

# Drex Complete System Rewrite - Development Estimates

## Total LOC Breakdown (Production-Ready)

### Core CBDC Platform

COMPONENTE	LOC	TECNOLOGIA	COMPLEXIDADE
DLT Core Engine	180,000	Rust	Alta
Consensus (Custom QBFT)	45,000	Rust	Crítica
ZK Privacy Layer	120,000	Circom/Halo2	Extrema
Smart Contract VM	85,000	Rust/WASM	Alta
P2P Network Stack	65,000	libp2p	Média

### Bacen Legacy Integration

SISTEMA	LOC	TECH STACK	DIFICULDADE
STR Interface	95,000	Java/MQ Series	Crítica
SPI Gateway	75,000	Java/REST	Alta
Selic Integration	110,000	Java/SOAP	Extrema
RSFN Protocol	40,000	C++/Network	Alta
Compliance Engine	160,000	Java/Rules Engine	Crítica

### Application Layer

MÓDULO	LOC	FRAMEWORK	PRIORITY
Bank APIs	120,000	Spring Boot	P0
Mobile SDKs	85,000	React Native/Flutter	P0
Admin Dashboards	95,000	React/Angular	P1
Monitoring/Alerting	65,000	Prometheus/Grafana	P1
Audit/Reporting	140,000	Apache Spark	P0

### Security & Operations

ÁREA	LOC	SPECIALTY	RISK
TEE Integration	55,000	Intel SGX/AMD SEV	Alto
HSM Interface	35,000	PKCS#11	Crítico
Key Management	75,000	Vault/Custom	Crítico
Threat Detection	85,000	ML/Analytics	Médio
Disaster Recovery	45,000	Infrastructure	Alto

TOTAL: 1,580,000 LOC

Comparação com Sistemas Similares:

- Bitcoin Core: ~150,000 LOC
- Ethereum: ~500,000 LOC
- Hyperledger Fabric: ~300,000 LOC
- Traditional Bank Core: ~2,000,000+ LOC
- Fed Wire/RTGS: ~800,000 LOC

✓ ESTIMATIVA REALISTA: 1.5M LOC está dentro do esperado para CBDC nacional

Sprint Planning - Metodologia Ágil Enterprise

Assumptions:

- Team Size: 120 desenvolvedores (15 squads × 8 devs)
- Sprint Duration: 2 semanas
- Velocity: 800 LOC/dev/sprint (enterprise quality)
- Code Coverage: 85%+ com testes

Delivery Timeline:

Fase 1: Core Infrastructure (Sprints 1-24)

Duração: 12 meses

SPRINT	ENTREGÁVEL	LOC	SQUAD RESPONSÁVEL
1-4	DLT Core + Basic Consensus	45,000	Core Platform
5-8	P2P Network + Node Discovery	35,000	Network
9-12	Smart Contract VM MVP	25,000	VM/Runtime
13-16	Basic ZK Proofs (sem privacy)	30,000	Cryptography
17-20	STR Integration Layer	40,000	Legacy Integration
21-24	Monitoring + Basic APIs	35,000	DevOps/API

Milestone 1: Sistema básico funcional (210,000 LOC)

Fase 2: Privacy + Banking Integration (Sprints 25-48)

Duração: 12 meses

SPRINT	ENTREGÁVEL	LOC	CRÍTICO
25-28	Advanced ZK Privacy	45,000	✓
29-32	TEE Integration	40,000	✓
33-36	SPI + Instant Payments	50,000	✓
37-40	Bank APIs + SDK	55,000	✓
41-44	Compliance Engine	60,000	✓
45-48	Mobile Apps MVP	35,000	-

**Milestone 2:** Banking-ready platform (495,000 LOC total)

**Fase 3: Production Hardening (Sprints 49-72)**

**Duração:** 12 meses

SPRINT	ENTREGÁVEL	LOC	RISK MITIGATION
49-52	Selic + Securities	70,000	Alto
53-56	Advanced Compliance/AML	80,000	Crítico
57-60	Disaster Recovery	45,000	Alto
61-64	Performance Optimization	25,000	Médio
65-68	Security Audit + Fixes	35,000	Crítico
69-72	Production Deployment	30,000	Alto

**Milestone 3:** Production-ready system (780,000 LOC total)

**Fase 4: Scale + Advanced Features (Sprints 73-96)**

**Duração:** 12 meses

SPRINT	ENTREGÁVEL	LOC	INNOVATION
73-76	Cross-border Payments	85,000	Alto
77-80	AI-powered Fraud Detection	90,000	Alto
81-84	Advanced Analytics	65,000	Médio
85-88	Multi-currency Support	75,000	Médio
89-92	Integration Testing	20,000	-
93-96	Performance Tuning	15,000	-

**Final:** Feature-complete system (1,130,000 LOC)

**Fase 5: Ecosystem + Innovation (Sprints 97-120)**

**Duração:** 12 meses

Remaining 450,000 LOC para:

- DeFi protocols integration
- IoT payments
- Programmable money advanced features
- International partnerships APIs

**TOTAL: 120 Sprints = 60 Meses = 5 Anos**

### **Critical Path Dependencies:**

1. **Consensus Mechanism** → Blocks everything else
2. **Privacy Layer** → Blocks banking integration
3. **Legacy STR/SPI** → Blocks production deployment
4. **Compliance Engine** → Blocks regulatory approval
5. **Security Audit** → Blocks go-live

### **Risk Mitigation:**

- **Parallel Development:** Network + VM teams work simultaneously
- **Incremental Integration:** Test with legacy systems early
- **Regulatory Sandbox:** Deploy limited features for validation
- **Code Reuse:** Leverage existing open source (30% LOC reduction)