Signal Flow Analysis for CARB Reporting – Second Introductory Meeting: July 12, 2022

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TEAM MEETING – JULY 12

- Introductions (HRCS, others)
- Problem Statement (Tim)
- Project Overview (Tim)
- CARB update (Tim)
- HRCS Membership (Peter)
- Next Steps / Call to Action (Stephan)
- Wrap-Up / Discussion (All)

PROBLEM STATEMENT

There are several use cases related to automotive emissions compliance, safety analysis, system validation, fault isolation and event analysis that require an understanding of the propagation of signals within and between the vehicle's Electronic Control Units (ECUs)

Specifically -

> CARB request to all OEMs in 2019 …
>
> (1) Certification Documentation ….
>
> (2) The following information shall be submitted as “Part 1” of the certification application. … The information must include: …
>
> (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

The focus of this Working Group is to develop methods to meet these requirements and to specify standards for portions of the process required for cost effective for all stakeholders.

One of the tasks of the Working Group is to formalize the Problem Statement to be consistent with Rationale and Scope of the project.

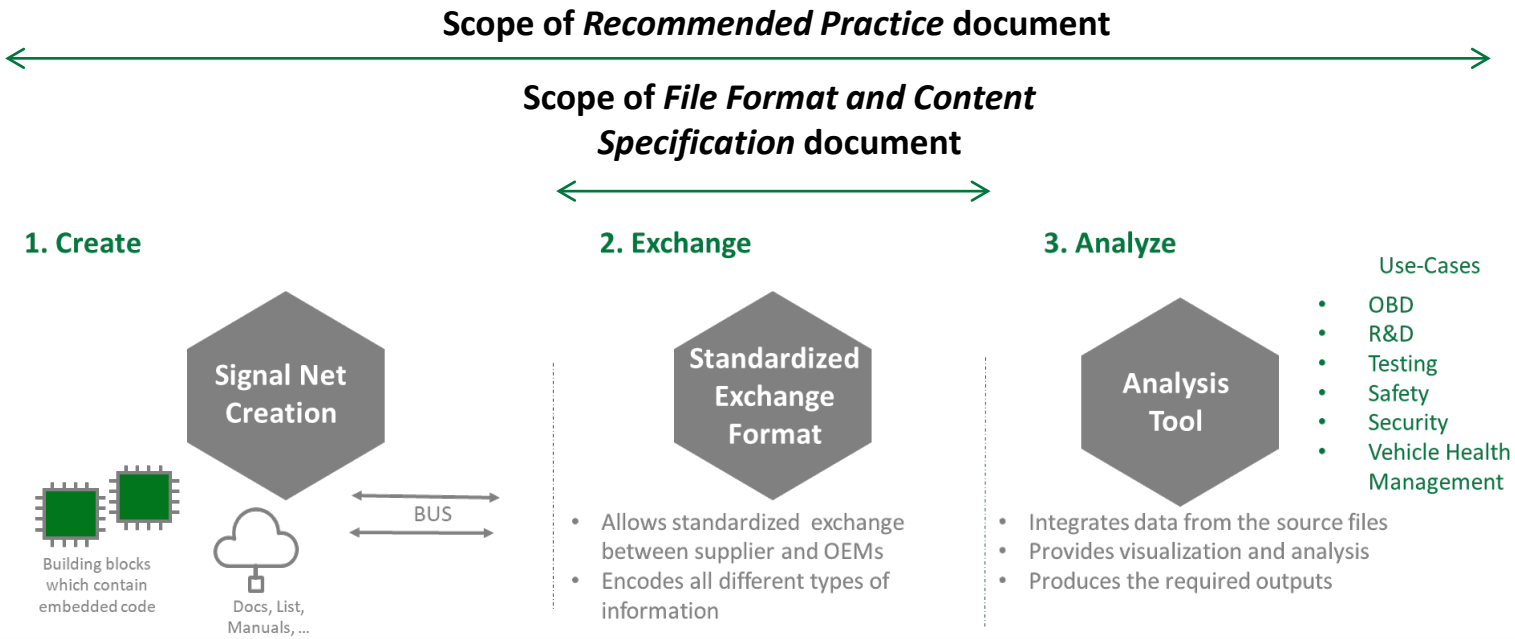
PROJECT RATIONALE

- SAE ITC's HRCS Consortium is well positioned to address the challenges identified above. One of HRCS' key goals is to improve communication of complex design and operating information between OEMs, suppliers, integrators and operators. Formalizing the communications required to integrate signal flow data for modules provided by multiple suppliers is natural application of one of HRCS' primary objectives.
- HRCS is a 501(C6) organization meaning that the members of HRCS are *companies,* unlike SAE International which is a 501(C3) where the members are *individuals*. This means that a single corporate membership includes all employees of the company.
- SAE International is responsible for its standards groups which are forbidden from serving the interest of specific companies but focus instead on the industry as a whole. In a complementary way, HRCS can develop methods and implementations beyond the relevant standards documents and they can indeed serve the needs of its member companies.
- Importantly, HRCS provides a legal umbrella for OEMs, suppliers, and integrators to collaborate on a precompetitive basis and avoid running afoul of anti-trust regulations. It also provides an administrative support function to facilitate the smooth functioning of the consortium. This allows HRCS teams to work at a much greater level of detail and to discuss how the results are aligned with member specific applications.

PROJECT SCOPE

The project will focus initially on producing two documents related to use of signal flow analysis to support the CARB OBD Summary Reports for a vehicle.:

- A *Recommended Practice* document that describes the overall process, required inputs, processing and outputs.
- A *File Format and Content Specification* document that provides a detailed schema and ruleset for the creation and use of exchange files.



PROJECT PLAN – NOTIONAL SCHEDULE

	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23
Coordination Activities	Introductory Meeting #1	Introductory Meeting #2	Introductory Meeting #3	Project Kick-Off	Stakeholders Meeting #1	Stakeholders Meeting #2	Stakeholders Meeting #3	Stakeholders Meeting #4	Stakeholders Meeting #5	Stakeholders Meeting #6
Recommended Practice Document Working Group				RP Team Kick-Off	Document Rationale, Scope and Definitions	Working Sessions and Report-Out	Working Sessions and Report-Out	Working Sessions and Report-Out	Initial Document Submitted for Review	Final Document Released
File Format Document Working Group				FF Team Kick-Off	Document Rationale, Scope and Definitions	Working Sessions and Report-Out	Working Sessions and Report-Out	Working Sessions and Report-Out	Initial Document Submitted for Review	Final Document Released

CARB UPDATE

- The meeting was well attended (10+ CARB Staff, 4 HRCS Members).
- The following objectives and benefits for the effort were identified:
  - Member receive antitrust / collusion protection by means of the HRCS organizational charter.
  - Coordination with CARB is through a single channel to ensure a feasible and cost-effective solution.
  - CARB is assured of an accurate and efficient mechanism through which the requires are satisfied.

The HRCS initiative provides an effective mechanism to meet the requirements of signal flow analysis for OBD reporting.

HRCS Membership

Peter Grau

HRCS MEMBERSHIP

- HRCS Membership Benefits to Members
  - Common channel with CARB (and other regulators)
  - Simplified communications between OEMs, Suppliers, and Operators
  - Reduced effort to respond to CARB mandate vs. individual company approaches
  - Differing perspectives, increased bandwidth, division of labor
  - Methodology can be applied to other developing areas (ie: autonomy, safety, cybersecurity etc.)
- IP and Antitrust Protection
  - Consortium is structured as a 501(c6) organization
  - Membership at the ***Corporate Level*** confers antitrust protection to the corporation
  - ***Corporate membership*** covers the entire company; unlimited participation
  - Discussions will be pre-competitive, non-proprietary
  - Proprietary information can be protected and will not require disclosure
  - Work Session summaries to contributors for reporting to their organizations
- Common approach and unified coordination with CARB
- Engagement with other HRCS initiatives

HRCS CONSORTIUM

- Overall Objective: Facilitate introduction of Integrated Vehicle Health Management (IVHM) across mobility sectors
  - Critical and enabling technology for autonomous vehicles; safety critical components must be health ready

- Enhance performance, availability, and safety of mobility assets through use of IVHM incorporating:
  - Uniform information sharing techniques
  - Predictive analytics and prognostics
  - Interoperability instead of costly proprietary approaches
  - Design and run-time information exchange

- Targets seven mobility sectors:
  - Aerospace
  - Automotive
  - Off-Highway Vehicles (agriculture, construction, mining)
  - Rail
  - Defense
  - Marine
  - Commercial Vehicles

Why now? – Drive use of a common standard before the market fragments into costly proprietary solutions

FOUNDATIONAL DOCUMENT: SAE JA6268

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

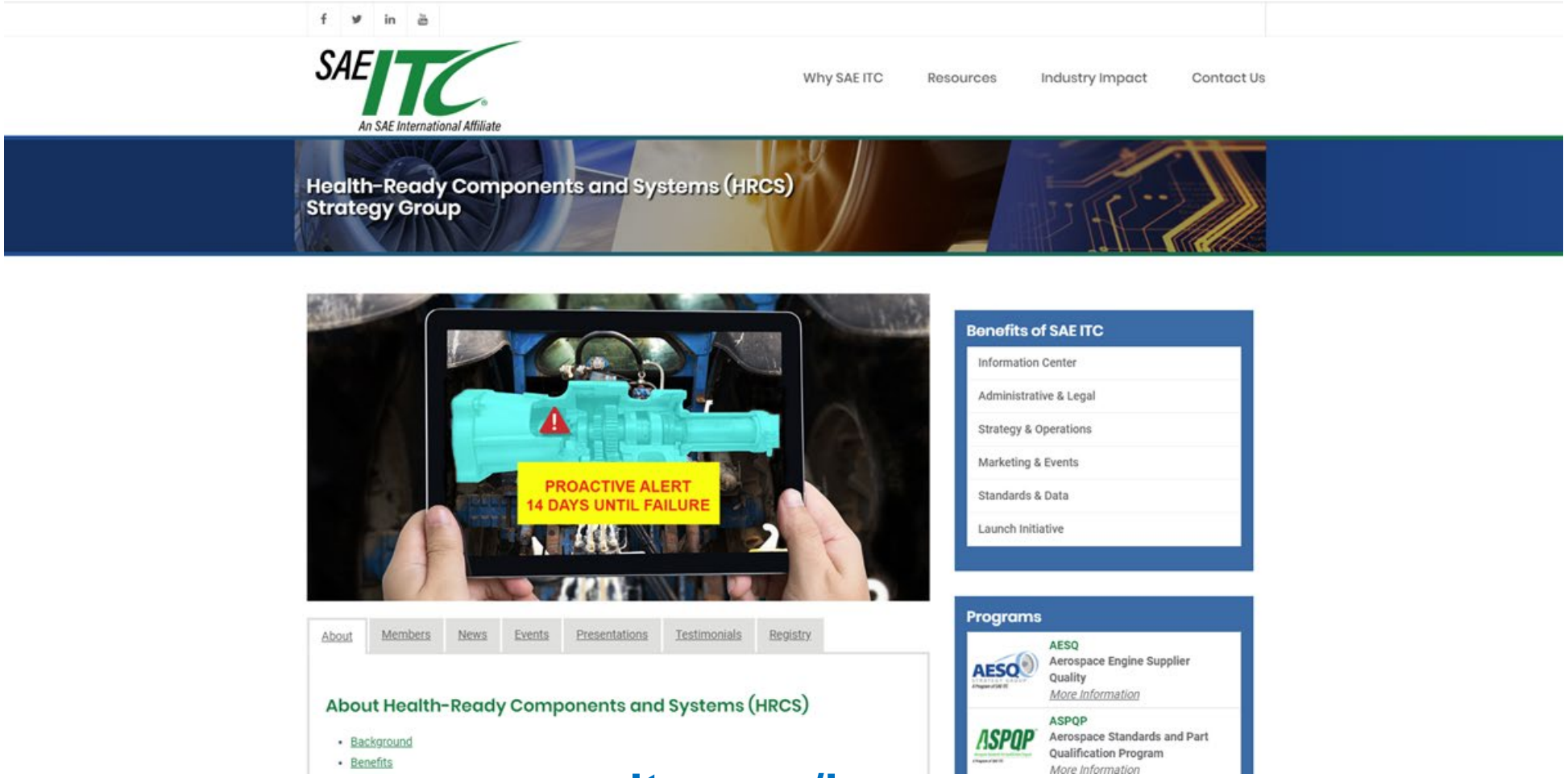
RATIONALE

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 MEMBERSHIP STRUCTURE

- **Executive Committee:** (July 1 – June 30 one-year positions)
  - Chairman Steve Holland (VHM Innovations/retired GM)
  - Vice Chairman Brian Tucker (Bell)
  - Secretary Joe Klesing (Nexteer Automotive)
  - Treasurer Peter Grau (SAE ITC)
- **Membership Levels:**
  - **Member** (full voting privileges, eligible for Executive Committee, full participation in other HRCS technical activities, early access to program results and output, ability to provide input to Executive Committee) Annual membership dues: $9,000, prorated for partial year membership
  - **Associate Member** (full participation in other HRCS technical activities, early access to program results and output, ability to provide input to Executive Committee) $5,000, prorated for partial year membership
  - **Strategic Partner** (by invitation of the Executive Committee, (full voting privileges, eligible for Executive Committee, full participation in other HRCS technical activities, early access to program results and output, ability to provide input to Executive Committee) Payment in-kind

HEALTH-READY COMPONENTS AND SYSTEMS



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Next Steps

Stephan Mauk

NEXT STEPS / CALL TO ACTION

- Next Steps
  - √ Intro Meeting 07th June
  - √ Status report and coordination meeting with CARB 07th July
  - 1st follow-up Meeting 12th July
  - 2nd follow-up Meeting planned for 16th August
  - OBD Americas 13th – 15th September
    - Target: Team set-up / working groups established

    (How soon can people join HRCS, Target date for membership to allow engagement in program)

- First Activities
  - Detailed Scope Definition, Split & Prioritization
  - Define Working Groups
  - Setup Regular Meeting Schedule (Agenda, Attendance, …, Sub-Teams)

NEXT STEPS / CALL TO ACTION

- How We Want To Work (proposal)
  - Core Team (overall agenda & schedule)
  - Sub Teams (efficient working groups)
  - Monthly Heads-Up

- Fast progress
  - Collect Input from Stakeholders (OEM, TIERs, CARB, …)
  - Gather already existing Information / Solutions / Best Practice
  - Target to establish a first (draft) Release within some Month

  → Enable Stakeholders to test

  → Collect early feedback

  →Clear Target to establish a Solution as soon as possible

KEY MESSAGE/ CALL FOR ACTION

Involvement / regular Harmonisation

- Ensures that Stakeholder (incl. CARB) requirements are covered
- More Input / Feedback → higher Coverage of the Standard

Challenges

- Harmonisation of Understanding / Expectations needed
- Many technical Challenges are already in Progress / solved from different Stakeholders → Synergies possible
- First promising Results achieved, but with “individual” Approaches

Advantages

- Synergies on TIER / OEM side → Time, Costs, …
- Similar Approaches to Comply to CARB Requirements → comparable Input from OEMs

Wrap-Up / Discussion