CoinXpert

Coin Selection Strategies for Transaction Fee Optimization

Pitch Meeting

E4 Engineering Excellence

David Bloch

72,594

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Transactions fees in BTC

totaling $900M

over 978M transactions

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Transaction Fee optimization is critical

David Bloch
Senior Data Scientist

I apply state-of-the-art **Machine and Deep Learning** techniques to solve financial problems from research to production.

I am reporting to Mathias Pronin and belong to Data Science Group led by Yael Man.

Success Stories - Portfolio

LATAM Innovation projects
- COP FIX FX: EoD spot price prediction
- Balance Prediction: Client daily balances prediction
- FX Spread Management: spread optimization

Data Quality – consent order
- Anomaly detection for Olympus data

Data Science domains

Geographies / Stakeholders

Global Spread Products (GSP)
- Market Making Bid / Ask probability distribution for RFQs

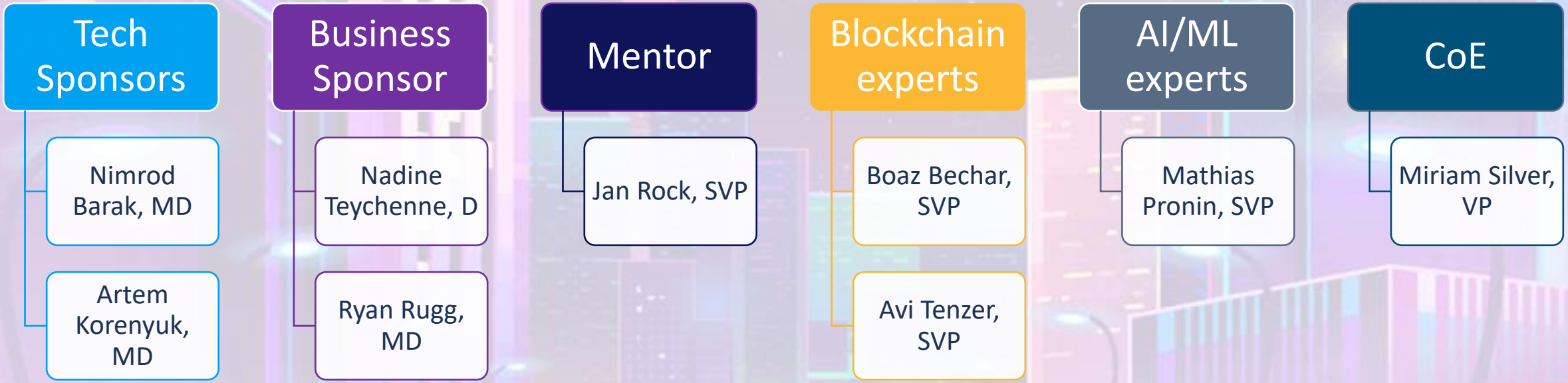
Market Commodity
- ML-based Crude oil index

Global AI Challenge Winner
- ESG funds score prediction

Areas of Expertise

- **AI – lead Data Science project full cycle: data collection, mining, visualization, cleaning, feature engineering, model training and testing, production.**
- **Supervised Machine Learning algorithms for classification and regression,**
- **Deep Learning: RNN and Transformers for Times Series forecasting, Conv Nets for object detection and segmentation.**
- **Blockchain passionate.**
- **Python, SQL**

E4 Partners and Enablers



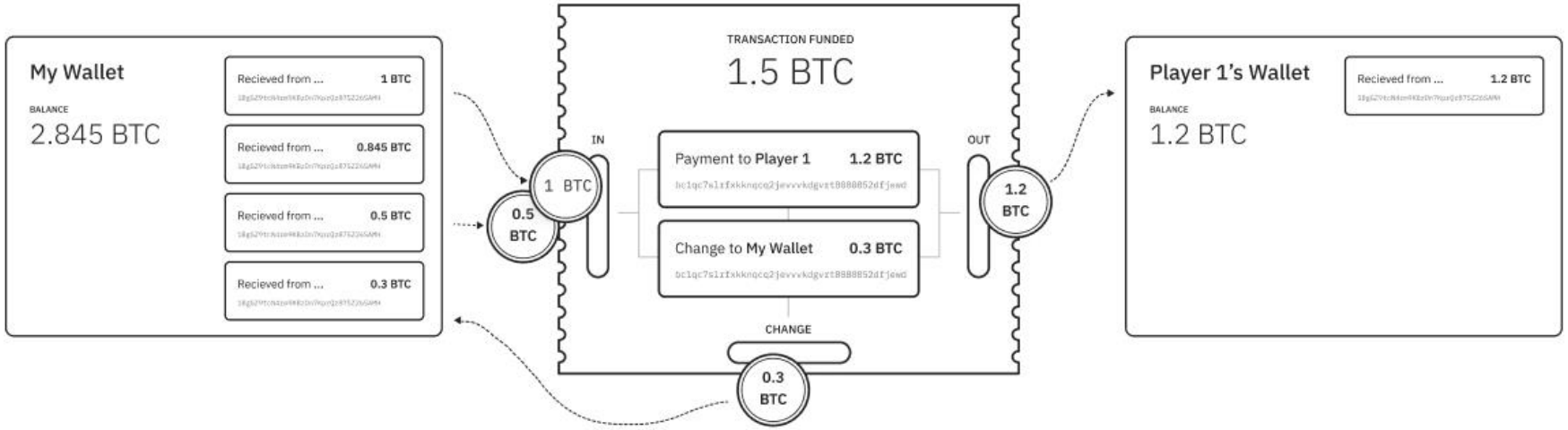
Coin Selection

Coin selection is the process of choosing which **UTXOs** (or “coins”) to use when making an on-chain bitcoin transaction.

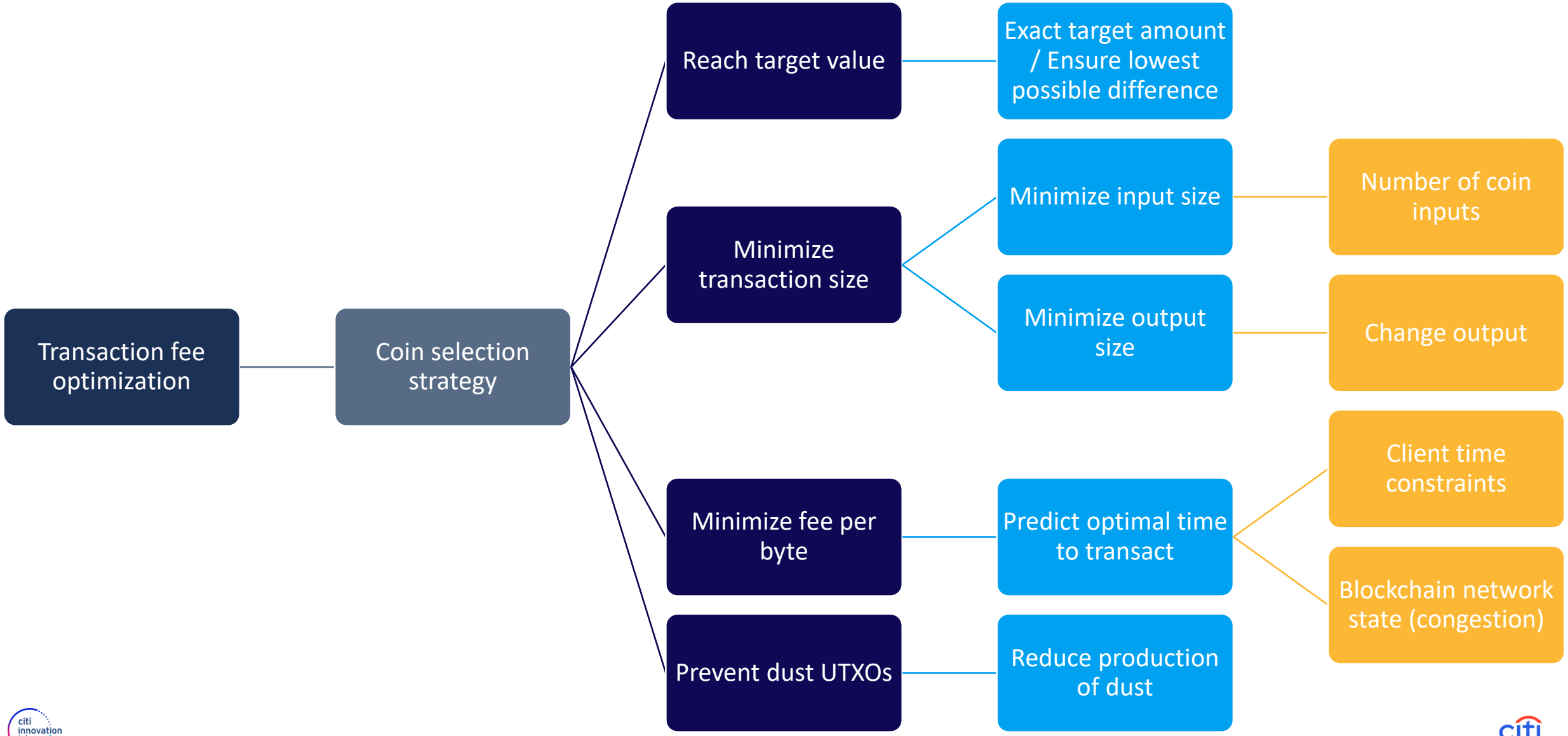
UTXO - Unspent Transaction Output

Distinctive element in a subset of digital currency models. A UTXO represents a certain amount of cryptocurrency that has been authorized by a sender and is available to be spent by a recipient.

On-chain Transaction



Transaction Fee Optimization - Overview



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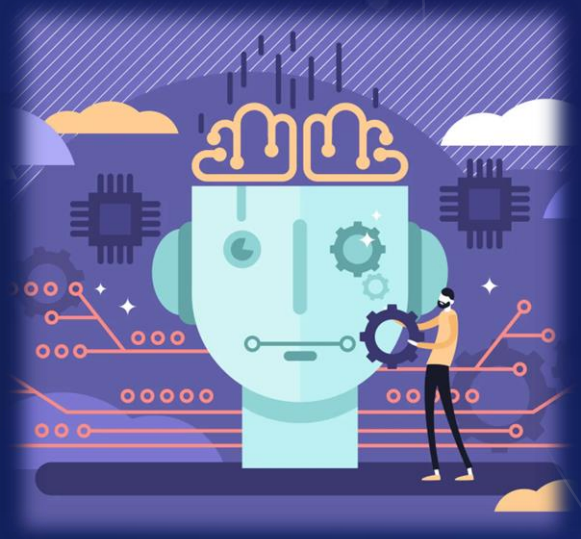
Our Solution: API

ML-powered decision engine for coin selection optimization, cost-effective transaction and dust UTXO prevention.



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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/521,415	11/28/2023 03:47:59 PM Z ET	CITI0438-US (125103-2155)

Title of Invention

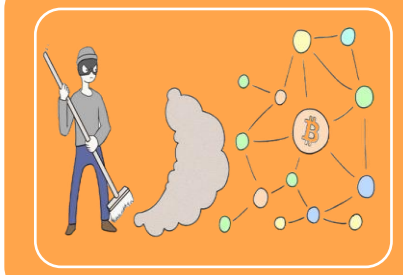
SYSTEMS AND METHODS FOR BLOCKCHAIN NETWORK TRAFFIC MANAGEMENT USING AUTOMATIC COIN SELECTION

Application Information

APPLICATION TYPE	PATENT #
Utility - Nonprovisional Application under 35 USC 111(a)	-

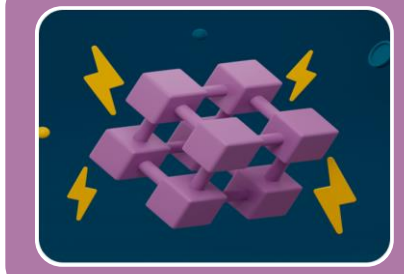
Coin selection optimizer

- Reach target value whilst ensuring the lowest possible difference.
- Limit the number of coins utilised in a transaction.



Dust UTXO risk management

- Combine small UTXOs to prevent dust UTXOs (consolidation)
- Select large amount UTXOs when relevant.



Transaction Fees Prediction

- Times Series ML model to predict transaction fees based on transaction fee historical data and network congestion levels.
- Anticipate timing to perform actual transactions or consolidations.

Wallet Behavior ML-model

- Predict future transaction sizes and UTXO types from past transaction history.
- This allows to select UTXOs that result in optimal change denominations, minimizing the creation of dust UTXOs and ensuring efficient use of the blockchain space.

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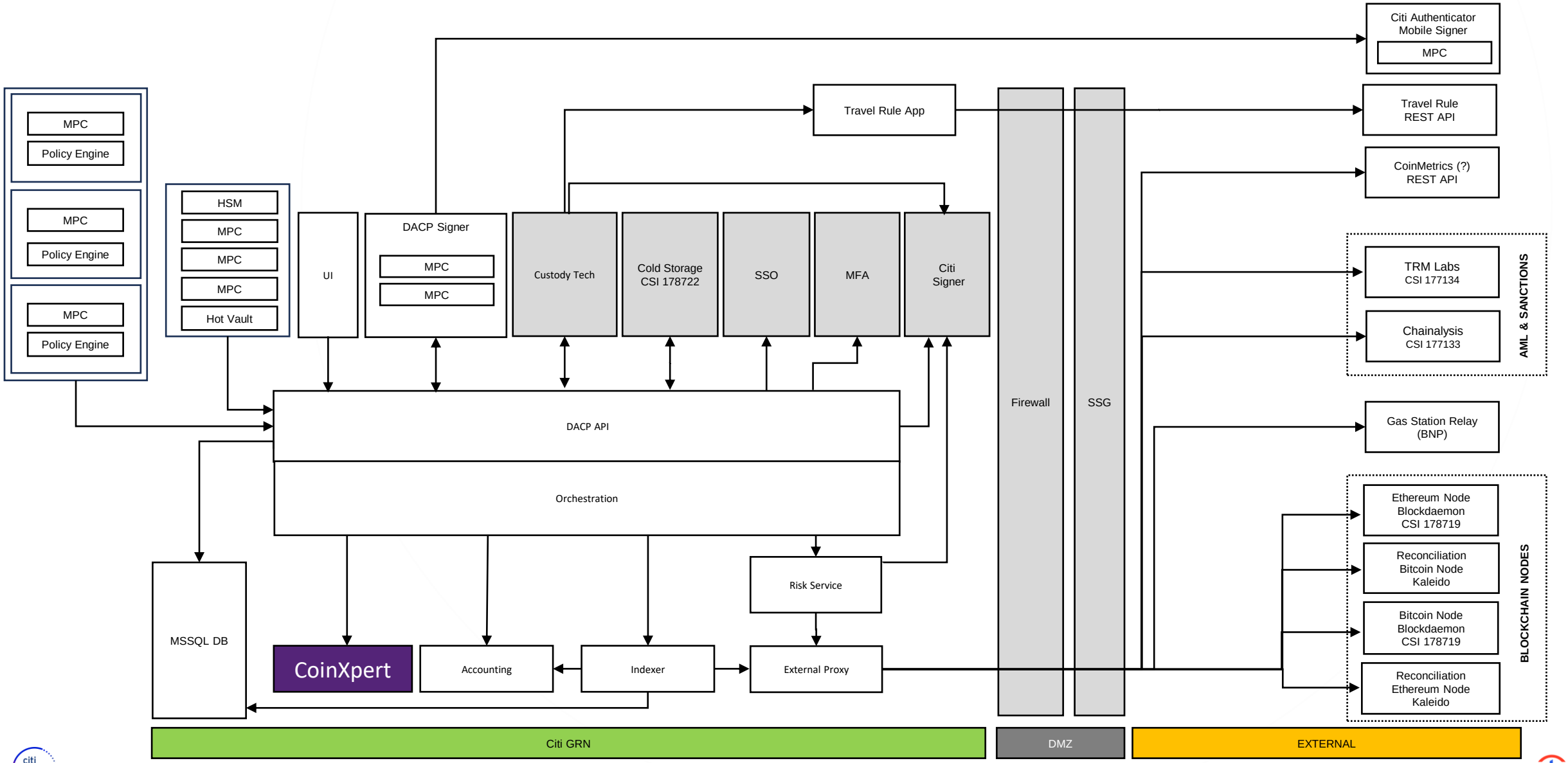
Architecture - Digital Assets Custody Platform



Comprehensive Technical Stack

Development Environment

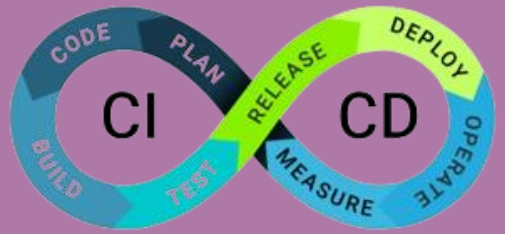
python™

FastAPI

Code Repository & Version Control

Bitbucket

Continuous Integration / Continuous Deployment



LightSpeed

Containerization & Orchestration

OPENSHIFT

Roadmap

Incubator

- Successfully developed baseline coin selection algorithms.
- Constructed a prototype user interface demonstrating CoinXpert's functionality.
- Gathered preliminary feedback from sponsors and potential users.

Algorithmic Maturation & Stakeholder Integration (Months 1-2)

- **Algorithm Optimization**: Apply advanced data structures and computational methods to enhance the efficiency and speed of coin selection algorithms.
- **Sponsor Feedback Loop**: Monthly review cycle to align technical developments with business expectations and gather actionable insights.

Predictive Modelling & Collaborative Refinement (Months 2-3)

- **ML Model Enhancement**: Predictive analytics for fee estimation, incorporating blockchain congestion levels and historical data trends.
- **Cross-Team Synergy**: Establish communication channels with custody solution teams to synchronize the integration strategy.

Roadmap

Integration Development & Robust Testing (Months 3-4)

- **System Integration**: Integration of CoinXpert into the broader custody solution platform, focusing on modularity and system compatibility.
- **Iterative Testing**: Implement automated tests, including unit, integration, and performance testing, to ensure code reliability and meet production standards.

User-Centric Design & In-Depth Beta Trials (Months 4-5)

- **Solution Enhancement**: Overhaul the solution based on feedback to provide seamless integration.
- **Beta Testing Program**: Launch a comprehensive beta testing phase with new transaction data, collecting detailed feedback towards final validation.

Final Optimization & Strategic Launch (Months 5-6)

- **Final Tuning**: beta feedback for final adjustments, ensuring technical excellence and optimal business impact.
- **Strategic Release**: Roll out CoinXpert as an integrated feature within Citi's custody platform, accompanied by documentation and support structures.
- **Post-Launch Roadmap**: ongoing development, maintenance, and feature expansion, informed by continued stakeholder engagement.

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The Lean Canvas

Designed for:	Designed by:	Date:	Version:
CoinXpert	David Bloch (db48046)	11/01/2023	1.5

Problem

Inefficient Transaction Management: blockchain system, much like a complex network of global transactions, accumulates remnants from each digital exchange called UTXOs (akin to leftover foreign currency after an international bank transaction). These need to be efficiently managed to avoid escalating transaction costs.

Slowed Transaction Processing: The buildup of these UTXOs is similar to having numerous small deposits that need to be cleared—each one individually seems insignificant, but collectively they slow down the entire processing system.

Wasted Financial Resources: small UTXOs, below the minimum spendable amount are lost. Over time, with many transactions and UTXOs, these losses can accumulate to significant amounts of value lost..

Existing Alternatives

Standard UTXO Protocols: currently manage thousands of transactions daily but with suboptimal efficiency.

Solution

A ML-powered decision engine for coin selection optimization. For a given transaction, the engine selects the most efficient set of UTXOs from the wallets, considering various factors such as transaction fees historical data, network congestion, future transactions.

Transaction fees prediction to optimize transaction timing, and Wallet Behavior Analysis to forecast future needs, potentially enhancing UTXO management.

Key Metrics

Transaction Fee Reduction: *Goal to decrease transaction fees by 15%.*

Dust Reduction: *Target of 30% reduction in dust generation.*

Operational Efficiency: *Projected to improve transaction processing by 10%.*

Unique Value Prop.

Transaction fee reduction through AI optimization

Dust minimization to improve wallet efficiency and blockchain cleanliness.

Customizable strategies that adapt to transaction patterns, potentially reducing future transaction costs

High-Level Concept

"Blockchain Transaction Optimizer": An AI-powered engine that smartly manages transactions, akin to a financial strategist for digital assets. It expertly manages UTXOs to minimize transaction fees and eradicate 'dust', thereby enhancing overall transactional efficiency and ledger cleanliness.

Unfair Advantage

Protected Innovation: secured a competitive edge though patent submission, ensuring proprietary innovation in blockchain efficiency.

Exclusive Expertise: Leveraging combined in-house blockchain and data science expertise.

Comprehensive UTXO management solution.

Channels

Internal Platforms: Seamless integration with existing Citi technology stacks: Lighspeed, Tekton into Digital Asset Custody Platform.

Innovation Channels: Utilization of Citi's internal innovation hubs for wider rollout.

Customer Segments

- **DLT Custody Services:** Direct impact on client transactions between wallets.
- **Digital Asset customers**
- **Citi Markets**
- **DLT space**

Early Adopters

Digital Asset Custody: Early integration within Digital Asset Custody solution

Citi Digital Custody clients.

Citi's incubator

Cost Structure

- Development: Data Scientist (1)
- Leverage existing Citi Infrastructure: Lightning ML (E4 2022 Sankar Patnaik), LightSpeed, D-Gen (E4 2023 Miriam Silver)
- Blockchain public data

Revenue Streams

- **Direct Cost Savings:** With a 15% fee reduction, potential direct savings scaling with transaction volumes, driving increase in revenue from additional RFP's won.
- **Indirect Savings:** Significant reduction of manual processes for automated solution.
- **Scalability Benefits:** As the system is adopted across various Citi services, potential savings could scale.


Q&A
Thank you!
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