Real-Time FRACAS for Enhanced Railway Service Reliability

ADI DHORA
Principal Solutions Consultant
Hottinger Bruel & Kjaer, Toronto, Canada

IHHA 2025
13TH INTERNATIONAL HEAVY HAUL ASSOCIATION CONFERENCE 2025
November 17-21, 2025 | The Broadmoor, Colorado Springs, CO, USA

Introduction

Service reliability continues to be a significant issue, recently inviting greater scrutiny especially for Class I freight[1]. To proactively minimize service disruptions caused by unplanned rolling stock and track maintenance, rail operators are adopting a continuous improvement approach. However persistent data silos across service delivery data, condition monitoring, and maintenance systems, greatly obstruct the ability to surface recurring issues and measure effectiveness of improvements.

Experimental work

A large-scale metro tackled service reliability by implementing an advanced, closed-loop Failure Reporting and Corrective Action System (FRACAS). Legacy methods involved manual cross-referencing logs and reports to investigate service disruptions which greatly hindered the ability to identify systemic issues early. The FRACAS was meant to integrate siloed data and provide a common platform to investigate service disruptions and equipment failures in near real-time.

Results

Implementation results indicate significant improvements in response times to investigate service disruptions.

The advanced, closed-loop Failure Reporting, Analysis, and Corrective Action System (FRACAS)—tailored specifically for rail operations:

- Manages thousands of operational events and alarms per minute, automatically categorizing service disruptions requiring investigation with low false rates (1 in 10,000 trips).
- Allows rail operator, equipment manufacturer and service provider a common, collaborative platform with verified ground-truths (service disruption details, diagnostic alerts, subsequent maintenance actions) for more effective root cause analysis.
- Generates a feedback loop for continuous improvement, allowing maintenance efficiency and effectiveness of diagnostics systems to now be monitored.

Based on these promising results, the advanced FRACAS will be used for additional service lines being added. The metro was able to reach 99% service reliability within 6 months of operation and generate 30% more time for continuous improvement within the asset management team.

Conclusions

Significant investments in communications technology and condition-based maintenance (CBM) are already underway. These investments are expected to help reduce approximately 25,000 Class I locomotive failures annually[2] and save between $5.6 billion to $19.8 billion in annual maintenance costs[3] for freight rail. A FRACAS that offers a closed-loop, real-time capability for continuous improvement is proven to be a robust tool to ensure maximum value can be extracted from these investments.

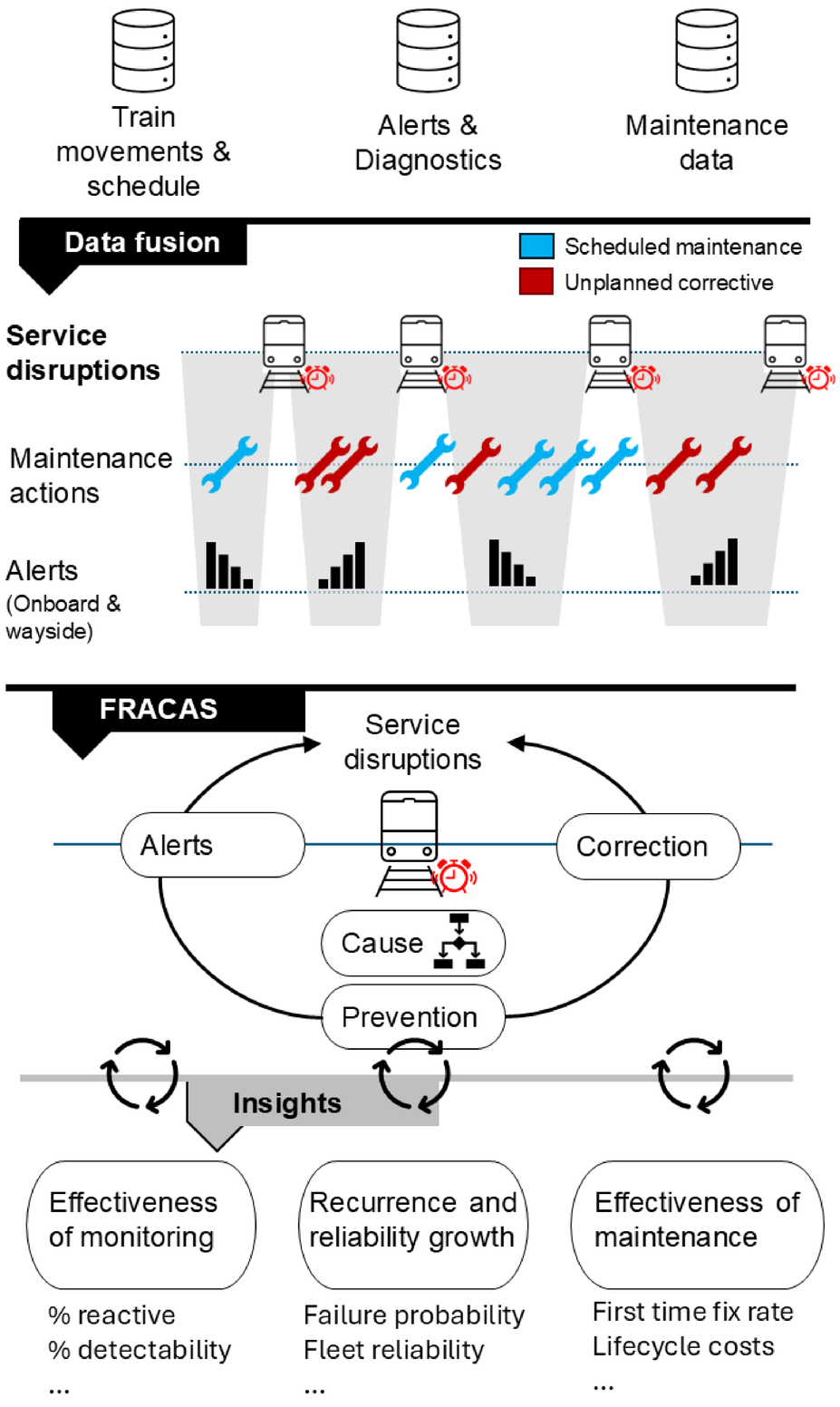

Figure 1: An advanced FRACAS which integrates siloed data to create a real-time platform to investigate recurring service disruptions due to equipment failure

Figure 2: Results achieved within light-rail passenger rail with use of a near real-time FRACAS

References

1. Surface Transportation Board, 2024. STB adopts final rule for reciprocal switching (PR-24-20)
2. Resor, R.R., Smith, M.E. & Patel, P.K., 2005. Positive Train Control (PTC): Calculating Benefits and Costs of a New Railroad Control Technology. Journal of the Transportation Research Forum, 44(2), pp.98
3. McKinsey & Company, 2018. The rail sector's changing maintenance game.

For further information please contact:
Adi Dhora , Hottinger Bruel & Kjaer, adi.dhora@hbkworld.com
Baxter Hall, Hottinger Bruel & Kjaer, baxter.hall@hbkworld.com