CONCEPT CHECK: ASSET PERFORMANCE MONITORING

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1. Asset: Train Condition Assessment Systems (TCAS)

Wayside train Condition Assessment (CAS) equipment are systems that are strategically installed alongside the rail and solely responsible to measure the condition and state of the rolling stock as they travel past the system. Different types of systems are installed for different parts of the locomotive or wagon. Some include:

- Hotbox Detectors (HBD)
- Wheel Profile Monitors (WPM)
- Load profile Monitors (LPM)
- Weighbridges (WIM)

2. Purpose:

These systems are put in place to assess the condition of the wheels, bearings, the axle loads/weights, profile of the load, etc. and holistically assist in preventing derailments of a train or damage to infrastructure. The unavailability of any of these systems could cause catastrophic results in the scenario that condition exceed specific limits go undetected.

3. The Maintenance Process:

The current maintenance process of these systems are as shown in Figure 1.

Three types of maintenance flows can be initiated.

1. *Utilisation of the Real-time monitoring dashboards* that raise alarms when systems have problems and includes comments on the actual maintenance needed. These dashboards are monitored by each regional team and technicians are sent out to fix issues if there are unavailable systems or ones requiring maintenance.
2. *Routine maintenance cycles per schedule* – currently fixed at 3 week cycles.
3. *Identification of ad-hoc chronic issues*, via monitoring system or visual inspections of routine maintenance.

4. Maturity Level:

The current maintenance maturity level is an APM Level 3: Real-time monitoring with alerts triggered given set thresholds, although visual inspection and periodic routine maintenance are also carried out.

5. Performance Metrics:

The metrics used to assess the performance of the systems are availability of the system (how long was the system online vs offline in time), calculated reliability of the system based on historical system availability and expected designed reliability and finally, the data integrity of the system (how correctly is the system measuring the condition of rolling stock based on invalid readings, RFID invalid rolling stock tags, no measurements, etc. The metrics used are appropriate for assessing the performance covering both the physical components as well as the data generation of the system.

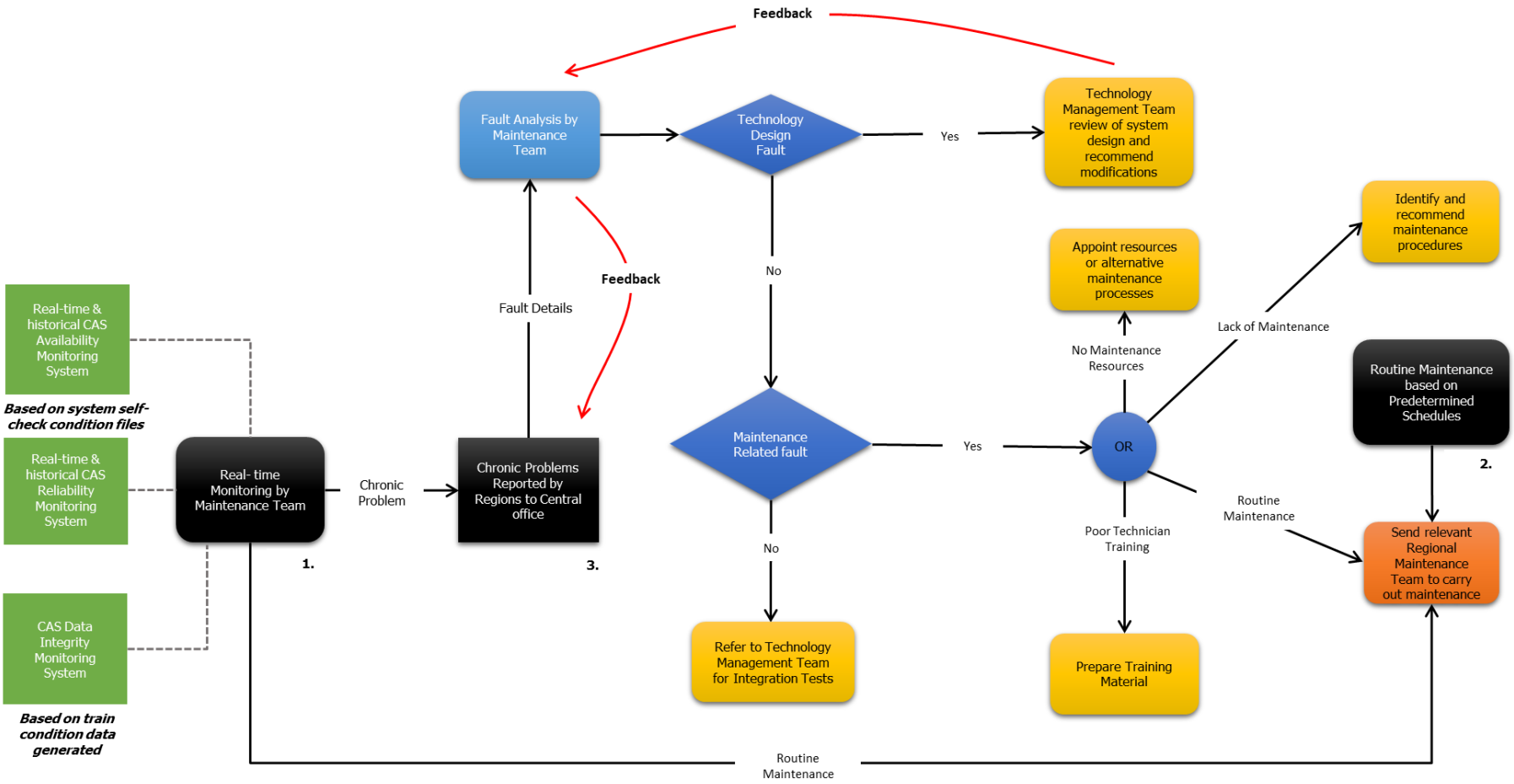

Figure 1: Maintenance Process Flows

6. Shortcomings of asset performance:

The greatest shortcoming of performance faced for all systems are mostly due to maintenance issues.

- Firstly, there are a lack of correctly trained staff to fix the systems. The ground staff isn't always knowledgeable enough and so VITs need to be sent out to fix systems (lot less available than ground staff), this increases the turnaround time to fix issues.
- Availability of parts required for replacement is also a problem. Most of the systems are old and almost obsolete technology and parts are not always readily available or are expensive.
- The environment and conditions the systems are exposed to on the rail (extreme heat, dust, extreme cold) are not always conducive to the proper functioning of the system – lens need regular cleaning due to dust etc.

7. Opportunities & Hindrances:

Firstly, an overhaul of the current systems with the latest technologies available should be executed. The systems selected should be tested and designed with the current environmental conditions taken into consideration and not as a thought when commissioning. They should be rail rugged specific systems. This is not always easy to do, unless done in-house perhaps and will have intense capital costs.

Systems could also be installed at the maintenance depots and departure yards, data collected and analysis performed in advance to make sure all trends suggest no failures prior to each train departure. The predictive maintenance philosophy of components must be adopted instead of just monitoring for a failure.