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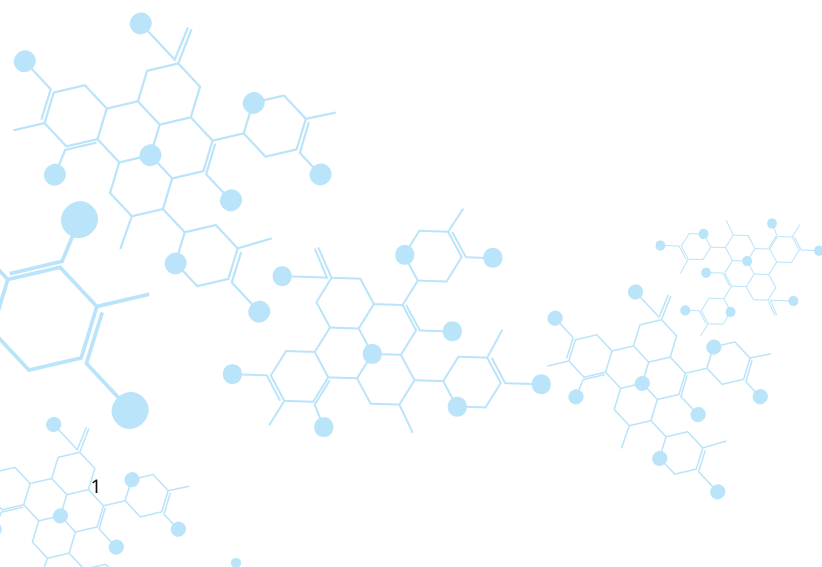
# Web3AI – Do Opposites Attract?

Decoding the DNA of  
Web3 and AI Convergence



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# Introduction

Web3 and Artificial Intelligence (AI) represent two of the most transformative technologies of our time. AI is changing how we process information, automate tasks and support decision-making, while Web3 challenges fundamental assumptions about trust, ownership and coordination. Both have captured the attention of many technologists, investors, policymakers and the public.

Yet, despite their individual impact, the question of how they interact with each other remains largely unexplored. Where do these technologies meet, how, and on what terms? Do they meaningfully converge and, if so, to what effect?

To answer these questions, we take a multi-layered approach. We begin by examining the foundational tensions between Web3 and AI, whereafter we establish a shared taxonomy through the Technological Anatomy (TA) framework. We assess adoption barriers for each technology and map the Web3AI solutions landscape, cataloguing 58 Web3AI solutions and scoring them for relative technological maturity and adoption. Finally, we decode the DNA of Web3AI and reveal which adoption barriers are most frequently addressed through the Barrier Relief Heatmap. We conclude by extracting a focused strand of Web3AI DNA that describes how Web3 and AI reinforce each other today.

Our goal is to provide strategists, technologists, and decision-makers with a granular understanding of Web3AI, which we define as the integration of Web3 and AI within the same technological system. This understanding is necessary to make informed decisions about where Web3AI matters most and where it remains nascent.

*In this report we use AI to refer primarily to generative AI (GenAI), especially foundational models, with broader machine learning (ML) referenced where relevant.*

# Foundational Tensions

Web3 and AI are built on fundamentally different principles, but how different are they truly and is there much overlap?

When we map the innate properties of both technologies, a clear pattern emerges; they sit at opposite ends of the spectrum on many fronts. Understanding these differences, and their underlying causes, is key to identifying how they might complement one another.

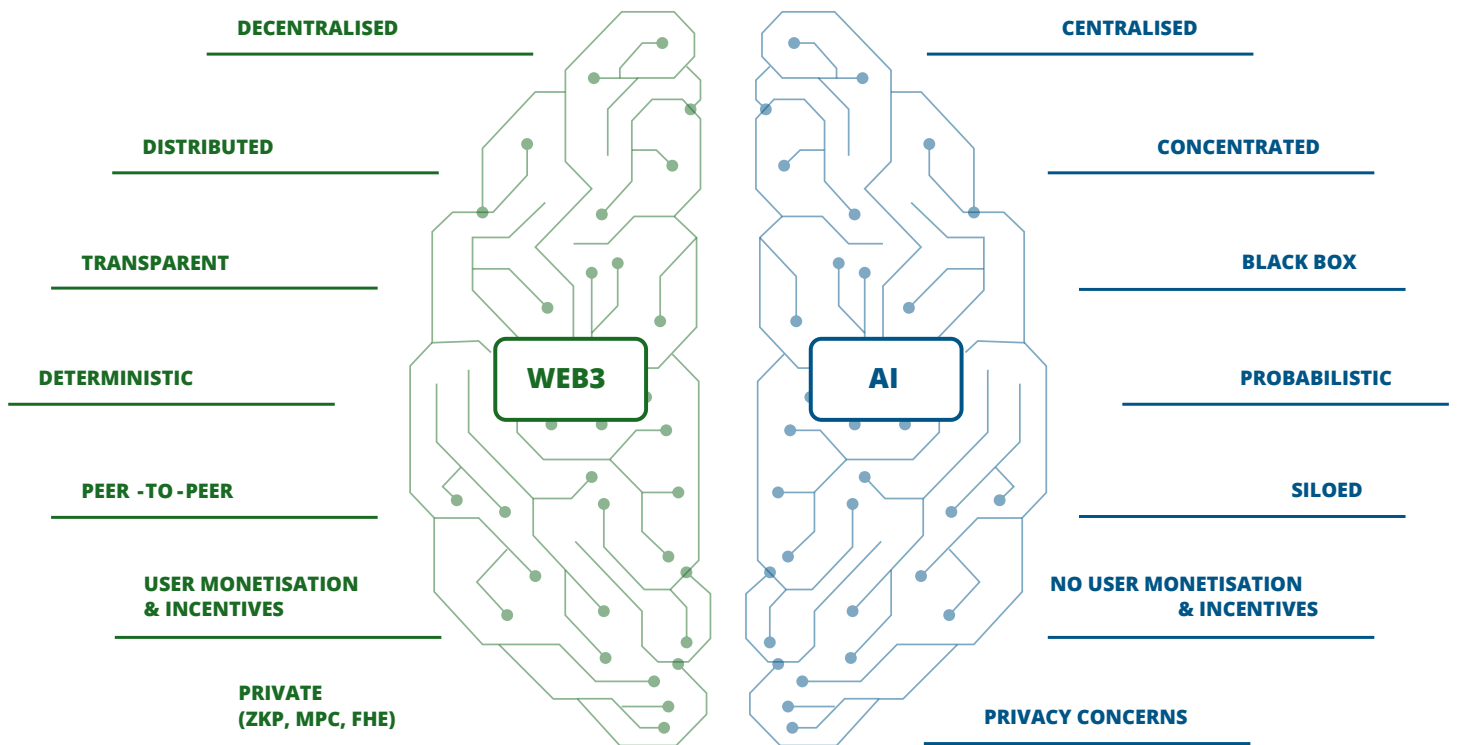


Figure 1: Foundational Tensions between Web3 and AI.



Web3 systems are designed for decentralisation. Bitcoin, Ethereum and many more blockchains operate globally across thousands of independent nodes, with no single entity controlling the network. Anyone can run a node, validate transactions, and participate in consensus. The distributed architecture creates redundancy and resilience while enabling open participation. AI systems follow a different path. They are commonly delivered and governed through a small number of centralised platforms. Advanced AI capabilities have become relatively monopolistic and gated, shaped by an increasingly concentrated access to models, data and compute.

There are also other distinctions. Web3 systems are transparent by design. Every transaction is publicly visible, verifiable and immutable. This transparency is foundational to its operation, as without it, there would be no way to verify that the system is operating fairly. AI systems, as a consequence of how deep learning works, are opaque and operate as black boxes. Similarly, while blockchain consensus mechanisms produce deterministic outcomes, the neural networks of AI systems produce probabilistic outcomes. A Large Language Model (LLM) does not “know” the answer to a question. Rather, it calculates a probability distribution over possible outputs.

In a similar fashion, Web3 systems are peer-to-peer. Participants interact directly with each other on a shared infrastructure. This creates room for user monetisation and incentives, as participants are rewarded for their contribution (compute, data or validation). AI systems are siloed, as users interact with the platform rather than with each other. Those platforms collect user data and harvest online content to train and fine-tune their models, and in most cases, neither users nor content creators are compensated for their contributions. Furthermore, Web3 systems offer privacy mechanisms to their users with cryptographic primitives, such as Zero-Knowledge Proof (ZKP), allowing users to prove facts about

their data without revealing it, whereas AI systems face concerns regarding the origin of training data and the privacy of user data.

It is important to note that most of these tension points do not reflect design flaws, but design choices. They are natural consequences of how Web3 and AI were built and what each optimises for. Web3 systems are designed to enable trust and coordination without a central authority. Decentralisation, transparency and peer-to-peer interactions are essential to its functioning. AI was never designed to be decentralised or distributed. Its mission is to train models at scale, extract patterns from data, and maximise performance. Given this mission, centralisation, along with other innate properties, is a logical outcome when the incentive is to optimise for performance and profit.

At Deloitte, we view these tension points as design variables that help identify potential synergies between the technologies, allowing them to complement one another and address shortcomings.

# The Technological Anatomy

To discuss the convergence of Web3 and AI meaningfully and move beyond the superficial label of “Web3 plus AI”, we must first establish what truly constitutes Web3 and what constitutes AI. We do so by mapping each technology across three layers:



Fundamentals



Applications & Use Cases



Benefits

The diagrams below present this mapping, referred to as the Technological Anatomy (TA) of Web3 and AI. We propose this framework as a practical tool to establish a shared taxonomy and support future structured analysis.

This framework is intentionally layered and designed to be read from left to right. Fundamentals are the building blocks that underpin the applications and use cases, and the benefits emerge as the downstream outcome of the applications when deployed in practice. The relationship between the three layers is many-to-many and interdependent. Meaning, multiple fundamentals must come together to enable a single application, and a single application can deliver multiple benefits.

Patterns emerge when examining both TAs. Web3’s fundamentals are designed around coordination and verification. Consensus mechanisms enable agreement without a central authority. Cryptography enables verification without trust. Peer-to-peer architecture enables interaction without intermediaries. Web3 fundamentals cluster around a core problem: how can multiple parties coordinate and verify transactions when no single party is trusted? AI’s fundamentals are designed around extraction and optimisation. Data collection extracts information from the world. Neural networks extract patterns from data. Knowledge storage and retrieval optimises the outcome. These fundamentals cluster around a different core problem: how do we extract patterns from data and optimise for predictive performance?

The differences between the two technologies become more apparent downstream when you look at the applications & use-cases and accruing benefits, as they are clear derivatives of the respective fundamentals of Web3 and AI.

*The TA is not presented as a fixed truth, as different groupings, placements, or levels of granularity are possible. Its purpose is to establish a shared taxonomy to move the conversation beyond broad labels and provide a lens to support meaningful future discussions when examining the DNA of Web3AI.*

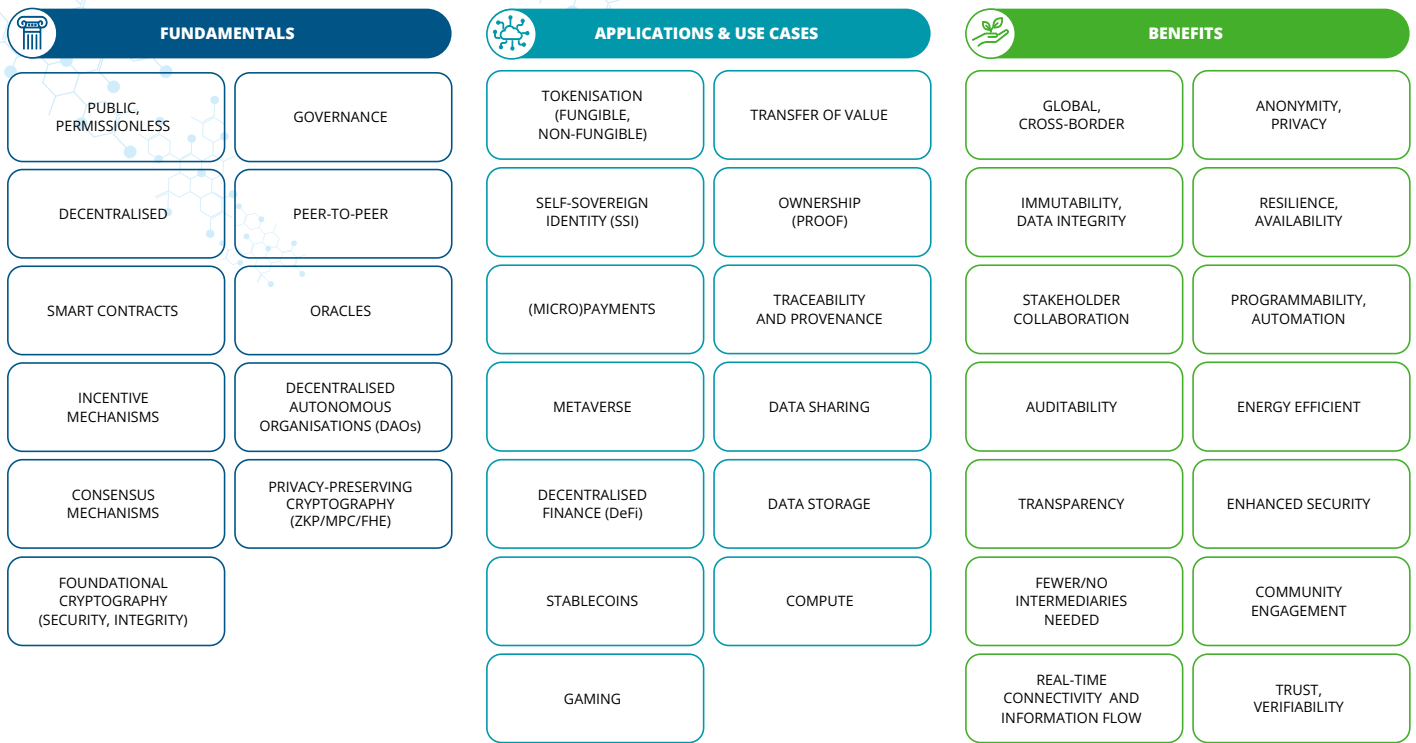


Figure 2: The Technological Anatomy of Web3.

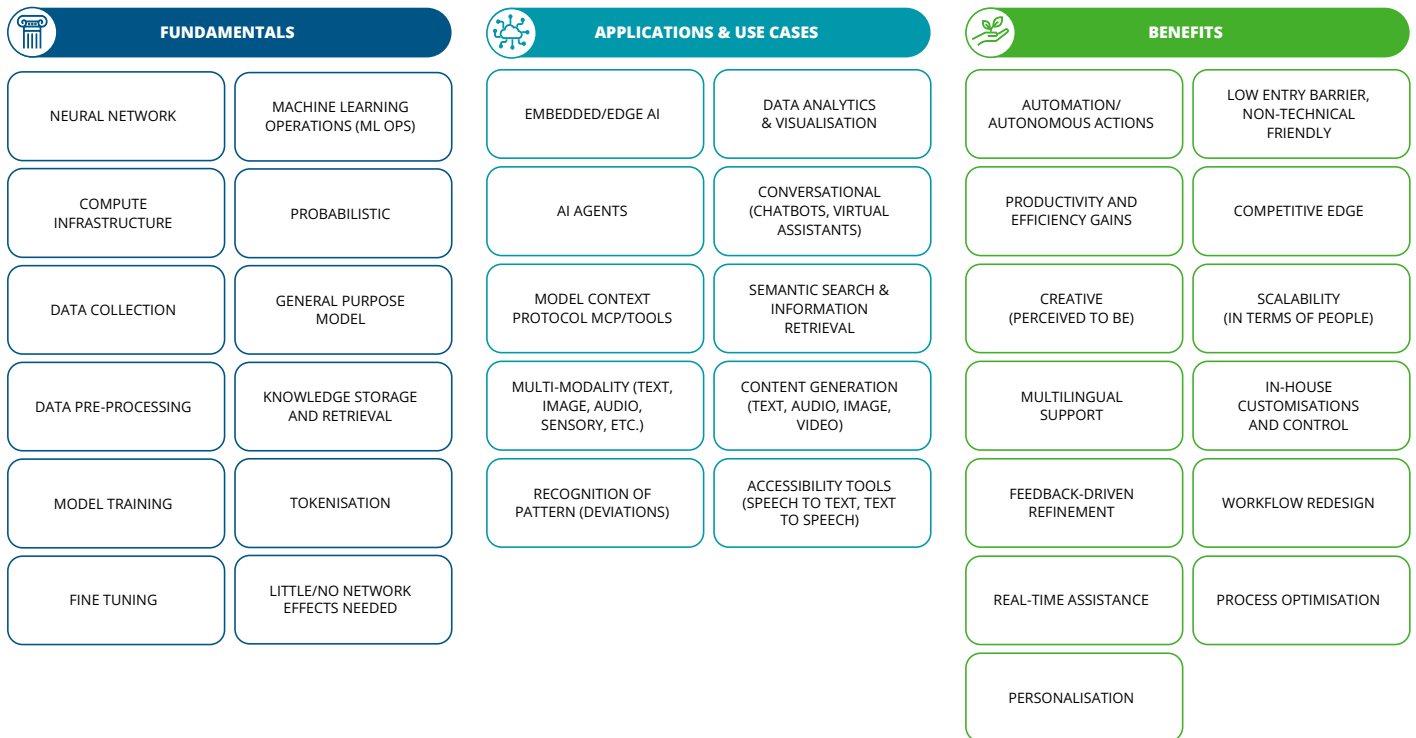


Figure 3: The Technological Anatomy of AI.

# Adoption Barriers

Adopting transformative technologies is never simple and straightforward, and rarely a matter of technological capability alone. The path from innovation to mainstream adoption is shaped by countless unique factors: organisational readiness, market dynamics, regulatory environments, human behaviour and much more. By understanding the obstacles on the path of adoption, organisations can anticipate them and find suitable ways to mitigate them.

Some people might group the respective challenges of Web3 and AI under a single “New Technology Syndrome”, since new technologies tend to exhibit similar concerns: integration complexity, uncertain ROI, risk and regulatory uncertainty. This perspective feels intuitive, as new technologies do share common challenges and growing pains. However, if the adoption barriers were to differ in meaningful ways, then assuming otherwise would only slow down the progress of adoption for both technologies by misallocating time and resources.

Therefore, we would like to address a simple but important question: Do Web3 and AI encounter the same adoption barriers?

Understanding this is critical, as adopting transformative technologies becomes increasingly more difficult when the wrong assumptions guide the approach. Establishing whether and how these adoption barrier profiles differ is therefore necessary for selecting appropriate governance, risk assessments and implementation approaches.

To answer this question, we must first establish the adoption barriers for each technology. Only then can we compare them, identify overlaps, and understand where their paths diverge. Drawing on interviews with 30 domain experts in Web3 and AI, we mapped the adoption barriers of Web3 and AI into four shared groups: Technology & Data, People & Culture, Business & Economics, and Governance, Risk & Ecosystem.



### Adoption Barriers of Web3

Web3's adoption barriers are shaped by its core design principles around coordination and verification without a central authority.

One of the deepest barriers to Web3 adoption is organisational. Mindset incompatibility coupled with the inability to let go of power and control is not a knowledge or technology problem; it is an organisational DNA problem. Organisations have difficulties adopting decentralised systems, as it challenges the fundamental assumptions about organisational authority and control. This is further compounded by the fact that Web3 often demands collaboration with others and requires stakeholders to adopt ecosystem thinking, as success largely depends on coordination with external partners and the number of participants, not just internal capability. This results in early adopters seeing limited value until critical mass is reached, resulting in a chicken-and-egg situation in which some organisations might view the low value in the short term, stop adopting the technology and abandon it, instead of waiting on expected future larger benefits that will accrue from network effects and growth.

Another critical concept is that, for most cases, blockchain is a substitutionary piece of technology, rather than complementary. Web3 aims to replace payment infrastructures, replace identity systems, and ultimately replace the way we interact with each other. This is different from AI, which is mostly additive, as AI can analyse data from existing payment networks or automate parts of existing processes without needing to replace parts of the underlying infrastructure. This binary framing increases adoption friction because it forces organisations to choose between a complete system overhaul (high risk, high cost) or no adoption at all. Couple this with the fact that many solutions are "good enough" and do not utilise Web3, and legacy system lock-ins that

result in high switching costs, many choose to maintain the status quo. In this situation, it is important to realise that Web3 does not necessitate an all-in or nothing mindset, as gradual integration, which we are seeing happening worldwide in many industries and domains, is possible and even recommended to ensure that organisations take the right steps at the right times.

Web3 addresses challenges and offers solutions that are large and global in nature: identity, payment, transparency, ownership, etc. These are concepts that are fundamental to so many systems that they are not simple to solve overnight or over a decade. The challenges at hand are so large and global that it requires coordination across multiple stakeholders, industries, and jurisdictions. This is fundamentally different from solutions that can be implemented within a single organisation. As discussed before, Web3 adoption requires ecosystem coordination, but that is difficult to achieve and materialises slowly.

That said, certain domains and industries will be reaching a point of critical mass very soon, stablecoins being a prime example. Once critical mass is reached, it becomes very difficult not to adopt the technology, because it would not make economic sense to do so. At that point, the technology has become faster, cheaper, more secure, and more reliable than the alternative. Ultimately, the better technology will always win. It is a matter of survival of the fittest. The question is not whether blockchain will be adopted by organisations, but rather how much longer legacy systems can survive until it becomes inevitable to make the swap to a better and more efficient system. However, until that critical mass is reached, Web3 adoption remains a difficult organisational and strategic decision.

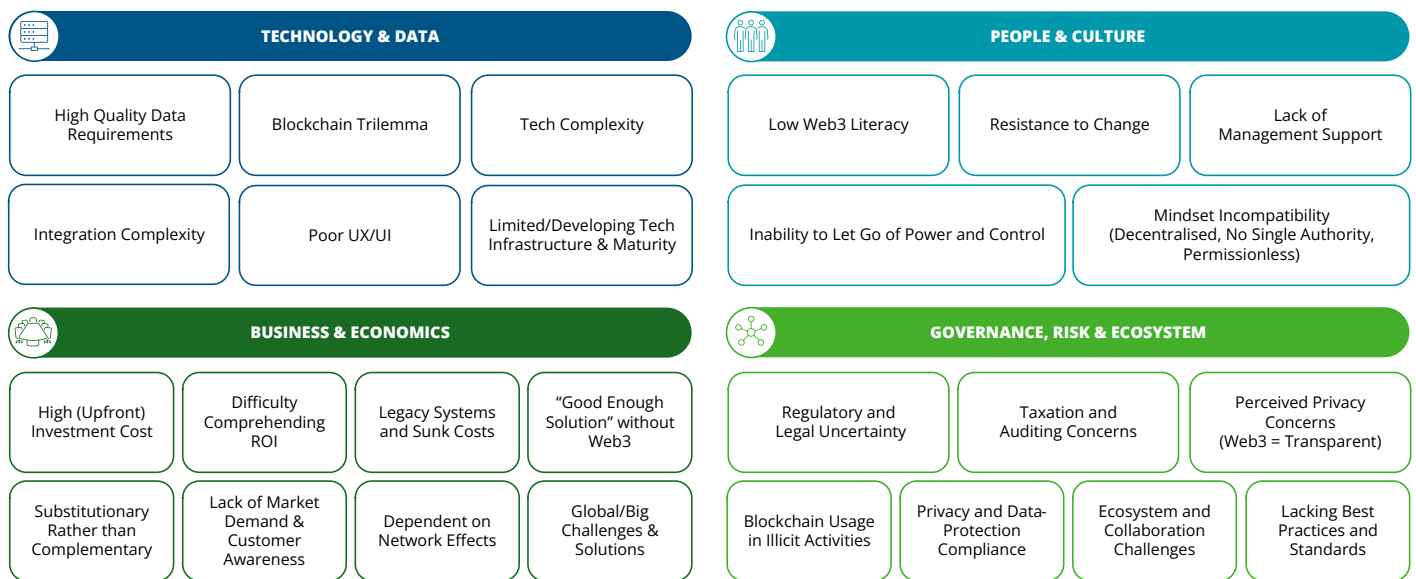


Figure 4: Adoption Barriers of Web3.

### Adoption Barriers of AI

AI's adoption barriers are shaped by its core design principles around extracting patterns from data and optimising for predictive performance at scale.

At the heart of AI lies an interesting paradox: a technology that would benefit the most from data sharing has organisations retain proprietary datasets for competitive advantage. This is because model performance generally improves with access to high-quality data, making data a significant strategic asset. This introduces a prisoner's dilemma: organisations aim to comply with fair-use, copyright and data-protection requirements, but may worry about relative disadvantage if competitors adopt more permissive data acquisition strategies. In practice, regulatory guidance and enforcement are still evolving, risk appetites differ, and standards are not yet fully aligned, leading to concerns about inconsistent data-governance practices across the market. This is not a technical limitation, but a governance, incentive, and transparency challenge.

The computational demands of AI are another factor. Training and serving an LLM at the scale achieved by major technology conglomerates requires substantial capital and infrastructure investments. This has contributed to a concentration of resources among a relatively small number of providers. Organisations become more dependent on tech giants for economies of

scale, limiting their autonomy and control over pricing, updates, and features. This centralisation is not incidental; it is a logical outcome of prioritising model performance and power. Larger models attract more users, which attracts more funding, more data and more talent, reinforcing a cycle in which only the largest organisations can sustain the investment. The environmental implications of AI training and usage are also present. Beyond direct energy consumption, there are water usage concerns, carbon emissions, and broader environmental impacts of scaling AI systems. For organisations with sustainability commitments, this can create operational constraints that may conflict with AI adoption ambitions.

Organisations must also find ways to navigate model opacity and explainability challenges, the "AI black box" problem. Models produce probabilistic outputs without clear reasoning, which can lead to hallucinations and inaccuracies. These technical limitations create friction in use cases where explainability, auditability and reliability are critical. Simultaneously, models trained on biased data perpetuate and amplify those biases, creating fairness and discrimination risks. Auditability and traceability challenges make it difficult to understand why a model made a specific decision or to prove compliance with ethical guidelines.

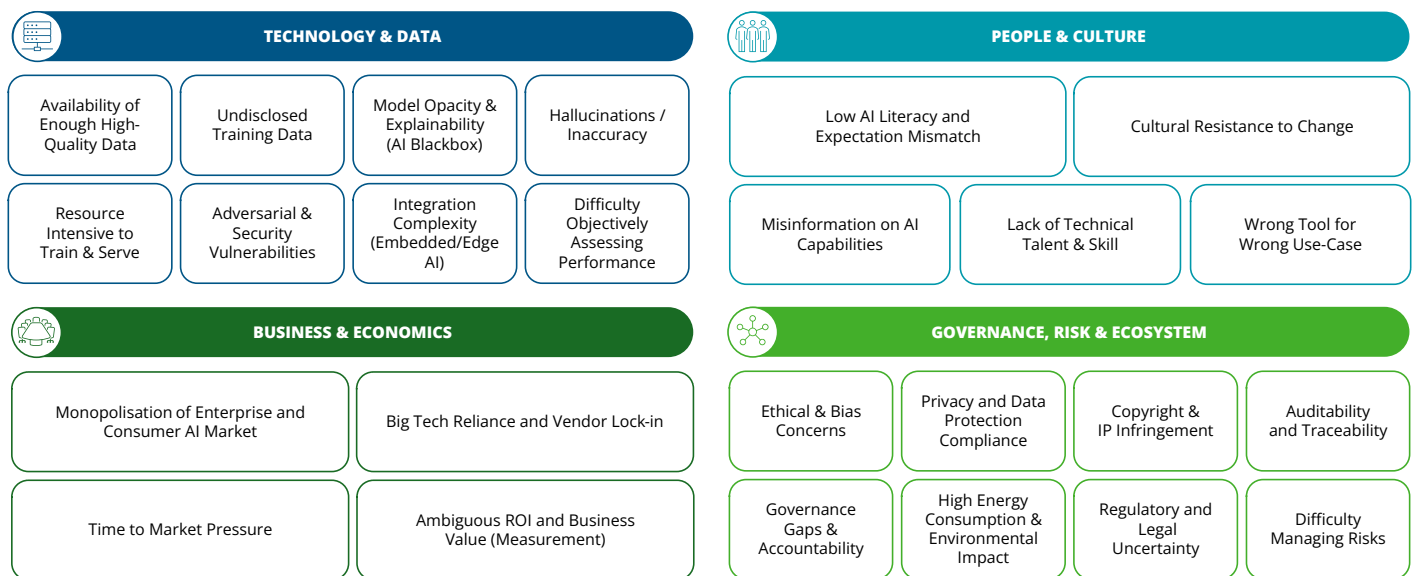


Figure 5: Adoption Barriers of AI.

### Adoption Barrier Overlap

The adoption barriers that overlap between Web3 and AI are quite deceptive, as they share similar names, but their root causes and mitigation strategies are fundamentally different.

Consider integration complexity: both Web3 and AI face this barrier, but the nature of the challenge differs substantially. Web3 integration complexity stems from an architectural mismatch between decentralised systems and centralised legacy infrastructure, a challenge that requires fundamental system redesign, particularly for large enterprises with complex, interconnected systems. AI integration complexity is mostly prevalent in embedded or edge deployment scenarios, whereas cloud-based AI integration is relatively lightweight via APIs. Similarly, both technologies face literacy barriers, but the underlying causes differ. Web3 literacy gaps reflect unfamiliarity with novel concepts (decentralisation, consensus mechanisms, tokenomics, smart contracts) that create friction and confusion about the value proposition, as well as outdated perceptions, such as equating all blockchains with energy-intensive Proof of Work rather than modern Proof of Stake. AI literacy gaps, by contrast, reflect expectation mismatches that are driven by inflated claims about AI capabilities. In this case, the barrier is caused not by lack of knowledge, but by misinformation and unrealistic expectations of its capabilities and limitations.

Resistance to change also appears in both domains, but the source of resistance differs fundamentally. Web3 challenges core organisational assumptions about central authority, the nature of trust and transparency, and incentive structures. AI raises workforce concerns about job displacement, loss of autonomy, and diminished role significance, making it a more personal and existential resistance that is rooted in fear. The same pattern emerges with ROI ambiguity. Web3's benefits are often emergent and nuanced (trust and verifiability, fewer/no intermediaries needed, transparency), which often clash with linear business-

case frameworks. AI's value appears clearer upfront (automation, efficiency, process optimisation), but realised benefits are often indirect (improved decision-making quality, workflow redesign, enhanced creativity), making it difficult to isolate and measure. Privacy and data-protection compliance barriers also reveal this pattern of similar names, different causes. Web3's transparency and immutability can conflict with privacy regulations like Art. 17 GDPR "Right to Erasure", which mandates data deletion. AI's barrier to privacy and data protection centres more around lawful data collection, usage, and storage.

Our analysis indicates that the two technologies exhibit almost completely different adoption barriers, and their respective paths to adoption are also fundamentally different in character. We did not find one unified list of adoption barriers, but two distinct profiles with less overlap than one might expect, reflecting the unique DNA of each technology.

To answer the question we posed at the beginning: No, Web3 and AI do not encounter the same adoption barriers. While some overlap exists, it is limited, and where it does appear, the underlying causes tend to differ. Treating Web3 and AI as if they share a single checklist of adoption barriers is a superficial and dangerous misdiagnosis. It is important to realise that the respective adoption barriers are not variations of a single new technology syndrome, but distinct profiles that reflect the fundamental differences between the technologies.

Recognising that their challenges are mostly unique is an important step toward identifying where Web3AI integration can be purposeful, as targeted integrations can be designed to address specific adoption barriers of either technology. Web3 can partially address AI's barriers and vice versa. This is because, ultimately, many adoption barriers are a result of fundamental design choices of the technology.



# The Web3AI Solutions Landscape

Having established the foundational tensions between Web3 and AI, mapped their unique Technological Anatomies, and identified their respective adoption barriers, we now turn to the practical convergence of these technologies. We begin by taking a closer look at the landscape of Web3AI solutions. We define Web3AI solutions as those that utilise both Web3 and AI within the same technological system, where the integration is essential to at least one core function or value driver of that system. Based on publicly available information, we identified 58 Web3AI solutions and organised them into thematic clusters, providing an overview of where the technologies converge in practice.

Each solution is assigned a score ranging from 1 (lowest technological maturity and adoption) to 5 (highest technological maturity and adoption), visualised by a colour scale. We refer to this as the Relative Technological Maturity and Adoption (RTMA) score. The scores were determined through market research, including analysis of public documentation, deployment status, user adoption signals, and expert assessment. In addition, each solution is marked with a square or diamond to indicate Tech Directionality (TD), showing the primary direction of value flow, i.e., whether Web3 primarily aids AI (WA solution) or AI primarily aids Web3 (AW solution).

Be aware that the scores reflect a comparative assessment. In other words, an RTMA score of 5 does not indicate advanced technological maturity or mainstream adoption by traditional standards, but rather that the technology is more mature and has achieved greater levels of adoption compared to the other Web3AI solutions. For a brief description of each Web3AI solution presented in the Web3AI landscape, please refer to the Appendix.

Across the 58 Web3AI solutions identified, an interesting balance emerges in terms of Tech Directionality:

- WA solutions (Web3 -> AI): 28 solutions (48%)
- AW solutions (AI -> Web3): 30 solutions (52%)

This near-symmetrical split emerged organically from our research rather than by design. It suggests that the Web3AI convergence is bidirectional, meaning, the value flows both ways, as each technology offers distinct contributions. However, taking relative technological maturity and adoption into account, a substantial asymmetry emerges:

- WA: average RTMA score of 2.5, concentration in 2-4 range
- AW: average RTMA score of 3.8, concentration in 3-5 range

The gap of 1.3 RTMA points is significant. It means that while Web3 and AI contribute equally in terms of solution count in the market, AI's contribution to Web3 is significantly more mature. This asymmetry is also visible in the distribution of extreme scores: all six solutions with an RTMA of 5 are AW solutions, and four out of five solutions with an RTMA of 1 are WA solutions.

## Value Drivers

Value drivers are the specific mechanisms through which Web3 and AI create tangible benefits when integrated. Web3's primary contributions to AI cluster around certain value drivers:

- **Decentralised Resources:** decentralised marketplaces and DePIN (Decentralised Physical Infrastructure Networks) enable AI to access distributed compute and data resources without relying on centralised cloud providers. This can address some of AI's bottlenecks, decentralise power and reduce vendor lock-in. However, these solutions remain moderately mature, suggesting that cost-competitiveness with centralised providers has not yet been achieved for most workloads.
- **Privacy:** cryptographic primitives and privacy-preserving training and inference approaches enable collaboration on sensitive data without revealing raw inputs. Combining this with auditable records on the blockchain, it strengthens lawful data use and enables multi-party collaboration without compromising on data confidentiality. This is one of the most interesting domains to keep an eye on in the near future, but as of now, it is in a nascent stage due to computational resource constraints. It is interesting to see whether blockchain's coordination and incentive mechanisms can accelerate the adoption of privacy-preserving AI, or whether the technical and economic barriers will be too high.
- **Provenance and Auditability:** on-chain registries record artefacts and events (content fingerprints, explainability references, usage receipts, etc.) to create a verifiable trail of data for compliance, trust and reliable data to operate on further. This type of convergence can improve trust in AI, but it is highly dependent on network effects and ecosystem alignment to reach higher levels of maturity.
- **Incentive Alignment and Coordination:** token-based mechanisms offer a way to coordinate data contribution, training and model serving across otherwise siloed actors. This addresses AI's data-hoarding problem by creating incentives for data sharing. While conceptually powerful, the real world challenges of mechanism design, quality assurance and sustained participation remain substantial.

# The Web3AI Solutions Landscape

## Privacy and Trust

### ZKP

- Training
- Inference
- Evaluation
- Guardrails AI (Agents)
- Multi-Party Computation (MPC)
- Fully Homomorphic Encryption (FHE)
- Compute to Data (C2D)
- Trusted Execution Environments (TEE)

## On-Chain AI Integrations

- Decentralised Identity of AI Agents
- ◆ On-Chain (Semi-)Autonomous AI Agents
- On-Chain AI Inference
- ◆ Smart Contract Calls to AI Models/Agents
- ◆ Adaptive/Dynamic Smart Contracts
- ◆ AI-Powered/Enhanced DAOs

## Infrastructure

### Decentralised Marketplaces and DePIN

- Compute
- Storage
- Datasets
- AI Models
- AI Agents

### Consensus Mechanisms

- ◆ AI-Optimised
- AI-Powered
- Decentralised Indexing Networks
- ◆ AI-Powered Oracles

## Finance

- Agentic Crypto Payment Infrastructure
- ◆ Agentic DeFi Agents
- ◆ AI-Driven Portfolio Management & Trading Strategies
- ◆ AI-Driven Liquidity Routing
- ◆ AI-Driven Market Making
- ◆ NLP Market Sentiment Analysis
- ◆ AI-Powered Insights & Anomaly Detection
- ◆ DeFi Credit Scoring & Lending Analysis
- ◆ AI-Optimised Algorithmic Stablecoins
- ◆ Multi-Chain Analytics

## Risk & Compliance

- ◆ Wallet Behaviour & Illicit Finance Analytics
- ◆ Scam, Phishing & Rug Pull Detection
- ◆ Web3 Cyber Threat Detection
- ◆ Crypto Wallet AI Assistant
- ◆ Pre-Execution Transaction Firewalling
- ◆ Smart Contract Security Review Assistant
- ◆ RegTech Compliance Assistant
- ◆ KYC and AML Onboarding

## Consumer

- ◆ AI-Generated NFTs and Avatars
- ◆ AI-Curated Web3 Newsfeed
- ◆ AI-Generated Smart Contracts/dApps
- ◆ AI (Agent) Chatbot Coin
- ◆ AI-Enhanced Customer Experience (CX)
- Decentralised Prediction Feeds & Signal Markets
- ◆ AI in Crypto Games

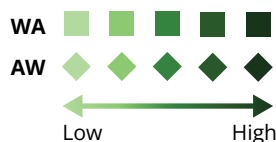
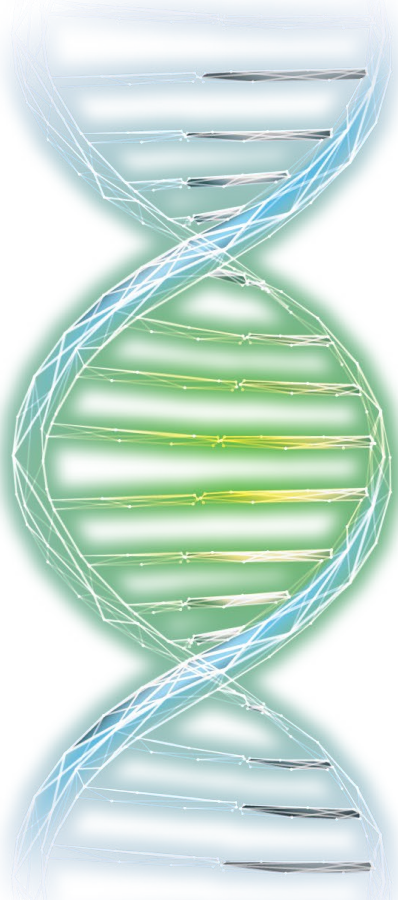
## Provenance & Governance

### Decentralised Federated Learning

- Model Training
- Synthetic Data Creation
- ◆ AI-Enhanced Blockchain Data Provenance
- Decentralised Deep-Fake Detection
- Decentralised AI Quorum

### Traceable

- AI Compute
- AI Lifecycle
- Explainable AI (XAI) Audit Trail Registry
- Data Usage Monetisation
- Digital Content Provenance Ledger



- **Governance, Identity and Trust:** smart contracts, DAOs and decentralised identity frameworks provide transparent rules, reputations and guardrails for AI systems and agents, while addressing concerns about bias, fairness and accountability. Yet these solutions remain early-stage, suggesting that the market has yet to fully recognise and standardise the value of on-chain governance for AI.

AI's primary contributions to Web3 cluster around different value drivers:

- **Intelligence, Analytics and Insights:** AI extracts patterns from fragmented on- and off-chain data to strengthen forecasting, anomaly detection and trend identification. This deepens situational awareness for protocols, institutions and users, and improves decisions across risk, market operations and ecosystem health. This is one of AI's strongest suits in Web3 and is reflected in high RTMA scores.
- **Optimisation:** AI analyses states, constraints and objectives to recommend or enact improvements. In practice, this ranges from portfolio construction and rebalancing, liquidity routing and market-making in Decentralised Exchanges to gas and execution strategies, and (within guardrails) the tuning of blockchain protocol parameters. The value is clear, and the adoption is relatively high for most, especially in finance-related domains.
- **User Experience and Accessibility:** natural-language interfaces, personalisation and real-time assistance can lower the barrier to entry and participation, and make Web3 interactions more intuitive. This domain is relatively mature, yet still offers significant headroom, as simple assistance and guidance can evolve to stronger intent capture and execution.
- **Automation:** AI enables autonomous planning and execution of complex tasks within Web3 systems with on-chain oversight and policy-constrained agents. These solutions are moderately mature, but growing in capability and are expected to play a substantial role in the near future of Web3.
- **Create and Curate:** AI can generate and organise content and assets (e.g., NFTs, avatars, news feeds, etc.) to enhance user and community experience. Adoption is high for creation and curation tools, though real strategic impact can vary by context.

The maturity gap between AW and WA solutions is an expected outcome when we consider the Technological Anatomy and adoption barriers we examined earlier. In general, AW solutions are additive and lighter-weight to integrate, as it operates on existing, transparent Web3 data, allowing extraction of patterns and automated actions. This aligns with AI's nature of enhancing other technologies to generate progress without requiring large systemic changes. By contrast, many WA solutions are substitutionary and coordination-heavy, as they seek to decentralise resources, enforce provenance, preserve privacy and realign incentives and governance across multiple independent global actors. These capabilities depend on network effects, shared standards, and cross-party commitment to new rules and processes, which are components that mature more slowly and map directly to Web3's adoption barriers. The digital content provenance ledger example illustrates this perfectly: registering content fingerprints and rights on chain is technically feasible, and would address some of AI's concerns, but real value will only emerge when rights holders, platforms, and consumers agree to participate and enforce usage, which is a big alignment challenge at a global scale, complicating adoption.

Ultimately, the most mature Web3AI solutions address well-defined problems with a clear ROI, while more nuanced, coordination-requiring and technically ambitious solutions witness lower levels of maturity. This suggests that Web3AI adoption follows a predictable trajectory: high-value, lower complexity problems are solved first, while more transformative but technically challenging applications require more time. The question for Web3 is not whether it can contribute to AI, but whether these contributions will be sufficient to justify the added complexity and overhead.

*It is important to note that several caveats apply. The Web3AI landscape evolves rapidly, so this overview constitutes a point-in-time snapshot. It is not exhaustive, as some use cases may be undisclosed, not well-documented or not aligned with the aforementioned definition of a Web3AI solution. Solution boundaries also vary in granularity, and some entries could be merged, split or redefined. RTMA scores are a best-effort assessment on extensive market research, meaning solutions may plausibly shift up or down one level. Finally, Tech Directionality is a simplification, as some solutions exhibit strong bidirectional value*

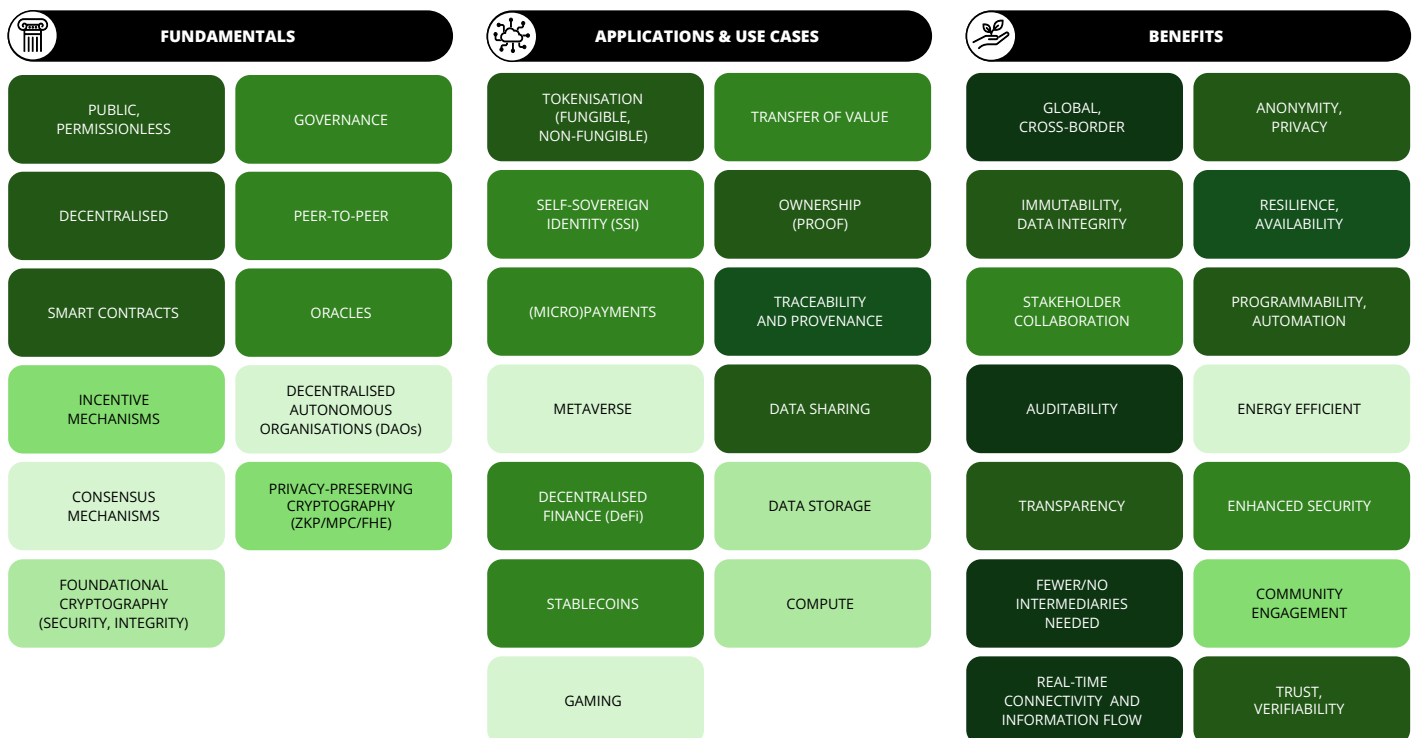


# The DNA Heatmap of Web3AI

As mentioned earlier, the Technological Anatomy can be a useful framework for examining the DNA of Web3AI. With the landscape of Web3AI solutions mapped, we can now apply this framework in a unique exercise to uncover some of the DNA of Web3AI and learn what this domain is actually “made of” in practice.

We mapped the Web3AI solution landscape against the Technological Anatomy by assessing which fundamentals, applications & use cases, and benefits are materially present for each of the 58 Web3AI solutions. Then, we aggregated all results and normalised the values using the RTMA scores, ensuring that more mature solutions have greater influence. This resulted in the DNA Heatmap of Web3AI for both technologies, featuring a colour scale to indicate low to high presence. It highlights which building blocks and value drivers appear to dominate the Web3AI landscape, as well as those that remain marginal. As such, it offers a point-in-time snapshot of the emerging DNA of Web3 and a basis for a more granular understanding of this domain.

Web3’s DNA in the Web3AI landscape is woven around four dominant themes. The first is centred on decentralised, open, and permissionless coordination with global stakeholders, where AI systems can interact directly on shared infrastructure, reducing the number of intermediaries where possible. The second focuses on programmable ownership and value, in which tokenisation and cryptographic proofs turn data, models and usage rights into machine-readable assets. The third theme focuses on accountability, transparency, and privacy, which enables verifiable provenance and audit trails around otherwise opaque activities, while privacy-enhancing techniques can protect sensitive inputs and identities. The fourth is immutable integrity and resilience, delivering a tamper-resistant ledger that provides a real-time, single source of truth for AI systems to interact with.



NA Low Medium High

Figure 6: The DNA Heatmap of the Technological Anatomy of Web3 in Web3AI.

AI's DNA in the Web3AI landscape is shaped by a few reinforcing themes. At its core, AI systems transform large volumes of on- and off-chain data into structured signals through pattern recognition, analytics, and semantic retrieval. This allows Web3 systems to move from raw data toward contextual understanding and decision support. A second theme centres on automation and efficiency. AI systems in the Web3AI domain can reduce operational overhead, enable semi-autonomous actions, and optimise processes. A third theme reflects the gradual shift of the domain toward adaptive, user-facing intelligence. Personalisation, real-time assistance, and multimodality appear as recurring patterns, supported by feedback-driven refinement.

The genetic profile of Web3AI suggests a clear division of roles within the Web3AI landscape. Web3 primarily contributes decentralisation, accountable record-keeping and programmable ownership and value, while AI contributes analytics, optimisation, automation and user guidance. The high intensity regions reflect this, not because they are easy to integrate, but because they deliver direct utility without demanding large-scale infrastructural changes. Medium intensity areas can point to the upcoming next wave: privacy-preserving AI collaboration, agent identity and governance, decentralised on-chain AI inference, content provenance and selected DePIN use cases are gaining momentum, yet they remain contingent on performance improvements, global alignments on usage and standards, and stable unit economics.

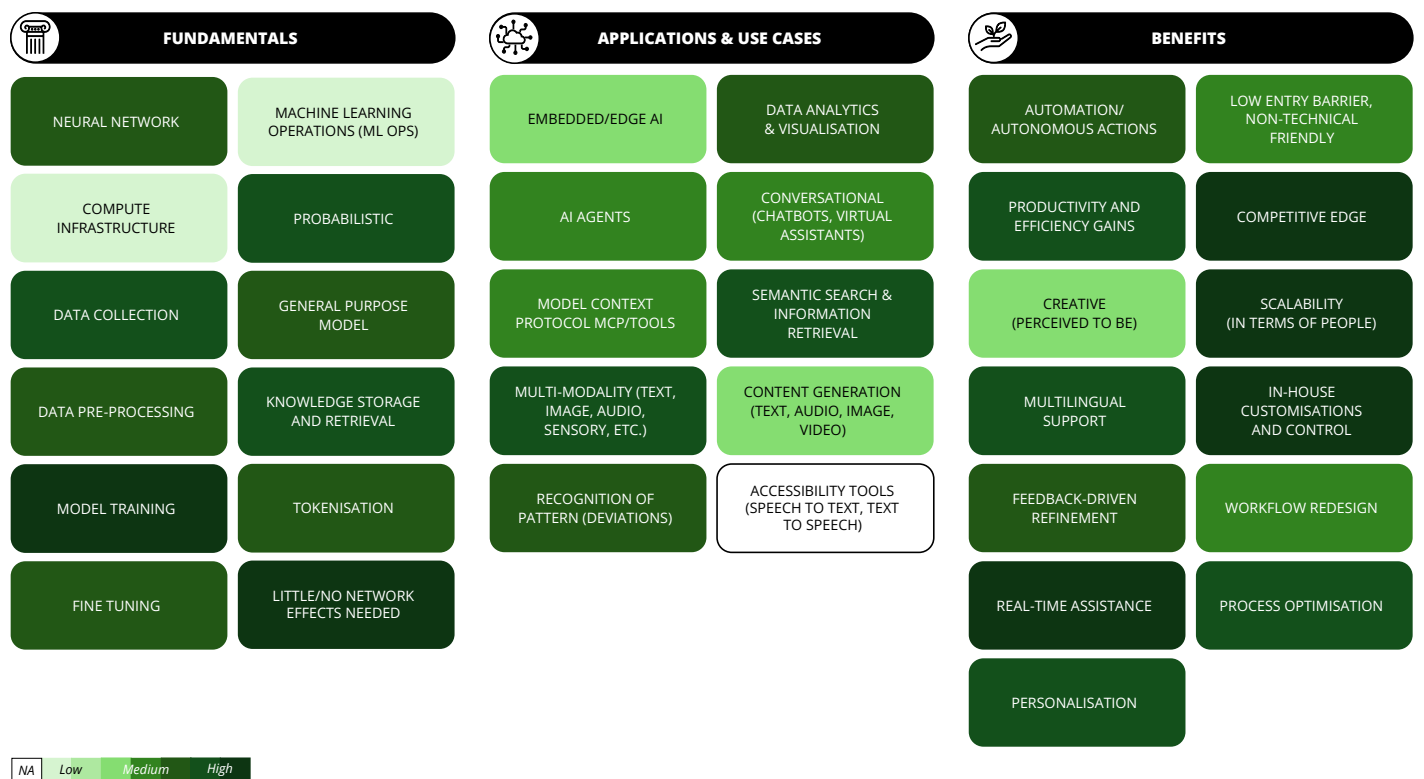


Figure 7: The DNA Heatmap of the Technological Anatomy of AI in Web3AI.



# The Barrier Relief Heatmap of Web3AI

The DNA Heatmap of Web3AI helped obtain a more granular understanding of Web3AI integration. A practical next step is to understand what these Web3AI solutions do in terms of adoption for both technologies. Specifically, which adoption barriers of Web3 and AI are most commonly addressed through the convergence of Web3AI?

To examine this, we mapped each of the 58 Web3AI solutions to the adoption barrier taxonomies established earlier for both technologies. For each solution, we identified the adoption barriers it addresses for Web3 and AI, and as before, aggregated the results and normalised the values using RTMA. This resulted in the Barrier Relief Heatmap of Web3AI. It indicates which adoption barriers for both technologies are most frequently targeted by the Web3AI solution landscape, and where the immune response of Web3AI DNA provides less or no relief. Importantly, the heat map reflects the relative volume of solutions that address a barrier, not the degree to which the barrier is mitigated. As a result, it should be used to identify patterns of where the current solution landscape (un)consciously concentrates its effort and to surface potential gaps in coverage, not as proof that any specific barrier can or cannot be conclusively solved.

Over time, AI can meaningfully address some of Web3's adoption barriers. Through data analysis, oracle integrations and other solutions, AI enhances the consistency and usefulness of data flowing within Web3 systems, helping to meet high-quality data requirements. Equally, AI-powered interface layers lower the tech complexity that many users encounter when interacting with on-chain applications. Semi-autonomous agents and context-aware chatbots can carry out routine tasks, guide users through unfamiliar workflows and simplify complex interfaces. This directly addresses UX/UI friction while raising overall Web3 literacy: AI can explain concepts, detect user intent in real-time and recommend actions to take, thereby making the domain more accessible to newcomers and non-technical users, easing engagement.

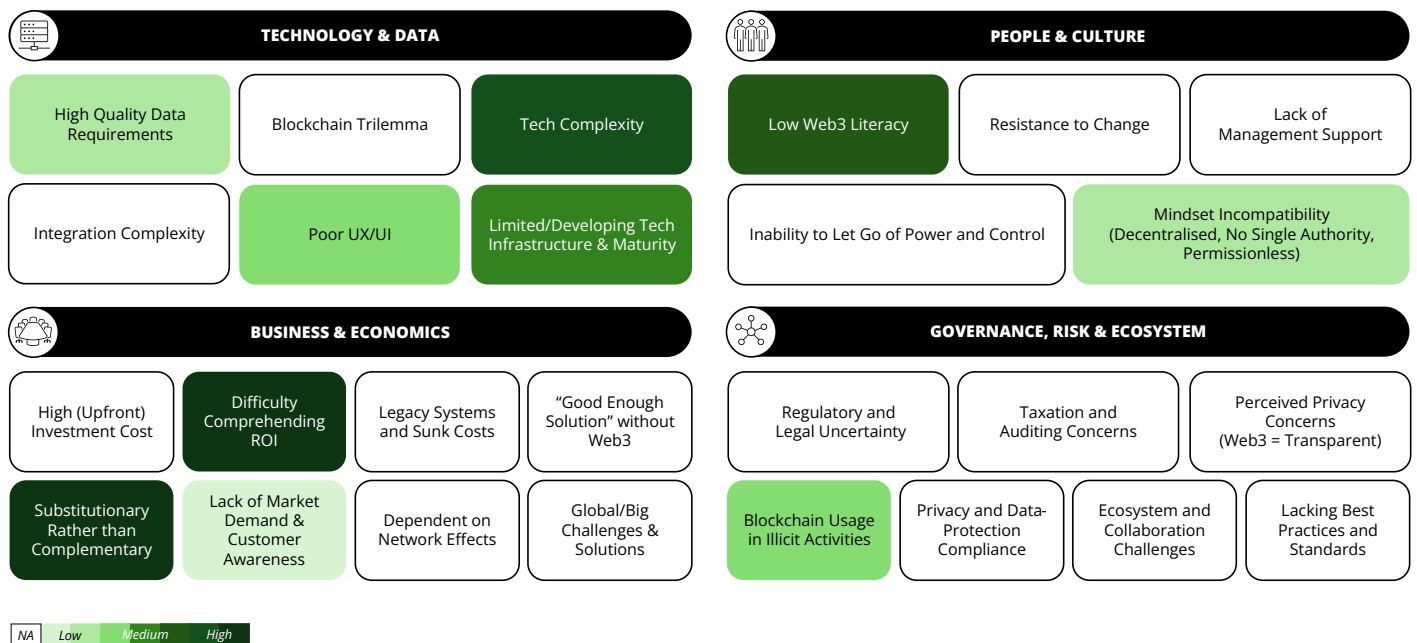


Figure 8: The Barrier Relief Heatmap of Web3 in Web3AI.

AI also helps to indirectly bridge mindset incompatibility. The principles of decentralisation, permissionless, and the absence of a single controlling authority are often difficult to justify, especially in terms of ROI. However, when framed around safe AI systems and multi-party computations, they become more compelling. Consider collaborative model training, where contributions are assessed fairly, and outcomes are governed collectively: it is a natural fit for Web3 systems in which ownership, coordination and trust do not reside with a single company. Furthermore, AI agents utilising cryptocurrencies will only amplify interest and utility, reinforcing emerging payment standards, and catalysing both infrastructure maturity and market awareness. While AI cannot eliminate blockchain's usage in illicit activity, it can reduce its prevalence by analysing data and preventing harm by detecting threats before they propagate.

In turn, Web3 can address many of AI's adoption barriers. As more meaningful information is recorded on the blockchain, effectively becoming the world's high-integrity global database, the associated economic value compels higher data standards, which in turn gives AI access to more high-quality, reliable and provenance-rich data. Privacy-preserving training methods, combined with Zero-Knowledge Proof (ZKP) and other cryptographic techniques, allow individuals and organisations to contribute to model development

and assess adherence to specified criteria without exposing raw data. Although referencing model artefacts, training metadata and reasoning traces on-chain does not solve the AI black-box problem, it does create an immutable reference point that improves accountability, auditability and provenance.

Web3 can also address market concentration and certain governance concerns. Decentralised infrastructure directly counters monopolisation and vendor lock-in by enabling open, federated alternatives across the AI stack. Transparent collaboration frameworks with ZKP can help mitigate ethical and bias concerns, while privacy and data protection obligations can be supported by advanced cryptographic tooling. Copyright and IP infringement can be addressed by registering models, outputs and licenses on-chain, with auditability and traceability extended to data provenance, model usage and associated payments. Governance gaps can also be narrowed through on-chain AI quorum decision-making and Decentralised Autonomous Organisations (DAOs). AI's energy footprint remains challenging, and although Web3 systems will not solve this problem, distributing workloads across decentralised compute networks that train models instead of performing arbitrary hashing can provide some type of relief.

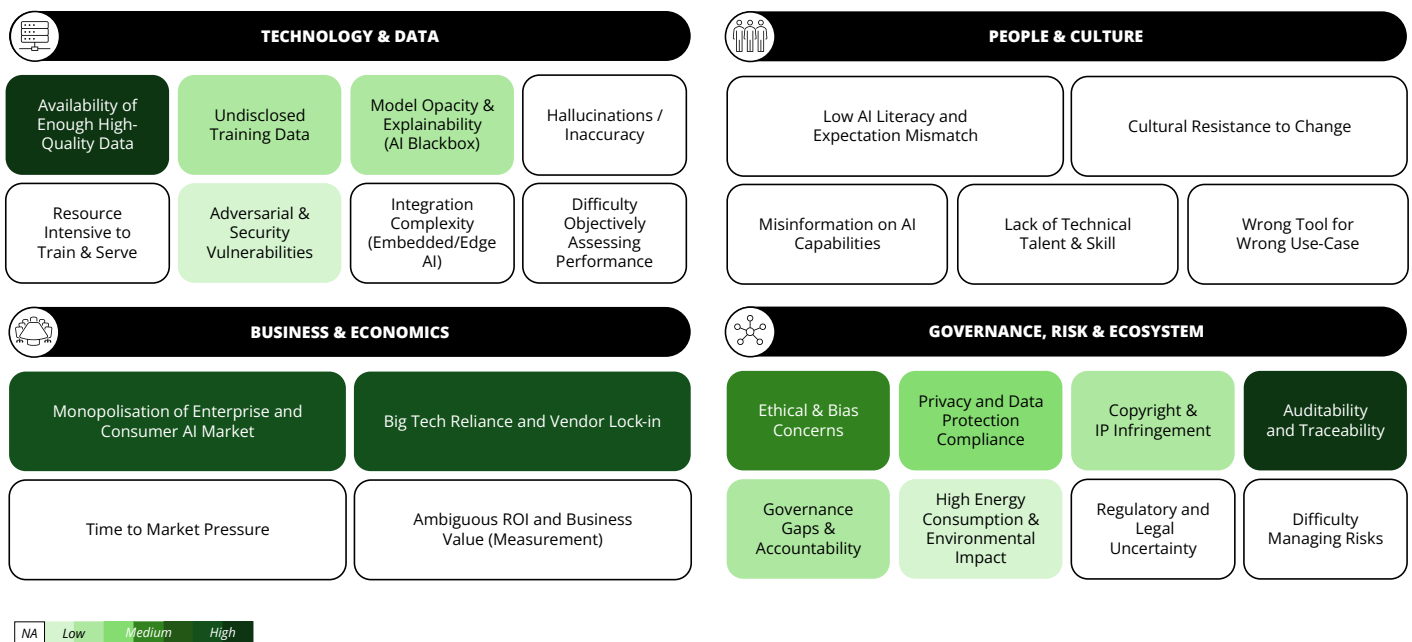


Figure 9: The Barrier Relief Heatmap of AI in Web3AI.

# Concluding Remarks

So, do opposites really attract? In the case of Web3 and AI, our analysis shows that they do, but selectively and on their own terms. We examined foundational tensions, mapped their distinct technological anatomies, identified divergent adoption barriers, catalogued 58 real-world Web3AI solutions, and decoded the DNA of Web3AI. When properly orchestrated, these apparent opposites serve as design levers that drive complementary progress, creating value neither could achieve alone.

This synergy is not a new technology nor a simple blend. Instead, it combines the strengths of each domain to reinforce the other and, in some cases, mitigate respective weaknesses. The genetic profile of Web3AI is clear on the division of roles and value drivers. To extract a focused strand of this DNA that describes how Web3 and AI reinforce each other today, we present the 5PA framework: Web3 enhances AI through five Ps: Provision, Provenance, Privacy, Participation and Property, while AI strengthens Web3 through five As: Analyse, Augment, Automate, Amplify and Advise.

Although the Web3AI domain is still in a relatively nascent stage, the number of unique Web3AI solutions that can materially improve both industries is substantial. At present, maturity follows simple adoption economics, with additive and simple first, and substitutionary and complex later. The former has shown promising results for both technologies, while the latter holds the potential to take them to a whole other level. Although the more promising solutions depend heavily on large-scale global coordination, standardisation, and viable unit economics, along with certain technological improvements, one thing is clear: the potential is there. Progress may be gradual, yet the next wave of promising Web3AI solutions is on the horizon, and with the right wind and tide, it may come ashore sooner than expected.

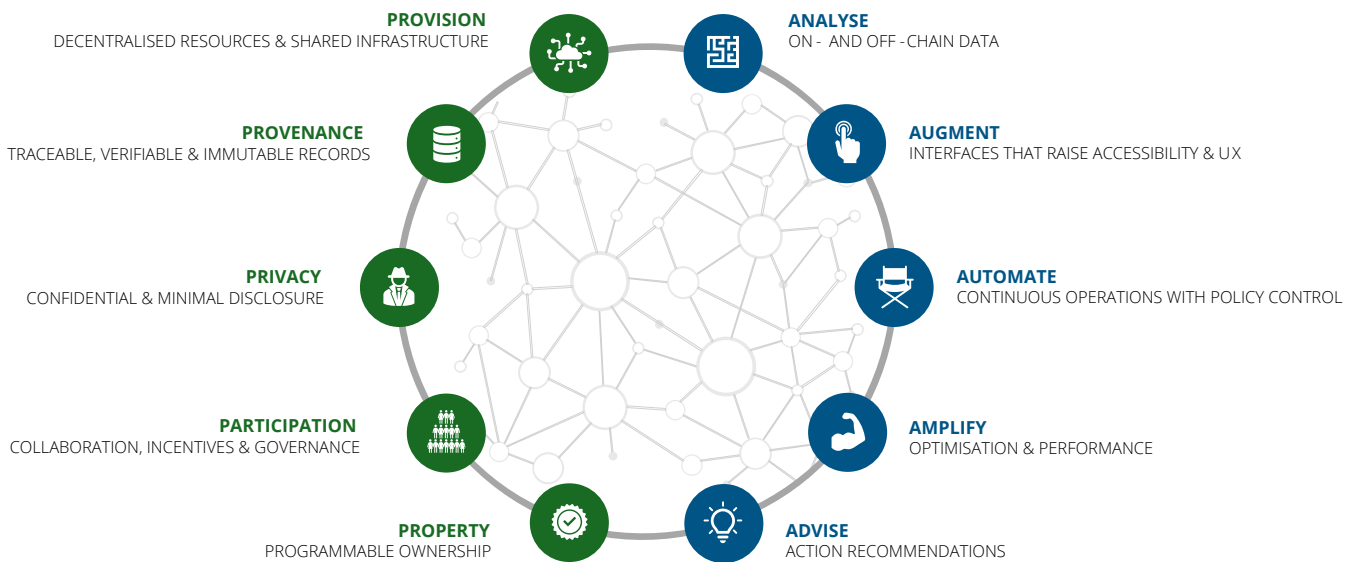


Figure 10: The 5PA framework.

Step into the convergence and let us be your trusted partner in the next era of technology.

# Appendix

## **Decentralised Marketplace & DePIN Compute**

A network where participants provide GPU and CPU capacity to users on demand, with open participation and token-based incentives.

## **Decentralised Marketplace & DePIN Storage**

A network where participants provide storage capacity to users on demand, with open participation and token-based incentives.

## **Decentralised Marketplace & DePIN Datasets**

A network where participants provide datasets to users under defined access terms, with open participation and token-based incentives.

## **Decentralised Marketplace & DePIN AI Models**

A network where participants provide AI models to users under defined access terms, with open participation and token-based incentives.

## **Decentralised Marketplace & DePIN AI Agents**

A network where participants provide AI agents to users as task-oriented services, with open participation and token-based incentives.

## **Decentralised Indexing Networks**

Transforming raw blockchain data into organised, searchable datasets and APIs for analytics and AI use.

## **AI-Powered Oracles**

Applying AI-driven processing to aggregate, validate, score and/or filter anomalies in off-chain data, producing higher-quality oracle outputs for on-chain use.

## **AI-Optimised Consensus Mechanism**

Using AI to monitor network and validator behavior and dynamically adjust blockchain protocol parameters within predefined bounds to improve network performance.

## **AI-Powered Consensus Mechanism**

Linking the right to produce blocks or earn rewards to verifiable AI work, such as model training instead of performing arbitrary hashing.

## **Wallet Behaviour & Illicit Finance Analytics**

Monitoring and screening wallets and transactions to generate risk scores and flag suspicious activity for compliance and investigations.

## **Scam, Phishing & Rug Pull Detection**

Identifying potential scams and warning users before they interact with malicious links, contracts or transactions.

## **Web3 Cyber Threat Detection**

Combining on-chain surveillance with AI-driven anomaly detection to flag infrastructure and protocol-level threats before exploitation or at the earliest stages of execution.

## **Crypto Wallet AI Assistant**

Providing contextual guidance and intent-based support for interacting with decentralised applications (dApps) and transactions, while keeping final approval and transaction signing with the user.

## **Pre-Execution Transaction Firewalling**

Applying an AI-driven firewall for rollups and protocols that screens transactions pre-execution and can block, delay, or require additional checks before they are processed and executed.

## **Smart Contract Security Review Assistant**

Scanning smart contract code to flag vulnerabilities and unsafe patterns, and proposing remediations before deployment or formal audit.

## **RegTech Compliance Assistant**

Supporting crypto compliance teams with assessments, case enrichments, and drafting investigation summaries and reporting narratives.

## **KYC and AML Onboarding**

Combining AI-assisted identity verification and compliance screening to improve onboarding conversion to crypto platforms.

## **Traceable AI Compute**

Producing verifiable, workload-level records of energy usage for AI training and inference, with the evidence anchored on-chain for auditability and reporting.

## **Traceable AI Lifecycle**

Maintaining a verifiable record of model artifacts and lifecycle events across training, fine-tuning, and deployment, enabling provenance, lineage verification, and controlled versioning.

## **Explainable AI (XAI) Audit Trail Registry**

Creating a verifiable on-chain registry for AI decisions by recording model version and input, output and explanation references, while keeping underlying artifacts off-chain.

### **Digital Content Provenance Ledger**

Registering content fingerprints and rights assertions with timestamps on-chain to support independent verification of origin, edits, and permitted use.

### **Data Usage Monetisation**

Recording AI content access and summarization events by anchoring tamper-resistant usage proofs on-chain and using those receipts later for automated payouts.

### **AI-Enhanced Blockchain Data Provenance**

Using AI to turn on-chain and off-chain records, e.g., fragmented supply chain/DPP information, into linked and queryable data with references.

### **Decentralised Deep-Fake Detection**

A network where participants contribute detection models or inference to score whether media is synthetic, with token-based incentives tied to performance.

### **Decentralised AI Quorum**

A system where multiple independent AI models must agree on an answer before it is provided, while recording it on-chain, and using it for auditable smart contract execution.

### **Decentralised Federated Learning - Model Training**

Allowing participants to train models locally and submit updates, while the blockchain coordinates aggregation, provenance and incentives without sharing raw data.

### **Decentralised Federated Learning - Synthetic Data Creation**

Allowing participants to generate synthetic datasets, while the blockchain coordinates aggregation, provenance and incentives without sharing raw data.

### **ZKP Training (zkPoT)**

A framework where model publishers attach cryptographic proofs that they trained a model the way they claim, on a specific dataset and recipe, without revealing the dataset or the weights.

### **ZKP Inference**

A system in which models return answers with proof that the agreed model ran on the stated inputs, with on-chain recording and verification.

### **ZKP Evaluation**

Enabling operators to prove that an AI model adheres to certain criteria without needing access to raw training data, ensuring compliance to ethical guidelines or regulations.

### **ZKP Guardrails AI (Agents)**

Enabling AI agents to prove that their actions comply with predefined policies or rules without revealing sensitive data, e.g., DeFi spending or voting in DAOs.

### **Multi-Party Computation (MPC)**

A network where multiple data holders collaboratively train or fine tune a model using MPC, with blockchain providing governance, record contributions, manage access and distribute rewards.

### **Fully Homomorphic Encryption (FHE)**

Training models on fully encrypted data using fully homomorphic encryption (FHE), enabling computation on ciphertexts without revealing the raw data, thereby preserving privacy throughout training.

### **Compute to Data (C2D)**

Keeping the data at rest with its owner and sending approved algorithms to controlled compute, returning only results, logs, and attestations, with blockchain providing governance, record contributions, manage access and distribute rewards.

### **Trusted Execution Environment (TEE)**

Running AI workloads, such as LLM training, inside Trusted Execution Environments, where code and data run in hardware-isolated memory, ensuring confidentiality and integrity. Remote attestation provides cryptographic proof that expected binaries ran on hardware, protecting sensitive inputs and user prompts.

### **Agentic Crypto Payment Infrastructure**

Enabling AI agents and services to initiate and route payments programmatically across fiat and crypto rails for tools, data and services.

### **Agentic DeFi Agents**

Running AI agents under defined policy constraints to execute DeFi activities such as trading, yield optimisation, liquidity provision and farming, with transparent on-chain governance and auditability.

### **AI-Driven Portfolio Management & Trading Strategies**

AI-driven tools that assist users in managing portfolios, providing actionable trading strategies.

### **AI-Driven Liquidity Routing**

Leveraging AI to intelligently navigate across multiple liquidity sources, finding the best available prices and routes while accounting for transaction costs, speed and risks.

### **AI-Driven Market Making**

Providing liquidity in trading pairs by learning market conditions and adjusting prices in real-time, ensuring tighter spreads, faster execution and more stable prices for traders.

### **NLP Market Sentiment Analysis**

Aggregating Web3-related social media, forums, and price data using natural language processing to quantify market sentiment.

### **AI-Powered Insights & Anomaly Detection**

Process large-scale blockchain data to identify patterns, forecast trends and flag anomalies.

### **DeFi Credit Scoring & Lending Analysis**

Analyzing on-chain wallet behaviors to generate reliable credit risk scores, facilitating optimised lending decisions in DeFi protocols.

### **AI-Optimised Algorithmic Stablecoins**

Algorithmic stablecoins enhanced with AI to maintain a stable value relative to fiat currencies by employing intelligent demand-supply balancing mechanisms.



### **Multi-Chain Analytics**

An analytics layer that aggregates, reconciles and normalises data across multiple heterogeneous blockchains and layer 2 networks.

### **AI-Generated NFTs and Avatars**

NFTs and avatars created by AI with on-chain ownership and licensing, enabling secure and verifiable digital asset creation and transfer.

### **AI-Curated Web3 Newsfeed**

AI-curated, personalized, real-time Web3 news and updates with transparent sourcing.

### **AI-Generated Smart Contracts/dApps**

Generate and optimise smart contracts and decentralised applications (dApps), enabling assistance in blockchain application development.

### **AI (Agent) Chatbot Coin**

Tokens linked to AI chatbots and/or agents that manage community interaction and games, creating active and engaging ecosystems.

### **AI-Enhanced Customer Experience (CX)**

AI-powered chatbots integrated with custody and trading systems to deliver real-time customer support.

### **AI in Crypto Games**

AI-powered NPCs and on-chain economic analytic tools that enhance gameplay and sustain blockchain game ecosystems.

### **Decentralised Prediction Feeds and Signal Markets**

Token-incentivised prediction feeds where participants submit and stake AI-driven forecasts on-chain, and aggregated predictions are sold as a consumable data feed.

### **Decentralised Identity of AI Agents**

A decentralised identity framework that assigns unique cryptographic identifiers, e.g., DIDs, to AI agents, combined with third-party issued Verifiable Credentials to authenticate, authorise, and build cross-chain reputations to mitigate Sybil attacks and ensure fair participation e.g., in token distribution and governance.

### **On-Chain (Semi-) Autonomous AI Agents**

AI agents with budgets and policies enabling autonomous interactions with blockchain platforms.

### **On-Chain AI Inference**

AI models and computations executed on blockchain platforms that support enhanced on-chain computation, either fully on-chain or via tightly integrated on-chain/off-chain hybrid architectures.

### **Smart-Contract Calls to AI models/agents**

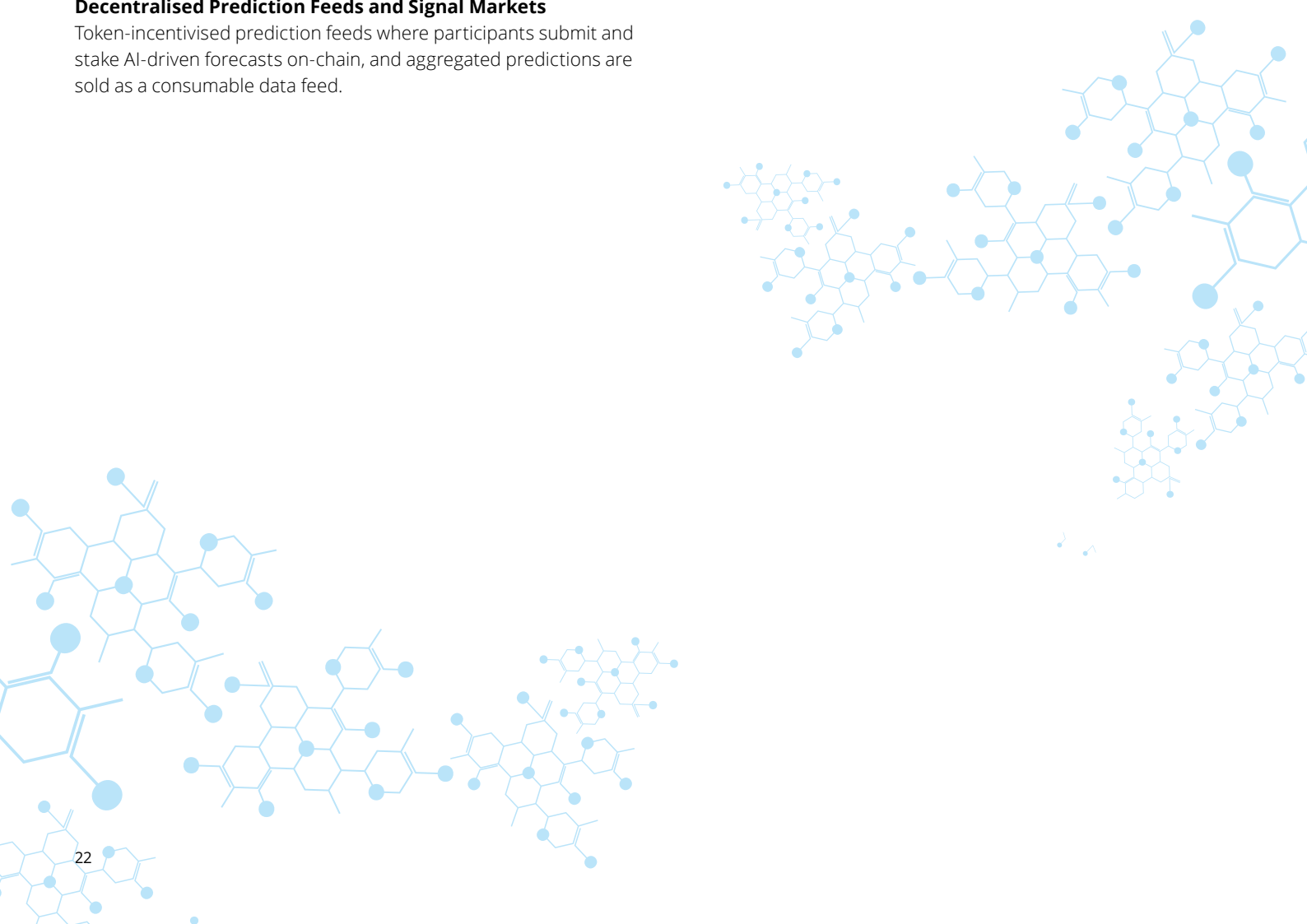
Smart contracts that make explicit calls or requests to external AI models or agents via oracles, APIs, or middleware to obtain data.

### **Adaptive/Dynamic Smart Contracts**

Smart contracts that use AI model outputs as inputs to modify its behavior post-deployment.

### **AI-Powered/Enhanced DAOs**

Decentralised autonomous organisations leveraging AI to enhancing governance, funding allocation, risk evaluation, etc.



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