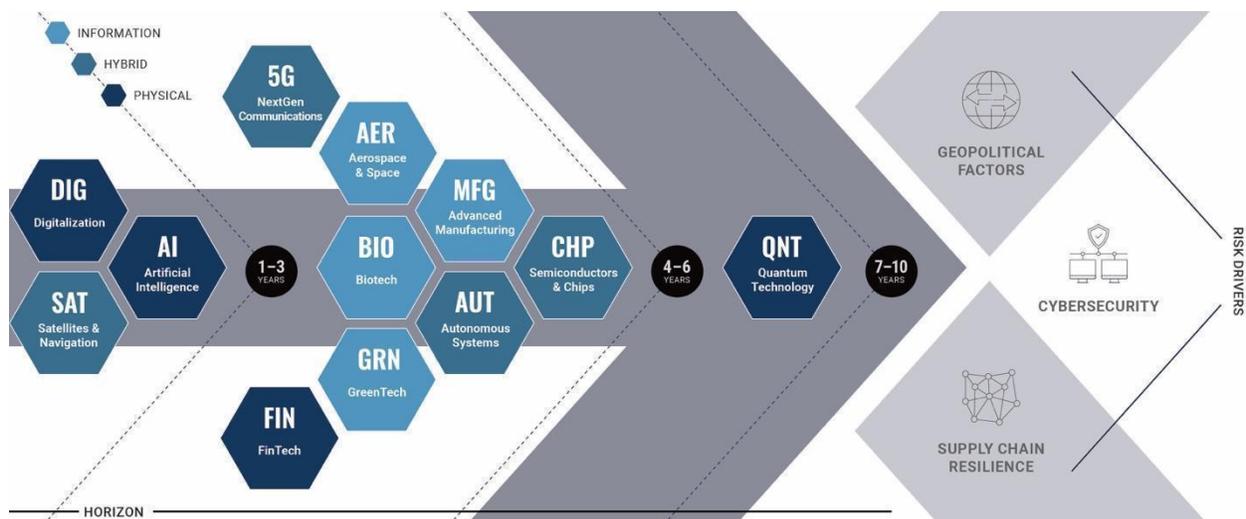




# MATRIX MONITOR

Friday November 5, 2021

Welcome to Next5's weekly digest – emerging technology news and analysis to keep you on your game and ready for what's Next



*This week's Next5 Matrix Monitor features our readout of the Aspen Security Forum, Google's bid to build the Pentagon cloud, China demonstrates satellite maneuverability, a new NATO strategy for AI, Quantum technology to replace GPS, the DOD & industry split over acquisition policy effectiveness, the US tacks on 4 more companies to the Entity List, and Chinese professors are feeling racially targeted in the US.*

## NEXT5 NEWS & AMPLIFICATIONS:

→ Next5 attended the Aspen Security Forum in Washington, D.C. this week.

### Our top 5 takeaways:

- Answering the pacing threat from China is one of the Nation's highest priorities.
- Technology leadership = Economic leadership = World leadership
- We must preserve American values while we embrace technology and incentivize innovation.
- The government needs to move faster on acquisition policy to keep up with adversaries and fund technology.
- New alliances in supply chains, information sharing, and technological innovation are needed.



→ A recent In-Q-Tel study took a unique approach to measure world leadership in technology that is worth highlighting. One of the most popular methods to measure technology leadership has been counting patents, PhDs, or citations, etc. But IQT instead worked to map open source metadata to see which countries are contributing to the advance of technologies. Open sources like GitHub, GitLab, or the Chinese equivalent Gitee have become global software development hubs where contributors create widely used software in public. Their key findings from the study include:

- Top contributors came from the U.S. (37%) and Western Europe (20%) while Chinese, Russian, and Indian-based contributors only accounted for 3%.
- Nordic countries have the highest per-capita rate of top contributors
- The number of unique countries associated with a package range from 1 to 30; the average is 13.
- Top Russia-based Anaconda contributors can be linked to their real persona.

Next5 would like to note that this study was limited to publicly available data, which is likely less common in places like China. So this data alone is insufficient to determine true technological leadership. But taken together with other traditional sources of measurement like patents and PhDs, we can start to see a more complete picture backed by data. #Geopolitics #USA #EUR #RUS #CHN [IQT](#)

## DIGITALIZATION

→ **Facebook made a splashy announcement last week when it changed its company name to Meta, but it joins a crowded market of other tech companies seeking to build the metaverse.** The metaverse is a stitching together of disparate technological phenomena of today—videogames, virtual reality, Zoom calls, cryptocurrency, social media—into a new whole upon which countless brands, creators and software engineers can do their thing. Meta CEO Mark Zuckerberg believes that the metaverse is the next generation of the internet. It's worth noting that a version of the metaverse has existed and failed at least once before. In the early 2000s, a proto-metaverse Second Life was enabled for millions, but it quickly became a passing fad. And some critics say the metaverse is susceptible to such hype cycles again. Microsoft is also touting its own versions of the metaverse. And Nvidia has talked about an omniverse which it says allows companies to create digital twins of critical systems and infrastructure. Snap, on the other hand, wants people to engage more in real life through augmented reality, which competes with virtual reality. Pokemon Go creator, Niantic, has espoused a similar vision. And Apple is working on AR headsets which could be headed in the same direction. If many of the biggest companies trumpeting their metaverses gather enough users to make continuing to invest in them worthwhile—Facebook has declared its investment in the metaverse will cost it \$10 billion in operating profit this year alone—the result is likely to be not “a metaverse” but “metaverses.” #DIG #USA [WSJ](#)

→ **Microsoft unseated Apple as the most valuable company for the first time since July 2020 after the iPhone-maker suffered serious supply chain issues.** Microsoft's market cap hit \$2.49T in a better-than-expected earnings report last week. Apple, on the other hand, ended the week with a market cap of \$2.46T but warned that supply chain disruptions are hindering iPhone and other product manufacturing. Even though the company logged a record 12-month profit nearing \$100B, its shares fell after the announcements. Many of the big tech giants like Microsoft have benefited from the sustained shift to working from home and remote schooling throughout the pandemic. Microsoft's embrace of cloud computing, one of the fastest growth areas in tech, has also been a key driver to the company's bottom line. Microsoft has a 20% share of the global cloud-computing market, making it the second-largest player in the industry, only second to Amazon which has a more than 40% share. Microsoft and Apple are the only US companies with market caps above \$2T. #DIG #USA [WSJ](#)

→ **Xi Jinping announced that China is applying to join the Digital Economy Partnership Agreement.** DEPA currently covers Singapore, New Zealand, and Chile, but Canada has also expressed interest in joining. It is designed to complement the WTO negotiations on e-commerce and build on the digital economy work underway within APEC, the OECD, and other international forums as trade becomes digitized. White House officials are also discussing proposals for a digital trade agreement covering Indo-Pacific economies as the Administration seeks ways to check China's influence in the region. Advocates for such an accord had suggested that it could draw on existing arrangements in the region, including DEPA. It's unclear

what China's planned application to DEPA would mean for the US proposal. In September, China attempted to join the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) - a trade treaty that Washington initially pushed as a way to exclude Beijing. The Trump Administration withdrew the US from it in 2017, but it concluded in 2018 with 11 signatories that have a combined economic value of ~13% of global domestic product. Many members of Congress have been pushing for the US to rejoin or to be more active on trade diplomacy in the Asia-Pacific region. #DIG #USA #CHN #NZL #CAN #SNG #CHL #Geopolitics [Bloomberg](#)

→ **Google is reportedly pursuing a cloud computing contract with the DoD after the Pentagon and Microsoft severed ties over the summer.** The Pentagon is looking to resurrect its cloud computing project which has posed an opportunity for Google to enter the bidding war. The New York Times sources reported that Google is now working to create a proposal. The new contract, dubbed the Joint Warfighting Cloud Capability, will take the place of the Joint Enterprise Defense Infrastructure (JEDI), which the Pentagon canceled in July. The contract, which was with Microsoft, was axed amid an intense legal battle involving Microsoft and Amazon. The new contract would upgrade the Pentagon's cloud technology and bolster support for utilizing artificial intelligence as a strategic tool on the battlefield. #DIG #AI #USA [NYT The Hill](#)

## SATELLITES & NAVIGATION

→ **China demonstrated the ability to track and maneuver a satellite with a high degree of precision when the Chinese military spotted a US satellite moving close and then redirected its own satellite away within 24 hours.** Some defense analysts said the scenario was not new and the incident should not be seen as escalating the rivalry between China and the US in space. Video footage from the August 2020 incident was released recently showed a covertly developed American surveillance satellite, USA 271, approach one of the PRC's heaviest and most advanced satellites, the SJ-20, which then moved away. This video gives a rare glimpse into the often classified realm of nation-to-nation run-ins in space - and potential future space warfare tactics. The video footage was provided by COMSPOC, a company that provides space tracking and other information to private companies and governments. #SAT #USA #CHN #Geopolitics [SCMP Breaking Defense](#)

→ **The European Space Agency has established a Directorate of Commercialization, Industry, and Procurement to help European companies succeed in the commercial space industry.** The new Directorate will play a role as Europe looks to go more digital and green over the coming decades. #SAT #GRN #EUR [Satellite Today](#)

→ **Designing satellites to fall apart is one of the key strategies to combat space debris.** Developed by ESA's Clean Space initiative, the approach is called 'Design for Demise' and involves making sure that derelict satellites will break up and burn up fully as they reenter the

atmosphere. Reentering space hardware should burn up entirely in the course of plunging through the atmosphere to be safe. In practice, some pieces can make it all the way down to Earth – some of them big enough to do serious damage if they do make it. Modern space debris regulations demand that such incidents should not happen. Uncontrolled re-entries should have a less than 1 in 10,000 chance of injuring anyone on the ground. As part of a larger effort called cleansat, ESA is developing technologies and techniques to ensure future low-orbiting satellites are designed according to the concept of ‘D4D’ – design for demise. One element of D4D research involves actually melting such bulky items within plasma wind tunnels capable of reproducing the fiery conditions involved. Another is to plan methods of ensuring an early breakup of reentering debris. #SAT #EUR [SciTechDaily](#)

→ **Lockheed Martin is designing a revolutionary satellite, the GOES-T, for launch in 2022 which will watch over Earth and provide early warning of natural disasters.** The GOES-T is the third satellite in a family of four Geostationary Operational Environmental Satellites used by NOAA to track weather from orbit. Being geostationary satellites, these spacecraft are designed to stay in a fixed orbit in time with the Earth's rotation. GOES-T is set to stay stationed above North and South America, bringing in data for the Western Hemisphere. GOES-T has instruments to track space and sun weather activity like solar flares, changes in the magnetosphere and radiation hazards. All have the power to affect not only the planet's weather, but also electronics and communications equipment on Earth, and in the International Space Station. In fact, one of the tasks of the GOES satellites is to provide warnings to astronauts on the ISS about incoming solar activity that could affect their operations or interfere with their instruments. The GOES-T is also packed with instruments for tracking Earth weather, like the Geostationary Lightning Mapper, which can map lightning all over the world, and the Advanced Baseline Imager, which takes images of the clouds, atmosphere and surface of Earth. #SAT #GRN #USA [CNet](#)

## ARTIFICIAL INTELLIGENCE

→ **The US Air Force is asking for industry's help in developing AI and ML for planning systems that help commanders adapt quickly to changing conditions in high intensity aerial battles.** Officials of the Air Force Research Laboratory's Rome Research Site in Rome, New York, issued a broad agency announcement last week for the Stratagem: Applying State-of-the-Art Artificial Intelligence and Machine Learning Approaches to Air Battle Management project. As the Air Force begins to operate in contested environments against peer and near-peer adversaries, the demands on planners and warfighters will increase quickly enough to require AI and machine learning decision support, researchers say. One source of this kind of technology is advanced video gaming. In recent years, game designers had made major developments in AI for non-human game-playing agents; this technology might be considered for battlespace decision support. The Stratagem project has three parts: machine intelligence support for complex military operations; capturing human expertise to augment

warfighter capability; and transferring machine-learning models from video gaming to Air Force battle management and simulations. #AI #AER #USA [Military Aerospace](#)

→ **The North Atlantic Treaty Organization announced the adoption of a new AI strategy and the creation of a €1 billion “NATO Innovation Fund” to support emerging tech innovation.** The full strategy has not been released, but [a summary](#) outlines its aims, including: developing responsible AI for the alliance’s defense, accelerating AI adoption and increasing interoperability, and defending against AI threats. The strategy also outlines six “Principles of Responsible Use of Artificial Intelligence in Defence” — lawfulness, responsibility and accountability, explainability and traceability, reliability, governability, and bias mitigation — that the alliance’s members pledged to observe. The [simultaneously-announced NATO Innovation Fund](#), meanwhile, will invest in “dual-use technologies of potential application to defence and security. The fund — together with NATO’s tech accelerator announced earlier this year — will help the alliance harness innovation from the private sector and incorporate emerging technologies into its arsenal. #AI #NATO #Geopolitics [NATO](#)

## NEXT GENERATION COMMUNICATIONS

→ **Lockheed Martin and Verizon are partnering to develop technology for a military 5G mobile network.** The companies’ announcement this week comes just after they worked together to link a commercial 5G mobile network with a military communications network used by fighter jets to send and receive targeting coordinates. The test’s secret sauce is a special Lockheed-made communications gateway that enables the two networks to connect to one another. In many cases, military weapons use disparate datalinks—specialized modems that cannot connect to one another. The gateway acts as a translator between these different networks. The agreement between the two multi-billion-dollar firms is the latest in a push by Lockheed and its CEO Jim Taiclet to position his company to be the lead player in the Pentagon’s complex plan to create a mesh network that connects all of its weapons on the battlefield. Taiclet, who spent two decades in telecommunications before becoming CEO of Lockheed in June 2020, has made tie-ups with commercial firms one of his top priorities. #5G #USA [Defense One](#)

→ **A provision of Congress’s \$42B plan to expand broadband into underserved areas could exempt it from privacy acts like FOIA, but this hampers oversight of money expected to flow mostly to telecommunications companies, raising debate.** It could also shield the terms of any agreements between grant recipients and the government from federal disclosure laws. The bill exempts the broadband grant program from the Administrative Procedure Act. That law broadly requires federal agencies to post public notice of certain proposed actions, take comments from the public before making decisions and establish uniform standards for dispute resolution. Both FOIA and the Privacy Act are wholly contained within the Administrative Procedure Act. The bill’s new high-speed internet program puts

individual states and territories in charge of running their own grant programs under guidelines set by the National Telecommunications and Information Administration, a unit of the Commerce Department that will dole out the money. Many lawmakers involved in the bill's drafting argued that individual states know better than the federal government where investments are most needed. But concerns still remain over transparency and privacy, which have yet to be addressed. #5G #USA [WSJ](#)

→ **The current Administration's decision to ban China Telecom (Americas) last week underscores the continued bipartisan tough stance the US is taking towards China, no matter who is President, even as Biden works to improve communications with Beijing.** As we reported last week, the FCC voted to cancel permission for China Telecom to operate in the US over privacy and espionage concerns. Moves to ban China Telecom originally started under the Trump Administration, along with actions against China Unicom and its subsidiary ComNet. The FCC is also moving toward ending authorizations for these companies to operate in the US. Nevertheless, the Biden Administration is still working to rebuild communications on trade, Taiwan, technology, and the origins of COVID-19. #5G #USA #CHN #Geopolitics #SCRM [Bloomberg](#)

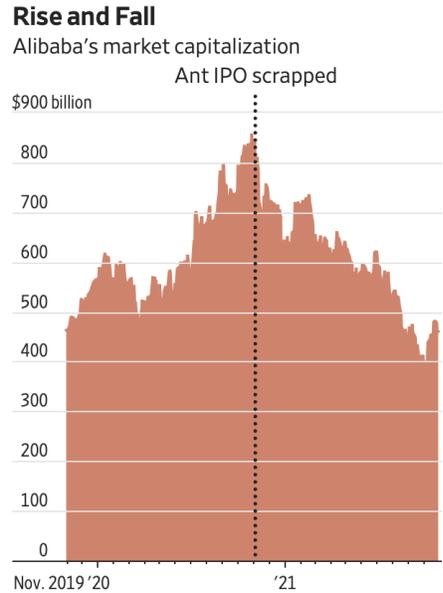
→ **Last week, Huawei said its revenue fell 38% in the most recent quarter as US restrictions on its access to global chip supplies took a hit on the company for the fourth straight quarter.** The data released last Friday said the company lost \$71.2B in the first nine months of 2021. That puts the Chinese telecom giant down \$21.2B in the most recent quarter compared to the same period last year. The company is trying to steer away from business that is reliant on foreign supply chains to survive in the long term under international pressure. The US under the Trump Administration, formally declared Huawei a national security threat in 2020 due to its connections to the Chinese government. Last week, the Senate passed the Secure Equipment Act aimed at further cracking down on the company by banning the FCC from authorizing products from companies designated as a national security threat. #5G #SCRM #Geopolitics #USA #CHN [The Hill](#) [WSJ](#)

## FINANCIAL TECHNOLOGY

→ **Some of the biggest banks and financial firms have added about 1,000 crypto-related roles since 2018 as demand for the fast-developing currencies ballooned.** Among those hiring the most are JPMorgan Chase, Wells Fargo, and Goldman Sachs. While Wall Street mostly scoffed at Bitcoin's entrance into the world more than a decade ago, growing global acceptance and client interest have eroded their resistance, leading firms to add research teams and trading desks and even offering compensation bumps of as much as 50% for comparable roles to lure talent. And, as financial firms staff up, they have to compete with technology and crypto firms doing likewise -- competition intensified by a scarcity of talent with both types of experience, recruiters said. That means a crypto job can be lucrative, with a related role at a bank commanding a 20% to 30% premium in total compensation over a

comparable position at the same institution. Still, there are reasons for caution about working with the assets. Crypto firms face the prospect of a broad crackdown from federal regulators, while China, which already has rules barring banks from offering crypto-related services, banned crypto transactions in September. Amid the crackdown, some Bitcoin miners shifted operations out of China and to the US for the most part. #FIN #USA #CHN #Geopolitics [Bloomberg](#)

→ **Investors are hoping the worst is over for Alibaba after a \$400B stock selloff that halved the market value of the Chinese e-commerce giant in less than a year.** Alibaba, a bellwether for Chinese new-economy stocks, hit a record high a year ago last week, when its market capitalization topped \$850B. That solidified its position as China's most valuable listed company. And as we previously reported, only days later the Chinese government blocked its affiliate Ant Group's would-have-been recording-breaking IPO. Alibaba's shares began a long slide that slashed about \$400 billion from the company's market value. And as Chinese regulators increased their scrutiny of more internet-technology companies, global investors cut their stakes in Alibaba. But the company's shares rebounded partially last month, after announcements that Charlie Munger increased its stake in Ali and Ant CEO Jack Ma made a trip to Europe demonstrating he is free to travel overseas and may no longer be facing intense scrutiny at home. Ali also encouraged investors when it unveiled an advanced chip, as we reported a few weeks ago. #FIN #CHP #CHN #USA #EUR #Geopolitics [WSJ](#)



Source: FactSet

## AEROSPACE & SPACE

→ **Boeing announced October 27 it is taking an additional \$185M charge against its earnings to cover the costs to get its CST-100 Starliner commercial crew vehicle flying again.** The company took a \$410M charge in January 2020 to cover the costs it anticipated at the time to complete a second uncrewed flight after software problems truncated the original OFT mission in December 2019. When Boeing took the original earnings charge, it said it did so because it committed to redo the uncrewed flight test at no expense to NASA. Boeing had planned to perform that second uncrewed test flight, OFT-2, in early August but scrubbed a launch attempt hours before scheduled liftoff when valves in the spacecraft's propulsion system failed to open. Boeing leadership declined to say whether these additional costs would prevent Boeing from ever making a profit on the Starliner program, for which the company received a \$4.2B fixed-price contract from NASA to develop and operate in 2014. #AER #USA [SpaceNews](#)

→ **According to a recent survey, the DoD and industry are split over whether the Space Force has been effective at improving space acquisition.** Space has historically suffered a slow moving Federal acquisition process which was supposed to improve with the establishment of the US Space Force and Space Development Agency. A Breaking Defense survey found: While 20% of respondents believe that the Space Force is not effective “at all” in improving acquisition, just 4% of DoD respondents said the Space Force hasn’t helped, while 23% of industry respondents held that view. 37% reported the Space Force has been moderately effective, 29% said slightly effective, and 11% said very effective. #AER #USA [Breaking Defense](#)

## BIOTECHNOLOGY

→ **Security risks to supply chains for AI and machine learning are drawing scrutiny from Rank One, an OEM provider of biometrics to the U.S. government.** It expressed that systems critical to national security should be free from the vulnerabilities that foreign technology components can introduce. Using foreign biometrics technology could mean that certain people are predisposed not to be identified by the system and that there are backdoors that allow biometric information to be siphoned out. Rank One said that it is working with the industry to mitigate supply chain risk to the national identity screening ecosystem. #BIO #USA #SCRM [Biometric Update](#)

→ **Advances in biology and technology have led to unprecedented product innovation, and as a result, investment in life sciences are reaching new heights.** Healthcare investment in 1H 2021 hit \$47B, doubling the first half of 2020, which already increased more than 50% from 2019. However, investing in life science companies carries several unique risks:

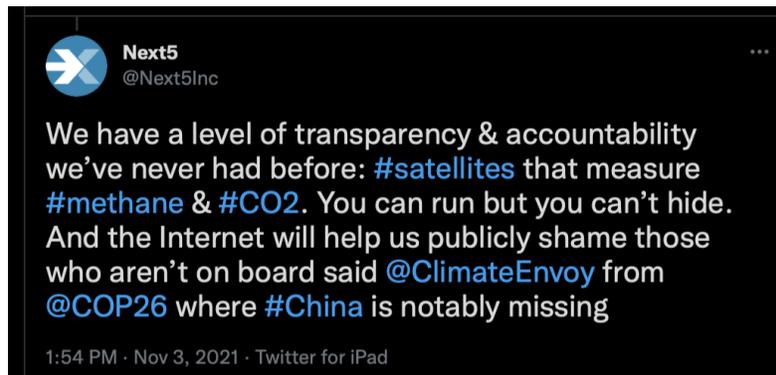
1. **Less than 10% of products complete clinical trials and receive FDA approval.**
2. **Less than 50% of new drugs marketed attain pre-launch forecasts.** Even if a drug gains FDA approval, physicians stick with familiar products because they must enter a compelling reason for doing so in the electronic medical record and obtain permission from insurance companies. **Additionally, rebates are often required before physicians can access new drugs.** Insurance companies rely on pharmacy benefit managers (PBMs) to determine how much they should pay for a drug. Unless a new drug has uniquely compelling benefits, PBMs will demand price rebates in exchange for making new products available, dampening the performance of new drugs.
3. **Drug pricing has faced scrutiny from Congress.** High drug prices have often been used to fund more innovation; however, Congress’ focus on making drugs more affordable and accessible might hinder life sciences innovation, making investments less attractive.

#BIO [Forbes](#)

## GREEN TECHNOLOGY

→ **Climate negotiators from nearly every country are meeting this week and next in Glasgow, Scotland to hammer out a new agreement aimed at cutting emissions to a level scientists hope will limit global warming at COP26.** World leaders, including President Biden, flew out earlier this week, leaving talks in the hands of climate diplomats. In the first few days of the summit, world leaders agreed to try to stop deforestation, limit methane emissions and retool the world's financial plumbing to stoke investment in lower-emissions energy. While world leaders didn't get any closer to a deal on specific emissions cuts, negotiators are making progress in other areas, including over a deal that would create a framework for global carbon trading. The conference will run through November 12. **A notable missing participant is China - the world's greatest polluter. Many officials allege that the world climate crisis cannot be sufficiently addressed without China on board.** #GRN #USA #EUR #CHN #Geopolitics [WSJ](#)

Next5 heard directly from US Climate Envoy John Kerry who tuned into the Aspen Security Conference earlier this week to give an update on COP26 progress.



→ **The world's top five polluters were responsible for 60% of global emissions in 2019.** China alone generated about the same amount of CO2 as the next four countries combined. And its carbon output is still rising every year. Further, according to a study by Rhodium Group, China's companies drove the country's greenhouse gas emissions above those of all developed nations combined in 2019. The companies are Petrochina (881M metric tons of CO2 or equivalent), China Petroleum & Chemical (733M), Huaneng Power (317M), China Baowu Group (211M), and SAIC(158M). To deliver on President Xi Jinping's promise to zero out emissions by 2060, these same companies will have to shift away from dirty energy, embrace new technologies and change the way they operate. #GRN #CHN [Bloomberg](#)

## ADVANCED MANUFACTURING

→ **A new report from CSET assesses trends in robotics patents.** Key findings include:

- **China leads in granted robotics patents**, accounting for nearly 35 percent of the global robotics patents total between 2005 and 2019. The United States ranks fourth, with

about 13 percent of the world’s total robotics patent output for this time period, coming in after Japan and South Korea.

- While it accounts for only 2 percent of the global robotics patent output between 2005 and 2019, Russia is responsible for 17 percent of the global military robotics patents, ranking third in the world in this category.
- Industrial robotics is the most popular category of robotics patent types, followed by medical robotics and transportation.
- The United States leads in robotics patents in areas such as aerospace, medical, military/security, and telepresence, as well as robotics patents with AI features. China tops the chart in patents for industrial robotics, transportation, humanoid/exoskeleton, agriculture, underwater applications, and education.

#MFG #USA #CHN [CSET](#)

→ **Redwire, a company that makes its money buying up space companies, just acquired a space biotech company named Techshot.** The Indiana-based company develops biotechnology payloads for microgravity research. Redwire declined to disclose details of the sale. Techshot has developed a range of biotechnology and physical science research payloads, including a bio printer on the ISS capable of producing human tissues. Redwire was founded last year by private equity firm AE Industrial Partners by combining two companies it had acquired: Adcole Space and Deep Space Systems. It has since acquired several more companies to include space manufacturing company Made in Space and Deployable Space Systems, a developer of spacecraft structures and solar arrays. #AER #BIO #MFG #USA [SpaceNews](#)

## AUTONOMOUS SYSTEMS

→ **Autonomous urban boats will be introduced in Amsterdam at the end of 2021.** This project started in 2015, where MIT conducted small-scale experiments that involved testing shoebox-sized “Roboats.” Now, a version of Roboat can finally seat humans, and it will be debuting in Amsterdam’s canals by the end of the year. The Roboat, is battery powered and fully autonomous, navigating using lidar to localize on a pre-existing map along with cameras and ultrasonic sensors for obstacle detection and avoidance. Compared to roads, a canal environment is safer because it is lower space and contains much less complexities like pedestrians and lane markings. #AUT #NLD [IEEE Spectrum](#)



→ **The Coast Guard is exploring new technology for its Unmanned Systems (UxS) project, which will include four defined domains – unmanned aircraft, surface and subsurface, and land systems.** UxS also seeks to incorporate the rapid advance of vehicle

and sensor technology to support communications, data management, and other infrastructure. Thomas Remmers, U.S. Coast Guard Captain, said that his team is constantly examining how new, evolving technology can be adapted to improve Coast Guard operations. In order to achieve its goals, UxS cooperates with the Department of Homeland Security to obtain sponsorship of new technology; it also works with the Navy and Department of Defense to pursue its Defense Readiness mission. #AUT #USA [Inside Unmanned Systems](#)

## SEMICONDUCTORS & CHIPS

→ **A report by the Semiconductor Industry Association found that semiconductor shipments reached a record high of \$145M in Q3 of 2021.** This represents an increase of 27.6% over Q3 2020 and 7.4% more than Q2 2021. This highlights the ever-increasing demand for chips and the industry's efforts to increase production to meet that demand despite recent global chip shortages. #CHP [Seeking Alpha Semiconductor Industry Association](#)

→ **The year-long global chip shortage is showing no signs of improvement, only getting worse with no end in sight.** As demand continues to be high and supply continues to be clogged, wait times for chip deliveries have climbed well above a healthy threshold of 9-12 weeks. As of October, wait times reached 22 weeks, and for the scarcest parts, wait times can reach up to 38 weeks. Moreover, global shipping constraints and stockpiling by companies who fear further shortages have also exacerbated the crisis. Consequently, many expect shortages to last until 2023, considerably longer than expected. Among the hardest hit by chip shortages is the auto industry. Despite efforts by major chipmakers to ramp up production, automakers have struggled to recover, with GM and Ford recording steep drops in third quarter profits as chip shortages decreased factory output. Even companies with robust supply chains like Tesla have struggled to meet consumer demand due to the lack of critical components. #CHP #SCRM [WSJ](#)

## QUANTUM TECHNOLOGY

→ **Researchers at the Institute for Experimental Physics of the University of Innsbruck, Austria built a prototype for a compact, completely European-built quantum computer that could run on solar power.** This computer is designed to fit quantum computing experiments into the smallest space possible and has the ability to entangle 24 qubits using only 1.5 kilowatts – the same amount of energy used to power a kettle. The computer “could address industrial and public needs such as predicting the stability of complex molecules in chemistry for intelligent materials or vaccine development, or yet optimizing and saving energy distribution in complex grids.” #QNT #EUR [Quantum Daily](#)

→ **IBM is launching a new quantum speed metric in order to measure the speed of quantum processors.** Named Circuit Layer Operations Per Second (CLOPS), the metric measures the number of quantum circuits a quantum processing unit can execute per unit of time. IBM hopes that CLOPS can complement scale and quantum volume – two other metrics that reflect the performance of a quantum computer. Scale is measured by the number of qubits

that the quantum processor supports, while quantum volume gauges how faithfully a quantum circuit can be implemented in a quantum computing system. While the quantum industry is moving fast, it has raised concerns that the technology is being overhyped. To prevent this, publicly published metrics like qubits, quantum volume, and CLOPS show the true state of quantum systems today and provide an objective understanding of the quantum computers' performance. #QNT [ZDNet](#)

→ **A team from Sandia National Labs may have finally found a way to use quantum technology as an alternative to GPS.** The team developed a quantum sensor that doesn't need the power or massive support machinery of previous prototypes, and which has overcome durability concerns by running for a year and a half in the lab. That could enable a wide range of civil and military applications, including drones that don't need weak and spoofable satellite signals to navigate in the air, underwater, and even underground. Quantum navigation operates via a process called atom interferometry. Cooling atoms to just millionths of a degree above absolute zero, then hitting them with beams of light can trick them into a quantum superposition. Each atom takes on two states simultaneously: moving and still. Each state reacts differently to forces, including gravity and acceleration. And **this quantum method can measure things like distance more accurately than GPS without the need for hackable signal from space.** #QNT #USA [Defense One](#)

## GEOPOLITICS

→ **The US Commerce Department added several technology companies to the entity list this week over security concerns: Positive Technologies of Russia, NSO Group and Candiru of Israel, and Computer Security Initiative Consultancy of Singapore.** The designation of these companies means that exports to them from US counterparts are restricted. NSO Group and Canidru have been accused of selling hacking tools to authoritarian regimes. NSO says it only sells to law enforcement and intelligence agencies and takes steps to curb misuse. Positive Technologies was designated for providing support to the Russian security services. And Computer Security Initiative Consultancy was listed for trafficking cyber tools used to gain unauthorized access to computer networks. #Geopolitics #Cybersecurity #RUS #SGP #USA #ISR [Reuters](#) [WSJ](#)

→ **Two surveys document how the U.S. government's three-year-old China Initiative to curb China's influence on academic research has impacted scientists of Chinese heritage.** The key findings include:

- At top research institutions, Chinese scientists are four times more likely to fear government surveillance than their non-Chinese colleagues and to have research projects cancelled with their Chinese counterparts for fear of becoming a target.
- At University of Michigan (UM), 42% of Chinese faculty worry that UM will not defend them against racially motivated government investigations, and only 12% think UM still encourages collaborations with China.

- Rising hate against Asians in the U.S. may cause a reverse brain drain in U.S. higher education. At UM, 42% of Chinese faculty said those factors have made them consider seeking employment in another country, and a third of Chinese scientists nationwide say their background has impeded their success.

42% of the 650 Chinese scientists said they “feel racially profiled by the U.S. government” compared with only 9% of 770 non-Chinese scientists. Additionally, 24% of U.S.-based Chinese scientists have ended collaborations with China in the past three years, compared with only 6% of non-Chinese scientists taking such steps. 71% of Chinese faculty surveyed felt that their concerns were invisible to university administration and that their heritage were underrepresented in leadership positions. Around 18% of Chinese faculty members at UM have been subjected to China Initiative-related investigations by university officials, federal law enforcement, or federal research agencies. #Geopolitics #USA #CHN [Science.org](#)

→ **Around 600,000 Chinese migrant workers working on projects connected to President Xi Jinping’s Belt and Road Initiative (BRI) are being subjected to exploitative conditions.**

Chinese Labor Watch estimates that tens of thousands of workers abroad are being paid less than promised or exploited in other ways. In some cases, workers had to sign contracts for lower pay and longer durations while having their passports confiscated. In fact, many labor contractors did not even obtain a government license before arranging for workers to go overseas. China’s “zero COVID” strategy has only exacerbated the problem. Reductions in international flights and stringent entry conditions have discouraged workers from returning home and decreased the number of new workers entering BRI countries. As a result, workers are working past their contracts. Workers who wish to return home are forced to pay for their own transportation and could only return on direct flights, leading many to resort to smuggling. #Geopolitics #CHN [WSJ](#)

## CYBERSECURITY

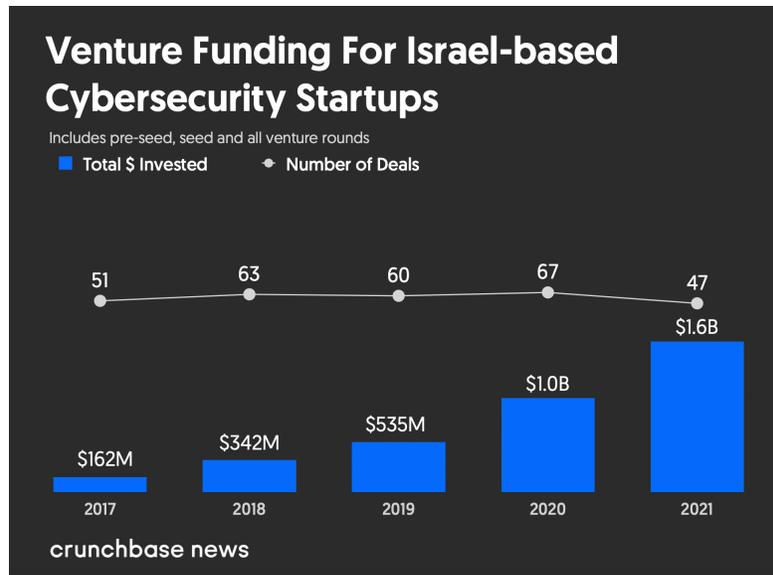
→ **Amid an increasing wave of ransomware attacks, efforts to protect groups critical to national security from cyber threats are gaining traction in the U.S. government.** The Cybersecurity and Infrastructure Security Agency (CISA) Director Jen Easterly said that the Agency has begun an effort to identify “primary systemically important entities” to be protected from threats. In Congress, the Securing Systemically Important Critical Infrastructure Act would authorize CISA to set up a program to identify critical groups to protect, similar to what CISA is doing now. In addition to identifying critical groups, Congress is also considering forms of legislation to mandate those groups to report cyber incidents to the government. #Cybersecurity #USA [The Hill](#)

→ **MITRE and the Cybersecurity and Infrastructure Security Agency (CISA) announced the “2021 Common Weakness Enumeration (CWE) Most Important Hardware Weaknesses” list.** The list includes 12 most frequent and critical errors that result in serious hardware vulnerabilities with five additional weaknesses that scored just outside the list. The list

can help plan security testing and evaluation, and help managers assess the progress of their efforts to secure hardware and decide where to allocate resources when it comes to mitigating vulnerabilities. #Cybersecurity [Security Week](#)

<a href="#">CWE-1189</a>	Improper Isolation of Shared Resources on System-on-a-Chip (SoC)
<a href="#">CWE-1191</a>	On-Chip Debug and Test Interface With Improper Access Control
<a href="#">CWE-1231</a>	Improper Prevention of Lock Bit Modification
<a href="#">CWE-1233</a>	Security-Sensitive Hardware Controls with Missing Lock Bit Protection
<a href="#">CWE-1240</a>	Use of a Cryptographic Primitive with a Risky Implementation
<a href="#">CWE-1244</a>	Internal Asset Exposed to Unsafe Debug Access Level or State
<a href="#">CWE-1256</a>	Improper Restriction of Software Interfaces to Hardware Features
<a href="#">CWE-1260</a>	Improper Handling of Overlap Between Protected Memory Ranges
<a href="#">CWE-1272</a>	Sensitive Information Uncleared Before Debug/Power State Transition
<a href="#">CWE-1274</a>	Improper Access Control for Volatile Memory Containing Boot Code
<a href="#">CWE-1277</a>	Firmware Not Updateable
<a href="#">CWE-1300</a>	Improper Protection of Physical Side Channels

→ **Israel, the second largest cyber startup market in the world, will likely double total venture dollars raised this year.** Cyber companies in Israel have raised around \$1.6B to date this year, breaking last year's record of \$1B thanks to some large funding rounds. Historically, Israel has been strong in cybersecurity because of the government's emphasis on it. Israel's military is home to Unit 8200, an intel unit that slowly became a training ground for cyber entrepreneurs from the country. The government's support has rippled down to the private sector, cultivating startups and bringing venture capital money into the country. Cyber in Israel has become an increasingly competitive area to invest in. Early-stage dollars continue to flow into Israel, and more Israeli VC firms are eyeing early opportunities. At the same time, larger growth players have also increased. Overall, cyber comprises 20% of venture investment in Israel. #Cybersecurity #ISR [Crunchbase News](#)



→ **The FBI and DHS raided the Florida offices of PAX Technology, a Chinese provider of point-of-sale devices used by millions of businesses and retailers globally.** The raid was tied to reports that PAX’s systems may have been involved in cyberattacks on U.S. and EU organizations. The investigation into PAX started when a major U.S. payment processor reported unusual network packets originating from its payment terminals. It was discovered that PAX’s terminals were used as a malware “dropper” and as “command-and-control” locations for staging attacks and collecting information. #Cybersecurity #USA #CHN [KrebsOnSecurity](#)

## SUPPLY CHAINS

→ **Apple revenue fell short of Wall Street expectations in its fiscal fourth quarter, which can be attributed to larger-than-expected supply constraints that cost the company \$6B.** Apple CEO Tim Cook said that the supply constraints were driven by industry-wide chip shortages and COVID-related manufacturing disruptions in Southeast Asia. Specifically, the supply issues were with chips on “legacy nodes,” or older chips. Despite that, Apple’s revenue was still up 29% and each of its product categories grew on an annual basis. Apple also expects its revenue in the next quarter to be the largest in the company’s history, primarily due to the high demand for iPhone 13 models. #SCRM [CNBC](#)

→ **The global supply chain crisis is leading companies to reevaluate their ad spending, questioning whether it makes sense to promote products they cannot adequately stock.** Multiple companies like Hershey, Church & Dwight, and Kimberly-Clark have all cut back on ad and marketing spending because of supply chain challenges that would make it difficult for companies to meet further demand. For big online advertising platforms like Facebook and Snapchat, supply chain bottlenecks are expected to have a negative impact on their revenue growth in the fourth quarter. However, some companies remain committed to marketing. For instance, GM plans to have a “hearty media presence” despite chip shortages causing

automakers to cut production. Similarly, Procter & Gamble will continue to invest in marketing despite supply chain disruptions. Many advertisers are reluctant to cut marketing as they want to remain top of mind with customers and retain market share. #SCRM [WSJ](#)

→ **After the winter storm last year that crippled Texas' energy system, Texas remains unprepared for another cold winter, risking another energy crisis.** Although Governor Greg Abbott signed reforms that would shore up the electrical grid, the natural gas systems that were at the core of the shortages have gone largely unchanged. As the winter approaches, the gas industry is particularly vulnerable because it is the largest supplier of plant fuel in Texas, yet has very few weatherization requirements because of its lobbying power in Austin. The only mandate for gas companies this winter is to register their facilities with utilities as critical infrastructure, but operators can pay \$150 to opt out of that registration process. Problematically, gas companies do not have an incentive to winterize because their historical underperformance was rewarded with unusual profits. When gas supplies cratered last winter, the spike in demand for scarce gas gave gas companies a windfall of \$11B. #SCRM #USA [Bloomberg](#)

→ **China's economy showed signs of further weakness in October as power shortages and increasing commodity prices slowed manufacturing, while strict COVID-19 policies decreased holiday spending.** The manufacturing purchasing managers' index (PMI) fell to 49.2, below the key 50-mark that signals a contraction in production. The non-manufacturing gauge, which measures activity in the construction and services sectors, dropped to 52.4, which was lower than expected. These data confirm that manufacturers are struggling to produce and consumers are decreasing their spending. Furthermore, the inflation of manufacturers' input and output prices is another concern for China's economy. Simultaneously, turmoil in China's property market is harming the economy – housing sales and prices have decreased and Evergrande's debt crisis is spilling over to the industry. As a result, growth forecasts for China have been downgraded, with the consensus being 3.5% this quarter. #SCRM #CHN [Bloomberg](#)