

# Michael L. Welles

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## Overview

Senior Principal Engineer with 20+ years designing, implementing, and scaling distributed systems across safety-critical and high-growth environments. Proven track record defining architectural vision, leading cross-functional technical initiatives, and delivering production-ready systems with measurable business impact. Deep expertise in backend architectures, system reliability patterns, and GenAI/LLM integration using open-source models. Partner closely with engineering, product, and business stakeholders to drive technical excellence while maintaining hands-on coding contributions. Achieved 2.5× velocity increase at MediData through technical leadership, mentorship, and pragmatic CI/CD practices.

## Core Technologies

**Languages & Frameworks:** Python, Rust, Go, TypeScript, Swift, Objective-C, Kotlin, Java **\*\*Data & Distributed Systems:\*\*** Databricks, Spark, PostgreSQL, DynamoDB, Elasticsearch, vector databases **\*\*Cloud & Infrastructure:\*\*** Kubernetes, Docker, AWS (SQS/SNS, S3, IAM, VPC, SageMaker), Azure, Terraform **\*\*AI/ML Platforms:\*\*** Open-source LLMs, SageMaker, model training pipelines, prompt engineering, AI orchestration **\*\*Reliability & Observability:\*\*** CI/CD, distributed tracing, metrics/logging, SLOs/alerting, system observability **\*\*Architectural Patterns:\*\*** Microservices, event-driven architecture, multi-tenant SaaS, pub/sub, async processing

## Experience

### Consulting Principal Engineer, CubeNexus.ai

*Aug 2025 - Present · Remote*

Principal architect for geospatial intelligence platform leveraging LLM-based natural language querying and 3D visualization. Led architectural decisions balancing innovation, scalability, and maintainability across engineering teams.

- Defined technical roadmap and architectural vision for multi-terabyte geospatial data platform with real-time LLM integration for natural language queries against satellite and sensor data
- Designed and implemented scalable ingestion pipeline (PySpark, Pandas) processing multi-terabyte datasets with event-driven architecture for real-time telemetry streaming
- Hardened production API backend (Python/FastAPI) and established CI/CD pipelines across all repositories, driving adoption of modern development frameworks and observability standards
- Mentored engineering team on distributed systems patterns, code quality practices, and design documentation standards

### Principal Engineer, Istari Digital

*Feb 2024 - Jul 2025 · New York, NY*

Senior-most technical leader for zero-trust digital collaboration platform connecting cyber-physical engineering tools. Drove architectural initiatives across multiple teams and domains, delivering production systems with cryptographic security guarantees.

- Architected cryptographically verified asset lineage system and DoD-compliant control framework enabling zero-knowledge collaboration while preserving dependencies, provenance, and metadata—balancing innovation with security and compliance requirements
- Led cross-team development of secure backend registry service (Python, FastAPI, SQLAlchemy, PostgreSQL, Zanzibar) and multi-language SDK ecosystem. Designed database schema for complex relationship graphs and optimized queries for lineage traversal at scale
- Built high-performance cryptographic core in Rust with Python and WebAssembly bindings, creating SDKs consumed by automation agents and frontend teams—demonstrating technical leadership through hands-on framework development
- Partnered with product and business stakeholders to align technical roadmaps with commercial and government client objectives. Delivered all milestones on time, enabling successful product relaunch
- Established architecture review processes and CI/CD validation for compliance requirements, publishing results for streamlined ATO submission and deployment on classified networks

### Director of Software Development, Raytheon Technologies

*Sep 2021 - Nov 2023 · New York, NY*

Technical lead driving architectural vision for next-generation aerospace data platform. Led principal-level initiatives across multiple teams, designed distributed systems at scale, and mentored senior engineers.

- Defined and evangelized architectural roadmap for real-time flight telemetry platform adopted across Pratt & Whitney commercial aerospace division. Designed streaming data architecture (Databricks, Spark, Python) processing thousands of engine sensors through ML-driven fault detection and anomaly detection models
- Architected distributed system handling severity-based automated alerts from emergency grounding to routine maintenance—demonstrating deep understanding of backend architectures, data modeling, and system reliability patterns for safety-critical applications
- Designed ML model training and orchestration pipeline with comprehensive audit trails and parallel model evaluation using asynchronous patterns. Implemented concurrent processing architecture that added zero latency overhead while improving model coverage
- Led "inner-source" initiative establishing best practices and reusable frameworks: SDKs for parsing proprietary data formats, quickstart kits for Databricks projects, and synthetic data generators—acting as force multiplier enabling teams to move faster
- Managed team of 14 developers across three agile projects while providing technical mentorship and architecture guidance. Supervised platform adoption for 40+ teams through design reviews, hands-on prototyping, and technical coaching

## **Head of Technology, Dayforward**

*Jan 2020 - Sep 2021 · New York, NY*

Principal architect and technical leader for life-insurance startup. Defined architectural vision, led cross-functional collaboration, and delivered production-ready algorithmic underwriting platform in under 10 months.

- Designed and scaled distributed microservices platform (Go, Kubernetes) with federated GraphQL API and Vue.js frontend for multi-tenant SaaS insurance underwriting
- Partnered closely with Product, Engineering, and business stakeholders to compress build-ship-iterate cycle. Launched platform same day company received regulatory approval, demonstrating ability to turn complex ideas into reliable systems with measurable business impact
- Established technical direction balancing speed-to-market with long-term maintainability. Led small team through hands-on technical leadership, code reviews, and architecture sessions

## **Director of Software Engineering, UTC Aerospace Systems**

*Feb 2019 - Jan 2020 · Brooklyn, NY*

Engineering director managing 17 engineers across multiple project teams. Defined technical standards and evangelized best practices for IoT, mobile, and developer tooling initiatives.

- Led cross-functional technical initiatives spanning IoT sensors, mobile applications, and design systems
- Established engineering processes, documentation standards, and best practices adopted company-wide
- Influenced technical and non-technical stakeholders through clear communication and architectural leadership

## **Lead Engineer / Chief Technologist, Riverdrop**

*Jan 2018 - Feb 2019 · New York, NY*

Chief technologist defining architectural vision for ML-driven product search engine. Led team of three senior engineers, designed distributed systems, and delivered scalable microservices platform.

- Designed and implemented ML-driven ETL pipeline (Python, spaCy, NLTK, scikit-learn) for product identification and NLP entity extraction. Integrated image recognition and classification models on AWS SageMaker with OpenCV preprocessing
- Architected event-driven distributed system using AWS SQS/SNS for asynchronous processing, implementing reliability patterns: retry logic, dead-letter queues, and idempotency guarantees
- Built microservices platform with discrete transformation steps packaged as Docker images and deployed via CI/CD to Kubernetes (Terraform). Developed search API in Go against Elasticsearch indexes with React.js/TypeScript frontend
- Demonstrated hands-on technical leadership writing production code while guiding team through design sessions and code reviews

## **Director of Engineering (Mobile), MediData**

*Feb 2017 - Jan 2018 · New York, NY*

Engineering leader for Patient Cloud platform collecting clinical trial data from mobile devices and wearable sensors across regulated healthcare environments.

- Managed portfolio of products including ePRO (iOS/Android), Patient Cloud (iOS clinician app), native SDK, and wearables platform with supporting backend services
- Launched two major mobile initiatives and led complete migration to Swift and Kotlin, establishing technical direction for mobile engineering organization
- Instituted organizational and process improvements that increased average team velocity by 2.5× through mentorship, code quality standards, and CI/CD automation

## **Principal Architect / Director of Mobile, Hugu**

*May 2013 - Feb 2017 · Brooklyn, NY*

Principal-level technical leader managing cross-functional team of 20+ engineers, QA, designers, and product managers. Drove technical excellence, mentorship culture, and innovation initiatives.

- Led architectural reviews, design sessions, and hands-on prototyping across multiple concurrent client projects. Evangelized agile best practices, CI/CD, and engineering excellence
- Instituted engineering guild system for cross-office knowledge sharing and formal R&D initiatives. One guild-led innovation generated new product proposal securing \$5M contract—demonstrating ability to multiply impact through technical leadership
- Championed innovation through technology investigations (interior way-finding, Arduino/embedded systems), engineering blog, meetups, and open-source contributions
- Directed notable projects including Bluetooth audio/video streaming accessories, 3D avatar scanning companion app, and B2B/B2C mobile commerce platforms

## **Manager of Mobile Technology, Consumer Reports**

*Jul 2011 - May 2013 · Yonkers, NY*

Founded mobile applications group and built in-house iOS/Android engineering team. Defined technical strategy and launched flagship ratings application.

## **Senior Software Engineer – iTunes Store Video Workflow Group, Apple**

*Mar 2008 - May 2011 · Cupertino, CA*

Senior engineer on team responsible for encoding and assembling all iTunes video media. Owned encoding toolchain for processing cluster, specified media formats, developed validation suites, and created hardware compliance testing reference media. Led two major workflow rewrites for HDTV launch and international expansion.

## **Senior Software Architect, The New York Times**

*Aug 2007 - Mar 2008 · New York, NY*

Created tools for managing releases and production deployment. Oversaw offshore CMS development.

## **Founder, Partner, Bangstate**

*Jun 1999 - Mar 2008 · New York, NY*

Founded and managed five-person development consultancy. Oversaw business operations and delivered projects for clients including The Associated Press, American Bar Association, Atlantic Records, Forbes Magazine, and Time Inc.

## **Education**

### **Bachelor of Arts in History, The University of Chicago**

*Chicago, IL*