HRCS Consortium Update for SAE HM-1

March 1, 2022

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SAE - HEALTH READY COMPONENTS AND SYSTEMS (HRCS)

HRCS FOCUS: *MOBILITY* (BUT CAN ALSO BE APPLIED TO FIXED-BASE EQUIPMENT)

HRCS Purpose – To accelerate the adoption of JA6268 with focus on providing standard templates for components and systems for high priority industries:

- Passenger Automotive
- Commercial Trucking
- Off Highway
- Commercial Aircraft
- Defense – Ground Vehicles
- Helicopters
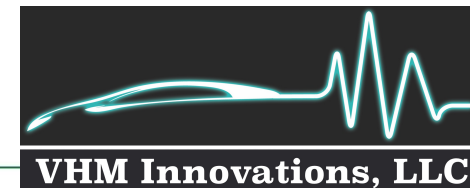
FOUNDATIONAL DOCUMENT: SAE JA6268

SURFACE VEHICLE/AEROSPACE RECOMMENDED PRACTICE	JA6268™	APR2018
	Issued	2018-04
Design & Run-Time Information Exchange for Health-Ready Components		

RATIONALE

This Surface Vehicle & Aerospace Recommended Practice was created to help reduce existing barriers to the successful implementation of Integrated Vehicle Health Management (IVHM) technology into the aerospace and automotive sectors by introducing health-ready components. Health-ready components are augmented either to monitor and report their own health or, alternatively, ones where the supplier provides the integrator sufficient information to accurately assess the component's health via a higher-level system on the vehicle. The principal motivation for health-ready components is to facilitate enhanced IVHM functionality in supplier-provided components that better meet the needs of end users and government regulators in a cost-effective manner. Underlying this motivation is the assumption that market forces will drive the need to achieve IVHM's benefits, which will in turn drive new requirements that suppliers must ultimately meet. This recommended practice has two primary objectives: (1) to encourage the introduction of a much greater degree of IVHM functionality in future vehicles at a much lower cost, and (2) to address legitimate intellectual property concerns by providing recommended IVHM design-time and run-time data specification and information exchange alternatives in an effort to help unlock the potential of IVHM.

HRCS FOCUS: *MOBILITY* (BUT CAN ALSO BE APPLIED TO FIXED-BASE EQUIPMENT)

✓ *Your company is invited to join!*

✓ *Membership fees are very attractive.*

✓ *Get involved and help chart your own destiny and that of your industry!*

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COLLABORATION WITH ATA-TMC

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TMC and SAE ITC Announce Collaboration

November 1, 2021:

"SAE ITC and the American Trucking Associations are pleased to announce an agreement between ATA's Technology & Maintenance Council and the Health Ready Components and Systems Consortium for use of the Council's Vehicle Maintenance Reporting Standards in helping to implement Integrated Vehicle Health Management technologies."

HRCS UPDATE: COLLABORATION WITH TMC

- Launched two pilot studies (2021):
  - Volvo- Garrett- ABF Freight Lines
  - SEFL- DG Technologies- Saferide Technologies

- HRCS has signed a VMRS (Vehicle Maintenance Reporting Standards) License Agreement with TMC to incorporate VMRS coding within commercial trucking standard templates layered on top of SAE standards such as J1939, J2012, and J1972. This will accelerate development and acceptance within the sector.

- Joint Press Releases issued in late 2021, followed by social media.

- ATA-TMC has requested this approach for all future new initiatives. The first three are:
  - 1.) Autonomy and platooning
  - 2.) Advanced powerplants
  - 3.) Axle/electric braking/smart trailers

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S5 Health Ready Components and Systems (HRCS)

This Task Force will develop a Recommended Practice regarding the use of VMRS codes in developing data sheets for health ready componentry in conjunction with SAE International Health-Ready Components & Systems practice.
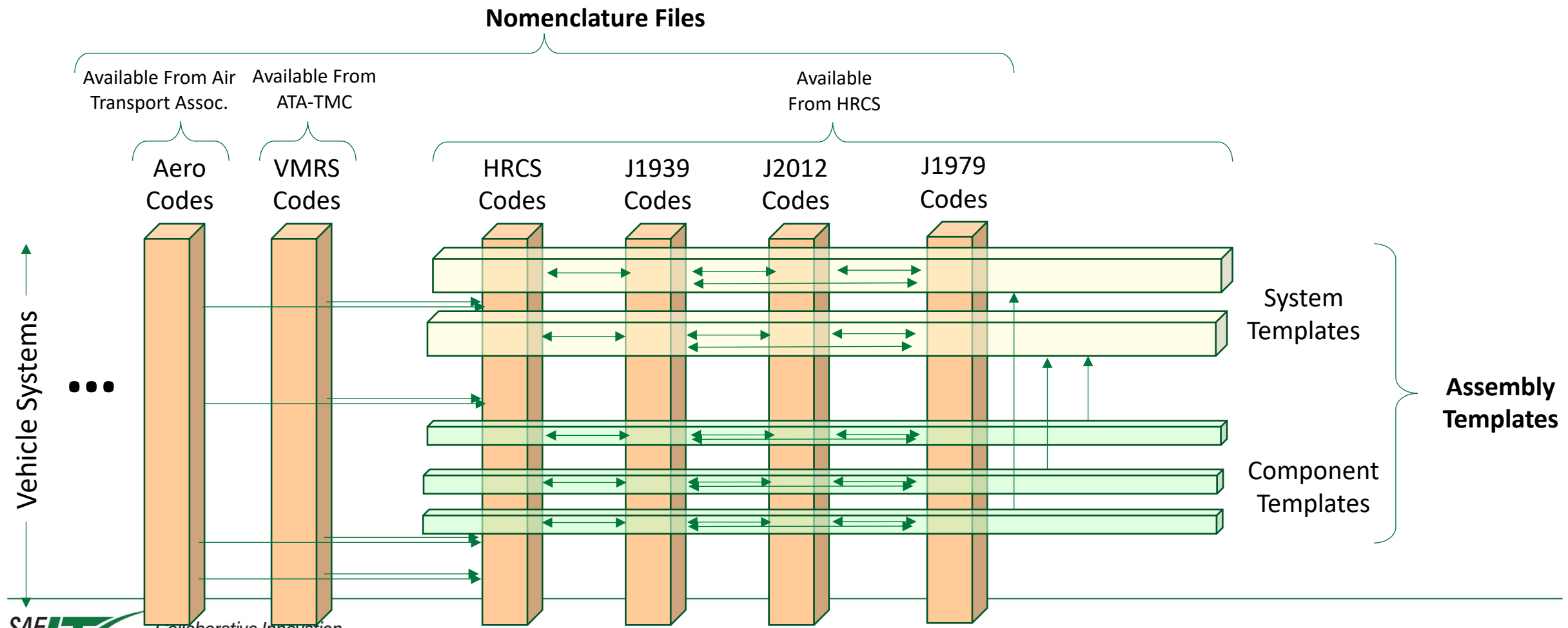
CODING AND TAXONOMY

- We realized that a focused approach is needed for different industrial sectors (Auto, Commercial Truck, Off-Highway, Aerospace, Marine, etc.). We concluded that we should use SAE source data for HRCS codes from SAE J1939, J1979, & J2012.

- This approach will support a mechanism to develop and manage standard mapping between HRCS and existing sector specific codes (such as VMRS in trucking, ATA codes in aviation, or OBD codes in automotive).

- Sector specific codes will be incorporated to accelerate acceptance and improve granularity where feasible.

AEROSPACE AUTOMOTIVE

COMMERCIAL
VEHICLES

OFF-HIGHWAY
(AGRICULTURE,
CONSTRUCTION, MINING)

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MARINE RAIL

DEFENSE
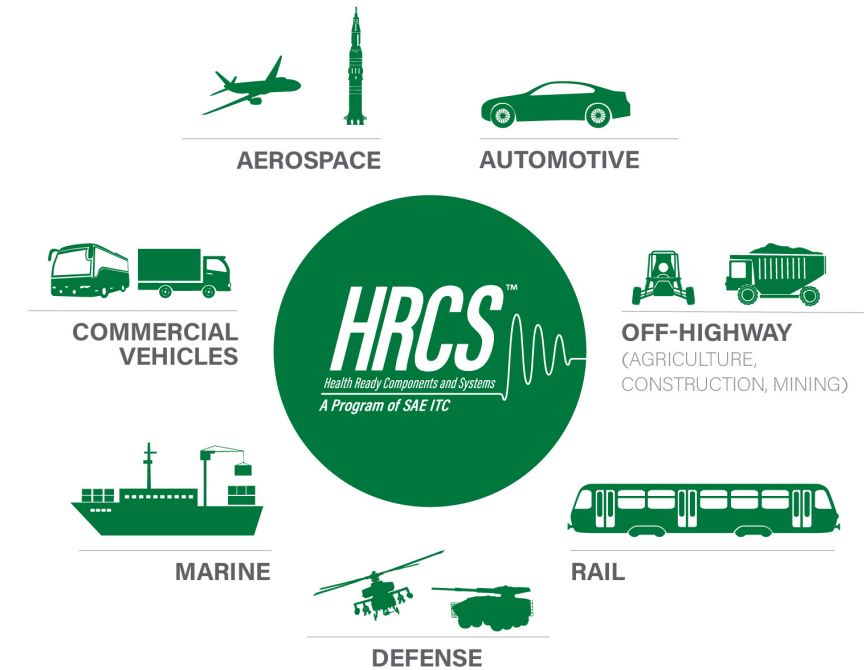
# VMRS-JA6268 Mapping File Basic Strategy
(IMPLEMENTATION CONCEPT)

VMRS - JA6268 Mapping File Process

1. HRCS will use a combination of text matching and structural analysis to identify the most probable associations between VMRS Codes and JA6268 Systems, Sub-Systems, Assemblies and Corrective Actions.

2. HRCS will manually audit the mappings and produce an initial version of the mapping file.

3. HRCS will deliver the mapping file to TMC and hold a joint audit of its content

4. HRCS will assist TMC in developing a process by which the mappings are maintained

Overall JA6268 Model Development Process
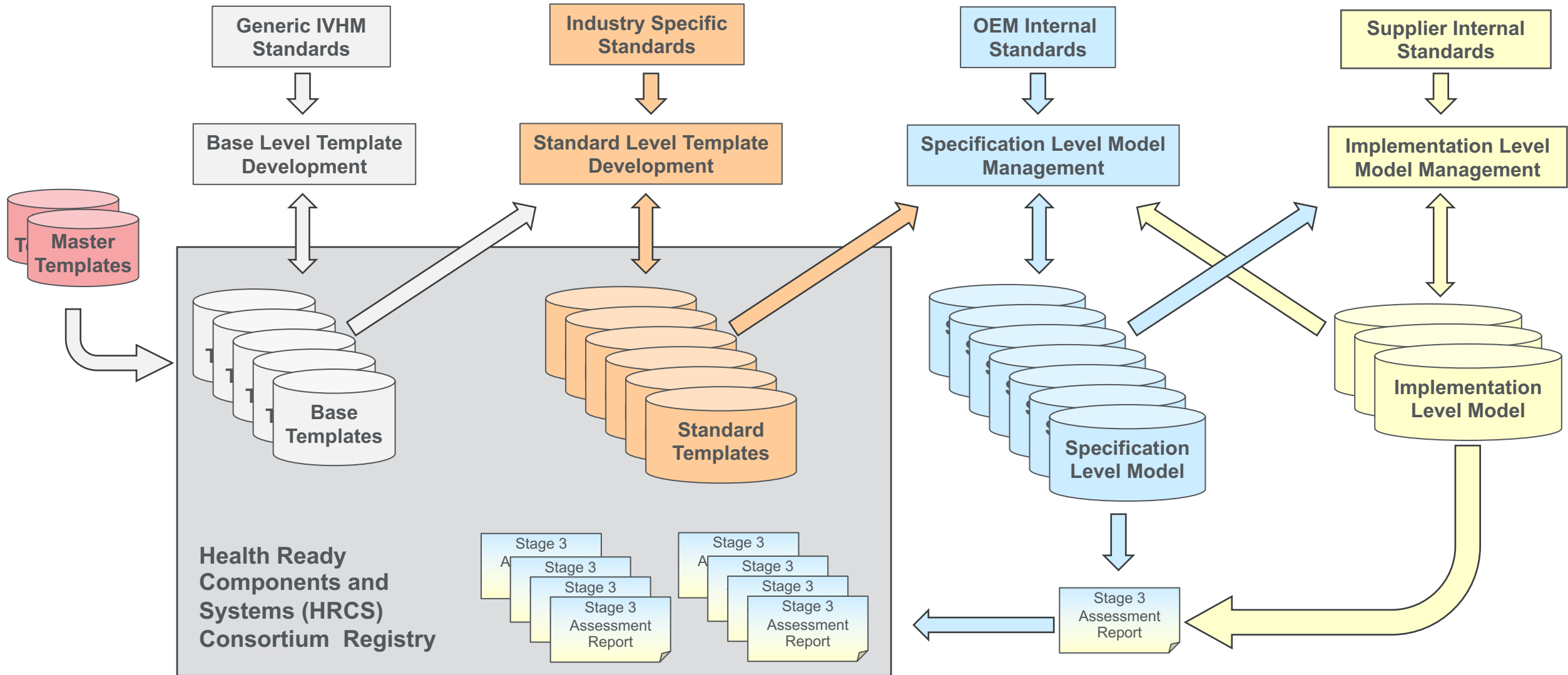
Process develops common IVHM vocabulary for each Industry Segment.

STATUS AND PLANS
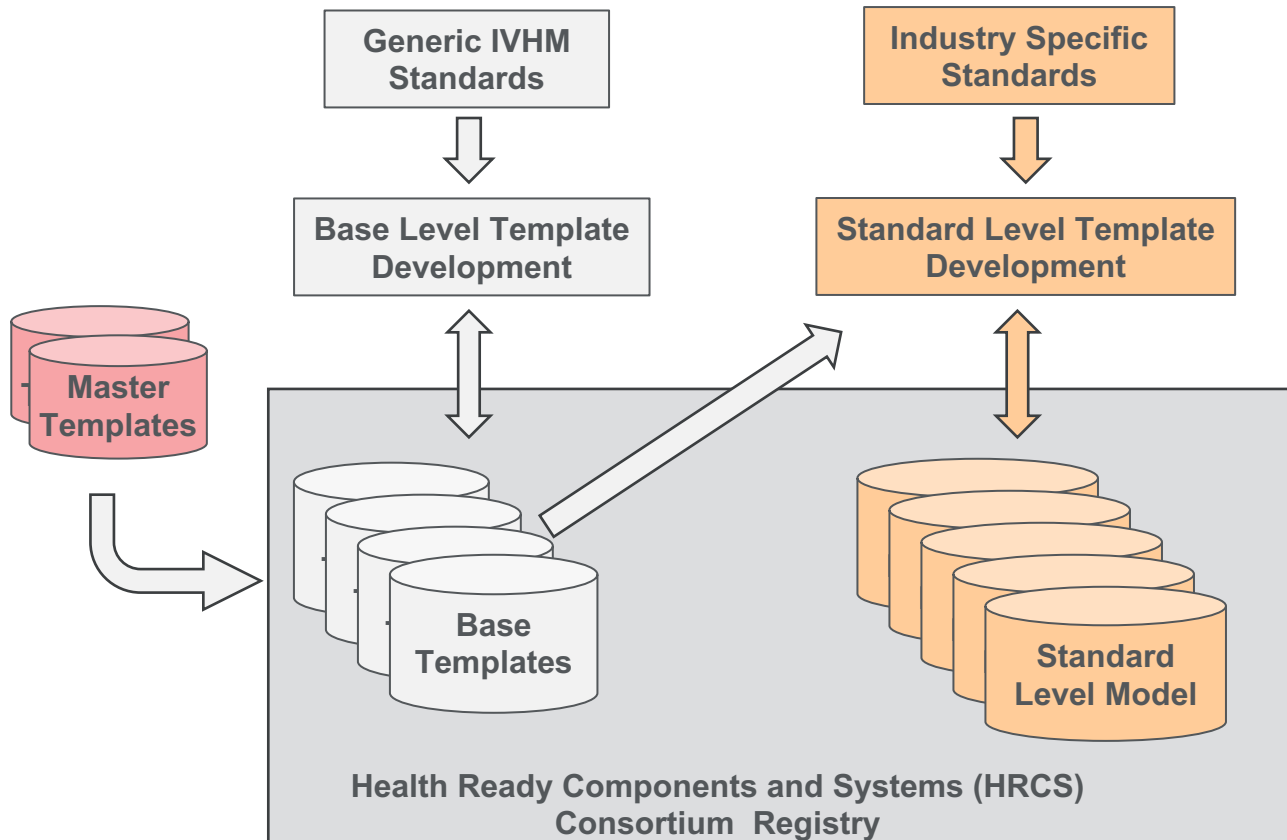
Base Components –
Appx 100 generic/base components, 80% complete (20% Std Function Templates for commercial vehicles)
Targeted for initial release end of September

Standard Components –
Appx 20 components will be used in commercial truck pilot needed by mid October.
Additional 300 components needed by commercial trucking in early 2022.
Components will be needed for other segments in 2022.

We are looking for volunteers to audit the content of the base templates and to assist in development of standard templates for each industry segment.

Please contact tim.felke@garrettmotion.com if you are interested.

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PROPOSAL TO STANDARDIZE DATA EXCHANGE
(OBD SIGNAL FLOW ANALYSIS)
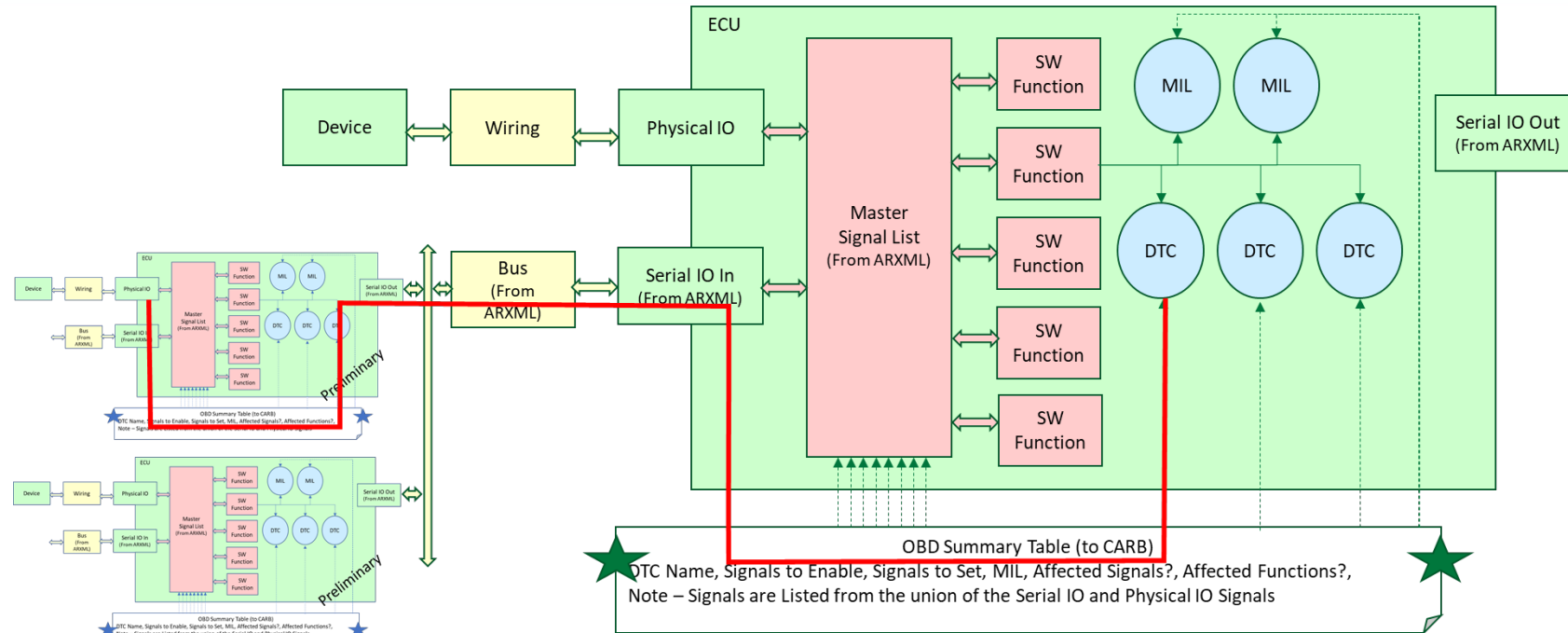
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STANDARDIZE OBD SIGNAL FLOW ANALYSIS IN SUPPORT OF CARB REQUIREMENTS

- Request for proposal from BMW for HRCS to lead a new working group to address CARB concerns
  - To enable more accurate tracing of signal flow between OBD functions and all sensors, actuators and other data on which they depend
  - Goal is to ensure that all malfunctions and degradations that result in the vehicle being out of compliance are adequately monitored and result in the MIL being illuminated.

- CARB Meeting on 17 Feb
  - SAE HRCS Consortium met with 12 representatives of CARB.
  - CARB gave their enthusiastic support to take the next steps to develop a cost-effective solution that meets their needs without excessive burden on industry.
  - CARB agreed to review progress to ensure the approach meets their needs and remains viable.

- SAE OBD-Europe Symposium presentation scheduled for March 15-17

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TECHNICAL CHALLENGES

While it is clear that a specification will be needed to facilitate the integration of data between suppliers and OEMs, it is also clear that there are significant technical challenges where new inventions / innovation is required:

- Understanding differences between static and dynamic software analysis,
- Integrating signal flow between Application, OS and hardware device drivers,
- Dealing with effects of Calibration Files and other option-controlled signal flows.

CARB OBD DEPENDENCY ANALYSIS – PROBLEM STATEMENT
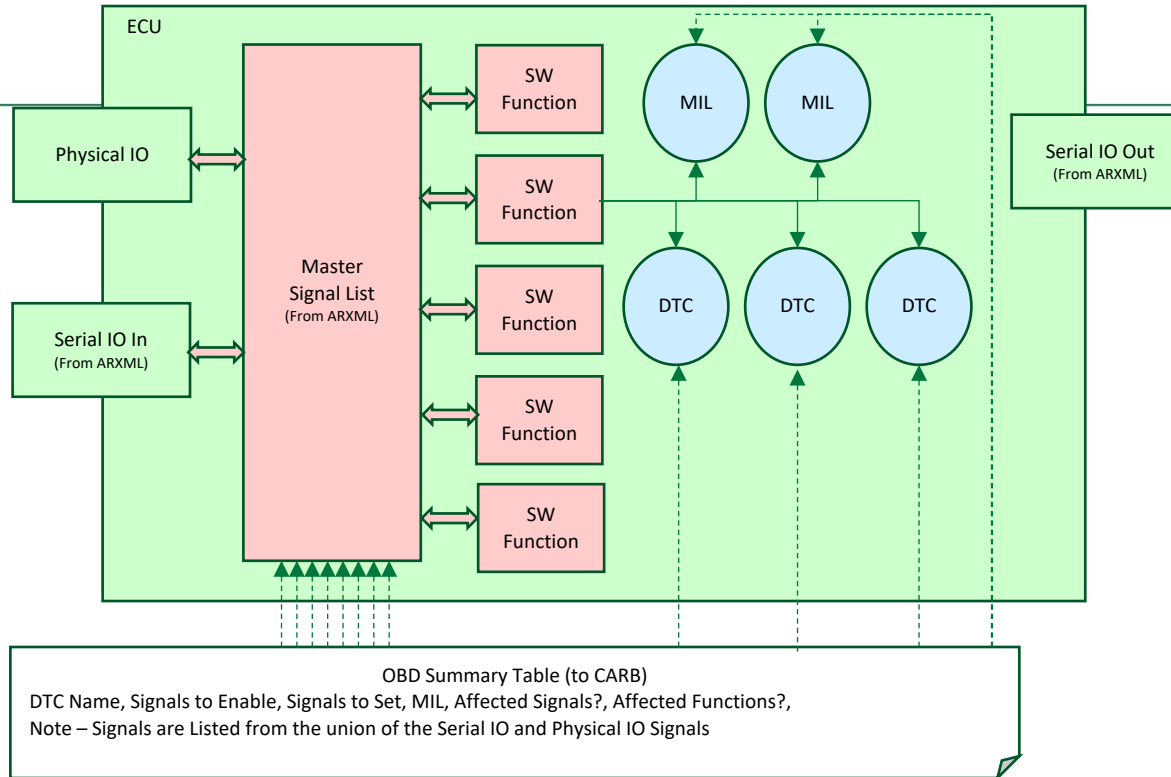
CARB request to all OEMs in 2019

(2.8) A listing of all electronic powertrain input and output signals (including those not monitored by the OBD II system) that identifies which signals are monitored by the OBD II system.

- CARB Requires that OEM show that all signals related to OBD or Safety Related Functions are adequately monitored and reported.
- Tracing the flow of Signals within Functions and then between Functions is a major challenge.
- Knowing the degree of monitoring associated with the signals that are received by an ECU is almost impossible.

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TECHNICAL STRATEGY

HRCS Led Activities:

- Form a team of experts that are working on different aspects of the problem.

- Develop a clear statement of problem, scope, deliverables and timeline (Q2 2022).

- Iterate on the specification(s) in tandem with teams producing various artifacts and integrators to find a feasible solution.

- Work with industry to find best mechanism to standardize the results.

(TBD) Lead Activities:

- Standardize the results.

OTHER HRCS ACTIVITIES

HRCS MULTISECTOR STRATEGY

- HRCS is promoting the application of IVHM in industry

- Targeting mobility- seven sectors

- Developing content relevant across all mobility sectors

- Actions:
  - organizing pilot studies
  - developing standards, best practices, and policies
  - creating standard templates and worksheets to standardize communications

AEROSPACE   AUTOMOTIVE

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MARINE   RAIL

DEFENSE

HRCS POLICY STATEMENTS

HRCS Consortium™ intends to periodically issue broad policy recommendations

These statements represent the collective wisdom of our consortium membership and are intended to encourage thoughtful discussion on topics of strategic importance to industry which may impact the successful implementation of Integrated Vehicle Health Management (IVHM) technology solutions. The current set of position statements include:

1.   **Operating Data Ownership** (2021):

Sophisticated components installed in modern vehicles can store and transmit large volumes of data regarding the operating condition of individual components, systems or the entire vehicle. This data is valuable for predictive and comparative purposes in a variety of contexts. This statement is intended to clarify the rightful owner of that operating data as well as elucidate some of the key issues relevant to this question.

2.   **Right to Repair** (2022):

This is a special case of the "Operating Data Ownership" policy. This policy is focused on maintenance-related information and does not apply to clearly proprietary design content such as control logic. It is intended to ensure that all repair organizations have access to all necessary info.

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POLICY STATEMENTS: DATA OWNERSHIP & RIGHT TO REPAIR

- **Data Ownership** addresses:
  - Operating data produced by an asset (vehicle, aircraft, …)
  - Rightful owner of the data
  - Sharing of data among those with different perspectives
  - Safety & legal implications
  - Design IP, maintenance and servicing of the asset

- **Right to Repair** addresses:
  - Owners and repair shops' right to maintenance-related info to safely service and maintain assets in both automotive & aerospace
  - Existing and proposed legislation as well as governmental regulations
  - Customer support services incl. VHM & Proactive Alerts
  - Design IP of OEMs and Suppliers
  - Vehicle owner and operator privacy rights

HRCS Policy Statements: https://www.sae-itc.com/programs/hrcs/positions

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HEALTH-READY COMPONENTS AND SYSTEMS WEBSITE

www.sae-itc.com/hrcs

HRCS CONSORTIUM DISCUSSION

Questions?

For more information regarding the SAE-ITC HRCS Consortium, please contact peter.grau@sae-itc.org

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