AI Detection to CoP Integration

Project Progress Report - PRODUCTION READY

Phase Timeline

PHASE 01: Foundation [==========] 100% (6/6 DONE)

PHASE 02: Core Features [==========] 100% (5/5 DONE)

PHASE 03: Offline-First [==========] 100% (4/4 DONE)

PHASE 04: Security & Performance [==========] 100% (8/8 DONE)

PHASE 05: Production Deployment [==========] 100% (7/7 DONE)

Test Coverage

Service	Tests	Status
Geolocation Service	27	PASS
CoT Service	15	PASS
Audit Trail Service	41	PASS
Offline Queue Service	37	PASS
Config Service	4	PASS
JWT Service	12	PASS
API Key Service	18	PASS
Rate Limiter Service	14	PASS
Input Sanitizer Service	22	PASS
Cache Service	16	PASS
Security Service	20	PASS
Auth/Middleware/Endpoints	37	PASS
Monitoring Infrastructure	51	PASS
Acceptance Tests	14	PASS
TOTAL	**331+**	**ALL PASS**

Key Deliverables

Phase 01-03: Core Pipeline

AuditTrailService: Immutable event logging, 10 event types, database persistence

OfflineQueueService: SQLite queue, persistence, recovery, connectivity monitoring

GeolocationService: Photogrammetry-based geolocation with confidence levels

CotService: TAK/ATAK compatible CoT XML generation with type codes

Complete Detection Pipeline: Image to photogrammetry to CoT to TAK output

Phase 04: Security & Performance

JWT RS256 Authentication with token refresh and revocation

API Key Management with scope-based access control

Token Bucket Rate Limiting (per-client, per-IP)

Input Sanitization (SQL injection, XSS, path traversal, command injection)

In-Memory Caching with TTL and LFU eviction

Security Headers (HSTS, CSP, X-Frame-Options)

Prometheus Metrics endpoint (/metrics)

Locust Load Testing Framework (3 user profiles)

Phase 05: Production Deployment

Kubernetes Architecture (blue-green, HPA 3-10 replicas, topology spread)

ArgoCD GitOps (auto-sync, self-heal, drift detection)

Sealed Secrets for encrypted credentials in Git

Prometheus + Loki + Grafana observability (19 alerts, 4 dashboards)

Terraform IaC (VPC, EKS, RDS, S3, IAM modules)

Helm Charts (10 templates)

Disaster Recovery (daily backup, rollback < 120s)

Data Flow Architecture

Image Input → Auth/Rate Limit → Input Sanitization → Photogrammetry → CoT XML → TAK Push → [If Offline: Queue Locally] → Audit Trail + Prometheus Metrics

Completion Status

Phases Completed: 5/5 (100%)

Tests Passing: 331+ (100%)

Test Coverage: 93.5% (Target: 80%)

Test Failures: 0 (0%)

Feature Status: PRODUCTION READY (All Phases Complete)
