



Health-Ready Components and Systems

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***Collaborative Innovation.
Trusted Implementation.***

PRESENTATIONS AT UPCOMING CONFERENCES

- SAE 2019 AeroTech Americas March 26-28, 2019 (Charleston, SC)
- HM-1 Committee April 2-4, 2019 (Charlotte, NC) hosted by Collins Aerospace
- SAE World Congress Experience WCX April 9-11, 2019 (Detroit, MI)
- AMC/AEEC (Avionics Maintenance Committee/Airlines Electronic Engineering Committee) April 29-May 2, 2019 (Prague, Czech Republic)
- Association for Unmanned Vehicle Systems International (AUVSI) Xponential April 29-May 2, 2019 (Chicago, IL)
- SAE Aviation Technology Forum June 4-5, 2019 (Shanghai, China)
- EFB Users Forum June 25-27, 2019 (Chicago, IL)
- PHM Society Asia-Pacific Conference July 23-25, 2019 (Beijing, China)
- SAE AeroTech Europe Conference September 24-26, 2019 (Bordeaux, France)
- PHM Society Annual Conference September 21-26, 2019 (Scottsdale, AZ)

WEBSITE DEVELOPMENT

- Website is the main landing page, with tabs for:
 - About HRCS
 - Charter (updated draft)
 - News
 - Events
 - Presentations
 - Testimonials
 - Feedback
 - Future tabs for HRCS database and HRCS membership
- <https://www.sae-itc.com/health-ready-components-and-systems-hrcs-strategy-group>

HRCs DATABASE

SAE JA6268™ CERTIFICATION PROCESS

Background Info

SAE HRCS HEALTH-READY COMPONENTS REGISTRY

Registry **WILL NOT contain
any proprietary information
(only Stage 1 information will
be included regardless of the
Stage completed.)**

IVHM CAPABILITY *(NOTE: VEHICLE LEVEL)* (SOURCE: SAE JA6268™)

Illustrating industry evolution in use of diagnosis & prognosis for vehicle maintenance

SAE Level	Vehicle Health Capability	Narrative Description	Participation in Repair Actions	Key Data Resources	Availability of Logged &/or Real-Time Data	Use of Supporting Models	IVHM System Characteristics
Manual Diagnosis & Repair Process performed by Technician							
0	Limited On-Vehicle Warning Indicators	Service actions for scheduled maintenance or when Operator notices problems or is alerted by indicator lights or simple gages.	Operator/Driver & Service Tech	On-Vehicle Measurements & Observation	N/A	Paper-based Manuals	Only Manual Diagnostic Tools & No Condition-Based Services
1	Enhanced Diagnostics Using Scan Tools	Service techs gain added diagnostic insight using automated scanners to extract vehicle operating parameters & diagnostic codes.	Operator/Driver & Service Tech	On-Vehicle & Service Bay/ Depot Tools	Logged Diagnostic Codes & Parameters available to Service Tech	Paper-based Manuals	On-Board Diagnostics Available
2	Telematics Providing Real-Time Data	Service techs gain real-time vehicle data via remote monitoring of vehicle to more completely capture issues.	Operator/Driver, Service Tech & Remote Support Center Advisor	On-Vehicle, Service Bay / Depot & Cloud Data	Telematic Data Available to Service Tech with Diagnostics Info	Paper-based Manuals	On-Board & Remote Data Available
Diagnosis & Repair Augmented by Prognosis & Predictive Analytics							
3	Component Level Proactive Alerts	Operator and service techs are provided with component health status (R/Y/G) before problem occurs. Limited condition-based maintenance.	Operator/Driver, Service Tech & Cloud-Based Services	On-Vehicle, Service Bay & Cloud Data	Telematic Data Available to Service Tech with Diagnostics Info	Addition of Component-Level Health Models	Component-Level Health Predictions
4	Integrated Vehicle Health Mgmt.	Operator and service techs are provided with system or vehicle level health indicators before problems occur with remaining useful life estimated. Condition-based maintenance.	Operator/Driver, Service Tech & Cloud-Based Services	On-Vehicle, Service Bay & Cloud Data	Telematic Data Available to Service Tech with Diagnostics Info	Addition of Vehicle-Level Health Models	Vehicle-Level Health Management
5	Self-Adaptive Health Mgmt.	Self-adaptive control and optimization to extend vehicle operation and enhance safety in presence of potential or actual failures.	Operator/Driver, Service Tech & Cloud-Based Services	On-Vehicle, Service Bay & Cloud Data	Telematic Data Available to Service Tech with Diagnostics Info	Addition of Vehicle-Level Health Models	IVHM Capability Integrated into Vehicle Controls

SAE JA6268™ THREE CERTIFICATION STAGES

(NOTE: NOW AT COMPONENT/SUBSYSTEM LEVEL)

Stage 1: *Functional Self Assessment*

Stage 2: *Failure Modes Assessment*

Stage 3: *Detailed Design Assessment*

Note:

- *Stage 1 is intended to provide a provisional certification with a low barrier to entry. All Stage 1 information will be recorded in online HRCS Registry.*
- *Stages 2 & 3 are enhanced by seeking an OEM/ Integrator to validate the more detailed supplier-provided assessments. Stage 2 & 3 submissions should be accompanied by Stage 1 info as well to populate registry. Stage 2 & 3 completion will be noted in HRCS Registry but the additional data will not be loaded since it contains potentially proprietary information.*

HRCS DATABASE- STAGE 1 MULTIPLE LISTINGS

SAE ITC HRCS Health-Ready Components Registry

Search registry

Home > Health-Ready Components Registry

Health-Ready Components Registry

Part Name	Supplier Name	Sector	Certification Stage	Machine Readable Info Exchange	Machine Readable Conv of Inputs to Eng Units	Criticality of Failures	Data Acquisition & Manipulation Coverage for Given Failure Mode	Health Indicators ID'd	Relationships/ Models ID'd	Diagnostic Metrics	State Detection & Health Assessment Coverage for Given Failure Mode	Typical RUL Notice	Typical RUL Std Dev	Prognostic Metrics		Prognostics Assessment & Advisory Generation Coverage for Given Failure Mode
Antilock Brake Module	XYZ Co	Automotive	1	✓	✓		●	✓	✓	80% - 82% NTF	●					●
Turbocharger	GA Co	Automotive	3	✓	✓		●	✓	✓	85% NTF	●	10 OPERATION HRS	4 OPERATION HRS	80% TNR	20% FNR	●
Electric Power Steering	NE Co	Automotive	2	✓	✓		● 100%	✓	✓	65% - 70% NTF	●	2 WEEKS	0.5 WEEKS	90% PPV	85% NPV	●
Flight Control	Up Co	Aerospace	1	✓	✓		●	✓	✓	80% NTF	●					●
Antilock Brake Module	Stop Co	Aerospace	1	✓	✓		●	?	✗	80% NTF	●					●
Infortainment	Entertain Co	Aerospace	1	✓	✓		●	✓	✓	80% NTF	●					●
Auxilliary Power System	Power Co	Aerospace	1	✓	✓		●	✓	✓	80% NTF	●					●
Landing Gear	Land Co	Aerospace	1	✓	✓		●	✓	✓	80% NTF	●					●

HRCS DATABASE- ACTUAL STAGE 1 LISTING

SAE ITC Health-Ready Components & Systems (HRCS) Registry (Beta)

Health-Ready Components Registry

Health-Ready Components Registry

SHOW 25 ENTRIES FILTER BY: SEARCH:

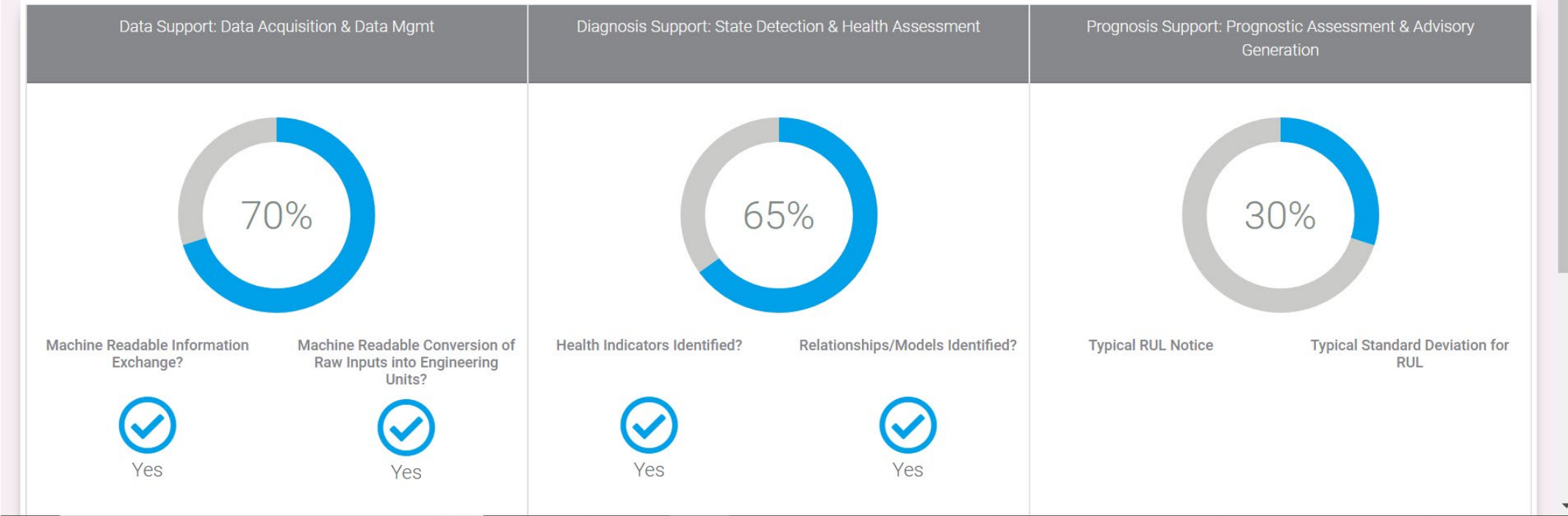
Part Name	Supplier Name	Sector	Certification Stage	Machine Readable Info Exchange	Machine Readable Conv of Inputs to Eng Units	Criticality of Failures	Data Acquisition & Manipulation Coverage for Given Failure Mode	Health Indicators ID'd	Relationships/ Models ID'd	Diagnostic Metrics	State Detection & Health Assessment Coverage for Given Failure Mode	Typical RUL Notice	Typical RUL Std Dev	Pro
Electric Power Steering (EPS)	Nexteer Automotive	Automotive	1	✓	✓	1 2 3 4 5		✓	✓	60% - 70% CdC				20

Previous 1 Next

HRCS DATABASE- STAGE 1 LISTING DETAIL

Electric Power Steering (EPS) Nexteer

STAGE 1



HRCS DATABASE- STAGE 1 LISTING CORE INFORMATION

SAE ITC Health-Ready Components & Systems (HRCS) Registry (Beta)

Health-Ready
Electronics
Mechanical

Assembly Details

Component Name	Electric Power Steering		
Known Aliases	Catalog Reference Number(s)	HRCS Certification Stage	
EPS		STAGE 1	
Supplier Name	Sector	Primary Validation Approach	Format of Health-Ready Information
Nexteer Automotive	Automotive	Combined Design & Run-Time Info	MS Word templated tables
DUNS Number	CAGE Number	Validating OEM/Integrator/Operator	
00-025-7923		General Motors Company	
Supplier Contact		Yat-Chung Tang	
Matt Tompkins		@ Yat-chung.tang@gm.com	
@ matthew.tompkins@nexteer.com		+1 (586) 907-3059	
+1 (989) 757-4992		29755 Louis Chevrolet Rd.	
3900 E. Holland Rd.		Warren, MI	
Saginaw, MI		48093	
48601		Date Validation Certified	Date Validation Expires
		3/4/2019	3/4/2022

Yes Yes Yes Yes

HRCS DATABASE AND OTHER ACTIVITIES

- Listings:
 - All new listings during calendar 2019 free of charge for one year from listing date
 - Discounted listing fees commensurate with membership level
 - SAE ITC Registered badge by Stage (1, 2, or 3) for improved product branding
- Conference with HRCS track and exhibition later in 2019

HRCS REGISTERED COMPONENTS PROPOSED STAGE 1 BADGE



HRCS REGISTERED COMPONENTS PROPOSED STAGE 2 BADGE



HRCS REGISTERED COMPONENTS PROPOSED STAGE 3 BADGE



HRCS REGISTERED COMPONENTS PROPOSED BADGES



CONSORTIUM DEVELOPMENT



Mission

SAE Industry Technologies Consortia (ITC) enables organizations to connect, collaborate and positively impact global industries by empowering implementation of precompetitive solutions and innovative technologies.

Vision

We are a trusted global leader in consortia-based collaborative tools and services for highly technical industries' operations and supply chain, especially automotive and aerospace.

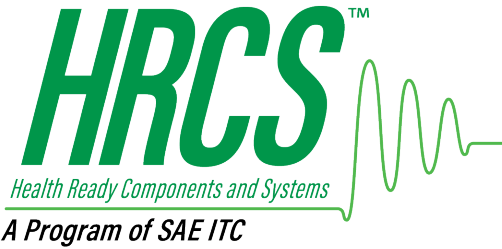
Collaborative Innovation. Trusted Implementation.

HRCS STRATEGY GROUP LETTER OF INTENT AND CHARTER

- Purpose of Letter of Intent (LOI)
 - Outline of anticipated responsibilities, benefits, and scope
 - Identify champions within prospective member companies
 - No financial commitment
 - Interested parties who sign up will have primary input on consortium development

- Purpose of Membership Agreement
 - Defines membership levels and associated privileges
 - Forms a structure to manage new initiatives
 - Three membership levels, pricing to include commensurate benefits
 - Timing- response requested by May 15th

HRCS STRATEGY GROUP LETTER OF INTENT



LETTER OF INTENT BETWEEN THE SAE ITC AND [agency name]

- Parties.** This Letter of Intent (hereinafter referred to as "LOI") is made and entered into on the _____ day of _____, 201__ (the "effective date"), by and between SAE ITC, whose address is 400 Commonwealth Drive Warrendale, PA, USA 15096 ("SAE ITC"), and the [agency name], whose address is _____ ("_____").
- Purpose.** The purpose of this LOI is to establish the terms and conditions under which the Consortium (hereinafter referred to as the "Health-Ready Components and Systems Strategy Group" (HRCS SG)), assembled with a collection of organizations (individually or collectively referred to as "Participant Group Members") working and functioning together to develop a Health-Ready Components and Systems Database (the "Program"), and undertaking other activities the group considers to be beneficial.
- Term of LOI.** This LOI is effective upon the day and date last signed and executed by the duly authorized representatives of the parties to this LOI and shall remain in full force and effect for not longer than two years. This LOI may be terminated, without cause, by either party upon 30 days written notice, which notice shall be delivered by hand or by certified mail to the address listed above.
- Responsibilities of SAE ITC.** SAE ITC agrees to provide support for all applicable Participant Group Members matters mutually agreed upon. Program support shall be coordinated by SAE ITC and at least one principal designee of the Participant Group Members. It is contemplated that the initial organizational matters will be handled by the parties through telephonic conferences and electronic mail exchanges, and that SAE ITC will coordinate and facilitate all HRCS SG meetings.
- Responsibilities of (other agencies).** Participant Group Members agree to comply with guidelines defined by this agreement ("Participant Responsibilities") and covered by this LOI to support SAE ITC for costs and expenses related to the HRCS SG, including the cost of wages, salaries, benefits, and use of equipment belonging to an agency while acting pursuant to this LOI.

A. **Anti-trust Guidelines.** Participant Group Member(s) agree to abide by this LOI, SAE ITC Anti-trust Guidelines, and the rules and procedures of the HRCS SG.

LETTER OF INTENT BETWEEN THE SAE ITC AND [agency name]

1. **Parties.** This Letter of Intent (hereinafter referred to as "LOI") is made and entered into on the _____ day of _____, 201__ (the "effective date"), by and between SAE ITC, whose address is 400 Commonwealth Drive Warrendale, PA USA 15096 ("SAE ITC"), and the [agency name], whose address is _____ ("_____").

HRCS STRATEGY CHARTER AGREEMENT



DRAFT

Health-Ready Components & Systems Strategy Group CHARTER AGREEMENT

1.0 Foreword

Integrated Vehicle Health Management (IVHM) technology has the potential to enable significant benefits for a myriad of assets (aircraft, automotive, trucking, shipping, rail, mining, and other industries) in terms of performance, availability, and safety. However, the level of deployment of

HRCS MEMBERSHIP BENEFITS AND PRICING



Application for Membership

Company / Organization	
Address Where Incorporated or Registered	
Contact Name	
Contact Email	
Contact Phone	

Please refer to the HRCS Fees Schedule for the following. Entity:

For-Profit <input type="checkbox"/>	Non-Profit <input type="checkbox"/>	Government <input type="checkbox"/>	Academia <input type="checkbox"/>
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Organization Type:

Supplier <input type="checkbox"/>	Integrator <input type="checkbox"/>	Manufacturer <input type="checkbox"/>	Operator <input type="checkbox"/>	Other <input type="checkbox"/>
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Desired Membership Level:

Bronze <input type="checkbox"/>	Silver <input type="checkbox"/>	Gold <input type="checkbox"/>
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HRCS MEMBERSHIP BENEFITS AND PRICING

Membership Category	Leadership Voting	Corporate Member Voting	Webpage/Promotion	Complimentary Parts Listing	Program Documents	On-line/ WebEx Training	Event Promotion/ Recognition	Registry Electronic Access	HRCS Events	Sponsorship rates	Annual Fee
Bronze	No	Yes	Listing	3	10% discount	10% discount	Yes	10% discount	10% discount	10% discount	\$3K
Silver	No	Yes	Listing+Link	6	25% discount	25% discount	Yes	25% discount	25% discount	25% discount	\$6K
Gold	Yes	Yes	Logo + Listing +2 links	9	50% discount	50% discount	Yes	50% discount	50% discount	50% discount	\$9K

HRCS DATABASE COMPONENT PRICING

Membership Category	Initial Setup Fee	2019 Listing	3yr Listing Fee	3yr Listing Bundle (10)
Non-member	\$200	Complimentary	\$300	\$2,500
Bronze	\$100	Complimentary	\$270	\$2,250
Silver	\$50	Complimentary	\$225	\$1,875
Gold	Complimentary	Complimentary	\$150	\$1,250

HRCS STRATEGY GROUP LETTER OF INTENT AND CHARTER

HRCS Activities and Objectives Roadmap

1. Strategy (Communications, Prioritization, Deployment, Standards, Trial Use Pilot Projects, etc.)
2. Communication, branding, and marketing actions (e.g., websites, press releases, social media, certification badges to use in ads, etc.)
3. Development of an HRCS database. The database will list components, their capabilities, and certification stage
4. Establishing a voting and membership policy, meeting cadence, and rules
5. Liaison with SAE committees (e.g., SAE HM-1, OBD-II, E-32, and ARINC Industry Activities, etc.) and other standards organizations
6. Liaison with government organizations and regulatory bodies to review requirements relating to the flow down of Health-Ready Component requirements to the supply chain
7. Development and coordination of HRCS characterization training, certification training, JA6268™ training, liaison/endorsement of providers
8. Guidance for applicable tool development to support implementation (e.g., registries, databases, data exchange tools, training, etc.)
9. Deployment actions (timing, execution)
10. Management of third-party service providers
11. Program Participant Agreement Appendix (HRCS Strategy Group contracted work)
12. Funding/finances - budget & invoicing and what it supports/limitations

HOW CAN YOU GET INVOLVED NOW?

- Please have someone in your company sign the LOI and return as soon as possible
- Nominate components for listing in the database
- Volunteer to participate in consortium development
- Submit pilot program recommendations
- Please share membership benefits and low cost entry with appropriate individuals in your company for action and signature
- Please return suggestions to Peter Grau at: peter.grau@sae-itc.org

QUESTIONS?



THANK YOU!

