PRESIDIO®

SOLUTIONS BRIEF

PRESIDIO *and* GOOGLE CLOUD

Revolutionizing Transit Safety and Efficiency with Predictive Rail Maintenance

THE CHALLENGE:

Keeping urban rail networks safe and reliable.

Major urban railway transit authorities face the immense task of maintaining vast, complex networks safely and efficiently. A major US city's transit authority, responsible for 472 subway stations and over 6,500 subway cars serving 15 million people, relied heavily on traditional track inspection methods. This involved infrequent automated scans and frequent, labor-intensive visual inspections by workers on the tracks – a reactive, costly process that carried inherent safety risks. Lacking a timely, automated way to detect track nonconformities and leveraging no predictive analytics, the authority faced challenges in preventing potential derailments, minimizing delays, and optimizing maintenance efforts.

PRESIDIO'S INNOVATIVE SOLUTION: SMART DATA COLLECTION VIA COMMODITY HARDWARE

Presidio, a global digital services and solutions provider with deep public sector expertise, partnered with Google Public Sector's Rapid Innovation Team to address this challenge head-on. Recognizing the need for a cost-effective, rapidly deployable solution, Presidio devised an innovative approach: transforming readily available Google Pixel smartphones into powerful data collection sensors.

By retrofitting these smartphones onto subway cars, Presidio created a system to continuously gather crucial data, including:

- **GPS location** (pinpointing specific track sections
- **Accelerometer and gyroscope readings (**detecting vibrations and movements indicative of track issues)
- **Under-car audio recordings** (identifying acoustic anomalies

This data is securely transmitted to Google Cloud for analysis. Presidio built an application leveraging **Google Firebase** and sophisticated ingestion pipelines to process the massive data streams – analyzing over:

- **150 million sensor recordings**
- **500,000 unique GPS locations**
- **750 hours of audio in the initial POC**

FROM RAW DATA TO PREDICTIVE INSIGHTS

The collected sensor data, combined with existing customer data on track geometry and known nonconformities, feeds into advanced AI/machine learning models hosted on Google Cloud. Using powerful analytics tools like Looker dashboards, the system achieves two critical goals:

1. **Near real-time defect identification:**
   The system can automatically flag 92% of new track nonconformities as they develop, often much sooner than traditional inspection cycles allow.
2. **Predictive maintenance:**
   By analyzing patterns and trends, the AI models predict where future track issues will likely occur, enabling proactive intervention before failures happen.

Google Cloud

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TRANSFORMING OPERATIONS: ENHANCED SAFETY, EFFICIENCY, AND EMPOWERMENT

The Presidio solution delivered significant outcomes beyond the initial goal of improved predictive maintenance:

- **Enhanced safety:** By automating detection and prediction, the system significantly reduces the time maintenance workers need to physically inspect tracks, lowering their exposure to dangerous environments. It also allows the rail transit authority to address potential hazards like derailments proactively.
- **Increased efficiency:** Maintenance efforts can be precisely targeted to areas identified by the system, optimizing resource allocation and reducing downtime caused by unexpected track failures and delays.
- **Cost savings:** Proactive repairs are typically less expensive than emergency fixes after a failure. Preventing service disruptions also avoids significant operational costs and rider inconvenience.
- **Worker empowerment:** Presidio developed prototype tools like the **"TrackInspect"** app and natural language interfaces ("Chat with data") to provide inspectors with easy access to predictions, historical data, and maintenance procedures, enabling faster, more informed decision-making right in the field.

WHY PRESIDIO

This successful POC demonstrates Presidio's ability to:

- **Innovate with practical, cost-effective technology applications** - smartphones as enterprise sensors.
- **Leverage powerful cloud platforms** - Google Cloud's AI/ML for complex data analysis and prediction.
- **Develop customized solutions** solutions - addressing critical infrastructure challenges in the public sector.
- **Deliver tangible improvements in safety, efficiency, and operational reliability.**

Presidio is helping transit authorities modernize their infrastructure maintenance, ensuring safer journeys and more reliable service for millions.

Contact Presidio today: **www.presidio.com**