SMART INDIA HACKATHON 2025

TITLE PAGE

- **Problem Statement ID - SIH25149**
- **Problem Statement Title - Loan Utilization Tracking via Mobile**
- **Theme - Smart Automation**
- **PS Category - Software**
- **Team ID - 63034**
- **Team Name - Infinitely Innov@tive**

Problem Statement

Problem Statement Title	Loan Utilization Tracking via Mobile
Description	**Background** Field verification of loan utilization is expensive, slow, and prone to errors. **Challenge** • Develop a mobile app for beneficiaries to upload geotagged, time-stamped photos/videos of assets purchased with loan funds, validated by AI. • Mobile number–based login for beneficiaries. • App must have facility for State Agency/Bank to enter data of those beneficiaries who have taken a loan. **Constraints** • Must work offline with later sync. • Allow State Agency officers to review and approve remotely. **Impact Goal** Achieve measurable reductions in fraud, asset diversion, and misreporting through AI-powered detection, leading to faster disbursement cycles, stronger beneficiary trust, and better compliance with scheme guidelines.

Infinitely Innov@tive

DigiPraman: Universal Loan Verification System

SMART INDIA HACKATHON 2025

Detailed explanation of the proposed solution:

- AI-powered proprietary multi-layer **VIDYA AI (Vision Intelligence for Document & Yield Assessment)** to process geo-tagged, time-stamped photos/videos of purchased assets, enabling beneficiaries to submit digital evidence for instant automated verification.
- Universal risk scoring system (100-point scale) handling all loan types - physical assets, services, education, and business setup, with intelligent routing: 0-65 auto-approve (65%), 66-85 officer review (20%), 86-100 video call (15%).
- Offline-first architecture ensuring functionality in remote areas with automatic sync capabilities.
- State Agency/Bank web portal for remote verification, bulk processing, and compliance reporting.

How it addresses the problem:

- Eliminates expensive field visits (₹800 - ₹2000 per visit and verification).
- Reduces processing time from weeks to hours through automated AI analysis.
- Prevents fraud through multi-layer detection including document authenticity and behavioral pattern analysis.
- Covers 95% of government loan schemes vs current 40% coverage.

Innovation and uniqueness of the solution:

- First universal verification system supporting asset-based, service-based, education, and business loans.
- Real-time risk scoring with transparent 100-point methodology.
- Complete elimination of physical verification through 4-layer AI analysis: image quality → object detection (YOLOv8) → OCR (Google Vision) → fraud scoring, with continuous model retraining.

Infinitely Innov@tive

MoSJE schemes

SMART INDIA HACKATHON 2025

Scheme	Disbursement Type	Verification Needed	How Your System Helps
NSFDC	Loan for income activities	Physical check of asset	Geo-tagged photos, AI fraud detection
NBCFDC	Micro-finance for assets	Field inspection	Automated invoice/OCR + location proof
NSTFDC	Enterprise loans	Mandatory field audit	Remote officer approval workflow

Infinitely Innov@tive

TECHNICAL APPROACH

SMART INDIA HACKATHON 2025

Component	Chosen Technology	Why This Was Chosen	Why Not Alternatives
Cross-platform App	**Flutter**	Single codebase for Android & iOS, near-native performance, fast UI rendering, strong Google support. And support offline saving of data	Native Android/iOS = higher dev cost & time; React Native = bridge-based performance issues
Offline Storage	**SQLite**	Lightweight, fully offline, fast local queries, no server dependency	Hive/SharedPrefs are not ideal for structured relational data
GPS Tagging	**Geolocator**	Accurate location APIs, widely tested, simple permission handling	Platform-specific APIs increase maintenance
Frontend	**React.js**	Component reusability, large ecosystem, fast development cycles	Angular = heavy; Vue = smaller enterprise adoption
Video Calls	**Jetsi**	Built on WebRTC but ready-to-use, open-source, no vendor lock-in, supports self-hosting (data sovereignty), faster integration	Raw WebRTC needs heavy custom signaling; Zoom/Google SDKs are costly & limit control
API Server	**Node.js**	Non-blocking I/O, handles concurrent requests efficiently	Java/.NET = slower dev & heavier infra
Routing Framework	**Express.js**	Minimal, flexible, fast to build REST APIs	Django/Spring = opinionated and heavier

Infinitely Innov@tive

TECHNICAL APPROACH

SMART INDIA HACKATHON 2025

Component	Chosen Technology	Why This Was Chosen	Why Not Alternatives
Primary Database	**PostgreSQL**	ACID-compliant, strong relational integrity for loans, beneficiaries, banks, and audits	MongoDB lacks strict relational constraints
Spatial Data	**PostGIS**	Industry-standard geospatial extension, accurate distance, point-in-polygon, geo-fencing	MongoDB geo features are limited and less precise
SMS Notifications	**Twilio**	Reliable delivery, scalable, global reach	Local SMS gateways are inconsistent

Infinitely Innov@tive

TECHNICAL APPROACH

SMART INDIA HACKATHON 2025

VIDYA AI (Vision Intelligence for Document & Yield Assessment)

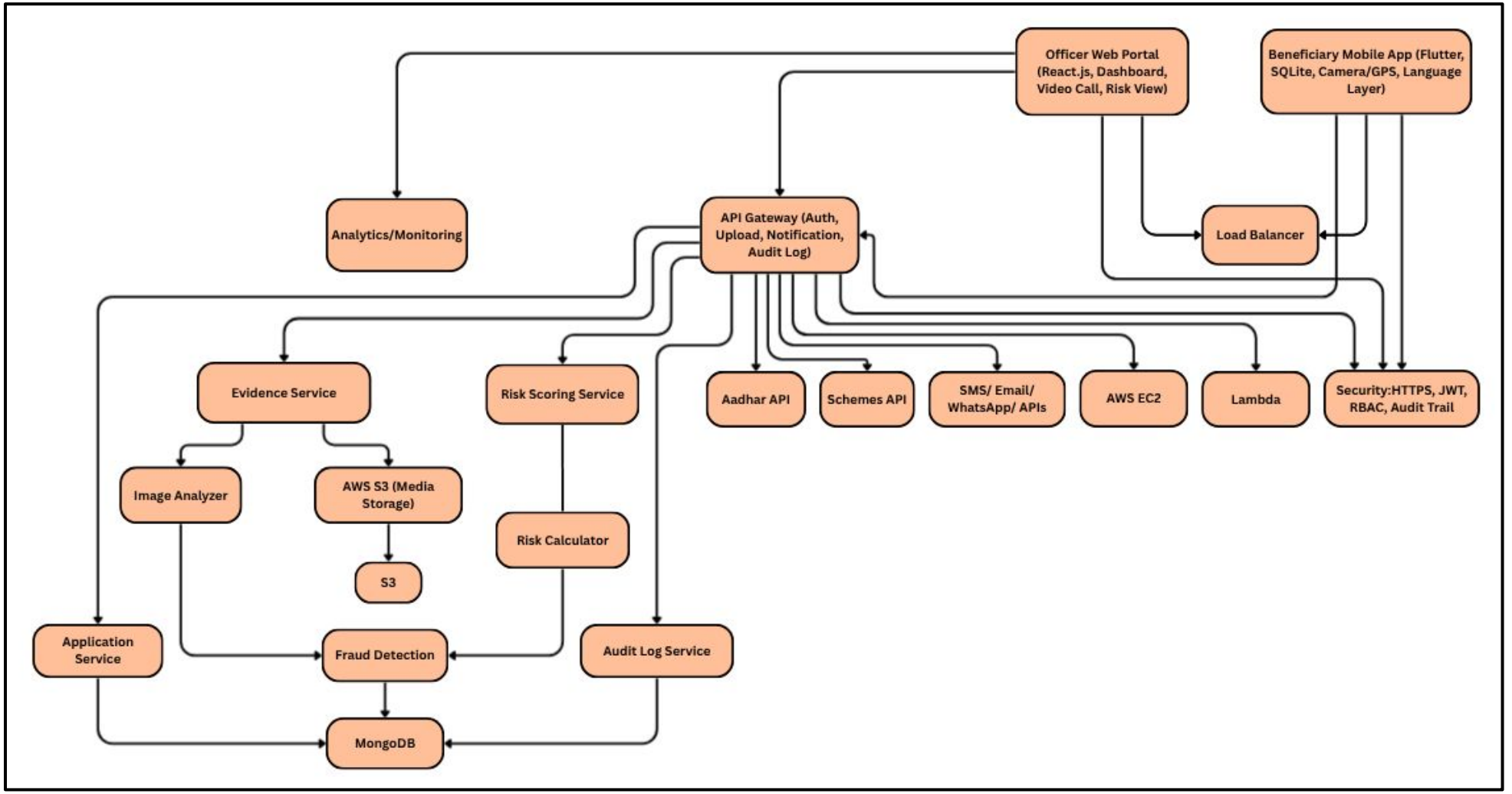
- **Image Analysis: Google Vision AI** for general analysis, **YOLOv8** for asset verification
- **OCR: Google Cloud Vision AI** with **Python** for text extraction
- **Fraud Detection: Perceptual Hashing** for duplicates, **CNN** for screen capture analysis, **RT-DETR** for asset mismatch
- **Risk Scoring: Marble** open-source decision engine for automated fraud scoring
- **Model Management: MLflow** for model lifecycle and tracking.

Infinitely Innov@tive

TECHNICAL APPROACH

SMART INDIA HACKATHON 2025

Architecture Diagram

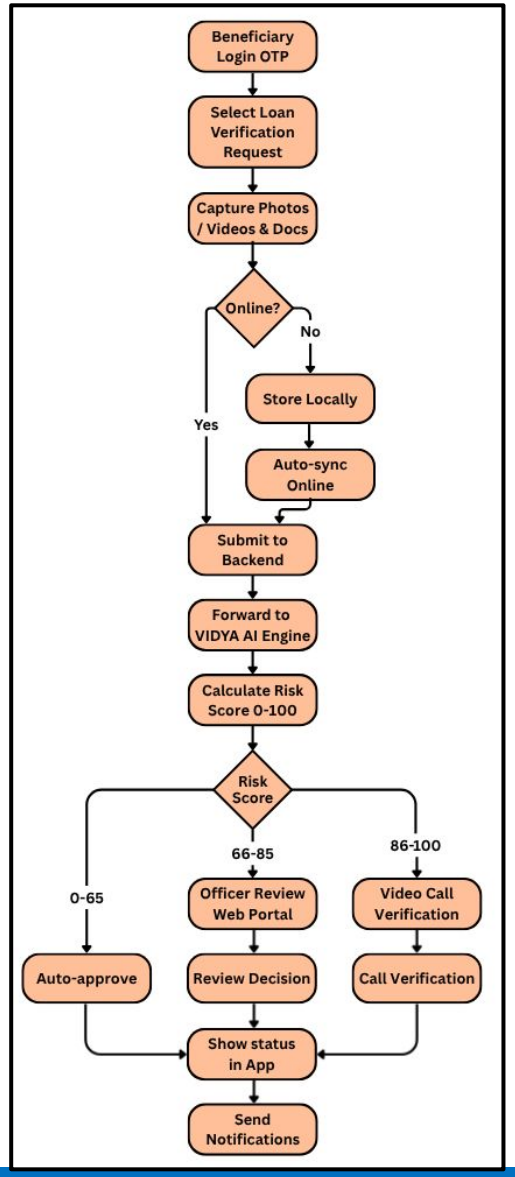


Infinitely Innov@tive

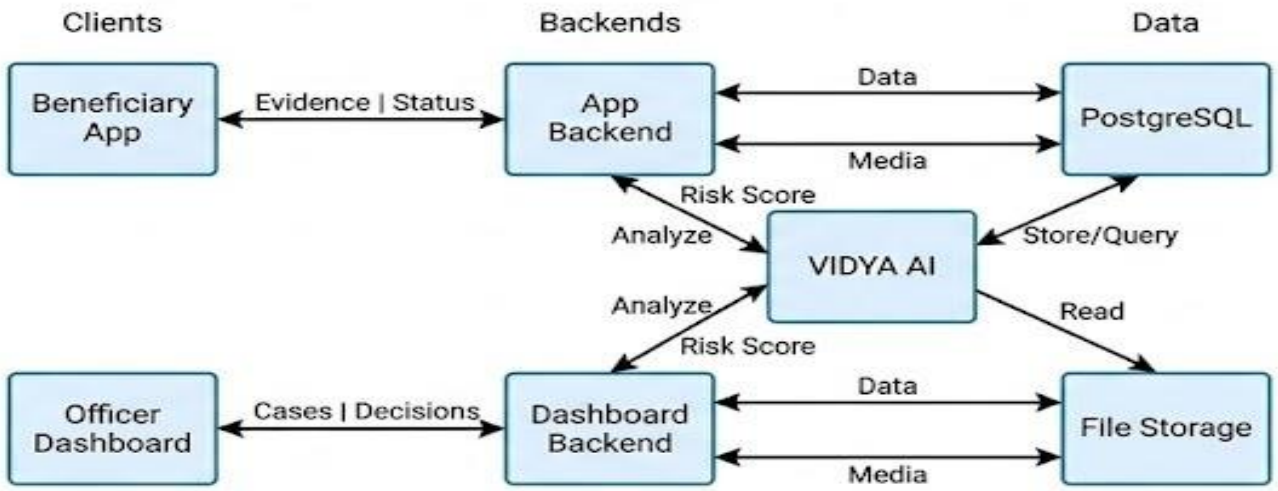
TECHNICAL APPROACH

SMART INDIA HACKATHON 2025

Flow Diagram



ARCHITECTURE



Infinitely Innov@tive

FEASIBILITY AND VIABILITY

SMART INDIA HACKATHON 2025

Analysis of the feasibility of the idea:

- Technical: Proven mobile/web technologies, scalable cloud infrastructure, existing AI frameworks for fraud detection; seamless integration with Aadhaar and banking APIs.
- Economic: ₹50L development cost vs ₹500+ crore annual fraud prevention savings; 60% reduction in verification costs from ₹8000 to ₹2000 per case.
- Operational: Covers all government schemes (PMMY, PMEGP, education loans); works with existing officer workflows; minimal infrastructure changes required.

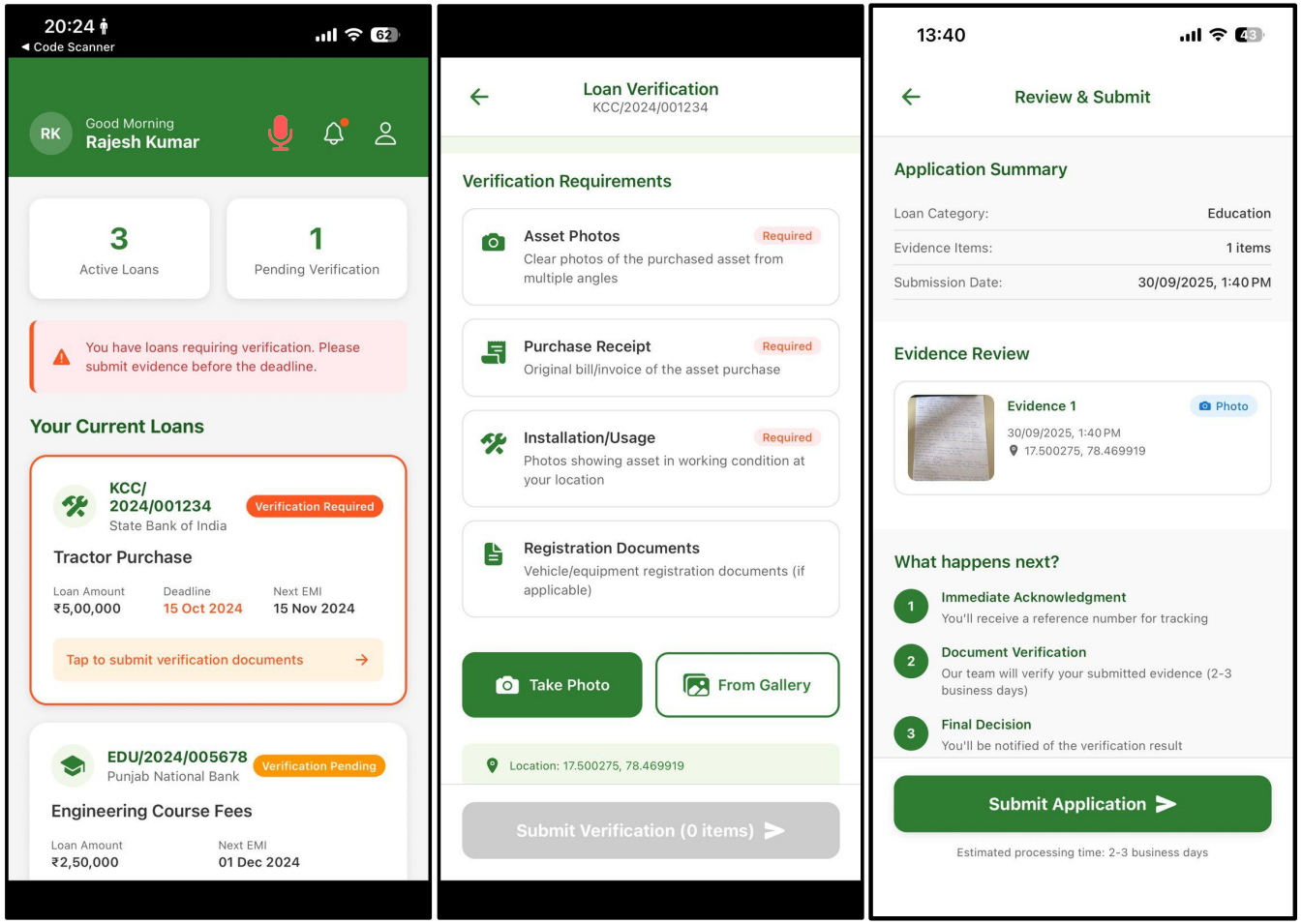
Potential challenges and risks:

- AI Accuracy: Ensuring fraud detection works across diverse asset types, regional variations, and different photo qualities from rural smartphones.
- Rural Adoption: Getting low-literacy beneficiaries and elderly users to successfully upload photos and documents via mobile app interface.
- System Integration: Connecting with multiple government databases, handling peak loads during scheme launches, maintaining 99% uptime.

Strategies for overcoming these challenges:

- Continuous Learning: AI model retraining with real verification data; regional customization; human-in-loop feedback for edge cases and accuracy improvement.
- User Training & Support: Multilingual interface, voice guidance, simple UX design; officer assistance programs and regional language support for onboarding.
- Phased Implementation: Pilot rollout in select districts; gradual scaling; robust backup systems; 24/7 technical support with automatic failover mechanisms.

UI Screenshots of Prototype (DigiPraman Beneficiary App):



Infinitely Innov@tive

FRAUD DETECTION

SMART INDIA HACKATHON 2025

Fraud Category	What to Look For (Manual Clues)	Why This Indicates Fraud	Typical Real-World Example
1. Inconsistent Formatting	Mixed font styles, misaligned totals, uneven spacing, pixelated logos, missing sections	Genuine receipts follow a fixed POS template. Formatting issues arise when text or logos are copied, edited, or resized manually.	Line items in one font and totals in another; tax amount not aligned under subtotal
2. Incorrect or Misleading Information	Wrong or fake tax IDs, impossible timestamps, mismatched store location, generic merchant names, invalid SKUs	Fraudsters often mix correct and fabricated information to bypass basic checks, but details fail verification against official records.	Receipt claims purchase in Singapore for a product sold only in Ireland
3. Bad Math and Unusual Figures	Totals don't match items, incorrect tax rates, repeated items with different prices, unnaturally rounded totals	Forged receipts usually fail exact arithmetic rules used by POS systems, especially around tax calculation and discounts.	Subtotal ₹950, tax ₹50, total shown as ₹980
4. Receipt-Specific Inconsistencies	Outdated logos, incorrect language (Sales Tax vs VAT), missing footers, foreign payment processors, inconsistent cashier IDs	Merchants have unique receipt "fingerprints" that stay consistent over time. Deviations indicate copied or outdated templates.	A 2025 UK receipt using "Sales Tax" instead of "VAT"
5. Metadata Discrepancies	File created after transaction date, editing software listed as author, suspicious filenames, image-only receipts	Digital files retain creation traces. Editing tools and abnormal timestamps strongly suggest post-transaction manipulation.	Receipt dated Feb 1 but file created on April 10 with "Photoshop" as author

Infinitely Innov@tive

IMPACT AND BENEFITS

SMART INDIA HACKATHON 2025

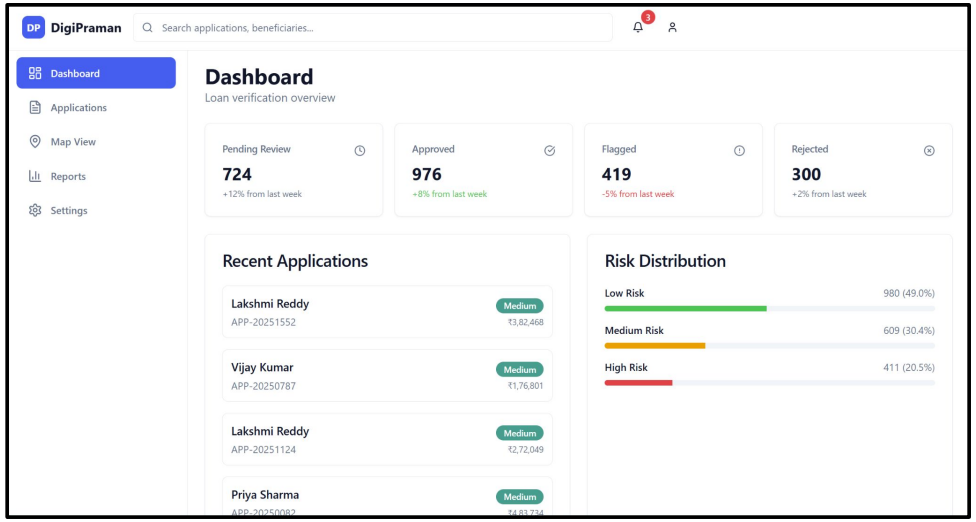
Potential Impact on Target Audience:

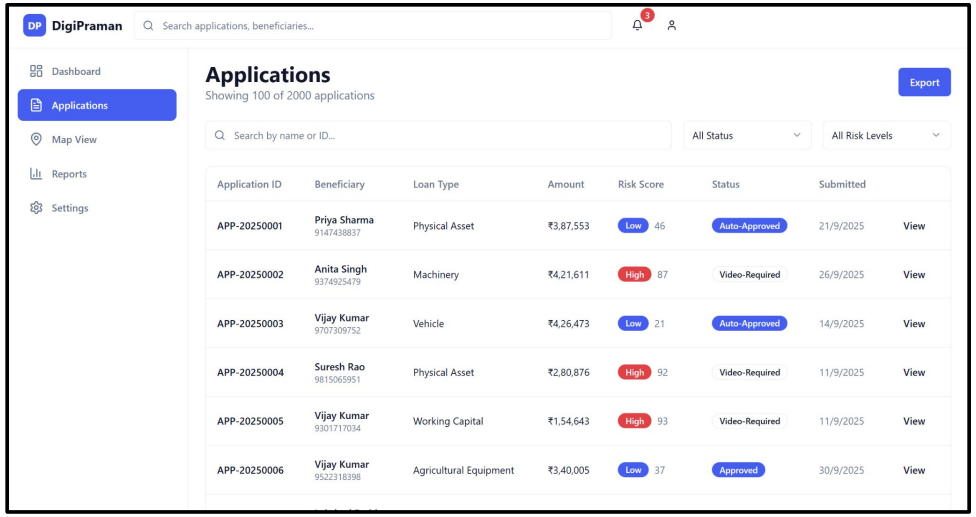
- **Beneficiaries:** Instant verification and transparent tracking for all loan types - farmers, students, entrepreneurs get faster approvals regardless of asset or location.
- **Government Officers:** Remote verification capability with improved efficiency, faster decisions, and eliminated field visit burden.
- **Banks & Agencies:** Enhanced compliance, safer disbursements, reduced fraud incidents benefiting institutional reputation.

Benefits of the Solution:

- **Social:**
  - Universal coverage; no applicant excluded by asset type or location.
  - Financial inclusion for rural and underserved populations.
  - Digital literacy through simple multilingual mobile interface.
- **Economic:**
  - ₹500+ crore annual fraud prevention enabling legitimate lending growth.
  - 75% faster processing with reduced operational costs.
  - Rural economy boost through quicker loan disbursements.
- **Operational/Environmental:**
  - Data-driven decisions via unified AI risk scoring dashboard.
  - Zero carbon footprint from eliminated field visits.
  - Scalable coverage growing with scheme expansion needs.

UI Screenshots of Prototype (DigiPraman Bank/Agencies Portal):





Infinitely Innov@tive

RESEARCH AND REFERENCES

SMART INDIA HACKATHON 2025

Government Policy & Data Sources:

- Ministry of Social Justice & Empowerment loan scheme operational guidelines 2024
- RBI Digital Lending Directions 2025 - Consolidated regulatory framework (May 8, 2025)
- Central Fraud Registry database - Online searchable fraud reports by banks
- Government of India Lok Sabha reports on loan frauds (Rajya Sabha Question *94, July 2025)

Financial Fraud Statistics:

- Economic Times: Loan Frauds FY25 - "₹33,148 crore loan frauds - 92% of total fraud amount" (May 2025)
- RBI Annual Report 2024-25 - Loan frauds account for 92% of financial fraud losses
- Ministry of Home Affairs Cyber Fraud Report - "₹22,845 crore cyber fraud losses in 2024" (206% increase)
- Times of India: Cyber Fraud Epidemic - 20 lakh complaints filed in 2024

Technical Research Papers:

- GSC Advanced Research - "AI-driven fraud detection in banking: Systematic review" (Sept 2024)
- International Journal of Advanced Sciences - "Enhanced AI-based model for financial fraud detection" (2024)
- SSRN Research Paper - "XGBoost achieves 99.2% accuracy in fraud detection" (Dec 2024)
- IBM Research - "AI Fraud Detection in Banking" machine learning algorithms (2025)

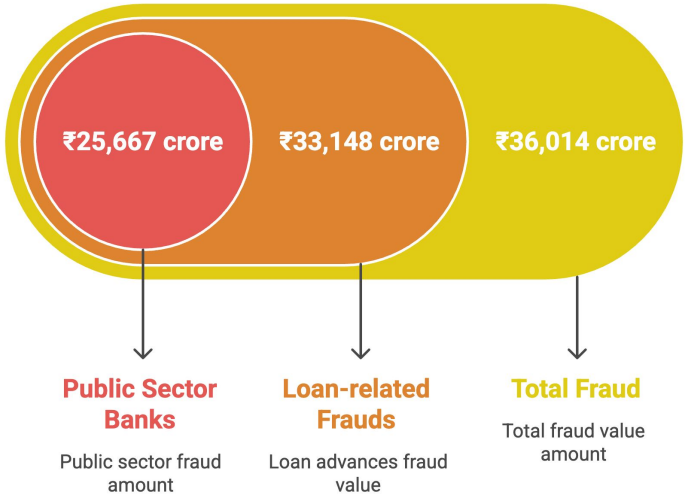
Industry Implementation Studies:

- RBI Guidelines on Digital Lending - MuleHunter AI system analytics for suspicious activity
- Open Government Data Platform - CFCFRMS ₹5,489 crore fraud prevention data
- ScienceDirect Banking Research - 87-94% detection rates with reduced false positives

For the complete list of references and research papers, visit:

- **Research Work / Literature Survey**

Loan fraud value in FY25



- **Loan Frauds Dominant** – 92% of fraud value in FY25 (₹33,148 Cr) from loans.
- **PSU Banks Hit Hard** – 71% (₹25,667 Cr) borne by public sector banks.
- **High Verification Costs** – Field visits drive OPEX; geo-tagged, AI-validated mobile checks cut cost & TAT.