OCORA

Open CCS On-board Reference Architecture

MDCM-OB introduction

Monitoring, Diagnostics, Configuration, Maintenance subsystem

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Revision history

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0.03	- Final draft version for review towards publication in OCORA R2 - Major rework and consolidation of all contents from chapters 2 and 3 - Added new chapter 4	KS	13.06.2022
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1.01	- Additional improvements and corrections according to review comments from OCORA core team - The abbreviations table added in version 1.00 has been transferred to OCORA Glossary	KS	28.06.2022

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[1] OCORA-BWS01-010 – Release Note

[2] OCORA-BWS01-020 – Glossary

[3] OCORA-BWS01-030 – Question and Answers

[4] OCORA-BWS03-010 – Introduction to OCORA

[5] OCORA-BWS04-010 – Problem Statements

[6] OCORA-BWS05-010 – Road Map

[7] OCORA-BWS06-010 – Economic Model, Introduction & Overview

[8] OCORA-TWS01-030 – System Architecture

[9] OCORA-BWS02-030 – Technical Slide Deck

[10] OCORA-TWS04-010 – Functional Vehicle Adapter, Introduction

[11] TSI CCS: 02016R0919 - EN - 16.06.2019 - 001.001 - 1: COMMISSION REGULATION (EU) 2016/919 of 27 May 2016 on the technical specification for interoperability relating to the 'control-command and signalling' subsystems of the rail system in the European Union, amended by Commission Implementing Regulation (EU) 2019/776 of 16 May 2019 L 139I

[12] Specification of TCMS Data Service, Eurospec, 2019

[13] OCORA-TWS03-010 – Generic Safe Compute Platform, Whitepaper

[14] OCORA-TWS02-010 - CCS Communication Network – Evaluation

[15] ISO 14229-1:2020, Road vehicles — Unified diagnostic services (UDS) — Part 1: Application layer

[16] ISO 14229-5:2022, Road vehicles — Unified diagnostic services (UDS) — Part 5: Unified diagnostic services on Internet Protocol implementation (UDSonIP)

[17] Autosar, Specification of Diagnostics for Adaptive Platform, Release 21-11

2 Introduction

2.1 Purpose of the document

This document aims to provide an overview about the main aspects, ideas and concepts for the OCORA Monitoring, Diagnostics, Configuration, and Maintenance On-Board (MDCM-OB) building block.

2.2 Applicability of the document

All parts of this document are informative. The intended audience are CCS domain experts, infrastructure managers (IMs) and railway undertakings (RUs), as well as CCS product vendors and vehicle manufacturers.

2.3 Context of the document

This document is published as part of an OCORA Release, together with the documents listed in the release notes [1]. Before reading this document, it is recommended to read the Release Notes [1]. If you are interested in the context and the motivation that drives OCORA we recommend to read the Introduction to OCORA [4], and the Problem Statements [5]. The reader should also be aware of the Glossary [1] and the Question and Answers [3].

3 MDCM-OB overview

The Monitoring, Diagnostics, Configuration, Maintenance subsystem (MDCM-OB) is a building block of the OCORA CCS-OB architecture. Its main purpose is the provision of services for monitoring, diagnostics and configuration of onboard functions. The main stakeholders of the MDCM-OB are infrastructure managers (IM) and railway undertakings (RU). Envisioned users of the MDCM-OB are operators and technicians, as well as CCS equipment vendors and vehicle manufactures.

3.1 MDCM-OB objectives

3.1.1 Short-term perspective

The MDCM-OB short-term objectives are mainly focusing on CCS onboard monitoring and onboard data transmission to trackside.

- Support imminent ETCS retrofit projects. No ATO focus.
- Transmit JRU data (SS-027) to trackside systems in IM and/or RU zones
- Support additional use cases from SS-149; see also ch. 3.2

The main use cases driving the MDCM-OB short term design are the following.

- Monitoring of infrastructure components (Balise, Euroloop, LEU) through data collected by vehicles
- Operational performance monitoring and management of vehicles by RUs [1]
- Provision of standardized vehicle-status and performance information to IMs for the purpose of integration and use of this information in TMS

The assumed onboard architecture for MDCM-OB short-term design is shown in Figure 1. Only the left part containing ETCS OBUs and related equipment will be considered.

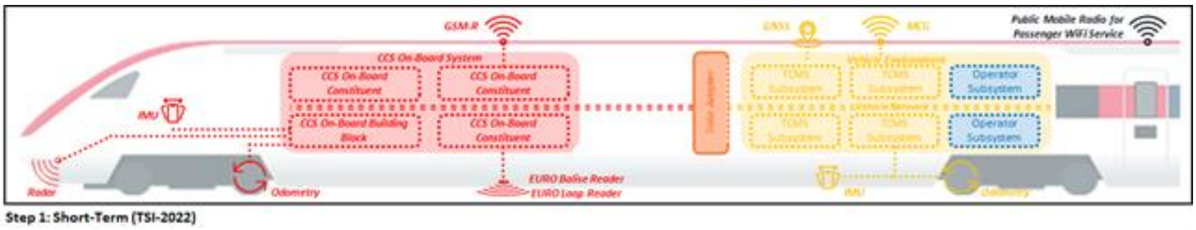

Figure 1: Onboard architecture assumption for MDCM-OB short-term design

3.1.2 Mid-term perspective

The MDCM-OB mid-term objectives are related to the provision of services for configuration and maintenance of CCS onboard functions. The main stakeholders are RUs responsible for fleet management and vehicle maintenance.

The main use cases driving the MDCM-OB mid-term design are the following.

- Support configuration and update management of CCS onboard functions, both over-the-air and in-vehicle

[1] In particular, the use of vehicle status and performance information by RUs for improved troubleshooting and optimized planning of vehicle maintenance and repair tasks for workshops

- Support for maintenance and repair of CCS onboard equipment in workshops
- Support for integration and testing of new CCS onboard equipment during project phases

The assumed onboard architecture for MDCM-OB mid-term design will be the same as for the short-term design. Support for in-vehicle configuration and maintenance use cases will be only provided for OCORA compliant components and building blocks.

3.1.3 Long-term perspective

The MDCM-OB long-term objectives [2] are defined with respect to future use cases requiring new onboard functions and platform architectures for highly and fully automated train operation (ATO GoA3/4).

Most prominent examples for new onboard functions and technologies, currently specified and harmonized in the sector, and eventually becoming part of future rail operations, are:

- Future Railway Mobile Communication System standard (FRMCS)
- Self-supervised ATP based on ETCS level 3
- Systems for automated scheduling and dispatching of trains (TMS)
- Onboard and trackside ATO functions (digital driver)
- Onboard functions for perception (PER) and localization (LOC)
- Onboard and trackside functions for incident prevention and management (IPM) [3]

The envisioned onboard architecture for the MDCM-OB long-term perspective is shown in Figure 2 below. [4]

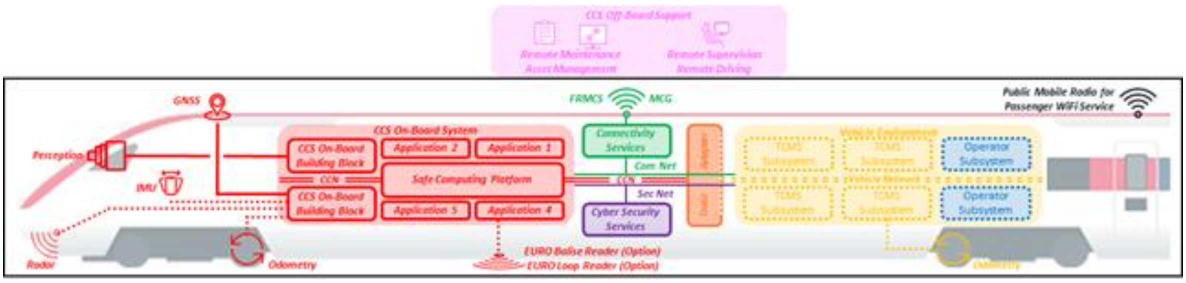

Figure 2: Vehicle onboard-architecture assumption for MDCM-OB long-term perspective

The main uses cases driving the MDCM-OB long-term design are the following.

- Initiating and controlling self-tests and sensor calibration-procedures
- Support of IPM function, in particular the provision of quality-related system health- and performance information, needed by IPM for quality-related incident prevention and automated trouble shooting.
- Widen the MDCM-OB scope to the whole vehicle comprising both CCS and TCMS functions.
- Define and standardize a minimum required set of onboard diagnostic data for CCS and TCMS functions to achieve interoperability

Introducing new onboard functions and technologies necessary for ATO GoA3/4 requires an evolution of communication and computing platforms to meet the demands for transferring and processing large amounts

[2] "long term" is here the envisioned operation in new vehicles, 2035+
[3] Note that in OCORA R2 System Architecture the IPM function has been renamed to APM for some reason. Nevertheless, it is the functionality, i.e. the incident prevention, management and automated troubleshooting, which is relevant here.
[4] In this figure the mentioned game changer ATO is no included.

of data.[5] Furthermore, new challenges have to be tackled, for example, the verification, homologation and maintenance of AI-based systems, or introducing new technologies and processes for IT/OT security.[6]

It also becomes apparent that the current separation of onboard functions into CCS (IM authority) and TCMS (RU authority) will eventually vanish [7], since ATO GoA3/4 use cases are cross-cutting [8]. Future ATO GoA3/4 use cases are going to become another main driver for further sector-wide innovation and standardization activities within the next years.[9]

The increasing complexity of future onboard systems typically also demands for an evolution of onboard diagnostics and configuration capabilities. Especially the new, sensor-intensive PER and LOC functions will introduce new components exposed to environmental disturbances such as EMI, bad weather conditions, dust, etc., requiring proper handling and an automated troubleshooting in case of errors, which is supposed to be manged by IPM function. [10]

To ensure system integrity and to avoid frequent measurement errors, periodic self-tests and sensor calibration procedures need to be performed. Initiating and controlling these potentially long-running test- and calibration-procedures is envisioned to be partly or fully handled through the MDCM-OB.

Another responsibility of the MDCM-OB in ATO GoA3/4 scenarios would be to collect and aggregate, per functional cluster [11] (e.g. PER or LOC), diagnostic events from equipment- and application-level monitoring and to maintain an aggregated, timestamped health record containing reported equipment-health states and one or more calculated performance measures for the individual functions of a cluster (for example PER-TFM), as needed by IPM for the quality-related incident prevention and management part.

Note, that the MDCM-OB is assumed to be only basic-integrity according to EN 50126 and not involved in monitoring and reacting on safety critical conditions. In the case of an inoperative sensor requiring a safety reaction, the detection and subsequent safety reaction is performed independently from MDCM-OB. However, the MDCM-OB might log this as occurrence of an exceptional condition in the health record of the corresponding functional cluster.

3.2 Relation to SUBSET-149

UNISIG has recently proposed the SS-149 containing requirements for an Online Monitoring System (OMS) which is responsible for transmission of information collected onboard the vehicle to a wayside server, allowing to detect basic train born errors, as well as particular trackside issues, such as defect balises.

SS-149 is planned to be introduced as informative part in TSI-2022 but might become normative in later TSI revisions. The current version of SS-149 only considers JRU data (SS-027). Future evolutions of SS-149 might include additional datasets from ETCS onboard, as well as information generated by other onboard systems.

The currently defined OMS architecture concerns both onboard and trackside services for collecting and

[5] This applies in particular to sensor-intensive and AI-based onboard functions related to perception, localization, planning, incident prevention, automated troubleshooting and predictive maintenance. Most of them requiring onboard HPC platforms and frequent connectivity with operator IT-backends
[6] Think of “over-the-air” SW-updates during train operation using public mobile communication networks
[7] There is the “One common bus” concept which is currently discussed, and which goes into this direction
[8] ATO onboard command and control loops for GoA3/4 require full access from CCS to TCMS; ATO can be regarded here as the “digital driver”, supervised by APS and TMS
[9] One example is the Shift2Rail Joint Undertaking and its planned successor Europe’s Rail Joint Undertaking
[10] For example, due to bad weather conditions (e.g. fog or heavy rain), GoA4 operation might not be possible anymore since object and landmark detection based on lidars is not reliable under these conditions, and other sensors might not be sufficient for backing up. IPM would be then in charge to troubleshoot and recover from this state, for example by lowering the GoA level and asking a remote operator to take over.
[11] In OCORA terminology this roughly relates to building blocks

processing JRU data from ETCS OBUs. The communication between OMS and ETCS OBUs is based on Ethernet bus technology which is in alignment with OCORA CCN architecture [7], [8].

OMS transmits monitoring data in real-time to an associated wayside server via public mobile networks. The use of GSM-R and future FRMCS standard support might be added in later revisions.

SS-149 defines a common message format for data transmission to the wayside server. Requirements for cyber security and data protection are defined as well.

SS-149 directly relates to the MDCM-OB short-term scope (cf. ch. 3.1.1) and does not conflict to what is pursued as short-term solution for CCS-OB diagnostics.

3.3 MDCM-OB design approach

3.3.1 Service oriented architecture

In order be scalable and flexibly usable, the MDCM-OB design pursues a service-oriented approach, where MDCM-OB features for diagnostics and configuration will be provided as dedicated onboard services with a common, extensible service API.

The following MDCM-OB services and corresponding feature scopes are planned with respect to MDCM-OB short-, mid-, and long-term perspectives.

- Short-term: CCS DataService (CCS-DS)
    - Initially only dealing with JRU data (SS-027) as default scope
    - Directly relates to SS-149 (OMS) scope
    - CCS-DS scope should be extendable for specific projects
- Mid-term: CCS ConfigService (CCS-CS)
    - Requires the introduction of a common configuration protocol
    - Configuration will be then limited to complaint OCORA compliant CCS implementations
- Long-term: TCMS DataService (TCMS-DS)
    - Based on the existing, non-normative TCMS-DS specification from Eurospec [12]

Figure 3 shows an example from Automotive sector which is considered as best practice and potential blueprint for defining the MDCM-OB design.

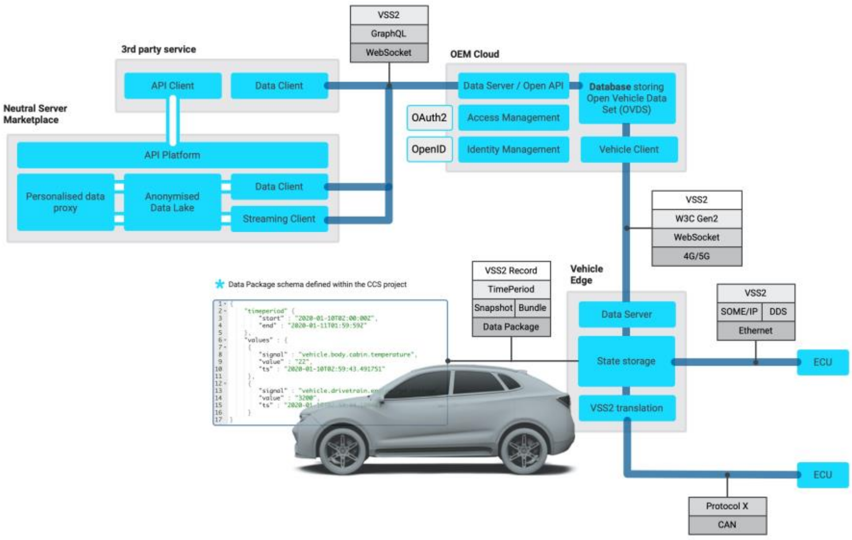

Figure 3: GENIVI Cloud Connected Architecture

The part of Figure 3 which is most relevant here is the VehicleEdge containing the DataService, DataStore and the protocol adapters for interfacing with different ECUs (OBUs)

3.3.2 Envisioned environment

This section defines the assumed CCS-OB environment for MDCM-OB long-term perspective from chapter 3.1.3 and describes, on a generic level, the envisioned interfacing between MDCM-OB and OB / TS actors.

3.3.2.1 Scope

New vehicles and future projects [12] .

The scope of MDCM-OB CCS-DS and CCS-CS is limited to OCORA building blocks.

The scope of MDCM-OB TCMS-DS is based on [12]; see chapter 3.3.2.7 for additional prerequisites.

3.3.2.2 CCS-OB platform

The assumed baseline for the onboard platform is SCP [13] and CCN [14]; see also [9] , p.19.

The SCP may comprise several physical and/or virtual CCUs [13] connected via CCN.

The assumed OCORA deployment is *Final View + Building Blocks with SCP*; see [9], p. 22.

OCORA building blocks (including MDCM-OB) are solely hosted by SCP.

Communication between OCORA building blocks is transparently managed by SCP and CCN.

3.3.2.3 MDCM-OB deployment

The MDCM-OB is envisioned to be deployed to SCP as a container and to run within a virtual environment.

This option is currently considered to avoid restricting the MDCM-OB design to SCP as platform.

Running the MDCM-OB inside a container enforces, however, to perform diagnostic communication with OCORA building blocks via (local) CCN, not using the SCP API; see also chapter 3.3.2.6.

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[12] Having the full MDCM scope available for new projects is, realistically estimated, not assumed before 2035 due to the roadmap for TCMS-DS standardization and the planned application in TSI 2027, which would be probably also only become an informative annex during the first couple of years. For OCORA development roadmap, see [5]

[13] Virtual CCUs are containerized deployments having their own virtual runtime environment

3.3.2.4 Specific terms

All *terms* introduced in this section will be also used in the remainder of this document.

The term *machine* refers to a physical or virtual CCU.

The term *node* refers to an OB or TS actor.

The term *local node* refers to CCS-OB nodes, in particular OCORA building blocks.

The term *remote node* refers to non-local nodes.

The term MDCM-OB *frontend* refers to MDCM-OB service layer.

The term MDCM-OB *backend* refers to MDCM-OB internal components (business logic). [14]

The term *diagnostic communication* refers to the interaction between MDCM-OB backend and local nodes for the purpose of diagnostics and configuration.

The term *DM services* (DM: Diagnostic Management) refers to the capabilities of local nodes used by MDCM-OB backend for diagnostic communication.

3.3.2.5 MDCM-OB service access

Remote nodes can access MDCM-OB services through NG-TCN Connectivity- and Security-Services; see also [9] , p. 22 and p. 27.

Authentication and access control of remote nodes towards MDCM-OB services is supposed to be provided by IAM-OB.

3.3.2.6 DM services and UDS

All local nodes subject to MDCM-OB-based diagnostics and configuration are supposed to implement Diagnostic Management (DM) services with a standardized interface. The notion and scope of these DM services is based on [17] and schematically shown in Figure 4.

The DM services of a local node provide external access to the internal event memory and other application-specific diagnostic data, as well as routines (procedure calls) to perform configuration[15] and to initiate tests [16].

The envisioned standard to be used for diagnostic communication between MDCM-OB backend and the DM services of local nodes is UDSonIP [15],[16].

The set of implemented UDS services [17] per local node can be application- and project-specific. The MDCM-OB backend is supposed to be configurable to allow adaption to different use cases.

Besides services for diagnostics and configuration, UDS also enables the dynamic discovery of available local nodes in MDCM-OB backend.

[14] The term MDCM-OB backend was here deliberately chosen for referring to the MDCM-OB part implementing the business logic and protocol adapters for diagnostic communication with local nodes. The unattended reader might easily miss that fact and think of it as an "IT-backend", which is wrong in this context.

[15] This includes SW updates

[16] For example, extended functional tests conducted in workshops as part of maintenance and repair

[17] And service-specific parameters, as well as supported sub-services

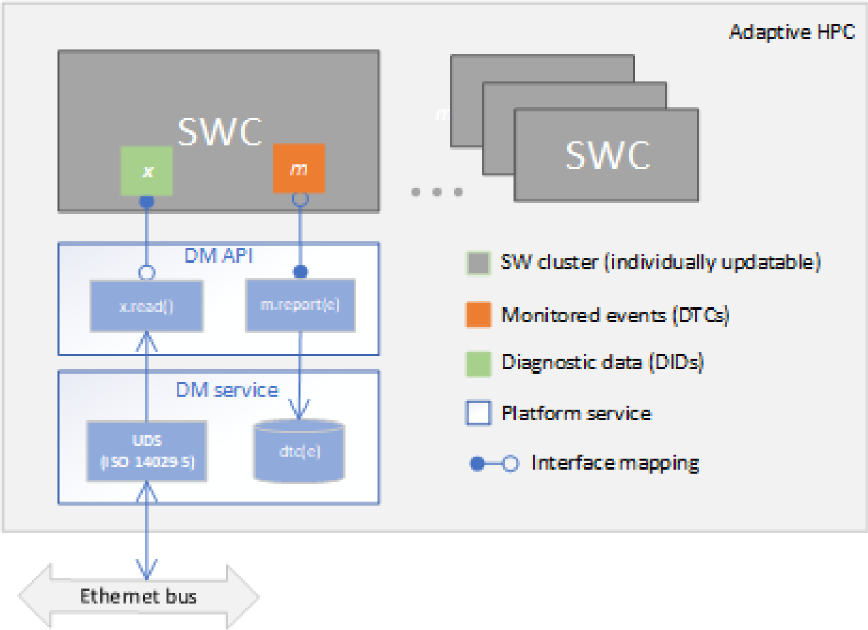

Figure 4: Diagnostic Management function on Autosar Adaptive HPC platform

3.3.2.7 Dependencies for TCMS-DS

The MDCM-OB TCMS-DS solely depends on the assumption that vehicle information according to [12] is provided by NG-TCN to CCN, and accessible to MDCM-OB.

The minimum needed TCMS-DS scope is currently evaluated and formalized based on future ATO GoA4 use cases, where the focus is on quality-rated data needed by IPM function; see also ch. 4.3.

3.3.3 Configuration aspects

3.3.3.1 MDCM-OB service tree

MDCM-OB service items can be modelled as named resources denoting either diagnostic datasets or procedure calls (for the purpose of configuration and test).

MDCM-OB services and their associated resources can be modelled as service tree which is exemplary shown in Figure 5 below. Leaf nodes of the service tree can be attached attributes describing the purpose and contents a particular diagnostic dataset or procedure call.

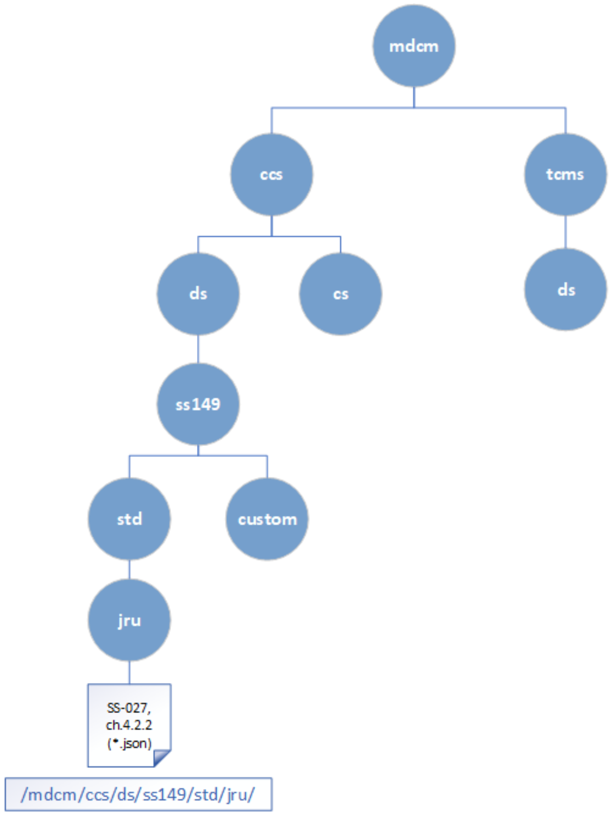

Figure 5: Example of an MDCM-OB service tree

Service tree structures and resource properties can be authored and exchanged, for example, by using JSON, YAML, or XML as serialization format.

Service tree definitions can be used to configure and setup the MDCM-OB backend.

Paths to leaf nodes of a service tree can be used as service request parameters (URIs) in MDCM-OB frontend.

3.3.3.2 MDCM-OB resource configuration

Descriptions of diagnostic datasets and routines (procedure calls) defined as resources in MDCM-OB service tree have to be authored by domain experts per application and project.

Furthermore, the parametrization of diagnostic communication via UDS for accessing these resources will be necessary.

Due to the foreseen effort, the MDCM-OB configuration process has to be automated as much as possible, which in turn requires using a common workflow supported by domain specific methods and tools.

An example from Automotive sector for such a workflow is show in Figure 6.

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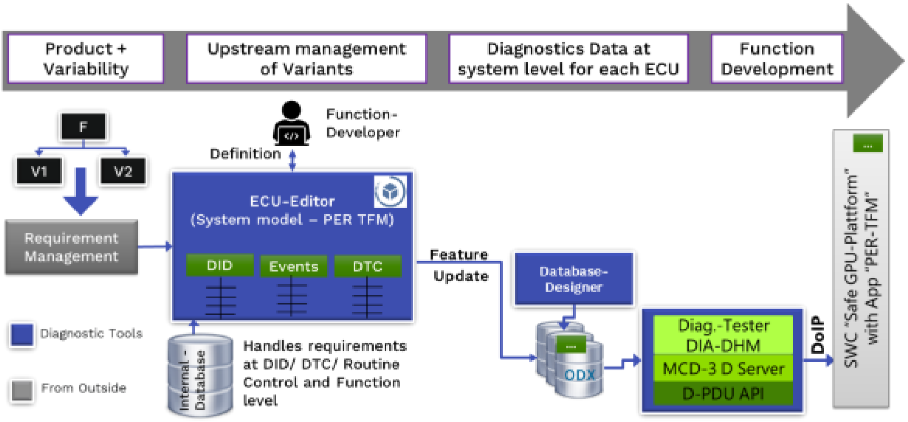

Figure 6: Autosar process chain for diagnostic data engineering and automated integration

3.4 Use of existing standards

So far there are no normative standards for diagnostic communication and diagnostic data handling defined in the railway sector. To accomplish the challenges in operating and maintaining future vehicles it is necessary to introduce a minimum set of normative standards and associated processes for diagnostics and configuration.

3.4.1.1 Selected recommendation and standards from railway sector

For rolling-stock onboard diagnostics some attempts have been made in the past to define the basic needs and a minimum set of baselines for harmonizing onboard diagnostics.

UIC Leaflet 557 defines general requirements for a "Train Diagnostics System" in loco-hauled trains and consists with multiple units.

Train functions, configurations and realization of HMIs for diagnostics are mainly described in UIC Leaflet 612-x series.

UIC leaflet 556 defines the "what and how" for information exchanged on the train bus and references related (mostly non-normative) standards defining the details on certain aspects. Therein some proposals for diagnostic data exchange are made.

UIC Leaflet 559 defines technologies and data standards for the onboard to ground exchange of diagnostic data.

Finally, the IEC 61375-2-x standards, of which only some are already applicable for new vehicles, define the TCN architecture and application profiles. From MDCM-OB point of view the interesting parts are:

- IEC 61375-2-3 – TCN communication profile, ECN addressing and services
- IEC 61375-2-6 – Train to ground communication via MCG and addressing of trains

As already stated above, when it comes to onboard diagnostics, no commitment is made in the above references to standardize onboard diagnostics.

3.4.1.2 Potential use of Automotive standards

Monitoring and diagnostics in E/E onboard architectures of modern cars and trucks has been harmonized in Automotive sector during the past 20 years. Today there is a reasonable small set of vendor-neutral diagnostics standards applicable for almost all newly developed vehicles.

The Automotive diagnostics standards, potentially also interesting for MDCM-OB design, are:

- ISO 14229-5/13400 (UDSonIP) for system diagnostics and configuration, in combination with
- ISO 22900 (MVCI) for diagnostic communication and data conversion (D-server)

- ISO 22901-1 (ODX) for modeling diagnostic data and defining associated UDS endpoints
- ISO 13209 (OTX) for defining diagnostic data processing, test sequences and SW updates

Note that above set of Automotive standards and referenced documents also cover aspects related cyber-security, data integrity and data protection, which is particularly relevant when it comes remote access and over-the air updates.

Figure 7 depicts a conceptual architecture that has been defined and evaluated for a future use case [18] within a feasibility study recently conducted by DB. This conceptual architecture has been also discussed in detail with various MDCM-OB stakeholders and industry partners regarding its applicability for CCS-OB diagnostics and configuration.

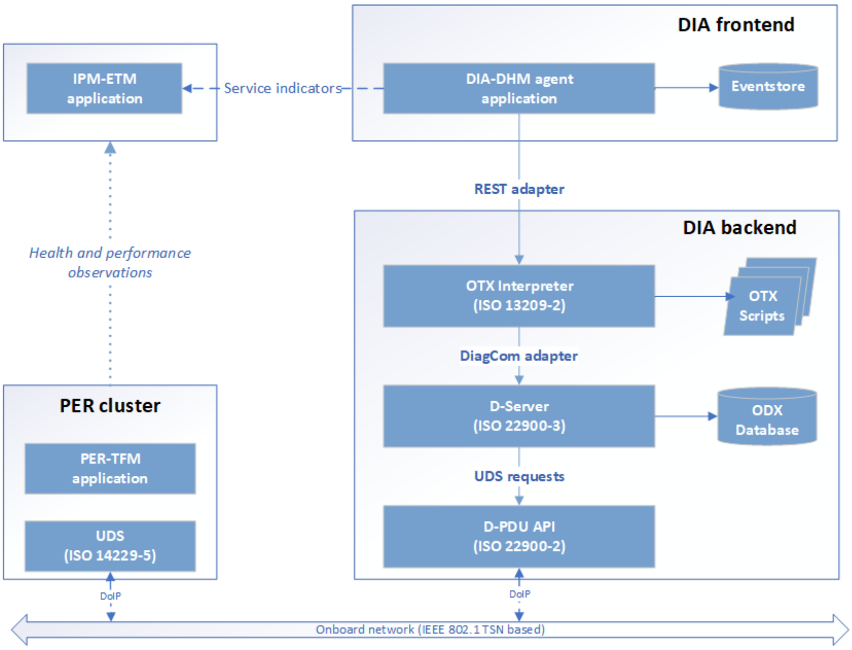

Figure 7: Conceptual architecture for PER-TFM onboard diagnostics (DB concept study from 2021)

The use of Automotive diagnostic standards and technologies for MDCM-OB design is particularly interesting for realizing the MDCM-OB CCS-DS and CCS-CS; see also ch. 3.3.

CCS-OB building blocks such as PER and LOC have to implement UDS-based services for diagnostic communication with MDCM-OB backend for the purpose of diagnostic data exchange and configuration.

TS and OB actors [19] can access the MDCM-OB CCS-DS and CCS-CS through a REST-based API.

Remarks on the conceptual architecture from Figure 7

- The above concept is mainly intended for diagnostics and configuration in future onboard architectures and projects
- The impact of applying this concept in OCORA system architecture will be on integrating the UDSonIP SW stack in the OCORA building blocks as well as to stick to parts of the ODX standard for compliant diagnostic data modeling.[20]

[18] The considered use case was: PER-TFM sensor fault diagnostics for the Train Front Monitor function of a perception system, involving several types of sensors such as radars, lidars and video cams.
[19] Operator systems and maintenance equipment
[20] The latest Autosar Adaptive platform revision (R21-11) has already integrated UDSonIP as a platform service. So, applications can just use it through the Adaptive Platform API. The provision of UDSonIP as a platform service might be also an option for SCP design and SCP API specification. The need for ODX compliant data modelling remains, however.

- The major benefit of this concept is on the right part of Figure 7, specifically on the backend. All of the backend parts are standardized, generic SW components [21] and available off-the shelf.
- The potential transfer of Automotive diagnostics standards and use of COTS diagnostics SW stacks for newly developed CCS applications is a matter of considering the one-time effort for product development, vehicle integration and homologation vs. the long-term reward in vehicle operation and maintenance both on vendor and customer side.

3.4.1.3 Further considerations

Other existing standards that were considered as potential candidates for usage in MDCM-OB design are:

- MIMOSA OSA-CBM, as reference implementation of ISO 13374
- IEEE Std 1232-2010, defines formal models for diagnostic knowledge bases and corresponding methods/services for an automated exchange and usage of this models
- OPC-UA, defines an information model and associated service architecture for industrial automation and IoT applications

From those candidates only OPC-UA turned out to be a viable candidate for use in MDCM-OB design, in particular for the specification of the public service API and internal data stores for CCS DataService and CCS ConfigService.

The other two candidates are rather focusing on implementing condition-based maintenance systems (CBM) and diagnostic expert systems and won't be considered further here. The MDCM-OB might support onboard CBM use cases in terms of access to CBM data (provided by CCS onboard systems).

The implementation of diagnostic knowledge bases containing vendor- and/or operator-specific information and procedures for CCS onboard maintenance and repair is not in MDCM-OB scope. However, the MDCM-OB might support accessing such information on demand when available as part of a CCU configuration. In this case the MDCM-OB will handle this information as opaque data.

4 MDCM-OB roadmap

4.1 General considerations

The MDCM-OB is an OCORA building block. This basically means that the MDCM-OB design should allow for separate sourcing of prototyping activities, initial product development and, later on, for separate sourcing of product updates to potentially competing vendors.

The building block feature has further implications for the MDCM-OB design and product development

- Features and technologies introduced in any product life cycles phase may not introduce vendor locks
- The MDCM-OB has to provide means for achieving a sufficient degree of forward and backward compatibility wrt. different OCORA baselines
- The MDCM-OB product and the MDCM-OB product configuration has to expose versioning information to allow integrators and tools perform compatibility checks

[21] i.e. vendor-neutral and thoroughly configurable

4.2 Current status

The MDCM-OB stakeholder requirements elicitation has been performed and the main MDCM-OB system capabilities have been identified.

The MDCM-OB scope in terms of provided services has been defined for the short-, mid and long-term.

The general MDCM-OB design approach has been proposed and initially discussed in OCORA TWS-08.

4.3 Next steps

Near term

Define the initial set of MDCM-OB design requirements as part of the planned MDCM-OB-SRS for OCORA Release 3.

Conduct feasibility studies for MDCM-OB backend implementation and diagnostic communication with CCS-OB functions using Automotive diagnostics standards in alignment with railway-specific guidelines for onboard diagnostics (UIC 556, UIC-557, UIC-559, etc.).

Start modeling MDCM-OB subsystem architecture in Capella and integrate it into the OCORA model.

Mid-term

Start partnering projects and PoCs for MDCM-OB short-term scope (CCS-DS) with interested industry partners.

Get engaged in upcoming ERJU initiative to share and promote MDCM-OB concept with the sector.

Long term

Develop an MDCM-OB minimum viable product and demonstrate aspects of the MDCM-OB in ERJU/FA2 innovation pillar.

Formalize and extend the scope of TCMS-DS. Use requirements form [12] as starting point to conduct feasibility studies and PoCs.