APPENDIX A

TIMEX EXCHANGE DEVELOPMENT PROPOSAL

A Plasma-Based Hybrid Cryptocurrency Exchange for the ChronoBank Ecosystem

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Submitted for TIME Token Holder Vote February 2018

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1. Executive Summary

1.1 Statement of Intent

ChronoBank proposes to develop TimeX, a next-generation hybrid cryptocurrency exchange that combines the speed and user experience of centralised exchanges with the security guarantees of decentralised settlement. Upon approval by TIME token holders, the development team will commence work on this critical infrastructure component of the ChronoBank ecosystem.

1.2 Core Value Proposition

TimeX is designed to address fundamental limitations in the current cryptocurrency exchange landscape. By leveraging the emerging Plasma scaling framework announced in August 2017, TimeX will offer:

- **Real-time order execution** through centralised matching, eliminating the latency issues that plague fully decentralised exchanges
- **Non-custodial security** where users retain control of their funds until settlement
- **On-chain settlement guarantees** via Ethereum smart contracts, providing cryptographic proof of all trades
- **Protection against exchange failures** through the Plasma exit mechanism, ensuring users can always recover their funds

1.3 Strategic Alignment

TimeX directly supports ChronoBank's core mission of labour-hour tokenisation by providing the necessary trading infrastructure for Labour-Hour Tokens (LHT) and the TIME governance token. Without reliable, secure exchange infrastructure, the broader ChronoBank vision cannot achieve mainstream adoption.

1.4 Development Timeline

Upon approval, the development team targets an initial launch in Q4 2018, with a phased rollout of features extending into Q1 2019. This timeline accounts for the complexity of integrating Plasma technology, which remains an active area of research and development in the Ethereum ecosystem.

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2. Market Context and Problem Statement

2.1 Current Exchange Landscape (Late 2017/Early 2018)

The cryptocurrency exchange market in early 2018 is dominated by centralised platforms including Poloniex, Bittrex, Binance (launched July 2017), and HitBTC. While these exchanges offer responsive trading experiences, they suffer from critical structural weaknesses:

Security Vulnerabilities

The aftermath of the Mt. Gox collapse (2014) continues to cast a shadow over the industry, with an estimated 850,000 BTC lost. More recently, the Bitfinex hack of August 2016 resulted in the theft of approximately 120,000 BTC. These incidents demonstrate the inherent risks of entrusting assets to centralised custodians.

Operational Issues

Community feedback, including from our own TIME token holder community, highlights ongoing problems with existing exchanges:

- Withdrawal delays lasting days or weeks
- Arbitrary account freezes without explanation
- Inadequate customer support during high-volume periods
- Manipulation concerns due to opaque order books

Reports from our Telegram community specifically cite difficulties withdrawing TIME tokens from certain exchanges, with some users forced to convert to BTC and transfer out at significant cost and inconvenience.

Counterparty Risk

Users of centralised exchanges must trust the operator with full custody of their funds. This creates a single point of failure and exposes users to:

- Exchange insolvency
- Internal fraud or theft
- Regulatory seizure
- Technical failures

2.2 Early Decentralised Exchange Challenges

The emergence of decentralised exchanges (DEXs) such as EtherDelta (launched 2016) represents an attempt to address custodial risks. However, current DEX implementations face significant limitations:

Performance Constraints

- Ethereum mainnet throughput of approximately 15 transactions per second creates bottlenecks during high activity
- Transaction finality times of 15+ seconds make real-time trading impractical
- Gas costs make small trades economically unviable

Front-Running Vulnerabilities

On-chain order books are visible in the mempool before confirmation, allowing miners and sophisticated actors to:

- Insert transactions ahead of known orders
- Extract value from legitimate traders
- Manipulate price discovery

Order Collision

Multiple users attempting to fill the same order simultaneously results in failed transactions and wasted gas fees. This creates a poor user experience and unfair advantages for users with superior network connectivity.

Liquidity Fragmentation

The poor user experience of current DEXs results in thin order books and wide spreads, creating a negative feedback loop that discourages adoption.

2.3 The Hybrid Exchange Opportunity

TimeX is designed to capture the best attributes of both centralised and decentralised approaches:

Attribute	Centralised	Decentralised	TimeX (Hybrid)
Order Execution Speed	Fast	Slow	Fast
User Experience	Excellent	Poor	Excellent
Custody Risk	High	None	None
Front-Running	Possible	Severe	Prevented
Settlement Guarantee	Trust-based	Cryptographic	Cryptographic
Regulatory Clarity	Established	Uncertain	Balanced

By processing orders off-chain while settling on-chain, TimeX achieves the performance characteristics users expect while maintaining the security guarantees that distinguish blockchain technology.

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3. Technical Architecture

3.1 Plasma Framework Overview

In August 2017, Vitalik Buterin and Joseph Poon published the Plasma whitepaper, describing a framework for scalable blockchain computation. ChronoBank proposes to leverage this emerging technology for the TimeX exchange infrastructure.

Core Plasma Concepts

Plasma introduces the concept of "child chains" that operate alongside the Ethereum mainnet (the "root chain"). These child chains can process transactions at high throughput while periodically committing state summaries to the root chain.

Key properties relevant to TimeX:

1. **Scalability**: Child chains can process thousands of transactions per second, unconstrained by mainnet limitations
2. **Security Inheritance**: The child chain inherits security guarantees from Ethereum through periodic state commitments
3. **Exit Mechanism**: Users can always withdraw their funds to the root chain, even if the child chain operator becomes malicious or unresponsive
4. **Fraud Proofs**: Invalid state transitions can be challenged and proven on the root chain

Application to Exchange Architecture

TimeX will utilise Plasma principles to create a high-performance trading environment:

- Trade matching and execution occur on the TimeX child chain
- Periodic state commitments (Merkle roots of account balances) are published to Ethereum
- Users can initiate withdrawals at any time through the Plasma exit mechanism
- Disputed states can be challenged using fraud proofs

3.2 Hybrid Architecture Design

The TimeX architecture comprises the following components:

Off-Chain Components

Component	Function
Order Matching Engine	High-performance matching of buy/sell orders
Order Book Management	Maintenance of real-time order books for all trading pairs
WebSocket Server	Real-time market data distribution to clients
API Gateway	REST and WebSocket interfaces for programmatic access
User Authentication	Secure session management and two-factor authentication

On-Chain Components (Ethereum Mainnet)

Contract	Function
Deposit Contract	Receives and records user deposits
Plasma Root Contract	Accepts state commitments, processes exits and challenges
Withdrawal Contract	Processes user withdrawal requests
Governance Contract	Manages protocol upgrades and parameter changes

Hybrid Flow

1. **Deposit**: User sends assets to the Deposit Contract on Ethereum mainnet
2. **Credit**: TimeX credits the user's balance on the child chain
3. **Trading**: Orders are matched off-chain with instant execution
4. **Settlement**: Trades are recorded on the child chain with periodic state commitments to mainnet
5. **Withdrawal**: User initiates withdrawal; after challenge period, funds are released from mainnet contract

3.3 Order Matching Engine Specifications

The TimeX matching engine will be designed for high performance and fairness:

Performance Targets

- Latency: < 10 milliseconds for order acknowledgment
- Throughput: 10,000+ orders per second capacity
- Availability: 99.9% uptime target

Matching Algorithm

- Price-time priority (FIFO within price level)
- Support for market, limit, and stop-loss order types
- Partial fill handling with remainder on book

Fairness Guarantees

- Deterministic matching based on order arrival time
- No preferential treatment for any participant
- Audit logs for all order events

3.4 Security Model

Front-Running Prevention

TimeX prevents front-running through several mechanisms:

1. **Encrypted Order Submission**: Orders are encrypted in transit and only decrypted by the matching engine
2. **Centralised Sequencing**: The matching engine assigns definitive sequence numbers, eliminating race conditions
3. **Commitment Schemes**: For large orders, traders may optionally use commit-reveal schemes

Order Collision Avoidance

Unlike on-chain DEXs, TimeX's centralised matching ensures exactly one party fills each order, with no wasted gas or failed transactions.

Withdrawal Guarantees

The Plasma exit mechanism ensures users can always recover their funds:

1. User submits withdrawal request with Merkle proof of balance
2. Challenge period allows disputes of invalid claims
3. After challenge period (proposed: 7 days), funds are released
4. In case of operator misbehavior, users can force exit with the last valid state

Third-Party Security Audits

Prior to launch, TimeX smart contracts will undergo:

- At least two independent security audits from recognised firms
- Public bug bounty program with meaningful rewards
- Formal verification of critical contract functions where feasible

3.5 Smart Contract Architecture

Deposit Contract

```
 Functions:
- deposit(token, amount): Accept ERC20 token deposits
- depositETH(): Accept ETH deposits (payable)

Events:
- Deposited(user, token, amount, depositId)
```

Plasma Root Contract

```
 Functions:
- submitBlock(merkleRoot, blockNumber): Operator submits state commitment
- startExit(token, amount, proof): User initiates withdrawal
- challengeExit(exitId, proof): Challenge invalid exit attempt
- finaliseExit(exitId): Complete exit after challenge period

Events:
- BlockSubmitted(blockNumber, merkleRoot)
- ExitStarted(exitId, user, token, amount)
- ExitChallenged(exitId, challenger)
- ExitFinalised(exitId)
```

Withdrawal Contract

```
 Functions:
- processWithdrawal(exitId): Transfer funds after successful exit
- emergencyWithdraw(proof): Bypass normal flow in case of operator failure

Events:
- WithdrawalProcessed(user, token, amount)
```

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4. Product Features and Functionality

4.1 Trading Interface

TimeX will provide a professional-grade trading interface suitable for both retail and institutional users:

Order Book Display

- Real-time bid/ask depth visualisation
- Configurable decimal precision
- Aggregated and detailed views

Order Types

Order Type	Description
Market	Immediate execution at best available price
Limit	Execute at specified price or better
Stop-Loss	Trigger market order when price reaches threshold
Stop-Limit	Trigger limit order when price reaches threshold

Charting and Analysis

- Candlestick charts with configurable timeframes
- Volume indicators
- Basic technical analysis tools (moving averages, RSI, MACD)
- Price alerts

Trade History

- Complete personal trade history
- Export functionality (CSV, JSON)
- Tax reporting assistance

4.2 API and Algorithmic Trading

TimeX will provide comprehensive API access for programmatic trading:

REST API

- Account management (balances, deposits, withdrawals)
- Order management (place, cancel, query)

- Market data (order book snapshots, recent trades)
- Rate limits: 1,000 requests per minute (standard), higher tiers available

WebSocket API

- Real-time order book updates
- Trade execution notifications
- Account balance updates
- Sub-millisecond latency

FIX Protocol Support

For institutional traders requiring industry-standard connectivity, TimeX plans to offer FIX (Financial Information eXchange) protocol support. This will enable:

- Integration with existing trading systems
- Familiar interface for traditional finance participants
- Low-latency order routing

Authentication

- API key/secret pairs for programmatic access
- IP whitelisting
- Request signing for security
- Two-factor authentication for sensitive operations

4.3 Fiat Integration Strategy

Recognising that cryptocurrency adoption requires accessible on-ramps, TimeX will prioritise fiat currency integration:

Initial Focus: Australian Dollar (AUD)

Given ChronoBank's Australian presence, the initial fiat integration will focus on AUD:

- Bank transfer deposits (BPAY, direct transfer)
- Credit/debit card processing (subject to payment processor partnerships)
- Same-day AUD withdrawal to Australian bank accounts

Compliance Requirements

Fiat integration necessitates robust compliance infrastructure:

- Customer identity verification (KYC)
- Transaction monitoring
- Suspicious activity reporting
- Record retention

Future Fiat Expansion

Subject to regulatory approval and business development, future fiat currencies may include:

- USD (United States Dollar)
- EUR (Euro)
- GBP (British Pound)

4.4 Supported Assets

Launch Assets

Asset	Type	Notes
TIME	ERC20	ChronoBank governance token
LHT	ERC20	Labour-Hour Token (when available)
ETH	Native	Ethereum
BTC	Bridged	Via atomic swap or wrapped token

Asset Listing Criteria

New assets will be evaluated based on:

- Technical compatibility (ERC20 standard compliance)
- Security (contract audit status)
- Regulatory status
- Community demand
- Liquidity potential

4.5 Mobile Access

Responsive Web Application

The TimeX web interface will be fully responsive, providing functional trading access from mobile devices through standard web browsers.

Native Mobile Applications

Following web launch, native mobile applications are planned:

- iOS application (iPhone, iPad)
- Android application

- Push notifications for price alerts and order fills
- Biometric authentication support

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5. Fee Structure and Economic Model

5.1 Trading Fees

TimeX will employ a maker-taker fee model that incentivises liquidity provision:

Fee Type	Rate	Description
Taker Fee	0.50%	Orders that remove liquidity
Maker Fee	0.25%	Orders that add liquidity

These rates are competitive with major exchanges and may be adjusted based on market conditions and competitive dynamics.

Volume Discounts

High-volume traders will receive fee discounts based on 30-day rolling volume:

30-Day Volume (USD equivalent)	Taker Fee	Maker Fee
< $50,000	0.50%	0.25%
$50,000 - $250,000	0.40%	0.20%
$250,000 - $1,000,000	0.30%	0.15%
> $1,000,000	0.20%	0.10%

5.2 TIME Token Integration

TIME token holders will receive preferential treatment on the TimeX platform:

Fee Discounts

Verified TIME token holders receive additional fee discounts:

TIME Holdings	Additional Discount
10+ TIME	10% off fees
100+ TIME	20% off fees
500+ TIME	30% off fees

Governance Participation

TIME token holders may participate in governance decisions affecting TimeX:

- Listing new trading pairs
- Fee structure adjustments
- Feature prioritisation

Priority Access

TIME token holders will receive:

- Early access to new features during beta periods
- Priority customer support
- Invitation to community events and AMAs

5.3 Deposit and Withdrawal Fees

Asset Type	Deposit Fee	Withdrawal Fee
Cryptocurrency	Free	Network fee only
AUD (Bank Transfer)	Free	$2.50 AUD
AUD (Card)	2.5%	N/A

5.4 Revenue Allocation

Trading fee revenue will be allocated as follows:

- Operations and infrastructure: 60%
- Development and improvement: 25%
- Security reserves: 10%
- Community initiatives: 5%

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6. Regulatory and Compliance Framework

6.1 Australian Regulatory Environment

TimeX will operate in compliance with Australian regulations governing digital currency exchanges:

AUSTRAC Registration

The Australian Transaction Reports and Analysis Centre (AUSTRAC) requires digital currency exchange providers to register and comply with Anti-Money Laundering and Counter-Terrorism Financing (AML/CTF) obligations. TimeX will:

- Register with AUSTRAC prior to offering fiat services
- Implement compliant AML/CTF programs
- Conduct ongoing customer due diligence
- Report suspicious matters and threshold transactions

ASIC Considerations

The Australian Securities and Investments Commission (ASIC) may have jurisdiction over certain digital assets. TimeX will:

- Monitor regulatory guidance on token classification
- Seek legal advice on listing decisions
- Cooperate with regulatory inquiries

6.2 KYC/AML Implementation

Identity Verification Tiers

Tier	Requirements	Limits
Basic	Email verification	Crypto-only, limited volume
Standard	Government ID, address proof	Full crypto access
Enhanced	Enhanced due diligence	Fiat access, unlimited

Transaction Monitoring

TimeX will implement automated transaction monitoring to detect:

- Structuring (breaking transactions to avoid thresholds)
- Rapid movement of funds

- Transactions with high-risk jurisdictions
- Unusual trading patterns

6.3 Geographic Restrictions

Certain jurisdictions will be restricted from TimeX access due to regulatory requirements or sanctions:

- United States (pending regulatory clarity)
- North Korea
- Iran
- Other sanctioned jurisdictions per Australian requirements

Geofencing will be implemented at the application level, with additional verification for borderline cases.

6.4 Compliance Team

TimeX will establish a dedicated compliance function:

- Chief Compliance Officer reporting to CEO
- KYC/AML analysts
- Legal counsel (retained or in-house)
- Regular compliance training for all staff

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7. Development Roadmap

Phase 1: Foundation (Q1-Q2 2018)

Objectives

- Establish core development team
- Complete technical architecture design
- Develop and audit smart contracts
- Build matching engine prototype

Deliverables

Deliverable	Target Date
Technical specification document	April 2018

Deliverable	Target Date
Smart contract development complete	May 2018
First security audit complete	June 2018
Matching engine prototype	June 2018

Phase 2: Development (Q2-Q3 2018)

Objectives

- Build production matching engine
- Develop settlement layer
- Create trading user interface
- Implement API infrastructure

Deliverables

Deliverable	Target Date
Production matching engine	August 2018
Settlement layer integration	September 2018
Trading UI beta	September 2018
REST and WebSocket APIs	September 2018

Phase 3: Testing (Q3-Q4 2018)

Objectives

- Internal testing and QA
- Closed beta with selected users
- Security audit (second round)
- Bug bounty program launch

Deliverables

Deliverable	Target Date
Internal alpha launch	October 2018

Deliverable	Target Date
Closed beta launch	November 2018
Second security audit complete	November 2018
Bug bounty program live	November 2018

Phase 4: Launch (Q4 2018 - Q1 2019)

Objectives

- Soft launch with limited trading pairs
- Gradual feature rollout
- Marketing and user acquisition
- Full public launch

Deliverables

Deliverable	Target Date
Soft launch (TIME/ETH, LHT/ETH)	December 2018
Additional trading pairs	January 2019
Fiat integration (AUD)	Q1 2019
Mobile applications	Q2 2019

Contingency Planning

The development timeline includes buffer for:

- Plasma framework maturation (active research area)
- Security audit findings requiring remediation
- Regulatory requirements that emerge during development

The team will provide regular progress updates to TIME token holders and adjust timelines as necessary with full transparency.

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8. Team and Resource Requirements

8.1 Core Team Positions

The following roles are required for TimeX development:

Technical Leadership

Role	Responsibilities
Lead Blockchain Engineer	Plasma integration, smart contract architecture
Lead Backend Engineer	Matching engine, API infrastructure
Lead Frontend Engineer	Trading interface, user experience

Development Team

Role	Count	Responsibilities
Smart Contract Developer	2	Contract development, testing, deployment
Backend Engineer	3	Matching engine, APIs, data infrastructure
Frontend Engineer	2	Web interface, mobile applications
QA Engineer	2	Testing, quality assurance

Operations and Support

Role	Count	Responsibilities
Security Engineer	1	Security architecture, incident response
DevOps Engineer	2	Infrastructure, deployment, monitoring
Customer Support	3+	User assistance, issue resolution
Compliance Officer	1	Regulatory compliance, KYC/AML

8.2 External Resources

Security Auditors

Engagement of at least two reputable smart contract auditing firms for independent security review.

Legal Counsel

Retained legal counsel specialising in:

- Cryptocurrency regulation
- Australian financial services law
- Data privacy and protection

Payment Processors

Partnerships with licensed payment processors for fiat integration.

8.3 Infrastructure Requirements

Hosting and Compute

- Geographically distributed data centers
- High-availability architecture
- DDoS protection
- Automated failover

Security Infrastructure

- Hardware security modules (HSMs) for key management
- Intrusion detection systems
- Security information and event management (SIEM)
- Penetration testing program

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9. Risk Assessment and Mitigation

9.1 Technical Risks

Plasma Framework Maturity

Risk: Plasma remains an emerging technology with ongoing research. Production implementations may encounter unforeseen challenges.

Mitigation: - Active participation in Plasma research community - Fallback architecture that can operate without full Plasma functionality - Conservative approach to new features - Collaboration with other Plasma implementers

Smart Contract Vulnerabilities

Risk: Smart contract bugs could result in loss of user funds or exchange manipulation.

Mitigation: - Multiple independent security audits - Formal verification where feasible - Bug bounty program with significant rewards - Gradual rollout with deposit limits - Emergency pause functionality

Scalability Limitations

Risk: User growth may exceed system capacity, resulting in degraded performance.

Mitigation: - Horizontal scaling architecture - Load testing and capacity planning - Rate limiting and fair queuing - Clear communication during high-load periods

9.2 Market Risks

Competition

Risk: Established exchanges and new entrants may capture market share.

Mitigation: - Differentiation through security model - Integration with ChronoBank ecosystem - Competitive fee structure - Superior user experience

Cryptocurrency Market Conditions

Risk: Prolonged market downturns may reduce trading volume and revenue.

Mitigation: - Conservative financial planning - Diversified revenue streams (fees, services) - Operating efficiency focus - Reserve fund maintenance

Liquidity

Risk: Insufficient liquidity may result in poor spreads and user attrition.

Mitigation: - Market maker partnerships - Liquidity incentive programs - Strategic trading pair selection - Cross-exchange arbitrage facilitation

9.3 Regulatory Risks

Evolving Regulations

Risk: Regulatory changes may impose additional compliance burdens or restrict operations.

Mitigation: - Proactive regulatory engagement - Flexible compliance architecture - Legal monitoring and analysis - Geographic diversification planning

Licensing Requirements

Risk: New licensing requirements may create barriers to operation.

Mitigation: - Early engagement with regulators - Compliance-first approach - Legal reserve fund - Industry association participation

9.4 Operational Risks

Key Person Dependency

Risk: Loss of critical team members may impact development or operations.

Mitigation: - Knowledge documentation - Cross-training programs - Competitive compensation - Succession planning

Cybersecurity Incidents

Risk: Hacking attempts, social engineering, or insider threats.

Mitigation: - Defense in depth security model - Regular security training - Background checks for sensitive roles - Incident response planning

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10. Request for Approval

10.1 Summary

ChronoBank respectfully requests TIME token holder approval to proceed with the development of TimeX, a Plasma-based hybrid cryptocurrency exchange, as described in this proposal.

10.2 What Approval Authorises

Approval of this proposal authorises the ChronoBank Entity to:

1. Allocate development resources to the TimeX project
2. Engage external contractors, auditors, and service providers as required
3. Expend project funds in furtherance of TimeX development
4. Enter into necessary legal and commercial arrangements
5. Proceed with regulatory filings and licensing applications

10.3 Commitments

Upon approval, ChronoBank commits to:

- Provide regular progress updates to the TIME token holder community
- Publish development milestones and timelines
- Conduct development in accordance with the technical approach described herein
- Maintain transparency regarding material changes or challenges
- Seek further approval for significant deviations from this proposal

10.4 Accountability

The ChronoBank team acknowledges that this proposal represents a commitment to the TIME token holder community. While development involves inherent uncertainties and this proposal does not guarantee specific outcomes, the team commits to executing the project with diligence, professionalism, and in the best interests of the ChronoBank ecosystem.

Document End

This proposal forms part of the materials submitted for the TIME Token Holder Vote on the Updated ChronoBank White Paper, February 2018.