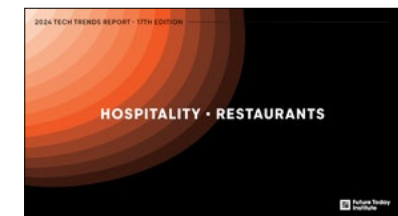
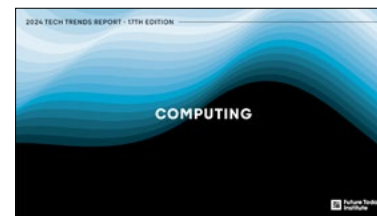
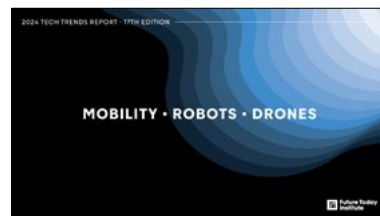
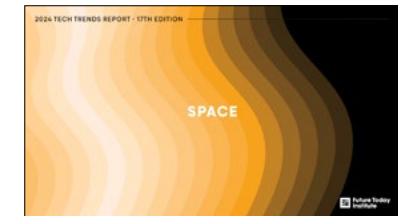


WEB3

FUTURE TODAY INSTITUTE'S 2024 TECH TREND REPORT

Our 2024 edition includes nearly 700 trends, which are published individually in 16 volumes and as one comprehensive report with all trends included.

Download all sections of Future Today Institute's 2024 Tech Trends report at <http://www.futuretodayinstitute.com/trends>.





THE YEAR AHEAD: TECH SUPERCYCLE

The theme for our 2024 report is Supercycle. In economics, a “supercycle” refers to an extended period of booming demand, elevating the prices of commodities

and assets to unprecedented heights. It stretches across years, even decades, and is driven by substantial and sustained structural changes in the economy.

We believe we have entered a technology supercycle. This wave of innovation is so potent and pervasive that it promises to reshape the very fabric of our existence, from the intricacies of global supply chains to the minutiae of daily habits, from the corridors of power in global politics to the unspoken norms that govern our social interactions.

Driving this seismic shift are the titans of technology and three of their inventions: artificial intelligence, biotechnology, and a burgeoning ecosystem of interconnected wearable devices for people, pets, and objects. As they converge, these three macro tech segments will redefine our relationship with everything, from our pharmacists to our animals, from banks to our own bodies. Future Today

Institute’s analysis shows that every technology—AR/ VR/ XR, autonomous vehicles, low Earth orbit satellites, to name a few—connects to the supercycle in some way.

The ramifications are stark and undeniable. As this tech supercycle unfurls, there will be victors and vanquished, those who seize the reins of this epochal change, and those who are swallowed whole. For business leaders, investors, and policymakers, understanding this tech supercycle is paramount.

In this 17th edition of FTI’s annual Tech Trends report, we’ve connected the supercycle to the nearly 700 trends we’ve developed. Our research is presented across 16 technology and industry-specific reports that reveal the current state of play and lists of influencers to watch, along with detailed examples and recommendations designed to help executives and their teams develop their strategic positioning. The trends span evolutionary advancements in well-established technologies to groundbreaking developments at the forefront of technological and scientific exploration. You’ll see emerging epicenters of innovation and risk, along with a preview into their transformative effects across various industries.

We’ve visually represented the tech supercycle on the report’s cover, which is an undulating image reminiscent of a storm radar. Vertical and horizontal lines mark the edges of each section’s cover. When all 16 section covers converge, the trends reveal a compounding effect as reverberating aftershocks influence every other area of technology and science, as well as all industries.

It’s the convergence that matters. In isolation, trends offer limited foresight into the future. Instead, the interplay of these trends is what reveals long-term change. For that reason, organizations must not only remain vigilant in monitoring these evolving trends but also in cultivating strategic foresight—the ability to anticipate future changes and plan for various scenarios.

Our world is changing at an unprecedented rate, and this supercycle has only just begun.

A handwritten signature in black ink that reads "Amy Webb".

Amy Webb

Chief Executive Officer
Future Today Institute

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TOP HEADLINES

Web3 has had a challenging year, but protocols in progress bode well for its future on the other side.

01 **If You Build it They Will Come (Maybe)**

Many of the technical restrictions that limited the blockchain functionality are being solved; however, novel, adoption-driving applications have yet to be developed.

02 **Bad News Sells Better, but Innovation Survives**

Major media crypto headlines remain overtly negative, matching the landscape of economic uncertainty, but development, project launches, and TradFi interest remain elevated.

03 **Just Don't Call Them NFTs**

Consumer-facing companies increasingly use blockchain-based digital collectibles to create and foster online communities for their fans and customers.

04 **Web2.5 the New Web3?**

Web3 promised to replace Web2 tech, but developments and integrations on both sides of the web divide blend the tech, better meeting users where they are.

05 **Splinter Regulation of a Global Network**

Blockchain networks are inherently global, but their nodes and users are not; fragmented regulations across geographies shift businesses and restrict users.

STATE OF PLAY

Blockchain has proven technological staying power, but its product-market fit remains uncertain, and near-term events will significantly impact its potential.

The crypto market has had a rough 12-18 months. Challenging economic conditions and high-profile meltdowns have pushed market volume, prices, and VC investment downward.

But bright spots exist beyond the headlines and price charts. Throughout the bear market, developers have continued to ship code, releasing cutting-edge projects and providing core scalability and reliability enhancements to public networks like Ethereum and Solana. Aside from raw technology infrastructure advancements, there has never been an easier time for new companies or traditional businesses to launch custom chains due to the developing Rollup-as-a-Service business model and SDK from leading Ethereum Layer2 scaling solutions.

However, significant roadblocks in regulation, adoption, and security still limit the industry's growth past early adopters. Companies and projects planning for future advancements will have a head start over competitors. Companies are building private blockchain networks to enhance their business, giving them the core benefits of blockchain while reducing scalability and security concerns. Finally, there is a concerted effort on both sides of the web divide to enhance the adoption of blockchain by integrating characteristics of Web2 and Web3 to provide users with a more effortless, more familiar experience and entry point into the industry.

KEY EVENTS

APRIL 20, 2023

Markets in Crypto Assets (MiCA)

MiCA regulation receives formal EU adoption as the first regulatory crypto framework in the world.

JUNE 23, 2023

BlackRock Bitcoin Spot ETF

The investment company's filing for a Bitcoin Spot ETF spurs a deluge of applications from other institutions.

AUGUST 15, 2023

Zynga Announces "Sugartown"

The leading mobile game developer teases its first blockchain-integrated game.

JUNE 5 & 6, 2023

SEC Sues Binance and Coinbase

The regulator targets top companies in the crypto exchange industry and classifies many coins as securities.

AUGUST 9, 2023

Base Launch on OP Stack

Base, a Layer 2 scaling solution for Ethereum developed by Coinbase, launches its mainnet.

LIKELY NEAR TERM DEVELOPMENTS

BRIDGING THE WEB DIVIDE

Many of the technological limitations of blockchain have been resolved or reduced, but adoption is the next hurdle for blockchain technology and crypto markets. Many forces are driving and limiting adoption today, and the speed of adoption will depend on the intersection and final outcomes of these forces. Even in the depth of the bear market, the industry is seeing very promising signs of interest and adoption from traditional industry players. However, major roadblocks—like regulation—persist, and these factors are largely out of the hands of the crypto industry.



Enshrined Account Abstraction

Account abstraction is a proposed upgrade to Ethereum that, when implemented, will provide flexibility in account setup via smart contracts. This will give users easier routes to maintain self-custody of tokens, more akin to account management in Web2.



Globally Successful Web3 Game

The video game industry is years into the creation of top titles that have blockchain built into the core of the gameplay. The similarities of these games to titles gamers are familiar with, combined with new ways to play, should attract crypto natives and Web2 gamers.



Tokenized Asset Network Adoption

Traditional global financial players are working on private blockchains to facilitate the transfer of tokenized financial assets, which are quicker to transfer and settle, and which help companies avoid the regulatory and security concerns of public networks.



Verifying AI Output

AI models are sowing online discord. Deep-fakes and misinformation are major issues for political elections and online interaction. Zero-knowledge cryptography could enable verifiable online content and remove distrust behind content consumed online.



US Regulators Forced to Decide

SEC investigation and regulation of crypto assets is causing pressure to mount. Major decisions around the SEC's regulatory scope, classification of securities, and legality of decentralized finance are coming to a head, which could shift the entire crypto market.



Crypto Double Down in Africa

In sub-Saharan Africa, crypto is more than a “nice-to-have”; it's a financial necessity. A mix of financial instability and demographics in this region have led to the quiet adoption of crypto payments, which will lead to a greater industry focus in the region.

11 MACRO SOURCES OF DISRUPTION



Technology



Media & Telecom



Demographics



Environment



Government



Public Health



Education



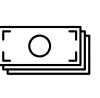
Geopolitics



Infrastructure



Economy



Wealth Distribution

WHY WEB3 TRENDS MATTER TO YOUR ORGANIZATION

New Business Model Opportunities

The outside world widely understands crypto as an instrument for currency exchange. However, novel decentralized business models in lending/borrowing, sequencing transactions, float, and others have developed. They are driving revenue for projects and stakeholders through high levels of automation and low overhead.

Shifting Consumer Expectations

Blockchain has created the ability to own and transact online value. Web3 users have adopted this technology, shifting their expectations of ownership rights of digital goods and services. As the adoption of Web3 grows, it will shift consumer preferences, requiring businesses to enhance their digital operations.

Strengthening Data Management

Storing data in cloud databases has limitations and downfalls. Data can easily be manipulated maliciously or accidentally, and sharing data outside the organization can be slow and challenging. Blockchain's immutable ledger can be used in private networks to store and share data, avoiding scalability and security concerns.

Need for Technical Sophistication

Web3, like many technologies, has a rapid pace of innovation that causes it to evolve quickly and often. Paired with regulatory uncertainty, businesses contemplating entering the space should focus on the macro details, application opportunities, and risks while continuing to consistently track technical aspects and nuances.

Tracking New Sources of Competition

DeFi solutions may not seem to threaten traditional finance, but they shouldn't be overlooked. Many projects and protocols exist at a scale that can compete for liquidity, loans, trading, and other services from clients and users. As investors become more comfortable with Web3, these solutions will pose real competition.

Integrations and Partnerships

As Web3 solutions become more sophisticated, legacy businesses will benefit from establishing early partnerships to learn about and implement the technology. There are many opportunities to build relations with leading Web3 projects today that can provide meaningful learnings for near-term strategic decision-making.

WHEN WILL WEB3 IMPACT YOUR ORGANIZATION?

Forecasted Time of Impact



0-4 YEARS

5-9 YEARS

10-14 YEARS

15+ YEARS

OPPORTUNITIES & THREATS

Threats

The decentralized nature of blockchain can expose businesses to new forms of cybersecurity risk, particularly for small and medium-size businesses that lack the capacity or technical sophistication to audit their Web3 capabilities.

Many jurisdictions are still developing regulations for blockchain technology and cryptocurrencies, posing risks for businesses in terms of compliance, legal challenges, and sudden changes in the regulatory landscape.

As Web3 grows in popularity, issues like network congestion, high transaction fees, and slow processing times may hinder the user experience on Web3 services, impacting businesses that are early adopters.

The high volatility of the cryptocurrency market and immaturity of Web3 startups can pose risks to businesses that rely on cryptocurrency for transactions, fundraising, or as part of their business model.

The complexity of today's Web3 applications compared to traditional Web2 solutions could be a barrier to widespread adoption and will burden businesses implementing Web3 to ensure ease of use for consumers.

Opportunities

Web3 enables tokenizing real-world assets that can be exchanged via blockchain marketplaces. Businesses can transform how they exchange goods or develop related services for asset valuation or exchange platforms.

Advancements in security and cryptography will unlock the development of decentralized identity solutions that allow consumers to control their personal information and share it or authenticate it without revealing PII.

Web3 technologies like the InterPlanetary File System (IPFS) provide opportunities for decentralized data storage that will enable businesses to transform their data storage, management, and verification solutions.

As more companies integrate blockchain into their operations, there will be a growing demand for advisory services that is domain-specific and helps companies ensure they are implementing the technology responsibly and correctly.

With the growth of virtual assets and worlds, companies can transform their Web2 properties into increasingly immersive and interactive Web3 properties, for consumers to interact with in novel ways.

INVESTMENTS AND ACTIONS TO CONSIDER

1

Partnerships have become essential for two-way knowledge transfer and exposure to Web3. Companies should seek partners across the web divide with mutually beneficial goals where technical components in Web3 benefit traditional businesses, and traditional businesses can provide adoption, exposure, or reputational benefits.

2

Businesses should begin building or improving the necessary structure for Web3 applications. This may include setting up a more robust network, building the foundation for user-friendly interfaces, or developing middleware that facilitates the integration of traditional systems with blockchain-based systems.

3

Companies—especially large or public institutions—should begin engaging with regulators to stay up to date on the development of related regulations or to begin shaping favorable regulations for their industry. Companies may also invest in legal expertise to navigate Web3-specific regulatory environments.

4

Businesses may seek to improve their institutional knowledge in Web3 by working to develop new blockchain protocols, exploring use cases for Web3 within their industry, or experimenting with new forms of digital assets. This early experimentation can help companies prioritize starting points for Web3 engagement.

5

Educational initiatives and training serve as a starting point for companies that may be affected by Web3. Companies should provide upskilling opportunities for employees to grow their knowledge of Web3 technologies from foundational protocols to user-facing applications, and all of the technologies in between.

6

Internal technology teams should revisit security protocols, encryption standards, and data security approaches to take advantage of Web3 capabilities such as zero-knowledge proofs. This review will also help companies prepare for new and increasingly complex cyber risks that will emerge from a more interconnected economy.

CENTRAL THEMES

Web 2.5 as a Bridge to Web3

Web3 has long been touted as a replacement for Web2 technology, but many barriers limit the technology's widespread adoption by businesses and users. Companies and projects on both sides of the web divide are acutely aware of these issues, and strides are being made to overcome the barriers. Many of these innovations and developments are leading to an intermediate Web2.5: a technology that gives users the convenience, familiarity, or safety of Web2 as well as the ownership and decentralized aspects of Web3. Web2.5 may just be the training wheels the world needs to drive adoption, or it could be a lasting infrastructure that lets users operate across the spectrum of the web. While Web3 infrastructure continues to make progress with its potential to support the entirety of the web, regulation, consumer preferences, and business practices will likely be limiting factors in the time to come.

Positive Innovation Externalities

Blockchain technology is extremely versatile, with applications well beyond finance and the ability to integrate with other rising technologies like artificial intelligence and Internet of Things to solve business problems. The rise in crypto market valuations and popularity has also increased investment in adjacent technologies that work within the ecosystem and will play an important role in solving issues we face daily online. However, overly restrictive regulations that do not account for the novel nuances of the technology and assets built on top of it threaten to subdue or eliminate the positive innovation occurring in the space. Regulators need to work with industry experts to develop new regulations that hold innovation and investor protection in the highest regard to limit nefarious activity without eliminating the technology's positive externalities for economies and society.

Relentless Building

Crypto prices are way off all-time highs, media coverage is overtly negative, transaction volume is down, and the fallout from FTX's collapse still hangs over the industry. And yet, late 2022 and 2023 have been arguably the most productive period in Web3's history. Major networks have had multiple significant upgrades, the ecosystem of Layer 2 chain on Ethereum has blossomed, and blockchain-based games continue to launch and improve. That said, there are blemishes in crypto's rebound: The NFT market has lost significant value, and security and scams remain a key issue though they haven't scared off the developers. This focus on building has even spread to traditional companies as major financial institutions, retailers, and video game companies have used this market to focus on experimentation with Web3 aspects that can enhance their businesses. Companies that continue to overlook Web3 because of headlines or comfort with previous technologies may fall behind competitors that have worked countercyclically to the hype cycle.

CENTRAL THEMES

Blockchains as Infrastructure

Today, the terms “Web3,” “internet,” and “metaverse” are often (incorrectly) used interchangeably. This reflects a broader trend in technology use: Most users engage with technology on a functional level, rather than with an understanding of its intricate mechanics. This is particularly true, and important, for blockchain technology. Business leaders should focus more on identifying the real business impact of blockchain, which will be realized through the applications built on it. As the technology rapidly evolves, it has the potential to support full-scale, innovative applications. A key indicator of blockchain’s success will be when its complex infrastructure becomes an unnoticed foundation, enabling powerful and successful applications to take the forefront. This transition marks a significant milestone in technology integration and user experience, highlighting the value of functionality over technical details in driving business innovation and user adoption.

Hiring Robotic Staff

Each year, cobots become smarter, more autonomous, and more prolific, and this year is no exception. In fact, the first humanoid robot factory is set to open and produce 10,000 robots a year. These robots that work alongside human workers are being trained on more data that allows them to adapt and work around their human counterparts. Developers have focused on improving cobot safety measures, so a cobot knows what to do if it bumps into an unexpected obstacle or person. These cobots mitigate potentially harmful work for humans by either augmenting the human body or replicating repetitive tasks that could cause future injuries. Some of the augmented wearables can also offer predictive pathways through the warehouse to ensure worker safety. As autonomy continues to grow in robots and transportation, this trend will create newfound efficiencies and productivity, particularly during peak demand seasons.

The Intelligent Manufacturing Evolution

Manufacturing continues to transform from a traditional labor-intensive practice to a more sophisticated and interconnected system. Recent advances intend to create higher levels of productivity and efficiency, but they’re also addressing sustainability requirements and enabling product personalization. The new tools and technology can spot flaws in products before they leave the floor, greatly increasing consistency for goods. Along with quality control, sensors and digital twins are getting companies to focus on predictive maintenance by reducing downtime during large runs or times of high demand. Additive manufacturing also allows for the integration of new materials that are themselves smarter and more connected. And it helps reduce the number of parts needed for production of a good, which can streamline production and reduce waste as only the parts needed are produced.

ONES TO WATCH

Hayden Adams, CEO of Uniswap Labs and developer of the Uniswap decentralized exchange protocol, for his thought leadership in Web3 and DeFi protocol development.

Vitalik Buterin, co-founder of Ethereum and other open-source projects, for his stewardship of Ethereum, blockchain thought leadership, and vision for the technology's future.

Evin Cheikosman, director at Blockchain Law for Social Good Center and former leader of the World Economic Forum's Crypto Sustainability Coalition, for her thought leadership on blockchain's benefits.

Anatoly Yakovenko, co-founder of Solana and CEO of Solana Labs, for his ongoing leadership in the Solana ecosystem and advocacy for the unification of blockchain technologies.

Sergey Nazarov, co-founder of Chainlink, for his ongoing contributions to Chainlink's oracle network and to interoperability protocols driving DeFi and TradFi integration.

Dr. Balaji Srinivasan, former CTO of Coinbase, general partner at Andreessen Horowitz, and author of "The Network State," for his thought leadership on Web3 for businesses and governments.

Dr. Gavin Wood, co-founder of Ethereum and creator of Polkadot and Kusama, for his development of leading blockchain technology and vision for Web3.

Brian Armstrong, founder and CEO of Coinbase, for his unwavering commitment to the US crypto market and thought leadership on application-specific use cases of blockchain.

Changpeng Zhao, co-founder and CEO of Binance, for his leadership of the world's largest cryptocurrency exchange amid increased regulatory scrutiny across the globe.

Joseph Lubin, co-founder of Ethereum and founder and CEO of ConsenSys, for leadership and foundational innovations like MetaMask and Linea zkRollup.

Prithvi Subburaj, a 15-year veteran of Google and now COO of OP Labs, for his background and opportunity to lead the expansion of the Optimism Network.

Steven Goldfeder, co-founder and CEO of Off-chain Labs (developer of Arbitrum) and author of "Bitcoin and Cryptocurrency Technologies," for his vision for Ethereum's future.

Yoseph Ayele, founder of Borderless Africa and community builder, for his dedication to solving Africa's economic insecurities with Web3 technologies, education, and access.

Neel Somani, founder of Eclipse Laboratories, for pushing the limitations of the modular blockchain thesis and encouragement for the unification of blockchains and communities.

Mustafa Al-Bassam, a hacktivist turned serial entrepreneur, now co-founder and CEO of Celestia Labs, for his contributions to blockchain modularity and Celestia mainnet.

Fumio Kishida, prime minister of Japan, for his support of Web3 initiatives and his work to make Japan a more open environment for Web3 businesses.

ZachXBT, a pseudonymous X (Twitter) influencer and on-chain detective, for his commitment to uncovering bad actors in the crypto ecosystem tied to scams and crimes.

Yat Siu, co-founder of Animoca Brands and investor, for leading a major blockchain gaming company and pursuit of a decentralized metaverse with secure digital property rights.

Daniel Alegre, Activision Blizzard and Google veteran, now CEO of Yuga Labs, for his leadership of one of the most innovative Web3 brands combining NFTs, gaming, and culture.

Avery Ching, co-founder and CTO of Aptos, for his experience working with traditional tech companies and leadership of a promising Layer 1 blockchain.

Rune Christensen, co-founder and CEO of MakerDAO, for his contribution to DeFi and decentralized stablecoins and his vision for the integration of TradFi and DeFi.

Larry Fink, chairman and CEO of BlackRock, for his support of a tokenized future for TradFi and his leadership of a company paving the way for crypto asset ETFs proliferation.

Jose Fernandez da Ponte, general manager of blockchain, crypto, and digital currencies at PayPal, for his leadership in driving the adoption of implementing blockchain technology and compatibility in TradFi.

Daniel Shorr, co-founder and CEO of Modulus Labs, for his rapid and transparent experiments and implementations of AI models deployed on public blockchains.

IMPORTANT TERMS

Airdrop

A marketing strategy where a project team distributes tokens to users for free in exchange for using the protocol or other requirements. Airdrops are often used as a guerrilla marketing technique to stimulate interest and adoption.

AppChains (application specific chains)

Special-purpose blockchains serving a single application. This gives developers total control of software upgrades and gives users less competitive block space of general-purpose blockchains.

Block space

The storage area on a blockchain for transaction and data storage, including smart contracts. Block space significantly impacts blockchain scalability and decentralization, and therefore gas fees for data inclusion.

Blockchain

A distributed ledger technology typically employed for the transaction and storage of data. It utilizes cryptography to provide an immutable and verifiable data source for participants in a network.

Blockchain trilemma

An optimization challenge faced by monolithic blockchains, requiring trade-offs between decentralization, scalability, and security; only two can be maximized. Solana, known for high transactions per second (TPS), prioritizes scalability and security over decentralization.

Bridge

A tool to facilitate the transmission of information and assets between distinct blockchains regardless of the interoperability of the networks.

Decentralization

The process of constructing architectural infrastructure, system logic, and social systems without the presence of a centralized authority that holds decision-making power or exerts disproportionate influence. Instead, control is distributed among the stakeholders of the network.

Decentralized autonomous organization (DAO)

An internet-native organization formed by individuals who agree to adhere to a specific set of rules and goals without a central authority. DAOs employ tokenized ownership and smart contracts to implement decisions.

Decentralized Exchange (DEX)

A peer-to-peer marketplace for users to trade crypto assets.

Decentralized finance (DeFi)

Financial services including banks, asset managers, insurance companies, and other financial services that leverage blockchain and smart contracts for transactions, data sharing, and other operations.

Exit scams (“rug pulls”)

A common type of fraud where a project team deceives investors to garner their investments and uses a purpose-built vulnerability to drain all funds and abandon the project.

Fork

A term commonly used to describe the act of copying and/or modifying existing code to either upgrade an existing system or launch a new product. Forks are frequently necessary for blockchain-wide software updates and are commonly observed in the decentralized finance (DeFi) sector, where one project replicates the code of another.

Layer 2 blockchain

A broad term that describes blockchains that delegate core infrastructure to another blockchain. Examples include Ethereum’s Rollups and Bitcoin’s Lightning Network, which aim to enhance scalability.

Modular vs. monolithic

Blockchains can be modular, breaking core components (execution, settlement, data availability, consensus) into separate specialized networks to address the blockchain trilemma. Monolithic chains like Ethereum provide all core modules within their infrastructure.

NFT (non-fungible token)

A digital token on a blockchain that contains unique and indivisible data. It is frequently used in digital art or when tokenizing real-world assets.

Nodes

Individual devices within a connected network of computers that serve various functions such as communication, transaction validation, and historical data storage within a blockchain network. Different nodes exist, each with functionality specific to the network they support. Examples include full, light, super, and archive nodes.

IMPORTANT TERMS

Oracle

A capability or service that gathers, collects, and transmits data on- and off-chain to facilitate real-time transactions and information transmissions. Oracles are bridges between blockchains and external off-chain information sources on the internet.

Phygital

This refers to the blending of physical and digital assets into an NFT. Phygital assets are commonly used for tokenizing physical collectibles and art pieces; they frequently include a burn and redeem functionality where the NFT is destroyed for the owner to receive the physical item.

Proof of stake (PoS)

A blockchain consensus mechanism that uses stake tokens to secure the network. Validators (nodes responsible for verifying blocks of transactions) must stake their tokens (use them as collateral) to participate in the block verification selection process. Malicious validators—those that fail to validate or attempt to mislead the network—will

see their collateral value slashed, while benevolent validators earn yields or other benefits for their work. Ethereum successfully transitioned from proof of work to PoS, resulting in a 99% reduction in the blockchain's energy consumption.

Rollups

A subcategory of Layer 2 blockchains with a scalability focus that process and bundle transactions to be submitted to Ethereum for settlement and consensus. The most popular types include optimistic rollups like Arbitrum and Optimism and zkRollups like zkSync.

Scalability

A blockchain's capacity to process and store data as network demand grows, typically measured in TPS.

Security tokens (ST)

Digital assets representing ownership of off-chain assets such as bonds, commodities, or real estate. Off-chain assets are tokenized into STs to enable trading on blockchain networks.

Sharding

A database partitioning technique that divides an extensive database into more manageable parts called shards. Ethereum's roadmap plans to use an adapted sharding methodology to improve the scalability of the blockchain by partitioning the chain and its validators into distinct but interconnected shards, allowing for parallelized transaction processing.

Smart contracts

A blockchain-based computer program that executes autonomously when predetermined criteria are met.

Stablecoin

Cryptocurrency assets whose value is referenced (or pegged) to another financial instrument, often a fiat currency. These assets are typically collateralized by fiat currencies, cryptocurrencies, and liquid assets.

Tokenomics

The economic framework of tokens, encompassing elements such as consensus mechanisms, yields, supply limits, and other monetary policies.

Traditional finance (TradFi)

Conventional means of money or asset management where services are provided by traditional banks, asset managers, insurance companies, etc.

Zero-knowledge proofs (ZKPs)

Mathematical techniques that allow users to prove knowledge (the prover) of something without divulging the private knowledge associated with it to another user (the verifier). Zero-knowledge proofs encompass two core principles important to blockchain technology: succinctness, which means that verifying the proof is significantly easier than producing the computation itself, and privacy-preserving, which involves hiding portions of computation while maintaining correctness during verification.

THE WEB3 LANDSCAPE

THE WEB3 LANDSCAPE

The Rising Regulation of Web3

The world of cryptocurrency and Web3 technologies has witnessed exponential growth in recent years, with North America, Europe, and East Asia emerging as the three largest markets in terms of cryptocurrency volume. However, within these regions, three major players—Japan, the European Union, and the United States—are taking distinctly different approaches to regulating this dynamic industry. These regulatory decisions have far-reaching impacts, influencing innovation, business creation, and even the global power dynamics within the crypto industry. Regulation is a double-edged sword. On one hand, it can provide stability and investor protection, fostering trust in the market. On the other hand, it has the potential to stifle innovation and disrupt the balance of power in the crypto industry. However, businesses in this space are resilient, and innovations tend to be “sticky,” often finding ways to thrive even under regulatory constraints.

Japan was an early adopter of cryptocurrency technology, with the country serving as the epicenter of crypto activity in the early 2010s. However, the infamous Mt. Gox exchange debacle and other issues prompted the Japanese government to introduce stringent regulations and tax regimes to protect investors. These measures, while well-intentioned, had the unintended consequence of restricting the viability of Web3 businesses in the country. Businesses, however, recognized the potential of blockchain technology and cryptocurrencies and took the initiative to create self-regulating organizations to promote adoption, particularly in areas such as the Security Token Market. Today, Japan is gradually rolling back these strict regulations, signaling a desire to encourage Web3 businesses to bring their innovation and investment back to the country.

The European Union, in contrast, has positioned itself as a “fast follower” in the realm of crypto regulation. In 2023, the EU ratified the Markets in Crypto-Assets (MiCA) framework, which is set to take effect in 2024. MiCA aims to strike a balance by creating a regulatory framework that builds on successful regulations in countries like France. The objective is to foster a workable environment that encourages innovation without stifling it, all while ensuring the protection of investors. This approach has been warmly received by the crypto industry, with positive public relations and marketing efforts successfully attracting businesses, such as Coinbase and Nexo, to relocate to stable regulatory regions within the EU. Notably, Nexo, a US-based business, moved to Europe due to regulatory inaction in its home country.

The United States presents a more chaotic regulatory landscape for the crypto industry. The lack of a clear partisan line for or against crypto has resulted in many bills floating around the House and Senate,

each with drastically different stances on the future of crypto in the US. The Securities and Exchange Commission has resorted to regulation by enforcement, adding to the overall uncertainty.

Despite this regulatory uncertainty, businesses in the TradFi and blockchain sectors continue to launch crypto-focused products. However, the lack of clarity has somewhat tempered the full potential of these innovations. It’s important to note that investors, both current and prospective, seek regulatory clarity. As crypto has become an ingrained investment category in the US, its regulation is crucial for attracting and retaining capital.

Regulation and innovation must be balanced effectively in order for Web3 to succeed. These countries must work closely with the crypto industry to protect investors while fostering the incredible potential blockchain technology and Web3 innovations can bring to their respective economies. The evolving landscape of crypto regulation will continue to shape the industry’s future on a global scale.

THE WEB3 LANDSCAPE

Decentralizing Venture Funding

Web3 VC funding has reached a three-year low, driven by regulatory uncertainty and the specter of major company collapses. Despite this drought, developer activity (SDK downloads, smart contract deployments, test net activity) is surging across various blockchain ecosystems. In this bearish market, DAOs and foundations are pivotal, enabling builders to persevere. The Ethereum Foundation, with assets nearing \$2 billion, is a prime example of decentralized funding supplanting early-stage investment traditionally targeted by seed-stage investors. The Foundation's success has birthed DAOs and foundation funds for alternative Layer 1 blockchains, allowing them to invest in their own growth flywheels. Uniswap, a prominent DEX, has grown to the extent that it now operates its own grant program to fund DeFi protocol development. Grants, often structured more favorably than VC investments, offer a straightforward application process and are typically non-dilutive. While VC funds have played an indispensable role thus far and are expected to persist in Web3, the proliferation of DAOs and the

expansion of their investable capital (the top 10 DAOs, excluding foundations, collectively hold nearly \$16 billion) can furnish additional liquidity during market downturns and expansions. This dynamic may engender heightened competition for VC investors.

Security Risks Take Different Shapes

Web3 security concerns are on the rise, with a growing focus on hacks and on-chain scams that result in the loss of millions of dollars. These illegal activities fall into two broad categories—code vulnerabilities and social engineering exploits.

Critical targets for code vulnerabilities include bridges, liquidity pools, and wallets due to their concentration of value. Despite protocols' investment in secure smart contracts, code audits, and bug bounty programs, the crypto space exceeded \$1.5 billion in losses in 2023. On-chain cybersecurity is still in its nascency due to the incompatibility of Web2 security measures with open-source networks, driving on-chain security solutions companies to explore the use of

AI for auditing, verification, and proactive threat detection.

Social engineering exploits, on the other hand, rely on human error and include phishing attacks and exit scams (commonly known as “rug pulls”). Rug pulls are popular due to their ease of execution and were responsible for \$100 million in scams in the first half of 2023 and just over \$200 million in 2022. Failure to safeguard investors through education and industry efforts may prompt regulators to intensify scrutiny and impose tighter controls on existing platforms.

These looming threats underscore the urgent need for enhanced security measures and regulatory oversight to protect participants and promote trust within the ecosystem.

Superpowering Blockchain with AI and IoT

Blockchain is becoming even more powerful by integrating with IoT and AI for specialized applications.

While these technologies have their strengths, they also have known weaknesses. IoT gathers data but is insecure, and AI is great for analyzing data but needs clean data to learn. But when they're paired with blockchain, the technologies become even more powerful. Lightning Labs' Bitcoin tool kit mixes blockchain with AI, enabling AI agent-to-agent payment and AI access to paywalled APIs autonomously. When blockchain is combined with IoT, it secures IoT data generation and IoT-to-IoT communications. And when all three technologies combine, the benefits feed off each other. State Farm has filed a recent patent to use blockchain, AI, and IoT to track autonomous vehicles on the chain to provide immutable records of incidents, assign liability, and process claims.

These kinds of integrations will become increasingly common as many more companies file patent applications involving all three technologies. Those include a wide array of industries, from financial services (Mastercard) to information technology (IBM) and food intelligence platforms (Innit). As AI and IoT

THE WEB3 LANDSCAPE

become more ubiquitous, we can expect new blockchain applications due to the synergistic relationships with these technologies.

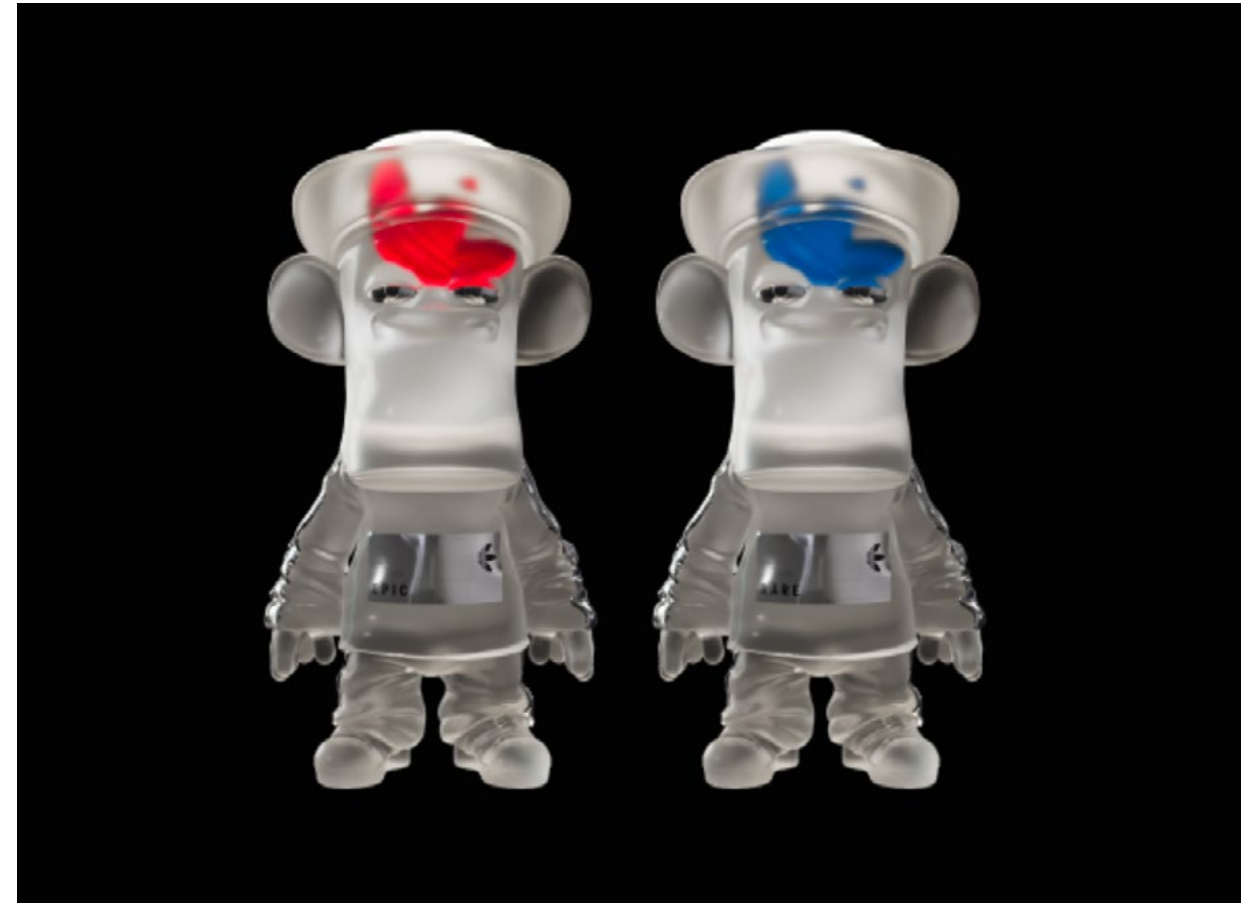
Build through the Bear

Building through the bear market is a recurring theme in the crypto space: Even when markets cool and attention shifts away from the technology, protocol developers and companies keep innovating. This trend has persisted in the crypto world and is becoming more common at traditional companies building new crypto solutions for the next economic upturn.

Despite the recent downturn and crypto's uncertain regulatory landscape, new companies continue to launch, operate, and develop Web3 initiatives. Those include payment companies like Visa and PayPal; investment applications like Spot Bitcoin ETH Futures, and ARK Invest; brokerage firms like Coinbase's L2 network; NFT loyalty programs like that offered by Adidas ALTS; and games like Zynga's "Sugartown." As traditional companies implement new business models and

cost reduction strategies in Web3, the technology is poised to have an impact as significant as cloud infrastructure in the 2010s.

This is the beginning of Web3's era of institutional adoption, as major criticisms of public blockchain technology around energy utilization and scalability continue to weaken. Expect to see continued development and deployment of Web3 initiatives from companies across every industry; the companies experimenting with the technology now will have a leg up on competition in the future.



Adidas ALTS are NFTs that provide early access to virtual and physical products.

Image credit: Adidas

SCENARIOS

SCENARIO YEAR 2027

What If SEC lawsuits were successful?

“US Falls Behind in Fintech as SEC Wins Major Crypto Lawsuits”

In a landmark development, the US Securities and Exchange Commission has successfully sued major crypto entities including Binance, Coinbase, DAOs, stablecoins, and NFT projects. This crackdown has driven crypto projects out of the US, severely limiting American access to the crypto markets and crippling related businesses. The SEC's aggressive stance has effectively severed the on-ramps for US citizens to crypto markets and reversed the country's fortune in the crypto industry, once boosted by China's crypto ban.

This shift has left the US lagging in fintech innovation. Now, regions like Japan, the EU, and Africa are emerging as new fintech leaders, capitalizing on the exodus of blockchain expertise from the US. The departure of blockchain projects has led to a dearth of skilled professionals in the field. US investors face minimal protection, as they can still access offshore protocols without oversight, echoing the FTX collapse in the Bahamas. Japan, in particular, is rising as an economic powerhouse due to its alignment with the Web3 industry and supportive regulatory environment. Meanwhile, the growth of DeFi and other blockchain projects is expected to slow, especially with US users facing access barriers.

The upcoming Supreme Court decision on defining investment contracts could further shape the SEC's reach over stablecoins and DeFi. As the global blockchain business adapts, the US' once-dominant position in fintech innovation is now challenged, marking a significant shift in the landscape of financial technology.

WEB3 INFRASTRUCTURE

WEB3 INFRASTRUCTURE

Proof of Stake Proves Its Worth

Ethereum's 2022 transition from electricity-guzzling proof of work (PoW) to a more energy-efficient and decentralized network secured by proof of stake was an incredible feat. But it's only a stepping stone in the progression toward a hyper-scalable, fully decentralized, highly secure, and easily usable platform for the internet.

Now, the Ethereum community has a list of improvement proposals, and research is ongoing to improve each area. They include adding temporary data storage to enhance the scalability of Layer 2 chains, increasing decentralization by separating block proposer and block builder capabilities to strip out MEV bots' capabilities to censor transactions, and improving account abstraction.

While none of the proposals or areas of research have hard implementation timelines, the Ethereum community has a proven track record of delivering high-quality and thoroughly tested protocol updates. Companies still on the Web3 sidelines because they lack

technical capability or fear usability issues should observe these behind-the-scenes moves; these new developments will continue to improve the capabilities of the platform for all types of applications.

Emerging Forms of Consensus Protocols

By many measures, Ethereum's merge to proof of stake (PoS) was a great success: The transition went smoothly, energy consumption dropped by 99%, staked ETH that secures the network has increased every month since the merge, and many more Ethereum users can participate in securing the network. But while PoS is a mainstay consensus mechanism in Web3, Ethereum's PoS is not a one-size-fits-all approach and still has downsides, such as limited scalability.

Other networks have chosen different forms of consensus protocols. Filecoin, a decentralized storage blockchain network, uses two different types of consensus mechanisms that allow the nodes in the network to verify data has been stored and continues to be stored in the network. This may become in-

creasingly important for specialized chains, which may need to change underlying infrastructure to bring new capabilities to the blockchain ecosystem.

Another recurring theme is new alternative Layer 1 blockchains. Most recently Aptos and Sui, two heavily venture-backed L1s, deployed their mainnets and are attempting to wrestle network usage away from incumbents like Ethereum and Solana with tech stack upgrades. They both use PoS but have very different algorithms under the hood: They're now using a two-pronged approach to transaction consensus that allows for high scalability through parallelizing transactions.

These protocols weren't possible in Ethereum's PoS based on how the blocks are structured and could present a red flag for the company. Ethereum's technology has lagged behind the industry for many years, but its massive network effects keep it relevant. Time will tell if a younger blockchain with more innovative consensus mechanisms and infrastructure designs can outcompete the current platform of choice.

Blockchain Modularity

The "blockchain trilemma" highlights a key challenge in Layer 1 blockchains: Optimizing for scalability, decentralization, and security simultaneously is difficult. Ethereum excels in decentralization and security but lags in scalability, while Solana offers scalability and security but compromises on decentralization. To address this, the blockchain sector is turning to modularity, separating Layer 1 blockchain functions—execution, settlement, consensus, and data availability—into distinct, specialized chains.

This approach is evident in Ethereum's Layer 2 solutions like Optimistic and Zero Knowledge Rollups, which enhance transaction speed and cost-efficiency. More broadly, various Layer 2s and blockchains are experimenting with different module combinations, aiming to improve blockchain performance and interconnect ecosystems. A notable example is Eclipse, a new Layer 2 architecture that integrates Ethereum, Celestia, Solana, and RISC Zero for different functionalities, showcasing advanced modularity.

WEB3 INFRASTRUCTURE

Although still in its early stages, the modular blockchain concept is gaining traction. The uptake of existing Layer 2 solutions and on-going experiments in specialized chains suggest a future where modular strategies could be vital in solving the blockchain trilemma for diverse applications and business needs.

Zero-Knowledge Proofs

Zero-knowledge proofs (ZKPs) aren't new: They were theorized back in the 1980s by researchers at New York University and were first deployed at scale with the 2016 launch of ZCash, a privacy-focused cryptocurrency based on bitcoin's codebase. More recently, improvements to computational capabilities and the cryptography itself have allowed for wider-scale deployment of ZKPs in the crypto space, most notably with ZK-Rollups.

ZKPs have gained significant adoption due to their two core characteristics: succinctness and privacy. The succinctness characteristic is the basis for the scalability enhancements of ZK-Rollups, because nodes can compute proofs of transactions off-chain and submit

the proofs to Layer 1 for verification. This shifts the heavy computation off-chain while still verifying the validity of every transaction.

However, ZKP characteristics allow them to be applied far beyond blockchain scalability solutions: Researchers are studying the application of ZKPs to AI training, interaction, and verification of model outputs. As computation capacity continues to increase and ZKP technology improves, expect to see it used throughout digital interactions to provide great control over private data and decrease unverified or fraudulent information.

The Appchain Thesis on Ethereum

The Appchain concept, originated by Cosmos, has been adopted in Ethereum's Layer 2 (L2) ecosystem. This idea advocates for protocols to create their own independent chains when they grow significantly, ensuring full control and reducing reliance on their original blockchain. RollApps, a key L2 provider, facilitates this by offering tools for easy deployment of new chains.

Ethereum's L2 chains like Arbitrum, Optimism, and zkSync are embracing this approach, allowing easier creation of L2 and L3 chains. These solutions enhance deployment ease, and upgrade flexibility, interoperability, and scalability, although Cosmos was the first to introduce this model. Coinbase's Base is another example of this trend, built on the Optimism OP Stack. Its success may prompt other companies to explore similar solutions.

This shift is crucial as it enhances scalability and reduces costs, making blockchain more user-friendly, especially for high-transaction applications. Application-specific chains offer more specialization and the possibility of private chains within a decentralized network, believed to be key for future interoperability and simplified user experience. However, not all in the crypto community agree with the multichain approach of Appchain. Some, like Solana, focus on a single chain for all applications. The effectiveness of these diverse strategies will become clearer over time.

WEB3 INFRASTRUCTURE

Data-as-a-Problem

Data storage, now cheaper and faster in the traditional economy, is a problem for blockchains. Their unique design, which limits how much data can be stored in blocks, makes data storage costly and challenging to optimize.

A key issue for blockchain scalability is the block size and the hardware needed to process and validate data. Bigger blocks are more scalable but require more computational power, making them expensive for validators and potentially reducing decentralization. Solutions like sharding or modularity can help blockchains circumvent these hardware demands, but they face the data availability problem, where malicious nodes could hide crucial transaction data. So, light nodes need methods to verify data availability without downloading everything, maintaining the efficiency of sharding.

Developers are seeking solutions to these challenges. PayPal sought a patent to prune blockchain blocks and store them with a data

storage provider. Ethereum is set to introduce EIP-4844 (proto-danksharding), adding a new, less resource-intensive data section to blocks, called “blobs,” to ease the computational load on nodes and improve scalability. Other projects are exploring approaches like data hosting consortiums and modular blockchain designs. Further progress from various crypto market segments should enhance scalability without compromising decentralization or security.

DECENTRALIZED APPLICATIONS

DECENTRALIZED APPLICATIONS

DeFi Protocols Network Effects

DeFi protocol business models are traditional: Protocols provide products and services and generate fees distributed to stakeholders. But these protocols operate in a unique environment: The business's "secret sauce" is public knowledge because nearly all DeFi protocols are open source.

Open-source protocols can generate competition—Uniswap has forked nearly 500 times, spurring continuous innovation—but they can also splinter the market and provide an opening for fraudulent activity. This was the case with Compound Finance, a fork of Yearn Finance that scammed investors out of more than \$10 million with minimal development effort.

Fraudulent projects are still a concern, but the bear market has washed out smaller competitors as investors leave the market or flee to more reputable service providers. As a result, large DeFi protocols continue to expand their influence, both vertically to provide more DeFi services (such as Maker starting

as a stablecoin provider but expanding into lending as Spark Protocol) and horizontally to provide the same services across multiple chains (such as Aave's lending product being available across nine different blockchains).

The average user can't verify code and will likely gravitate toward protocols with the best reputations. At the same time, businesses will have robust and tested codebases to use and adapt to their own chain services.

Guerilla Marketing: Crypto Airdrops

Airdrops raise awareness, drive user adoption, stress test platforms, and reward active or long-time users. They can be extremely lucrative: NFT platform Blur distributed tokens as part of its multiseason airdrop program, and in the first season, 23 users earned more than \$1 million in tokens.

Still, platforms should weigh benefits against long-term goals. If airdrops are too short term or have misaligned incentives,

they can miss the mark of getting real user adoption. Users have learned to game airdrop programs, known as "airdrop farming," where users set up dozens of automated wallets programmed to maximize their chances and total rewards from an airdrop. Incentive structure and qualifications for airdrops can limit this behavior, but many platforms have struggled. Arbitrum, a leading Ethereum L2, had a significant issue with airdrop farming that left many retail users dissatisfied, and to this day, 72 million ARB tokens are unclaimed.

While Arbitrum has become extremely successful anyway, the viability of these programs is murky. Most, if not all, tokens with significant airdrops see massive sell-offs at token distribution, as many users dump tokens to lock in value. It's difficult to tell if these users eventually return to the platform. But even if the outcomes are unclear, airdrops have become a mainstay in the ecosystem as a significant hype generator.

Hyperfinancialization

Financialization has been a hot-button topic in the crypto market as goods typically not considered financial assets—such as art, video games, and social media—are commoditized, recasting their value from enjoyment to investment returns.

In art, advanced trading techniques like mass NFT buys and sells commoditized art and shifts the focus away from culture and community. At the same time, token incentives spurred the gamification of NFT trades and manipulated volumes. The financialization of video games, GameFi (the combination of decentralized finance and video games) is often criticized for its lack of engaging gameplay and a hyper-focus on financialization. The latest development in social media financialization—Friend.tech—is also controversial. It allows users to tokenize social connections on X by buying and selling a sort of "key" in public profiles that gives access to private chat rooms and is criticized for commodifying people through their social media accounts.

DECENTRALIZED APPLICATIONS

In each case, the implementation and degree of financialization seems to be extremely important in the outcomes of the application. Despite the criticisms, financialization remains a core tenet of the crypto ecosystem. Expect to see new applications of financialization continue to be developed with ensuing volatility and uncertainty.

Personal “X-As-A-Service” Earning Models

Web3 has opened the door for consumers to earn through “X-as-a-service” models that allow for the automation of personal hardware and digital assets to generate returns—particularly in computation, security, and utility.

As mining is now monopolized by professional outfits, users seeking to provide computation-as-a-service are pivoting to running millions of iterations of training data for AI models—and getting paid handsomely for it. In Security-as-a-Service, blockchain users can stake their tokens to participate in transaction and block validation, helping secure the network. In the same area, restaking is

a new blockchain primitive where staked token balances on Ethereum can be used to validate Ethereum and other chains simultaneously for juicier yields. In NFT gaming projects, users can provide utility-as-a-service by providing digital services to player bases and earning portions of the transactions on their digital properties.

There are many more as-a-service earning opportunities for crypto adopters, such as providing liquidity as a service on DeFi platforms or providing cloud storage on Filecoin’s IPFS network. Many of these opportunities are limited to those with the knowledge and technical abilities to navigate the crypto ecosystem. Still, as barriers to adoption come down, these earning models will be available to anyone with internet access.



Crypto miner Hut 8 invested in five data centers which can now be used for other purposes, including training AI.

Image credit: Coindesk

SCENARIOS

SCENARIO YEAR 2038

What If We Established Systemically Important Technology Institutions (SITIs)?

The global financial system has undergone a transformation, with technology companies at its core. Over the past two decades, as digital assets have taken over, technology companies have invested heavily, by developing digital wallets, cryptocurrency exchanges, and NFT marketplaces, making these services integral to their digital ecosystems.

As a result, following a recent meeting, the US Financial Stability Oversight Council (FSOC) has announced plans to designate certain technology companies as being systemically important: a significant departure from the definition of “systemically important institutions” portrayed in the 2010 Dodd-Frank Act.

This oversight regulates technology organizations that now steward most of the country’s digital assets, which have become the underpinning of economic value. Digital assets have ballooned in value due to the financialization and monetization of people’s digital identities, capabilities, and online followings, as well as the tokenization of physical assets such as homes and vehicles. While blockchain technology spurred the creation of digital assets and ease of transacting online, adoption hurdled around technical requirements, leaving oversight, self-custody, and security concerns to be solved.

Systemically Important Technology Institutions (SITIs) will be required to adhere to strict standards in financial stability and risk management. They must also comply with advanced cybersecurity measures to protect against potential threats. This increased burden of compliance will weigh heavily on some technology companies but will at last secure the new economy of digital assets that many have come to rely on.

WEB2 & WEB3 INTEGRATION

WEB2 & WEB3 INTEGRATION

Digital Content Provenance and Authentication

As more and more platforms adopt AI, it becomes increasingly important for users to be able to verify the origin and authenticity of digital content. C2PA, the coalition of major tech companies founded in 2020 looking to develop an open-source infrastructure to protect digital content and consumers from fake news, has seen its membership increase by 60% over the past year due to interest in AI.

Digital watermarking can help human content creators by marking human content that's used in AI training to make sure it doesn't run afoul of copyright laws. In contrast, cryptographic hash functions that track and store the data manipulation history of assets can help human consumers. Zero-knowledge proofs can also help authenticate AI output by providing a model with certain conditions without revealing how the model created the output. Of course, in the future, as AIs start to be involved in higher-stakes decisions, there will be more incentives to tamper with or replace the model. Modulus Labs is experimenting with chain AI deployments for high visibili-

ty and easy verification of model outputs.

While progress has been swift, larger strides are necessary to get these technologies deployed at scale to protect consumers from malicious and false information and content creators' ownership of their digital content.

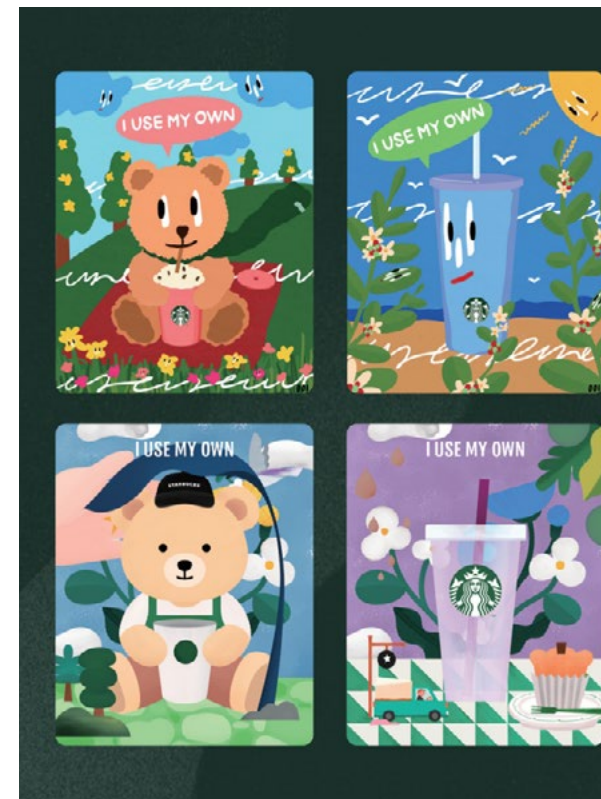
NFTs: Beyond the JPEG

When NFTs hit the mainstream, they focused on JPEG art. While this made NFTs a household term, the technology's ease of transfer, easy verification, historical ownership tracking, and immutability have benefits beyond pictures-for-profiles. Now, NFTs are being deployed to digitize ownership of assets in the real estate industry, make event ticketing more secure, and augment retailers' loyalty programs.

Consumer-facing companies are entering Web3 with NFTs at the core of their strategy: Nike, Starbucks, and Ducati have NFT programs that bridge the gap between their physical and digital products. Puma and NBA player LaMelo Ball partnered with Open Sea and Gutter Cat Gang to sell NFT versions of

a sneaker release that are convertible into a physical part of shoes once they're produced. ALTS by Adidas offer NFTs with perks for holders, like exclusive access to drops.

Web2 and Web3 native NFT projects are also converging. Blue-chip NFT projects like Doodles and Pudgy Penguins have launched clothing and toy lines, and Nouns DAO funded a full-length movie featuring popular NFT characters. Even if NFT trading markets never return to the highs they reached in 2021 and 2022, the technology is helping businesses and projects acquire, develop, collaborate with, and monetize a deeper connection with communities.



Starbucks launched an NFT project in Korea called 'Starbucks Starlight' which encourages customers to use their own cups.

Image Credit: Starbucks

WEB2 & WEB3 INTEGRATION

Self-Sovereign Identity Solutions

Growing online interactions dramatically increase the data people share with third parties. While centralized providers like Google and Facebook make it easy to sign in with one click, this enables tracking and puts consumer data at significant risk. In response, organizations like The Linux Foundation, W3C, and the Decentralized Identity Foundation have developed software standards that allow users to manage access to their data.

Self-sovereign identity (SSI) digitizes identity, giving data owners control of their digital identities, enabling access to digital ecosystems, and giving users control over what details of their identity are shared with different parties. While SSI has no set standard, it typically combines distributed ledger technology and cryptography with verifiable credentials and decentralized identifiers. SSI could reduce data breaches, as companies no longer need to store personal information.

Players like J.P. Morgan, Workday, and Microsoft have decentralized ID projects, but adoption has been slow, likely because of the lack

of profit incentives and consumer visibility. However, US and EU government agencies are offering grants and installing mandates to allow decentralized identity solutions to be built into consumer-facing wallets. In the EU, decentralized identity wallets are expected to launch as part of its 2030 Digital Decade program next year.

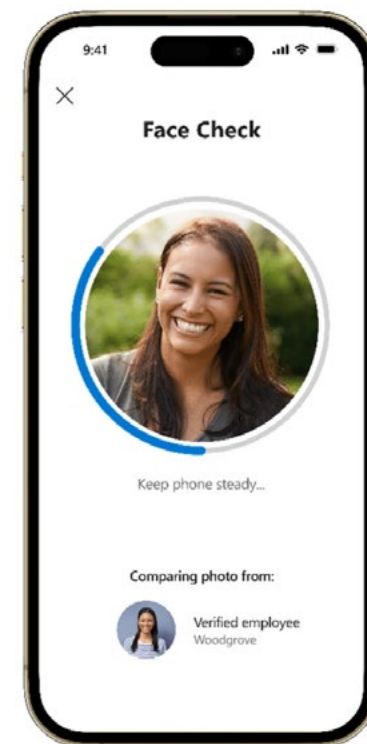
Tokenization of TradFi, Digital Assets & Security Tokens

The tokenization of real-world assets—security tokens—has been a bright spot in blockchain development. So far, security tokens have had limited implementation. One exception is Japan, which already has a thriving security token market focused on tokenizing corporate bonds or real estate-backed securities.

Growth is on the horizon: More organizations are adopting security tokens, more jurisdictions offer regulatory clarity, and bond market yields are increasing. The industry is experiencing two trajectories of security tokens: tokenization that occurs in closed or

private blockchain networks and that which is underway in public blockchain networks. On private blockchains, companies like Citigroup and Goldman Sachs are experimenting with tokenized digital securities markets to facilitate faster and more efficient financial services. On the public blockchain, US government bonds have been tokenized—Maker, Tether, and USDC use US treasuries as collateral.

Another area of development is in the tokenization of physical collectibles. In September, Arcade.xyz, a protocol specializing in peer-to-peer loans, facilitated a \$1.1 million loan where an NFT of a Supreme T-shirt collection was used as collateral. Many prominent figures and consulting firms see the tokenization of assets as a potential multitrillion-dollar market for blockchain technology.



Microsoft launched Entra Verified ID in early 2024 to include Face Check, a facial matching feature.

Image credit: Microsoft

WEB2 & WEB3 INTEGRATION

Credibility Scoring and Anonymity

DeFi lending is not capital efficient: Most DeFi loans are overcollateralized. To fix that balance, lending companies are turning to conventional means of credit risk scoring using on-chain data and nontraditional metrics focusing on reputational scoring of addresses based on DeFi activity.

Companies like Spectral pull on-chain data for accounts and use AI algorithms to analyze lending, borrowing, and other history and output a credit score. Other protocols like Taraxa and Cred Protocol use a mixture of on-chain and off-chain reputational metrics to enhance score outputs. DeFi is also using off-chain credit scores, like those reported by TransUnion. The company's partnership with Web3 companies Quadrata and Spring Labs allows users to port their credit scores directly into DeFi applications.

While credit scores improve capital efficiency, attaching scores to blockchain reduces user anonymity, a core tenant of the technology. The range of impact depends on the solution:

On-chain credit calculations have a lower risk, but blending on- and off-chain data will at a minimum result in pseudonyms. Off-chain credit scores will tie directly to individual identities. This could be a significant deterrent for crypto natives for whom anonymity is crucial. Still, for the next wave of adopters who are used to standard identity verification, it may have less impact.

On-Chain Gaming: Play, Own, Earn & Enjoy

On-chain games incorporate blockchain technology, ranging from fully on-chain games to those that only have digital assets on-chain. Fully on-chain games have all the benefits of blockchain, including alternative funding, community development, decentralized serverless development, player ownership, composability, and player-driven economies.

While the benefits of on-chain gaming are attractive, game deployments are subject to current capacity constraints of public blockchains. This has resulted in the release of initially slow turn-based games involving trading cards or battles that were criticized

for their lack of fun. These days, blockchain advancements in scalability and usability have enabled developers to create AA and AAA titles. Game studios such as Star Atlas, Gala Games, Bright Star, and others are deep into developing such games.

Traditional gaming companies have hesitated to adopt blockchain. Still, companies like Zynga and Ubisoft are experimenting with on-chain games—most notably Zynga's "Sugartown." It's built on Ethereum and just dropped an NFT collection tied to the project. Zynga has a history of producing high-quality hits, and the game's success could pave the way for users' increased familiarity with on-chain assets, tokens, and staking. This could in turn lead to increased Web3 integration and game development in the future.



Sugartown is a Web3 gaming platform created by Zynga.

Image Credit: Zynga

SCENARIOS

SCENARIO YEAR 2032

What If We Used AI To Monetize Privacy?

Are you tired of feeling like your personal data is out of your control? Well now you can rest easy with DataSentinel. This game-changing protection in digital privacy and data control is powered by AI, and purpose-built to keep you safe. Imagine a world where you are the master of your data. With DataSentinel, that world is now a reality. DataSentinel's cutting-edge self-sovereign identity solutions keep your private data stored securely and decentralized—meaning you, and only you, have the keys to your digital kingdom.

Here's the best part: With DataSentinel, you can monetize your data. That's right, turn your data into dollars! DataSentinel's AI-powered system optimizes your data, making it valuable for companies willing to pay for your insights. It's time your data started working for you!

The security on DataSentinel is top-notch. Thanks to blockchain technology, your personal information is safe and sound. Plus, you have the power to grant or revoke access as you see fit. It's like having a digital bodyguard. Gone are the days when companies could exploit your data without your consent. With DataSentinel, you forge a new path in the digital world, one where privacy isn't just a feature—it's a right.

Let's not forget about convenience! DataSentinel models are like personal assistants for your digital life, handling everything with the utmost confidentiality and efficiency. In compliance with the strictest data privacy regulations, DataSentinel ensures you're always in the driver's seat of your digital identity. So, if you're ready to take control of your digital life, sign up for DataSentinel and join the digital revolution. Your data will thank you!

AUTHORS & CONTRIBUTORS

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Melanie Subin is Managing Director of Future Today Institute, where she serves on our management committee and leads our consulting division.

Renowned for her pragmatic, forward-thinking approach, Melanie has successfully steered numerous clients towards future-ready strategies, harnessing emerging trends and technologies to identify risk and opportunity early enough for action. Her leadership has significantly impacted how industries envision and execute their long-term strategies.

Melanie specializes in strategic transformation, quantitative and qualitative research, and scenario development. With deep expertise in the development and establishment of foresight capabilities within large organizations, Melanie regularly counsels C-staff on strategy and execution. She has spent years assessing the impact of major external forces such as increasing technological sophis-

tics, changing consumer and business preferences, and rising connectivity on the evolution and transformation of industries and markets across the globe.

Melanie is a recognized expert in fostering psychological safety within teams, a crucial element for operationalizing strategic foresight effectively. Her work emphasizes creating an environment where open dialogue and innovative thinking are encouraged, enabling organizations to embrace change and navigate future uncertainties with confidence.

Melanie serves in the World Economic Forum's Metaverse Working Group and is a founding member of the Dubai Future Forum's advisory group. She serves as a coach in the strategic foresight MBA course at the NYU Stern School of Business. Melanie holds a BS in Finance from Central Connecticut State University and a Fintech Certification from the Massachusetts Institute of Technology.

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“A Gentle Introduction: Orbit Chains.” Arbitrum Docs, December 7, 2023. docs.arbitrum.io/launch-orbit-chain/orbit-gentle-introduction.

Amadán, Dylan. “Why AI Needs Zero-Knowledge Proofs.” Medium, Verum Capital Insights, April 4, 2023. medium.com/verum-capital-insights/why-ai-needs-zero-knowledge-proofs-957ec72627b9.

Asher, Mattison. “Zero-Knowledge Proofs: Starks vs Snarks.” Consensys, May 18, 2021. consensys.io/blog/zero-knowledge-proofs-starks-vs-snarks.

Awosika, Emmanuel. “Account Abstraction: Past, Present, Future.” MetaMask, April 25, 2023. metamask.io/news/latest/account-abstraction-past-present-future.

Banon, Justin. “The Trillion Dollar Crypto Opportunity: Real World Asset Tokenization.” CoinDesk, September 6, 2023. www.coindesk.com/consensus-magazine/2023/08/31/

the-trillion-dollar-crypto-opportunity-real-world-asset-tokenization/.

Beckett, Alex. “Modular vs. Monolithic: A Beginner’s Guide.” Celestia Blog, November 9, 2022. blog.celestia.org/modular-vs-monolithic-a-beginners-guide/.

Bedawala, Mustafa. “Monolithic vs. Modular Blockchain.” Visa, usa.visa.com/solutions/crypto/monolithic-vs-modular-blockchain.html.

Behnke, Rob. “Blockchain’s Storage Problem Is Growing. Are There Any Solutions?” Web3 and Blockchain Security Solutions, November 3, 2022. www.halborn.com/blog/post/blockchains-storage-problem-is-growing-are-there-any-solutions.

Berkowitz, Bram. “Visa and MasterCard Have Embraced Blockchain Technology. It’s a Smart Long-Term Strategy.” The Motley Fool, February 16, 2023. www.fool.com/investing/2023/02/16/visa-and-mastercard-have-embraced-blockchain/.

Bochan, Toby. “Pudgy Penguins NFT Project, Once Endangered, Proves Web3 Turnaround Is Possible.” CoinDesk, 23 May 2023, www.coindesk.com/web3/2023/05/25/pudgy-penguins-nft-project-once-endangered-proves-web3-turnaround-is-possible.

Brooks, Miles. “The 10 Best Crypto Learn and Earn Platforms in 2023.” CoinLedger, September 15, 2023. coinledger.io/tools/learn-and-earn-crypto.

Butterfield, Sean. “What Is Account Abstraction and Why Is It Important?” Crypto Council for Innovation, December 13, 2023. cryptofoinnovation.org/what-is-account-abstraction-and-why-is-it-important/.

Chen, Alec. “Modular Blockchains: A Deep Dive.” Volt Capital, July 7, 2023. volt.capital/blog/modular-blockchains.

Chow, Katelyn. “Tokenizing Identity: Friend.Tech’s Explosive Rise and Controversies.” Metatalks, August 28, 2023.

www.metatalks.ai/tokenizing-identity-friend-techs-explosive-rise-and-controversies/.

Copeland, Tim. “Airdrop Farmers’ Tell Us How They Make Millions.” The Block, April 6, 2023. www.theblock.co/post/225215/we-made-close-to-1-million-inside-the-murky-world-of-airdrop-farming.

Cryptopedia Staff. “Consensus Algorithm/Consensus Mechanism Innovations.” Gemini, March 10, 2023. www.gemini.com/cryptopedia/blockchain-consensus-mechanism-types-of-algorithm.

“DAOs and DeFi.” Deepdao, deepdao.io/organizations. Accessed September 7, 2023.

“Decentralizing Base with the OP Stack and Optimism.” Base, Coinbase, February 23, 2023. base.mirror.xyz/H_KPwV31M70-JT-THUnU7wYjOF16Sy7aWvaEr-5cgHi8l.

EigenLayer. “Intro to Eigenda: Hyperscale Data Availability

for Rollups.” EigenLayer Blog, October 19, 2023. www.blog.eigenlayer.xyz/intro-to-eigenda-hyperscale-data-availability-for-rollups/.

Fay, Mike. “Base: Assessing Coinbase’s New L2 Network.” Seeking Alpha, August 22, 2023. seekingalpha.com/article/4630199-base-assessing-coinbases-new-l2-network.

Floyd, Matthew L, et al. Systems and Methods for Maintaining a Distributed Ledger Pertaining to Autonomous Vehicles. November 21, 2023.

Forta Network. “The Future of Threat Prevention in WEB3.” June 5, 2023, forta.org/blog/the-future-of-threat-prevention-in-web3/.

Gehmlich, Ben. “Ethereum Blockchain Security: Pros and Cons of Pos Solutions.” Gigster, September 27, 2023, gigster.com/blog/pros-and-cons-of-pos-for-ethereum-security/.

Gkritsi, Eliza. “Microsoft, Aptos Labs Team up on New Blockchain AI Tools.” CoinDesk, August 11, 2023. www.coindesk.com/web3/2023/08/09/microsoft-and-aptos-labs-partner-on-new-ai-blockchain-solutions/.

“HACK3D The Web3 Security Quarterly Report—Q1 2023.” Certik.com, April 6, 2023. https://www.certik.com/resources/blog/3BaCA6ytR6uLFc1JV-vt313-hack3d-the-web3-security-quarterly-report-q1-2023.

“HACK3D The Web3 Security Quarterly Report—Q2 2023.” Certik.com, July 5, 2023.

www.certik.com/resources/blog/6KJQKBrVJEwHR6Tc4PAV-Jo-hack3d-the-web3-security-quarterly-report-q2-2023.

Hall, Phil. “Zynga Announces Web3 Game Sugartown.” Play to Earn, August 18, 2023. www.playtoearn.online/2023/08/18/zynga-announces-web3-game-sugartown/.

Hoffman, David. “David’s Takeaways from Ethcc 2023 on

SELECTED SOURCES

Bankless.” Bankless, July 26, 2023. www.bankless.com/david-ethcc-2023.

Hunt, James. “November saw \$343 million lost to crypto hacks and fraud cases: Immunefi.” November 30, 2023. The Block. <https://www.theblock.co/post/265437/november-saw-343-million-lost-to-crypto-hacks-and-fraud-cases-immunefi>

Inabinet, Jack. “Tokenized Treasuries and an RWA Revolution on Bankless.” Bankless, September 6, 2023. www.bankless.com/tokenized-treasuries-and-an-rwa-revolution.

Irrera, Anna. “PayPal Launches US Dollar Stablecoin PY-USD for Payments, Transfers.” Bloomberg, August 7, 2023. www.bloomberg.com/news/articles/2023-08-07/paypal-launches-us-dollar-stablecoin-py-usd-for-payments-transfers.

Isacson, Thomas M. “Patents at the Trivergence Combining Blockchain, Artificial Intelligence, and the Internet of

Things.” Blockchain Research Institute, 2022. <https://www.blockchainresearchinstitute.org/project/patents-at-the-trivergence/te>

John, Joel. “Grants & WEB3.” April 7, 2022. www.decentralised.co/p/grants-and-web3.

Joshi, Shashank, and Arhan Choudhury. “Tokenization of Real Estate Assets Using Blockchain.” IJIT vol.18, no.3 2022: pp.1-12. <http://doi.org/10.4018/IJIT.309588>.

Khun, Eric. “NFT Misconception: JPEG Aren’t on the Blockchain.” Eric Khun, October 31, 2021. erickhun.com/posts/nft-misconception-image-arent-on-blockchains/.

Kufuor, Kofi. “The State of Crypto Security.” Medium, The Control, October 7, 2022. thecontrol.co/the-state-of-crypto-security-d628ac5b609d.

Kumar, Ronak. “Lido Chooses Axelar and Neutron for WSTETH Launch on Cosmos.” The Crypto Times, September 15, 2023.

www.cryptotimes.io/lido-chooses-axelar-and-neutron-for-wsteth-launch-on-cosmos.

Ledesma, Lyllah. “SEC’s Binance, Coinbase Suits Create Uncertain Future for Listed Tokens: Legal Experts.” CoinDesk, June 13, 2023. www.coindesk.com/markets/2023/06/12/secs-binance-coinbase-suits-create-uncertain-future-for-listed-tokens-legal-experts/.

Levin, Michael, and Olaoluwa Osuntokun. “AI for All: Powering APIs and Large Language Models with Lightning.” Lightning Labs, July 6, 2023. lightning.engineering/posts/2023-07-05-l402-langchain/.

Lindrea, Brayden. “CTFC Cracks Down on DeFi Protocols Opyn, Zeroex and Deridex.” Cointelegraph, September 7, 2023. cointelegraph.com/news/ctfc-issues-order-against-defi-protocols-opyn-zeroex-deridex.

Liu, Bessie. “Why Data Availability Sampling Matters for Blockchain Scaling.” Blockworks, 23 August

2023. blockworks.co/news/data-availability-ethereum.

Mirpuri, Jash. “Unraveling the Mantle Network: A Deep Dive into the New Layer-2 Scaling Solution for Ethereum.” Flagship.FYI, July 2, 2023. flagship.fyi/outposts/blockchains/mantle-network-deep-dive-into-the-new-layer-2-scaling-solution-for-ethereum/.

Mitchelhill, Tom. “AAVE Protocol Launches Stablecoin Gho on Ethereum Mainnet, \$2M Minted.” Cointelegraph, July 17, 2023. cointelegraph.com/news/aave-protocol-launch-stable-coin-gho-ethereum-mainnet.

Mondello, Antonino, and Alberto Troia. “Cryptography-based Platooning Mechanism for Autonomous Vehicle Fleet Management.” US20210319702A1.

Nagarajan, Shalini. “Borrowing Crypto with Defi? Transunion Shares Real-World Credit Scores.” Blockworks, April 21, 2023. blockworks.co/news/transunion-crypto-defi-credit-scores.

“OP Stack Components.” Optimism Docs, December 11, 2023. docs.optimism.io/stack/components.

Overgang, Alexandra. “What Is Filecoin? The Leading Decentralized Storage Network.” Cointelegraph. cointelegraph.com/learn/what-is-filecoin-the-leading-decentralized-storage-network.

Owie, Best. “Study Says You’re Better off Dumping Your Airdropped Tokens.” Bitcoinist.com, March 11, 2022. bitcoinist.com/study-says-youre-better-off-dumping-your-airdropped-tokens/.

Parkhouse, Arthur. “A Look at LVMH’s Blockchain Consortium.” Hypebeast, August 17, 2022. hypebeast.com/2022/8/lvmh-aura-blockchain-luxury-fashion.

Peterson, Macauley. “Maker to Spark ‘New Explosion of Dai’ with Custom Lending Market.” Blockworks, May 8, 2023. blockworks.co/news/makers-spark-protocol-dai.

Richards, Daniel. “The Rising Efficiency—and Falling Costs—of Data Storage.” Impax Asset Management, August 17, 2023. impaxam.com/insights-and-news/blog/the-rising-efficiency-and-falling-costs-of-data-storage.

Sandor, Krisztian. “Tokenized U.S. Treasuries Surpass \$600M as Crypto Investors Capture Tradfi Yield.” CoinDesk, July 11, 2023. www.coindesk.com/markets/2023/07/11/tokenized-us-treasuries-surpass-600m-as-crypto-investors-capture-tradfi-yield/.

“Securitize Japan Announces Business Alliance with Sony Bank and Sumitomo Mitsui Trust Bank on Landmark Tokenized Joint Money Trust.” Securitize, July 3, 2023. securitize.io/press-releases/securitize-japan-announces-business-alliance-with-sony-bank-and-sumitomo-mitsui-trust-bank-on-landmark-tokenized-joint-money-trust.

SELECTED SOURCES

Sensei, Degen. “The Case for and Against the Appchain Thesis.” The Aspiring Degen, October 16, 2022. degensensei.substack.com/p/the-case-for-and-against-the-appchain.

Staff, Decrypt. “These Are the High-Profile Spot Bitcoin ETF Applications Currently in Play.” Decrypt, December 7, 2023. decrypt.co/62912/high-profile-bitcoin-etf-applications.

Strack, Ben. “Race for a Spot Ether ETF Begins with Bid from Ark Invest, 21Shares.” Blockworks, September 6, 2023. blockworks.co/news/21shares-ark-filing-for-spot-ether-etf.

Strack, Ben. “TRADFI, DEFI Convergence Continues Through Tokenizing Real-World Assets.” Blockworks, August 31, 2023. blockworks.co/news/real-world-assets-tradfi-defi-tokenization.

Team, Chainalysis. “Curve Finance Pools Exploited Due to Code Vulnerabilities.” Chainalysis, September 19, 2023.

www.chainalysis.com/blog/curve-finance-liquidity-pool-hack/.

Thapa, Ronal. “Aptos vs Sui Blockchain: Similarities and Differences.” Boxmining, February 21, 2023. boxmining.com/aptos-vs-sui/.

“The Crunchbase Web3 Tracker.” Crunchbase News, April 28, 2023. news.crunchbase.com/web3-startups-investors/.

“The Rug Pull Report.” Certik, March 14, 2023. www.certik.com/resources/blog/5Zai85KkvlgW-OwBJPQxl3i-the-rug-pull-report.

Thomas, Langston. “NFT Tickets Are the Future of Live Events. Here’s Why.” NFT Now, March 30, 2023. nftnow.com/features/nft-tickets-are-the-future-of-live-music/.

Thomas, Stanley. “The Role of Liquidity Providers in Decentralized Finance (DEFI)!” Medium, DataDrivenInvestor, April 24, 2023. medium.datadriveninvestor.com/the-role-of-liquidity-providers-in-decentralized-finance-defi-d5af679aac2f.

Time, Big. “Big Time: Airdrop Program Explained.” Medium, PlayBigTime, January 19, 2023. medium.com/playbigtime/big-time-airdrop-program-explained-ed92fb3dd7d2.

“Tokenized Treasuries.” Rwa.Xyz. Accessed November 1, 2023. [app.rwa.xyz/treasuries](https://rwa.xyz/treasuries).

Tropee Team. “8 Best Benefits of Nfts in 2023.” Tropee, February 23, 2023. www.tropee.com/blog/8-best-benefits-of-nfts-in-2023.

“Understanding Tokenized US Treasury Bills.” Conduit Guides. Accessed December 7, 2023. www.conduit.fi/guides/understanding-tokenized-us-treasury-bills.

Vishu. “What Is Crypto Airdrop and How You Can Earn Money through It.” Binance, April 16, 2023. www.binance.com/en/feed/post/426221.

Wagner, Casey. “Stoner Cats Agrees to Pay \$1M Fine to Settle SEC Charges.” Blockworks, September 13, 2023.

blockworks.co/news/stoner-cats-sec-unregistered-securities-nfts-hollywood.

Weiss, Ben. “A Brief History of Zero-Knowledge Proofs, the Buzzy Mathematical Technique That’s Taken Crypto by Storm.” Fortune, June 6, 2023. fortune.com/crypto/2023/06/05/zero-knowledge-proofs-history-zk-rollups-cryptography-zcash/.

“What Is Zora? How Does It Work?” OpeanSea, August 22, 2023. opensea.io/learn/blockchain/what-is-the-zora-network.

Wodehouse, Carey. “What Will Blockchain Mean for Data Storage?” Pure Storage Blog, August 18, 2023. blog.purestorage.com/perspectives/what-will-blockchain-mean-for-data-storage/.

Wood, Catherine, et al. “Why Bitcoin Is the Currency for AI.” Ark Invest, September 7, 2023. ark-invest.com/podcast/bitcoin-brainstorm-02-why-bitcoin-is-the-currency-for-ai/.

Wood, Chris. “Publicis Groupe Joins Human vs. AI Content Verification Initiative C2pa.” MarTech, June 5, 2023. martech.org/publicis-groupe-joins-human-vs-ai-content-verification-initiative-c2pa/.

Woodmansee, Benjamin. “AI and Blockchain Infrastructure Joyrides: Can AI and Blockchain Germinate?” Medium, April 28, 2022. medium.com/@benwoodmansee/ai-blockchain-infrastructure-joyrides-can-ai-and-blockchain-germinate-april-2021-d937a1dd21fc.

Worldcoin Team, and dcbuilder.eth. “An Introduction to Zero-Knowledge Machine Learning (ZKML).” Worldcoin Blog, February 22, 2023. worldcoin.org/blog/engineering/intro-to-zkml.

Wu, Eva. “The Financialization of Fun: Crypto Gaming Thesis.” Mechanism Capital, January 14, 2022. www.mechanism.capital/crypto-gaming-thesis/.

Xu, Tammy. “AI Watermarking Locks down Unauthorized Use of Datasets.” IEEE Spectrum, May 1, 2023. spectrum.ieee.org/watermark-ai.

Y. Li, M. Zhu, X. Yang, Y. Jiang, T. Wei and S.-T. Xia, “Black-Box Dataset Ownership Verification via Backdoor Watermarking,” in IEEE Transactions on Information Forensics and Security, vol. 18, pp. 2318-2332, 2023, doi: 10.1109/TIFS.2023.3265535.

zkSync. “Introducing the ZK Stack.” Medium, Matter Labs, September 6, 2023. blog.matter-labs.io/introducing-the-zk-stack-c24240c2532a.

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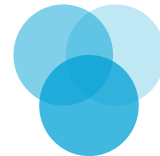
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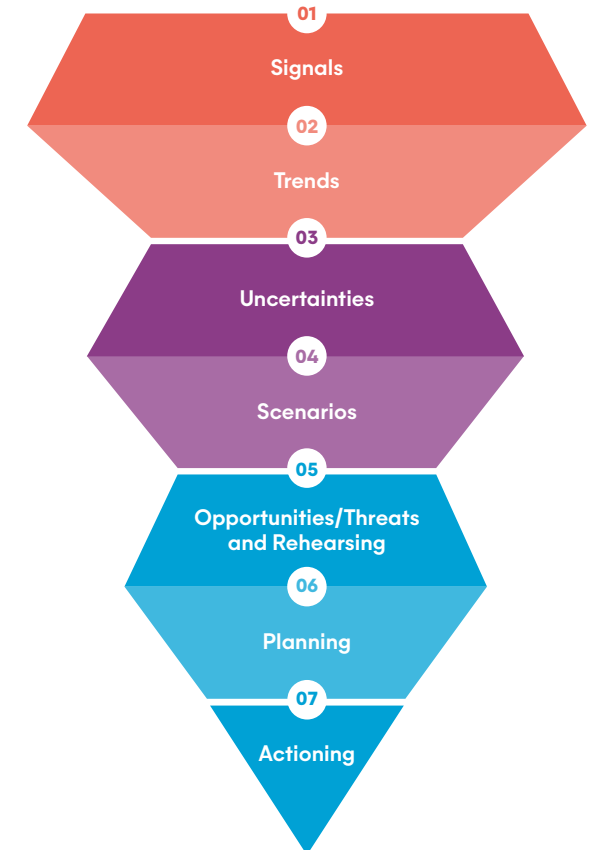
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