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Shift Ahead: How to Solve the Big Hardware/Software Challenges in Automotive

What OEMs and Tier 1 Suppliers Need to Know to Be Successful

Introduction

The automotive industry is going through big changes. And more change is coming. This white paper covers: what successful teams do to get ahead; 4 big challenges still facing hardware/software teams; and how to solve those challenges and shift ahead of the competition.

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Big Shifts in the Automotive Industry

There are big shifts happening in the automotive industry.

From development and manufacturing to testing and marketing, software drives new innovations. This brings challenges. Hardware teams need to collaborate with software teams. New software tools are needed to visualize prototypes, test, and go to market. Learn what you need to shift ahead of the competition.

ADOPTION OF ELECTRIFIED, AUTONOMOUS, SHARED, CONNECTED, AND YEARLY UPDATED (EASCY) TRENDS

Electrified, autonomous, shared, connected, and yearly updated (EASCY) trends are shifting the future of the automotive industry.

EASCY vehicles will shift from being the luxury of tomorrow to the take-it-for-granted expectations of today. OEMs and Tier 1 suppliers will need to adopt and adapt to keep up.

A 2018 PWC report outlines projections on how EASCY will impact the industry.

Electrified cars will become a global requirement. Drivetrains will need to shift to hybrid-electric, electric, and fuel-cell technologies. Policymakers and capital providers are telling automakers they need to electrify vehicles now. By 2030, 10–15% of cars will be electrified.

The big automakers are already listening to the call.

For example, Ford has announced an $11 billion investment in electrification, with 40 new electrified vehicles planned by 2022.

Automated cars will move from advanced driver-assistance systems to fully autonomous driving as the technology matures. The autonomous market is expected to grow from $54.23 billion in 2019 to $556.67 billion in 2026.

To get there, many companies are investing heavily in autonomous vehicles. This includes OEMs (like Volvo), Tier 1 suppliers (like Continental), and those who supply Tier 1 suppliers (like NVIDIA).

The **shared** economy is diversifying mobility — and changing consumer preferences. The standard model will continue to evolve from outright purchase and lease to rentals and car sharing. Up to 1 in 10 cars sold in 2030 will be shared.

OEMs and Tier 1 suppliers have already been investing in shared mobility. For example, Daimler invested in Car2Go years ago, eventually establishing full ownership in 2018.

Cars are increasingly **connected.** This includes V2X and infotainment, as well as traffic services. New business models and services will increase as cars get connected to each other, to the wider infrastructure, and to people.

Innovations like Android Auto and Apple Car Play are just the beginning. OEMs and Tier 1 suppliers will need to build hardware and software that facilitates connectivity.

Yearly updated will become the norm for cars. Updates will need to happen regularly to incorporate the latest hardware and software developments. And over-the-air (OTA) updates are moving from nice-to-have to necessity.

Tesla already upgrades cars remotely. And Ford and GM plan to, starting with 2020 models.

But what do these trends mean for the teams developing the hardware and software for cars?

SAFETY AND SECURITY VS. SPEED OF DEVELOPMENT

As vehicles become increasingly connected and autonomous, the need to ensure safety and security remains all the more important.

In a 2019 Perforce survey, 40% of automotive professionals cited safety as their top concern. Functional safety standards — such as ISO 26262 — will not go away. And new safety standards — such as SOTIF — will continue to emerge and evolve. Teams will need to go above and beyond these requirements to guarantee safety.

Security was the third greatest concern for automotive professionals in the Perforce survey. With more and more lines of code going into cars, cybersecurity will continue to be important. Every piece of hardware and software in a car will need to be protected from outside attackers. Teams will need to incorporate security best practices to ensure protection.

At the same time as teams battle safety and security concerns, the speed of development needs to accelerate.

To remain competitive, OEMs and Tier 1 suppliers will need to deliver innovative technology at unprecedented speed. This means ramping up development and production. And quality cannot be sacrificed for speed. (Quality was the second biggest concern in the Perforce survey.)

WHO OEMS/TIER 1 SUPPLIERS NEED TO WORK WITH

The shift towards connected and autonomous vehicles also changes who OEMs and Tier 1 suppliers need to work with.

New players will enter the industry. And traditional manufacturers will need to compete on multiple fronts, including mobility (Uber, Lyft, etc.), tech giants (Apple, Google, etc.), and specialty OEMs (Tesla, etc.). And to do so, they will need to work with other companies.

Each component may require someone else to build it. Big data and Kubernetes will need to be leveraged. And there will be a range of programming languages required — C, C++, Python, and Java, for starters.

No matter who is building each piece of hardware and software, everything will need to work together.

What Successful Teams Do to Get Ahead

When it comes to embracing innovation and keeping up with new trends, one thing is clear. Those who want to be successful will need to build the right teams, technology, and partnerships.

Successful OEMs and Tier 1 suppliers will need to:

- Attract developers (and survive competition with tech companies).
- Avoid recalls by reducing defects.
- Increase connectivity.
- Meet the challenge from disruptors, like ride-sharing services.
- Develop autonomous driving systems.

And how will they do it?

One of the secrets to success is building the right partnerships.

LEVERAGE THE RIGHT PARTNERSHIPS

OEMs and Tier 1s will need to partner with other companies to produce the software and systems to power vehicles.

This may even mean a separate company or team for each component, whether it is:

- Chassis and safety (electric power steering (EPS), brakes, and airbags).
- ECU/ECM.
- Powertrain (engine, transmission).
- Driver assistance (BSD, LDW, TPMS, park assist, drowsiness monitoring, ADAS).
- Infotainment systems.
- LiDAR.
- Connected car and V2X.
- Hybrid electric control systems (HEV/EV).
- Instrument clusters/HVAC/lighting.
- Dealer management.
- Diagnostic.
- Manufacturing.
- Supply chain.

Example: NVIDIA Drive, Volvo, and Uber

Over 370 OEMs and tier 1 suppliers (among others) are leveraging partnerships with NVIDIA Drive. Using NVIDIA drive teaches autonomous cars how to see, think, learn, and navigate. For example, Uber is partnering with Volvo and NVIDIA Drive on autonomous vehicles.

Example: Denso and Toyota

OEM Toyota recently deepened their partnership with Tier 1 supplier Denso. This partnership is a joint venture for research and advanced development of next-generation, in-vehicle semiconductors. These semiconductors will play a key role in innovation on connected and autonomous vehicles.

Example: VW and Many Suppliers

The VW Group also recently signed deals with several partners in their strategic supplier network — Future Automotive Supply Tracks (FAST). This partnership has a goal of strengthening electrified car components.

4 Big Challenges That Still Face Hardware/Software Teams

OEMs and Tier 1 suppliers are investing in connected and autonomous vehicle technology and leveraging partnerships for greater success.

But there are still 4 big challenges facing their hardware and software teams:

1. Global collaboration.
2. Component reuse.
3. Secure access.
4. Remote teams.

The volume of assets involved in automotive development is increasing. This includes source code, as well as hardware files, binaries, and design assets.

> Trying to collaborate and reuse these assets is a challenge. Especially between hardware and software teams.

It becomes increasingly difficult because systems are siloed and separated. Multiple repositories and cross-repository dependencies add complexity to a project. And without a single source of truth across facilities and projects, teams need to search for assets.

Securing access to assets adds another hurdle. IPs must be protected from internal and external hackers. And distributed teams spread around the globe need to securely share files faster.

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As a result of these challenges, teams spend too much time looking for assets they've already created, which drains productivity.

How to Shift Ahead of the Competition With Helix Core

The automotive industry is vast. Development is only going to get more complex as teams strive to solve challenges and keep pace with the trends. More change is inevitably coming.

To manage that complexity, development leaders will need to select the right version control system (VCS). And that VCS is Helix Core.

SOLVE THE BIG HARDWARE/ SOFTWARE CHALLENGES

Helix Core solves the big hardware/software challenges.

Global teams use Helix Core to collaborate better.

With Helix Core, it is easier for hardware and software teams to work together on projects.

Speed is of the essence in development. And Helix Core makes it easy to reuse components across teams and achieve that speed. Developers and designers will no longer need to waste time looking for assets. And distributed teams will be able to pull down files at LAN speed, without the WAN wait.

Meeting safety and security requirements is paramount. Helix Core provides the traceability and auditability needed for ISO 26262. It can also secure access at the file level. This ensures that teams have access to the right assets. At the same time, it protects IP.

Helix Core creates a single source of truth for projects.

It simplifies how you access the data you need to satisfy audits by providing unparalleled traceability.

By solving these challenges, teams are better prepared to push for more ADAS technology. They will be ready to meet ever-more-strict safety and security requirements. At the same time, they'll be able to optimize processing power and chip costs.

OEMs and Tier 1 suppliers using Helix Core will be well-positioned to succeed with connected and autonomous technology.

UTILIZE DIGITAL TWINS TECHNOLOGY

The cars of the future are being built with digital twins. From real-time rendering for crash test simulation, training driver assistance systems with synthetic sensor data, and more, auto manufacturers are testing all kinds of prototypes before going through the expense of a build.

Digital twins technology demands a software foundation that is capable of scaling to the massive amounts of data, number of files, and size of files involved. It also requires storing and versioning of assets to view product evolution, as well as compliance with safety and auditing requirements.

It used to be that digital twins were cost-prohibitive to create, with high investment in personnel and complex software. Enter game engines. Capable of running thousands of tests with fewer resources and less software, game engines enable teams to generate photorealistic environments, replicate real-world behavior, and see how changes will impact the final design.

Used by game development companies for years to manage and version their large digital assets — similar to what's required for building digital twins — Helix Core is an enterprise-grade, secure, high-performant system that scales as projects grow to meet the demands of the automotive industry.

MIGRATE FROM CLEARCASE — AND MODERNIZE

Many OEMs and Tier 1 suppliers are still using ClearCase for version control. However, ClearCase lacks the capabilities and support needed to push automotive development forward.

Teams working in ClearCase have huge, monolithic codebases. They like ClearCase for its auditability, as well as its security requirements. And many think ClearCase is the best way to scale.

The problem is that ClearCase is no longer on the cutting edge of technology. And the cutting edge is exactly where automotive development teams need to be.

ClearCase is unsupported, difficult to use, and slow. It lacks the hardware integrations and global capabilities that help support growing teams. With ClearCase, it is impossible to stay competitive in the automotive industry.

Moving from ClearCase to Helix Core helps teams scale even better. Helix Core accelerates development processes from end-to-end, enabling teams to achieve a very fast ROI.

Plus, using Helix Core makes life easier for everyone. ClearCase repositories can be moved over and modernized — and development teams won't miss a beat.

AVOID GIT FOR HARDWARE TEAMS

Some teams believe moving from ClearCase to Git is the best way to modernize. But Git is not sufficient for automotive development.

Git is unable to scale to the complexity required. It will be difficult to reuse components. Git also lacks built-in security. This promotes developer carelessness and leaves codebases exposed to security threats that are incompatible with automotive industry standards.

Teams attempting to use Git in automotive will need to add security on top and maintain constant vigilance. Hardware teams especially should avoid Git, as it will not be able to handle their large design files (as well as the quantity of files).

Using Helix Core is a superior choice.

Helix Core can scale better than Git. It can handle all file types — from source code to large binary files to design assets. It can even support millions of transactions per day. And if there are teams working on components in Git, Helix4Git can be added to safely bring that code into the build pipeline (alongside assets from Helix Core).

SHIFT AHEAD WITH HELIX CORE

OEMs and Tier 1 suppliers cannot settle for the status quo. And using ClearCase or Git will not help them get ahead of the competition.

Helix Core can help OEMs and Tier 1 suppliers shift ahead, even as the automotive industry continues to change.

Take Helix Core for a test drive today for free (for up to 5 users).

perforce.com/products/helix-core/free-version-control