

**Unsettled Technology  
Opportunities for Vehicle  
Health Management  
and the Role for Health-  
Ready Components**

Steven W. Holland

# Unsettled Technology Opportunities for Vehicle Health Management and the Role for Health- Ready Components

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Courtesy: General Motors, 2018



**Steven W. Holland** is a leading proponent of prognostics and vehicle health management (VHM) in the global automotive industry. He retired from General Motors in 2019 following a long career centered on artificial intelligence and robotics, where he most recently served as a Research Fellow and Chief Technologist for VHM. In 2015, he helped launch OnStar® Proactive Alerts, which now provides starting system prognostics for millions of General Motors customers. Steve is now consulting in the prognostic and vehicle health arena via VHM Innovations, LLC. He served on the PHM Society Board of Directors as its automotive industry lead director and has been active in SAE IVHM Standards, where he sponsored SAE JA6268™ on Health-Ready Components, published in 2018. His company, VHM Innovations, LLC, was recently selected as a Strategic Partner by SAE's Industry Technology Consortium on Health-Ready Components & Systems (HRCs). Steve is a Life Fellow of the IEEE and a fellow of the PHM Society. He is a Registered Professional Engineer and holds technical degrees from Kettering and Stanford Universities.

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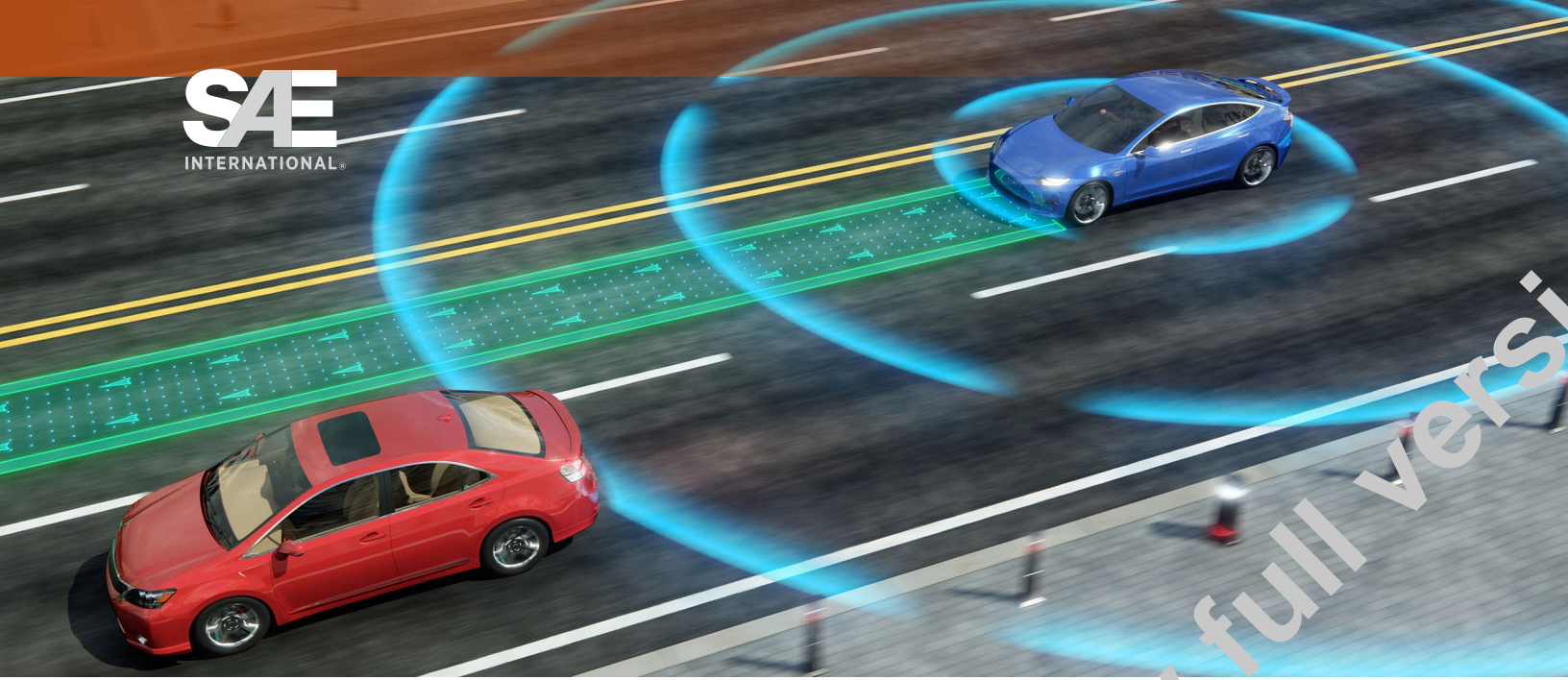
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# Unsettled Technology Opportunities for Vehicle Health Management and the Role for Health-Ready Components

## Abstract

Game-changing opportunities abound for the application of vehicle health management (VHM) across multiple transportation-related sectors, but key unresolved issues continue to impede progress. VHM technology is based upon a much broader field of advanced analytics. Much of traditional analytics efforts to date have been largely descriptive in nature and offer somewhat limited value for large-scale enterprises. Analytics technology becomes increasingly valuable when it offers predictive results or, even better, prescriptive results, which can be used to identify specific courses of action. It is this focus on action which takes analytics to a higher level of impact, and which imbues it with the potential to materially impact the success of the enterprise. Artificial intelligence (AI), specifically machine learning technology, shows future promise in the VHM space, but it is not currently adequate by itself for high-accuracy analytics. The recent push for *health-ready components* offers hope in resolving some of the issues slowing the implementation of VHM technology. Health-ready components are those components that provide the necessary functionality or information to allow them to be gracefully integrated into an overall VHM solution. Our primary focus area in this SAE EDGE™ Research Report is on maintaining the health of vehicles in various transportation sectors with the greatest content coming from automotive. Tremendous synergies can be achieved by applying these very broad concepts from automotive to aerospace and other sectors, and vice versa. As will be seen, these concepts are also important for key emerging product features and for the manufacturing systems that produce the vehicles. The barriers impeding progress are organizational, historical, technological, and legal, among others. We offer some insights into how these barriers arose with some potential courses of action to mitigate them as well as to stimulate further discussion.

NOTE: SAE EDGE™ Research Reports are intended to identify and illuminate key issues in emerging, but still unsettled, technologies of interest to the mobility industry. The goal of SAE EDGE™ Research Reports is to stimulate discussion and work in the hope of promoting and speeding resolution of identified issues. SAE EDGE™ Research Reports are not intended to resolve the issues they identify or close any topic to further scrutiny.

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