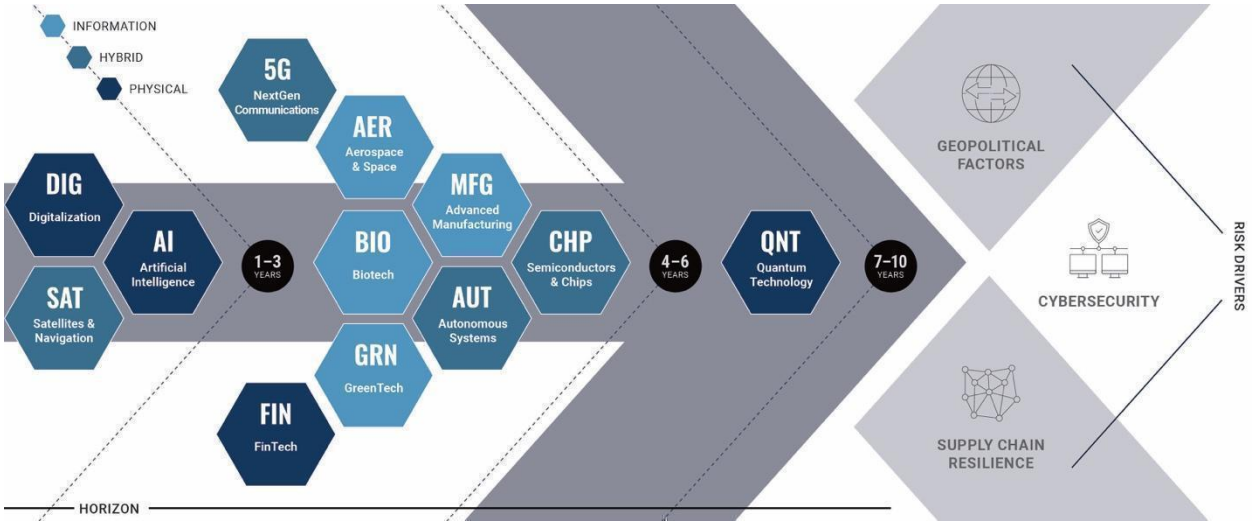
MATRIX MONITOR

Friday July 15, 2022

The only source dedicated exclusively to the emerging technologies shaping the future of business and national security.



This week's Next5 Matrix Monitor features an augmented reality contact lens, a laser system designed to blind satellites, software Chinese researchers claim they can gauge the loyalty of Communist Party members, crypto for everyday purchases, plans for gravity-defying habitats on the Moon and Mars, 3D printing on US Navy ships, an underground, autonomous, zero-emissions transportation system for small cargo loads, Qualcomm chips as a primary selling factor for Chinese EV makers' latest models, and President Biden's new technological partnership with Israel.

NEXT5 NEWS & AMPLIFICATIONS

→ **A Task Force at the Council on Foreign Relations analyzes the current state of the internet and makes recommendations for the future of international connectivity.** The US invention of the internet enabled it to instill American values around the world as it was rolled out, yet today's internet remains fragmented, less secure, and under regulated. A few of CFR's major findings include:

- The US has failed to adopt a comprehensive, successful policy on internet access and privacy.
- Most cyberattacks remain below the threshold of the use of force or an armed attack.
- Cybercrime is a national security risk.
- AI and other emerging technologies will increase strategic instability.
- The US has failed to impose sufficient costs on malicious cyber actors.
- Norms are more useful for binding allies than containing adversaries.

A few of CFR's major recommendations include:

- Build an allied digital trade agreement.
- Adopt a shared policy that is interoperable with Europe's GDPR.
- Create an international cybercrime center.
- Launch a program for cyber aid and infrastructure development.
- Work with partners to retain technology superiority.
- Declare norms against destructive attacks on election and financial systems.
- Hold states accountable for malicious activity emanating from their territories.
- Offer incentives to ISPs and CSPs to reduce malicious activity within their infrastructure.
- Address the domestic intelligence gap.

#USA #Cybersecurity #Geopolitics #SCRM CFR

→ **An investment fund supported by the White House and partially funded by tech heavyweights Peter Thiel, Eric Schmidt, and Craig Newmark is working to advance "deep technologies" to give the US the edge over China** – especially when it comes to cybersecurity. The US needs to do more to win the "great nation competition," according to Gilman Louie, CEO of the newly launched America's Frontier Fund (AFF) and **Chairman of LookingGlass' board of directors.** This will entail supporting innovation in AI, quantum computing, fusion, microelectronics, 6G cellular technology, advanced manufacturing, and synthetic biology. The White House recently named Louie, a gaming executive who became the venture capitalist behind In-Q-Tel, the CIA's investment arm, to President Biden's Intelligence Advisory Board, giving him a direct line to the president. AFF will be a hub for what Louie calls the Quad Investor Network (QIN), a partnership that AFF will lead with other global democracies to invest jointly in emerging technology. The White House announced the QIN effort in late May, about three weeks after it said Louie had been selected alongside three others for the intelligence advisory board. Cybersecurity has been a White House priority since Biden took office – the administration increased efforts to work alongside the private sector after the

SolarWinds and Colonial Pipeline attacks during the president's first term. But Louie's work is also building on efforts started in the Trump administration. AFF appears to have grown out of work done by the Congressionally-chartered National Security Commission on Artificial Intelligence (NSCAI) led by Schmidt, the former Google CEO who is a key AFF donor. Louie was one of a handful of national security and technology leaders who worked under Schmidt to produce NSCAI findings last year. In addition to donations from Schmidt, Palantir co-founder Peter Thiel, and Craigslist founder Craig Newmark, the AFF is also supported by a board of directors that includes high-level veterans of national security and the tech industry. #Cybersecurity #DIG #AI #QNT #5G #MFG #BIO #USA #CHN CyberScoop

DIGITALIZATION

→ According to research firm PrivacyHQ, half of NFT owners have lost access to one or more of their digital collectibles at some point. **Below are some of the biggest security concerns surrounding the NFT market.**

1. **Traditional Phishing Scams:** Threat actors have tricked users into signing online contracts allowing them to trade tokens with vital portions of the authorizations blank. This allows scammers to complete the forms and transfer NFT ownership from the original users.
2. **Reliability of Marketplaces:** As centralized platforms, NFT marketplaces store vital information about users and can be vulnerable to a variety of attacks. While security protocols are in place, hackers are constantly looking for sources of weakness.
3. **Hacks of Support Networks:** As NFTs are a relatively new type of asset, many users have questions about how they operate. This can make support networks an easy target for hackers. By posing as legitimate support staff, scammers can lure unsuspecting users to fake networks or other websites and then ask them to share their screens or provide personal identifying information that can then be used to commit theft.
4. **Theft of Tweets:** One scam involves a tweet bot that automatically converts tweets into NFTs, which scammers can then immediately claim ownership over.
5. **Loss of Title and Ownership Records:** NFTs don't have paper trails that can prove ownership of the assets. Although NFT purchases are logged on the blockchain, the actual assets don't exist there – just an identifier showing the purchase was made.
6. **Illegal Copies:** Scammers can create illegal online copies of assets and sell them to numerous individuals. Not only would a purchaser not own a unique NFT, but the original artist could also eventually track down a legitimate user owning an illegal copy.

#DIG #Cybersecurity GoBankingRates

→ **A mass retreat from cryptocurrencies has spread to startups that offer users digital tokens, pushing down digital asset prices and driving away users.** The Web3 startups allowed users to play virtual games and collect digital assets – the companies' growth hinged on interest from people seeking to acquire blockchain-based assets. But the broader cryptocurrency downturn this year is causing a downturn in users in many Web3 companies, and players and investors are re-evaluating the utility of token-based business models.

Investors in 2021 poured more than $4.5B into blockchain-based gaming, digital media, and commerce companies, compared with $197M in 2020, according to Crunchbase data. The increase mirrored the rise of cryptocurrency investing in Silicon Valley: Last year, venture capitalists invested ~$17.9B into blockchain-related startups, compared with $2.1B in 2020, according to Crunchbase. Proponents of Web3 say the blockchain is a new way to shift economic power from dominant companies such as Facebook parent Meta and institutions like central banks. Over the past few years, it has fueled the rise of sectors such as decentralized finance. Yet some consumers believe that blockchain-based services are becoming less useful due to the inability of some Web3 companies to retain users. #DIG #FIN WSJ

→ **Last week, researchers at Mojo Vision in Saratoga California conducted the first authentic test of an augmented reality contact lens.** Mojo Vision put a high-resolution display on a small transparent lens that could sit comfortably on the human eye. The device communicates externally with wireless devices and is fully powered without a physical tether of any kind. According to the company, the Mojo Lens has a 14k pixel-per-inch microLED display with a pixel pitch of 1.8 microns. By comparison, an iPhone 13 with a Super Retina XDR Display has 460 pixels per inch. Therefore, the Mojo Lens display hardware has about 30 times the pixel density of a new iPhone. In addition, these lenses include an ARM processor with a 5GHz radio transmitter, along with an accelerometer, gyroscope, and magnetometer to track eye movements. The Mojo Lens also includes medical-grade micro batteries as a power source. The technologies to enable immersive AR have developed rapidly over the past 30 years, beginning with a room full of expensive Air Force hardware in 1992, and advancing to tiny transparent lenses that fit on the surface of the eye in 2022. Other significant innovations along the way include the Microsoft HoloLens and Magic Leap headsets, Pokémon Go, and Snap AR. #DIG #BIO #USA VentureBeat

→ **New rules on cross-data transfer will force businesses in China to seek approvals from Chinese authorities before transferring data abroad.** The rules – published by China's internet regulator last Thursday and effective on September 1 – will likely increase compliance costs for businesses and push more multinationals to store data in the country. "Critical information infrastructure operators" – companies processing data for key industries such as telecommunications, defense, energy, and finance – must pass a security review by the Cyberspace Administration of China before they can transfer personal data abroad. Over the past five years, Beijing has released a flurry of rules aimed at building up its data-governance system and cyber sovereignty, an idea that countries have absolute control over their corners of the internet. The new rules dictate that approvals are necessary to ship "important data," but regulators haven't clarified the definition of what constitutes such data, nor do businesses have visibility into the outcome of such security reviews or the type of data export allowed. China's different industry regulators have said they are still developing catalogs of "important data" for each sector. In the past, Chinese regulators have used a broad and opaque definition when it comes to such data, particularly data that could endanger national security, economic, and social stability if misused, damaged, or leaked. #DIG #CHN WSJ

SATELLITES & NAVIGATION

→ **Russia is likely constructing a sophisticated laser system designed to blind adversary satellites.** The construction is taking place at the Russian Ministry of Defense's Krona space facility near Zelenchukskaya in Russia's far southwest, home of the massive RATAN-600 radio telescope. The existence of this new complex was revealed in an in-depth open-source investigation published by *The Space Review* that analyzed public satellite imagery, solicitation documents from Russian industrial contractors, and Russian financial documents. All of these sources lay out the construction of a project named Kalina, described in the financial documentation obtained by The Space Review as a laser system designed for "electro-optical warfare" that can permanently blind adversarial satellites by shining laser pulses so bright they can damage optical sensors. The new investigation suggests that, despite having been planned years earlier, construction on Kalina has recently begun at an existing space surveillance complex operated by the Russian Ministry of Defense that houses lidar (light detection and ranging) and radar systems designed to help identify targets for space telescopes. Russia is likely not the only state developing new anti-satellite capabilities. As we previously reported, Chinese military researchers have called for the development of a "hard kill" weapon to destroy the Starlink satellite system if it threatens China's national security. The team also called for the development of soft-kill methods for the SpaceX constellation; ground-based lasers like Russia's new Kalina system could provide such a method described by the Chinese researchers. #SAT #USA #RUS #CHN Space.com

→ **An orbital carrier controlled by AI could be used to patrol and counter attacks in space, according to a new study by Chinese scientists.** The study presents a large orbital platform carrying hundreds of cubesats – tiny satellites that weigh about 2.2lbs – that could defend China's space assets with speed and efficiency. According to the researchers, it would need help from AI to determine when and where to release the cubesats so they could fend off enemy satellites. The researchers say the complexity of a large and fast space battle would be beyond the human brain – and even beyond some powerful AI algorithms. Therefore, studying the best strategy for AI to control an orbital carrier would have "strong economic and military value," the team said in a paper published in *Chinese Space Science and Technology* on June 25. The team proposed using AI for mission planning by using it to answer key questions such as the direction of orbit transfer, when the cubesats should be released, and the timing of encounters with other satellites. Beyond space warfare, the team said an orbital carrier using AI could be used for in-orbit refueling and maintenance. #SAT #AI #AER #CHN SCMP

→ **Rocket Lab delivered a spacecraft to orbit for the US National Reconnaissance Office (NRO), which operates the nation's fleet of spy satellites.** A Rocket Lab Electron booster topped with the NROL-162 spacecraft lifted off from the company's New Zealand site on Wednesday, July 13. One hour later, the Electron's "kick stage" deployed NROL-162 into Earth orbit as planned, Rocket Lab founder and CEO Peter Beck confirmed via Twitter. NROL-162 "will strengthen the NRO's ability to provide a wide range of timely intelligence information to national decision makers and intelligence analysts to protect the United States' vital interests

and support humanitarian efforts worldwide," Rocket Lab wrote in a description of Wednesday's mission. NROL-162 is a joint effort by the NRO and the Australian Department of Defense (AUS DoD). #SAT #AER #Geopolitics #USA #NZL Space.com

ARTIFICIAL INTELLIGENCE

→ **MIT researchers developed an AI model that finds potential drug molecules a thousand times faster than existing models.** In a paper, the researchers present a geometric deep-learning model called EquiBind that is 1,200 times faster than one of the fastest existing computational molecular docking models, QuickVina2-W, in successfully binding drug-like molecules to proteins. Before drug development can take place, drug researchers must find promising drug-like molecules that can bind or "dock" properly onto certain protein targets in a process known as drug discovery. After successfully docking to the protein, the binding drug, also known as the ligand, can stop a protein from functioning. If this happens to an essential protein of a bacterium, it can kill the bacterium, conferring protection to the human body. However, the process of drug discovery can be costly both financially and computationally, with billions of dollars poured into the process and over a decade of development and testing before final approval from the Food and Drug Administration. Unlike most models that require several attempts to find a favorable position for the ligand in the protein, EquiBind already has built-in geometric reasoning that helps the model learn the underlying physics of molecules and successfully generalize to make better predictions when encountering new, unseen data. #AI #BIO #USA MIT

→ **An AI institute in Hefei, in China's Anhui province, says it has developed software that can gauge the loyalty of Communist Party members.** According to analysts, China has improved its AI-powered surveillance using big data, machine learning, and facial recognition to "get into the brains and minds of its people," building what many call a draconian digital dictatorship. The institute posted a video called "The Smart Political Education Bar," on July 1 to boast about its "mind-reading" software, which it said would be used on party members to "further solidify their determination to be grateful to the party, listen to the party and follow the party." In the video, a subject was seen scrolling through online material that promotes party policy at a kiosk, where the institute said its AI software was monitoring his reaction to see how attentive he was to the party's thought education. The post, however, was taken down shortly after sparking a public outcry among Chinese netizens. The so-called mind-reading software is the latest digital control China has implemented. The CCP reportedly has long deployed facial recognition in Xinjiang to keep tabs on ethnic Uyghurs while having enhanced its surveillance in recent years with "one person, one file" software to make it easier to track its people. #AI #DIG #CHN VOA

NEXT GENERATION COMMUNICATIONS

→ **Maritime 5G is emerging as a significant market vertical.** Jet Engineering System Solutions announced the successful deployment and testing of a floating 5G base station, a proof of concept the company hopes will spur further investment in solutions for maritime telecommunications access. The Jet-4 Babel platform hosted the base station, which could connect on the water to the company's offshore Jet-3 Arial buoy. The buoy, equipped with subsurface cameras, streamed video in real-time to the testing team. According to the company, this proof of concept enables Jet to provide the first fully functional floating 5G network at sea. Separately, in June, Latvian telco LMT announced a partnership with port services provider Rigas Brivostas Flote (RBF) to create and deploy maritime 5G starting with ship-to-ship communication in the Baltic Sea. The first demonstration of the technology is scheduled for next year in the Gulf of Riga. Additionally, Ericsson ONE said in 2020 it was working on a point-to-point 5G solution for seafarers. The company sought to break "the satellite-based monopoly over the seas" by offering higher-performance and lower-cost wireless broadband connectivity geared towards IoT-based sensor and analytics-based automation technologies, as well as for critical communications. Much of the focus on 5G non-terrestrial network deployment has been centered around low earth orbit satellites and stratospheric platforms, including hot-air balloons and solar-powered drones. But efforts by Jet, EricssonOne, and LMT/RBF demonstrate maritime 5G is emerging, although it remains at a nascent stage. #5G #SAT #GBR #LVA #SWE RCRWireless

→ **Swedish telecom equipment maker Ericsson, French aerospace group Thales, and the US's Qualcomm plan to work jointly to develop a satellite-driven 5G network to improve terrestrial connectivity.** A 5G mobile device that can connect with satellites would make communication possible from remote corners of the globe and provide a challenge to expensive satellite phones and rival broadband internet services provided by Elon Musk's Starlink. A space-based network could also be used to back up terrestrial networks in the event of major outages or disasters, and offer connections in places not covered by traditional service providers. The companies will first do simulations on the ground before carrying out tests in space, according to Hakan Djuphammar, head of special projects at Ericsson's technology arm. Testing would continue well into 2023 to determine the feasibility for building a network of satellites that can connect with phones, Djuphammar said. It was not specified when the tests would begin. #5G #USA #SWE #FRA Times of San Diego

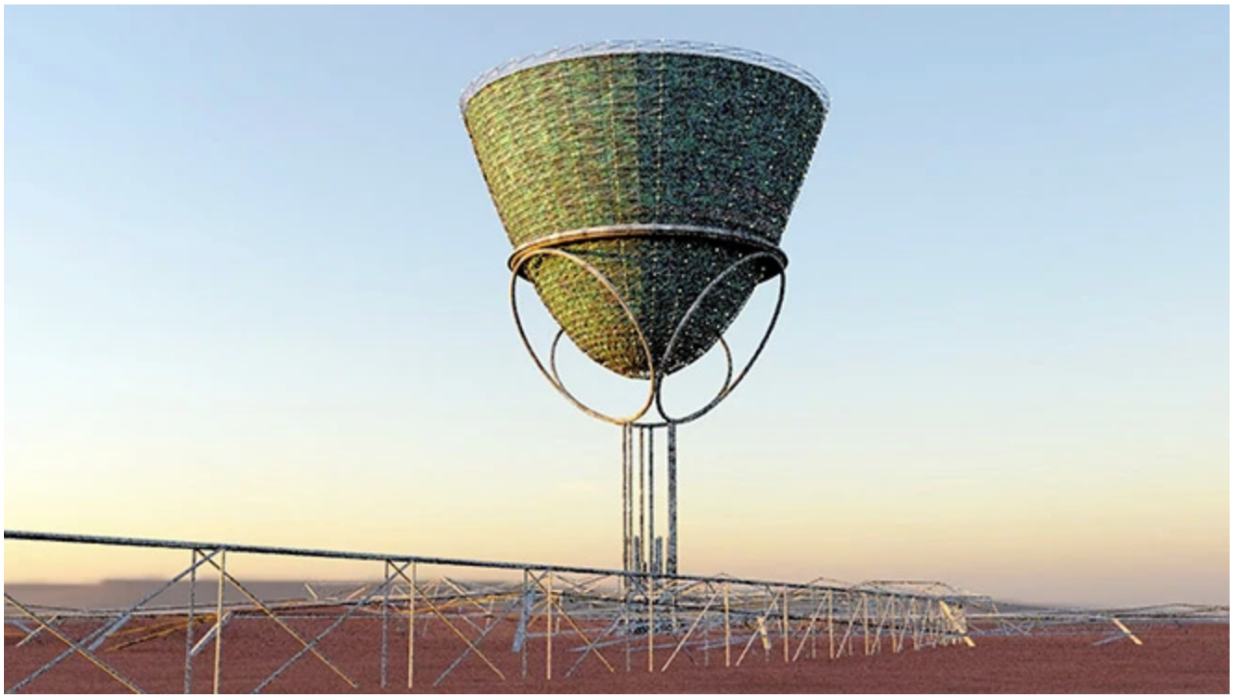
FINANCIAL TECHNOLOGY

→ **Visa and Mastercard are planning for customers to use crypto routinely for everyday purchases.** Consumers now can make payments with cryptocurrencies linked to Visa and Mastercard cards provided mainly by fintech companies, but it's a niche market**.** Transactions generally depend on third parties converting the crypto to local currencies, but Visa and Mastercard – the largest card networks in the US – say they are working on ways to handle the mechanics of crypto payments themselves. These efforts, if successful, would mark the first time the decades-old networks would enable settling payments in assets beyond what most consider mainstream currencies. This could enable consumers to purchase everyday items with

a card that's funded by cryptocurrency, like how debit cards are linked to checking accounts. It could also drive more financial institutions to issue these cards for consumers while more merchants begin accepting stablecoins or other crypto as payments. Some companies, including AT&T, Overstock.com, and Chipotle Mexican Grill already accept crypto payments from consumers. Both Visa and Mastercard see fiat-backed stablecoins, with values pegged to traditional currencies like the US dollar or other financial assets, as a testing ground for handling crypto payments. After consumers make a payment with a card linked to stablecoin, the networks want to be able to receive stablecoin payments directly from the card's issuer – a bank or other financial institution – and then send the stablecoin to the merchant's bank. Visa is testing converting the stablecoin into local currency itself and sending it to the merchant's bank. The company is aiming to roll out the latter capability in certain markets globally before the end of the year. Currently, many US banks don't allow customers to buy crypto with credit cards they have issued because of pricing volatility. The concern is that cardholders might be more likely to default on their bills if crypto plunges soon after a purchase. #FIN #USA WSJ

AEROSPACE & SPACE

→ **Researchers at Kyoto University have joined forces with contractor Kajima to develop gravity-defying habitats required for use on the Moon and Mars.** The habitats are complete with their own transportation system, according to a report by Japanese newspaper Asahi. The team announced that they will undertake a joint study to achieve the plan; however, the plan will only become possible in the 22nd century at the earliest. At the core of the plan is constructing "artificial gravity living facilities" to generate the same level of gravity as on Earth by using centrifugal force created by rotational motions. One of these facilities, called Lunar Glass, will be built on the moon under the plan while another, called Mars Glass, will be constructed on Mars. Gravity on the moon and Mars are one-sixth and one-third of that on Earth, respectively. The facilities will help reduce the impact on the health of people living on the moon or Mars that could be caused by low gravity, according to the researchers. They also plan to create space in the living facilities complete with forests or waterfronts by mimicking the biodiversity on Earth. Although they expect constructing the massive facilities will take them around 100 years, they aim to build a simplified version of them on the moon by 2050. The plan will include a transportation system called the "Hexagon Space Track System," reminiscent of a galaxy express, to travel between Earth, the moon, and Mars. The system's space train, as large as a Shinkansen, will also generate artificial gravity and travel like trains running on Earth, according to the researchers.



An artist's image of an artificial gravity living facility called Mars Glass on Mars (Provided by Kajima Corp.)

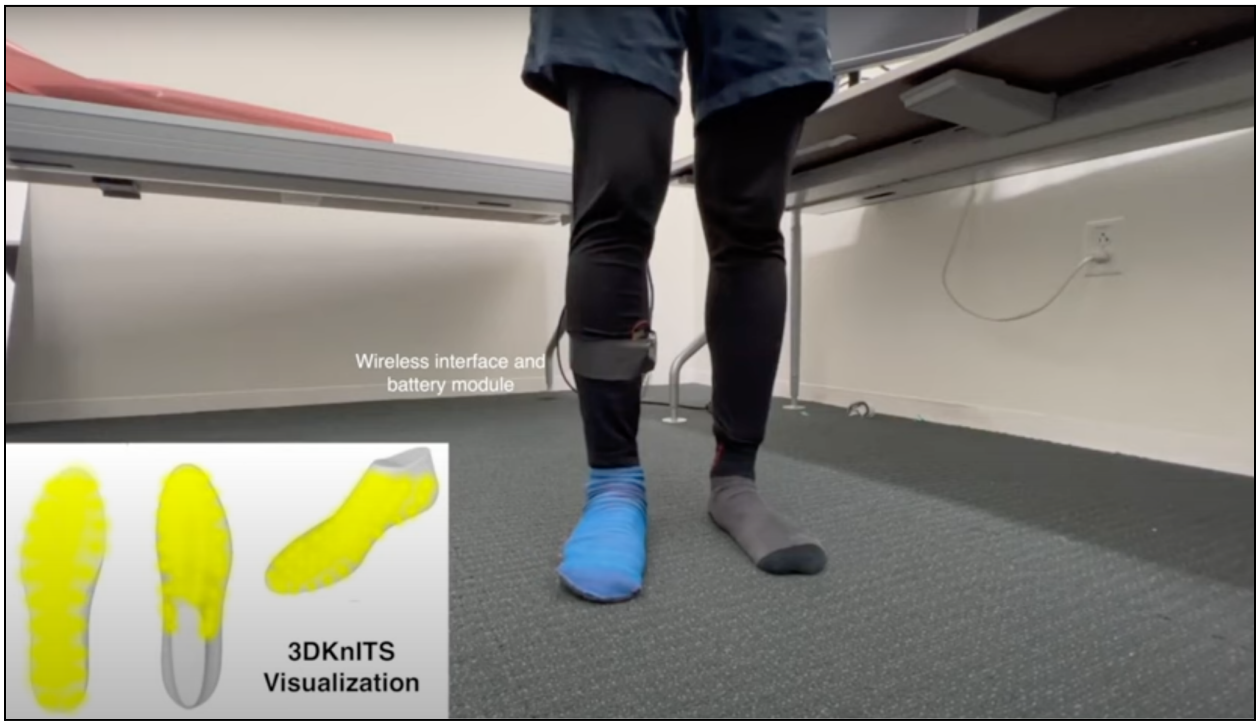
#AER #JPN Interesting Engineering

BIOTECHNOLOGY

→ **A novel study in which physicians implanted genetically engineered pig hearts into clinically deceased patients could open the path for human trials and a future with more life-prolonging organ transplants.** In the past month, researchers at NYU Langone Health transplanted pig hearts into two people who had recently suffered catastrophic heart failure and were left brain dead but remained on life support. In both cases, the new hearts beat strongly and were not rejected by the host bodies right away. Doctors reported that the hearts continued to function normally until the end of the three-day experiment. Pig hearts must be genetically modified before being transplanted to reduce the risk of rejection and to ensure proper function. Researchers "knock out" — or silence — specific genes to prevent human antibodies from attacking the newly connected organ. The researchers also prevent the expression of genes that would allow the heart to grow larger after the transplant recipient is exposed to human growth hormone. Certain genes are also "knocked in" by researchers to perform important human biological processes. The doctors hope that their research model, which involves testing pig organs in clinics with deceased patients, will help to prepare the medical community for clinical trials and reduce the likelihood that living patients' immune systems will reject new organs. There are fewer organs available for transplant than patients require; pig organs could increase access to transplants and allow doctors to broaden who is eligible for such procedures. #BIO #USA NBC News

→ **Harvard University bioengineers created the first biohybrid model of human ventricles with helically aligned beating cardiac cells to improve understanding of how the heart beats.** This advancement was made possible by Focused Rotary Jet Spinning (FRJS), a new method of additive textile manufacturing that enabled the high-throughput fabrication of helically aligned fibers with diameters ranging from several micrometers to hundreds of nanometers. FRJS fibers, which were developed at the School of Engineering and Applied Sciences (SEAS) by the Disease Biophysics Group, direct cell alignment, allowing the formation of controlled tissue engineered structures. Unlike 3D printing, which slows down as features become smaller, FRJS can rapidly spin fibers at the single micron scale – roughly 50 times smaller than a single human hair. This is critical when constructing a heart from the ground up. The ventricles were seeded with rat cardiomyocyte or human stem cell derived cardiomyocyte cells after spinning. Within a week, several thin layers of beating tissue had covered the scaffold, with the cells aligning with the fibers beneath. The beating ventricles resembled the twisting or wringing motion of human hearts. The researchers compared the deformation of the ventricle, the speed of electrical signaling, and the ejection fraction of ventricles made of helical aligned fibers and those made of circumferentially aligned fibers. They discovered that helically aligned tissue outperformed circumferentially aligned tissue on all fronts. The researchers also demonstrated that the process can be scaled up to the size of a human heart and even larger, to the size of a Minke whale heart (the larger models were not seeded with cells because it would require billions of cardiomyocyte cells). #BIO #MFG #USA ScienceDaily

→ **Using a novel fabrication technique, MIT researchers created smart textiles that can detect the wearer's posture and movements.** The researchers were able to greatly improve the precision of pressure sensors woven into multilayered knit textiles called 3DKnITS by incorporating a special type of plastic yarn and slightly melting it with heat (a process called thermoforming). They used this method to develop a "smart" shoe and mat, and then developed a hardware and software system to measure and interpret data from pressure sensors in real time. The machine-learning system accurately predicted motions and yoga poses performed by a person standing on the smart textile mat. According to Irmandy Wicaksono, a research assistant in the MIT Media Lab and lead author of a paper presenting 3DKnITS, their fabrication process, which uses digital knitting technology, enables rapid prototyping and can be easily scaled up for large-scale manufacturing. The technique has a wide range of potential applications, particularly in health care and rehabilitation. It could be used to make smart shoes that track a person's gait as they learn to walk again after an injury, or socks that monitor pressure on a diabetic patient's foot to prevent ulcers.



#BIO #USA Tech Xplore MIT Media Lab

GREEN TECHNOLOGY

→ **According to a Bloomberg analysis, the US has crossed a pivotal line to the mass adoption of electric vehicles.** The US is the latest country to pass what's become a critical EV tipping point: 5% of new car sales powered only by electricity. This threshold signals the start of mass EV adoption, the period when technological preferences rapidly flip, according to the analysis. For the past six months, the US joined Europe and China – collectively the three largest car markets – in moving beyond the 5% tipping point. If the US follows the trend established by 18 countries that came before it, a quarter of new car sales could be electric by the end of 2025. That would be a year or two ahead of most major forecasts. Most successful new technologies – electricity, televisions, mobile phones, the internet, and LED light bulbs – follow an S-shaped adoption curve. Sales move at a crawl in the early-adopter phase, then quickly once things go mainstream. (The top of the S curve represents the last holdouts who refuse to give up their aging technology.) In the case of EVs, 5% seems to be the point when early adopters are overtaken by mainstream demand. #GRN #USA #CHN Bloomberg

→ **A research team from the Department of Energy's Pacific Northwest National Laboratory has developed a sodium-ion battery with greatly extended longevity in laboratory tests.** A change in the ingredients that make up the liquid core of the battery prevents the performance issues of sodium-based batteries. The new PNNL-developed sodium-ion technology uses a naturally fire-extinguishing solution that is also impervious to

temperature changes and can operate at high voltages. For now, sodium-ion technology lags behind lithium in energy density. But it has its own advantages, such as imperviousness to temperature changes, stability, and long cycle life. These features may have applications for certain light-duty EVs and grid energy storage in the future. #GRN #USA ScienceDaily

ADVANCED MANUFACTURING

→ **The US Navy has installed a 3D printer on the USS Essex, a Wasp-class amphibious assault ship.** The Essex will serve as a test bed to evaluate the performance of the 3D printer at sea for the first time. If successful, the Navy hopes to leverage the additive manufacturing technology to vastly improve its overall warfighting capabilities. In the US Navy, ships will usually go out to sea for up to two weeks each month for training. However, deployments may last six to nine months, making it difficult to determine the number of spare parts required for the time. There is thus a constant need for flexible manufacturing capabilities housed on the ships themselves. The metal 3D printing system on board the Essex is reportedly one of the fastest of its kind on the market. The machine can fabricate aluminum parts up to 10" x 10" in size, and will eventually be used to print fuel adapters, heat sinks, bleed air valves, housings, valve covers, and more. Separately, in May, the US Air Force invested in a 3D printer capable of producing spare parts for its Strategic Automated Command Control System (SACCS). Elsewhere, the US Army Combat Capabilities Development Command (DEVCOM) is conducting a project that could enable soldiers to 3D print everything from shelter to weapons on the battlefield in the future. #MFG #USA 3D Printing Industry

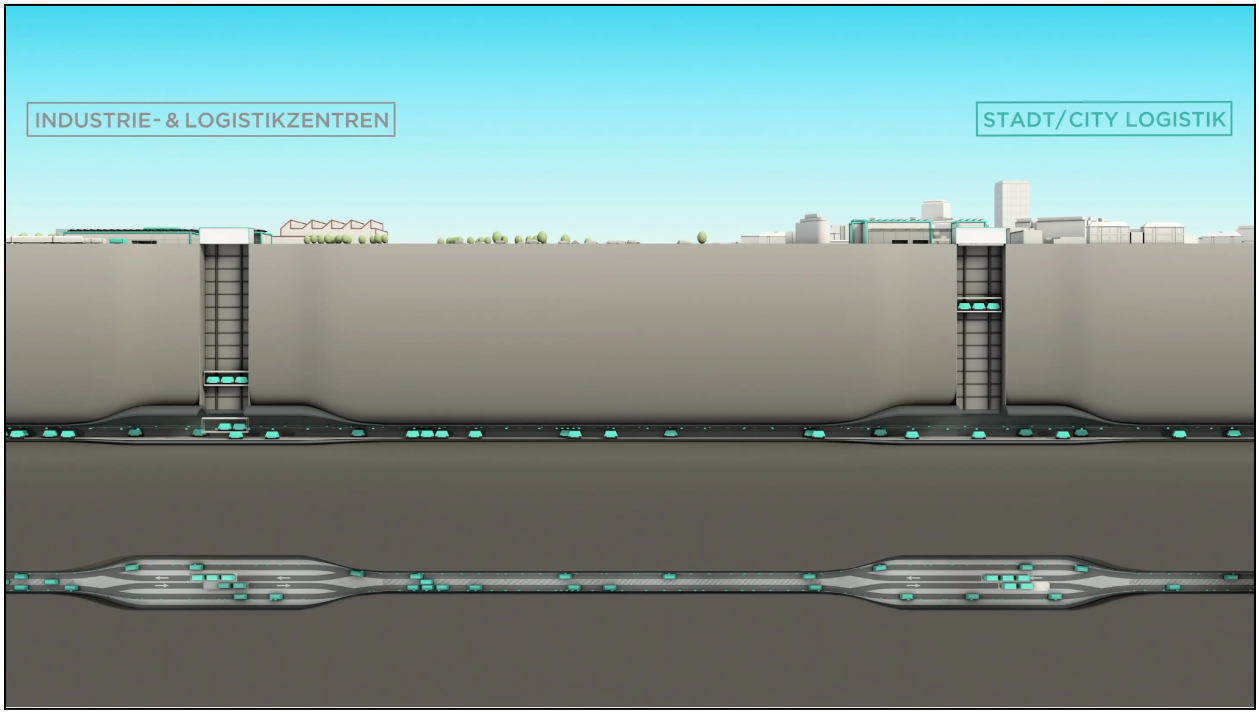
→ **Researchers at Universität Hamburg have recently introduced a new approach to teach robots to grasp and manipulate objects using a multi-fingered robotic hand.** This approach, introduced in *IEEE Transactions on Neural Networks and Learning Systems*, allows a robotic hand to learn from humans through teleoperation and adapt its manipulation strategies based on human hand postures and the data gathered when interacting with the environment. In the future, the new approach could help to improve the manipulation skills of both existing and newly developed humanoid robots. In addition, it could prove to be a promising strategy to close the gap between deep learning and control-based approaches, merging the advantages of both to improve the capabilities of robots. #MFG #DEU Tech Xplore

AUTONOMOUS SYSTEMS

→ **Volkswagen's head of software development envisions a pay-per-use autonomous system in which users could be assigned autonomous driving sessions for long distance drives.** Volkswagen (VW) is currently developing an operating system that is scalable across its brands and capable of frequent over-the-air updates to enable enhancements such as driver-assistance features — areas where Tesla has a significant lead. The layout for their next group-wide architecture is comparable to what Tesla initially proposed, but VW subsidiary Cariad wants to go even further. This entails increased integration, increased computational power, and a different scope. There is already a new business model in place — a subscription

model or function-on-demand — in which AI informs users that they can drive autonomously for the next 50 miles if they so desire. Cariad intends to use this model to expand their AV capabilities. #AUT #AI #DIG #DEU #USA Bloomberg

→ **Cargo Sous Terrain, based in Switzerland, is developing an underground fully autonomous, zero-emissions transportation system for small cargo loads that will relieve pressure on road systems, with a target debut date of 2031.** Each tunnel will have a 6 m (20 ft) diameter and a flat floor divided into three lanes. Platoons of small cargo pods will travel at speeds of around 30 km/h (18.6 mph) along these lanes. They will be powered by induction rails and will be propelled by electric motors. Pods will be loaded at above-ground logistics facilities before being lowered on elevators to on/off-ramp sections of the tunnel system. The tunnels' outside lanes will be one-way, while the inside lanes can be dynamically configured to avoid traffic jams if a large number of pods are waiting for a single elevator. The company has begun investigating and surveying locations for the first ten hubs, prioritizing locations that will take the most traffic off the roads. If everything goes as planned, the CST tunnel network will span 500 km (311 mi) from Geneva to St. Gallen, with short secondary lines connecting to Basel, Lucerne, and Thun.



#AUT #GRN #SCRM #CHE New Atlas

SEMICONDUCTORS & CHIPS

→ **GlobalFoundries and STMicroelectronics will announce plans to build a semiconductor factory in France with government funds next week**, according to people familiar with the matter. The announcement is part of French President Emmanuel Macron's

effort to encourage international investments. The two companies' project will be the second foundry announcement under the EU's Chips Act, a $43.8B plan to subsidize unique semiconductor production in Europe. The Commission aims to produce 20% of the world's chips by 2030 in order to boost domestic production and alleviate supply chain constraints. The vast majority of funds to boost chip production will come from EU countries, which could provide billions in state subsidies. Under the Important Projects of Common European Interest program, EU countries will also contribute to the financing of more than 100 smaller chip projects. #CHP #SCRM #USA #CHE #FRA #EU Bloomberg

→ **Researchers from Monash University and RMIT University collaborated to develop the world's first self-calibrated photonic chip, revolutionizing the connectivity of current optical chips and replacing bulky 3D-optics with a wafer thin slice of silicon.** Photonic circuits are capable of manipulating and routing optical information channels, as well as performing computations such as pattern recognition. Pattern recognition is used in many applications, including medical diagnosis, autonomous vehicles, internet security, threat detection, and search algorithms. The chips can be quickly and reliably reprogrammed, allowing new search tasks to be programmed quickly and accurately. However, precision to the level of a tiny wavelength of light (nanometers) is required, which is currently difficult and expensive to achieve — self-calibration solves this problem. A key challenge of the research was to integrate all optical functions onto a device that could be "plugged in" to existing infrastructure. The solution proposed by the researchers is to calibrate the chips after they have been manufactured, effectively tuning them up using an on-chip reference rather than external equipment. The method is an important step toward commercializing photonic chips. Rather than having to search for a setting, as in an old radio, the researchers were able to tune the chip in a single step, allowing for the quick and reliable switching of data streams from one destination to another. Reliable tuning of photonic chips enables many other applications, such as optical correlators, which can almost instantly detect data patterns in data streams such as images — another project the group has been working on. #CHP #MFG #AUS Phys.org

→ **A powerful chip from US semiconductor giant Qualcomm is being highlighted as one of the primary selling factors of Chinese electric vehicle (EV) makers' latest models, demonstrating China's persistent reliance on American core technologies.** Li Auto, a major Chinese EV manufacturer, highlighted the smart cockpit of its recently announced top L9 model, which is powered by two Snapdragon SA8155P CPUs — part of Qualcomm's portfolio of 7-nanometer automotive semiconductors — in its advertising materials. The smart cockpit in the revised 001 model, unveiled this week, also operates on Qualcomm's 8155P processor, replacing the old 820A chip, according to Zeerkr, a new energy vehicle brand under Chinese carmaker Geely. The two companies are among a lengthy list of Chinese EV manufacturers, including Xpeng and Nio, that have incorporated Qualcomm's flagship 8155P chip in their latest models, giving the US fabless semiconductor firm — already a market leader in smartphones — a clear lead in China's EV market. Despite efforts to lessen reliance on foreign semiconductor technologies amid US-China tensions, the chip's supremacy reveals China's strong reliance on imports for high-end semiconductors. While China's import volume of integrated circuits fell

10.4% YoY in the first half of this year, the value of those imports grew by 6.4% to $210B, according to China Customs data. #CHP #Geopolitics #USA #CHN SCMP

→ **A Shanghai-listed unit of Foxconn purchased a share in one of China's top chipmakers during its $9B rescue, the latest in a string of investments the Taiwanese-run corporation has made in China's semiconductor industry**, according to people familiar with the matter. Foxconn Industrial Internet Co invested in state-backed Tsinghua Unigroup through a fund it established with investment firm Wise Road Capital. The fund paid roughly $788M for a minority share in Unigroup. Following the bailout, Unigroup is owned by a consortium led by state-backed JAC Capital, and is seen as one of a handful of chipmakers critical to Beijing's objective of self-reliance in semiconductors. The investment by Apple's main iPhone assembly unit may raise concerns as tensions between Beijing and Taipei escalate over topics such as technology and supply chain security. The agreement requires approval from Taiwan's investment commission, which regulates sensitive transactions, but Foxconn has yet to submit an application for approval, according to a Taiwan Ministry of Economic Affairs official. Additionally, on Wednesday, July 13, Unigroup's new chairman, Li Bin, stated that the company plans to expand beyond chips and into areas such as genetics and AI. #CHP #SCRM #AI #BIO #TWN #CHN Bloomberg

→ **German tech giant Bosch anticipates supply bottlenecks for certain types of chips to persist beyond 2023, even if inflation cuts demand for certain consumer goods, the firm said on Wednesday, July 13 as it announced a $3B investment in chip production.** The company, which makes silicon carbide chips and micro sensors for everything from cars to earbuds, will invest $170M in new development centers in Germany and $250M in upgrading its Dresden wafer fab. Bosch will also explore the use of gallium nitride in chips, which can achieve a fourfold reduction in power loss when compared to traditional silicon-based power chips. While other chipmakers, such as Intel, are developing tiny 2-nanometer chips, Bosch wafer fabs are designed for the 40 to 200 nanometer chips used in electromobility. #CHP #SCRM #DEU Reuters

QUANTUM TECHNOLOGY

→ **A team of researchers from Ludwig Maximilian University and Saarland University has entangled two quantum memories over a 33-kilometer-long fiber optic connection, setting a new record and taking an important step toward the quantum internet.** The quantum mechanical entanglement was mediated by photons emitted by the two quantum memories. The atoms in the experiment were excited by a laser pulse, and then they spontaneously returned to their ground state, each emitting a photon. Because of the conservation of angular momentum, the atom's spin is entangled with the polarization of its emitted photon. These light particles can then be used to form a quantum mechanical bond between the two atoms. The scientists accomplished this by sending them via fiber optic cable to a receiver station, where a joint measurement of the photons revealed quantum memory entanglement. Most quantum memories, on the other hand, emit light with visible or near-infrared wavelengths. The telecom band is the lowest-loss frequency range in fiber optic

light transmission. The research team completed the conversion at a record-breaking 57% efficiency. They were also able to keep the high quality of information stored in photons, which is required for quantum coupling. The researchers believe their system has the potential to be used to build large-scale quantum networks and secure quantum communication protocols. #QNT #DEU The Quantum Insider

GEOPOLITICS

→ **On Wednesday, July 13, President Biden announced a new technological partnership with Israel aimed at addressing climate change, researching AI, and combating the Covid-19 pandemic.** The US and Israel have other agreements and partnerships, including security and economic pacts. But Wednesday's announced partnership promises to "deepen bilateral engagements" as well as "advance and protect critical and emerging technologies," according to the White House. The two countries will combat the pandemic by promoting R&D initiatives and fight climate change by researching and deploying innovative technology. They also intend to investigate the developing topic of AI for transportation, medicine, and agriculture. #Geopolitics #AI #BIO #GRN #USA #ISR The Hill

CYBERSECURITY

→ **Strider Technologies targets China's IP thieves by scouring open-source data in China to identify technologies most at risk of being stolen.** Oak Ridge National Laboratory in Tennessee has been a target for foreign governments looking to steal American secrets. China has targeted over 1.7k lab-developed technologies, according to the startup. Among the technologies on the list are ion beams, nuclear power equipment, and energy storage materials. Strider executives said they identified two postdoctoral researchers in nanotechnology who were recruited into China's Youth Thousand Talents Program while working at Oak Ridge Lab using custom software to search widely available sources of information on China's internet. The researchers were enticed by perks such as a $75k grant and other subsidies totaling up to $450k. Both relocated to China and are now employed by university labs with ties to China's defense industry. Strider has raised $57M in funding from DataTribe, Koch Disruptive Technologies, and Valor Equity Partners, an early investor in Tesla and SpaceX, for a valuation of more than $200M. The startup has dozens of Fortune 500 customers, including semiconductor, aerospace and defense, and oil and gas companies. The US Air Force has used the technology since 2020 to vet its suppliers for potentially problematic ties to China, according to procurement records and two people involved with the work. Several China scholars expressed concern that Strider's technology would "privatize" the China Initiative and stigmatize people without their knowledge, a claim Strider denies. #Cybersecurity #Geopolitics #CHP #AER #GRN #USA #CHN Bloomberg

→ **Growing concerns about cyberattacks on critical infrastructure, exacerbated by the war in Ukraine, are raising doubts about cybersecurity insurance's ability to cover the risks of a catastrophic attack.** According to a report released last month by the US Government Accountability Office, the challenge has policymakers wondering if and when the

government should intervene with its own form of insurance. “The first problem with the cyber industry is that the past doesn’t necessarily predict the future,” according to Monica Shokai, head of business risk and insurance at Google Cloud. Most insurance policies, such as auto insurance, rely on historical data to forecast future risks. Cybersecurity insurance analysts, on the other hand, face a rapidly changing threat landscape, making it difficult to predict what types of risks businesses will face in the coming year. Take, for example, the recent rapid increase in ransomware attacks. A flood of high-cost claims caught the industry off guard, causing premiums to skyrocket and coverage to be reduced. Assessing the risk becomes even more difficult when ransomware and other attacks target critical infrastructure. “[The public sector and the private sector] don’t have a sufficiently mature view of the systemic risks and cyber risks to critical infrastructure,” said Michael Phillips, chief claims officer at cyber insurance firm Resilience. Experts say that getting good data to build actuarial models is part of the problem. Last year, CyberAcuView, a 20-member consortium of global cyber insurance companies, was formed to pool data and experience to address industry issues such as assessing systemic risk. According to insurers, one good first step would be for the government to provide a clearer definition of what critical infrastructure is. Experts say that without this guidance, the industry will struggle to know how to set policy limits. Even when high-risk scenarios are defined, the minimum standards that insurers must follow are not always obvious. More government guidance on cybersecurity standards could also help, according to the experts. #Cybersecurity #Geopolitics #USA CyberScoop

→ **US defense contractor L3Harris has reportedly ended its bid to buy spyware and hacking tools from Israeli tech company NSO Group.** According to news reports, L3Harris ended the talks following security concerns raised by the Biden administration last month that the acquisition of the spyware would “pose a serious counterintelligence and security risk to US personnel and systems.” A senior administration official stated that “the US government was not involved in and did not support or attempt to facilitate any reported potential transaction involving a foreign commercial surveillance software company on the Department of Commerce’s entity list.” #Cybersecurity #Geopolitics #USA #ISR The Hill

SUPPLY CHAINS

→ **The Science and Technology Directorate of the Department of Homeland Security wants to encourage technology companies to create automated software bill of materials tools that provide greater visibility into supply chains.** The DHS S&T Silicon Valley Innovation Program has issued a five-year other transaction solicitation call for foundational open-source software libraries and other tools that will increase the availability of reliable software bills of materials (SBOMs), machine-readable inventories of components and how they relate. Many federal contractors are hoping that SBOMs will become the standard for demonstrating government-mandated compliance with the Secure Software Development Framework. However, there are numerous data formats, prompting CISA to seek translation tools and automated SBOM generators that can be integrated into build systems. On behalf of CISA, SVIP issued a request for tools to help secure critical communications, finance, transportation, and energy services. CISA is also interested in the following capabilities:

- ➔ Visualization of SBOM data on provenance and risk;
- ➔ Integration with consolidated development environment tools to highlight software dependencies, warn of vulnerabilities, and provide mitigations;
- ➔ Utilization of software identifiers to assist system administrators in identifying and prioritizing threats to the operational environment using security incident and event management tools.

#SCRM #DIG #Cybersecurity #USA FedScoop