metha·biofund

A DOMAIN-VALUE-BACKED CURRENCY FOR BIOMEDICAL RESEARCH

Decentralized Science Funding on Ethereum

The first proof-of-concept implementation of a new monetary architecture in which token emission is mechanically linked to investment in the productive domain that generates demand for the currency.

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EternalStorage	0xD81fFB850e44dd131D30E94eeD033CB9c8c546d9
MethaToken	0x0A1e366572f63bCa45A66dE4F5F1Ab5A62b3E16c
OpenGovernance	0x7BF8dd021477A44eD0F4b5eB48cB80cfb594917B
MethaCrowdsale	0x7B96b7e7670C6330b5F4f8b3F46245e4F49FF560
AuditingPool	0xD301Cff18Cec35F2c698a0fD7DFf81AF81098571
AuditorRegistryV2	0xDead08DfFa69FF1bde30A72E4BD993A67c61Ee03

DOCUMENT

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CHAPTER ONE

01 Executive Summary

A new monetary architecture where token emission, settlement demand, and protocol governance are locked to the same productive domain — by design.

Metha Biofund is the first proof-of-concept implementation of the **Domain-Value-Backed Currency (DVBC)** model — a new monetary architecture in which token emission is mechanically linked to investment in a productive domain, mandatory settlement of that domain's commercial outputs is denominated in the token, and the protocol is governed by token holders.

Built on Ethereum, Metha applies the DVBC model to biomedical research: METH tokens are emitted in exchange for ETH funding research, and biomedical IP funded through the protocol settles licensing transactions in METH.

> *The DVBC model resolves a structural incoherence shared by all existing monetary systems. Metha is the first system in which both the demand mechanism and the emission mechanism are locked to the same domain, by protocol design.*
>
> — DVBC WORKING DRAFT V1.4.1, §3.1

The petrodollar derives its demand from being the mandatory settlement currency for global oil trade — but US dollar emission is set by the Federal Reserve according to macroeconomic targets that have nothing to do with the oil ecosystem. Fiat currencies derive demand from legal tender mandates but emission is disconnected from any productive domain. Bitcoin enforces scarcity but its emission funds nothing.

Three-Condition DVBC Architecture

CONDITION (a)

Mandatory Settlement

Biomedical IP funded through Metha settles licensing transactions in METH.

PHASE 3 — PLANNED

CONDITION (b)

Emission–Investment Linkage

METH emission is mechanically tied to ETH invested in research.

PHASE 1 — LIVE

CONDITION (c)

Holder Governance

METH holders govern protocol parameters, audit firm registration, and condition (a) activation.

PHASE 1 — LIVE

Empirical Track Record

The protocol runs a perpetual proportional auction inspired by the EOS token launch — the same auction structure that raised **approximately $4.2 billion in ETH over 350 days** in 2017–2018, demonstrating the mechanism's capacity to bootstrap a token from zero to billions in market capitalization.

$4.2B

Raised by the same auction mechanism in EOS launch (350 days, 2017–2018)

5

Smart contracts deployed on Sepolia testnet, validated by 50 automated tests

3

Conditions encoded in the architecture, two of them already live on-chain

Settlement Layer, Not Investment Fund

Metha holds **no income-producing assets** — the treasury holds ETH (capitalized through the auction) which is disbursed to fund research, but the protocol is not an investment fund managing a portfolio. Patents, licensing agreements, and other commercializable outputs remain the property of the principal investigator. The mandatory-settlement requirement operates as a **contractual license clause** analogous to copyleft and performing-rights royalty regimes — a contractual restriction on how the IP is licensed, not an ownership claim on the IP itself.

The theoretical foundation of the DVBC model and the formal description of Metha's implementation are presented in the academic working draft listed at the end of this document. This whitepaper describes the protocol as a system to be built and operated; the working draft establishes the monetary theory it instantiates.

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CHAPTER TWO

Market Opportunity

A trillion-dollar settlement domain with structural inefficiencies that decentralized infrastructure can finally address.

The global biomedical research and development market reached approximately **$280 billion in 2024**, and the global pharmaceutical market reached **$1.7 trillion** in the same year — projected to exceed $1.8 trillion in 2025. Both markets are structurally expanding due to aging demographics, emerging infectious diseases, and accelerating biotechnology innovation.

$1.7T

Global pharmaceutical market revenue (2024, IQVIA)

$280B

Annual global biomedical R&D spending (2024)

$10T

Global healthcare expenditure (WHO, 2022 baseline)

The Funding Gap

Despite this scale, structural inefficiencies create massive unmet demand. Early-stage and translational research — the critical bridge between lab discovery and clinical application — is chronically underfunded. NIH grant success rates have fallen below 20% for experienced investigators, forcing researchers to spend more time writing proposals than doing science.

<20%

NIH grant success rate for experienced investigators

~44%

Research time spent on administrative tasks (Wellcome Trust, 2020)

$15B+

Estimated annual funding gap in early-stage biomedical research

The DeSci Wave

Decentralized Science (DeSci) has emerged as a credible alternative. VitaDAO has deployed over $10 million for longevity research. Molecule has facilitated IP-NFT deals worth millions of dollars. Total value locked across DeSci protocols surpassed $50 million in 2024.

Metha is positioned distinctively: not as a research-funding DAO, but as a **settlement infrastructure layer** over independently held biomedical IP. The difference matters for long-run value accumulation — a funding DAO's token value is bounded by its treasury and governance power; a DVBC's token value is bounded by the commercial output of the entire health domain.

The IP-NFT lineage. Molecule Protocol and VitaDAO have built the asset-layer of biomedical DeSci: NFTs that tokenise specific compounds, IP-NFT-backed funding rounds, and DAO custody over research outputs. The *Nature Biotechnology* editorial coverage in 2023 (vol. 41, p. 1346) signalled that this model is now part of how biotech is talked about. Metha is downstream of that lineage at a different layer: it does not hold IP and is not a DAO over a portfolio of compounds. Instead, METH is the settlement medium under which the IP that Molecule's stack, ResearchHub's stack, or any IP holder's stack chooses to license its outputs. The two layers compose: Metha funds the research, Molecule's IP-NFT framework can tokenise the resulting IP, and METH settles the commercial flow. This composability is the basis on which §13 invites IP-NFT-native projects to plug in rather than treating them as competitors.

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CHAPTER THREE

The Problem

Biomedical research funding is broken along three dimensions: access, efficiency, and accountability.

DIMENSION ONE

Access

Researchers in the Global South, early-career scientists, and those working on neglected diseases face systematic exclusion from traditional funding streams. Grant committees favor established institutions and well-connected principal investigators. International wire transfer friction and currency volatility further disadvantage non-Western researchers.

DIMENSION TWO

Efficiency

The average NIH grant takes 18–24 months from submission to first disbursement. Overhead charges at major research universities routinely exceed 50–60% of direct costs, meaning less than half of each funding dollar reaches the actual experiment. Metha smart contracts eliminate intermediaries, disbursing funds directly to researcher wallets with zero overhead extraction.

DIMENSION THREE

Accountability

Traditional peer review is opaque, slow, and rife with conflicts of interest. Reviewers are unpaid, anonymous, and have no stake in the quality of their assessments. Metha's AuditingPool introduces skin-in-the-game: auditors stake METH tokens and earn rewards proportional to the community consensus on their review quality — aligning incentives with rigorous science.

CHAPTER FOUR

The Metha Solution

Six integrated protocol components: a proportional crowdsale, a staking-based auditing pool, on-chain governance, eternal data storage, milestone verification, and a tiered firm registry for the audit layer.

Metha addresses these problems through a coherent six-contract system. Contributors send ETH to the MethaCrowdsale contract during a defined funding period. At period close, METH tokens are distributed proportionally. Funded research projects are tracked on-chain via EternalStorage. Accreditation firms register through AuditorRegistryV2 and review milestone progress in AuditingPool under a 2/3 supermajority rule with typed deliverables and an optional DSMB veto lane. Governance votes determine next-period research priorities.

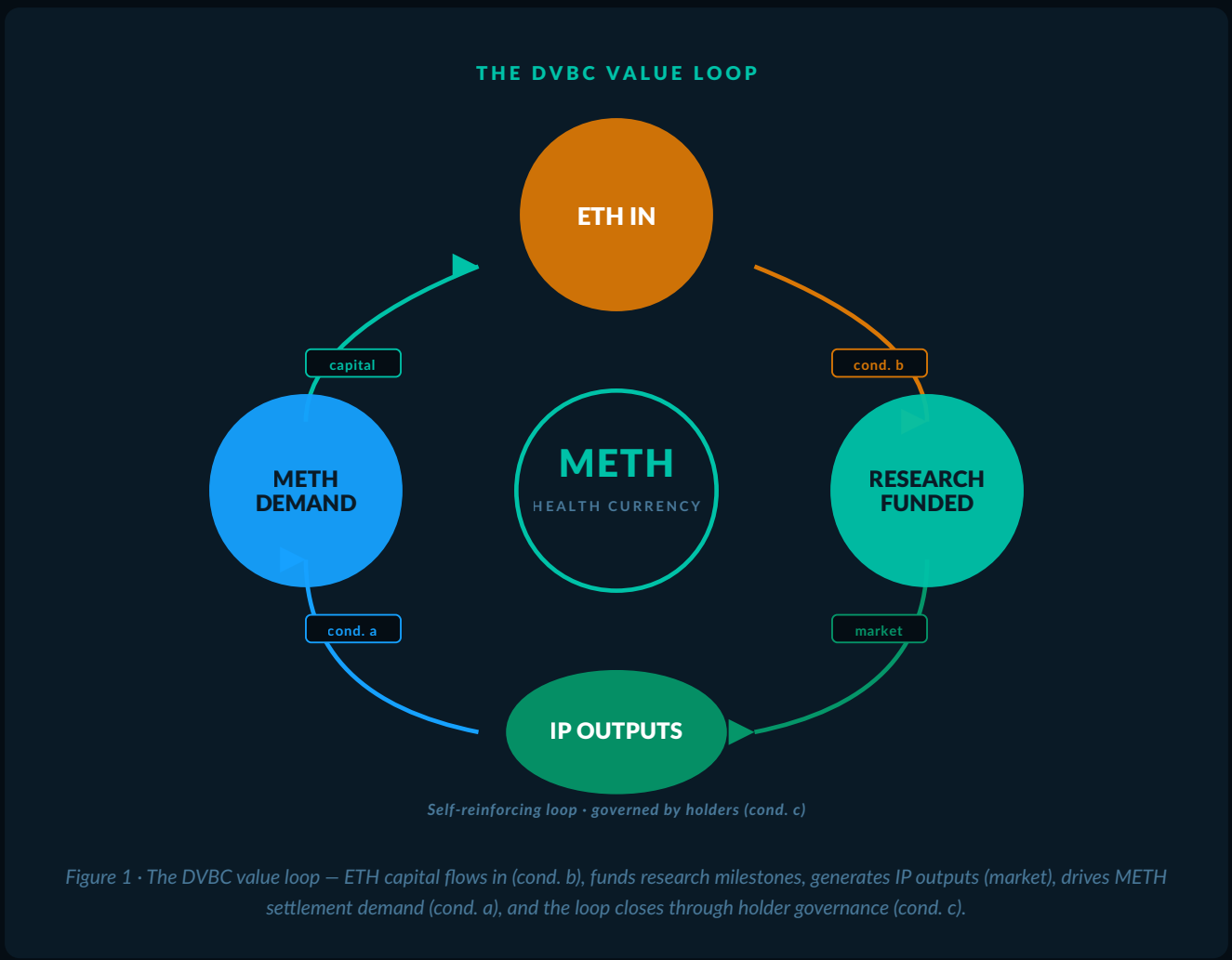

Figure 1 · The DVBC value loop — ETH capital flows in (cond. b), funds research milestones, generates IP outputs (market), drives METH settlement demand (cond. a), and the loop closes through holder governance (cond. c).

The Six Components

Each role in the system is implemented by a dedicated smart contract. The contracts are independent, upgradeable through governance, and verifiable on-chain.

CONTRACT 01

MethaToken

ERC-20 with snapshot. The DVBC currency itself; snapshot capability enables governance voting without token lockup.

CONTRACT 02

MethaCrowdsale

Implements condition (b): emission proportional to ETH investment per period. The perpetual auction engine.

CONTRACT 03

AuditingPool

The quality gateway ensuring emission is linked to productive investment. Six-state milestone machine.

CONTRACT 04

OpenGovernance

Implements condition (c): METH holder governance of all protocol parameters via snapshot-weighted voting.

CONTRACT 05

EternalStorage

Typed key-value storage enabling logic upgrades without data migration, ensuring protocol longevity.

CONTRACT 06

AuditorRegistryV2

Tiered registry of accreditation firms (Junior / Senior / Principal) with seven category specialisations and a Minor / Major / Critical slashing schedule. Deployed 2026-05-13.

Why Blockchain?

Blockchain is not a buzzword here — it solves specific problems. Immutability ensures research records cannot be falsified. Programmable money enables conditional disbursement tied to milestone completion. Permissionless participation removes geographic gatekeeping. Tokenization creates liquid markets for research IP that previously had no liquidity mechanism.

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CHAPTER FIVE

Use Cases

Six personas illustrate the range of participants the Metha platform serves.

M

THE INDEPENDENT RESEARCHER

Martin

PhD in oncology, works outside a major research university, limiting his access to NIH funding. He submits a research proposal through the Metha dApp, stakes a small amount of METH to signal commitment, and receives funding directly from the global contributor pool. His results are published on-chain.

S

THE INSTITUTIONAL SCIENTIST

Sarah

Leads a lab at a mid-tier university. Traditional grant timelines threaten to stall her team between funding cycles. Metha provides bridge funding within a single crowdsale period (weeks, not months), allowing her team to maintain momentum without the 18–24 month NIH cycle delay.

J

THE RETAIL CONTRIBUTOR

Jim

Biotech-enthusiastic software engineer with no scientific background. Contributes 0.5 ETH to the current funding period and receives METH tokens proportional to his share of the pool. Participates in governance votes on research priorities, becoming a genuine stakeholder in the science he cares about.

L

THE INSTITUTIONAL FUNDER

Laura

Manages a philanthropic foundation distributing $5M annually through a slow grant process. By deploying capital via Metha, she gains on-chain transparency for every dollar — automated disbursement, public audit trails, and verifiable research outputs replace expensive administrative overhead.

C

THE BIOTECH ENTREPRENEUR

Carl

Scouts early-stage research for commercial licensing opportunities. Metha's on-chain audit trail and publicly verifiable milestone history give him the due diligence data he needs before engaging in licensing discussions.

A

THE EARLY-CAREER RESEARCHER

Ana

Postdoctoral researcher at a university in São Paulo, NIH grant rejected three years in a row. Through Metha, Ana submits her proposal directly to the global contributor pool — no institutional affiliation required, no geographic bias. Evaluated on scientific merit by AuditingPool reviewers.

CHAPTER SIX

The Metha Platform

A dApp frontend, six smart contracts, and the enforcement infrastructure that makes mandatory settlement legally defensible.

Funding Periods

Funding operates in discrete periods. During each period, the MethaCrowdsale contract accepts ETH contributions. At period close, a fixed supply of METH tokens (10,000 METH per period by default) is distributed proportionally to ETH contributions. The mechanism is simple, transparent, and manipulation-resistant: no contributor benefits from front-running because price is determined post-window by aggregate participation.

AuditingPool — Quality Filtration

The AuditingPool ensures that METH emission is linked to *productive* research investment, not merely to any ETH contribution. Researchers submit proposals containing an IPFS content hash, a milestone schedule, and per-milestone ETH requests, accompanied by a 0.005 ETH anti-spam deposit. Funding is released milestone-by-milestone through a six-state machine:

`Locked` → `Unlocked` → `Claimed` → `ProofSubmitted` → `Disputed` → `Approved`

Quality controls live in v3. The AuditingPool enforces three quality controls beyond the basic state machine: **(1) multi-auditor consensus** — milestone approval requires a 2/3 supermajority of registered firms with no single firm dominating sizing (Condorcet-style aggregation across submitted estimates); **(2) typed deliverables** — each milestone anchors up to 32 typed artefacts (StudyReport, DataPackage, IPAssignment, Prototype, TechTransfer, Other) by content-hash on IPFS / Arweave / signed PDF, with `keccak256(abi.encode(deliverables))` committed on submission to detect any off-chain tampering; **(3) DSMB veto lane** — firms holding `dsmbVetoRights` (granted by oracle attestation in the ClinicalSafety category) can force a clinical-data milestone into the `Disputed` state without joining the consensus quorum, realising on-chain the safety-monitoring authority that off-chain Data Safety Monitoring Boards exercise under NIH and FDA frameworks.

Auditor Bootstrapping: From Individual to Firm-Based

The audit layer is now **live in its firm-based form** on Sepolia (`AuditorRegistryV2` deployed 2026-05-13). Phase 1 individual-auditor mechanics are preserved as a fallback path; the firm-based registry is the production design and the path on which the §6.1 enforcement framework rests.

Tiered registration. Accreditation firms register on-chain with a METH stake at one of three seniority tiers:

- **Junior** — stake ≥ 10 METH, milestone value cap of 5 ETH
- **Senior** — stake ≥ 100 METH, milestone value cap of 100 ETH
- **Principal** — stake ≥ 1,000 METH, no milestone cap

A 7-day cooldown applies on unstake to deter hit-and-run participation. Stake increases are immediate.

Category specialisations. Firms self-declare and are challenged on category specialisations from a fixed on-chain enum: `ClinicalSafety`, `RegulatoryOracle`, `PreclinicalScience`, `BiomarkerAssay`, `DataIntegrity`, `IPCommercialization`, and `GeneralScience`. Oracle-issued attestations (GxP, ISO 17025, KYB) can grant additional category rights including the DSMB veto.

Tiered slashing. Auditor accountability is enforced through escalating severity bands: *Minor* (3% / 5% / 10% of stake by strike count), *Major* (10% / 25% / 50%), and *Critical* (100% + permanent registry ban). The slashing window stays open for a configurable retroactive period, so rubber-stamping caught later is still recoverable.

The audit layer mirrors the role played by credit rating agencies and certification bodies in conventional finance and research — a layer of professional intermediaries whose business model is being trustworthy, with skin in the game expressed through both stake and reputation.

Enforcement of Settlement Obligations

Three layered mechanisms enforce the mandatory-settlement requirement of condition (a) without relying on goodwill alone.

MECHANISM A · LEGAL

Encumbrance with Succession Clauses

The funding agreement carries a succession clause obligating all subsequent IP assignees and licensees to denominate licensing in METH. Recorded with USPTO, EPO, JPO, KIPO so subsequent purchasers take with notice. The legal model is the GNU GPL's viral inheritance, established in *JMRI v. Katzer* (535 F. 3d 1373, 2008).

MECHANISM B · LEGAL

Bayh-Dole-Style March-In Rights

If a rights-holder fails to demonstrate good-faith commercialization within 5–7 years post-patent grant, OpenGovernance may authorize compulsory licensing on FRAND terms. Use-it-or-lose-it reversion plus a non-exclusive licensing requirement together preclude the strategy of buying worldwide-exclusive licenses to shelve the technology.

MECHANISM C · DUAL ENFORCEMENT

Contractual + On-Chain Bond + Reputational

Liquidated damages (full restitution + 1×–3× ecosystem-harm multiplier + disgorgement of profits, enforced through Swiss/Singapore arbitration under the **New York Convention's 172-jurisdiction reach**). A METH bond posted at funding inception (10–20%) slashable by qualified-majority OpenGovernance vote. A permanent on-chain reputational record. The combined effect is enforcement on multiple horizons (weeks, years, decades) and economically irrational for any actor seeking to evade.

CHAPTER SEVEN

07 Token Economics

A perpetual, never-ending auction. ETH funds research; METH issuance funds the protocol's operations. Metha holds no income-producing assets.

The Perpetual Auction Model

Unlike traditional token sales, Metha's MethaCrowdsale contract runs **indefinitely**. Each period (configurable duration, with 23-hour windows designed to rotate across global timezones), a fixed supply of METH is auctioned. Any address contributes ETH and receives METH proportional to their share of that period's total ETH pool. The auction never closes — it resets each period automatically via `block.timestamp` with no human intervention required.

Empirical Precedent: the EOS Launch

The perpetual proportional auction is not a theoretical construct. The EOS token launch (June 2017 to June 2018) implemented the same auction structure: a fixed daily token allocation distributed proportionally to ETH contributed in each window, repeated for 350 sequential periods. The mechanism raised approximately **$4.2 billion in ETH** — the largest publicly-conducted token sale on record at the time — demonstrating that the proportional auction can bootstrap a token from zero to billions in market capitalization.

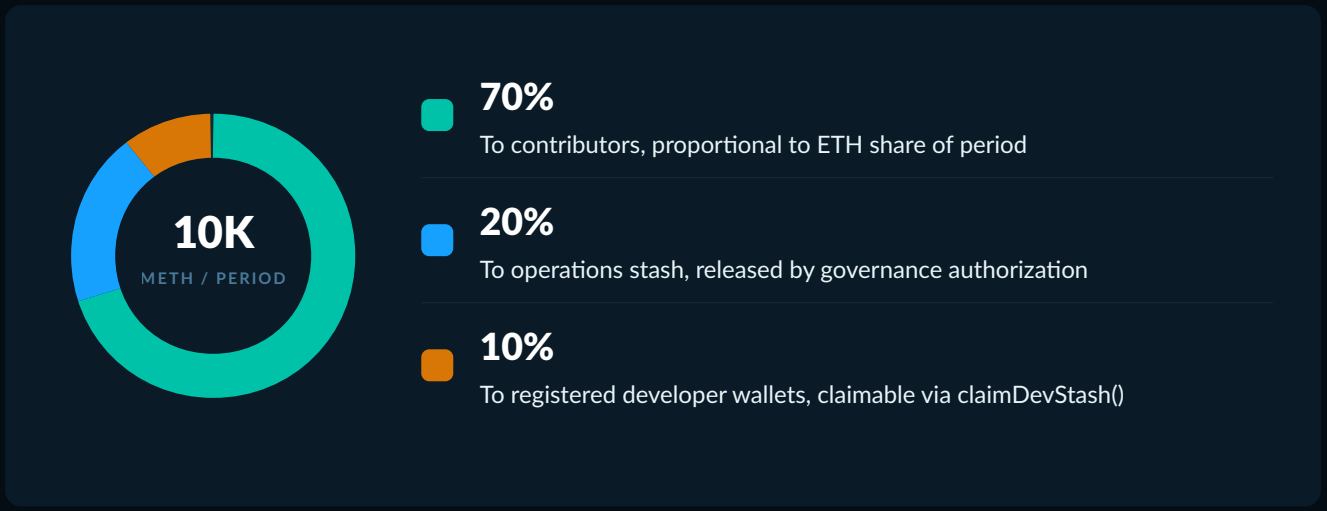
> *The auction is not the bottleneck. The bottleneck is the credibility of the value proposition.*
>
> — DVBC WORKING DRAFT V1.4.1, §7

We acknowledge that the broader EOS launch later became a regulatory cautionary precedent (a 2019 SEC settlement of $24 million with Block.one over unregistered securities allegations). The architectural choice of Metha as **settlement layer rather than IP custodian** is specifically designed to weaken the regulatory analogy that bound EOS, by removing the common-enterprise + portfolio-of-revenue-generating-assets structure that the SEC found dispositive.

Auction integrity under MEV/LVR scrutiny — what's solved and what's residual. The proportional rule per period closes the front-running surface inside the window — no contributor benefits from being last or first because price is determined post-window by aggregate participation. It does not close everything. Two residuals remain and are addressed honestly: **(1) wash-trading and contribution-recycling at period close** by coordinated related addresses — the proportional rule is partially robust but not fully against this; longer mainnet windows (5,760 blocks ≈ 23h) plus VRF-randomised closing and commit-reveal proposals are on the v3.x roadmap as candidate

mitigations; **(2) multi-period crowding-out by deep-capital actors** — this is a real residual that no single auction-design change closes; the §10.5 four-layer governance defence (snapshot voting + 2/3 supermajority + position-paper triggers + Stiftung residual veto) is what addresses it at the protocol level. The academic literature has moved past basic batch auctions to fair combinatorial auctions (Canidio & Henneke 2024, arXiv:2408.12225) and CoW Protocol's CIP-67 reflects this; both are candidates for longer-horizon v3.x exploration alongside, not in front of, the credibility-floor work.

Token Distribution Per Period



No tokens are pre-mined. The contract takes an ERC20 snapshot at each period close, enabling historical governance vote weights. Token Utility:

- **Governance:** 1 METH = 1 vote on OpenGovernance proposals (snapshot-weighted)
- **Auditing collateral:** stake METH to enter AuditingPool, earn rewards for milestone approvals
- **Settlement currency:** intended medium of exchange for biomedical IP licensing transactions
- **Arbitrage instrument:** market forces continuously bring capital into the research treasury

Settlement Layer, Not IP Custodian

A foundational architectural choice of the Metha protocol is that it does not acquire title to the intellectual property generated by funded research. Patents, licensing agreements, treatment protocols, and other commercializable outputs remain the property of the principal investigator or the entity through which the research is conducted (a university tech transfer office, a researcher-led spinout, a research cooperative). Metha's relationship with the IP is contractual, not proprietary.

The mandatory-settlement requirement of condition (a) is implemented as a clause in the funding agreement that obligates the rights-holder and any downstream assignee to denominate commercial licensing transactions in METH — a contractual restriction on how the IP is licensed, not an ownership claim on the IP itself. The closest legal analogs are the **copyleft licensing tradition** (GNU GPL, Creative Commons ShareAlike) and **performing rights organizations** (ASCAP, BMI, GEMA), which administer settlement of royalties without ever owning the underlying works.

> *Metha is settlement infrastructure across an external productive domain; governance protocols are control mechanisms over endogenous capital pools. The two are categorically different instruments.*

The Health Currency Vision

The long-term vision is that METH becomes the global interchange currency for health — analogous to how the US dollar became the world's reserve currency for oil. Just as oil is priced in USD globally, medical treatments, clinical trial sponsorships, research licensing, and health service exchanges could be denominated in METH. The token's value would derive not from speculation but from the economic activity of the global health ecosystem — a currency backed by the sum of human medical innovation, independent of central banks or national funding gatekeepers.

LEGACY PRECEDENT · 1971–PRESENT

USD ⇋ Oil

Mandatory settlement of global oil trade in US dollars. Demand structurally tied to commodity flows; emission disconnected from the oil ecosystem. Incoherent by design — the petrodollar gap.

Petrodollar mechanism · structural demand without emission coherence

DVBC INSTANTIATION · 2026–FUTURE

METH ⇋ Health

Mandatory settlement of biomedical IP licensing in METH. Demand and emission both locked to the same productive domain — coherent by construction.

DVBC mechanism · structural demand with emission coherence

> *A currency backed not by declaration, not by commodity storage, and not by scarcity alone — but by the ongoing productive output of the biomedical research ecosystem it funds and in which it settles.*
>
> — DVBC WORKING DRAFT V1.4.1, §6.1

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CHAPTER EIGHT

Governance

Snapshot-weighted on-chain voting on protocol upgrades and the future activation of condition (a).

METH holders vote on protocol changes through the OpenGovernance contract. Proposals require a configurable ballot duration and minimum vote threshold. Any change to core system slots — the token contract, the funding manager, or the auditor pool — requires a successful community vote with snapshot-based voting power.

Governance Scope

- Research proposal approval and treasury allocation
- Protocol parameter changes and platform upgrades
- Core contract slot updates (token, funding manager, auditor pool)
- AuditorRegistry firm registration, slashing, and revocation
- Snapshot-based vote weights from ERC20 token snapshots at period close

On testnet, ballot duration is set to 180 seconds for testing purposes; mainnet parameters will be established through community governance before launch.

CHAPTER NINE

Technical Architecture

Built on Ethereum, separating data persistence from business logic via the Eternal Storage pattern.

Metha is built in **Solidity 0.8.24** with OpenZeppelin v5 dependencies, optimizer enabled at 200 runs, **viaIR=true**, EVM target **cancun**. The architecture follows the Eternal Storage pattern, separating data persistence from business logic to enable safe upgrades without data migration. The test suite is approximately 100 Hardhat tests (98 at v3 cut on 2026-05-20) and a clean Slither 0.10 static-analysis run; the gas snapshot is committed at `metha-api/gas-report.txt`.

Oracle Layer for Off-Chain Settlement Verification

Settlement of off-chain commercial transactions in METH cannot be inferred from on-chain state alone — the protocol must verify that the off-chain event happened. Three architectures are under active design (§6.3 of the academic working draft):

- **Option 1 — Attestation-based (self-report under penalty of slashing).** Rights-holder and licensee jointly sign an EIP-712 typed-data record of the settlement event; the content hash is anchored on-chain via `attestSettlement()`. Cheap, fast, and cryptographically sound — but only as reliable as the joint rationality of the two signing parties under bond economics.
- **Option 2 — Oracle consortium (multi-attestor, KYB-bonded).** A panel of independent oracle nodes accredited under the AuditorRegistryV2 RegulatoryOracle category retrieves and verifies evidence; settlement is confirmed only on a 2/3 super-majority of attestations. Third-party verifiable but introduces a bootstrapping problem and per-event cost.
- **Option 3 — Stiftung-as-controller (legal entity as off-chain dispute resolver).** The Liechtenstein Stiftung holds standing and subpoena power to compel evidence production; indexes attestations on-chain through a single privileged call. Aligns with the legal entity that exists anyway for GDPR / DAC8 / CASP — but is a trust point.

The protocol's working path is **Options 1 + 3 combined**, with Option 2 reserved for ecosystem maturity. None of the three resolves the joint-bad-faith failure mode (rights-holder + licensee + Stiftung executive all compromised); that residual is addressed by §10.4 Metha Pharma as the residual fair-terms licensee.

Formal Verification — Certora Engagement

Beyond the clean Slither static-analysis run and 50+ Hardhat tests, the protocol commits to formal verification with Certora Prover (or K Framework / Runtime Verification as alternative) on four named safety properties prior to mainnet deployment:

1. **No-double-claim of METH** — for each `(contributor, period)` pair, the cumulative claimable amount cannot exceed the §4.1 formula, and a second claim reverts.
2. **Monotonic emission per period** — `tokensCreatedPerPeriod` and the 70 / 20 / 10 split are constant within a period; per-period totals sum to the protocol-constant emission rate without rounding leakage.
3. **Reachable-disbursement of treasury balances** — for every ETH balance held by AuditingPool or by an operations stash, there exists a reachable sequence of governance and admin transitions that disburses the balance (no funds can be made permanently unspendable).
4. **Flash-loan bypass-resistance** — voting power for any proposal is determined exclusively by the `block.number − 1` snapshot taken at proposal submission; no atomic single-transaction borrow-vote-repay sequence can change the outcome.

Specification artefacts and prover output will be published alongside the v1.5 of the academic working draft on completion. Additional invariants to scope during the engagement include role/access-control monotonicity, pause/upgrade safety, EIP-712 cross-chain replay resistance, EternalStorage slot-registry round-trip, and AR v2 stake monotonicity.

Deployed Contracts (Sepolia Testnet)

CONTRACT	ADDRESS
EternalStorage	`0xD81fFB850e44dd131D30E94eeD033CB9c8c546d9`
MethaToken	`0x0A1e366572f63bCa45A66dE4F5F1Ab5A62b3E16c`
OpenGovernance	`0x7BF8dd021477A44eD0F4b5eB48cB80cfb594917B`
MethaCrowdsale	`0x7B96b7e7670C6330b5F4f8b3F46245e4F49FF560`
AuditingPool	`0xD301Cff18Cec35F2c698a0fD7DFf81AF81098571`
AuditorRegistryV2	`0xDead08DfFa69FF1bde30A72E4BD993A67c61Ee03`

All contracts are verified on Sepolia Etherscan. Source code: `github.com/JVMart/metha` (currently private; public release planned alongside mainnet deployment). Canonical, always-current contract list at metha.life/#trust.

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CHAPTER TEN

Competitive Landscape

DeSci protocols address pieces of the funding problem. Metha integrates them into a single coherent settlement infrastructure.

PROTOCOL	FUNDING	AUDIT	GOVERNANCE	SETTLEMENT LAYER
VitaDAO	Yes	No	Yes	No
Molecule	Yes	No	Partial	No
ResearchHub	Partial	Yes	Partial	No
Gitcoin (QF)	Yes	No	Yes	No
Metha	Yes	Yes	Yes	Yes (planned)

Key Differentiators

- **Settlement layer architecture** — Metha is monetary infrastructure, not a fund or DAO over IP holdings
- **Auditing incentive layer** — no other DeSci protocol has a native staking-based peer review mechanism
- **Biomedical focus** — purpose-built for life science funding, not general research
- **Enforcement infrastructure** — encumbrance, march-in, and dual enforcement layer drawing on Bayh-Dole and copyleft precedents

CHAPTER ELEVEN

Roadmap

A three-phase path from current testnet to full DVBC realization through governance vote.

PHASE 01

Testnet

Token auction live on Sepolia (v3 redeploy 2026-05-13). AuditorRegistryV2 firm-based registry live with stake tiers and category specialisations. Multi-auditor 2/3 consensus, typed deliverables (cap 32), DSMB veto lane all on-chain. OpenGovernance deployed. Conditions (b) and (c) live; condition (a) on-chain primitives in place but contractual activation gated on §7 audit sequence.

LIVE NOW · V3 REDEPLOY 2026-05-13

PHASE 02

Mainnet

Mainnet auction with 23-hour periods. Liechtenstein Stiftung + Spanish CASP-SL B+A hybrid stood up. First accreditation firms registered in AR v2. Third-party security audit cleared + Certora four-property formal verification published. Enforcement mechanisms (recordation, march-in, on-chain bond + reputational) signed into first funding agreements.

AUDIT-GATED · NO FIXED DATE

PHASE 03

DVBC Completion

Governance vote activates condition (a). METH holders require METH settlement for licensing of Metha-funded biomedical IP. METH satisfies all three DVBC conditions.

FUTURE

Legal Architecture — The Liechtenstein Stiftung + Spanish SL Hybrid

The mainnet transition cannot happen from a personal wallet. The Legal Due Diligence v1.0 (May 2026) concludes that the protocol requires a regulated legal entity in place before serving EU residents under the MiCA Spain transitional regime, which expires **30 June 2026**. The recommended structure is a two-jurisdiction hybrid:

- **Liechtenstein Stiftung** — non-profit foundation acting as protocol issuer, perpetual-purpose anchor, and GDPR data controller. Holds the residual veto (§4.4 of the working draft) as a statutorily bounded circuit-breaker, not a discretionary lever.
- **Spanish operating SL** — MiCA-authorised CASP (Crypto Asset Service Provider) with limited services (advice + placement without firm commitment). Handles user-facing operations, KYB/KYC, tax filings (DAC8 / CARF), and the off-chain settlement evidence pipeline for §6.3 Option 3.

Year-1 standup cost band: **€520k–€1.35M**; recurring annual €280k–€620k. The seven-plane regulatory map (MiCA issuance / IP settlement / DAO governance / GDPR / AML-CFT / DORA / DAC8-CARF) and the costed entity comparison are published in the Legal DD. The Stiftung-as-controller is the addressable counterparty for litigation, GDPR Art. 17 requests, and tax authorities — a deliberate choice that trades a single point of legal contact for the protocol-level decentralisation that the rest of the architecture preserves.

The transition from Phase 1 to Phase 2 is gated on independent third-party security audit, formal verification of the MilestoneStatus state machine via Certora Prover, and the registration of at least one accreditation firm in AuditorRegistry v2. The transition from Phase 2 to Phase 3 is gated on signed institutional partnerships and the legal structuring of the IP settlement mechanism.

CHAPTER TWELVE

12 Team

Open-source development model with a growing community of researchers, auditors, and token holders.

JV

FOUNDER & PROTOCOL ARCHITECT

José Víctor Martínez

Building Metha Biofund since 2018. Author of all six smart contracts deployed on Sepolia (MethaToken, MethaCrowdsale, AuditingPool, OpenGovernance, EternalStorage, AuditorRegistryV2). Pluridisciplinary background: defence, renewable energy, high-speed rail, import-export, project management. Read the papers, read the code, decide for yourself.

Advisors & Community

Metha operates with an open-source development model. Core contributors are complemented by a growing community of researchers, auditors, and token holders who participate in governance and protocol improvement proposals. The codebase is publicly available and peer review of the contracts is actively encouraged at github.com/JVMart/metha.

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CHAPTER THIRTEEN

Risk Factors

Distinguishing securities-law risk (locus: condition b) from antitrust risk (locus: condition a) — two categorically different exposures.

Investment in and use of the Metha protocol involves significant risk. Prospective participants should carefully consider the following risk factors.

RISK 01

Smart Contract Risk

Despite rigorous internal review, smart contracts may contain undiscovered vulnerabilities. The codebase has undergone internal static analysis using Slither. An independent third-party security audit and bug bounty program are planned prior to mainnet deployment.

RISK 02 · LOCUS: CONDITION B

Securities-Law Risk

The proportional-auction emission mechanism creates the structure of an investment with an expectation of value appreciation, which is the regulatory category to which the Howey test (US) and MiCA's asset-referenced token framework (EU) most directly apply. The settlement-layer architecture materially weakens but does not eliminate this exposure: because Metha holds no income-producing IP assets, the common-enterprise + profits-from-the-efforts-of-others prong of Howey is harder to establish than in models where a treasury actively manages an IP portfolio.

RISK 03 · LOCUS: CONDITION A

Antitrust and Competition Risk

The mandatory-settlement requirement is a contractual restriction on the licensing terms of funded IP. The relevant legal categories are EU Article 102 TFEU (abuse of dominant position via tying) and US patent misuse doctrine — competition law, not securities law. Because Metha does not own the IP and the settlement requirement operates through the funded researcher's licensing terms, the closest legal analogs are performing rights organization royalty terms and copyleft license conditions.

RISK 04

Regulatory Action Risk

The regulatory treatment of utility tokens, on-chain governance, and mandatory-settlement IP licenses remains unsettled in most jurisdictions. Metha's response strategy is to pursue declaratory rulings or no-action equivalents in priority jurisdictions before activating condition (a).

RISK 05

Market Risk

METH token value is determined by market forces and may be highly volatile. Contributors may receive tokens worth significantly less than their ETH contribution at the time of distribution.

RISK 06

Adoption Risk

The success of Metha depends on attracting a critical mass of researchers, contributors, and auditors. There is no guarantee that network effects will materialize at a scale sufficient to sustain the protocol long-term.

CHAPTER FOURTEEN

Legal Disclaimer

METH is designed as a settlement currency, not as an equity claim. The architecture supports payment-instrument classification.

This whitepaper is provided for informational purposes only and does not constitute an offer or solicitation to sell shares, securities, or any other regulated financial instrument in any jurisdiction. **METH is designed to function as a settlement currency for biomedical IP licensing transactions, not as an equity claim on Metha's treasury or on any specific research output.**

The architectural choice that Metha holds no income-producing assets and acquires no title to funded IP — described in detail in the academic working draft listed in the Academic Foundation chapter — supports the classification of METH as a payment instrument with utility-token characteristics rather than as an investment contract under the regulatory frameworks of the primary jurisdictions where Metha operates. Final classification in any specific jurisdiction will require jurisdiction-specific engagement before mainnet deployment.

Nothing in this whitepaper constitutes legal, financial, tax, or investment advice. Participants should conduct their own due diligence and consult qualified advisors before participating in any token sale or protocol interaction.

The Metha protocol is experimental software deployed on a public blockchain. Use of the protocol involves risk of total loss of contributed funds. The Metha team provides no warranty of any kind, express or implied, regarding the security, reliability, or fitness for purpose of the protocol.

CHAPTER FIFTEEN

Academic Foundation

The DVBC model is formalized in an academic working draft archived on Zenodo with a permanent DOI.

The theoretical model behind Metha — Domain-Value-Backed Currency, or DVBC — is presented as an academic working draft archived on Zenodo under a permanent DOI and submitted to SSRN. The working draft formalizes the three-condition DVBC definition, proves the model's emission-demand coherence relative to the petrodollar, derives the value-loop dynamics, examines regulatory treatment under EU and US frameworks, and presents Metha's contracts as a proof-of-concept implementation.

Citation

Martínez, J. V. (2026). *Domain-Value-Backed Currencies: A New Monetary Model for Decentralized Financial Ecosystems — The Metha Biofund Case Study*. Working draft v1.4.1. Zenodo.

DOI: 10.5281/zenodo.20324774

Versioning

Both the academic paper and this whitepaper are versioned independently and may evolve in parallel. The paper presents the canonical specification of the model; this whitepaper describes the implementation, operational details, and deployment plan. When the two diverge, the academic paper is authoritative on monetary theory and architecture; the whitepaper is authoritative on protocol-specific parameters and roadmap. External feedback on either may motivate revisions to both.

Latest version of this whitepaper always available at **metha.life**
Latest version of the academic working draft always available via **DOI 10.5281/zenodo.20324774**