

MetriBlockX: A Verifiable On-Chain Analytics Platform with Unified DeFi and Centralized Exchange Activity Aggregation

IDEATION PAPER

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Abstract The proliferation of blockchain networks has produced an unprecedented volume of publicly accessible transactional data. Despite the emergence of numerous analytics platforms, a critical gap persists: the absence of a unified, block-referenced, and cryptographically verifiable analytics layer that encompasses both decentralized protocol activity and the on-chain settlement operations of centralized exchanges. MetriBlockX addresses this gap by aggregating raw blockchain data at the transaction and block level, decoding protocol interactions directly from on-chain sources, tracking the deposit and withdrawal activity of centralized exchange wallets, and rendering all derived metrics with their corresponding block numbers and transaction hashes. This enables any published figure to be independently audited and validated by any participant.

1. Introduction

Blockchain networks, by design, produce a complete and immutable record of every state transition within their respective ecosystems. Every token transfer, liquidity provision, swap execution, stablecoin minting event, and asset settlement is permanently inscribed in the ledger and is, in principle, accessible to any observer. This property, commonly referred to as radical transparency, is among the foundational value propositions of public blockchain infrastructure.

Yet the analytics platforms built atop this infrastructure have, to a significant degree, failed to fully honor this transparency. Platforms such as CoinGecko, CoinMarketCap, Dune Analytics, and TradingView aggregate and present on-chain and market data in forms that are informative but not independently verifiable at the transaction level by a general user. A volume figure, a total value locked (TVL) metric, or a liquidity depth measurement is presented as a singular number, with no direct, navigable reference to the underlying blocks or transactions from which it was derived. The consequence is a system in which the integrity of the metric must be taken on trust rather than verified by inspection. MetriBlockX is built on a different premise: that every analytics output should be anchored to the source transaction and block from which it was computed, such that any user may navigate directly from a data point on a chart to the corresponding block explorer entry and confirm the figure independently.

2. Problem Statement

2.1 The Verifiability Gap in Existing Analytics Platforms

Contemporary blockchain analytics platforms operate primarily as data interpretation layers. Raw on-chain data is ingested, transformed, and presented through proprietary pipelines whose internal derivation logic is not directly

accessible to the end user. Platforms such as CoinGecko and CoinMarketCap aggregate volume and pricing data from exchange-reported APIs rather than from raw block data, and present the resulting metrics without reference to the underlying transactions from which those figures are drawn. While CoinGecko publishes a methodology document outlining its aggregation approach, no block number or transaction hash is associated with any published metric, making independent verification at the transaction level impossible for a general user.

Dune Analytics represents a more technically advanced case: its internal data tables retain tx_hash and block_number columns that SQL-proficient analysts may query. However, published Dune dashboards present aggregated figures with no navigable, user-facing reference to the source blocks or transactions. The derivation path from raw block data to a displayed metric remains opaque for all but the most technically sophisticated users.

The consequence is a system in which the integrity of a published metric must be accepted on trust rather than verified by inspection. MetriBlockX proposes that every analytics output should be directly anchored to the source block and transaction hash from which it was computed, such that any user may navigate from a data point on a chart to the corresponding block explorer entry and independently confirm the figure.

Table 1. The Verifiability Gap in Practice.

Field	Existing Platform	MetriBlockX
Pool	WETH/USDT	WETH/USDT (0x0d4a11d5...1f1852)
Interval	Hourly (2026-02-10 00:00)	Hourly (2026-02-10 00:00)
Volume	\$27,181.11 USD	\$27,181.11 USD
Source Blocks	Not available	27 blocks (e.g. block 24422747)
Transaction Hash	Not available	0x876ea4...372c4
USDT Input	Not available	49,850,000 USDT
WETH Output	Not available	23,579,867,260,392,242 wei
Independent Verification	Not possible	Enter tx hash on Etherscan

The \$27,181.11 figure is identical in both cases. The difference is that MetriBlockX associates that figure with the 27 source blocks and 55 transaction hashes from which it was derived. No existing analytics platform makes this association accessible to a general user.

2.2 The Need for Unified On-Chain and CEX Settlement Analytics

A second distinct gap exists in the treatment of centralized exchange activity within the analytics landscape. Centralized exchanges operate internal matching engines that process the majority of their reported trade volume entirely off-chain, without any corresponding interaction with a public blockchain network. Industry research has found that a substantial portion of reported CEX volume is fabricated through wash trading. The 2019 Bitwise Asset Management report submitted to the U.S. Securities and Exchange Commission estimated that approximately 95% of reported Bitcoin trading volume across surveyed exchanges was fabricated, a finding corroborated by subsequent peer-reviewed academic research.

This structural characteristic of centralized exchanges means that their self-reported trading volumes cannot be independently verified through on-chain data alone, given that those trades never occurred on-chain in the first place. However, the asset flows that underpin CEX operations, including user deposits, user withdrawals, inter-wallet

rebalancing, and custodial transfers to and from other protocols, are necessarily executed on-chain whenever the underlying assets are native blockchain tokens or ERC-20 equivalent assets. This on-chain settlement footprint is permanent, public, and fully auditable.

Existing analytics platforms have not presented CEX on-chain settlement activity as a unified analytics layer alongside decentralized protocol metrics. MetriBlockX addresses this requirement by tracking the on-chain settlement activity of known centralized exchange wallet clusters and incorporating this data into the same verifiable analytics framework applied to decentralized protocol activity.

2.3 Native On-Chain Value as the Primary Unit of Measurement

A further methodological concern relates to the representation of on-chain activity values. The prevailing convention in blockchain analytics is to denominate all figures in fiat currency equivalents, most commonly USD, by applying real-time or historical spot price conversions to native token amounts. While fiat denomination aids cross-asset comparability, it introduces a layer of abstraction that distances the published metric from the actual on-chain event.

The high volatility of cryptocurrency prices means that a fiat-denominated volume figure reflects both on-chain activity and price movement simultaneously. A network processing the same number of transactions at the same token volumes will report dramatically different USD figures depending solely on prevailing market prices. Native token volume, which represents the actual quantity of tokens moving through the network, serves as a more direct indicator of ecosystem adoption, participant activity, and protocol utilization than its fiat equivalent.

MetriBlockX presents all metrics in their native on-chain denominations as the primary value representation, with fiat equivalents provided as a supplementary reference layer.

3. Methodology

3.1 Data Ingestion

The foundational data source for MetriBlockX is the blockchain node itself. Every transaction that occurs on a blockchain network is validated by nodes participating in that network and permanently stored within the chain's block structure. This architecture establishes the first layer of transparency in the MetriBlockX data pipeline: the source data is not proprietary, not owned by any single entity, and not dependent on any centralized provider. Any participant may operate a blockchain node and independently access the same underlying data.

Each blockchain network exposes its node data through Remote Procedure Call (RPC) endpoints. The endpoints central to MetriBlockX's data ingestion are those that return block data, block numbers, transaction receipts, and event logs. These four data types collectively constitute the raw material from which all analytics are derived.

Of particular importance are event logs, which are records emitted by smart contracts at the moment specific operations are executed on-chain. Event logs contain the precise data points that are analytically significant: token transfer amounts, swap input and output quantities, liquidity reserve states, and a wide range of contract-specific parameters that carry meaningful information about protocol activity. Because these logs are emitted directly by the contracts at execution time and recorded immutably in the block, they represent the most granular and reliable form of on-chain data available.

3.2 Transaction Decoding and Data Interpretation

Once raw data has been received through the RPC layer, it enters a structured decoding and interpretation pipeline before it can be used for analytics generation. This stage operates across two parallel processing tracks within the same block context: one for transactions and one for event logs.

Transaction-Level Processing: Each transaction within a block is first evaluated to determine its nature. Transactions that carry no interaction with a smart contract represent native asset transfers and are the basis for native transfer count metrics. Transactions that involve smart contract interaction are handled through the event log pipeline.

Event Log Processing and Signature-Based Classification: Event logs present a considerably more complex decoding challenge. Every event emitted by a smart contract carries an event signature, which is a hashed identifier that encodes the event type. Correct decoding requires a prior identification step: before any event can be decoded, the pool it originates from must be identified and its type established. Only once the pool type is known can the appropriate ABI be applied to extract the encoded event data.

Table 2. Dual Event Decoding from a Single Transaction.

Transaction 0x840d685fe34427b8f7ad062d54c665359d60cf40661857290822f94e7b46287a at block 24422859 (2026-02-10 00:41:11, Ethereum mainnet) emitted two distinct event types.

Event 1: Swap

Field	Value
Pool	0x0d4a11d5eeaac28ec3f61d100daf4d40471f1852 (WETH/USDT, Uniswap v2)
Sender	0x66a9893cC07D91D95644AEDD05D03f95e1dBA8Af
amount0In	0
amount1In	8,989,950 (USDT)
amount0Out	4,253,262,715,496,131 (WETH wei)
amount1Out	0

Event 2: Sync (Reserve State Update)

Field	Value
Pool	0x0d4a11d5eeaac28ec3f61d100daf4d40471f1852 (WETH/USDT, Uniswap v2)
reserve0	3,509,604,277,822,373,115,932 (WETH wei)
reserve1	7,395,863,791,458 (USDT)

3.3 Analytics Generation and Block-Referenced Metric Computation

Following the decoding and classification stage, all processed transactions and events are persisted to the data store with a comprehensive set of reference anchors attached to each record. Every stored entry carries the originating block number, the block timestamp, the transaction hash, and where applicable the pool or contract address associated with the event.

This reference-preserving storage model is the technical foundation of MetriBlockX's verifiability guarantee. Because every raw record retains its block number and transaction hash at the point of storage, any aggregated metric derived from those records inherits a traceable lineage back to its source transactions.

Table 3. From Individual Swaps to Hourly Aggregate.

Field	Swap 1	Swap 2
Block Number	24422747	24422859
Timestamp	2026-02-10 00:18:47	2026-02-10 00:41:11
Transaction Hash	0x876ea4...372c4	0x840d68...287a
Sender	0x00000047...1A34	0x66a989...8Af
USDT Input	49,850,000	8,989,950
WETH Output (wei)	23,579,867,260,392,242	4,253,262,715,496,131

Full tx hashes: 0x876ea4e6c4df78b9e8c1eb585121b47c1769b631c7f00dda103f2a0cc66372c4 and 0x840d685fe34427b8f7ad062d54c665359d60cf40661857290822f94e7b46287a

3.4 Centralized Exchange On-Chain Wallet Tracking

The identification of centralized exchange wallet addresses within MetriBlockX is based on a curated and continuously maintained registry of known CEX-controlled addresses. These addresses are sourced from multiple avenues: centralized exchanges periodically publish their wallet addresses through official channels as part of proof-of-reserves disclosures, and independent auditing firms regularly publish reports identifying the on-chain holdings and wallet clusters associated with major exchanges.

For all transactions that pass the CEX identification filter, directionality is established based on the address relationship. A transaction in which the recipient address belongs to the CEX registry is classified as an inflow; a transaction in which the sender address belongs to the registry is classified as an outflow.

Table 4. CEX On-Chain Wallet Flow Records.

Exchange	Block	Timestamp	Direction	Amount (ETH)
KuCoin	24426346	2026-02-10 12:22:47	INFLOW	15.10130336
KuCoin	24426276	2026-02-10 12:08:35	OUTFLOW	0.23906040
Binance	24423049	2026-02-10 01:19:11	OUTFLOW	0.07293503

3.5 Stablecoin Activity Tracking

Stablecoin tracking within MetriBlockX follows the same foundational pipeline established for decentralized exchange event processing, adapted to the specific characteristics of stablecoin smart contracts. During the event processing phase, transfer events originating from or directed to known stablecoin contract addresses are identified and routed into the stablecoin analytics track.

Because stablecoin activity is processed within the same pipeline that handles CEX wallet identification, transfers involving known centralized exchange addresses are further classified as CEX-related stablecoin inflows or outflows, providing visibility into the stablecoin settlement activity of major exchanges as a distinct metric category.

Table 5. Block-Level Stablecoin Aggregate with Cross-Category Traceability.

Field	Value
Block Number	24422859
Timestamp	2026-02-10 00:41:11
Network	Ethereum mainnet (chain ID 1)
Stablecoin	USDT (0xdac17f958d2ee523a2206206994597c13d831ec7)
Transfer Count	166
Aggregate Volume	196,933.89855 USDT

3.6 Data Storage, Time-Series Indexing and Aggregation Pipeline

MetriBlockX employs a time-series optimised database architecture capable of sustaining high-frequency concurrent read and write operations, as the data ingestion pipeline continuously writes decoded block data while the analytics layer simultaneously services read queries across multiple time intervals and networks.

The aggregation pipeline operates through a structured hierarchy of time intervals, each derived from the level immediately below it. Once a complete block has been decoded, classified, and written to the data store, block-level metrics are generated. From the block-level data, minute-level aggregations are computed, then hourly, daily, weekly, monthly, and yearly summaries. This hierarchical structure ensures the platform can serve analytics queries across any time granularity without re-computing aggregations from raw block data at query time.

3.7 The Verifiability Layer and User-Facing Audit Trail

The verifiability layer represents the defining characteristic of MetriBlockX. As aggregated metrics are computed from block-level data, the block numbers and transaction hashes that contributed to each aggregated value are retained in association with that value. A search facility integrated into the chart layer allows any user to input a block number or a transaction hash. When a matching reference is found, the corresponding data points on the chart are highlighted, visually indicating which aggregated values that block or transaction contributed to.

Table 6. End-to-End Verification: From Chart Value to Source Transaction.

Field	Value
Pool	WETH/USDT Uniswap v2 (0x0d4a11d5...1f1852)
Network	Ethereum mainnet (chain ID 1)
Interval	Hourly — 2026-02-10 00:00:00
Aggregate Volume	\$27,181.11 USD
Total Swaps	55 transactions across 27 blocks

Full transaction hashes for independent verification:

0x876ea4e6c4df78b9e8c1eb585121b47c1769b631c7f00dda103f2a0cc66372c4

0x840d685fe34427b8f7ad062d54c665359d60cf40661857290822f94e7b46287a

4. Proposed Solution and Core Contributions

MetriBlockX is designed to address the gaps identified in Section 2 through a unified on-chain data aggregation platform that derives all of its outputs directly from raw blockchain data at the block and transaction level. The platform introduces three core contributions that collectively distinguish it from existing analytics solutions.

4.1 Block-Referenced Verifiable Analytics

The primary contribution of MetriBlockX is the introduction of a verifiable audit trail as a native feature of the analytics interface. Every metric generated by the platform, regardless of the time interval at which it is presented, retains a direct association with the block numbers and transaction hashes from which it was computed. This association is preserved through every stage of the data pipeline, from raw block ingestion through decoding, storage, and aggregation.

A user may input any block number or transaction hash into the platform and immediately identify which aggregated data points that block or transaction contributed to. Conversely, any aggregated figure on a chart can be traced back to its constituent transactions, each of which can be independently verified on any compatible public block explorer. This bidirectional navigability between aggregated metrics and their source transactions is the foundational design principle of the platform.

4.2 Native Token Denomination as Primary Value Representation

The second contribution of MetriBlockX is the treatment of native on-chain token values as the primary unit of measurement for all analytics outputs, with fiat currency equivalents presented as a supplementary reference rather than the default denomination. Native token volume reflects only what actually moved through the network and is therefore a more precise and stable instrument for measuring ecosystem activity over time.

4.3 Unified DEX and CEX On-Chain Settlement Analytics

The third contribution of MetriBlockX is the integration of centralized exchange on-chain settlement activity into the same verifiable analytics framework applied to decentralized protocol data. Existing platforms treat CEX and DEX activity as separate domains, and none present CEX on-chain wallet flows as block-referenced, time-series aggregated metrics alongside decentralized exchange and stablecoin data in a unified view.

MetriBlockX tracks CEX flows through a curated registry of known CEX wallet addresses, classifies them by transaction type and directionality, filters out internal wallet-to-wallet transfers that carry no external economic significance, and presents the resulting inflow and outflow metrics with the same block-level verifiability applied to all other platform outputs.

5. Use Cases and Applications

5.1 Researchers and Traders

Academic researchers studying blockchain network behaviour and market participants making data-driven trading decisions share a common foundational requirement: the data they rely upon must be verifiable and traceable to its source. MetriBlockX addresses this requirement directly by providing analytics outputs that are anchored to specific block numbers and transaction hashes, allowing any data point to be independently confirmed against the public blockchain record. For researchers, this verifiability transforms MetriBlockX from a data source into an evidence base.

5.2 Compliance and Auditing Teams

Compliance teams at cryptocurrency firms and independent auditing organisations operate under an increasing regulatory requirement to demonstrate verifiable proof of on-chain asset flows. MetriBlockX provides compliance and auditing teams with a structured view of on-chain asset flows that is anchored to specific block numbers and transaction hashes at every level of aggregation. Any flow figure presented by the platform can be traced back through the aggregation chain to the individual transactions that constitute it.

5.3 Institutional Investors

Institutional investors conducting due diligence on blockchain networks, DeFi protocols, or digital asset strategies require a quality of data that is materially different from what retail-oriented analytics platforms provide. MetriBlockX addresses these requirements through its combination of block-referenced verifiable metrics and its explicit separation of on-chain activity from CEX-reported figures, enabling capital allocation decisions grounded in independently auditable evidence.

5.4 Journalists and Independent Investigators

Journalists covering cryptocurrency markets and independent investigators examining on-chain activity require access to verifiable, citable evidence that can withstand public scrutiny. A reported figure derived from MetriBlockX can be cited with a specific block reference that any reader may independently verify on a public block explorer, moving the standard of evidence from platform-reported figures that must be accepted on trust to on-chain referenced data that can be publicly audited by anyone.

6. Conclusion and Future Direction

6.1 Conclusion

Blockchain technology was conceived on the principle of radical transparency. Every transaction, every asset transfer, every protocol interaction is permanently inscribed in a public ledger that anyone may inspect. Yet the analytics platforms that emerged to bridge the gap between raw blockchain data and consumable metrics have done so by abstracting the raw data into consumable metrics, but in doing so they severed the connection between the published figure and its source transactions.

MetriBlockX is built to close that gap. By preserving block numbers and transaction hashes through every stage of the data pipeline and surfacing them directly within the analytics interface, the platform transforms aggregated blockchain metrics from figures that must be accepted on trust into evidence that can be independently audited by any participant. Combined with its integration of centralized exchange on-chain settlement activity and its com-

mitment to native token denomination as the primary value representation, MetriBlockX introduces a standard of analytical transparency that reflects the foundational promise of blockchain technology itself: not that users must trust the platform, but that they can verify it.

6.2 Future Direction

MetriBlockX is currently in active development as an independent research and engineering project. The following directions represent the planned trajectory of the platform's development.

Multi-Network Expansion. The platform's architecture is designed to support multiple blockchain networks through a standardised RPC interface layer. Expansion to additional networks is a primary development priority, with each new network addition extending the scope of verifiable on-chain analytics available to users.

Public API. A publicly accessible API is planned to allow researchers, developers, compliance teams, and institutional users to integrate MetriBlockX data directly into their own workflows and applications. The API will expose the platform's block-referenced metrics programmatically.

Protocol Coverage. MetriBlockX will expand its coverage of decentralized exchange protocols and DeFi primitives incrementally and with precision. Each addition to protocol coverage will be documented and verifiable, consistent with the platform's commitment to analytical integrity.

MEV Transaction Tracking. Maximal Extractable Value activity represents one of the most consequential and least transparently reported categories of on-chain behaviour. MetriBlockX will introduce dedicated MEV transaction tracking that surfaces the attacker address, the victim address, and the exact amounts extracted in each identified MEV event, all referenced to the specific block number and transaction hash in which the extraction occurred.

Educational Resource. A dedicated educational component will be developed alongside the analytics platform, designed to serve both technical and non-technical audiences, focusing on the specific technical and financial concepts that underpin on-chain analytics.

References

- [1] CoinGecko Methodology. <https://www.coingecko.com/en/methodology>
- [2] Bitwise Asset Management Report to the SEC (2019) via Coin Metrics. <https://coinmetrics.substack.com/p/state-of-the-network-issue-257>
- [3] Wash Trading in Centralised Crypto Exchanges (CEPR). cepr.org/voxeu/columns/wash-trading...
- [4] Do Cryptocurrency Exchanges Fake Trading Volumes? (ScienceDirect). [sciencedirect.com/science/article/abs/pii/S0378437121006786](https://www.sciencedirect.com/science/article/abs/pii/S0378437121006786)
- [5] Wash Trading at Cryptocurrency Exchanges (ScienceDirect). [sciencedirect.com/science/article/abs/pii/S1544612321000635](https://www.sciencedirect.com/science/article/abs/pii/S1544612321000635)
- [6] Dune Analytics Data Architecture. <https://cryptofreedman.substack.com/p/beginners-guide-to-blockchain-data>
- [7] Chainalysis Crypto Market Manipulation Report 2025. chainalysis.com/blog/crypto-market-manipulation...
- [8] Blockchain Data Analytics Review and Challenges (arXiv 2025). <https://arxiv.org/abs/2503.09165>
- [9]

LLM-based Exploration of Blockchain Data (ScienceDirect 2025). [sciencedirect.com/science/article/pii/S0957417425034669](https://www.sciencedirect.com/science/article/pii/S0957417425034669)

[10] Verifiable Blockchain Data and Open Finance. danielmcglynn.com/verifiable-blockchain-data...