



Construction Company Safety Compliance

Professional Technology Consulting

The Origami Corporation

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Building Safer Sites: Mobile-First ISO 45001 Compliance and Real-Time BI for a Multi-Site Construction Firm

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1 Building Safer Sites: Mobile-First ISO 45001 Compliance and Real-Time BI for a Multi-Site Construction Firm

1.1 Executive Summary

A mid-sized construction company operating 20 concurrent sites struggled to maintain consistent safety documentation and timely incident reporting. Paper-based processes delayed investigations, obscured leading indicators, and made ISO 45001 audit preparation a time-consuming, manual effort. We delivered a mobile-first safety management solution, automated compliance checklists mapped to ISO 45001, and executive dashboards powered by a secure cloud data pipeline. Within six months, workplace incidents decreased by 65%, compliance audit preparation time dropped from two weeks to two days, and improved safety performance led to a 30% reduction in insurance premiums.

1.2 The Challenge

Operating across multiple sites with rotating crews, the client relied on paper forms, spreadsheets, and ad hoc emails to capture incidents, near-misses, and daily safety checks. This created several issues:

- Lagging incident reporting and investigation initiation, sometimes days after an event
- Inconsistent completion of critical checklists (e.g., pre-start, permits to work, toolbox talks)
- Fragmented document control and limited traceability against ISO 45001 clauses

- Limited management visibility into leading indicators (e.g., near-miss frequency, corrective action close-out times)
- Reactive audit preparation requiring manual compilation of evidence from disparate sources
- Elevated insurance premiums due to historical loss experience and weak demonstrable controls

The organization needed a system that would embed safety processes into daily routines, ensure audit readiness by design, and surface actionable insights to managers in near real-time.

1.3 Our Approach

We applied a multidisciplinary approach spanning mobile development, ISO 45001 compliance, business intelligence, cloud infrastructure, and quality assurance:

- Conducted a rapid ISO 45001 gap assessment to map required evidence, roles, and process ownership (Clauses 6–10)
- Facilitated stakeholder workshops with site supervisors, HSE managers, and executives to define workflows, SLAs, and key risk indicators (TRIR, LTIFR, near-miss to incident ratio, CAPA aging)
- Designed a mobile-first experience that works offline, accelerates incident intake, and enforces mandatory fields and photo evidence
- Built an automated checklist engine with role-based assignments, version control, and digital signatures aligned to ISO 45001 requirements
- Implemented a secure cloud architecture with event-driven data ingestion and a centralized safety data model optimized for BI
- Delivered executive and operational dashboards featuring trend analysis, heatmaps by site, and compliance scorecards
- Instituted a comprehensive QA and change management plan, including pilot rollout, device testing matrix, and targeted supervisor training

1.4 Implementation

We implemented the solution over a 16-week program using an iterative, outcome-driven plan.

Mobile applications - Cross-platform app (iOS and Android) built with React Native for 45 supervisors across 20 sites - Offline-first architecture using local SQLite with intelligent sync (delta changes, conflict resolution via server timestamps and role precedence) - Incident and near-miss reporting with photo/video capture, GPS tagging, severity categorization, and root cause taxonomy - Digital forms for toolbox talks, JSAs, pre-start checks, and permits to work; mandatory fields enforced by risk category - E-signatures for workers and supervisors; time-stamped and geofenced

when online - Push notifications for assigned corrective actions and escalations if SLAs are breached

Compliance automation - Checklist engine linked to ISO 45001 clauses (e.g., 6.1 Hazard identification, 8.2 Emergency preparedness, 9.2 Internal audit) - Version-controlled procedures and policies with audit trails; automatic review reminders per document retention policy - Nonconformity and corrective action (CAPA) workflows with root cause analysis (5 Whys / Fishbone) and verification of effectiveness - Internal audit scheduler with sampling plans, finding categories, and corrective action linkage - Evidence repository for photos, forms, training records, and calibration certificates mapped to control points

Cloud infrastructure and data pipeline - Azure-based architecture to align with the client's Microsoft 365 ecosystem - API layer via Azure App Service (Node.js) and Azure API Management for secure, throttled mobile access - Primary data store: Azure PostgreSQL Flexible Server; documents and media stored in Azure Blob Storage - Event streams captured via Azure Event Hubs; orchestration and ELT to a centralized safety data model in Azure Synapse via Azure Data Factory - Authentication and authorization via Azure Active Directory with role-based access control (RBAC) and conditional access policies - Immutable audit logs enabled with Azure Blob immutability (WORM), plus detailed API telemetry in Azure Monitor and Application Insights - Encryption in transit (TLS 1.2+) and at rest (AES-256), with key management via Azure Key Vault

Business intelligence - Power BI dashboards for executive, HSE manager, and site supervisor personas - Metrics: TRIR, LTIFR, near-miss frequency rate, CAPA aging and closure rates, checklist completion heatmaps, incident severity distribution, and SLA compliance - Drill-through by site, contractor, task type, and timeline, with anomaly detection on leading indicators - Data refresh every 15 minutes for near real-time oversight; row-level security aligned to RBAC

Quality assurance and rollout - Automated API tests (Postman/Newman) with >85% endpoint coverage; contract testing to prevent breaking changes - Mobile UI regression suite using Appium across a device matrix (iOS and Android versions; ruggedized devices) - Static code analysis and SAST via SonarQube; dependency scanning for vulnerable packages - Load testing to 5x peak expected traffic; p95 incident submission under 1.8 seconds online - Pilot at 5 sites for 4 weeks; feedback loop yielded improvements in form ergonomics, offline sync reliability, and checklist conditional logic - Training: 3 role-based learning paths; in-app guidance and microlearning videos increased adoption and reduced support tickets

Integrations - User provisioning via Azure AD SCIM; auto-assignment of roles based on job function - One-way integration with HR system for training and competency records; used for compliance evidence and access gating - Document synchronization with SharePoint for policies and procedures; maintaining a single source of truth

1.5 Results & Impact

- 65% reduction in workplace incidents within six months, driven by faster reporting, standardized risk controls, and improved hazard identification
- Compliance audit preparation time reduced from two weeks to two days by centralizing evidence, automating checklists, and maintaining immutable logs
- 30% reduction in insurance premiums within the first renewal cycle, attributed to improved safety performance and demonstrable controls
- Corrective action closure time decreased by 58%, aided by notifications, ownership clarity, and SLA-based escalations
- Checklist completion rates improved from an estimated 62% to 96% within two months, with site-level scorecards and management visibility
- Near-miss reporting increased by 3.2x, providing leading indicators that informed targeted interventions and training
- Data latency reduced from weeks to minutes; executives accessed current TRIR and site-level risk profiles via mobile-friendly dashboards
- Supervisor productivity gains: average of 35 minutes saved per shift previously spent on paperwork and manual collation

Beyond metrics, the organization achieved audit readiness by design. Evidence collection is embedded in daily workflows, traceable to ISO 45001 clauses, and readily available for external assessors. The culture shift—from reactive reporting to proactive risk management—was reinforced by visible, data-driven leadership oversight.

1.6 Technologies & Services Used

- Services
 - mobile-development
 - compliance-audit-iso45001
 - business-intelligence
 - cloud-infrastructure
 - qa-testing
- Mobile and backend
 - React Native, SQLite (offline), Node.js APIs on Azure App Service, Azure API Management
- Data and cloud
 - Azure PostgreSQL Flexible Server, Azure Blob Storage (immutability/-WORM), Azure Event Hubs, Azure Data Factory, Azure Synapse Analytics, Azure Key Vault
- Identity, monitoring, and CI/CD

- Azure Active Directory (RBAC, Conditional Access), Azure Monitor, Application Insights, GitHub Actions (CI/CD)
- Testing and security
 - Appium (mobile UI), Postman/Newman (API), SonarQube (SAST), OWASP MASVS-aligned mobile security checks
- Analytics
 - Power BI with row-level security and scheduled refresh

1.7 Conclusion

By unifying mobile incident reporting, automated ISO 45001-aligned workflows, and real-time business intelligence on a secure cloud foundation, the client transformed safety management from a compliance burden into a strategic asset. The measurable impact—fewer incidents, faster audit readiness, and lower insurance premiums—was matched by cultural gains in accountability and proactive risk control.

With the core platform in place, the roadmap includes predictive analytics for risk scoring, computer vision to verify PPE compliance in photos (privacy-conscious and opt-in), and IoT integrations for equipment telemetry and environmental monitoring. The result is a resilient, scalable safety ecosystem that supports operational excellence across every site.

About The Origami Corporation

The Origami Corporation is a leading technology consulting firm specializing in cloud migration, DevSecOps, cybersecurity, and digital transformation. We help organizations navigate complex technological challenges and achieve their business objectives through innovative, secure, and scalable solutions.

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