



**DEMO DECK\***

# **AI-assisted MRV for Smallholder Carbon Project**

*\*Sample/illustrative assets – no proprietary data*

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Dec 2023–May 2025  
4 countries · 100+ contributors

## **Problem:**

- Evolving standards; uneven field data quality
- Long review cycles; inconsistent decisions
- Auditors need reproducible, tamper-evident evidence

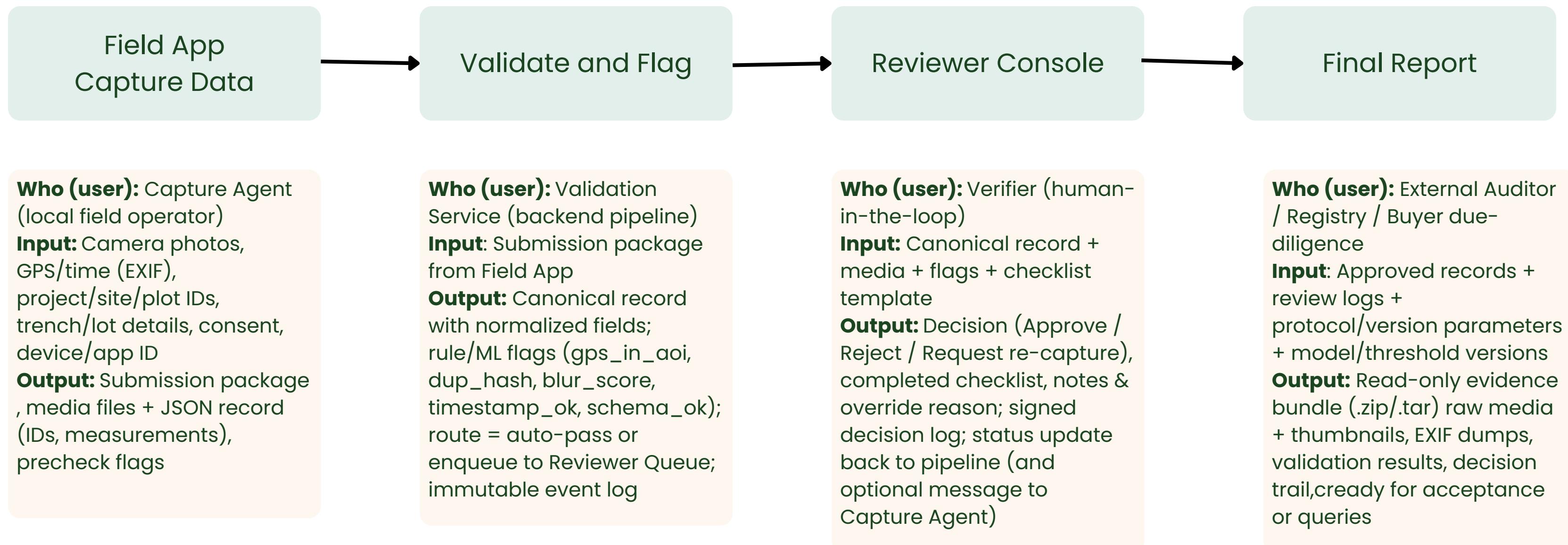
## **Context:**

- Distributed field teams across 4 countries
- Low/patchy connectivity; varied devices
- Human reviewers + external auditors

## **Goals / Success Criteria:**

- Auditor acceptance on first full cycle
- Simple for capture agents (local field operators)
- Median review time target: 3 days

# System at a Glance



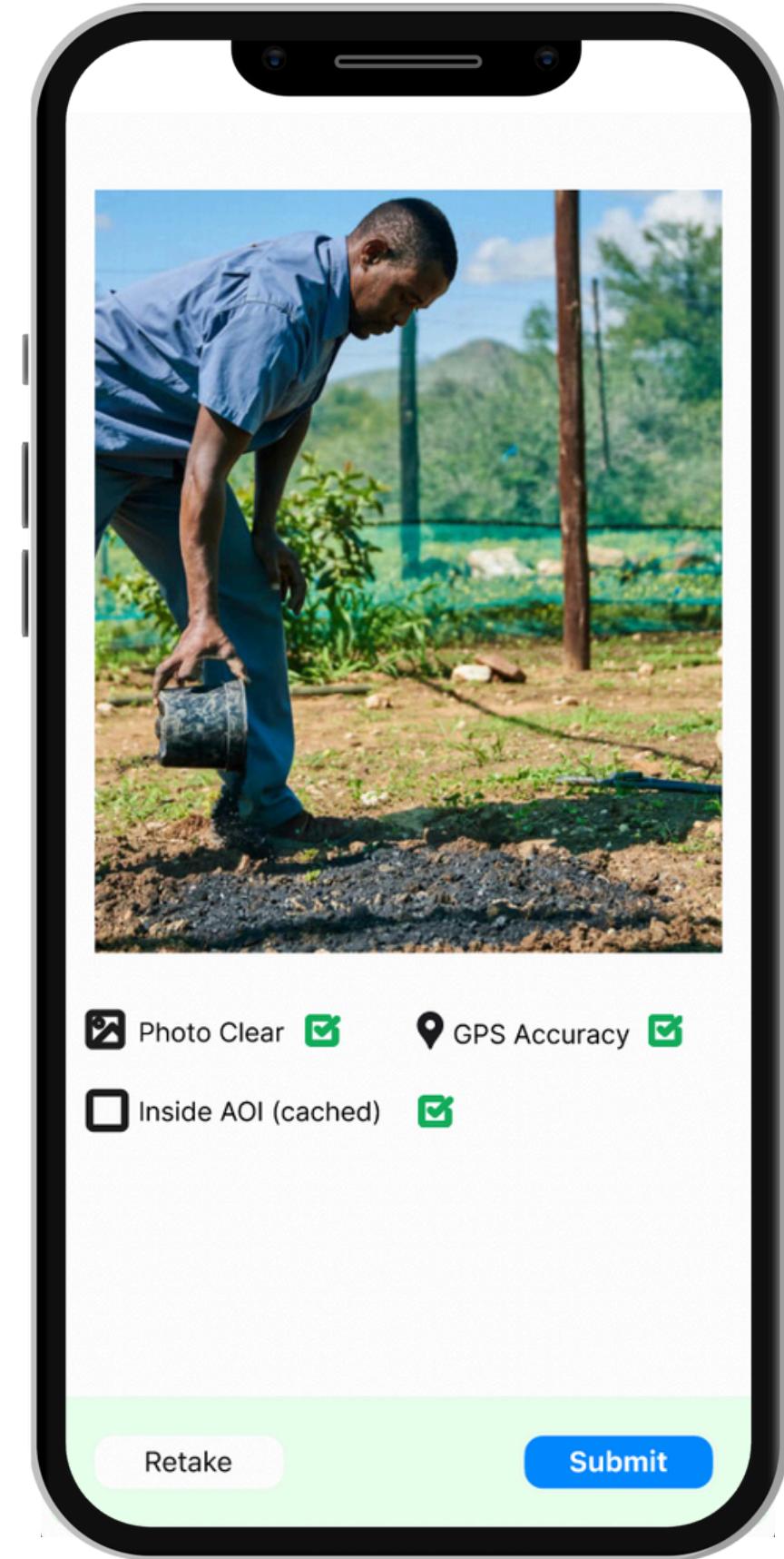
# Field App - Capture Data

**Who (user):** Capture Agent (local field operator)

**Input:** Camera photos, GPS/time (EXIF), project/site/plot IDs, trench/lot details, consent, device/app ID

**Output:** Submission package , media files + JSON record (IDs, measurements), precheck flags

**Tools:** Python on AWS; pHash + rule engine; OpenAI for reviewer hints; metrics to Power BI



Demo Screen

# Validate and Flag

**Who (user):** Validation Service (backend pipeline)

**Input:** Submission package from Field App

**Output:** Canonical record with normalized fields; rule/ML flags (gps\_in\_aoi, dup\_hash, blur\_score, timestamp\_ok, schema\_ok); route = auto-pass or enqueue to Reviewer Queue; immutable event log

*Sample Rules Table*

Rule	Threshold	Action on Fail
Blur/Sharpness	Variance-of-laplacian > 120	Send to Reviewer (Warn)
GPS Accuracy	$\geq 30m$	Send to Reviewer (Warn)
AIO Distance	Near edge	Send to Reviewer (Warn)
Duplicate Image	Duplicate Image	Send to Reviewer (Warn)
Trench Dimensions	outside allowed range e.g., Length 0.5–20 m, Width 0.2–1.5 m, Depth 0.2–2.0 m	Send to Reviewer (Warn)

*Sample only*

# Reviewer Console

**Who (user):** Verifier (Compliance Coordinator)

**Input:** Canonical record + media + flags + checklist template

**Output:** Decision (Approve / Reject / Request re-capture), completed checklist, notes & override reason; signed decision log; status update back to pipeline (and optional message to Capture Agent)

Reviewer Console

The screenshot shows a review interface for a sample record. At the top, there are dropdown menus for Region (Kenya), Type (Production), From (Aug 1, 2024, 9:41 AM), To (Nov 30, 2024, 9:41 AM), and Status (Received). Below these are search and filter fields. A list of sample records is displayed, with SAMPLE 104 highlighted in green. To the right of the list is a photograph of a person working in a field. Further right are sections for 'Name: John Doe', 'Production Date: Aug 3 2024 10:00 AM', 'LC: Mary Joe', 'Collection Date: Aug 3 2024 10:30 AM', 'Total: 3T', 'Co2: 6.588 T', and '1.2921° S, 36.8219° E'. At the bottom are 'Auto Flags' (No Duplicate, Trench Ok, GPS Present) and 'Manual Flags' (Photo Clear, TimeStamp Valid, Production OK) checkboxes, along with 'Notes' and 'Reject'/'Approve' buttons.

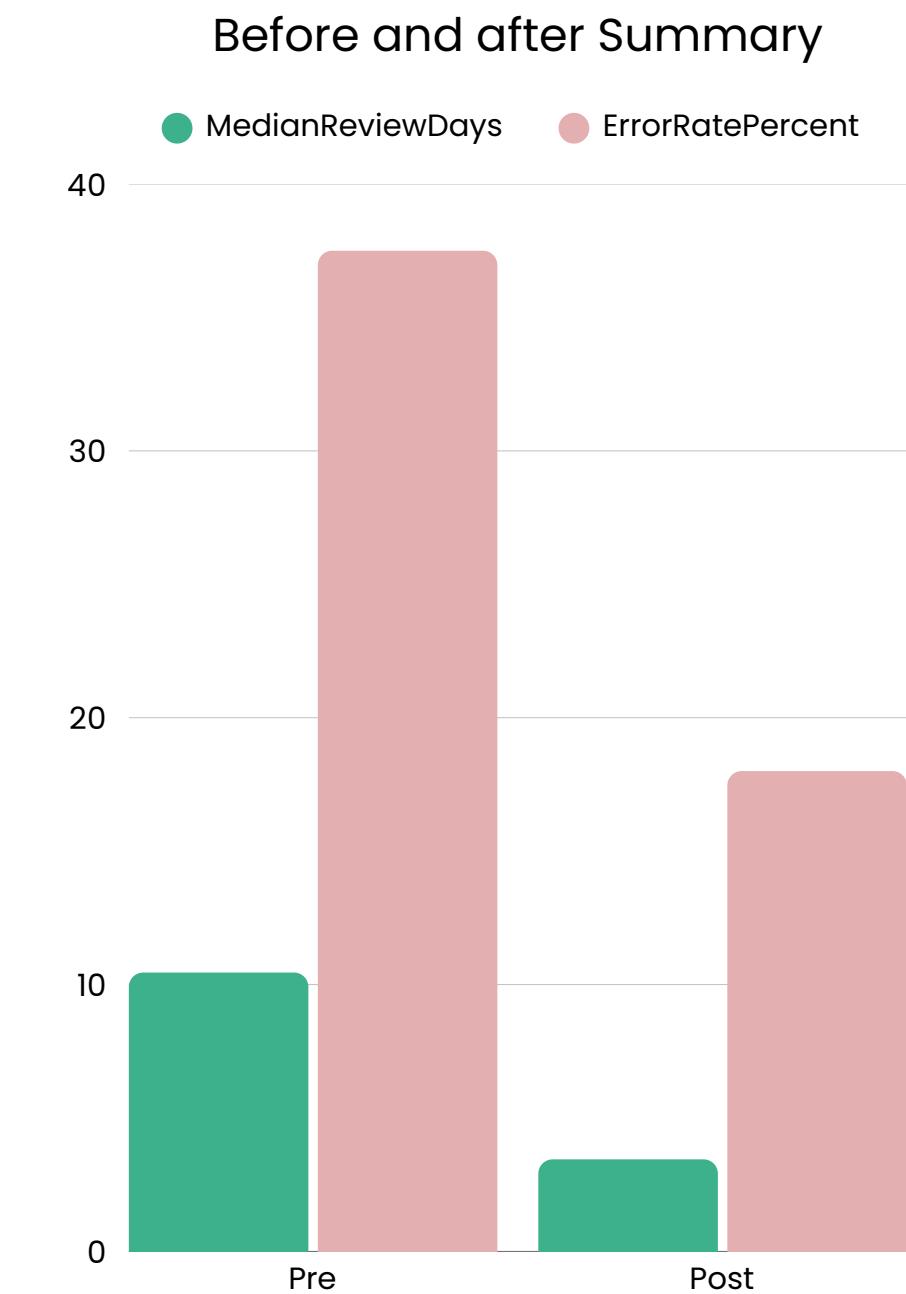
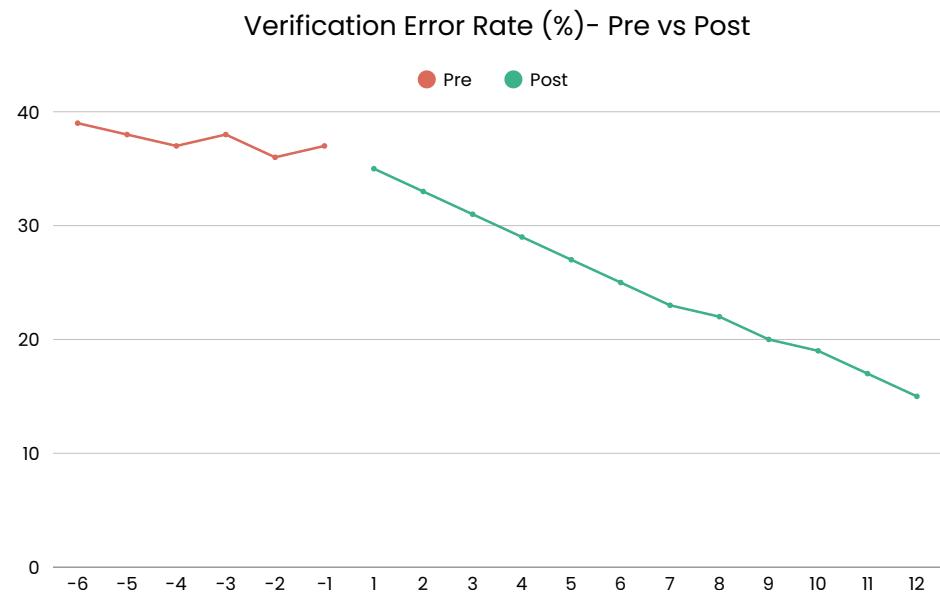
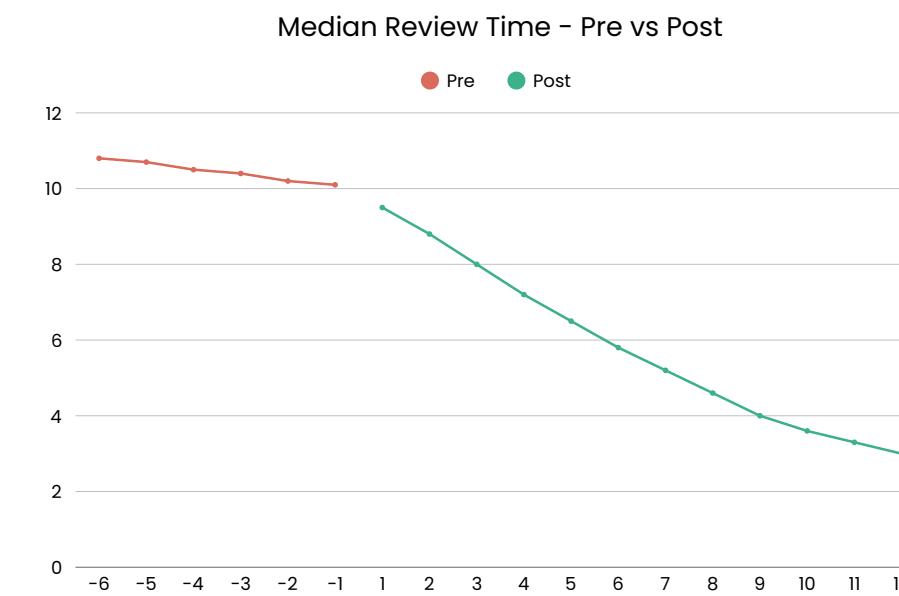
Sample only

# Outcome - Final Report

## Impact:

- 10,000+ verified credits
- Median review time: ~10d to 3d
- Verification errors: down ~15%

*Compared to the 6-week baseline, release cut median review time from ~10.5d to ~3.5d and error rate from ~37.5% to ~18% at steady state (last 4 weeks), while meeting our 3-day SLA."*



# System Architecture and Tools Used

Module	Tech	Why this choice	Notes
Capture app	React (PWA)	Fast to ship, works on any phone, offline capable	Offline outbox; prechecks for blur, min resolution, GPS accuracy, cached AOI; sends JSON + image to API
Ingest and validation	Python API on AWS (FastAPI or Lambda), S3	Simple and reliable services with strong libraries	Store media in S3; record ETag and size; EXIF sanity; pHash duplicate check; GPS and AOI checks; route to auto-pass, reviewer, or quarantine; append-only event log
Source of truth	PostgreSQL (optional PostGIS)	Strong relational plus geospatial and audit trail	Tables: submissions, media, AOI, reviews, events; idempotent upserts by submission_id
Reviewer console	Airtable Interface	Approve and Reject quickly without building a custom UI	Buttons with required rationale; Automation posts decision to API; API updates Postgres and event log; only minimal data in Airtable
Analytics	Power BI (reads Postgres)	Clear KPI cards and weekly trends	Use read-only views; export PNG or PDF for the deck
Backups and integrity	S3 versioning, RDS snapshots, small Python jobs	Simple safety and restore path	ETag and size for basic integrity; append-only event history; plan SHA-256 and manifest later if needed
Ops and change tracking	Jira	Track actions, releases, and rule changes	Link tickets to Decision Log and Thresholds list
Optional AI assists	OpenAI (server side)	Reviewer hints and FAQ drafting	Keep outputs as suggestions, not decisions
Hosting and security	AWS (S3, Lambda or ECS, RDS)	Scales as needed with managed services	IAM roles, least-privilege access; VPC for RDS; region near users

# Program Ops & Governance

## When

- Pre-launch: short team sync to check readiness
- Post-launch: weekly rhythm to track results and improve

## Weekly rhythm

- Metrics (30 min): how many finished, typical and slowest review times, percent meeting 3-day goal, percent auto-pass, percent hard fails → pick 2–4 fixes with owner and date
- Decision log (15 min): write what changed, why, who owns it, start date, rollback plan
- Team sync (45 min): Field, Data, Eng, Verifiers review risks, issues, field feedback, auditor asks

## Key docs

- Decision log: Date | Change | Why | Owner | Start | Rollback
- Rules list: one place for current numbers like min blur, max GPS error, AOI buffer, duplicate cutoff, model versions
- Reviewer guide: checklists and when overrides are allowed with a short note

## Roles

- TPM: runs the rhythm and change control
- Eng lead: keeps pipelines reliable and safe to retry
- Data lead: owns metrics and sampling
- Field ops: advises on usability and rollout
- Verifiers and auditors: advise on rule clarity and evidence

# Thank you

## TLDR

**Problem:** uneven data, changing rules, slow reviews

**Approach:** offline capture with device checks, clear backend validation, reviewer console, and audit logs

### Impact:

- 10,000+ verified credits,
- Median review time reduced from 10 days to 3 days,
- Errors down about 15%

**My role:** TPM and product lead across field, data, and engineering

**Stack:** Python, React, PostgreSQL, AWS (S3, Lambda), Power BI, Airtable, OpenAI (server-side assists), Jira

## Contact



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