IIIT & CO.

“DeFi-Enabled Agricultural Insurance Platform for India”

Blockchain × Smart Contracts × CBDC for Faster, Transparent & Automated Insurance

Presented To:

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CIRCULAR ECONOMY
IN BLOCKCHAIN ENVIRONMENT

OVERVIEW

1. INDIA’S INSURANCE GAP & SYSTEMIC CHALLENGES

- India’s agriculture employs nearly half the workforce, contributing 18.2% of GDP, yet crop insurance penetration remains only 24–27%, burdened by manual CCEs, long claim delays of 8–14 months, and declining farmer trust. Operational inefficiencies, documentation load, and a 507% claim ratio reflect a system unable to serve 146M farmers effectively.

2. OPPORTUNITY FOR A TECHNOLOGY-DRIVEN TRANSFORMATION

- With a USD 4.8–5.4B serviceable market and improving digital readiness—satellite imagery, blockchain maturity, and active CBDC pilots—India is uniquely positioned to modernize agricultural insurance. A shift toward automated, data-driven, and transparent systems can bridge gaps in speed, accuracy, and coverage..

3. PROPOSED DEFI-ENABLED INTEGRATED SOLUTION

- This project introduces a unified platform combining blockchain, AI-driven damage recognition, smart contracts, and CBDC payouts to automate claims, reduce settlement time to 24–48 hours, cut costs by 60–70%, and rebuild farmer confidence. The model delivers precision, transparency, and scalability across the entire insurance lifecycle.

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CURRENT SYSTEM CHALLENGES

- CLAIM DELAYS: 8–14 MONTHS
- MANUAL CROP CUTTING EXPERIMENTS (CCES)
- MASSIVE DOCUMENTATION
- LOW TRANSPARENCY
- HIGH CLAIM RATIO 507% → FISCAL STRAIN
- DECLINING ENROLLMENT (5.7 CR → 2.4 CR)

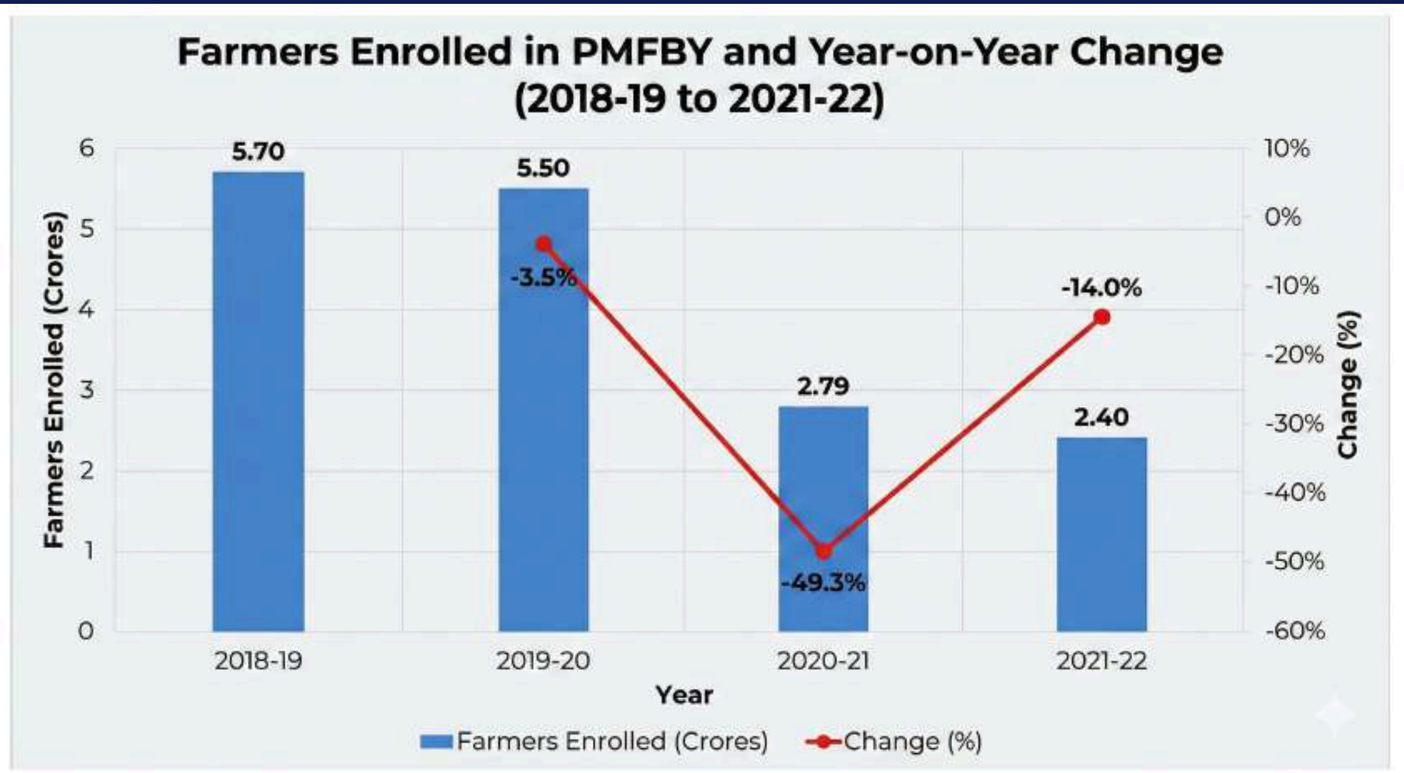


Fig: PMFBY Enrollment Trends

WHY CHANGE IS NEEDED NOW ?

- 24–48 HOUR SETTLEMENTS
- AUTOMATED DAMAGE ASSESSMENT
- FARM-LEVEL PRECISION
- TRANSPARENT AUDITABILITY
- COST EFFICIENCY & SCALABILITY

MARKET SIZE (TAM–SAM–SOM)

World map with insurance market size hotspots, highlighting India and Asia-Pacific.

PARAMETER	VALUE
GLOBAL MARKET SIZE (2024)	USD 48.36 B
PROJECTED MARKET SIZE (2033)	USD 95.41 B
CAGR (2024 - 2033)	7.8 %
ASIA-PACIFIC SHARE	32 -35 %

GLOBAL TAM: USD 95.41B BY 2033

SOM:

- **PHASE 1: 10–15M FARMERS**
- **PHASE 2: 25–30M FARMERS**

INDIA SAM: USD 4.8–5.4 BILLION

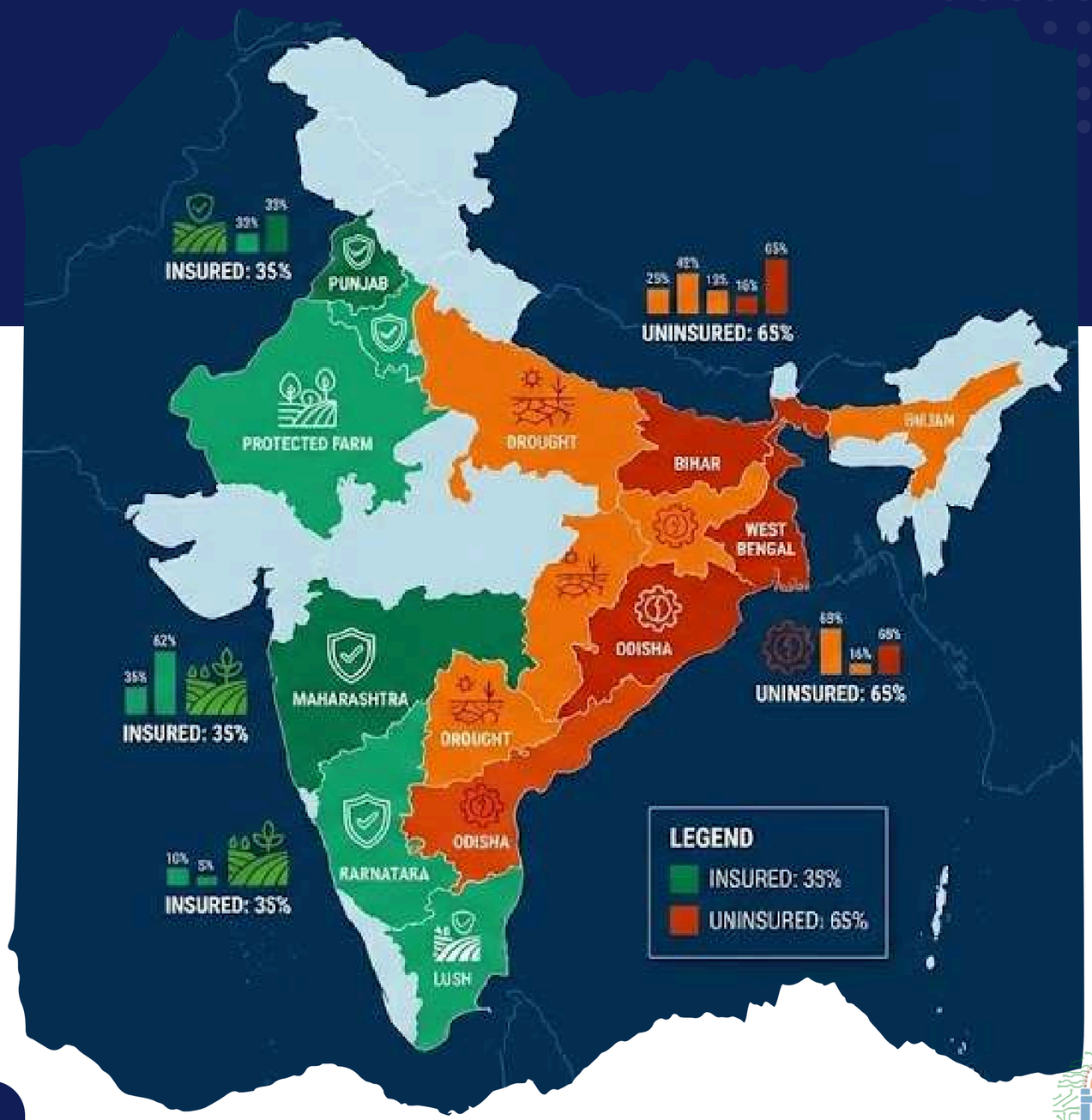
FARMER BASE & PENETRATION GAP

146.45M OPERATIONAL HOLDINGS

36–40M INSURED (ONLY ¼ COVERAGE)

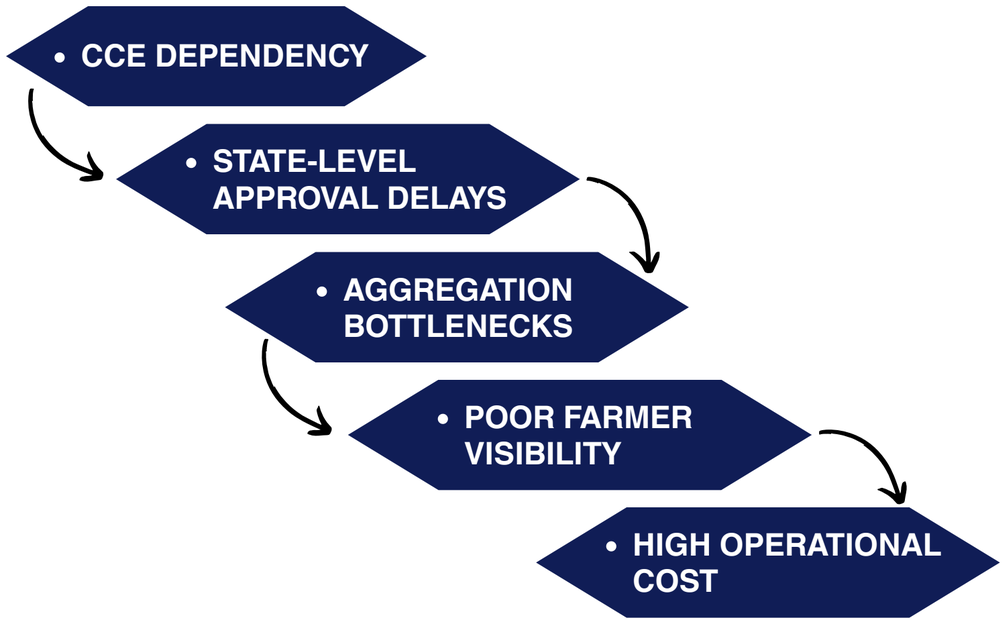
PREMIUM POTENTIAL: ₹15,000–20,000 CR

GOVT SUBSIDY POOL: ₹30,000–40,000 CR



PMFBY: STRUCTURAL BOTTLENECKS

PARAMETERS	VALUE (2016 -2024)
TOTAL APPLICATION PROCESSED	361.55 Million
SUM INSURED	₹15.97 Lakh Crore
FARMER PREMIUM CONTRIBUTION	₹28,000 Crores
TOTAL CLAIMS PAID	₹1,42,000 Crores
CLAIM RATIO	507%
AVERAGE ANNUAL COVERAGE	5.5 Crore Farmers



OPPORTUNITY FOR DISRUPTION

Satellite infrastructure matured

Blockchain Smart - contracts stable

700M+ Rural Mobile Users

CBDC Operational (5M+ Users)

DEFI AGRICULTURAL INSURANCE ARCHITECTURE

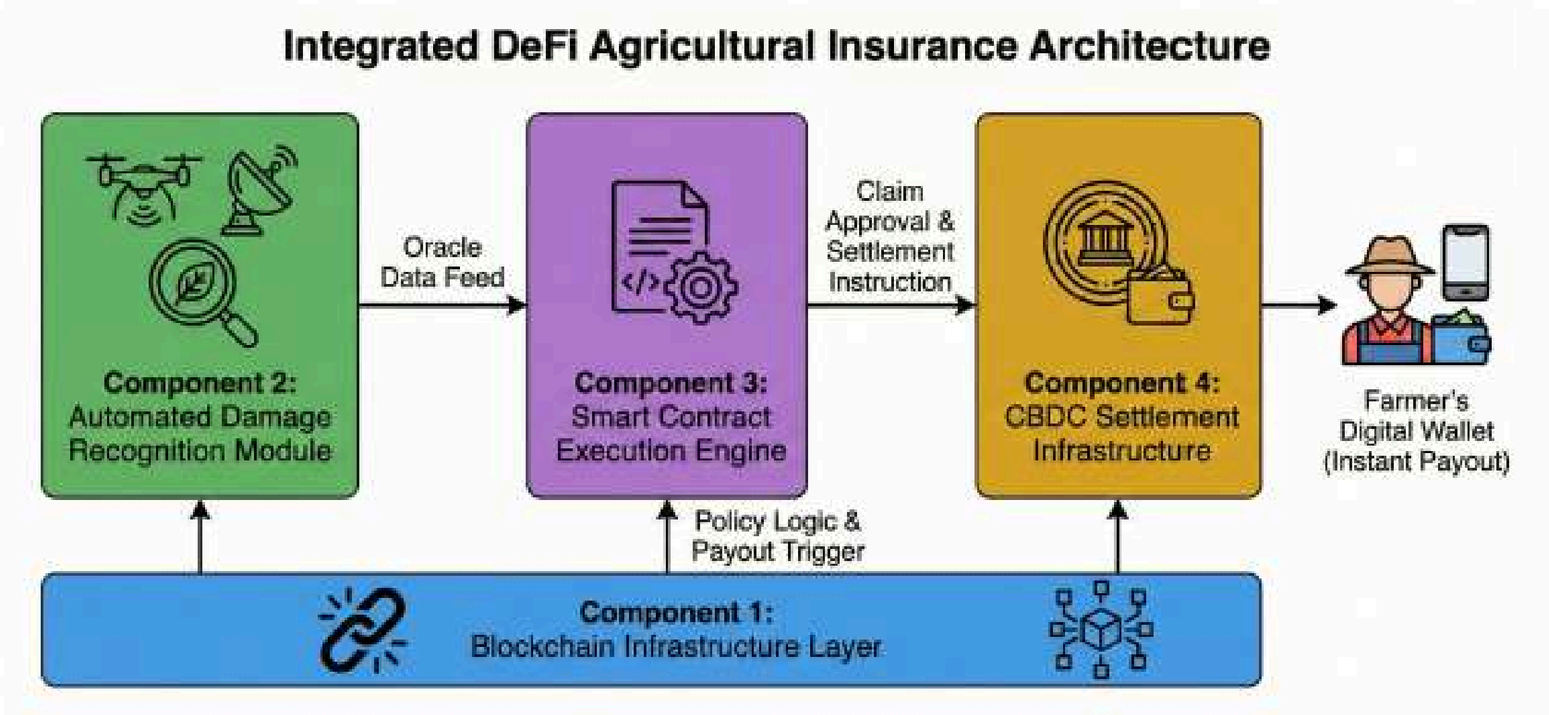


Figure 1: Integrated DeFi Agricultural Insurance Architecture

FOUR LAYERS

- BLOCKCHAIN NETWORK
- AUTOMATED DAMAGE RECOGNITION
- SMART CONTRACT ENGINE
- CBDC SETTLEMENT INFRASTRUCTURE

BLOCKCHAIN LAYER

API integration with data sources

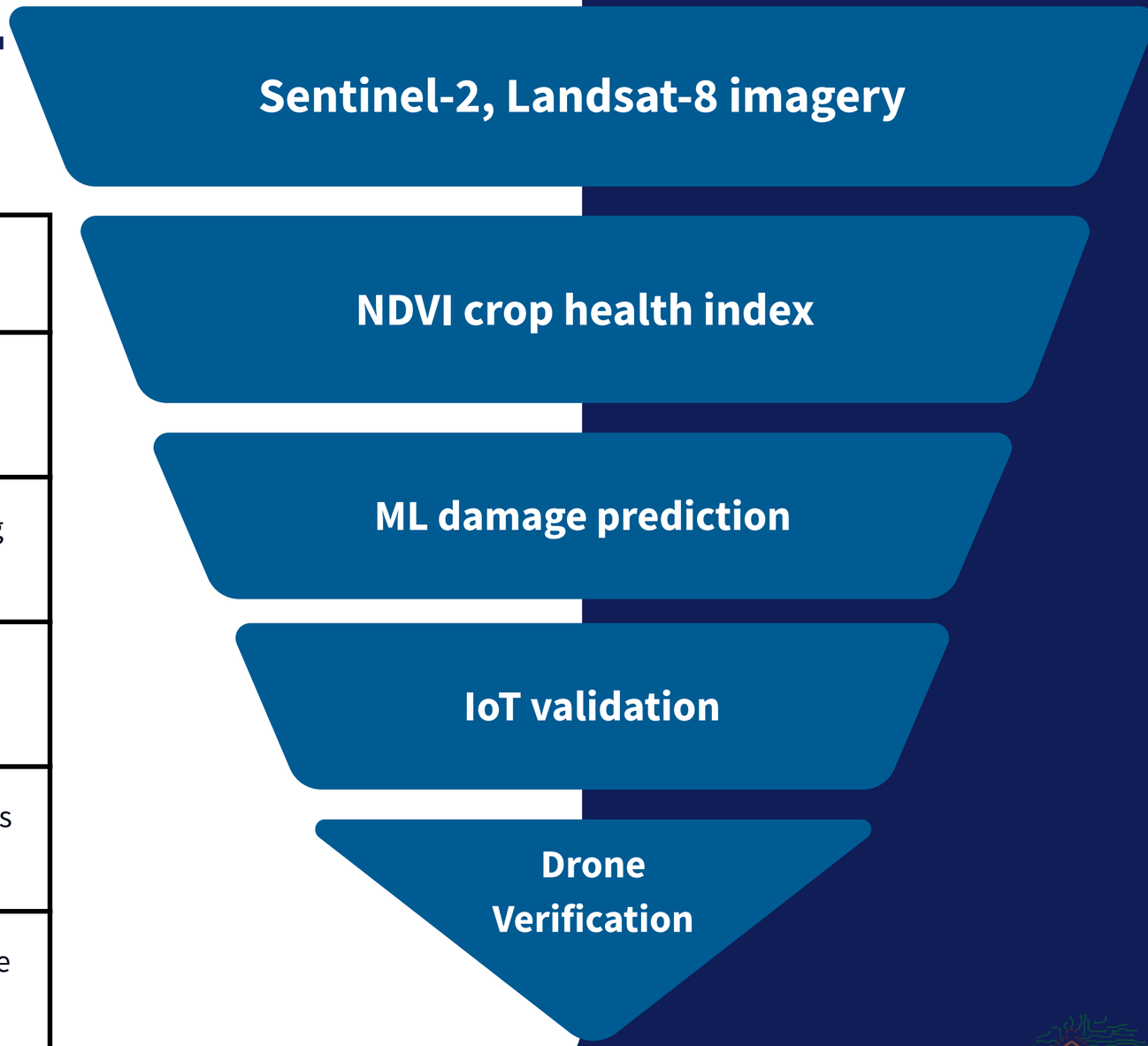
Immutable farmer data

Government & Insurers as validators

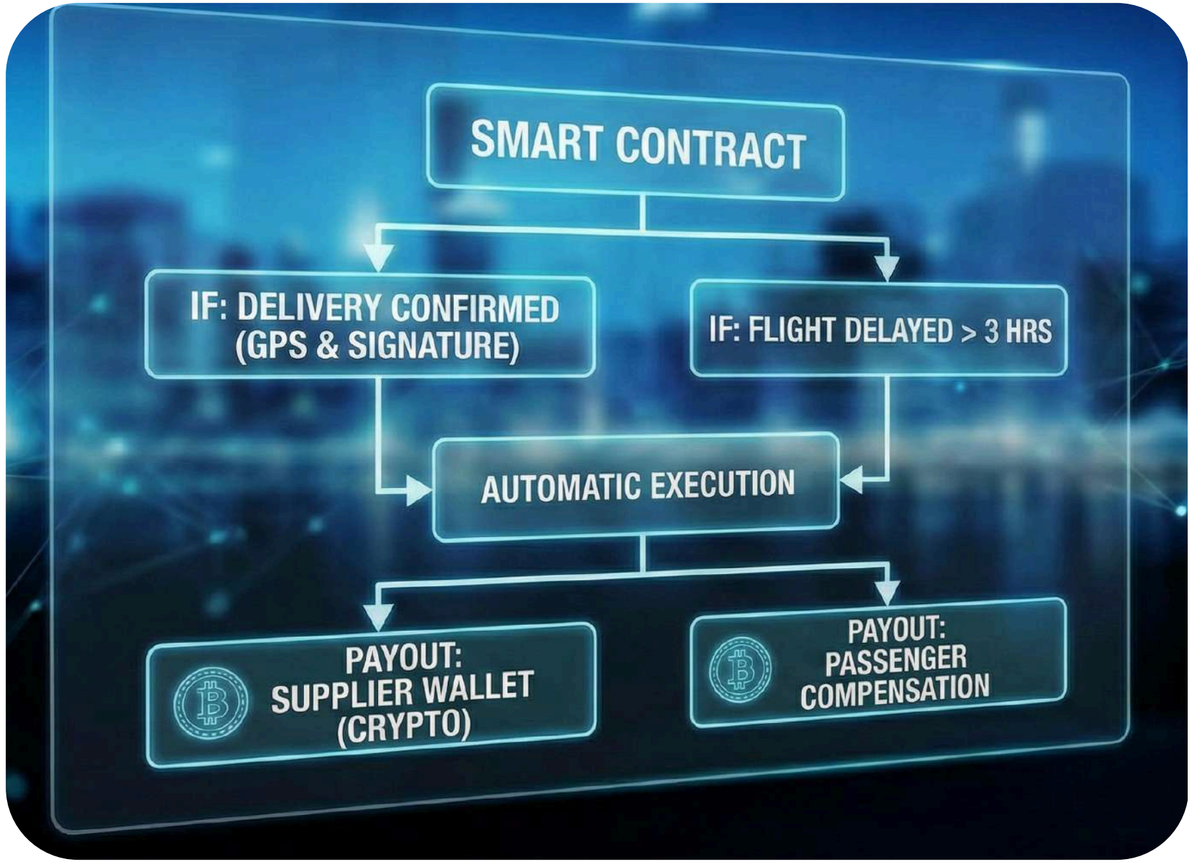
Permissioned blockchain

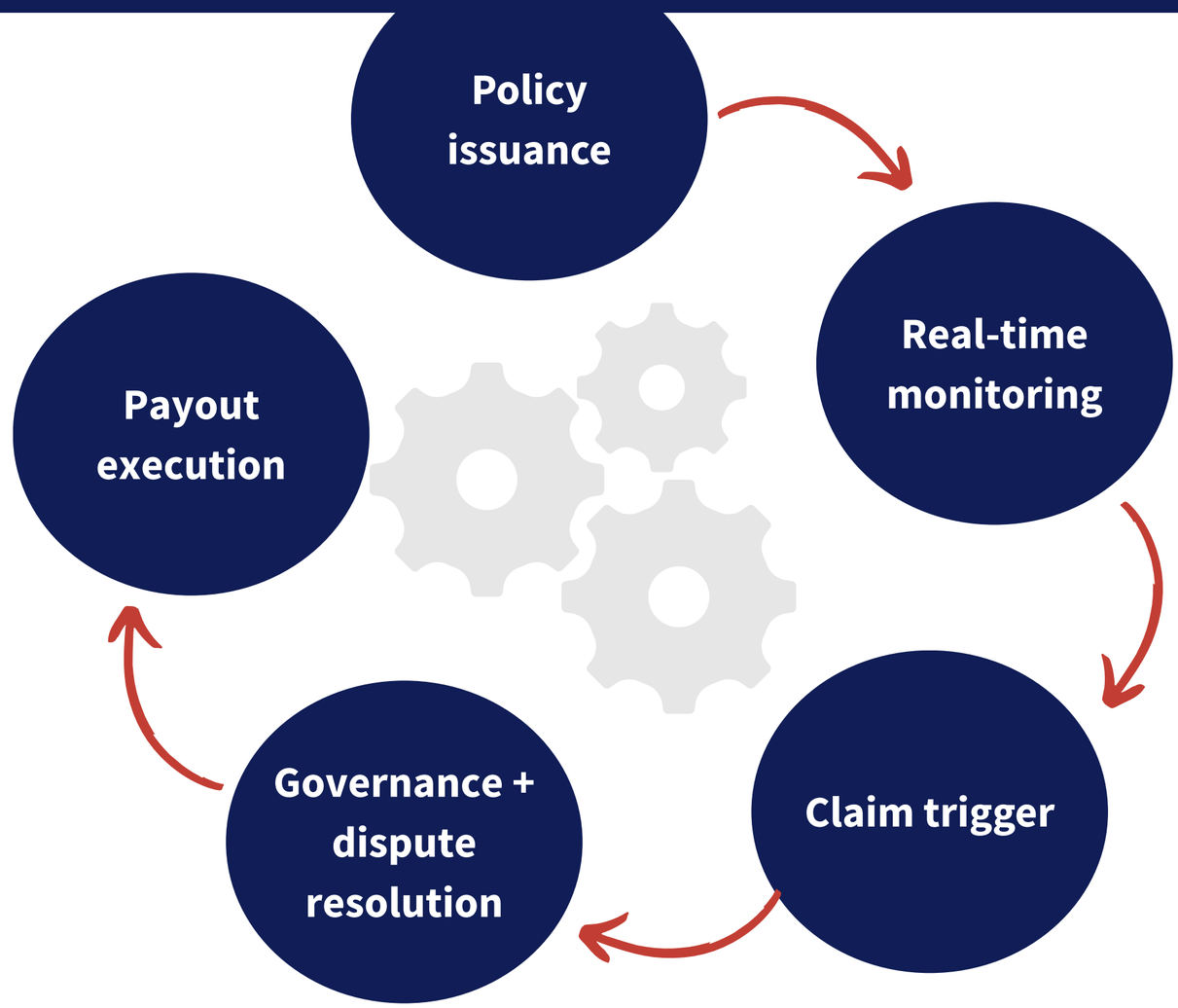
AUTOMATED DAMAGE RECOGNITION

Technology	Application
Satellite Imagery	Sentinel-2, Landsat 8 for multi-spectral crop health monitoring
NDVI Analysis	Normalized Difference Vegetation Index tracking for crop vigor assessment
Machine Learning	Trained models for crop type classification and damage detection
IoT Sensors	Ground-truth validation through weather stations and soil moisture sensors
Drone Imagery	High-resolution assessment for localized damage verification



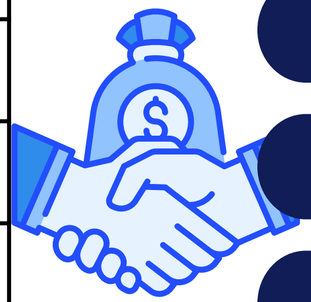
SMART CONTRACT ENGINE





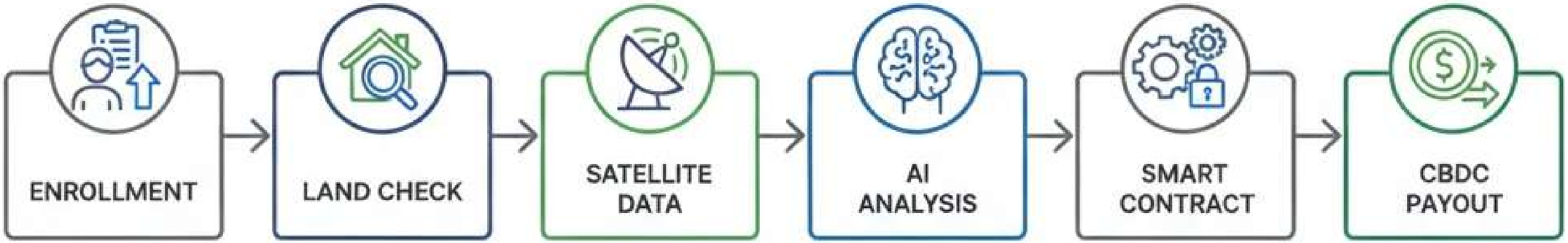
CBDC SETTLEMENT LAYER

Metric	Value
Pilot Launch Date	December 1, 2022
Participating Banks	16+ major banks
Active Users	5+ million
Transaction Volumes	Growing monthly
Use Cases	Retail payments, wholesale settlement



- INTEGRATED WITH RBI'S E₹
- INSTANT RETAIL WALLET PAYOUTS
- LOW-COST TRANSACTIONS
- TRANSPARENT TRAIL
- SUPPORTS PROGRAMMABLE MONEY

END-TO-END WORKFLOW



ENROLLMENT	LAND CHECK	SATELLITE DATA	AI ANALYSIS	SMART CONTRACT	CBDC PAYOUT
Farmer registers via app/CSC, selects crop, and receives a smart contract–based policy.	Land details are auto-verified through government databases and stored on blockchain.	Satellite and IoT data continuously track crop growth, weather, and NDVI indicators.	AI models detect stress or loss and calculate damage percentage at farm level.	If loss exceeds the threshold, the smart contract auto-initiates claim processing.	Digital Rupee (e₹) is transferred instantly to the farmer’s wallet within 24–48 hours.

PRE-SEASON: ENROLLMENT & ONBOARDING

MULTI-CHANNEL FARMER SIGNUP

- Farmers enroll via mobile app, Common Service Centers (CSCs), or assisted onboarding for low-digital users.

DIGITAL LAND RECORD LINKING

- Land ownership and crop area are verified instantly through digitally linked land records, ensuring accurate coverage.

SEAMLESS PREMIUM PAYMENT

- Premium is paid through CBDC (Digital Rupee) or UPI, enabling fast, secure, and low-cost transactions.

SMART CONTRACT POLICY CREATION

- A smart contract–based policy is generated automatically with predefined coverage terms, thresholds, and payout rules.

IN SEASON MONITORING

Automated monitoring includes:

- **Daily/Weekly Satellite Scans**

Continuous tracking of crop growth, NDVI, and vegetation health.

- **Weather API Feeds**

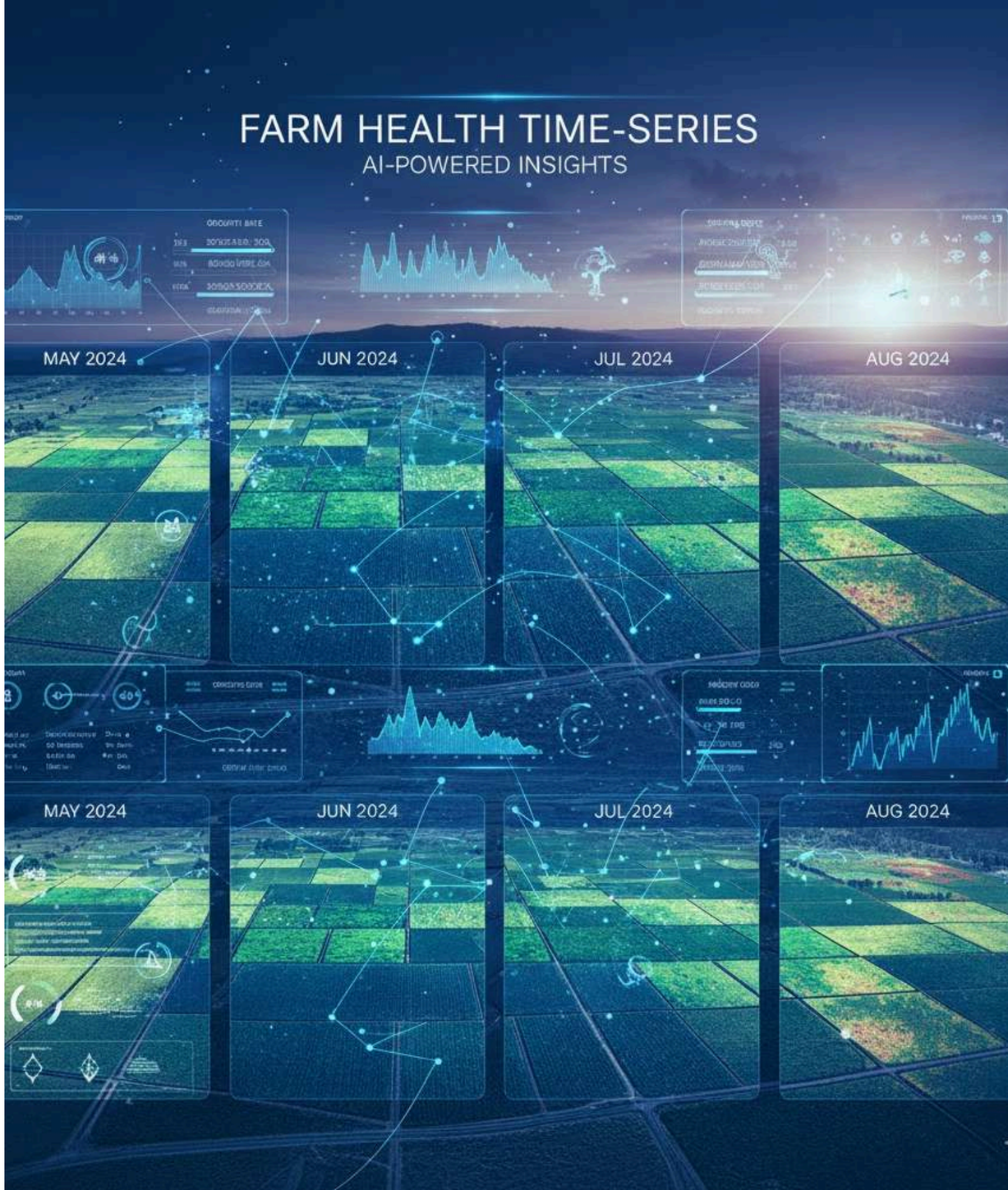
Real-time rainfall, temperature, and humidity data integrated into the system.

- **IoT Sensor Updates**

Ground-level insights on soil moisture and micro-climate conditions.

- **ML-Based Crop Stress Prediction**

AI models detect early signs of stress, pest impact, or yield risk.



POST-EVENT: CLAIM TRIGGER & PAYOUT

1. Damage Percentage Calculated

- AI evaluates satellite and sensor data to determine the exact crop loss.

2. Trigger Threshold Checked

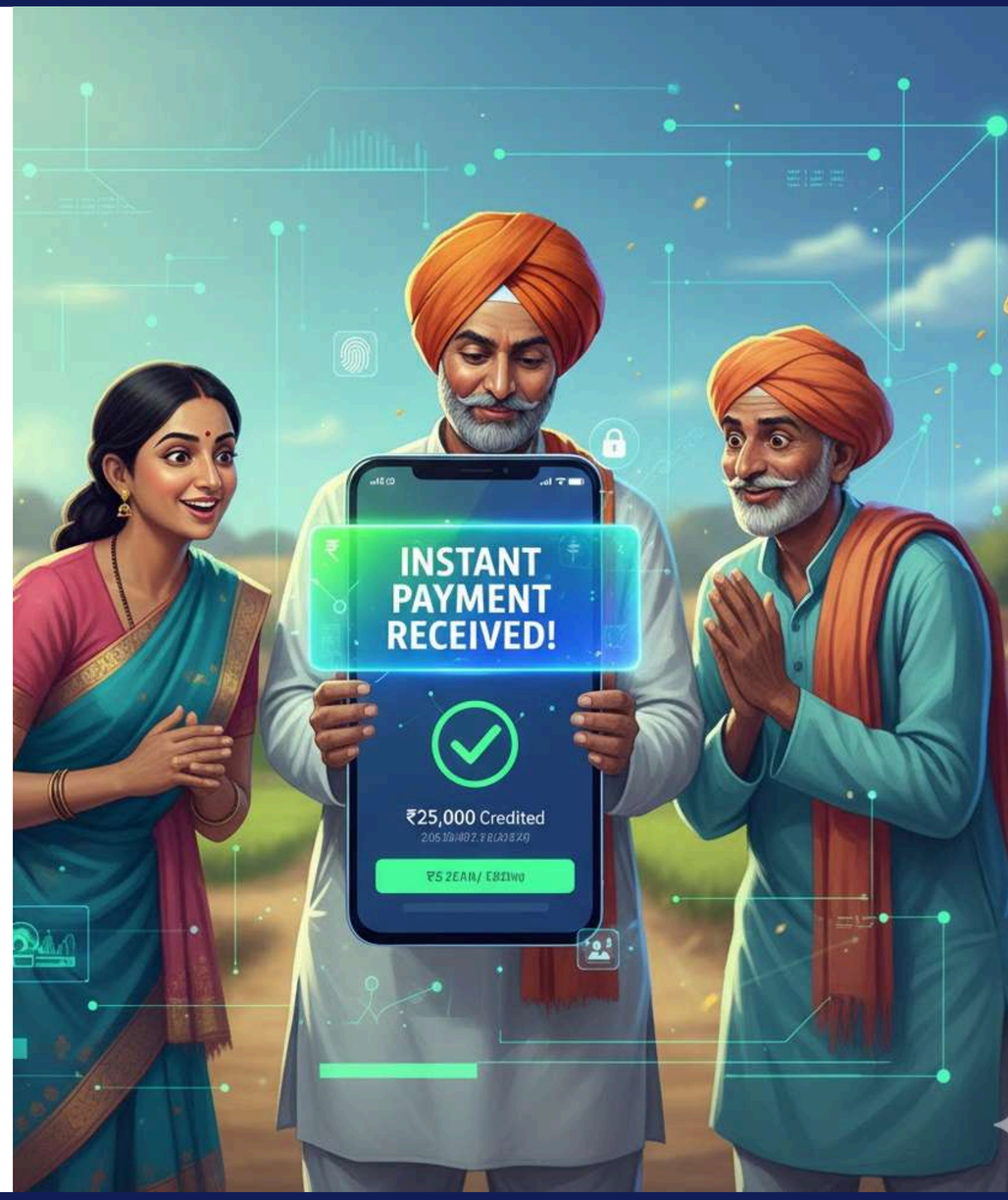
- System checks if the loss exceeds the insured threshold (e.g., >30%).

3. Smart Contract Executes Payout

- Once triggered, the smart contract automatically processes the claim—no paperwork needed.

4. CBDC Wallet Credited (24–48 Hours)

- The farmer receives the payout instantly through their Digital Rupee (e₹) wallet.



REVENUE MODEL

PER-POLICY TECHNOLOGY FEE

Charged for each farmer policy processed, covering satellite monitoring, AI damage detection, and blockchain operations.

SAAS LICENSING FOR INSURERS

Annual or monthly subscription for insurers to access the smart contract engine, monitoring dashboards, and automated claims platform.

GOVERNMENT DIGITAL INTEGRATION CONTRACTS

State/central agencies pay for PMFBY digitization, land-record integration, and CBDC-enabled payout infrastructure.

ANALYTICS-AS-A-SERVICE

Premium insights such as crop forecasts, district risk profiles, actuarial support data, and climate vulnerability analytics.

CBDC SETTLEMENT OPTIMIZATION FEE

A small fee on each instant Digital Rupee (e₹) payout, offering faster settlement and lower reconciliation costs.

Cost Structure

Total cost: **₹430–615 Cr**, broken into:

- Blockchain infra
- Satellite & AI models
- CBDC integration
- App development
- Training & change mgmt
- Pilot ops

ROI & Savings

Annual savings: **₹550–750 Cr**

ROI achieved within **12–18** months

Savings from:

- CCE elimination
- Admin overhead reduction
- Fraud reduction

5-YEAR EXPANSION PLAN

Phase 1: Coverage Expansion (Years 1–2)

- Scale to 10–15 million farmers across high-digital-readiness states using blockchain-based policy and CBDC settlement.

Phase 2: Nationwide Rollout (Years 3–5)

- Grow to 25–30 million farmers, integrating with state PMFBY systems and insurer platforms.

Diversification: New Insurance Lines

- Launch livestock insurance (AI health monitoring, RFID tags) and equipment insurance (telematics + usage-based smart contracts).

Integration with National Agri Data Infrastructure

- Leverage India’s unified agricultural data platforms for automated land verification, weather inputs, subsidy mapping, and risk scoring —enabling seamless scaling across all states.

IMPLEMENTATION ROADMAP

1. Proof of Concept (Months 1–6)

- Deploy the platform in 2–3 digitally advanced districts, validating satellite-based assessment, smart contract claims, and CBDC payouts.

2. Expanded Pilots (Year 1–2)

- Scale to multiple districts across 3–5 states, covering varied crops and agro-climatic zones.
- Refine AI models, automate workflows, and integrate government subsidy systems.

3. State-Level Rollout (Years 2–3)

- Implement full operations across selected states with millions of farmers, regional blockchain nodes, and insurer partnerships.

4. Nationwide Expansion (Years 4–5)

- Achieve coverage across all major agricultural states, enabling India-wide adoption of blockchain-based crop insurance with CBDC settlement.

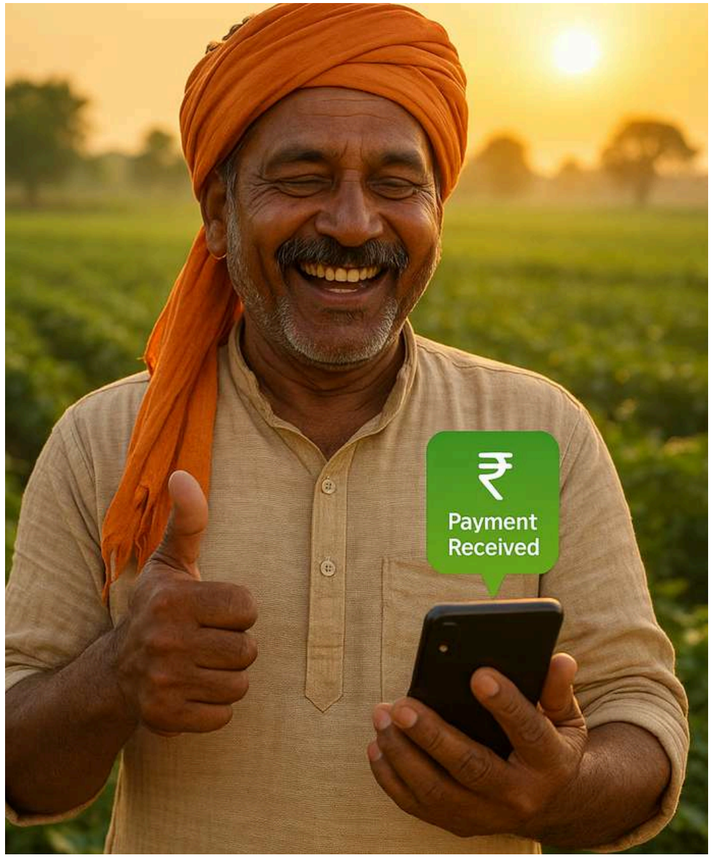
RISKS & MITIGATION

CONCLUSION & CALL TO ACTION

A transformative solution:

- Automated 24–48hr payouts
- Transparent & corruption-proof
- Scalable to 25–30M farmers
- Supports national digital agriculture vision

“Time to act is now.”




THANK YOU!