. Bakers, ammonia plants, car makers, smelters, and steel mills say they cannot afford to support their production levels. Numerous articles claim that Germany is about to undergo “deindustrialization” as their manufacturing plants close during this energy crisis.⁹ About 47% of Germany’s GDP is from exports, so look for their GDP to experience declines as the factories shut down this winter. Hopefully, the beer industry there is exempt from the new energy use restrictions (there are over 1500 breweries in Germany). If the people of Germany are cold, thirsty, and lose their jobs at the closed factories, that might inspire social unrest!

We are seeing European enthusiasm for their mythical green energy policies dwindle as they prepare their old, shuttered coal-fired power plants for operation this winter. They are buying natural gas from suppliers in the Middle East (at soaring prices). And their people are preparing to burn wood to stay warm and heat water, with less concern about contributing to climate change. Suddenly, their beliefs and priorities have changed. This reminds me of the old saying, “When you’re up to your hips in alligators, it’s hard to remember that your original objective was to drain the swamp.” Could this change in environmental sentiment lead EU countries to break the alliance and drop their compliance with the sanctions against Russia, tell Putin they are deeply sorry, and ask him to turn the gas pipelines back on? That depends on how cold and snowy it gets in Europe this winter, and how much economic turmoil and social unrest the energy shortage creates. European passion for impractical green energy policies, coupled with their reliance on Russia for natural gas, have created a tough situation.

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On an international level, we have seen the governments of five countries collapse over the past year: UK, Italy, Romania, and Bulgaria. Denmark’s government collapsed in early October. There are several “political risk maps” on the web, that list other possible candidates.

Let us move our attention to my favorite slow-motion train wreck: the auto industry. Their spasmodic move to electric vehicles (EVs) is creating momentous changes in their structure, economics, and technology at the same time. Back in March, Ford split their company into three divisions: Ford Model E (for electric vehicles), Ford Blue (for gas vehicles), and Ford Pro (for commercial vehicles). In September, Ford released their new dealership plan. Their dealers can choose to sell only gas-powered vehicles with few contract changes. If they want to sell EVs, there are two plans. The first requires dealers to sell at fixed prices (no haggling) and install charging stations (at a cost of about \$500,000 to the dealer), with a cap on how many vehicles they can sell each year. Or, they can become an “Elite” dealer, but they must install more charging stations (at the cost of about \$1 million to the dealer) with no cap on how many vehicles they can sell.¹⁰ In August, Ford announced the layoffs of 3,000 people effective at once, and 5,000 more in the near future. (Tesla also laid off 229 people in their autopilot division.) It takes about 30% fewer workers to make an EV than a gas-powered vehicle, so they will be handing out more pink slips to employees than keys to new EVs for many years to come.

The CEO of Ford also said that the company must stop advertising: that adds \$600 to \$700 to the cost of every vehicle sold and puts them at a pricing disadvantage in the market.¹¹ They lose money on every EV they sell today. He says Ford must move to an on-line direct-sales model and use the dealerships for delivery to the customer. FYI, Tesla spends no money on traditional advertising of their vehicles, only word-of-mouth.

8 Oliver JJ Lane, "Imported Energy Crisis Sees Wood Burning Stoves, Dry Firewood Sell Out in Germany", Breitbart, July 2, 2022, <https://www.breitbart.com/europe/2022/07/02/imported-energy-crisis-sees-wood-burning-stoves-dry-firewood-sell-out-in-germany/>

9 "Germany faces a looming threat of deindustrialisation", The Economist, September 11, 2022, <https://finance.yahoo.com/news/germany-faces-looming-threat-deindustrialisation-190652755.html>

10 Rob Stumpf, "No More Markups? Ford Will Make Dealers Agree To No-Haggle Pricing", The Drive, September 14, 2022, <https://www.thedrive.com/news/no-more-markups-ford-will-make-dealers-agree-to-no-haggle-pricing>

11 Levin Day, "Ford CEO Jim Farley Says Direct Sales, No Ads, Will Sell Future EVs", The Drive, June 3, 2022, <https://www.thedrive.com/news/ford-ceo-jim-farley-says-direct-sales-no-ads-will-sell-future-evs>

Volkswagen announced in September that they will spin-out their Porsche division and take it public.¹² That move should give them about \$9 billion, to finance their future efforts for electric cars in their VW, Mercedes, and other divisions. Watch for Ford to spin-out their Model E division as a separate company. Then watch GM start restructuring and spin-out their electric vehicle division.

Before the automakers go bankrupt, they are planning to implement “subscription” options for features in the vehicles they sell. Want your heated seats to work? That is \$18/ month. Want access to Apple CarPlay or Android Auto? That is \$80/ month. Want the batteries in your car to take you four hundred miles before a charge, instead of 250 miles? That is \$100/month (some EVs have mileage monitors that can restrict your range, even though the batteries can take you much farther). After you buy a new car, expect to pay an average of \$135/month to enable features already installed in the car.¹³ Certain features will be “bundled”, just like your cable or satellite TV provider packages channels, but to get one most-wanted feature, you will have to subscribe to a list of other features you don’t want. My advice? Take care of your gas-powered car, keep it running as long as you can, and ignore electric vehicles for a while. All EVs on the market today can be roughly categorized as prototypes, and customers who buy them could be loosely classified, to some degree, as crash-test dummies. EVs may be the future, but they have problems to work out.

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Here is a feature you will not have to pay for: intelligent speed assistance (ISA). That is a computer, software, cameras, and a network connection that automatically limits your vehicle’s speed to the speed limit on the road you are traveling (a driver nanny). That feature is mandatory on all vehicles (gas or EV) sold in the EU after July 2024.¹⁴ If the government wants to control your speed on the highway, what will they want to control next? There are new efforts to put breathalyzers on all cars. You must blow into a tube after you get into the car and presence is determined on the driver’s seat by a weight sensor. If alcohol is detected, the car will not move.

While driving an EV, you are sitting on top of the big battery. Sometimes, those batteries go into thermal runaway and create a vapor cloud of flammable gasses. That has led to fourteen vapor cloud explosions (VCE) events since 2010.¹⁵ Think about that the next time you ride in an EV. Speaking of batteries, prepare to pay over \$20,000 for new batteries when your car explodes, or your warranty runs out (whichever comes first). In June, Ford recalled 49,000 electric Mustangs for battery issues: they might overheat and weld-together or permanently-open the contacts on the main power relay.

Green energy explosions are not limited to EV batteries. Over the past few years, six Amazon fulfillment centers have seen their solar power systems burst into flame. So, they shut all the others down until the problems are found and identified. They claim that bad installation and flakey components were to blame.¹⁶ Check your insurance coverage if you have solar panels on your roof!

If you are eyeing a new Toyota BZ4X electric, or a Subaru Solterra EV, check the wheels. Over 5,000 of these vehicles have been recalled because the wheels fall off regularly (the hub bolts snap under braking pressure or when turning corners).¹⁷ Every EV maker (except Tesla) is losing money on every car they sell. They are carelessly trying to drive their cost down by using cheaper unproven components (i.e., batteries, power relays, hub bolts, etc.).

12 "Porsche IPO Set To Become Europe's Largest Listing In Over A Decade", Zerohedge.com/Yahoo Finance, September 19, 2022, <https://finance.yahoo.com/news/porsche-ipo-set-become-europe-173000766.html>

13 Andrew J. Hawkins, "The future of cars is a subscription nightmare", The Verge, July 13, 2022, <https://www.theverge.com/2022/7/13/23206999/car-subscription-nightmare-heated-seats-remote-start>

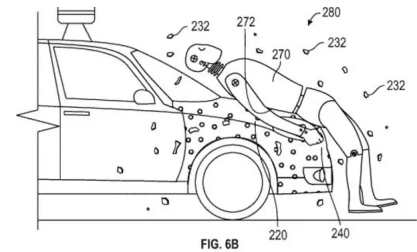
14 A. Khalid, "EU will require all new cars to include anti-speeding tech by 2024", Engadget, July 7, 2022, <https://www.engadget.com/eu-intelligent-speed-assistance-vehicles-anti-speeding-europe-000007992.html>

15 Emma Sutcliffe, "A look at electric car explosions", EV FireSafe, February 4, 2022, <https://www.evfiresafe.com/post/electric-car-explosions>

16 Matt Vespa, "Want to Guess Why Amazon Had to Shut Down All Its Solar-Powered Facilities in the US Last Year", Townhall, September 23, 2022, <https://townhall.com/tipsheet/mattvespa/2022/09/23/amazons-green-future-is-ablaze-as-company-nixes-all-solar-rooftops-over-fires-n2613519>

17 Victoria Scott, "Toyota CEO Leans on Japan To Soften EV Push As it Recalls Only EV on Sale", The Drive, June 24, 2022, <https://www.thedrive.com/news/toyota-ceo-leans-on-japan-to-soften-ev-push-as-it-recalls-only-ev-on-sale>

Finally, carmakers patent everything they can in their vehicles, to give them even small competitive advantages. As they fight for their survival in the EV market, expect them to start asserting a plethora of patents against their competitors. The dumbest one so far is a patent on a “sticky hood” (held by Google, US9340178B1). If you hit a pedestrian while silently driving down the street in your EV, that unfortunate person will stick to the hood of your car and not experience further injury by being dragged down the road or getting run over by the wheels.¹⁸ Surely there is a can of special solvent in the trunk, to release the pedestrian from the adhesive on the hood! I wonder if that is a free feature, or something you must pay a \$20 per month subscription for, to unlock the compartment in the trunk holding the solvent?



As you can see, economic conditions look precarious going forward, being influenced by inflation, energy and food shortages, and disrupted supply chains. Business models are changing rapidly too, driven by advances in technology and environmental policies, especially in older established industries. We will have to wait and see how things play out, especially in Europe. As stated by Kristalina Georgieva, managing director of the International Monetary Fund, on October 6, “If we are to navigate our way through this period of historic fragility, we must weave a new economic and social fabric.”

Technology

Let us start with the news you have all been waiting for. In June, the PCI-SIG announced the PCIe 7.0 specification, due to be released in 2025.¹⁹ It will run at 512GB/s (x16). This is interesting for several reasons. First, running those signals through copper connectors should be fun. Next, this announcement comes before PCIe 5.0 (128GB/s x16) chips are available in volume. And it comes when PCIe 6.0 chips (256GB/s x16) have not come to market yet. Additionally, the CXL Consortium released their CXL 3.0 specification (Compute Express Link) for data centers in October, enabling new levels of scalability.²⁰

The EU passed laws in June mandating USB-C style charging ports on all rechargeable consumer electronics products (phones, earbuds, hand-held game devices, headphones, headsets, and e-readers).²¹ Laptops have until 2027 to convert their products to USB-C. Unbundling will also be mandatory: you can buy your charger separately from the device, from any supplier. This new law puts Apple in a bind, with their Lightning chargers, as this new law gets adopted around the world.

You probably missed this announcement, but again in June, Japan's National Institute of Information and Communications Technology (NICT) transferred data at a new speed record: 1.02 Petabits per second (a petabit is one million gigabits).²² They used a standard multi-mode optical fiber (certainly not copper). This speed will allow ten million channels of 8K broadcasting per second. It makes PCIe 7.0 look awfully slow, doesn't it?

In May, the new Frontier Supercomputer at Oak Ridge National Labs set a new processing record: 1.102 Exaflops per second.²³ That beat-out the earlier fastest machine, Japan's Fugaku Supercomputer (442 Petaflops per second). The

18 Arjun Kharpal, "Google patents sticky car hood to protect pedestrians upon crash", CNBC, May 19, 2016, <https://www.cnbc.com/2016/05/19/google-patents-sticky-car-hood-to-protect-pedestrians-upon-crash.html>

19 Steve Dent, "PCI Express 7 will be eight times faster than PCI Express 5", Engadget, June 22, 2022, <https://www.engadget.com/pci-express-7-launching-in-2025-with-512-g-bs-speeds-090102752.html>

20 Danny Moore, "CXL 3.0: From Expansion To Scaling", Semiconductor Engineering, October 6, 2022, <https://semiengineering.com/cxl-3-0-from-expansion-to-scaling/?cmid=d9eb09fd-bbf2-453a-bbad-ecd85df36b10>

21 Renaud Foucart, "New USB-C charger rule shows how EU regulators make decisions for the world", The Conversation, June 12, 2022, <https://theconversation.com/new-usb-c-charger-rule-shows-how-eu-regulators-make-decisions-for-the-world-184763>

22 Jane Nam, "Japan sets new record, brings world closer to internet 100,000 times faster than current speeds", YahooNews, June 3, 2022, <https://www.yahoo.com/news/japan-sets-record-brings-world-211744363.html>

23 Brian Wang, "USA ORNL Frontier Supercomputer is the First True Exaflop Supercomputers", Next Big Future, May 31, 2022, <https://www.nextbigfuture.com/2022/05/usa-ornl-frontier-supercomputer-is-the-first-true-exaflop-supercomputers.html>

TOP500 maintains a ranking of the top 500 supercomputers plus what CPUs/GPUs and interconnects they use. Frontier is the first machine to hit the Exaflop level of computing.

Frontier uses seventy-four 19-inch racks to house all the electronics and consumes 21 Megawatts of power when running flat-out. Much of that power is consumed by moving data around on networks connecting all the circuit boards. The next versions of exaflop machines will be built with chiplets, dies connected in a 2D or 3D package. That will get rid of many of the network connections and reduce power consumption while increasing computing performance.²⁴

Another interesting area is the development of portable nuclear micro-reactors for power generation (small modular reactors or SMR).²⁵ Back in April, the Pentagon contracted for their first one, generating from 1MW to 5MW of power for 3 years without refueling, operating in the space of a standard trailer (about 48 feet long, 8.5 feet wide, and 13.5 feet high). Some of our nuclear submarines have 200+MW reactors in a tube 48 feet in diameter and 55 feet long. Portable reactors in a trailer might get up to about 20MW in the future. Maybe the EU authorities in Brussels will mandate that every European home install an SMR in their living room by January, to get through their energy crisis!

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In another development in the energy market, General Motors has created a new business unit - GM Energy. They will sell batteries, solar panels, chargers, and cloud services that allow your electric vehicle to power your home in an emergency and feed electricity back to the grid from parked EVs. This looks like a horizontal market strategy, to subsidize their unprofitable EV products.²⁶ When operational, the batteries in parked EVs will create a distributed electric grid in certain areas, to power homes and businesses. GM will take a cut of the price of the energy being fed back to the grid by the connected EVs. This is just an extension of the automakers' subscription services plans. Tesla and Ford already offer this capability and other EV makers will probably follow.

Here is an example of the unintended consequences of technology. The new iPhone 14 has a crash-detection feature, that senses when you are in a car wreck (with an accelerometer) and automatically calls 9-1-1. It could also call emergency services when you are riding on a roller coaster!²⁷ So you will need to turn-off the crash-detection mode on your iPhone before you get on a ride, or you might get a ticket and a fine.

The Metaverse is my new target of exploration. After spending \$10 billion on Horizon Worlds, Meta's (Zuckerberg's) version looks like the Pong game from the 1970's. The graphics are reported to be terrible.²⁸ Meanwhile, they are merging the digital wallets of Meta and Facebook so they can be used on those platforms plus Whats App and Instagram, to hold crypto currencies and non-fungible tokens (NFTs).

Meta has joined forces with Microsoft, Nvidia, and eight other companies to develop the Metaverse standards.²⁹ Apple and Google have declined to join the effort. The big difficulty is moving easily from one company's metaverse to another, and being able to carry your digital money, NFTs, digital art, your avatar's designer clothes, and your magic

²⁴ Mark Lapedus, "Chiplets Enter The Supercomputer Race", Semiconductor Engineering, March 17, 2022, <https://semiengineering.com/chiplets-enter-the-supercomputer-race/>

²⁵ Jaspreet Gill, "Idaho National Labs to build Pentagon's mobile 'nuclear microreactor'", Breaking Defense, April 13, 2022, https://breakingdefense.com/2022/04/idaho-national-labs-to-build-pentagons-mobile-nuclear-microreactor/?_ga=2.21415357.780098105.1649883356-695904110.1649883355

²⁶ John Rosevear and Michael Wayland, "GM is launching a new business to connect homes and businesses with EV chargers, energy storage", CNBC, October 11, 2022, <https://www.cnbc.com/2022/10/11/gm-energy-launches-to-connect-homes-businesses-with-ev-chargers-energy-storage.html>

²⁷ Florence Ion, "iPhone 14's Car Crash Detection Feature is Calling 911 About Roller Coaster Rides", Gizmodo, October 10, 2022, <https://gizmodo.com/iphone-14-roller-coaster-car-crash-detection-turn-off-1849639868>

²⁸ Nitish Pahwa, "Why the Metaverse Has to Look So Stupid", Slate, August 19, 2022, <https://slate.com/technology/2022/08/mark-zuckerberg-metaverse-horizon-worlds-facebook-looks-crappy-explained.html>

²⁹ Sharon Harding, "Meta and Microsoft team up to create metaverse standards; Apple, Google sit out", ARS Technica, June 22, 2022, <https://arstechnica.com/gadgets/2022/06/meta-and-microsoft-team-up-to-create-metaverse-standards-apple-google-sit-out/>

wand with you. Meta0 (not to be confused with Zuckerberg's Meta) is developing the protocol to connect all the metaverses.³⁰ There is also a big issue about true ownership of digital assets that must be worked out.³¹

Here is a thought: if you leave Meta's metaverse for another company's metaverse, maybe there's an exit fee? The fee to access Horizon Worlds is \$400 and they are losing money like crazy right now. They already take a 47.5% cut on the sales of any digital products in Horizon Worlds.³² In the middle of all this, the value of crypto currencies has collapsed, along with NFT prices.³³ Europe is about to levy new rules and taxes on all metaverse universes too (no surprise there).³⁴ The seven most popular metaverses today are: Axie Infinity, Cryptovoxels, Decentraland, Roblox, The Sandbox, Somnium Space, and Star Atlas, ever hear of any of these?³⁵ Make sure you buy your virtual reality headset (prices go up to \$3,000) so you can get the most out of the clunky graphics and spasmodic movement of the avatars. Here is another thought: just go buy a new EV and watch the wheels fall off, or the car blow up from a VCE event, in perfect 3D motion and living color, no VR headset needed!

Nvidia has created an AI-based object generator for the metaverse.³⁶ As stated earlier, the metaverse sites open today are clunky and not very well populated with objects. Nvidia's GET3D can generate buildings, cars, animals, furniture, and other 3D objects at about twenty per second with nice texture and color. Look at this tool as a wallpaper generator for the metaverse.

Meta announced their AI-based "make-a-video" tool. It can generate a video from text.³⁷ Type in "a man walks his dog" and the tool will create a video of a man walking his dog. Just try to imagine the incredibly stupid and disturbing videos this tool could create. As Einstein said, "The difference between genius and stupidity is that genius has its limits."

Walmart has also entered the metaverse.³⁸ They have partnered with online gaming platform, Roblox. In Walmart World, you can see and buy the products in their stores and on their website. In Universe of Play, you can play games. Their entry into the metaverse is aimed at people twenty-five and younger. I wonder if there will be a traditional Walmart greeter when you enter those domains?

Finally, Martian rock samples should return to earth in 2033, so the scientists are developing a biosafety level 4 facility to receive them.³⁹ We have no idea what potentially deadly critters those rocks might contain, so it is important that none of them get loose and destroy every living thing on the planet. On the other hand, about one hundred metric tons of rocks and dust enter the earth's atmosphere every day, so maybe those Martian pathogens are already here. In 1984, a 4.3-pound Martian meteorite was discovered in Antarctica (AH84001). Under a microscope, it looks like the fossilized remains of alien bacteria are on the rock, but that claim has been contested. That piece of Mars came to earth

30 Brian Wang, "New Startup to Connect Metaverses", Next Big Future, July 5, 2022, <https://www.nextbigfuture.com/2022/07/jason-fung-former-faming-head-at-tiktok-new-startup-to-connect-metaverses.html>

31 João Marinotti, "Can you truly own anything in the metaverse?", The Conversation, April 21, 2022, <https://theconversation.com/can-you-truly-own-anything-in-the-metaverse-a-law-professor-explains-how-blockchains-and-nfts-dont-protect-virtual-property-179067>

32 Jon Fingas, "Meta will take a 48 percent cut from sales in Horizon Worlds", Engadget, April 13, 2022, <https://www.engadget.com/meta-metaverse-virtual-good-sales-cut-142832149.html>

33 Ryan Browne, "Bitcoin sinks below \$19,000 as crypto meltdown intensifies", CNBC, June 18, 2022, <https://www.cnbc.com/2022/06/18/bitcoin-sinks-below-20000-as-crypto-meltdown-intensifies.html>

34 Natasha Lomas, "Europe wants to shape the future of virtual worlds with rules and taxes", TechCrunch+, September 14, 2022, <https://techcrunch.com/2022/09/14/eu-metaverse-virtual-worlds-tax/>

35 Lisa Kailai Han and Kari McMahon, "Insider's Guide to the Metaverse: How to play, make money, and party in 7 of the most popular virtual worlds right now", Insider, April 25, 2022, <https://www.businessinsider.com/what-is-the-metaverse-decentraland-axie-infinity-roblox-sandbox-facebook-2022-4>

36 Kris Holt, "NVIDIA's new AI model quickly generates objects and characters for virtual worlds", Engadget, September 23, 2022, <https://www.engadget.com/nvidia-ai-model-get3d-virtual-worlds-objects-130021127.html>

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38 Melissa Repko, "Walmart enters the metaverse with Roblox experiences aimed at younger shoppers", CNBC, September 26, 2022, <https://www.cnbc.com/2022/09/26/walmart-enters-the-metaverse-with-roblox.html>

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about 13,000 years ago. Watch the old movie "The Andromeda Strain" to see what happens when alien microbes get loose on earth!

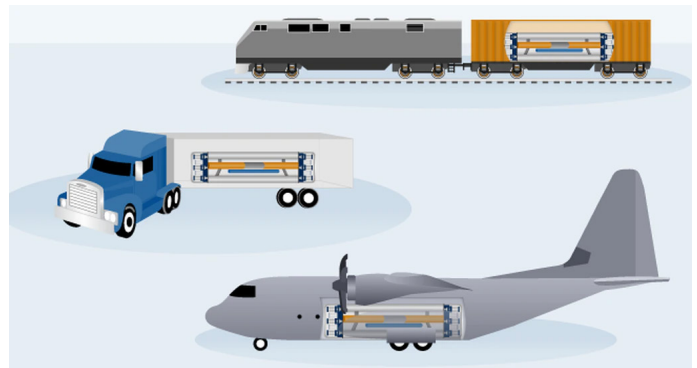
Military

Starting at the top, the Pentagon has renamed their UFO office again. It was called Airborne Object Identification and Management Group (AOIMG). Now, it is called All-domain Anomaly Resolution Office (AARO).⁴⁰ The reason for this name change is because they forgot to consider transmedium flying saucers that come and go from the oceans. If you are a civilian, you can still report UFOs on the National UFO Reporting Center (NUFORC) website. They have collected over 150,000 UFO reports over their existence. Here in Arizona, we rank #7 in UFO sightings (4,721 reported)!

And be aware that the United Nations has a UFO office...sort of. It is called United Nations Office for Outer Space Affairs (UNOOSA). Their role is to ensure that space is open and available to all the countries on earth. The Search for Extraterrestrial Intelligence (SETI) people have a protocol, to report to UNOOSA people if they intercept alien communications. But the UNOOSA people do not have a protocol concerning what to do with it. And UNOOSA does not have a procedure yet, about what to do if extraterrestrial aliens land in some country, who will talk to them, and what they will say. We will get to that later.

Now that you have an idea about how clunky the commercial metaverse is, you need to look at the U.S. Army's version called Synthetic Training Environment (STE).⁴¹ It uses realistic images of the terrain anywhere on the planet, managed by Bohemia Interactive Simulations' Mantle ETM software, which ensures that all people and platforms in the simulation see exactly the same trees, bushes, buildings, vehicles, and the minute details of the area. According to reports, it is much better than what Meta and other commercial companies have designed so far. The Space Force is independently working on their version of the metaverse, called "Spaceverse." I have not found anything about the Navy's version of the metaverse, but I bet the background is blue, with wisps of white here and there, with no trees or bushes in sight. The Navy's metaverse should be easy to create!

All the AI algorithms doing training and inference in the cloud, on IoT devices, and on military systems will consume all the power generated on the planet by about 2050, according to a recent report.⁴² For comparison, it takes about 1,449 kilowatt hours of electricity to run the algorithms to mine one bitcoin. All those mining servers are using about 1% of all electricity generated today. Think about how much power all the metaverse environments will consume in the future. That is why the U.S. Army is investing in small portable nuclear reactors under Project Pele.⁴³ In August, Ireland stopped construction of any new data centers in their country. They do not have the power generation capacity to supply them, especially with the energy shortage hitting Europe.



The Defense Department is moving ahead with an effort to develop small, portable nuclear reactors. These concepts from the Government Accountability Office show potential ideas for transport and deployment. (U.S. Government Accountability Office)

⁴⁰ Catherine Buchaniec, "Pentagon renames UFO office, expands mission to include 'transmedium' objects", Defense News Weekly, July 20, 2022, <https://www.defensenews.com/battlefield-tech/space/2022/07/20/pentagon-renames-ufo-office-expands-mission-to-include-transmedium-objects/>

⁴¹ Pete Morrison, "The U.S. Army, not Meta, is building the metaverse", Venture Beat, <https://venturebeat.com/datadecisionmakers/the-u-s-army-not-meta-is-building-the-metaverse/>

⁴² Brian Bailey, "AI Power Consumption Exploding", Semiconductor Engineering, August 15, 2022, <https://semiengineering.com/ai-power-consumption-exploding/?cmid=1c9a6ebe-071d-4b5f-9433-f084336b9289>

⁴³ Aaron Mehta, "Portable nuclear reactor project moves forward at Pentagon", Defense News, March 23, 2021, <https://www.defensenews.com/smr/energy-and-environment/2021/03/23/portable-nuclear-reactor-project-moves-forward-at-pentagon/>

In August, the Army transferred all its communications satellites and associated people over to the U.S. Space Force. The Navy did the same thing back in June.⁴⁴ Since the Space Force operates under the Air Force, they already control any Air Force space assets.

Navy F-35 and Air Force F-22 aircraft were seen in August with shiny geometrically shaped tiles embedded on their fuselages. Speculation is that they are evaluating a "Harry Potter Cloaking" technology making the aircraft stealthier.⁴⁵ Our enemies are getting better with their air defense radar, so maybe this is the antidote.

After Congress turned-down the Navy's fleet plans several times over the past few years, the Chief of Naval Operations has submitted his new plan for five hundred ships, including 150 unmanned surface vessels and underwater drones.⁴⁶ Big, slow things on the water are just big, fat targets for our enemy's anti-ship missiles and there is no way to camouflage them. So, the Navy must move away from heavily crewed large ships and toward smaller unmanned platforms.

The Army is doing something similar with unmanned light tanks. GM Defense and General Dynamics Land Systems are working together to build the Optionally Manned Fighting Vehicle (OMFV).⁴⁷ It would weigh less than 30 tons, about half the weight of the M-1 Abrams tank and can be delivered to the battlefield by smaller propeller-driven transport planes.

Several companies are working on MQ-Next, the next generation of Unmanned aerial Vehicles (UAVs) for the Air Force. Examples are the new Gambit series from General Atomics and the new Ghostbat drone from Boeing.⁴⁸

Additionally, the Air Force is developing a new enemy signal jamming platform (Angry Kitten), and a new enemy radar spoofing platform (MALD). They will make the enemy deaf, dumb, and blind in a fight if they work as planned.⁴⁹

It is clear that Navy ships are vulnerable to enemy long-range anti-ship missiles on the seas. Army tanks are vulnerable to enemy missiles on the ground. Air Force planes are vulnerable to enemy anti-aircraft missiles in the sky. So, the solution is to send expendable unmanned intelligence, surveillance and reconnaissance (ISR) vehicles into the war zone first, to draw enemy fire and reveal their locations. Then, we will send in armed expendable unmanned vehicles



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44 Thomas Novelly, "Space Force Takes Over All Military Satellite Communications", Military.com, August 15, 2022, <https://www.military.com/daily-news/2022/08/15/space-force-takes-over-all-military-satellite-communications.html>

45 Joseph Trevithick and Tyler Rogoway, "Navy F-35C Surfaces Wearing New Mirror-Like Skin", The Drive, August 25, 2022, <https://www.thedrive.com/the-war-zone/navy-f-35c-surfaces-wearing-new-mirror-like-skin>

46 Kris Osborn, "Navy Envisions 500-Ship Fleet Including 150 Drones", Warrior Maven, August 30, 2022, <https://warriormaven.com/sea/navy-envisions-500-ship-fleet-150-drones>

47 Gary Gastelu, "GM Defense working on \$45B autonomous tank for US armed forces", Fox Business, February 21, 2022, <https://www.foxbusiness.com/lifestyle/gm-defense-autonomous-tank-us-armed-forces>

48 Emma Helfrich, "General Atomics' Gambit Drones To Have Different Airframes With Common 'Cores'", The Drive, September 22, 2022, <https://www.thedrive.com/the-war-zone/gambit-family-of-drones-will-have-different-airframes-but-a-common-core>

49 Valerie Insinna, "Angry Kitten electronic attack pod bares its claws during Air Force tests", Breaking Defense, August 5, 2022, <https://breakingdefense.com/2022/08/angry-kitten-electronic-attack-pod-bares-its-claws-during-air-force-tests/>

(along with Angry Kitten and MALD) to destroy their defenses. Then, we will send in the big slow manned platforms to do any clean-up work.

Finally, if aliens land on this planet, how will we talk to them? A lot of work has been done by scientists trying to figure out how to talk to dolphins. They makes squeaks, clicks, pops, and whistles that conform to sound-frequency graphs, Zipf plots, and Shannon Entropy charts. That suggests that they have a structured language (they respond to certain sequences, which seem to be their names). So, the mathematicians produced a language to talk to aliens: Lingua Cosmica (LINCOS). It is a written language made up of mathematical equations and symbols that any extraterrestrial creature should easily understand (if they have eyes). I cannot find any tool that translates the equations and symbols into a spoken language. Maybe the dolphins can help with that (pop, snort, squeak, click, whistle, pffftt, etc.)! But the success of an audible version of LINCOS depends on the aliens having ears. If they have mastered space travel, then they probably sense their environment and communicate at the quantum level. I am having a lot of trouble with this whole LINCOS idea. Go read Ben Miller's book, "The Aliens Are Coming!", for more details.

Mergers and Acquisitions

It seems that the UK has been selling-off a number of their military contractors to U.S.-based companies. In July, Advent International (a U.S. private equity firm) bought Ultra Electronics. Previously, aerospace manufacturer GKN was bought by Melrose. Parker-Hannifin bought UK aerospace firm Meggitt in September. U.S.-based ViaSat bought the UK's satellite communications company, Inmarsat. The English pound has declined to near parity with the U.S. dollar (making other UK military contractors cheaper), so we may see other UK-based defense contractors sold off.

In the U.S., the Department of Justice filed a complaint to stop Booz Allen from buying Everwatch, a contractor that supplies artificial intelligence and cloud services to NSA and other intelligence agencies.⁵⁰ In June, Leonardo DRS bought Israeli radar maker Rada Electronics Industries. In May, Carlisle Group bought ManTech, a contractor that supplies services to the U.S. intelligence agencies.

Defense News lists the top 100 defense contractors in the world. FYI, there are 19 VITA members on the list.

Summary

It is not hard to summarize all the data presented here: it does not look good going forward, particularly about world financial conditions. Things are more uncertain now than they were six months ago. Putin's war in Ukraine will probably escalate (he is already coercing his allies in Belarus and Moldova to attack Ukraine). So, let us end this by talking about something we mentioned in the previous sections: extraterrestrial aliens.

You know that the SETI people have been listening for radio signals from aliens for over 60 years now, and they found nothing. We sent men to the moon, and they found no evidence of extraterrestrial life. We sent rovers to Mars, and they found nothing. However, the **National UFO Reporting Center (NUFORC)** is logging hundreds of UFO sightings per month (you must check this one out!). So here is the deal: scientists have spent billions of dollars looking for alien life and they came up empty. Yet, thousands of ordinary people have seen thousands of spacecrafts, piloted by extraterrestrial alien life, while coming out of bars after spending millions of dollars on alcohol. Where do you think the money is being better spent?

We have been sending radio signals (morse code, then commercial radio, then TV, then radar, then cellphone signals, then lasers) into space for about a century now. Let us see how long it takes for a radio signal from earth to reach each of the planets in our solar system (at the speed of light, 186,000 miles per second). From Earth to Mercury: 8.27 minutes. To Venus, 3.26 minutes. To Mars, 5.15 minutes. To Jupiter, 51.22 minutes, To Saturn, 70.2 minutes (1.17 hours). To Uranus, 168.6 minutes (2.81 hours). To Neptune, 254.4 minutes (4.24 hours). And to Pluto (a dwarf planet), 266.4 minutes (4.44 hours). If any intelligent life exists on those planets, they would have heard us one hundred years ago.

⁵⁰ Colin Demarest, "Booz Allen acquisition of defense firm EverWatch would harm NSA, US says", C4ISRNET, June 30, 2022, <https://www.c4isrnet.com/industry/2022/06/30/booz-allen-acquisition-of-defense-firm-everwatch-would-harm-nsa-us-says/>

If there is other life in our solar system, they are probably microbial bacteria or multi-tentacled spaghetti monsters that have not invented radios yet!

Now, let us look at the stars near earth. A signal from earth to Proxima Centauri would take 4.2 years to get there. To Sirius, 8.7 years. So, if intelligent life was there, they have had time to answer us. Signals going to Aldebaran (in Taurus) takes 60 years, and to Regulus (in Leo) takes 69 years. Their answer, if they sent one, will show up in another 20 years or so. The Milky Way Galaxy is about 105,700 light years across, and our signals have only traveled about one hundred light years so far. Do not get excited about hearing from anyone out there soon.

There, that was more fun than rehashing the disappointing financial data. If things do not get better in the next six months, we will discuss how the digestive system of a silicon-based extraterrestrial works in my next report. There are two atoms in the periodic table that can readily combine with other elements to make long-chain molecules capable of supporting life: carbon (which we are made from) and silicon. Here is a preview: if silicon-based life eats silicon-based rocks in an oxygen environment, they will excrete silicon dioxide (SiO₂, or sand) as waste. Maybe the earth was heavily populated by silicon-based creatures billions of years ago and the oxygen made them go extinct? That might sound crazy, but it would explain all the sand in the oceans, on the seashores and in the deserts!

"If there is other life in our solar system, they are probably microbial bacteria or multi-tentacled spaghetti monsters that have not invented radios yet!"

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