Modernizing Device Monitoring Apps with WaveMaker

An IOT Case Study for an Italian Dental Equipment Manufacturer

The Story

A leading manufacturer of sterilization and sedation equipment for dental practices, the company supports users who depend on precise monitoring of everything from gas levels to sterilization cycles. Their operations require unwavering quality assurance and regulatory compliance.

They faced a critical need to modernize its medical equipment monitoring and documentation systems. Through collaboration with LogConsulting and using WaveMaker's rapid application development platform, they created an integrated IoT ecosystem that now manages 2,700+ devices, automates compliance documentation, and transforms customer support.

The solution represents a strategic approach to digital innovation in medical device manufacturing, addressing key challenges of manual processes, limited equipment visibility, and resource-intensive support operations. Through advanced IoT technologies and cloud infrastructure, they repositioned themselves as a technology-driven medical equipment provider.

The Industry Context

Medical device manufacturing demands a careful balance between innovation and compliance. This project united the company's deep industry expertise with LogConsulting's digital transformation capabilities to create a solution that serves both technical and regulatory needs.

LogConsulting

Founded in Bologna in 1999, LogConsulting evolved from traditional IT consulting to specialized digital transformation. Their OneClickApp Division demonstrates this evolution, delivering SaaS applications 67% faster than traditional development methods. This Italian medical device manufacturing company is a client of LogConsulting, who were instrumental in on-boarding WaveMaker to modernize their operations.

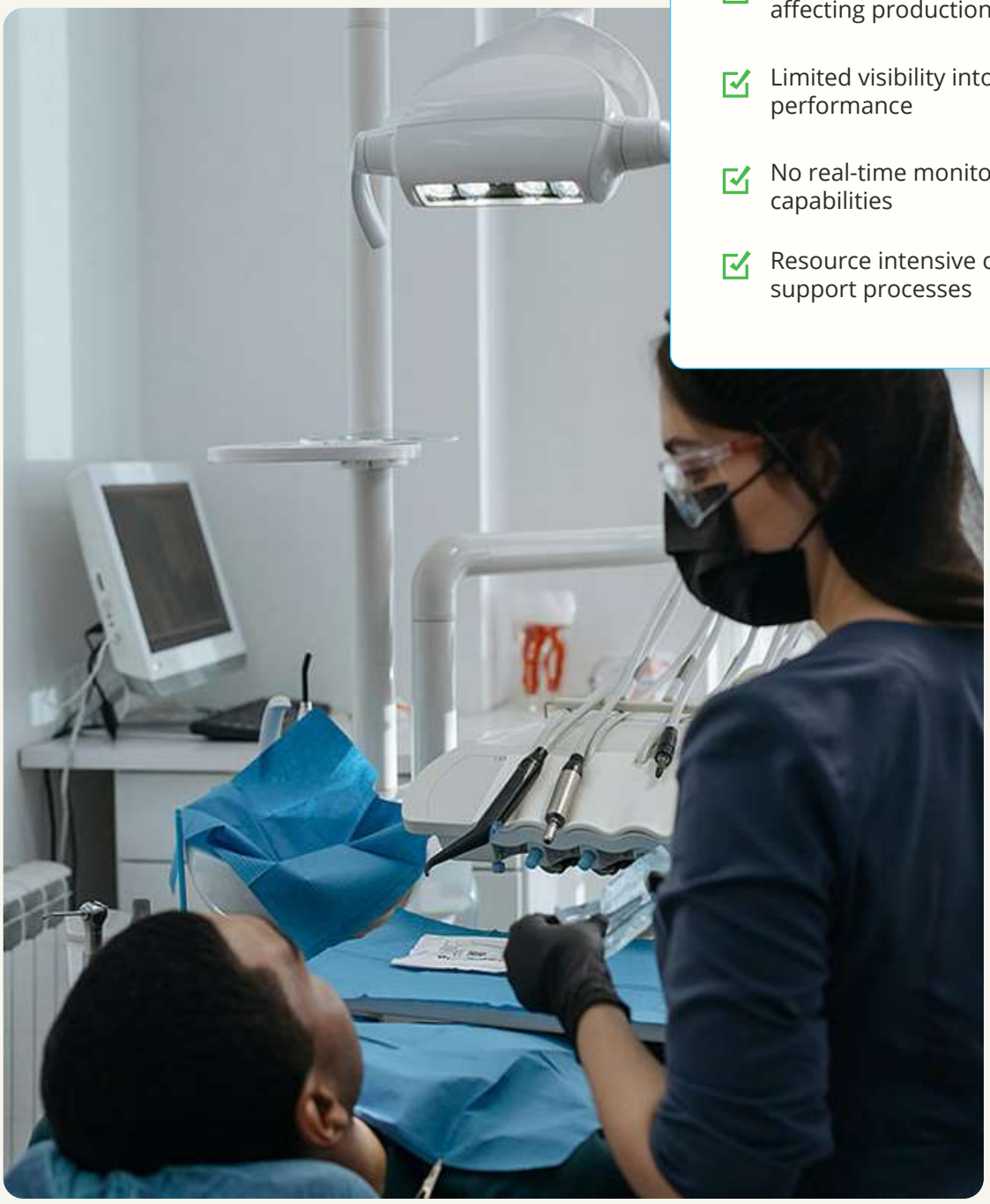
> *Manual processes were creating significant bottlenecks, while our customers increasingly requested better equipment monitoring capabilities.*
>
> ***Operations Manager***
> *at the manufacturing firm*

Critical Hurdles

Before implementing the new system, they needed to address fundamental operational constraints while maintaining their high standards for quality and safety. These challenges affected everything from daily operations to customer satisfaction.

Key Constraints

- Manual documentation processes requiring extensive paper records
- Quality control bottlenecks affecting production
- Limited visibility into equipment performance
- No real-time monitoring capabilities
- Resource intensive customer support processes



The Solution

The solution required a comprehensive approach to handle device data, regulatory compliance, and user interactions.

LogConsulting developed three interconnected systems, each addressing specific operational requirements while maintaining seamless integration.

1. **AWS Ecosystem Implementation**
2. **Microservices Architecture**
3. **IoT Platform Components**

AWS Ecosystem Implementation 1

The AWS infrastructure forms the backbone of the entire system, providing scalability, security, and reliability across all components.

The solution's architecture relied on several key AWS service groups, each handling specific aspects of the system.

Here's how each component group contributed to the overall solution.

Data Collection and Device Management

Managing thousands of medical devices requires robust communication and data handling. We implemented the following services to ensure reliable device connectivity and data flow.

AWS IoT Core

- MQTT protocol integration for device communication
- Device shadow services for offline functionality
- Realtime data streaming capabilities
- Secure device authentication and authorization

AWS SQS

- Message queuing for device data
- Buffer for high volume data processing
- Reliable message delivery system

Data Storage and Processing

Medical equipment generates vast amounts of critical data that requires both real-time processing and long-term storage. Our storage strategy balanced performance with compliance requirements.

AWS Timestream

- Time series data management
- High performance query processing
- Automated data lifecycle management

AWS RDS

- Operational data storage
- Transaction processing
- Backup and recovery management

AWS Elasticache

- Performance optimization
- Session management
- Realtime data caching

Application Deployment and Scaling

To ensure consistent performance across different regions and user loads, we implemented a flexible deployment architecture.

AWS Elastic Beanstalk

- Microservices deployment
- Autoscaling configuration
- Load balancing

Storage and Archival

Medical device data requires both long-term retention for compliance and quick access for operations. We implemented a tiered storage strategy.

- Amazon S3
- Document storage
- Backup retention
- Compliance archival
- Audit trail storage

Content Delivery and Security

With medical devices deployed globally, ensuring secure, fast access to data and services was crucial. Our delivery and security infrastructure included.

- AWS CloudFront for reduced latency
- AWS Web Application Firewall (WAF) for threat protection
- Data encryption and secure key management

Microservices Architecture 2

The solution was built on AWS Elastic Beanstalk with load-balanced elastic WaveMaker applications, structured as distinct microservices. Each service is independently deployable and scalable, with its own database and business logic, communicating through REST APIs and message queues.

Gateway Service

Handles all device communication
Manages authentication and authorization
Routes data to appropriate services
Provides API interface for external systems

Flux IoT Service

Monitors medical gas systems
Tracks gas usage patterns
Manages safety compliance
Generates usage reports

Steam IoT Service

Processes sterilization machine data
Validates sterilization cycles
Generates digital certificates
Manages equipment maintenance schedules

Support Portal Service

Handles customer support tickets
Manages warranty claims
Provides documentation access
Coordinates technical support

IoT Platform Components

3

The heart of this digital transformation lies in **three specialized IoT platforms**. Each platform was designed to address specific operational needs while maintaining seamless integration with the overall system. These platforms work together to create a comprehensive device management ecosystem.

1. **Flux IoT for Medical Gas Management**
2. **Steam IoT for Sterilization Control**
3. **Valido IoT for Process and Compliance Management**

Implementation Approach

Creating a secure, compliant IoT system for medical devices required careful consideration of both technical and regulatory requirements. The development team utilized WaveMaker's capabilities to ensure reliability and compliance.

> *WaveMaker's API handling, CI/CD integration, and automated security features have transformed our development and deployment processes.*
>
> Head of Enterprise Architecture

Integration Strategy

Creating a cohesive system from multiple components required a carefully planned integration approach. We developed a multilayered integration architecture that ensures reliable communication between devices, services, and users while maintaining security and performance.

Device Layer Integration

- Lightweight, real-time data transmission from medical devices
- Automated device registration and authentication
- Streamlined device onboarding while ensuring security
- Custom device shadows for offline operation
- Buffered message handling for reliability

Service Layer Integration

- REST APIs with standardized interfaces
- Event-driven architecture for real-time updates
- Service discovery and registry to track and route requests to available service instances
- Centralized authentication and authorization serving as a single source of information for security policies across services

Data Layer Integration

- Unified data model across services to ensure consistent data representation throughout the system and distributed services
- Caching strategies for performance to optimize retrieval of frequently accessed data
- Data validation and transformation pipelines to ensure data quality and format uniformity

Key Features-Mobile Application Development

- Native iOS and Android applications
- Offline operation capability
- Push notification system
- Secure authentication
- Realtime equipment monitoring

Why is WaveMaker a Strategic Choice

While multiple development platforms were considered, WaveMaker emerged as the strategic choice for their digital transformation.

The CTO at the Italian Medical Manufacturing firm, has articulated the key decision factors in this statement.

> *WaveMaker is professional, fast and stable with AWS systems because it produces standard applications, our users face no issues with WM apps, we chose Wavemaker for its simple developer seat licensing model that allows for scaling up the number of users and open standards development model.*
>
> *We prefer the browser-based RAD (Rapid Application Development) model that WM offers. You can leverage a single license and ship many applications, WaveMaker is the only platform that can help one to create products in run time, there is no extra payment that is needed, and we only need to pay for the AWS model. Development is not joined with run time. Apps can scale and the business can focus on sales. This creates more time for development computing. Right now, all our applications are public and working smoothly.*

Read more about WaveMaker

Measuring Success: Four Years of Production in Numbers

After years of continuous operation, the system has demonstrated consistent performance improvements across all key areas.

Quality Control Metrics

Complete digital documentation

Comprehensive audit trails

47% reduction in processing errors

Operational Efficiency

52% reduction in equipment downtime

38% improvement in resource utilization

43% decrease in maintenance costs

System Performance

2,700+ active system users

99.9% system uptime

24/7 continuous operation

Seamless global accessibility

Customer Service Improvements

24/7 system availability

15-minute average response time

73% reduction in support tickets

89% customer satisfaction rate

What’s Next on the Roadmap

With the core system successfully deployed, the manufacturing firm is positioned to expand its digital capabilities further. The foundation we've built enables new possibilities for automation, analytics, and customer service. Our planned developments focus on leveraging the existing infrastructure while adding new capabilities.

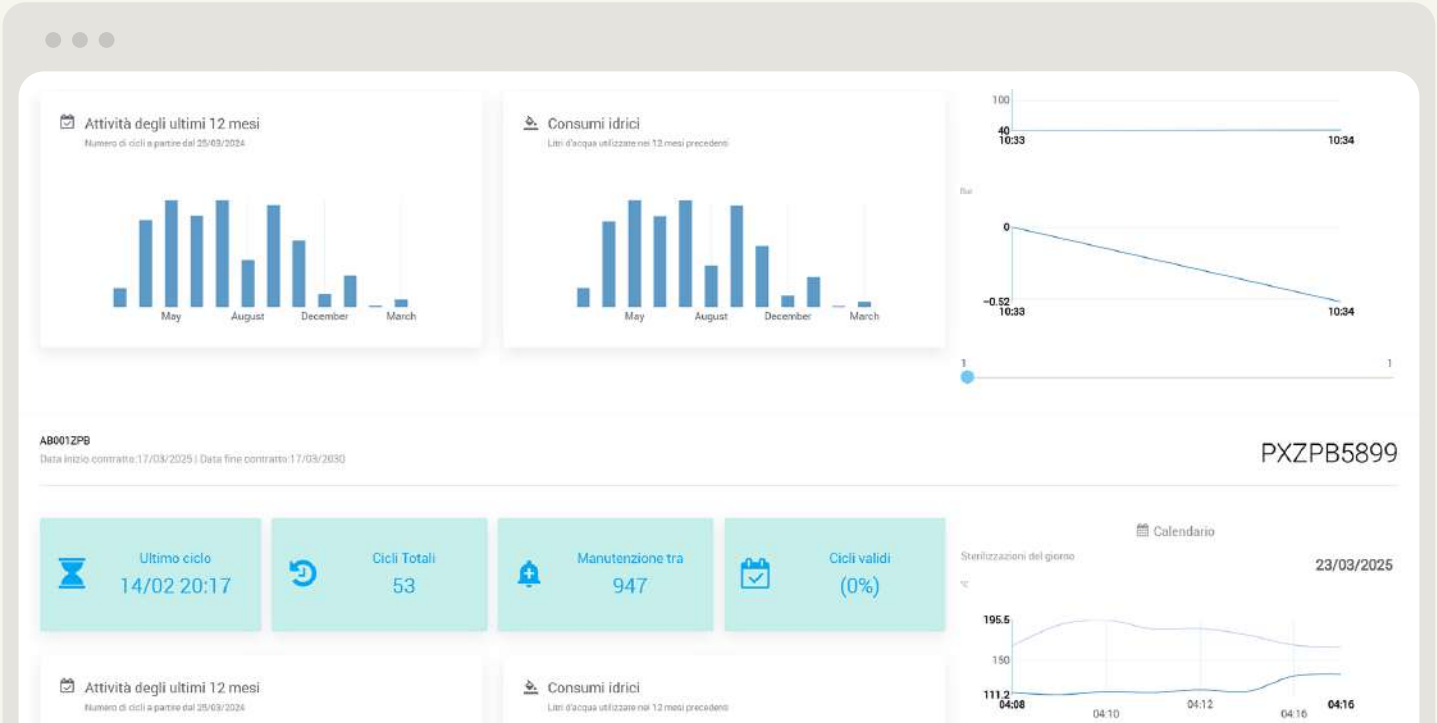
Planned Developments

1. **Patient Procedure Tracking System**
   End-to-end monitoring of medical procedures
   Integration with hospital management systems

2. **Facility Management Integration**
   Centralized control of all connected devices within medical facilities
   Resource optimization and automated scheduling

3. **Advanced Analytics Implementation**
   Predictive maintenance using machine learning
   Usage pattern analysis for equipment optimization

4. **Digital Service Expansion**
   Remote device diagnostics and troubleshooting
   Enhanced customer self-service capabilities



Driving Results Through Strategic Digital Investments

By partnering with LogConsulting and implementing WaveMaker's development platform, the manufacturing company successfully modernized its operations, transitioning from manual processes to an integrated IoT ecosystem.

The impact of this transformation is clear. Quality control has improved through digitization and automation. Operational efficiency has increased, with notable reductions in equipment downtime, maintenance costs, and resource utilization. The system's performance delivers excellent service to thousands of global users.

Free from the constraints of manual bottlenecks and data silos, the company now has a solid foundation for ongoing innovation. With plans to expand into patient procedure tracking, facility management, advanced analytics, and enhanced digital services, they are well-positioned to continue shaping the future of dental practice technology.

As they continue to grow, their success serves as an inspiring study for other medical manufacturing companies looking to embrace the potential of digital transformation.

By focusing on critical challenges, partnering strategically, and investing in adaptable, scalable technologies, companies in this space can not only optimize their current operations but also create new opportunities for growth and impact in the rapidly changing healthcare industry.

About WaveMaker

WaveMaker is the most open, extensible and flexible low code platform that efficiently complements your enterprise application delivery. The open standards Java-based platform is designed for professional software development teams. WaveMaker has SaaS, on-prem and white-labeled offerings for large enterprises and ISVs to build modern, API-driven, scalable and secure software applications and platforms.

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