

A System Health Record Platform - Enabling Predictive Maintenance in Surface Vehicles.

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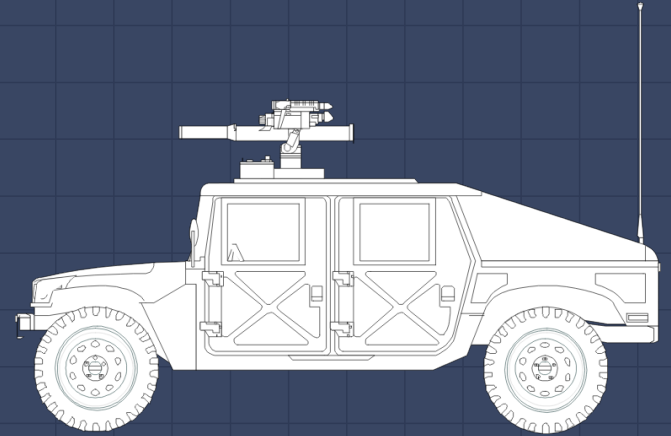
31 October 2019

CBM+/PHM Standard

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SAE J1939

- Current Data
- Freeze Frame Data
- Diagnostic Trouble Codes
- Clear Diagnostic
- Pending Diagnostic Trouble Codes
- Test Results (System Monitoring)



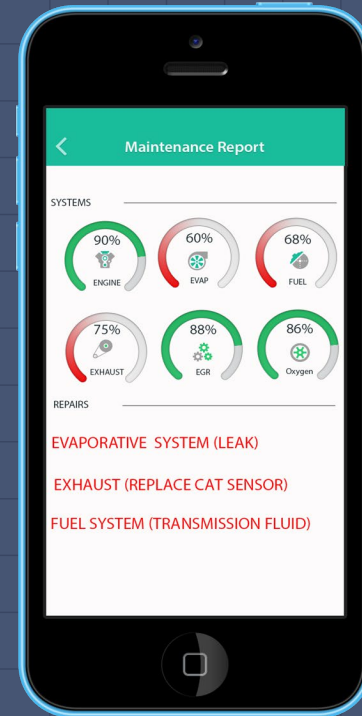
JSON Standard

- Is an open-standard format that uses human readable text to transmit data objects consisting of attribute-value pairs
- JSON is light-weighted which means it's easier to get and load data quickly
- An Alternative to XML Format
- Primarily used to for sending data over a network connection

Diagnostics vs Prognostics

a distinct symptom or characteristic

an advance indication or portent of a future event.



Problem

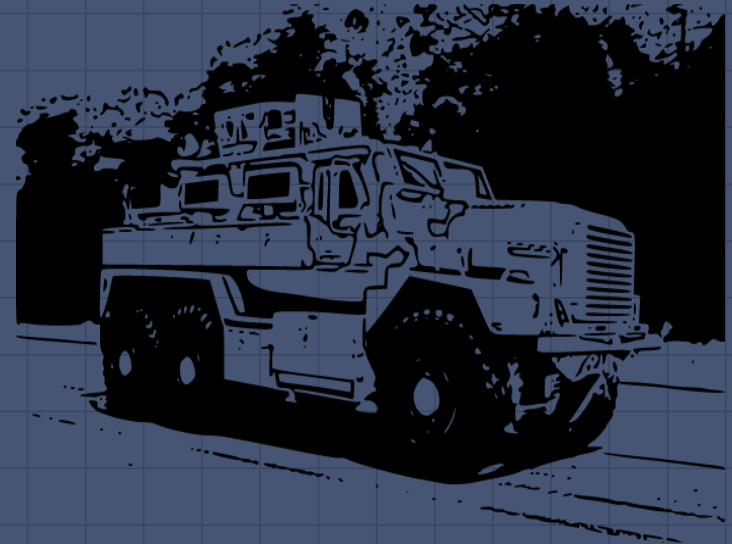
Military personnel perform **too much** maintenance and don't have enough parts.

Paper still used to collect hand written information which involves a lot of human error during data entry.

No easy way exist to develop artificial intelligent systems & machine learning algorithms for predictive maintenance.

Solution

A digital platform providing documentation of an individual system's machine data, and maintenance information enabling predictive maintenance.



SHR Platform

- ❑ **The System Health Record (SHR) platform sits on any cloud architecture consuming any kind of structured or unstructured data.**
- ❑ **Provides the framework for data collection, integration exchange, and interoperability across levels of maintenance.**
- ❑ **Uses Engineering data to provide “current state” of diagnostics and eventually prognostic apps.**
- ❑ **Enables machine learning model for operational BIT data, maintenance test results, and maintenance actions.**
- ❑ **JSON format (RFC7159 JavaScript Object Notation. (JSON) Data Interchange Format)**

OUR PROCESS IS EASY



Collect

Collect all necessary data for CBM+ and predictive maintenance .

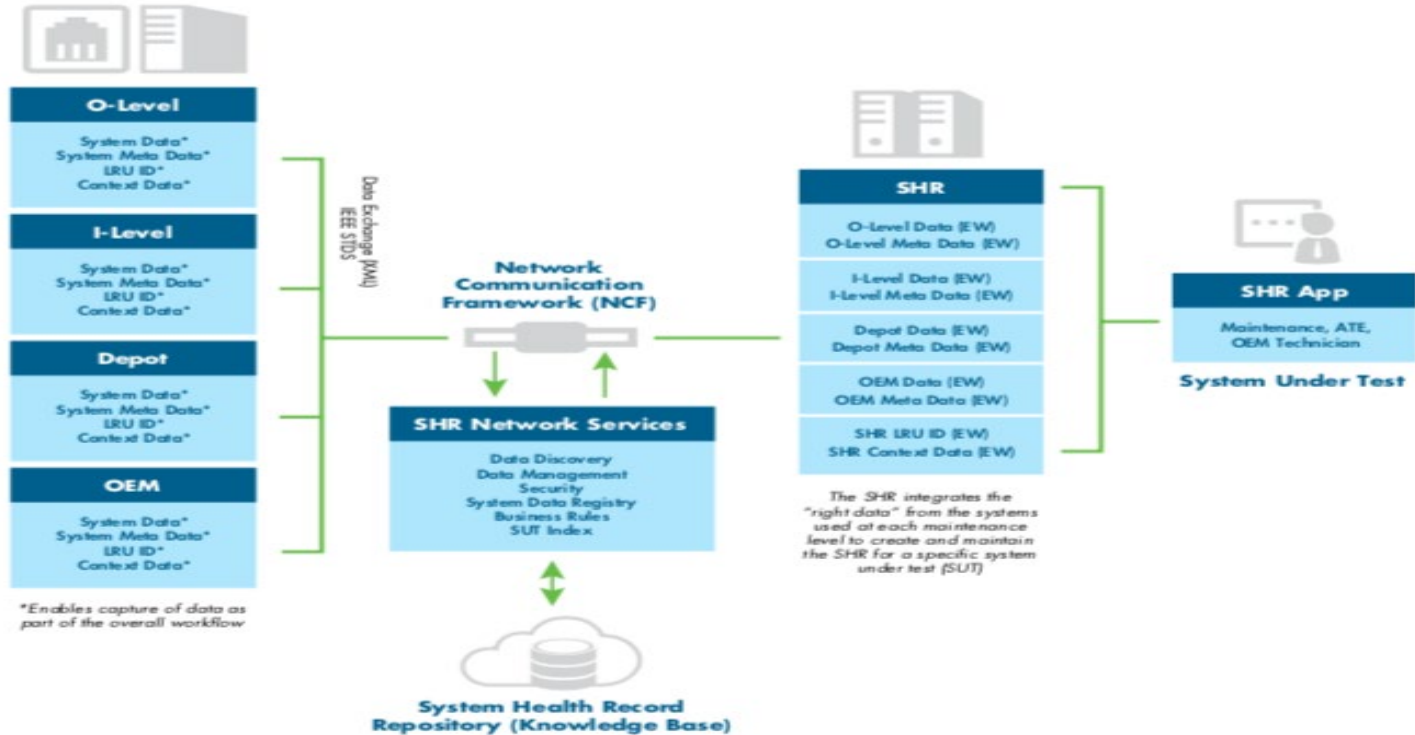
Characterize

Determine what data can be used for CBM+ and Predictive maintenance applications..

Cloud

Vizulize data to understand how to implement AI systems & ML algorithms.

Maintenance Data Flow



Unless your main ride is a lawn mower (no disrespect), your engine probably has more than one cylinder. Here's a 4 cylinder setup.

Camshaft

Cams

Cam gear

Timing belt (or chain)
A timing belt or chain synchronizes the rotation of the crankshaft and the camshaft(s) so that the engine's valves open and close at the proper times during each cylinder's intake and exhaust strokes. It also prevents the piston from striking the valves.

A timing belt (shown) is a rubber belt that usually features teeth on the inside surface, while a timing chain is a metal roller chain.

Cylinder head

Engine block

Flywheel

Crankshaft
The crankshaft carries piston power out of the engine and eventually to the wheels. It has counterweights to produce a balanced spin.

RPM
RPM means Revolutions Per Minute. If your engine is running at 3,000 RPM, that's 50 full crankshaft revolutions per second!

Other engine configurations

You told all your buddies when dad bought that V8 sedan. Now you can find out what it actually means: opposing cylinders arranged in a "V" shape.

V TWIN	FLAT FOUR	V 6	V 8
A two cylinder arrangement. Many Harley-Davidson motorcycles use this configuration, for instance.	Four cylinders arranged in a flat, opposing configuration. Found in classic VW Beetles and various current Subaru model cars.	Six opposing cylinders. Well suited for sports cars or mid-size SUVs.	Eight opposing cylinders. Generally suited for muscle-car applications or heavy duty engines.





Questions?