Vehicle Diagnostics Development

KPIT

Pain Points

Questions and challenges
Even as automotive OEM continue to focus on Electrification & Autonomous as their growth mainstays, the current state of their **diagnostic development processes and tools**, is posing some serious questions and challenges.

Key Impact
Redundant development efforts, **data design in-efficiencies, safety risks and a delayed** time-to-market top the list.

The Fix!
To counter these challenges, organizations need to pursue a standards-based, **integrated & an automated** approach to diagnostic data design, data creation/ management and ECU validation.

Diagnostics, an afterthought

The modern-day automotive is managed by software that runs into **100+ MILLION LINES OF CODE.**
Effective diagnosis of such complex systems warrant detailed diagnostics specifications to be shifted to the beginning of the development process, and not to be an afterthought!

Challenge
Insufficient diagnosis and repair capabilities

Impact
NTF based warranty claims
Unplanned down-times

2-3% OEMs reserve **2-3%** of their annual revenues for warranty claim Cost of un-planned downtime ranges from **$3000/hr to $800/day**, across segments

Traceability & Coverage

Ideally, the diagnostics development process needs to ensure data transparency, uniformity, and re-use. However, lack of standardized & integrated diagnostic approaches result in development silos, which impede **100% TEST COVERAGE** and result in minimal traceability to requirements.

Challenge
Un-tested safety critical conditions

Impact
System / sub-system malfunction

2019 witnessed **85 software-related recall** campaigns across OEMs in the US. A **3.2x jump from 2009.**

Multi module SOTA/FOTA updates/upgrades

When managing software updates, it is vital to account for dependencies: updating one module may mean updating others to ensure they remain compatible.
Handling these dependencies and **SOTA/FOTA** campaigns for performing updates require its own governing and management system.

Challenge
Unknown dependencies between modules

Impact
Security & safety risks

6.5 MN+ vehicles received **software remedies** via **OVER THE AIR UPDATES** in 2019-2020(US)

Change-driven validation & verification

An effective methodology for data driven testing, **validation and verification of ECU diagnostics software** is critical to ensure that each ECU functions properly, and as specified in its operational environment.

Challenge
Defect leakage

Impact
Malfunctioning software & systems

More than **15 MN** vehicles recalled for **electronic component/software** defects in 2019-2020 (US)

Functional verification dependent on H/W availability

Completion of verification and validation activities require complete **HARDWARE SET-UPS**. While the intention is to test earlier in the development process and **left-shift verification**, however, owing to the lack of hardware readiness in the early stages of development, it un-intentionally gets right-shifted

Challenge
Hardware architecture finalization & readiness

Impact
Delayed time-to-market

Virtualization, needed now more than ever to ensure the reliability of rapidly evolving **EV and ADAS/Active Safety systems**

KPIT's Engineering Platform
A transformational solution for vehicle diagnostics development

KPIT's Engineering platform has been at the core of addressing the pain points highlighted above and in transforming the diagnostic development landscape at leading global OEMs.

A standards-driven & a cloud-agnostic solution

Ability to integrate with requirements management systems and workflow automation tools (JIRA/X-ray ecosystems) for end to end traceability
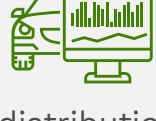
Operates on a 'single source of truth' premise to deal with multiple complex systems with variants and runtime dependencies

Supports virtual HIL integration to accelerate production readiness (for ICE & Electric vehicles)

Streamlines diagnostic development based on CI/CD principles

Leverages an integrated & automated approach to diagnostic content authoring, management, distribution and ECU validation

Enables left-shifting of testing & verification & increases test coverage through automated regression for all s/w versions and vehicle variants

Are you facing similar challenges in your vehicle diagnostics development journey?

If so, we would be keen to partner you in developing & deploying a transformational diagnostics solution!

You can reach us at diagnostics@kpit.com