EXECUTIVE SUMMARY

SOFTWARE TECHNOLOGY

GLOBAL EPICENTER OF MOBILITY
REVOLUTIONIZING THE DETROIT REGION

Detroit Regional Partnership

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IN THIS SUMMARY

The Global Epicenter of Mobility (GEM), a signature program of the Detroit Regional Partnership (DRP), is designed to enable growth and development of the advanced mobility industry in the 11-county Detroit Region. GEM and its strategic partners work together to create a smart, secure, and sustainable advanced mobility industry in Southeast Michigan. GEM's efforts were made possible by a four-year U.S. E.D.A. Build Back Better Regional Challenge grant award.

As part of its work, GEM provides its grant partners and regional stakeholders with key mobility sector research, data, and insights. In 2024, GEM commissioned a Future Mobility Technology Study (FMTS) in collaboration with S&P Global Mobility. The FMTS is a comprehensive report that identifies the seven advanced mobility technologies with the strongest mid-term growth potential in the Detroit Region. Together with supporting data from other key sources, FMTS serves as the foundation of the Road to 2030 website.

This website covers the key insights from the FMTS, as well as other reports and key sources. Our content includes an executive summary of opportunities stemming from each of the seven technologies covered in the FMTS. The executive summaries, as well as a corresponding section of the Road to 2030 website, will be released over the course of the year. This executive summary, the fifth in our series, is focused on Software Technology.

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SOFTWARE TECHNOLOGY INTRODUCTION

This module covers three software technology domains: Software-Defined Vehicles (SDV), in-vehicle cybersecurity, and Over-The-Air (OTA) software update capability. Each of these domains is briefly described below.

- Software-Defined Vehicles (SDVs) enable software-driven customization of vehicle dynamics and rely on the readiness of hardware, software, and connectivity. They provide the foundation for integrating advanced technologies and features, including charging systems, predictive maintenance, autonomous driving, connected vehicle capabilities, and enhanced safety systems. Full implementation of SDV technology is expected for some OEMs between 2030 and 2035.
- Cybersecurity in vehicles focuses on protecting in-vehicle technologies by detecting and preventing cyber breaches. Enhanced connectivity extends these efforts to cloud and external systems. Advancements in AI and machine learning support real-time threat detection and response, while technologies such as quantum computing, 5G, and cloud computing enable the management of large data sets and strengthen overall cybersecurity capabilities.
- Over-the-Air (OTA) technology enables wireless updates of vehicle software, currently focused on infotainment and telematics systems. Future applications are expected to extend to control modules in powertrain and other critical vehicle systems. OTA is a key enabler for Software-Defined Vehicle (SDV) features, allowing updates and enhancements without requiring a dealership visit.

Software-Defined Vehicle (SDV) development remains a core focus for OEMs, with suppliers expected to assume a growing role in specialized applications. Optimal strategies for domain resilience rely on a blend of software- and hardware-based capabilities, supported by long-term resource co-location near OEMs to prevent the migration of critical software functions to lower-cost regions.

Over the past decade, OEMs have increased their control over SDV platforms to accelerate revenue growth, enhance product differentiation, and improve responsiveness through over-the-air (OTA) updates. While results have been mixed, economies of scale are expected to allow suppliers to expand their involvement in niche and specialty functions. Autonomous capabilities within light vehicles will further necessitate close SDV coordination, though adoption beyond Automation Level 2+ is expected to remain limited in volume through 2030. Across sectors, maintaining strong integration between OEM software, OEM hardware design, and the supply base is essential for building and sustaining competencies.

Several factors are accelerating SDV adoption. The industry-wide transition to advanced electrical and electronic architectures enables improved cybersecurity, OTA communication, and new commercial opportunities. Evolving cybersecurity requirements ensure SDV development will remain a long-term priority. New centralized electrical backbones—featuring fewer, more powerful chips and high-speed communication structures—are creating the foundation for faster data exchange, reduced complexity, and enhanced connectivity. Many OEMs are leveraging both internal and supplier capabilities to develop next-generation OTA systems, motivated by opportunities to generate income from in-vehicle digital services, unlock hardware and software features, and strengthen cyber protection.

Other mobility sectors are also utilizing SDV-related technologies, though at smaller scale. Off-highway equipment and maritime applications already employ OTA capabilities for diagnostics and optimization, while aerospace and VTOL platforms incorporate advanced autonomous functions.

Despite these advances, several issues continue to slow SDV adoption. The geographically agnostic nature of SDV technology challenges traditional engineering and service structures, reshaping dealer networks, real-time customer interaction, and OTA-driven support models. Because SDV deployment can be global with minimal regional constraints, established ecosystems like the Detroit Region must adapt quickly.

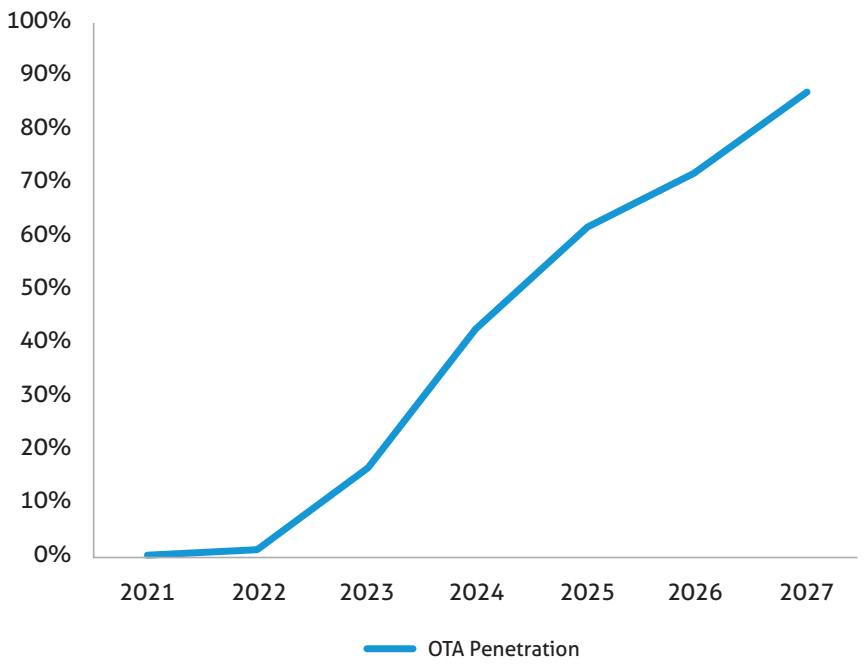
KEY TAKEAWAY

PRODUCTION & EMPLOYMENT GROWTH FORECASTS

Chart 1:

NORTH AMERICA LIGHT VEHICLE OTA (OVER-THE-AIR) PENETRATION

SOURCE: S&P GLOBAL SOFTWARE VEHICLE DOMAIN FORECAST, JULY 2024

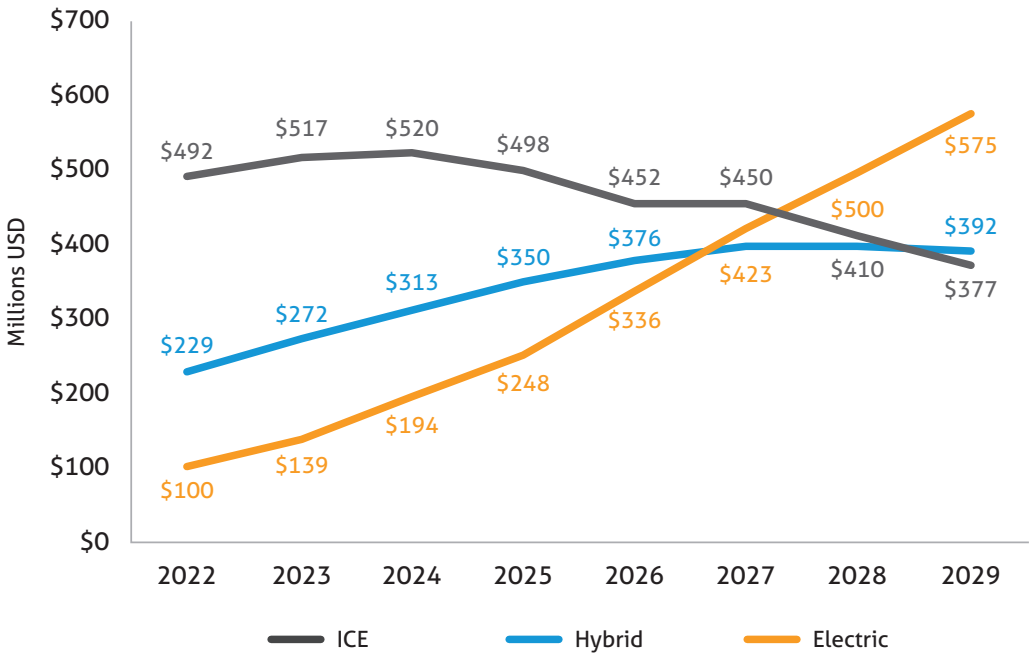


The penetration of Over the Air (OTA) capabilities in Light Vehicles is rising rapidly, from nearly 0% in 2021 to a forecast level of 86% by 2027. Because Light Vehicles are by far the highest-volume mobility sector, this growth represents a tremendous level of integration of vehicle operations between software and hardware components.

Chart 2:

NORTH AMERICA SOFTWARE SPENDING BY POWERTRAIN TYPE

SOURCE: S&P GLOBAL SOFTWARE VEHICLE DOMAIN FORECAST, JULY 2024

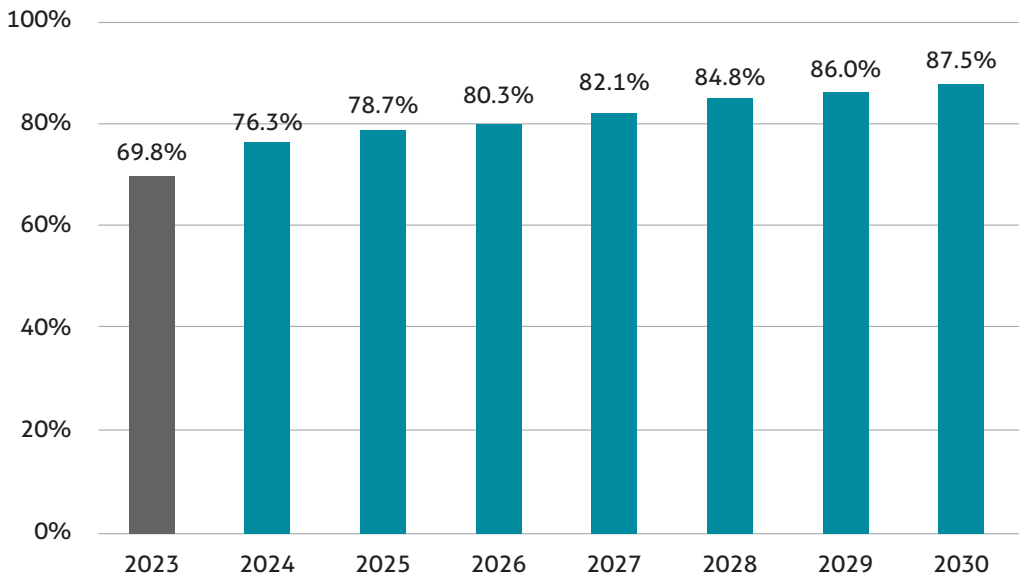


In 2024, Internal Combustion Engine (ICE) software spending was more than double that of Electric and Hybrid spending. That position is forecast to change by 2030, when Electric vehicle software spending will reach $575 million.

Chart 3:

U.S. MARKET LV NAVIGATION SYSTEM PENETRATION

SOURCE: S&P GLOBAL SOFTWARE VEHICLE DOMAIN FORECAST, JULY 2024



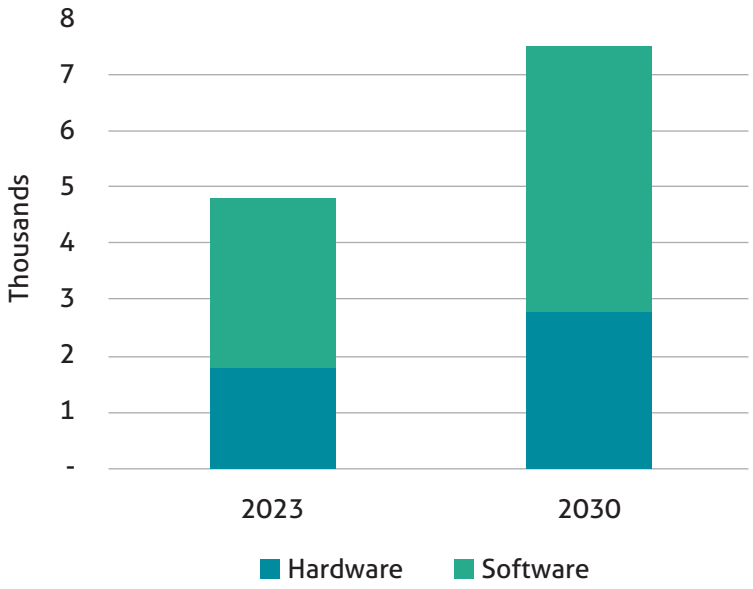
Navigation systems are becoming a common connected feature in Light Vehicles. The penetration of navigation systems in Light Vehicles is rising, from just under 70% in 2023 to a forecast level of nearly 88% by 2030.

Because Light Vehicles are by far the highest-volume mobility sector, this growth represents a key example of software-dependent features already present in the most critical of mobility sectors.

Chart 4:

MICHIGAN SDV-RELATED EMPLOYMENT AND FORECAST

SOURCE: S&P GLOBAL MOBILITY



Because Cybersecurity and OTA employment is distributed throughout various other functions, an employment forecast is not reliably possible. Because of the more specific nature of SDV-related functions, it is possible to estimate the related employment, as well as a 2030 forecast. In 2023, there were about 4,800 SDV-related workers in Michigan. Employment is expected to reach 7,500 in 2030, a growth of over 56%.

MOBILITY SOFTWARE WORK ACROSS THE DETROIT REGION

Because of the decentralized nature of software solutions, the work on these technologies is distributed among many companies, educational institutions, and other entities in the Detroit Region. Three prominent examples are summarized below.

MCITY (UNIVERSITY OF MICHIGAN, ANN ARBOR)

Mcity is a purpose-built urban and suburban test environment at the University of Michigan that enables safe, repeatable research and development of connected, automated, and Software-Defined Vehicle (SDV) technologies. The facility includes roads, intersections, traffic signals, and infrastructure that mimic real-world conditions, allowing academic researchers, industry partners, and mobility experts to collaborate on vehicle connectivity, autonomous driving, OTA updates, and cybersecurity. Through its integration with the University of Michigan Transportation Research Institute (UMTRI) and the broader Mobility at Michigan initiative, Mcity supports both experimental testing and applied research to accelerate the deployment and validation of advanced mobility solutions.

IMAGE SOURCE: MCITY

AMERICAN CENTER FOR MOBILITY (ACM)

The American Center for Mobility, located in Ypsilanti Township, is a 500-acre smart mobility test center designed for large-scale validation and demonstration of connected, automated, and autonomous vehicle technologies. ACM provides specialized infrastructure, including test tracks, labs, and simulation environments, enabling OEMs, suppliers, and researchers to develop and test SDV, OTA, connectivity, and advanced safety systems under controlled, real-world conditions.
As a hub for industry-academia collaboration, ACM supports innovation and commercialization of mobility technologies, bridging the gap between experimental research and deployment in public transportation and automotive markets.

IMAGE SOURCE: ANN ARBOR SPARK

UNIVERSITY OF DETROIT MERCY ADVANCED MOBILITY LABORATORY AND VEHICLE CYBERSECURITY INSTITUTE

The University of Detroit Mercy hosts the Advanced Mobility Laboratory (AML), where students and faculty conduct hands-on research in mobile robotics, autonomous ground vehicles, and sensor networks, integrating both hardware and software systems relevant to advanced mobility. Complementing this, UDM leads a regional Vehicle Cybersecurity Institute that focuses on securing connected and Software-Defined Vehicles (SDVs), providing workforce training and research in vehicle cybersecurity, OTA security, and data protection. Together, these efforts position UDM as a key institution in the Detroit Region for developing secure, next-generation mobility solutions and preparing the talent needed to support SDV deployment, connected vehicle systems, and advanced automotive technologies.

CONCLUSION

The three software technology domains addressed in this module (Software-Defined Vehicles (SDV), in-vehicle cybersecurity, and Over-The-Air (OTA)) are critical not just for ensuring that the Detroit Region remains at the cutting edge of mobility innovation. Given their critical role in a wide range of corporate and product functions, their robust presence in the Detroit Region also makes the region more competitive in retaining and attracting companies from all sectors of the economy. The success of the Detroit Region's mobility ecosystem in supporting these efforts therefore provides significant benefits to the residents and companies in the region.