2025 TECH TRENDS REPORT • 18TH EDITION

WEB3

FTSG

150 Letter From the Author
151 Top 5 Things You Need to Know
152 State of Play
153 Key Events • Past
154 Key Events • Future
155 Why Web3 Trends Matter to Your Organization
156 When Will Web3 Trends Disrupt Your Organization?
158 Pioneers and Power Players
159 Opportunities and Threats
160 Investments and Actions to Consider
161 Important Terms
164 Web3 Trends

165 **The Web3 Landscape**
166 The Rising Regulation of Web3
166 Trust-Minimized Infrastructure Development
167 Invisible Blockchain Integration in Critical Sectors
167 AI Integration in Web3
168 Security Risks in the Age of AI
168 Real-World Asset (RWA) Tokenization
169 Sustainable Public Goods Funding Models
170 Cross-Chain Interoperability Advancements
170 Biometric Authentication in Web3
172 Scenario: A Retrospective from The Global Business Review

174 **Web3 Infrastructure**
176 Emerging Forms of Consensus Protocols
176 Blockchain Modularity
177 Advanced Cyptography for Privacy and Efficiency
177 Layer-2 and Rollup Solutions
178 Decentralized Physical Infrastructure Networks (DePIN)
179 Privacy-First Messaging Protocols
179 Cryptographic Certainty in Digital Transactions
180 Quantum-Resistant Cryptography
181 Scenario: CTOs Architect the Next Era of Business

183 **Decentralized Applications**
184 Decentralized AI
184 DeFi AI Hybrids (DeFAI)
186 Enterprise-Grade DApps for Traditional Industries
186 Hyperfinancialization with RWA Integration
187 AI Agents for Autonomous Decision-Making
187 Reducing Friction in Cross-Border Transactions
188 Decentralized Science (DeSci) Platforms
189 Tokenized Loyalty Programs
190 Scenario: The DApp Revolution
192 **Web2 + Web3 Integration**
193 Digital Content Provenance and Authentication
194 Self-Sovereign Identity Solutions with Privacy Focus
195 Web3-Powered Education and Skill Verification
196 Decentralized Cloud Computing Services
198 Regulatory Compliance Frameworks for Web3 Technologies
200 Scenario: The Inevitable Unfolding: How Web3 Will Come To Fruition

204 Authors & Contributors
206 Selected Sources

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Melanie Subin
Managing Director

If you're focused on NFTs, you're missing the point of Web3.

For years, Web3 has been synonymous with speculation. NFTs, meme coins, and get-rich-quick schemes have shaped the public narrative, making it easy to dismiss as hype. But beneath the noise, something much more fundamental is taking shape—a structural shift in how we secure, verify, and exchange value in the digital world. The internet as we know it was never designed to handle the weight of the global economy. Our systems—financial, legal, and informational—are layered on top of fragile, trust-based networks prone to breaches, fraud, and inefficiency. Every day, companies and individuals place blind faith in intermediaries to maintain records, safeguard assets, and act in good faith. And every day, we see examples of why that faith is misplaced.

Web3 is not just about decentralization for the sake of it, nor is it a rebellion against institutions. It is about infrastructure—about replacing trust with cryptographic certainty, about reducing friction and risk in an increasingly volatile digital landscape. Enterprises, governments, and industries that seem slow to adopt blockchain-based solutions aren't rejecting the technology itself; they are struggling with the human reality of change. Adoption is not just a technical hurdle—it is a cultural one. Yet, this shift to a Web3-powered world is inevitable. It won't come in the form of a single disruptive moment, but as a slow and necessary evolution as blockchain becomes invisible, seamlessly embedded into the fabric of digital commerce, identity, and security. From financial services to supply chains, health care to intellectual property, the most critical sectors will depend on these systems not because they are new, but because they are better.

The challenge ahead is not about convincing people to "believe in crypto." It is about building the systems that make trust obsolete—where integrity is the default and risk is minimized by design. This report is not about hype. It is about what comes next.

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While Web3 still feels out of reach for many, there's been real pragmatic progress in the areas of tech evolution and regulation.

1

Web3 adoption accelerates as enterprises explore blockchain solutions

Businesses are increasingly integrating blockchain into operations, from supply chain tracking to digital identity management. This shift marks a move beyond speculative crypto assets, toward practical, enterprise-driven Web3 use cases.

2

Regulatory uncertainty slows crypto, but spurs institutional Web3 growth

While regulatory crackdowns affected cryptocurrencies, enterprises and financial institutions have pushed forward with blockchain initiatives, focusing on compliance-friendly applications like tokenized assets and decentralized identity.

3

Decentralized Finance (DeFi) evolves to meet institutional standards

DeFi platforms are incorporating regulatory frameworks, risk management tools, and institutional-grade compliance to attract enterprise adoption. This evolution is bridging the gap between traditional finance and decentralized protocols.

4

Web3 gaming sees resurgence with focus on player ownership

Following early hype and subsequent decline, Web3 gaming is regaining traction with models emphasizing player ownership, sustainable economies, and enhanced user experiences. Major gaming studios are cautiously entering the space.

5

AI and blockchain converge to unlock new business models

The combination of AI and blockchain is enabling novel applications, from verifiable AI-generated content to decentralized AI models. This synergy is driving new business models across media, finance, and supply chain sectors.

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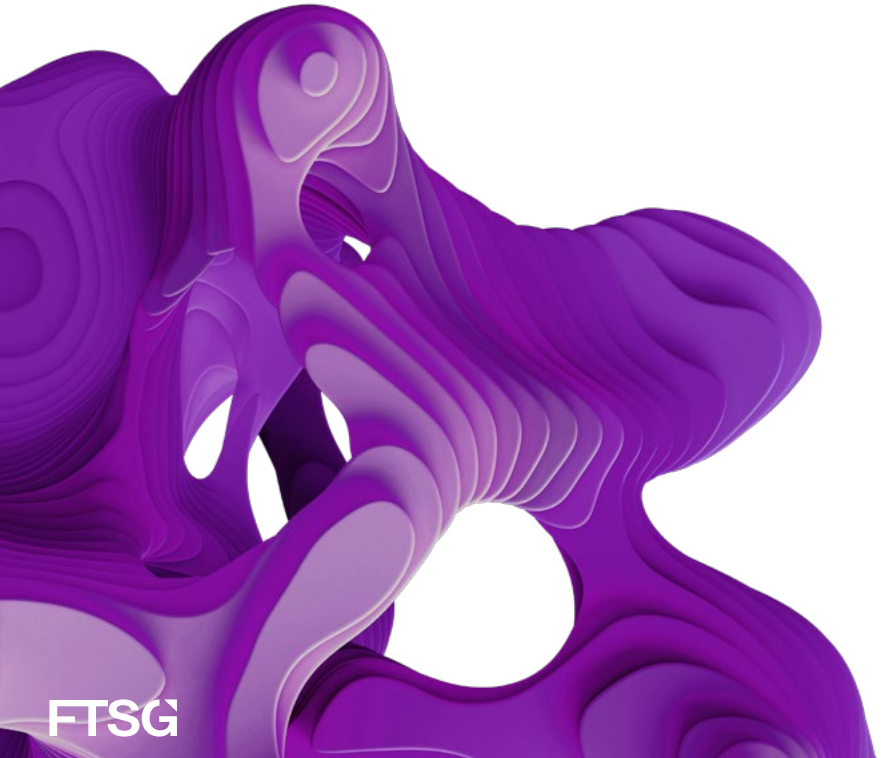
2025 will be a crucial year in determining how Web3 evolves moving forward.



In early 2025, Web3 is at a turning point, transitioning from a niche technology to a mainstream force reshaping digital interactions and business models. This paradigm shift is driven by the convergence of blockchain, decentralized finance (DeFi), and artificial intelligence, creating a new internet infrastructure that prioritizes user ownership, transparency, and peer-to-peer transactions. Business leaders across industries are recognizing Web3's potential to disrupt traditional value chains, create new revenue streams, and redefine customer relationships.

The Web3 ecosystem is rapidly evolving, with key developments in several strategic areas. Decentralized autonomous organizations (DAOs) are emerging as novel governance structures, challenging traditional corporate models. The tokenization of real-world assets is opening new avenues for fractional ownership and liquidity in previously illiquid markets. Meanwhile, the metaverse concept is gaining traction, blurring the lines between physical and digital realms, and creating immersive experiences that are reshaping entertainment, education, and commerce. These trends are compelling businesses to reevaluate their digital strategies and explore how Web3 technologies can enhance their competitive edge.

However, the path to Web3 adoption is not without challenges. Regulatory uncertainty remains a significant hurdle, with governments worldwide grappling with how to oversee this decentralized landscape. Scalability and interoperability issues persist, though Layer-2 solutions and cross-chain protocols are making strides in addressing these concerns. User experience and accessibility continue to be pain points, hindering mass adoption. For business leaders, the key to navigating this landscape lies in strategic experimentation, fostering partnerships within the Web3 ecosystem, and staying agile in response to rapid technological advancements and shifting regulatory landscapes.

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2024 was marked by regulatory action and shifting retail strategies.

MAY 2024

Hong Kong Kicks Out Unlicensed Crypto Exchanges

Regulators announced all unlicensed exchanges must apply for a license by February 2025 or cease operations.

JUNE 2024

MiCA Stablecoin Rules Take Effect

The EU's MiCA regulation implemented rules for stablecoins, further solidifying its comprehensive crypto framework.

DECEMBER 2024

Nike Shuts Down RTFKT

Nike ended the virtual sneaker and fashion brand, citing a recalibration of priorities after acquiring the brand in 2021.

« PAST

JUNE 2024

Adidas Sells Roblox Necklace For $20,000

The digital sale marked the most expensive user-generated item sold on the platform, signaling a new model for brands.

JULY 2024

Spot Ethereum ETFs Begin Trading

Spot Ethereum ETFs, approved by the SEC, began trading in the US in July 2024, offering investors exposure to ether.

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It could be a busy year ahead for US regulation of crypto and other Web3–based assets.

FUTURE »

JUNE 2025

Crypto Task Force Initial Report

The Presidential Working Group on Digital Asset Markets is tasked with submitting a report within 180 days.

AUGUST 2025

Potential Resolution of Binance Case

Following the 60-day stay requested in the SEC's lawsuit against Binance, this case may be resolved by August.

OCTOBER 2025

Possible Rulemaking Proposals

Given the SEC's shift towards a "rules-over-enforcement" approach, we may see proposed rules from the Crypto Task Force.

DECEMBER 2025

Year–End Review of Crypto Task Force Progress

The SEC might provide a year-end update on the Crypto Task Force's progress and achievements since its February formation.

ONGOING–2025

No–Action Letters and Exemptive Relief

Commissioner Peirce indicated the SEC will increase its use of no-action letters and exemptive relief.

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Organizations, especially those in high-trust environments, can greatly benefit from the security Web3 trends provide.

Decentralization Enhances Security and Trust

Web3 reduces reliance on centralized authorities, lowering risks of single points of failure and data breaches. Organizations can leverage blockchain-based verification to ensure transparency, improving customer and stakeholder trust.

New Business Models and Revenue Streams

Tokenization and decentralized finance open new monetization opportunities, such as fractional ownership, micropayments, and smart contract-driven transactions. Organizations can leverage NFTs, Decentralized Autonomous Organizations (DAOs), and blockchain-based services to create novel customer experiences and engagement models.

Greater User Control Over Data and Digital Identity

With self-sovereign identity and decentralized identity solutions, users gain more control over their personal data. This shift can redefine customer relationships, reducing compliance risks (e.g., GDPR) and improving personalization without intrusive tracking.

Enhanced Transparency and Compliance

Immutable ledgers ensure auditability and traceability, which is particularly valuable for industries like finance, supply chain, and health care. Smart contracts automate compliance and reduce operational inefficiencies in contract execution and enforcement.

Community-Driven Innovation and Governance

DAOs empower community-driven decision-making, fostering innovation through collective intelligence. Organizations can leverage DAOs for ecosystem governance, funding mechanisms, and strategic partnerships without traditional bureaucracy.

Interoperability and Digital Asset Ownership

Web3 enables seamless interoperability across platforms, allowing assets (e.g., tokens, digital identities, virtual goods) to move freely across ecosystems. This enhances customer engagement and loyalty, particularly in industries like gaming, media, and finance, where digital ownership is a major value driver.

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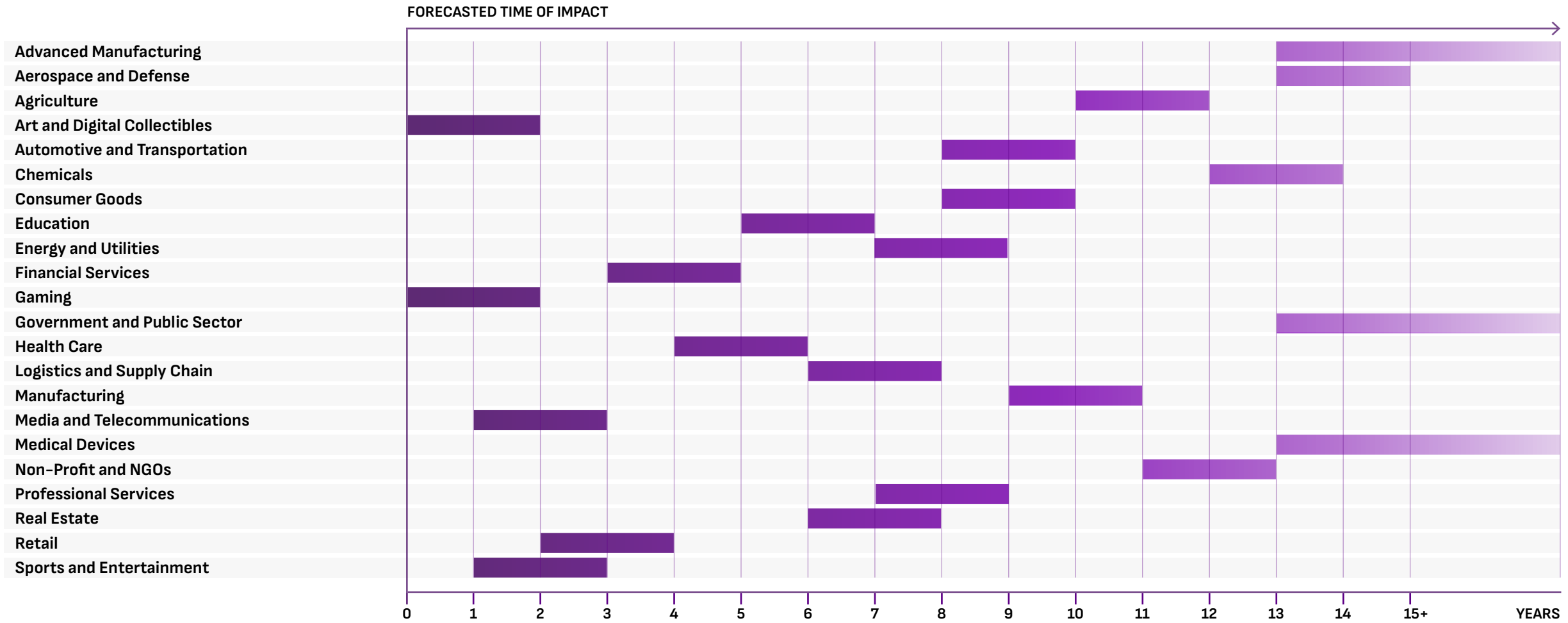
Many industry operations are already being directly impacted.



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Willingness to invest in infrastructure will determine your firms' ability to benefit from the early mover advantage.

SCALING

Industries with modular processes or digital-first operations, such as gaming and fintech, can implement and scale Web3 incrementally. In contrast, sectors with complex, interconnected systems face longer adoption curves due to the need for holistic transformation and ecosystem-wide coordination.

CONSTRAINTS ON ADOPTION

Interoperability issues between different blockchain protocols and legacy systems create significant technical debt, particularly in industries with entrenched IT infrastructures. This will be challenging for industries with numerous legacy businesses, but less so for digital-native sectors.

MEDIA MENTIONS

In B2C industries, increased media attention often translates to faster adoption, but in B2B sectors, the hype cycle generated by media leads to more measured, strategic approaches. The challenge for business leaders lies in distinguishing between media-driven hype and genuine transformative potential.

R&D DEVELOPMENTS

The cross-pollination of Web3 with other technologies such as AI and edge computing is catalyzing a new wave of innovation, creating novel use cases and accelerating adoption in unexpected sectors. This is enabling industries to leapfrog traditional adoption timelines, creating new centers of innovation.

COSTS

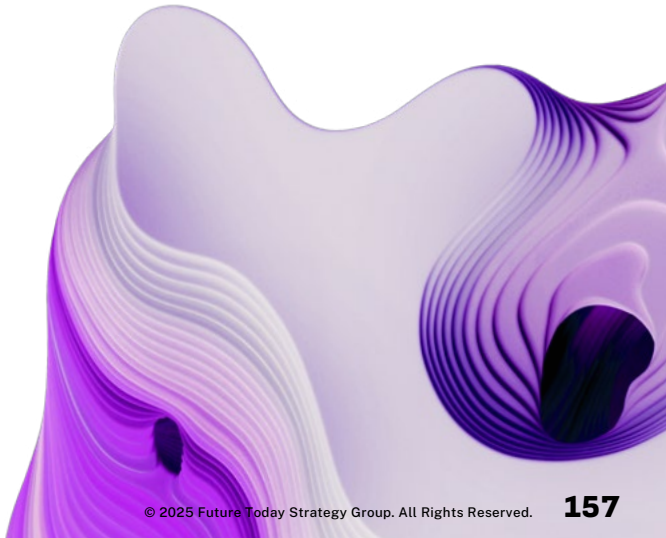
Sectors with high transaction costs or intermediary fees see a compelling ROI, driving faster adoption. Conversely, industries with slim margins or capital-intensive operations may delay implementation until the technology matures and costs decrease, balancing innovation against fiscal prudence.

REGULATIONS

Regulatory uncertainty, especially around tokenization and DAOs, is creating a "wait-and-see" approach in many industries. But in some jurisdictions, proactive frameworks are creating regulatory sandboxes that accelerate adoption, and provide companies with a place to experiment.

PUBLIC PERCEPTIONS

The evolution of Web3's public image from crypto phenomenon to utility-driven technology is fundamentally altering adoption patterns across industries. This shift is particularly impactful in sectors where trust and transparency are paramount, such as health care, and financial services.



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These individuals are shaping the creation of a new Web3 infrastructure.

- **Tim Beiko, Ethereum Foundation protocol support lead,** for bi-weekly All Core Devs calls, and his work coordinating Ethereum's core developers and orchestrating network upgrades.
- **Samczsun, head of security at Paradigm, for discovering and preventing major DeFi vulnerabilities,** saving projects like SushiSwap from multimillion-dollar exploits.
- **Primavera De Filippi, research director at CNRS,** for her work on blockchain governance, decentralized law, and pioneering blockchain-based art DAOs like the Plantoid project.
- **Gabby Dizon, co-founder of Yield Guild Games,** for leading the play-to-earn gaming movement and helping players in developing regions earn income through NFT-based games.
- **Tarun Chitra, founder of Gauntlet Networks,** for applying quantitative finance to DeFi, optimizing protocols like Aave and Compound, and managing financial risks in crypto lending.
- **Kevin Owocki, co-founder of Gitcoin,** for championing public goods funding through quadratic grants, distributing more than $64M to open-source projects in the Web3 ecosystem.
- **Olayinka Odeniran, founder of Black Women Blockchain Council,** for driving diversity in Web3 and leading an initiative to train 500,000 Black female blockchain developers by 2030.
- **Ameen Soleimani, creator of Moloch DAO,** for pioneering grant-giving DAOs to fund Ethereum infrastructure and open-source development through collective decision-making.
- **Taylor Monahan, product lead at MetaMask,** for improving crypto wallet usability and security, from founding MyCrypto to integrating user protections in MetaMask.
- **Sheila Warren, CEO of Crypto Council for Innovation,** for shaping global blockchain policy, founding WEF's blockchain division, and advocating for responsible Web3 adoption.
- **Lucía Gallardo, founder of Emerge,** for using blockchain to drive social impact, creating solutions for supply chain transparency, humanitarian aid, and sustainable development.
- **Aya Miyaguchi, executive director of Ethereum Foundation,** for leading Ethereum's global growth, funding ecosystem development, and advocating for decentralization.

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Web3 will help businesses remain compliant with evolving regulations...

OPPORTUNITIES

New Revenue Streams and Business Models

Tokenization, DeFi, and NFTs unlock new ways to monetize digital assets, intellectual property, and services. Subscription-based models can be replaced with tokenized access.

Enhanced Customer Engagement and Loyalty

Web3 enables personalized, user-owned experiences through decentralized identity and blockchain-based loyalty programs. Brands can create exclusive experiences using NFTs and DAOs to build deeper community engagement.

Decentralized Infrastructure Reduces Costs

Smart contracts automate business processes, reducing reliance on intermediaries and lowering transaction costs. Decentralized storage and computing can enhance efficiency and security while decreasing infrastructure expenses.

Transparency and Security Improvements

Blockchain-based systems can help reduce fraud and increase trust in financial transactions, supply chains, and data management. Decentralized identity solutions enhance privacy and security.

...but implementation could be costly and tricky to achieve.

THREATS

High Implementation Costs and Technical Complexity

Developing Web3-based solutions requires expertise in blockchain, smart contracts, and decentralized infrastructure, which can be expensive and difficult to source.

Scalability Limitations and Performance Bottlenecks

Blockchain networks can struggle with transaction throughput, high gas fees, and network congestion, making them less efficient for large-scale business operations.

Interoperability Challenges with Existing Systems

Businesses must integrate Web3 technologies with their current IT stack, including CRM, ERP, and cloud services, which can be cumbersome and require middleware solutions.

Uncertain ROI and Long Adoption Cycles

Consumer adoption of decentralized applications (dApps) remains slow, meaning businesses must be prepared for extended timelines before seeing significant user engagement and revenue.

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Businesses should take action today to ensure they are ready for scale when the market matures.

Before full-scale adoption, businesses should pilot Web3 initiatives such as tokenized loyalty programs, decentralized identity verification, or blockchain-based supply chain tracking. Identify potential use cases while ensuring scalability and integration with existing infrastructure.

Create governance policies to ensure compliance with global regulations, including the EU's GDPR, the US' AML, and securities laws regarding tokenization. Work with legal experts to define a strategy for handling smart contract liabilities, data privacy, and cross-border blockchain transactions.

Choose blockchain protocols that support high transaction throughput, low fees, and interoperability (e.g., Layer 2 solutions, modular blockchains, or hybrid models). Assess whether private, public, or consortium blockchains best suit the organization's needs.

Join industry consortia, such as the Blockchain Association or Enterprise Ethereum Alliance, to help shape regulations and advocate for business-friendly policies. Establish a compliance team to monitor evolving regulations on digital assets, smart contracts, and DeFi to mitigate legal risks.

Invest in cloud-based or on-premise infrastructure capable of supporting Web3 applications, including distributed storage (e.g., IPFS, Arweave) and decentralized identity solutions. Establish partnerships with blockchain service providers to ensure secure and scalable implementation.

Offer targeted training on blockchain, smart contracts, DeFi, and token economies to ensure employees understand Web3's impact on their roles. Establish cross-functional Web3 task forces within the company to drive innovation and identify new business opportunities.

Technology Deployment

Capital Expenditure

Talent Development

Regulatory Influence

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Important terms to know before reading.

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 DeFi sector, where one project replicates the code of another.

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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.

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.

PHYGITALS

This refers to the blending of physical and digital assets into an NFT. Phygitals 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.

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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.

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WEB3 TRENDS

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THE WEB3 LANDSCAPE

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THE WEB3 LANDSCAPE

The Rising Regulation of Web3

The financial world is entering a new era as governments create rules for digital currencies and assets. Just as traditional banking has regulations to protect customers and maintain stability, countries are now establishing similar guardrails for digital money and related technologies.

The European Union is implementing its first comprehensive framework for digital assets, the Market in Crypto Asset (MiCA) regulation, which was passed in 2023. The European Commission has also proposed a new framework that is more technologically up to date than MiCA, which would replace all other EU and national rules currently governing the issuance, trading and storing of crypto assets such as utility tokens or payment tokens which are not covered under MiCA.

Other major economies are following suit. South Korea launched new consumer protection rules in July 2024, focusing on companies that help people buy and sell digital assets. The United Kingdom is expanding its financial watchdog's authority to oversee digital currencies, aiming to have a complete system in place by 2026. Unlike some countries that are taking a gradual approach, the UK plans to regulate all aspects of digital assets simultaneously.

This trend is widespread—about 70% of major economies worked on new regulations for digital assets in 2024. International organizations like the G20's Financial Stability Board have provided recommendations, while countries from Australia to Brazil announced plans for their own rules. This global movement suggests that digital assets are becoming a permanent part of the financial landscape, albeit with proper oversight. While these regulations should help large institutions feel more confident about participating in digital markets and protect everyday users, finding the right balance is crucial—too many restrictions could prevent beneficial innovations in financial technology.

Trust-Minimized Infrastructure Development

The blockchain industry is strengthening its foundation by reducing reliance on single companies or organizations. This shift mirrors traditional finance's move away from concentrated risk—instead of one institution controlling critical functions, responsibility is distributed across multiple independent parties.

New systems now enable safer movement of digital assets between different blockchains. The Union protocol, for example, allows Bitcoin transfers with enhanced security by distributing oversight across multiple parties instead of depending on a single custodian.

Companies maintaining the Ethereum network, the second-largest blockchain after Bitcoin, are also improving their security measures. Lido, which manages about 32% of all Ethereum staking, began testing technology in 2024 that splits control of funds among several independent operators. This approach protects against both technical failures and potential misconduct by any single operator.

Infrastructure providers are similarly becoming more distributed. Infura, a major service provider, launched a network in 2024 that spreads its operations across many independent operators rather than running everything through centralized servers. By late 2024, this network supported a dozen different blockchain systems, making the entire infrastructure more resilient to outages.

Different blockchain networks are also establishing more secure ways to communicate with each other. Instead of relying on trusted intermediaries to relay messages between chains, new protocols use mathematical proofs to verify information directly. These improvements make the blockchain ecosystem more robust by eliminating single points of failure. The enhanced security and reliability are essential for businesses considering long-term adoption of blockchain technology.

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THE WEB3 LANDSCAPE

Invisible Blockchain Integration in Critical Sectors

Major industries are now using blockchain technology in their daily operations—not as a flashy marketing tool, but as practical infrastructure that works quietly behind the scenes. Much like how consumers don't think about the technical systems processing their credit card payments, blockchain is becoming an invisible part of business operations.

The shipping industry provides a clear example. In late 2024, shipping company COSCO tested a blockchain system that manages safety certificates for hazardous materials like carbon black. The system allows ports, carriers, and regulators to instantly verify these critical documents, reducing delays and ensuring safety compliance.

In health care, pharmaceutical companies are using blockchain to meet strict drug tracking requirements. The MediLedger project, conducted with FDA oversight, proved that blockchain technology can effectively trace prescription drugs through complex supply chains. This system helps ensure medicine authenticity and protect patient safety.

Financial institutions are also adopting blockchain for traditional operations. By August 2024, organizations, including the World Bank and European Investment Bank, had issued 14 bonds using blockchain systems. These bonds function exactly like traditional ones from an investor's perspective, but the underlying blockchain technology makes them more efficient to manage.

The diamond industry demonstrates another practical application. De Beers expanded its Tracr platform in 2023-24 to track diamonds from mines to retail stores. This system verifies each diamond's origin and characteristics, ensuring authenticity and ethical sourcing without changing how customers buy jewelry.

This shift toward using blockchain as invisible infrastructure, rather than a marketing buzzword, signals its evolution into a practical business tool. Organizations can now gain the benefits of permanent, tamper-proof record-keeping without requiring their customers or partners to understand the underlying technology.

AI Integration in Web3

Artificial intelligence technology is rapidly merging with blockchain systems to create more powerful and automated business tools. This integration is happening across multiple industries, creating new capabilities for data processing, customer engagement, and financial operations.

Major financial institutions are already testing these combined technologies. In 2024, data company Chainlink worked with Swift and Euroclear to use AI for processing complex financial information. Their system used advanced AI models to automatically read and standardize corporate information about mergers and dividends, making this data immediately available and verified on blockchain networks. This solved a common business problem: turning scattered market data into reliable, standardized information that all parties can trust.

The technology is also transforming customer engagement. A company called Alethea AI launched a system in April 2024 that creates interactive digital characters, verified through blockchain technology. These AI characters can display realistic emotions and hold conversations, offering businesses new ways to provide customer service or create engaging content in virtual environments.

The financial sector is seeing particularly interesting developments. The derivatives platform SynFutures introduced an AI system called "Synthia" that can execute complex trading strategies through simple voice commands. This points to a future where AI agents could handle sophisticated financial operations automatically while maintaining a clear record of all transactions on the blockchain.

Security is another key application. Machine learning systems are now analyzing blockchain transactions in real time to identify potential fraud or unusual patterns,

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THE WEB3 LANDSCAPE

adding an extra layer of protection to digital assets and transactions.

These developments suggest a fundamental shift in how businesses can operate: combining AI's ability to process and act on complex information with blockchain's capability to create permanent, verified records of all activities.

Security Risks in the Age of AI

Artificial intelligence is dramatically changing the security landscape for digital assets and blockchain technology, creating both new threats and defensive capabilities. This dual impact requires business leaders to understand both the risks and protective measures.

The scale of the challenge is significant. Cryptocurrency-related fraud reached unprecedented levels in 2024, with estimated losses of $10-12 billion—a 40% increase from the previous year. According to blockchain analysis firm Chainalysis, AI tools played a major role in this surge. Criminals now use AI to create highly convincing fake websites, business communications, and even technical documents that appear legitimate to even experienced investors.

The threats are sophisticated. In December 2024, the FBI warned that criminals were using AI to create perfect grammatical phishing emails and clone executive voices for fraud. These techniques can deceive even experienced professionals into authorizing fraudulent transactions or revealing sensitive security information.

However, businesses are also using AI to strengthen their defenses. Security firms now employ machine learning to monitor blockchain transactions in real time, identifying suspicious patterns that might indicate fraud or money laundering. For example, Chainalysis uses AI to track illegal fund movements through cryptocurrency networks, helping law enforcement recover stolen assets. Security auditors are also using AI to scan business contracts for potential vulnerabilities before they can be exploited.

New security measures are emerging in response to these challenges. Organizations are developing ways to verify the authenticity of digital communications and protect digital identities from AI impersonation. These tools will be crucial for maintaining trust in digital business transactions.

The key message for business leaders is clear: while AI makes fraud easier and more convincing, it also provides powerful new tools for protection. Success in this environment requires understanding both aspects and preparing accordingly.

Real-World Asset (RWA) Tokenization

A major transformation is underway in how traditional assets—from government bonds to real estate—are being digitized using blockchain technology. This process, called tokenization, is gaining significant traction with major financial institutions and governments.

The numbers tell a compelling story. Consider MakerDAO, a leading digital finance protocol: by late 2023, 60% of its more than $5 billion in assets were backed by traditional investments like US Treasury bills, rather than cryptocurrencies. This shift demonstrates how digital finance is increasingly connected to conventional financial markets.

Major asset management firms are actively entering this space. Franklin Templeton launched a blockchain-based US government money market fund that grew to $270 million by early 2024. BlackRock's CEO Larry Fink has predicted that eventually all stocks and bonds will use blockchain technology. By early 2024, investment firms had already put more than $1 billion in tokenized money market funds on blockchain networks, offering benefits like instant settlement and continuous trading.

Government participation adds further credibility. Hong Kong made history in February 2024 by issuing a HK$800 million (approximately US$100 million) government bond using blockchain technology—the first of its kind globally. Singapore's and Australia's central banks are conduct-

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THE WEB3 LANDSCAPE

ing similar experiments with digital government securities.

This trend matters because tokenization can solve several longstanding business challenges: it can make traditionally illiquid assets easier to trade, reduce settlement times from days to minutes, and allow for partial ownership of expensive assets. For business leaders, this represents an opportunity to improve operational efficiency and access new markets. The involvement of established financial institutions and governments suggests this technology is moving beyond speculation to practical business applications.

Sustainable Public Goods Funding Models

The blockchain industry is pioneering innovative ways to fund public resources like open-source software, infrastructure, and social projects. These new funding models could transform how businesses support critical shared resources and social initiatives.

One leading example is Gitcoin, which distributed $10.4 million in 2024 using a unique matching system called quadratic funding. This approach amplifies small donations from many contributors with larger matching pools, effectively identifying which projects have the broadest community support. In 2024, more than 141,000 donors helped fund nearly 1,750 projects spanning technology, climate initiatives, and education.

A new concept called Retroactive Public Goods Funding is gaining traction. Rather than providing speculative upfront grants, this model rewards work after its value is proven. Optimism, a blockchain platform, demonstrated this approach by distributing millions in tokens to developers who had already created valuable tools for their ecosystem. This results-based funding model could provide more sustainable incentives for innovation.

Specialized organizations called “impact DAOs” are channeling blockchain-based funding to social causes. KlimaDAO, for example, has facilitated the retirement of more than 17 million tonnes of carbon offsets. Other organizations fund community gardens or humanitarian relief. These groups leverage blockchain’s transparency to show donors exactly how their money is used, operating with lower overhead than traditional nonprofits.

Major blockchain networks are also building public goods funding into their core operations. Some protocols automatically direct a portion of their revenue to development grants and community projects. This creates a sustainable cycle where successful platforms continuously reinvest in their foundational infrastructure and community resources.

These innovations matter because traditional funding for public resources often falls short. By creating more efficient, transparent, and sustainable funding models, the blockchain industry is demonstrating how technology can address broader social and environmental challenges while supporting critical infrastructure development.

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THE WEB3 LANDSCAPE

Cross-Chain Interoperability Advancements

A fundamental shift is occurring in how different blockchain networks connect and communicate, similar to how the early internet evolved from isolated networks into today's interconnected web. This development makes blockchain technology more practical for mainstream business use.

In 2024 there were several illustrative examples of this shift. The Cosmos network enhanced its communication protocol to enable faster, more secure transfers between different blockchain systems. Similarly, Polkadot, another major platform, released new technology in October 2024 that allows different blockchain networks to exchange assets and information more efficiently.

Perhaps most significantly for the business world, SWIFT—the network that handles most international bank transfers—conducted successful trials with multiple banks between July and October 2024. These tests proved that SWIFT could serve as a central connection point between different blockchain networks and traditional banking systems. Based on these results, SWIFT announced plans for live trials in 2025 with banks across North America, Europe, and Asia, focusing on cross-border transactions and foreign exchange.

This shift toward interconnection solves a critical business challenge: different blockchain networks are designed for different purposes, but businesses need them to work together seamlessly. For example, one network might excel at processing transactions quickly, while another offers better security for high-value assets. Connecting these networks allows businesses to leverage the best features of each.

These benefits are practical and immediate, letting companies move assets between different blockchain networks more easily, reducing costs and complexity. It also means businesses can spread their operations across multiple networks to improve efficiency and reduce risks. This interconnection is crucial for blockchain technology to become a practical part of mainstream business infrastructure.

Biometric Authentication in Web3

The digital asset industry underwent significant changes in 2024 as companies integrated biometric authentication into their security systems. This shift means users can now use physical characteristics like fingerprints, facial recognition, and iris scans to secure their digital accounts and assets. The technology mirrors familiar tools like Apple's FaceID but applies them to managing digital currencies and assets, making these technologies more accessible to mainstream users and businesses.

The integration of biometric authentication addresses two persistent challenges in digital asset management. First, it enhances security—just as modern smartphones use fingerprints or facial recognition instead of just passwords, digital asset platforms are adopting similar technology to protect valuable digital assets. This additional security layer helps prevent unauthorized access and reduces the risk of theft. Second, it improves the user experience. Traditional digital asset management requires users to remember complex passwords and "seed phrases"—long strings of words used as backup codes. Biometric authentication simplifies this process, allowing users to access company digital assets as easily as unlocking a phone.

Several major developments shaped the landscape in 2024. Companies introduced new security devices with built-in biometric readers, similar to how corporate ID cards might include fingerprint verification. These devices require both physical possession and the correct biometric input to access digital assets, significantly reducing the risk of theft or unauthorized use. Major financial platforms integrated biometric login features similar to mobile banking apps, allowing users to access their digital assets using their phone's built-in fingerprint reader or facial recognition rather than typing passwords. This development makes digital asset management as convenient as modern mobile banking.

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THE WEB3 LANDSCAPE

New systems for verifying unique human identity also emerged, though with mixed reception. The most prominent example, Worldcoin, used iris scanning technology to ensure each person could only create one account. While innovative, this raised privacy concerns similar to those faced by traditional biometric databases. In response, researchers developed new methods for using biometric data without storing sensitive information centrally—enabling identity verification without sharing actual fingerprint or facial scan data. This addresses common privacy concerns about biometric data collection and storage.

The business implications of these developments are significant. Biometric authentication offers enhanced security through multiple authentication factors, reduces the risk of password-related security breaches, improves user experience for employees and customers, and provides better protection against account sharing and unauthorized access. However, challenges remain. Biometric data requires careful handling due to its sensitive nature, privacy concerns must be balanced against security benefits, and organizations must consider technology costs, implementation challenges, and regulatory compliance regarding biometric data.

Looking ahead, biometric authentication is likely to become increasingly common in digital asset management, following the path of mobile banking and corporate security systems. Businesses should monitor developments in this space, particularly regarding security standards and regulatory requirements. Organizations might consider starting pilot programs for biometric authentication in controlled environments while developing clear policies regarding biometric data collection and usage. When evaluating vendors, companies should pay particular attention to their approach to privacy and security.

Biometric authentication represents a significant advancement in making digital assets more secure and accessible. While the technology continues to evolve, its potential to improve security and user experience makes it worthy of serious consideration for businesses involved in digital asset management.

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SCENARIO YEAR 2035

A RETROSPECTIVE FROM THE GLOBAL BUSINESS REVIEW

Ten years ago, Web3 was still largely seen as a fringe technology, synonymous with volatile cryptocurrencies and niche use cases. Today, it's the bedrock of global commerce, securely and efficiently powering operations across countless industries. The transformation wasn't a revolution, but a gradual integration, much like how the internet itself became an indispensable utility.

By now, in 2035, the "blockchain" buzzword has faded, replaced by the quiet hum of trust-minimized systems operating seamlessly in the background. Regulations, carefully balanced to encourage innovation while protecting consumers, have fostered mainstream adoption. International standards and interoperability protocols, spearheaded by organizations like a revamped SWIFT and industry consortiums, allow for seamless data and asset transfer across different blockchain networks and legacy systems. This cross-chain operability has been a game changer for global supply chains. Consider the luxury goods industry: Every diamond, handbag, and bottle of wine is digitally tracked from origin to point of sale, guaranteeing authenticity and ethical sourcing thanks to systems like De Beers' Tracr platform. Consumers can instantly verify a product's provenance, combating counterfeiting and bolstering brand trust.

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The financial services sector has been completely transformed. Tokenization of real-world assets (RWAs) is ubiquitous. Major asset managers like BlackRock and Franklin Templeton offer tokenized versions of everything from government bonds to real estate. These digital assets trade 24/7 on decentralized exchanges, offering unprecedented liquidity and fractional ownership opportunities. AI-powered trading platforms, like the descendants of SynFutures' Synthia, execute complex strategies with unparalleled efficiency and transparency, all immutably recorded on-chain. Cross-border payments are instantaneous and nearly frictionless, powered by stablecoins and central bank digital currencies (CBDCs) operating on interoperable blockchain networks.

Of course, with increased integration comes increased risk. AI-powered cyberattacks are a constant threat, necessitating advanced security measures. Biometric authentication is standard, but sophisticated deepfakes and AI-generated phishing scams require constant vigilance. The industry has responded with AI-driven security solutions that analyze blockchain transactions in real-time, detecting and mitigating threats before they can cause damage. Zero-knowledge proofs are also becoming commonplace, allowing businesses to verify data without revealing sensitive information, further enhancing privacy and security.

Web3's evolution has not only improved efficiency and security but has also fostered new models of collaboration and funding. Sustainable public goods, like open-source software and critical infrastructure, are increasingly funded through retroactive funding mechanisms and quadratic funding platforms like Gitcoin. DAOs have become sophisticated governance tools, empowering communities to collectively manage resources and make decisions transparently.

The Web3 of 2035 is not the utopian dream of decentralization maximalists, but a pragmatic and powerful infrastructure layer woven into the fabric of global commerce. Businesses that embraced this evolution early on are now reaping the rewards: increased efficiency, reduced risk, enhanced transparency, and closer relationships with their customers. Those who hesitated are now playing catch-up in a world where cryptographic certainty is the new normal.

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ZKP implementation has fundamentally changed how we approach customer data protection. We're now able to verify transactions and authenticate users without exposing sensitive information, which has dramatically reduced our security risks while improving customer trust.

Sarah Chen, Chief Information Security Officer, JPMorgan Chase

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Emerging Forms of Consensus Protocols

The technology that secures blockchain networks is evolving beyond traditional methods, with new approaches that are more efficient, faster, and environmentally friendly. These innovations make blockchain more practical for business applications while maintaining security.

One notable example is Chia Network, which uses computer storage space instead of computing power to secure its blockchain. By 2024, Chia had built one of the world's largest distributed storage networks, with more than 160 exabytes of capacity. This approach achieves the same security level as Bitcoin but uses far less energy, as it only requires keeping hard drives online. Similarly, Filecoin's network provides 6.6 exabytes of useful storage while securing its blockchain, demonstrating how these systems can provide practical business value beyond just transaction processing.

Speed improvements are another key development. Research teams made significant advances in 2024 with new protocols that can process thousands of transactions per second. Companies like Mysten Labs and platforms like Avalanche demonstrated that blockchain networks can handle high-performance applications like social networks or games without sacrificing decentralization.

Security against future threats is also being addressed. Researchers are developing new protocols that can withstand potential attacks from quantum computers, which could theoretically break current cryptographic systems. While still theoretical, this work is crucial for ensuring long-term blockchain security.

Different blockchain platforms are adopting varied approaches based on their specific needs. For example, Kadena uses multiple parallel processing chains for higher throughput, while Solana combines different security mechanisms for better efficiency. This trend toward customized solutions means businesses can choose blockchain platforms that best match their specific requirements for speed, security, and scalability.

These technological advances are making blockchain networks more capable of supporting large-scale business applications while reducing environmental impact and maintaining security—key considerations for business adoption.

Blockchain Modularity

The architecture of blockchain technology is undergoing a fundamental change, moving from all-in-one systems to a modular approach where different components handle specific tasks. This shift is similar to how modern software development uses specialized services rather than building everything from scratch.

A major milestone occurred in October 2023 when Celestia launched the first blockchain dedicated solely to data storage and ordering. This innovation allows other blockchain systems to focus on processing transactions while using Celestia for secure data storage. By mid-2024, multiple development teams were building new systems on top of Celestia's foundation, demonstrating the value of specialized infrastructure layers.

This modular approach is gaining traction in major business applications. Coinbase, a leading cryptocurrency exchange, launched its Base network in August 2023 using modular technology from Optimism. Other major platforms like Polygon are developing similar systems that handle transactions more efficiently by separating different functions. This approach allows for much higher processing capacity without compromising security.

The industry is also developing shared services that multiple blockchain systems can use, similar to how many websites might use Amazon Web Services for cloud computing. Companies like Espresso and Astria are building these shared services, which help manage transaction ordering and security across multiple blockchain networks.

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This architectural shift has important business implications. Companies can now build blockchain systems tailored to their specific needs while relying on established infrastructure for core functions like security and data storage. This is similar to how modern businesses can quickly launch web applications by using existing cloud services rather than building their own data centers.

The trend suggests a future where launching a new blockchain-based business service will be as straightforward as deploying a new web application today, potentially accelerating business innovation in this space.

Advanced Cyptography for Privacy and Efficiency

Advanced cryptographic technology, particularly "zero-knowledge proofs" (ZKPs), is revolutionizing blockchain capabilities. This technology allows verification of information without revealing sensitive details—imagine being able to prove you have sufficient funds for a transaction without showing your account balance.

In 2024, this technology made significant advances in two key areas: improving privacy and increasing processing efficiency. Several major platforms demonstrated practical applications.

StarkWare's StarkNet and Matter Labs' zkSync Era showed how ZKPs can process thousands of transactions off the main blockchain while maintaining security. Scroll launched a system that matches Ethereum's capabilities but at much lower costs, making these benefits accessible to mainstream businesses.

A particularly exciting development is the combination of machine learning with zero-knowledge proofs, called "zkML." Research teams demonstrated how AI models could be run on private data while proving the results are correct—without revealing either the data or the AI model itself. This could enable services like private credit scoring in decentralized finance, where borrowers could prove their creditworthiness without exposing personal financial data.

These advances are drawing significant investment and attention from major technology companies. Many blockchain platforms now have dedicated cryptography teams, and companies are filing patents for innovations in this field. Their focus is on making blockchain systems more powerful and more private.

The business implications are substantial. Companies can process sensitive transactions on public blockchains while keeping details confidential. They can run complex operations more efficiently by processing them off-chain and proving the results. Most importantly, they can build AI-driven smart contracts that maintain privacy while providing verifiable results.

This technology is laying the groundwork for blockchain systems that can handle enterprise-scale operations while protecting sensitive business information—a crucial combination for widespread adoption in the business world.

Layer-2 and Rollup Solutions

Layer-2 solutions—systems built on top of existing blockchain networks—made significant advances in 2024, dramatically reducing costs and improving efficiency. Think of these as express lanes built above an existing highway, allowing for faster, cheaper transactions while maintaining the security of the main network.

A major breakthrough came in March 2024 when Ethereum implemented an upgrade called "Dencun." This update reduced blockchain transaction costs on Layer-2 networks by approximately 90-98%, making them much more affordable for everyday use. This is similar to how the introduction of fiber optic cables dramatically reduced the cost of internet data transmission.

The market responded quickly to these improvements. Coinbase's Layer-2 network, Base, attracted millions of users and secured more than $100 million in assets within months of its launch. Multiple other networks also went live or expanded their

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WEB3 INFRASTRUCTURE

services, including Linea, Scroll, and Taiko. By 2024, more than a dozen significant Layer-2 networks were operating on Ethereum, collectively managing tens of billions of dollars in transactions.

Another key development was improved connectivity between different Layer-2 networks. New systems emerged allowing users to move assets directly between these networks without going through the main blockchain, similar to how you can transfer money directly between banks without using a central clearing house. Companies like Connext and LayerZero led this effort, making it possible to conduct complex financial transactions across multiple networks efficiently.

This technology isn't limited to Ethereum. Bitcoin's Lightning Network, a Layer-2 solution for instant payments, grew to handle more than 5,000 Bitcoin in transaction capacity by 2024. Other blockchain platforms like Solana are also exploring similar scaling solutions.

These developments mark a crucial shift in blockchain technology: Layer-2 solutions are no longer experimental but are becoming essential infrastructure for business applications. They're making blockchain technology practical for large-scale business use by solving the critical challenges of cost and speed while maintaining security.

Decentralized Physical Infrastructure Networks (DePIN)

A new model of building physical infrastructure is emerging, using blockchain technology to incentivize individuals and communities to deploy and maintain real-world networks. Called DePIN (Decentralized Physical Infrastructure Networks), this approach is showing promise in telecommunications, data collection, and other industries traditionally dominated by large corporations.

Helium, a pioneer in this space, demonstrated significant success in 2024. Their mobile network, partnering with T-Mobile, reached nearly 100,000 subscribers in early 2024. Users spent approximately $1.47 million in the first five months of 2024 to access Helium's services, showing that businesses and individuals are willing to pay for these community-operated networks. The model is simple but effective: individuals host network hotspots and earn tokens for providing coverage.

The concept is spreading to various industries. Pollen Mobile is building a community-operated 4G network in the United States, while HiveMapper is creating a decentralized alternative to Google Street View by paying drivers to collect street imagery with their dashcams. In the automotive sector, DIMO is building a vehicle data network where car owners earn rewards for sharing their vehicle data, and they've already established partnerships with insurance companies in 2024.

This approach is attracting serious attention from investors and institutions. The Helium Foundation received grants for smart city projects, and NATO's Innovation Hub explored these networks for their potential in building resilient infrastructure. This interest suggests that the concept of community-powered infrastructure has applications beyond the cryptocurrency sector.

Challenges remain, including the sustainability of token-based rewards and regulatory compliance (particularly in telecommunications). But despite these hurdles, 2024 showed that this model can work at scale. Eventually, this innovation could transform how we build and maintain infrastructure. Instead of requiring massive centralized investment, communities can collaborate to build networks, potentially bringing services to underserved areas more quickly and cost-effectively than traditional approaches.

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WEB3 INFRASTRUCTURE

Privacy-First Messaging Protocols

A new wave of messaging platforms is transforming how businesses can protect their sensitive communications. Unlike traditional messaging services that rely on central servers controlled by single companies, these innovative solutions use distributed networks and advanced encryption to ensure messages remain truly private and secure.

Leading this transformation is the xx messenger, developed by security expert David Chaum. It works similarly to familiar apps like WhatsApp or Signal but with a crucial difference: instead of passing through central servers that could be compromised, messages are routed through multiple independent points, making it virtually impossible to track who is communicating with whom. For businesses handling sensitive information, this level of privacy provides unprecedented protection for intellectual property and confidential discussions.

The industry is also seeing the emergence of messaging systems that integrate with digital identity verification, allowing businesses to send encrypted messages to verified partners using unique digital addresses. This works similarly to email but with significantly enhanced security features. Major technology standards organizations, including the Internet Engineering Task Force and World Wide Web Consortium, are developing new protocols for secure group messaging that could revolutionize how businesses communicate internally and with partners.

These developments represent a significant shift from traditional messaging systems that can be vulnerable to surveillance or data breaches. For businesses, the benefits are clear: better protection against industrial espionage, secure channels for sensitive discussions like mergers and acquisitions, and improved compliance with data protection regulations. As digital privacy becomes increasingly crucial in the business world, these new messaging solutions offer a way to ensure that sensitive communications remain truly confidential and secure.

Cryptographic Certainty in Digital Transactions

Digital business is increasingly moving online, from contracts and payments to official documents and credentials. This shift has created an urgent need for ways to prove that digital transactions are authentic and trustworthy—similar to how we traditionally rely on notaries and wet signatures for important papers. New technologies are emerging to provide this certainty in the digital world.

A major development in this space is the European Union's new framework for digital identification and signatures, launched in 2024. This system, known as eIDAS 2.0, creates a standardized way for businesses and individuals to prove their identity and sign documents digitally across all EU countries. Think of it as a secure digital passport and signature that works everywhere in Europe. The system also includes tools to prove exactly when documents were sent and received—critical for business dealings where timing matters.

Financial institutions are also adopting new transparency measures. Major digital asset exchanges have begun publishing cryptographic proof of their reserves, allowing customers to verify that their funds are fully backed without revealing sensitive business details. This is similar to a bank audit but with mathematical certainty, helping restore trust in financial services after several high-profile failures.

Universities and government agencies are starting to issue digital credentials that can be verified anywhere without calling the issuing institution. For example, several European universities now issue diplomas in a digital format that graduates can easily share with employers, who can instantly verify their authenticity. Similarly, businesses can now timestamp important documents using blockchain technology, creating an unchangeable record of when a document existed in a particular form—useful for protecting intellectual property or proving contract terms.

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WEB3 INFRASTRUCTURE

These developments are making digital transactions more reliable and trustworthy, reducing the risk of fraud and disputes in an increasingly online business world. By providing mathematical proof of authenticity, timing, and ownership, these tools help businesses operate with confidence even when they can't meet face-to-face or rely on traditional intermediaries.

Quantum-Resistant Cryptography

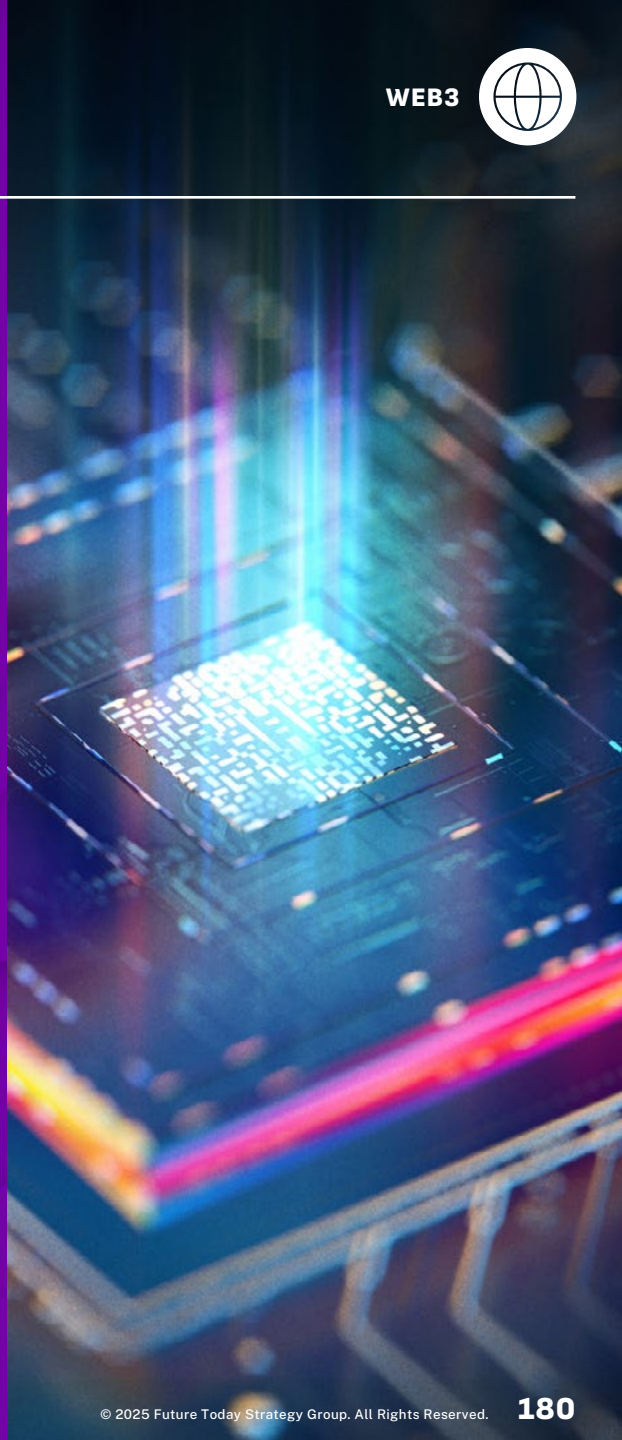
The emergence of quantum computing presents new opportunities. But it also poses a significant security challenge for organizations relying on blockchain technology and cryptographic systems. While quantum computers capable of breaking current encryption don't yet exist, their eventual arrival could compromise the security of cryptocurrency holdings, smart contracts, and other blockchain-based assets. This technological shift requires advance preparation to protect business operations and digital assets.

The US National Institute of Standards and Technology has identified four post-quantum algorithms for standardization, prompting major blockchain platforms like Bitcoin and Ethereum to explore implementation strategies. Industry leaders including IBM and Google are already collaborating with blockchain consortia to test these algorithms in enterprise chains, while government agencies in the US and EU are actively pushing for transition preparation.

The U.S. Department of Commerce's National Institute of Standards and Technology (NIST) finalized its principal set of encryption algorithms in August 2024, and has encouraged organizations to begin implementing them, though that has yet to begin in earnest. In February 2025, China launched an organization to begin developing its own algorithms. Organizations should approach this transition gradually, implementing new quantum-resistant systems alongside existing solutions. This approach allows for thorough testing while maintaining operational continuity.

For businesses with significant digital assets or blockchain operations, preparation should focus on three key areas: assessing current cryptographic vulnerabilities, developing a practical transition strategy, and monitoring emerging standards and best practices. While immediate wholesale changes aren't necessary, organizations should allocate resources for research and testing of quantum-resistant solutions as part of their technology strategy.

Success in this transition requires coordination between business leadership, technical teams, and security experts. Organizations that prepare effectively will be better positioned to protect their assets and potentially gain competitive advantages in an increasingly quantum-aware business environment. The focus should be on systematic implementation rather than rapid transformation, ensuring business continuity while progressively enhancing security against quantum threats.



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SCENARIO YEAR 2035

CTOS ARCHITECT THE NEXT ERA OF BUSINESS

The foresight and strategic actions of Chief Technology Officers during the 2020s were instrumental in shaping the business landscape we know today. The integration of Web3 technologies, initially met with skepticism and uncertainty, has become the invisible infrastructure upon which much of modern commerce relies. This transition was far from automatic; it was the result of deliberate, thoughtful planning and execution by CTOs who recognized the transformative potential of decentralized systems.

The first critical step was dismantling the legacy data silos that had long hindered innovation and efficiency. Forward-thinking CTOs championed the adoption of interoperable standards and protocols, facilitating the seamless flow of data between disparate blockchain networks and traditional systems. This commitment to interoperability unlocked entirely new possibilities for collaboration and value creation, enabling businesses to participate in decentralized ecosystems without sacrificing control or security.

These leaders understood that true security stemmed not from centralized control, but from cryptographic certainty. They spearheaded the implementation of advanced cryptographic techniques like zero-knowledge proofs, ensuring that sensitive data could be verified without ever being exposed. This shift towards

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trust-minimized systems instilled confidence in the integrity of digital transactions, paving the way for broader adoption of blockchain-based solutions across industries.

AI emerged as a critical tool in this transformation, augmenting human capabilities and automating complex processes. CTOs championed the integration of AI-powered security solutions that could analyze blockchain transactions in real-time, detecting and neutralizing potential threats before they could cause harm. AI also played a key role in streamlining operations, optimizing resource allocation, and enhancing decision-making across the enterprise.

Consider the logistics industry: by 2035, AI-powered supply chain management systems leverage blockchain technology to track goods from origin to destination with unparalleled transparency and efficiency. This has not only reduced fraud and waste but has also enabled businesses to respond more quickly and effectively to disruptions in the supply chain. Or, consider the financial services sector: AI-driven trading platforms execute complex strategies on decentralized exchanges, providing investors with access to new asset classes and investment opportunities while maintaining a transparent and auditable record of all transactions.

The successful integration of Web3 technologies required more than just technical expertise; it demanded a new mindset, a willingness to experiment, and a commitment to continuous learning. Visionary CTOs invested in training and development programs to equip their teams with the skills and knowledge they needed to thrive in this rapidly evolving landscape. They fostered a culture of innovation, encouraging their teams to explore new use cases for blockchain technology and to challenge conventional wisdom.

As we look back on this period of transformation, it is clear that the CTOs who embraced Web3 early on were the ones who positioned their organizations for long-term success. They understood that blockchain technology was not just a fad, but a fundamental shift in the way businesses operate. Their foresight and leadership have helped to build a more efficient, secure, and transparent digital economy for all. The next era of business was truly architected by these visionary technologists.

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DECENTRALIZED APPLICATIONS

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DECENTRALIZED APPLICATIONS

Decentralized AI

Decentralized AI networks represent an emerging market opportunity that challenges the current AI industry dominance of major technology companies. These networks distribute AI development and computing power across multiple participants through blockchain-based systems, creating new business models for AI services, data marketplaces, and computational resources.

The market opportunity stems from growing concerns about AI resource concentration and transparency. Current AI development requires substantial computing infrastructure, limiting innovation to a few well-resourced companies. Decentralized networks address this by enabling broader participation in AI development while creating new revenue streams for resource providers and developers.

And increasingly, these market developments are demonstrating commercial viability. SingularityNET's AI Marketplace 2.0 has established a functioning ecosystem where developers monetize AI services through token-based transactions. The platform routes user requests to distributed nodes rather than centralized servers, demonstrating a viable alternative to traditional AI service delivery models. Ocean Protocol has created new revenue opportunities in data markets, particularly in sectors like health care, where organizations can monetize data assets while maintaining control through smart contracts.

The computing resource market shows particular promise. Networks like Golem and Akash have successfully facilitated distributed AI model training, creating new revenue streams for computing resource providers. This development suggests potential for organizations to monetize underutilized computing infrastructure or participate in community-driven AI development projects.

Practical applications are emerging across industries. In Munich, Fetch.ai demonstrated real-world utility with a blockchain-based system connecting drivers with parking facilities, automating booking and payment processes. This implementation shows how decentralized AI can streamline operations and create new service offerings in traditional industries.

Governance innovations present additional opportunities. Organizations are exploring blockchain-based systems for AI oversight, including training data verification and output authentication. These developments address growing concerns about AI transparency and accountability, potentially creating competitive advantages for early adopters.

There are several ways to invest in this technology. First, direct participation in decentralized AI networks through computation provision or service development. Second, integration of decentralized AI services into existing business operations to reduce costs or enhance capabilities. Third, development of new products and services leveraging decentralized AI infrastructure.

The technology remains in early stages compared to established AI providers, but market indicators suggest growing adoption. Organizations should evaluate opportunities based on their specific circumstances, considering factors such as existing computational resources, data assets, and strategic alignment with decentralized technologies.

The key consideration is strategic positioning. While decentralized AI networks may not immediately replace traditional AI services, they offer unique capabilities and market opportunities. Organizations should monitor developments in this space and consider pilot projects to gain practical experience with these emerging technologies.

DeFi AI Hybrids (DeFAI)

Artificial intelligence is beginning to transform the world of digital finance, particularly in emerging decentralized financial platforms. This combination—sometimes called "DeFAI"—is creating new opportunities for automated trading, risk management, and investment strategies that weren't possible before.

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DECENTRALIZED APPLICATIONS

One significant development is the emergence of AI-powered trading assistants like SynFutures' "Synthia." The AI agent allows users to execute complex financial trades using simple English commands. Instead of navigating complicated trading interfaces, users can simply type what they want to do—like "swap $100 for ethereum"—and the AI handles all the technical details, including automatically finding the best prices across multiple markets.

AI is also enhancing investment management. Several investment protocols are now using machine learning to automatically adjust their investment strategies based on market conditions. These AI-driven investment vaults can shift funds between different types of assets when they detect changing market patterns, aiming to improve returns while managing risk. Early results suggest that these AI-managed portfolios are performing better than traditional static investment strategies.

Perhaps most importantly, AI is being used to improve risk assessment in lending. New platforms are using artificial intelligence to evaluate borrowers' creditworthiness using various data points, similar to how traditional banks use credit scores. This could make it possible for businesses to access loans through digital platforms without putting up excessive collateral. Major lending platforms are also using AI simulations to optimize their interest rates and risk parameters, helping them operate more efficiently while protecting against defaults.

But there are still challenges to navigate in this merger of AI and finance. Financial institutions are carefully considering how to maintain transparency when AI makes important decisions, and how to protect against potential errors or market disruptions caused by automated systems. Even so, the trend is clear: artificial intelligence is making digital finance more sophisticated, automated, and accessible to everyday users and businesses.

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DECENTRALIZED APPLICATIONS

Enterprise-Grade DApps for Traditional Industries

Across industries, major companies are now adopting blockchain technology to improve their core business operations, marking a shift from early experimental uses to practical applications. These enterprise blockchain systems are designed to meet the strict requirements of large organizations, including privacy controls, regulatory compliance, and the ability to handle high transaction volumes.

A major development in this space is the Canton Network, launched in July 2024, which connects more than 30 leading financial institutions including Goldman Sachs, Deutsche Börse, and HSBC. The network helps these organizations streamline financial operations like clearing trades and managing collateral. One application on this network is already processing $1.5 trillion in financial transactions monthly, demonstrating that blockchain technology can reliably handle large-scale, regulated financial operations.

In global trade, several industry groups have moved blockchain projects from testing to actual implementation. Networks like Marco Polo and Contour are helping banks and companies digitize traditional trade documents, while other platforms are being used to track shipments and supply chains in real time. These systems are designed to work with companies' existing software systems while providing better visibility and security for all parties involved.

The real estate industry is also embracing this technology. Real estate companies in Europe and the UAE are using blockchain platforms to manage property investments in new ways. For example, a Swiss real estate fund now allows qualified investors to trade shares instantly using a blockchain system that complies with local regulations—a significant improvement over traditional property investment methods.

To make adoption easier, major technology companies like SAP and Oracle have begun offering blockchain tools that integrate with their existing business software. This development suggests that blockchain technology is becoming a standard part of business infrastructure, much like cloud computing did before it. Companies can now implement blockchain solutions with the same level of support and reliability they expect from their other business software.

Hyperfinancialization with RWA Integration

Traditional financial markets are increasingly merging with new digital financial platforms, creating an environment where almost any valuable asset—from real estate to Treasury bills to business loans—can be traded and used as collateral in digital markets. This trend, sometimes called "hyperfinancialization," is making it possible to trade and finance assets 24/7 with instant settlement and even fractional ownership.

A leading example of this trend is MakerDAO, a digital finance platform that issues a cryptocurrency called DAI. By the end of 2023, about 60% of DAI's backing came from traditional assets like government bonds and bank deposits. In 2024, the platform expanded further, managing a $1.6 billion portfolio of US Treasury bills and partnering with a Florida bank to offer insured deposits. As seen here, digital finance platforms are becoming more like traditional financial institutions, while offering new levels of accessibility and efficiency.

New lending platforms are also emerging that connect global investors with real-world borrowers. For instance, platforms like Goldfinch have facilitated more than $150 million in loans to businesses in emerging markets. This means that individual investors can now participate in financing opportunities that were previously only available to large institutions, such as funding small businesses in Nigeria or real estate projects in the United States.

These platforms are also creating new financial products that combine traditional and digital finance. Investment managers are now offering structured products that let investors choose their preferred level of

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DECENTRALIZED APPLICATIONS

risk, similar to traditional financial products but with the added benefits of digital trading and broader accessibility. For example, investors can choose between lower-risk and higher-yield options in the same asset pool, all managed through digital platforms.

However, this merger of traditional and digital finance brings new challenges. Regulators are paying close attention to these developments, and platforms must carefully manage risks related to real-world assets. Despite these challenges, the trend suggests a future where traditional and digital finance become increasingly interconnected, potentially making financial services more efficient and accessible to everyone.

AI Agents for Autonomous Decision-Making

A new trend is emerging in digital organizations: the use of artificial intelligence to help run day-to-day operations and decision-making. These AI systems are being tested in decentralized autonomous organizations (DAOs)—online communities that make decisions collectively—to handle tasks that would typically require constant human attention.

In 2024, several organizations began experimenting with AI in practical ways. For example, VitaDAO, an organization focused on longevity research, used AI tools to evaluate grant applications, helping their community identify the most promising candidates. Another organization integrated AI into its voting platform to analyze and summarize lengthy discussion threads, making it easier for members to understand key points before voting on important decisions.

Some organizations are testing even more ambitious applications. One investment group allocated a small fund for an AI system to manage autonomously, essentially creating a mini AI-run hedge fund as an experiment. While results were mixed, it provided valuable insights into how AI might handle unpredictable market conditions. Other groups are developing AI systems that can monitor financial positions and automatically adjust strategies based on market changes, working around the clock without human intervention.

Looking ahead, industry experts envision organizations that could operate with minimal human oversight, using AI to handle routine tasks like managing finances, processing emails, and making basic decisions. These AI systems would be programmed to follow the organization's rules and values, only deferring to human judgment for contentious or unusual situations. This could help solve common problems in online organizations, such as low participation in voting and slow decision-making.

However, giving AI systems this level of autonomy raises important questions about safety and trust. Organizations are carefully considering how to ensure these AI systems remain transparent in their decision-making, align with human values, and have appropriate limitations on their actions. While it's still early days for this technology, the initial steps taken in 2024 suggest a future where AI could become an integral part of how organizations operate.

Reducing Friction in Cross-Border Transactions

One of the original promises of digital currencies was to make international money transfers faster and cheaper. In 2024, this promise has finally become reality through various digital payment solutions, including stablecoins (digital currencies tied to traditional money like the US dollar) and new partnerships between traditional financial institutions and blockchain technology companies.

A notable example is MoneyGram's crypto-based transfer service, which uses digital dollars on the Stellar network. This service allows someone in the US to send money abroad with fees under 2%, compared to traditional international transfer fees of 5-7%. The recipient can collect their money in local currency through MoneyGram agents, often within minutes rather than the days it typically takes for traditional transfers. Financial technology companies in Latin America, Africa, and Southeast Asia are now incorporating similar systems into their apps, making these

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DECENTRALIZED APPLICATIONS

faster, cheaper transfers available to users who may not even realize they're using blockchain technology.

Major financial institutions are also exploring blockchain-based international transfers. In late 2023, central banks from China, Hong Kong, Thailand, and the UAE, working with the Bank for International Settlements, conducted a successful trial that processed $22 million in cross-border payments. The system reduced transaction times from days to seconds and eliminated many traditional banking fees. Similarly, Mastercard is developing its own blockchain network to help banks settle international transactions more efficiently.

The technology is becoming increasingly user-friendly. New services are making it as easy to send money internationally as using a regular payment app. For example, a person in the Philippines can now use a simple wallet app to send pesos that are automatically converted to digital dollars, transferred to the US, and converted to US dollars in the recipient's bank account—all within minutes. This is a dramatic improvement over traditional international money transfer services, which often take days and charge higher fees.

These developments are particularly important for foreign workers sending money home to their families, small businesses engaged in international trade, and anyone who needs to make cross-border payments. By reducing fees and speeding up transfers, these new systems are making international commerce more efficient and helping more of each dollar reach its intended recipient.

Decentralized Science (DeSci) Platforms

A new movement called Decentralized Science (DeSci) is bringing innovation to how scientific research is funded, conducted, and shared. Instead of relying solely on traditional funding sources like government grants or corporate sponsorship, this approach uses blockchain technology to allow direct community funding and participation in scientific research.

One notable success story is VitaDAO, an organization focused on longevity research. In late 2023, VitaDAO launched its first biotech company, Matrix Biosciences, providing $300,000 in community-pooled funds to develop new treatments for age-related diseases. This project demonstrated how community funding could accelerate research that might otherwise take years to secure traditional grant funding. Similar organizations are now funding early-stage research in various fields, including psychology and laboratory services.

The movement is also transforming how scientific findings are published and shared. New platforms like ResearchHub are creating alternatives to traditional academic journals, allowing researchers to publish their work and share it directly with the public while receiving compensation through digital tokens.

A particularly innovative development is the creation of "IP-NFTs"—digital certificates representing ownership in scientific intellectual property. This allows research organizations to sell partial rights to their discoveries to raise funding for further development. In 2024, this model proved successful when a pharmaceutical company licensed a compound that had been funded through community contributions, sharing the proceeds among the contributors.

Traditional academic institutions are beginning to take notice. The University of Copenhagen, for example, partnered with a blockchain project to explore issuing digital diplomas and using community voting for grant allocation. Even prestigious journals like Nature have acknowledged the potential of this approach to promote innovative, high-risk research through community funding. While challenges remain—including many scientists' unfamiliarity with these new technologies—the developments in 2024 suggest that this new approach to scientific research has gained legitimate traction.

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DECENTRALIZED APPLICATIONS

Tokenized Loyalty Programs

Tokenized loyalty programs represent a significant evolution in customer engagement strategy, leveraging blockchain technology to transform traditional loyalty points into tradable digital assets. This transformation offers businesses new opportunities for customer retention, cross-brand partnerships, and market differentiation while addressing the current challenges of fragmentation and limited transferability in the loyalty program market.

Several market leaders have already demonstrated successful implementations across different sectors. In aviation, Lufthansa Group's Uptrip platform has acquired more than 20,000 users during its soft launch. The platform issues digital trading card NFTs for travel destinations, integrating with the Polygon blockchain while maintaining a traditional user experience. The program offers reward mechanics including lounge access and flight upgrades, and has shown particularly strong engagement among younger demographics.

The retail and luxury segment has seen varied approaches to implementation. Nike's .SWOOSH platform connects digital collectibles with physical merchandise benefits, while luxury brands like Louis Vuitton and Gucci leverage NFT ownership for exclusive VIP access. Universal Pictures has expanded into the entertainment sector with franchise-specific tokens for fan engagement.

In the hospitality industry, innovative implementations include a Maldives resort's introduction of tradable "Reward Tokens" for nights and services, demonstrating enhanced liquidity compared to traditional hotel points. This approach has proven particularly effective for offering VIP access and exclusive experiences through token ownership.

Technical implementation requires careful consideration of architecture and user experience. Successful programs typically integrate backend blockchain systems with simplified user onboarding through traditional login systems. Most platforms offer optional self-custody for advanced users while maintaining managed wallets for typical customers. Risk management focuses on regulatory compliance regarding token classification, with emphasis on utility over speculation, supported by clear terms of service and usage guidelines.

Risk mitigation remains crucial, with organizations needing to ensure regulatory compliance from the outset, implement robust security measures, and maintain clear communication with users. The technology itself should remain largely invisible to end users, with focus placed on the benefits and experiences it enables.

Tokenized loyalty programs present a compelling opportunity for businesses to modernize their customer engagement strategies. Early adopters have validated implementation models, while market trends suggest growing acceptance and demand for these solutions. Organizations should evaluate their readiness for pilot programs while maintaining awareness of implementation challenges and regulatory requirements. Success in this space will likely depend on seamless user experience, clear value proposition, and strategic partnership development rather than technical sophistication alone.

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SCENARIO YEAR 2030

THE DAPP REVOLUTION

Looking back at the landscape just five years ago, it's remarkable how profoundly decentralized applications have reshaped our daily lives. In 2025, dApps were still largely considered a niche technology, mostly used by crypto enthusiasts. Today, in 2030, they're an integral part of how we work, play, and interact with the world.

The key to this transformation was the shift from experimental projects to enterprise-grade dApps tailored for traditional industries. Major companies finally recognized the potential of blockchain technology to improve their core operations, leading to a wave of practical implementations across diverse sectors.

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Finance

The rise of "DeFAI" (Decentralized Finance AI Hybrids) has revolutionized how we manage our money. AI-powered trading assistants like Synthia, which seemed novel back in 2025, are now commonplace. They execute complex trades based on simple voice commands, finding the best prices across multiple markets automatically. Investment management is also largely automated, with AI algorithms adjusting portfolios based on market conditions.

Supply Chain

The promise of blockchain in supply chain management has finally been realized. We can now track products from origin to consumer with unparalleled transparency and security. This has not only reduced fraud and counterfeiting but has also enabled businesses to respond more quickly and effectively to disruptions.

Identity

The European Union's eIDAS 2.0 framework, launched in 2024, proved to be a catalyst for secure digital identity. We now have a standardized way to prove our identity and sign documents digitally across all EU countries, making cross-border transactions seamless and secure. Platforms like Worldcoin, despite initial privacy concerns, paved the way for more privacy-preserving biometric authentication methods, which are now integrated into most dApps.

Infrastructure

Decentralized Physical Infrastructure Networks (DePINs) have transformed how we build and maintain essential services. Community-operated mobile networks like Helium have expanded dramatically, providing affordable internet access in underserved areas. We're also seeing the rise of decentralized alternatives to traditional data storage and computing, empowering individuals and businesses to participate in the digital economy.

Science

Decentralized Science (DeSci) platforms have disrupted the traditional model of scientific research. Organizations like VitaDAO have demonstrated the power of community funding to accelerate research in critical areas like longevity. Researchers can now publish their work directly to the public and receive compensation through digital tokens, bypassing the traditional academic publishing system.

Social Media

Privacy-first messaging protocols have become the norm. We communicate using platforms like xx messenger, which route messages through multiple independent points, making it virtually impossible to track who is communicating with whom.

Loyalty Programs

Tokenized loyalty programs are ubiquitous, offering customers tradable digital assets that can be used across multiple brands. These programs have proven to be a powerful tool for customer retention and engagement.

Of course, the dApp revolution hasn't been without its challenges. Security risks have become more sophisticated, requiring constant vigilance and the implementation of AI-driven security solutions. Regulatory frameworks have evolved to address the unique challenges of decentralized technologies, balancing innovation with consumer protection.

But overall, the impact of dApps on our lives has been overwhelmingly positive. They've empowered individuals, fostered innovation, and created new opportunities across diverse industries. As we look to the future, it's clear that decentralized applications will continue to play a critical role in shaping the digital world. The foundations were set—the invisible transformation has occurred.

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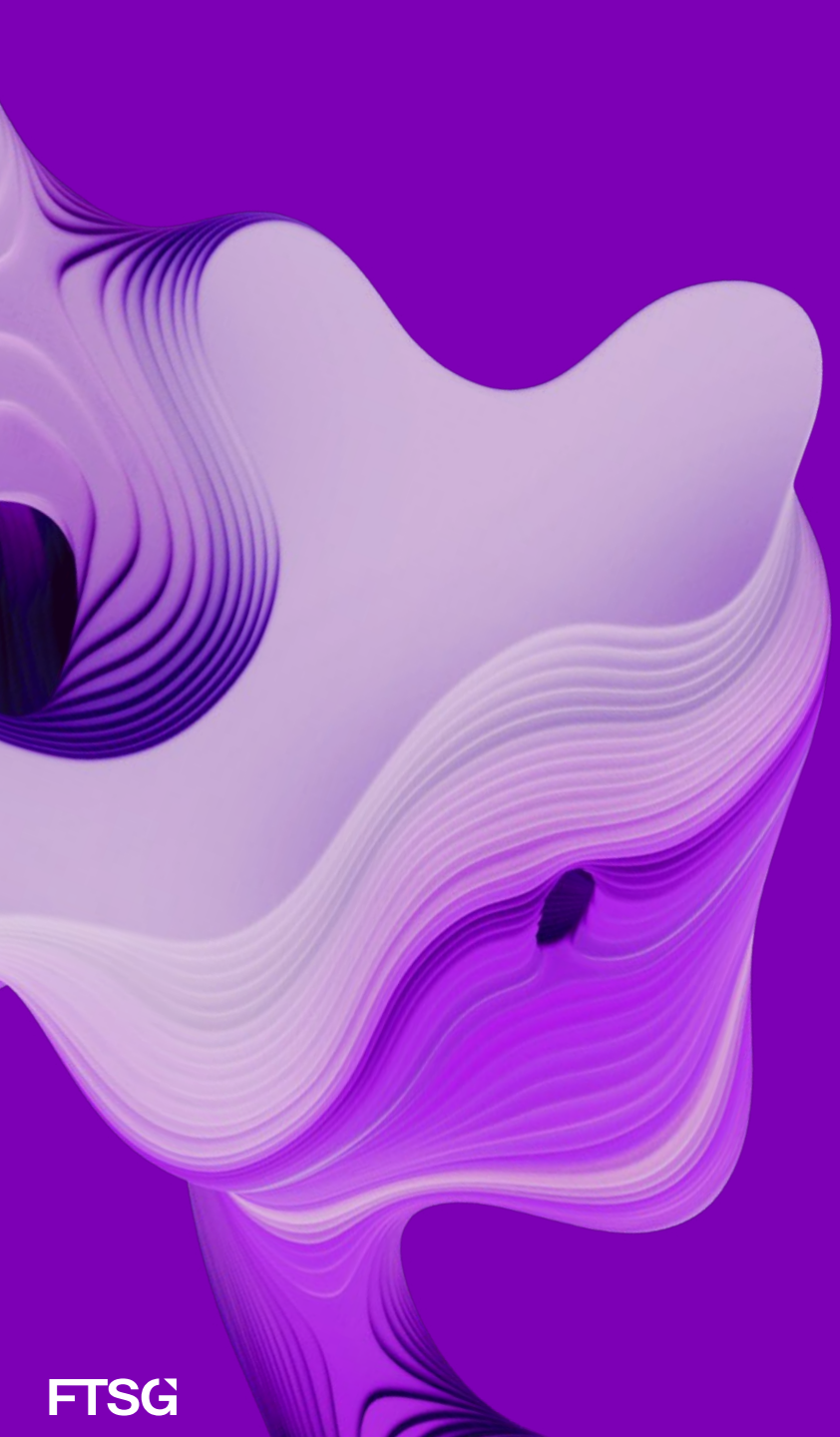

WEB2 + WEB3 INTEGRATION

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Digital Content Provenance and Authentication

The rise of artificial intelligence and sophisticated content manipulation tools has created new challenges for businesses in verifying the authenticity of digital media. In response, major technology companies are developing new solutions to verify and track the origins of digital content, from corporate communications to marketing assets. These developments are particularly relevant for businesses concerned about brand protection, intellectual property rights, and maintaining trust with customers.

Adobe, a leader in creative software, made significant strides in 2024 with its Content Authenticity Initiative. This system, now integrated into Photoshop, works similarly to how companies currently track document changes in Microsoft Word, but for images and other media. When a designer creates or edits an image, the software automatically records who made the changes and when, creating a verifiable history that stays with the file. Major news organizations, including the Associated Press and BBC, have adopted this system for their photo journalism, setting a new standard for content verification that businesses may soon need to consider for their own digital assets.

Large technology companies including Microsoft and Intel are developing similar authentication systems for video and audio content. Microsoft's Azure cloud platform now offers business customers the ability to add cryptographic signatures to their video content. This works like a digital seal of authenticity—if someone tampers with the video, the signature breaks, alerting viewers to the manipulation. This technology is particularly valuable for businesses that rely heavily on video content for training, marketing, or communication, as it helps ensure the integrity of their materials.

Social media platforms are also adapting to these changes. Twitter (X) and YouTube are exploring ways to display verification badges on media uploads, similar to the verified checkmarks on business accounts. This development could affect how companies manage their social media presence and verify their official content across platforms. It may soon become standard practice for businesses to authenticate their digital content just as they currently verify their social media accounts.

These verification tools are also extending past social media. Browser extensions and mobile apps now allow users to quickly verify the authenticity of images and videos, similar to how they currently check website security certificates. This trend suggests that consumers may soon expect to see authentication credentials on business content, making content verification as routine as checking for a secure website padlock icon.

For businesses, these developments present both opportunities and challenges. Organizations can now better protect their intellectual property and brand assets by creating verifiable records of their original content. This is particularly valuable for industries where image manipulation or counterfeit content could damage reputation or lead to liability issues. Marketing departments can prove the authenticity of their campaigns, while legal teams can better protect against unauthorized use or manipulation of company materials.

However, implementing these authentication systems requires investment in new tools and workflows. Businesses need to consider how to integrate content authentication into their existing digital asset management systems, train staff on new procedures, and potentially update their content creation and distribution processes. The cost of not adapting could be significant—as authentication becomes standard, unverified content may be increasingly treated with suspicion by customers and partners.

Looking ahead, businesses should prepare for a future where content authentication becomes as fundamental as digital signatures are today. Organizations that deal with sensitive information or valuable digital assets should particularly consider

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early adoption of these technologies. As AI-generated content becomes more prevalent, the ability to verify authentic business communications and materials will become increasingly crucial for maintaining customer trust and protecting brand integrity.

Self-Sovereign Identity Solutions with Privacy Focus

A significant shift is occurring in how organizations handle digital identity and credentials, moving away from centralized databases toward systems that give individuals control over their own information. This new approach, known as user-controlled digital identity, allows people to store and manage their credentials (like professional certifications, identity documents, and employment verification) on their own devices, similar to how they might keep physical documents in a wallet.

The European Union is leading this transformation with its Digital Identity Wallet initiative. Under this program, citizens will store official credentials like driver's licenses, diplomas, and professional certifications on their smartphones. These digital credentials work like their physical counterparts but with enhanced privacy features. For example, when proving age at a venue, users can simply confirm they're over 18 without revealing their actual birthdate or other personal information. This represents a fundamental change in how businesses verify customer information.

Major technology companies are already adapting to this trend. Microsoft has introduced verifiable credentials in its enterprise systems, allowing companies to issue digital versions of employee IDs and certifications. These credentials can be instantly verified anywhere while reducing administrative overhead. Universities are also adopting this technology, issuing digital diplomas and transcripts that students can share with employers. Apple has updated its Wallet app to support digital driver's licenses in some regions, signaling broader adoption of digital credentials in everyday business transactions.

For businesses, this shift offers several advantages. First, it reduces the liability and cost of storing sensitive customer data. Instead of maintaining databases of customer information, businesses can simply verify credentials when needed, similar to checking a physical ID card. Additionally, this approach also streamlines customer onboarding and verification processes. Financial services companies, for instance, are already testing systems where customers can prove their identity or credit status instantly without lengthy paperwork or manual verification.

The implications for business operations are substantial. Employee credentials, professional certifications, and compliance requirements can be managed more efficiently. When hiring, companies can instantly verify candidates' credentials without contacting previous employers or educational institutions. For regulated industries, proving compliance becomes more straightforward as required certifications can be verified in real time.

These systems also have privacy features that address growing consumer data protection concerns and regulatory requirements. Businesses can verify necessary information about customers or employees without collecting and storing excess personal data. This aligns with privacy regulations like GDPR while reducing the risk of data breaches.

However, adoption challenges remain. The system requires coordination between credential issuers (like governments and educational institutions) and the organizations that need to verify these credentials. Progress is being made as governments, particularly in Europe and parts of North America, establish frameworks for digital credential recognition. Banks and other financial institutions are also creating standards for accepting these digital proofs of identity.

Looking ahead, businesses should prepare for a future where digital credentials become as common as email addresses. Organizations may soon need to accept these new forms of digital verification while also

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considering how to issue their own credentials to employees, partners, or customers. The transition might require updating verification processes and training staff, but the potential benefits in efficiency, security, and customer privacy make this a worthwhile investment.

The rise of user-controlled digital identity represents a fundamental shift in how businesses handle verification and credentials. While the technology is still evolving, forward-thinking organizations are already preparing for this change. Those who adapt early will likely gain advantages in operational efficiency, customer trust, and regulatory compliance.

Web3–Powered Education and Skill Verification

The education and professional development landscape is undergoing a significant transformation as institutions adopt new digital technologies for issuing and verifying credentials. This shift promises to streamline hiring processes, reduce credential fraud, and create new opportunities for continuous learning in the workplace.

Major universities are leading this change by issuing digital diplomas alongside traditional paper certificates. MIT, the University of Toronto, and several European universities have implemented systems where graduates receive tamper-proof digital credentials that employers can instantly verify online. The European Union is taking this further by developing a region-wide system that allows any EU university to issue digital credentials that employers across the continent can easily verify through a standardized application. This development is particularly valuable for international recruitment, as candidates can prove their qualifications without the lengthy process of obtaining and translating paper documents.

The corporate world is also embracing this digital transformation. Salesforce has implemented a digital certification system for its professional training programs, where completing specific learning paths earns participants a verified digital badge. These credentials are already recognized by consulting partners when evaluating job candidates' expertise. Some IT companies in India have begun accepting digital certificates from online courses as proof of technical skills, reducing their reliance on additional testing during hiring.

New approaches to professional development and training are emerging through incentive-based learning platforms. These systems reward employees for completing training modules or acquiring new skills, similar to how loyalty programs reward customer purchases. Some platforms allow professionals to accumulate "skill tokens" as they complete training or contribute to projects, creating a verifiable portfolio of their capabilities. While still early, these systems show promise in increasing engagement with corporate training programs and providing more transparent ways to track professional development.

The education marketplace is also evolving. New platforms are emerging that connect instructors directly with learners, allowing for more flexible and targeted professional development. These systems enable companies to offer specialized training modules that employees can access on demand, with automatic verification of completion. This approach challenges traditional corporate training models by making professional development more modular and adaptable to specific business needs.

For human resources departments, these developments offer significant advantages. Digital credentials can streamline the verification process during hiring. Instead of manually contacting universities or previous employers to verify qualifications, HR systems can instantly verify candidates' credentials through secure digital checks. This could dramatically reduce the time and cost associated with background checks while increasing their reliability.

The implications for business operations extend beyond hiring. Companies can better track and verify employee skills and certifications, ensuring compliance with industry requirements and identifying skills gaps more effectively. Training

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programs can be more precisely targeted, and achievement can be more accurately measured. This is particularly valuable for regulated industries where maintaining current certifications is crucial.

Looking ahead, organizations should prepare for a future where digital credentials become standard in professional development and hiring. This might involve updating HR systems to handle digital verification, reconsidering how internal training programs issue and track certifications, and developing new policies for accepting digital credentials during recruitment.

The transformation of educational and professional credentials represents more than a technological shift—it's a fundamental change in how organizations verify skills and manage talent development. While the systems are still evolving, forward-thinking organizations are already preparing for this change, recognizing that early adoption could provide significant advantages in recruitment, training, and workforce development.

Decentralized Cloud Computing Services

A new approach to cloud computing is emerging that could change how businesses think about their digital infrastructure. Unlike traditional cloud services provided by major vendors like Amazon Web Services or Google Cloud, these new systems distribute computing power and storage across networks of independent providers. This shift offers businesses new options for hosting websites, storing data, and running applications.

This transformation matters for several reasons. Traditional cloud services, while reliable, create potential vulnerabilities when a single provider experiences outages or technical issues. The new distributed approach reduces this risk by spreading resources across multiple providers. It also addresses growing concerns about data privacy and security, as information isn't concentrated in a single company's data centers. For businesses operating internationally, these systems can provide more flexibility in how and where they store and process data.

Storage solutions have significantly advanced. New storage networks have expanded rapidly, with thousands of providers offering competitive rates for business data storage. These systems are particularly cost-effective for long-term storage of documents, images, and other digital assets. While accessing frequently-used data can be slower than with traditional services, businesses are finding success with hybrid approaches that combine new storage methods with traditional content delivery networks.

Computing services are also evolving. New marketplaces have emerged where businesses can access computing power for specific tasks, often at lower costs than traditional cloud providers. This is particularly relevant for companies needing significant computing power for specialized tasks like video processing or artificial intelligence training. While these services may not yet match the consistency of traditional providers for critical business operations, they're proving valuable for specific use cases and non-time-critical tasks.

Major technology companies are taking notice. Google Cloud has partnered with data exchange platforms to help their enterprise clients better monetize their data assets. Amazon Web Services now supports some of these new services through their marketplace, making it easier for businesses to experiment with these alternatives while maintaining their existing cloud infrastructure. These developments suggest that future cloud services might blend traditional and new approaches, giving businesses more flexibility in how they manage their digital resources.

Reliability, a key concern for business operations, has improved significantly. New networks have implemented sophisticated systems to ensure data persistence and service uptime. Some video streaming services using these distributed networks have achieved reliability rates comparable to traditional providers. This progress is particularly important for businesses considering these alternatives for customer-facing applications.

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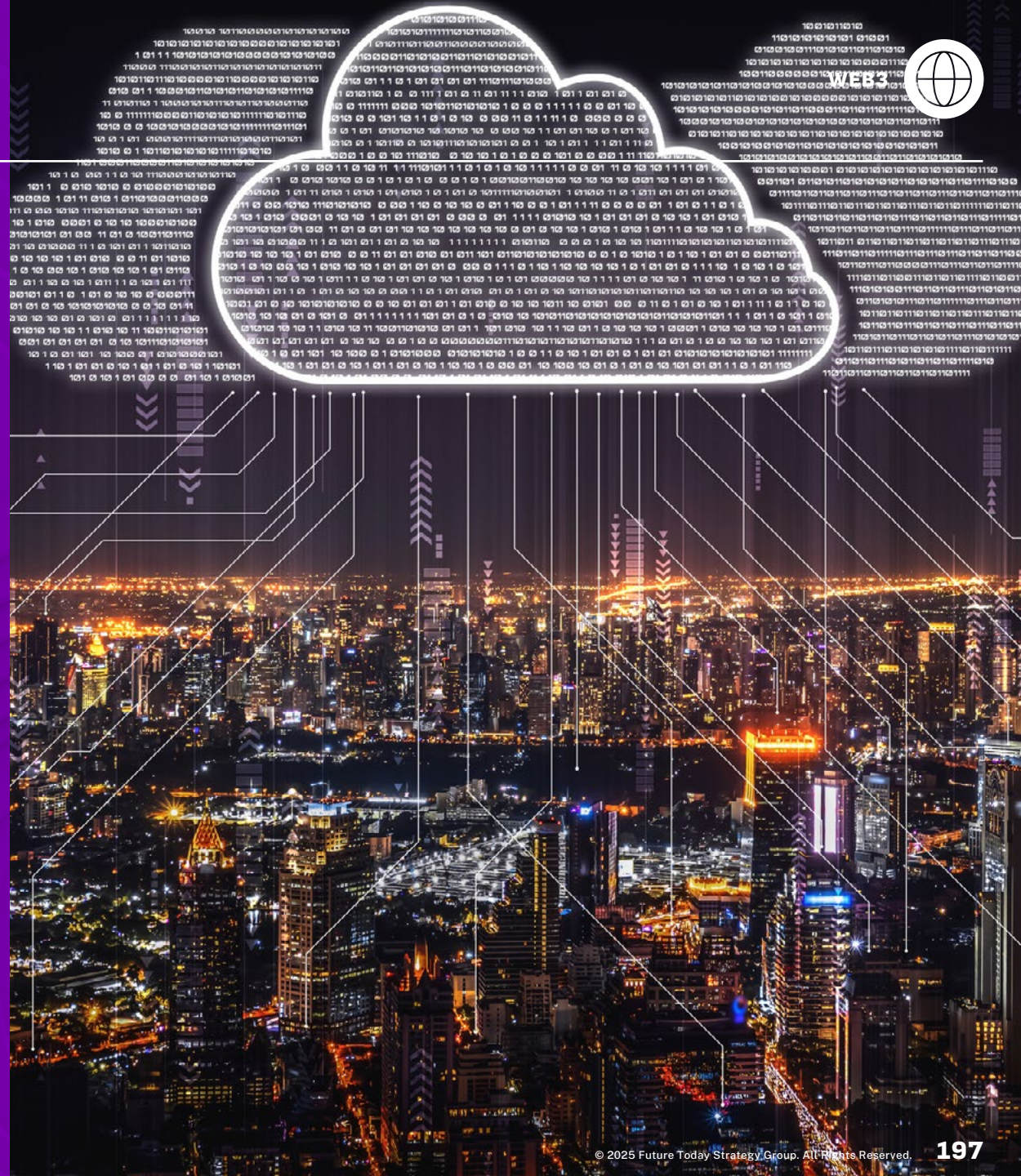
But the business implications extend beyond technical considerations. Companies can now monetize their excess computing resources by contributing them to these networks, potentially creating new revenue streams from existing infrastructure. This democratization of cloud services could be particularly valuable for businesses with significant computing resources that aren't continuously utilized.

These developments also offer new options for business continuity and disaster recovery. Some organizations are using these distributed systems as backup solutions, ensuring their websites and applications remain accessible even if their primary hosting service experiences issues. This approach has proven valuable in regions where internet access might be restricted or during large-scale service outages.

Looking ahead, businesses should consider how these evolving cloud services might fit into their infrastructure strategy. While they may not be ready to replace traditional cloud providers entirely, these new options could complement existing services, particularly for specific use cases like long-term data storage or backup systems. Organizations should evaluate these alternatives based on their specific needs for reliability, data access speed, cost, and regulatory compliance.

The evolution of cloud services represents a significant shift in how businesses can approach their digital infrastructure. While the technology continues to mature, forward-thinking organizations are already exploring how these new options might enhance their operations and reduce their dependence on single providers.



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Regulatory Compliance Frameworks for Web3 Technologies

The regulatory environment for digital assets and blockchain technologies is rapidly evolving as governments worldwide work to create comprehensive oversight frameworks. These new regulations aim to provide clearer guidelines for businesses while protecting consumers and maintaining financial stability. Understanding these developments is crucial for organizations considering entering the digital asset space or expanding their existing operations.

A major focus of regulatory efforts has been transaction monitoring and reporting requirements. The European Union has implemented new regulations requiring financial service providers to share sender and receiver information for large digital asset transfers, similar to existing banking regulations. Japan, South Korea, Hong Kong, and Singapore have adopted similar requirements. These rules primarily affect companies handling digital assets on behalf of customers, such as exchanges and custodial services. To help businesses comply, industry groups have developed standardized formats for sharing this information, and technology providers now offer automated compliance solutions.

Financial regulators are also addressing new business models that emerged with digital assets. The US Commodity Futures Trading Commission has clarified that decentralized organizations must comply with existing financial laws, prompting many businesses to implement stronger compliance measures. Some organizations now use blockchain analysis tools to screen transactions for potential risks, while others have created separate pools of assets specifically for regulated institutions that require strict compliance measures. These developments indicate that even innovative business models must adapt to traditional regulatory frameworks.

Licensing frameworks are becoming clearer across major financial centers. The European Union is creating a unified licensing system that will allow digital asset service providers to operate across all EU countries with a single license, similar to existing financial services passporting. Hong Kong has launched a licensing system for digital asset platforms, with major companies already applying. The United Arab Emirates has established comprehensive rules for digital asset businesses through Dubai's Virtual Assets Regulatory Authority. These frameworks typically require businesses to maintain specific capital reserves, undergo regular audits, and follow strict marketing guidelines.

Tax and accounting standards are also evolving to accommodate digital assets. The US Internal Revenue Service has provided updated guidance on taxing various types of digital asset transactions, while countries like Portugal and Germany have refined their tax treatment of these assets. On the accounting front, standard-setting bodies are adapting their guidelines to better reflect how businesses should report digital assets on their balance sheets. The US Financial Accounting Standards Board has made progress in allowing companies to use fair value accounting for digital assets, making it easier for businesses to reflect these holdings accurately in their financial statements.

For businesses, these regulatory developments create both opportunities and challenges. Clear frameworks reduce legal uncertainty, potentially making it easier for organizations to incorporate digital assets into their operations. However, compliance requirements can be substantial, requiring investment in new systems and processes. Organizations need to carefully evaluate their capabilities and resources when considering entry into regulated digital asset activities.

Looking ahead, businesses should prepare for increased regulatory oversight while watching for opportunities created by clearer rules. Organizations already operating in this space may need to update their compliance programs to meet new requirements. Those considering entering the market should factor compliance costs and operational requirements into their planning. Financial institutions, in particular,

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may find new opportunities as regulatory clarity makes it easier to offer digital asset services to their clients.

The evolution of digital asset regulation represents a maturation of the industry. While some worry that regulation might stifle innovation, others see it as necessary for mainstream adoption. As frameworks continue to develop, businesses that can navigate these requirements while maintaining innovative services will likely find significant opportunities in this emerging market. Success will require staying informed about regulatory changes while maintaining flexible compliance programs that can adapt to new requirements.

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SCENARIO YEAR 2038

THE INEVITABLE UNFOLDING: HOW WEB3 WILL COME TO FRUITION

In the 1990's, the internet felt newfangled, unnecessary, and destined to stay hidden in the halls of government and "high-tech." The internet as we know it has transformed society, but it was never designed to handle the complexities of modern digital commerce. This has led to a patchwork of regulations layered on top of antiquated infrastructure. Now, as Web3 technologies mature, a new paradigm is emerging—one where trust is embedded in the infrastructure itself. This is how it will unfold.

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2025–2029: Seeds of Change

Enterprise

- **Experimentation Phase**
  Enterprises will begin dipping their toes into Web3, primarily focusing on proof-of-concept projects and exploring potential use cases. Areas like supply chain tracking, digital identity management, and tokenized loyalty programs will see initial adoption. Early adopters will be driven by the promise of increased efficiency and transparency, but adoption will be cautious due to regulatory uncertainty and technological immaturity.

- **Skill Gaps & Early Adopters**
  Businesses will face a shortage of skilled Web3 developers and architects. Early adopters will invest in training programs and strategic partnerships to bridge this gap.

Government

- **Regulatory Scaffolding**
  Governments will start laying the regulatory groundwork for digital assets and blockchain technology. The EU's MiCA regulation will serve as a key example. Initial regulations will focus on consumer protection and preventing illicit activities, with less clarity on more complex areas like DeFi.

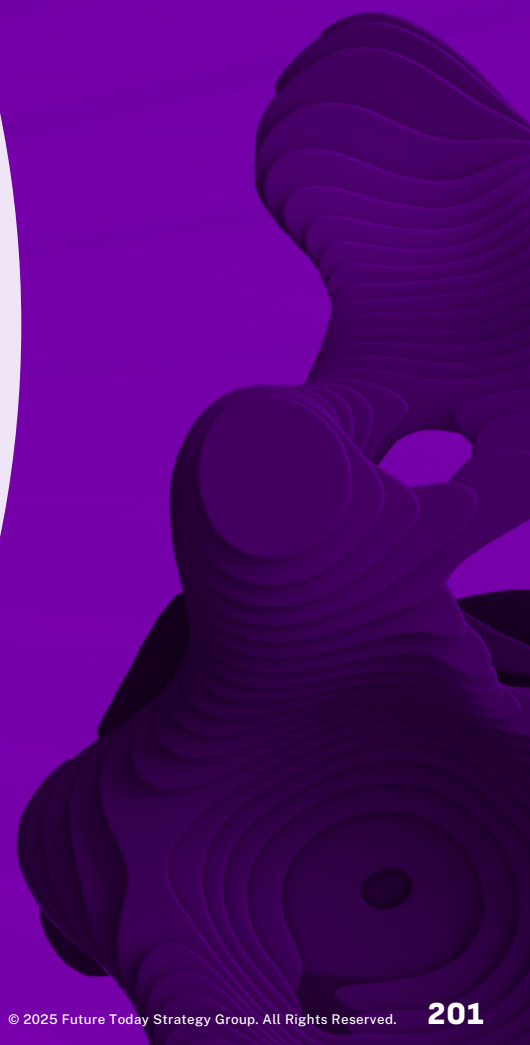
- **Central Bank Digital Currencies (CBDCs)**
  A few nations will begin piloting CBDCs, but widespread adoption will be limited due to privacy concerns and technical challenges.

Technology

- **Layer-2 Scaling Solutions**
  Layer-2 scaling solutions like Optimism, Arbitrum, and zkSync will gain traction on Ethereum, drastically reducing transaction fees and increasing throughput. This will make dApps more viable for everyday use.

- **Cross-Chain Interoperability**
  Cross-chain interoperability protocols will emerge, enabling seamless asset transfer and data sharing between different blockchain networks. However, security concerns will remain a major hurdle.

- **AI-Blockchain Convergence**
  The initial integration of AI and blockchain will emerge, with projects exploring AI-powered smart contracts and decentralized AI marketplaces.



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2030–2034: Web3 Becomes Invisible

Enterprise

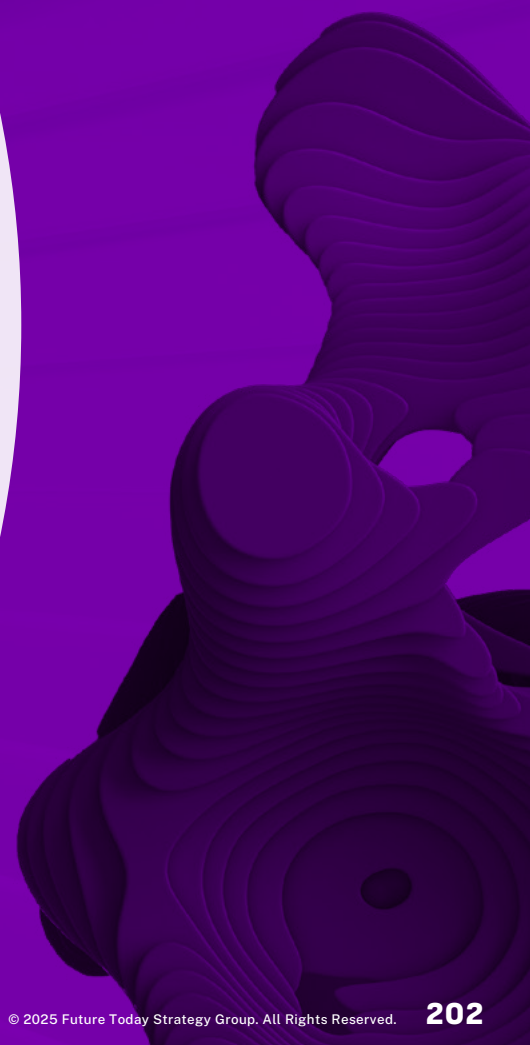
- **Mainstream Adoption in Specific Verticals**
  Web3 technologies will gain mainstream adoption in specific industries where the benefits are clear and regulation is favorable. Supply chain management, finance, and digital identity verification will be at the forefront.
- **Focus on User Experience**
  Enterprises will prioritize user experience, abstracting away the complexities of blockchain technology and creating user-friendly interfaces for dApps.
- **RWA Tokenization Emerges**
  Enterprises will start experimenting with Real World Asset (RWA) tokenization. This will lead to increased liquidity and fractional ownership opportunities.

Government

- **Clear Regulatory Frameworks**
  Governments will establish more comprehensive and clear regulatory frameworks for digital assets and blockchain technology, providing legal certainty for businesses.
- **Digital Identity Initiatives**
  Governments will launch digital identity initiatives based on blockchain technology, empowering citizens to control their own data and streamlining access to public services.

Technology

- **Interoperability Standards**
  The industry will coalesce around interoperability standards, enabling seamless communication and data exchange between different blockchain networks and legacy systems.
- **Privacy-Enhancing Technologies**
  Advanced cryptographic techniques like zero-knowledge proofs (ZKPs) will become more widely adopted, enabling businesses to protect sensitive data while participating in blockchain networks.
- **DAO Governance Models**
  DAOs will evolve into more sophisticated governance tools, enabling communities to collectively manage resources and make decisions transparently.
- **DePINs Continue to Grow**
  More and more people will participate in Decentralized Physical Infrastructure Networks.



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2035–2038: The Web3 World Realized

Enterprise

- **Web3 as Core Infrastructure**
  Web3 technologies will become deeply embedded in enterprise IT infrastructure, powering core business processes and enabling new business models.
- **Decentralized Applications Everywhere**
  Enterprises will leverage decentralized applications (dApps) to improve efficiency, transparency, and security across diverse functions, from supply chain management to customer relationship management.

Government

- **Global Regulatory Harmonization**
  International organizations will work to harmonize regulatory standards for digital assets and blockchain technology, creating a more level playing field for businesses operating globally.
- **AI-Assisted Regulation**
  Regulators will leverage artificial intelligence to monitor Web3 activity, detect fraud, and identify emerging risks.
- **CBDCs Gain Traction**
  Some government entities will utilize the blockchain for CBDCs.

Technology

- **AI-Driven Web3 Ecosystem**
  Artificial intelligence will play a critical role in managing and optimizing the Web3 ecosystem, automating complex tasks, enhancing security, and personalizing user experiences.
- **Quantum-Resistant Security**
  Quantum-resistant cryptography will be widely adopted, safeguarding blockchain networks and digital assets from the threat of quantum computing.
- **Self-Sovereign Identity**
  Individuals will have complete control over their digital identities, using self-sovereign identity solutions to securely manage their credentials and access online services.

Looking back from 2038, it will be clear that the transition from Web2 to Web3 was not a technological revolution, but a cultural and societal evolution. It was a gradual shift towards a more decentralized, transparent, and equitable digital world, where individuals are empowered to control their own data, assets, and online experiences. It was a journey, not a destination, and where it will ultimately lead is yet to be defined. But what is clear is that by 2038, society as a whole will live on a new foundation.

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Melanie Subin is Managing Director at Future Today Strategy Group, serving on our management committee and leading our consulting division. Renowned for her pragmatic, forward-thinking approach, Melanie has successfully steered numerous clients toward 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.

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