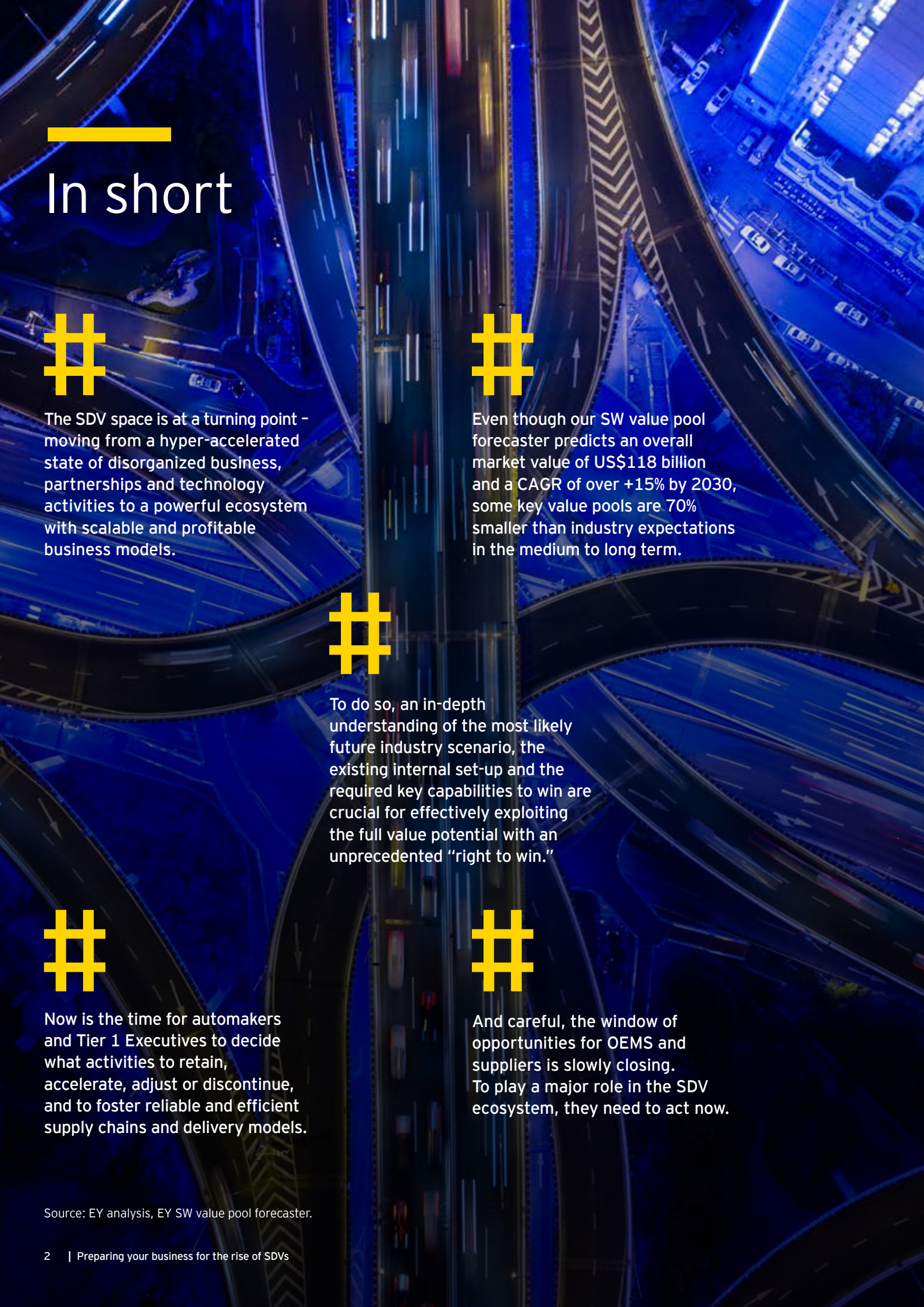
Preparing your business for the rise of SDVs

How to take the right path in a hyper-accelerated ecosystem

The better the question.
The better the answer.
The better the world works.

EY

Shape the future with confidence



In short

The SDV space is at a turning point – moving from a hyper-accelerated state of disorganized business, partnerships and technology activities to a powerful ecosystem with scalable and profitable business models.

Even though our SW value pool forecaster predicts an overall market value of US$118 billion and a CAGR of over +15% by 2030, some key value pools are 70% smaller than industry expectations in the medium to long term.

To do so, an in-depth understanding of the most likely future industry scenario, the existing internal set-up and the required key capabilities to win are crucial for effectively exploiting the full value potential with an unprecedented "right to win."

Now is the time for automakers and Tier 1 Executives to decide what activities to retain, accelerate, adjust or discontinue, and to foster reliable and efficient supply chains and delivery models.

And careful, the window of opportunities for OEMS and suppliers is slowly closing. To play a major role in the SDV ecosystem, they need to act now.

Source: EY analysis, EY SW value pool forecaster.

In this e-book, you'll find ...

Five stumbling blocks in today's turbulences

1

- Zigzag course between open source and proprietary software hinders scalability
- Battles for sweet spots emerge at every SDV tech layer
- Reported failed SDV projects promote the SW "losers" narrative for OEMs and suppliers
- Unclear strategic targets spread resources too thinly

Hypotheses: what the storming to performing transition will look like

2

- SW value pools' grow solidly. Yet some stay 70% below industry projections
- Strong software capabilities boost investor attractiveness and access to capital
- OEMs reduce their partnership pipeline to those that enable clear use cases
- Getting the size and intensity of the SDV transformation program right

Key execution enablers for industry incumbents to move into the performance phase

3

- Step one: Know your SDV value pools and capability gaps
- Step two: Prepare your people, organization, technology and capital for the transformation
- Step 3: Continuously monitor and adjust your transformation progress

Key takeaways

4

The SDV ecosystem is standing at a crossroads

It doesn't have to be a trade-off between doing the right thing and making a profit.

The vision of a smartphone on wheels now stretches back more than a decade, promising new digital business models for OEMs, a clear roadmap for the introduction of level 4/5 autonomous driving, reduced development costs and complexity, and a vastly enhanced user experience for consumers.

Despite the rapid technological activity in automotive software, much of the initial hype and excitement has yet to translate into tangible business value. This is strongly reflected in today's automotive customer satisfaction, especially in digital native markets such as China, where incumbent automakers are failing to deliver on the expected digital car capabilities, leading to rapidly declining vehicles sales.

The crossroad that determines whether software becomes a real business opportunity for automakers and suppliers has now been reached. There are two realistic directions: Either incumbent automakers and suppliers will play a critical role in the software-defined ecosystem and contribute truly differentiating hardware-software bundles, or they will fail to find product-market fit, become part of the background noise and be pushed out by strong tech players.

To get on the right track, it is imperative that automakers understand where the industry is heading and prepare their organizations for a successful transition to a high-performance software business

This involves three steps:

1

First, automakers and suppliers need to make a laser-sharp distinction between what is buzz from today's turbulent market activity around technology, standardization, partnerships and value pools, and what is truly business impactful.

2

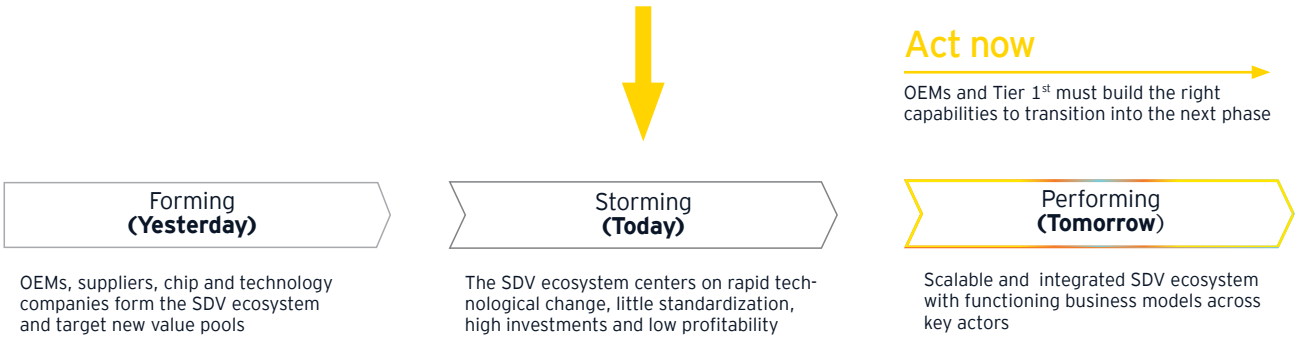
Second, automotive executives must clearly assess what the transition from today's storming phase to the performing phase will look like, i.e., dealing with slower than widely expected realization of software value pools and factoring this into mid-term strategy, but also steering partnerships and transformation programs more on return on investment.

3

Third, and most importantly, established automotive leaders need to act now to start turning the right corner: That means reassessing existing software bets, if they are still valid, and having a clear roadmap for monetization; preparing the people, technology and organization to execute on the software investments; and having a monitoring and governance framework in place to keep the hardware-software transformation manageable in the long run.

The latter is especially important because investment dry powder is finite for OEMs and suppliers alike, especially as many legacy products come under increasing pressure (e.g., due to the shift from ICE to EV), significantly reducing internal funding power.

Figure 1:
The evolving SDV ecosystem
(Source: EY analysis EY SW value pool forecaster.)



5 stumbling blocks in today's turbulences

#1

Due to today's hyper-accelerated SDV ecosystem, it can be difficult for executives to distinguish between background noise and true business opportunities. This makes it difficult to identify success factors, prioritize investments and stick to long-term transformation agendas. Ongoing SDV transformations are therefore jeopardized by short-term side battles, resulting in a state where business models and organizations never reach a stable and productive state, but are always in flux.

Zigzag course between open source and proprietary software hinders scalability

The common tenor among automotive players is clear: Open Source is the key to meet new requirements that exponentially increase software complexity in vehicles. However, this leads to different and sometimes conflicting strategic imperatives that hinder innovation and scalability in automotive software. Technology vendors are strong advocates of OSS and support the standardization of the tech stack as they have done in the mobile ecosystem to scale their infrastructure.

After some initial hesitation by suppliers, the situation is now clear: to deliver software for SDV, there must be strong support for standardized open-source platforms across vehicle models, product lines, brands, and organizations, otherwise custom engineering efforts are jeopardizing any effective scaling. In contrast, automakers regularly switch between supporting open-source and proprietary approaches in search of the right balance. Especially as the understanding of software complexity, what is truly differentiating and what could become commoditized grows, many automakers are turning to open-source solutions to increase development speed and quality.

Battles for sweet spots emerge at every SDV tech layer

One thing is clear: the revenue potential of SDV ecosystems is huge (EY SW value pool forecaster predicts a market size of US$118b in 2030), as is the competition to exploit it. Fighting the wrong battles creates additional noise in the marketplace and incurs immense sunken costs.

a. AD enabling sensors: first, lidar, radar and cameras are a major battlefield for incumbent suppliers, and AD vendors and chipmakers leaving their footprints.

b. AD processes SOCs: Second, a major battle is being fought over high-performance systems on chips designed specifically for compute-intensive use cases (e.g., AD), with chipmakers dominating this space.

c. AD SW: Third, the AI models and supporting software that drive AD use cases are being developed by multiple vendors, starting with the OEMs themselves, technology players, Tier 1s and AD companies.

d. Software control in car: Car.os and underlying middleware, i.e., a SW base into which AD and other stacks can be dynamically embedded, ensuring security and updateability under all circumstances.

e. User interface control: OEMs are seeking control of the user interface to participate in the digital revenues enabled by in-car infotainment platforms, while technology players are seeking to provide access to their pre-existing ecosystem.

Reported failed SDV project promote the SW "losers" narrative for OEMs and suppliers

Looking at the software initiatives of incumbent OEMs, it is noticeable that they are perceived negatively due to their well-publicized struggled to deliver working software on time and quality. While all of the reports continue to hype the ecosystem and influence OEM executive sentiment, the nature of the failures vary widely:

- Massive SW rollout delays: Underestimated SW complexity, nontransparent interdependencies, and immature software platforms force the automaker to postpone the SOP of key models.
- Shutdowns of future bets: Especially in the D space, OEMs revisit their startups and scale up investment due to the long time to market and unclear exit options for investors.
- Large scale recalls: Due to the combination of immature software and lack of over-the-air update capability, automakers are forced to issue massive recalls to fix bugs.
- Downsizing of solo effort projects: Particularly in the car.os and infotainment space, many OEM solo efforts are being scaled back or transitioned into strategic partnerships to better respond to complexity and customer requirements.

Unclear strategic targets spread resources too thinly

Due to strong fear of missing out, automakers and suppliers have expanded far beyond their core competencies to explore new opportunities along the technology chain. This is also reflected in the distribution of players along the tech stack.

Particularly in the autonomous driving space, there is a broad distribution of active players far outside the domain of expertise, leveraging their specific software/hardware expertise.

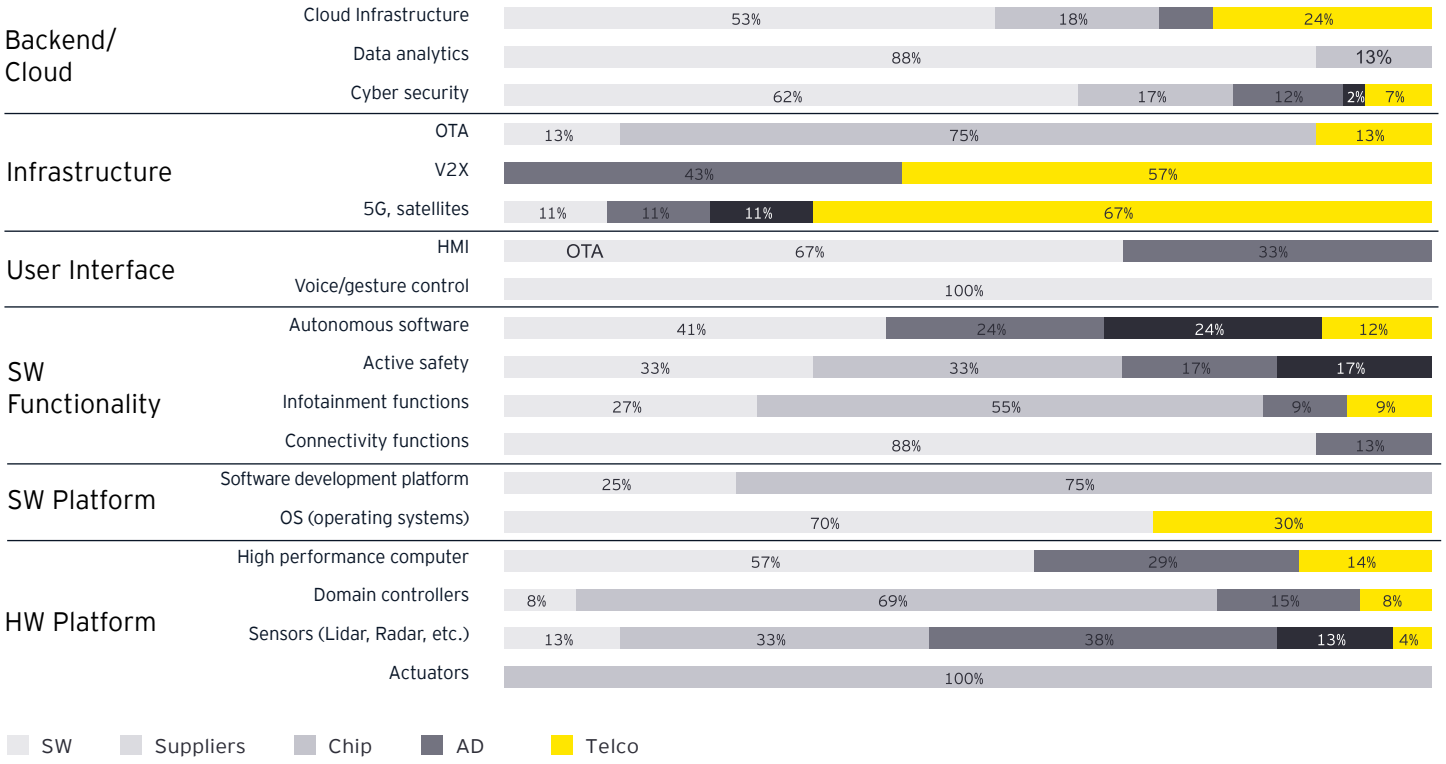


Figure 2:
Player type composition per layer
(Source: EY analysis EY SW value pool forecaster.)

The same is true in the cloud and backend space, where software players are active, but also a significant share of suppliers, telcos and chip manufacturers are building services. Amidst the opportunities, the reality is that the odds of winning any of the games can be low, given the set of capabilities, market access, talent base, and most importantly, the willingness to fund innovation. That's why many automakers and suppliers are currently scaling back their experimental bets and specializing rather than spreading resources too thinly.

Many partnerships are formed to onboard SW capabilities, but many fail

Partnerships across the SDV stack are key to delivering the software and hardware capabilities required. However, the latest EY analysis of the top 10 OEMs and suppliers in terms of revenue shows that more than 450 partnerships have been initiated by OEMs and more than 180 by suppliers focused on the SDV space over the past 10 years. Both OEMs and suppliers have partnered extensively on software functions such as ADAS, safety, connectivity and infotainment.

It is also clear that many of the partnerships contain elements of coopetition, meaning that the players involved collaborate on the development of the software, but are competitors in a narrower sense. This is particularly evident in autonomous driving. Fewer partnerships are formed regarding the user interface, indicating the strategic importance of OEMs in securing the channel to the user. However, OEMs need to build their own capabilities in this area, making the partnership strategy one of the most important pillars for SDV success.

5 hypotheses: What the storming to performing transition will look like

#2

The path forward for both the technology and the business model for the SDV ecosystem is still emerging. But based on extensive research and professional insights, EY teams have developed five hypotheses about how tomorrow's transition to the performance state will look like:

1. SW value pool growth is below projections

2. Investor attractiveness through SW capabilities

3. Reduced partnership pipeline

4. OEMs must reinvent themselves

5. Right-sized SDV transformation programs

SW value pool growth is below projections

Overall, the SW value pool is expected to grow to $118 billion with a strong growth rate of 15% CAGR. However, much of the expected market potential for the SDV sector will be realized more slowly and is expected to be smaller than originally anticipated. EY teams newly conducted value pool forecaster has revealed intriguing insights, indicating that the market sizes for AD/ADAS functionalities are predicted to be 72% smaller for 2030 compared with earlier research. This divergence in forecasts can be attributed to the previous underestimation of the technological complexity involved in the transition from hardware to software domination.

In addition, the impact of varying regulations in different countries poses significant challenges to the one-size-fits-all deployment of AD/ADAS technologies, slowing global scaling. Car operating systems and underlying middleware are expected to drive a higher level of standardization, leading to incremental innovation, but much of the core technology is expected to be open sourced to drive scalability. Subsequently, prices are expected to gradually decline through 2030, resulting in a 57% reduction in the value pool compared with today's industry assumptions.

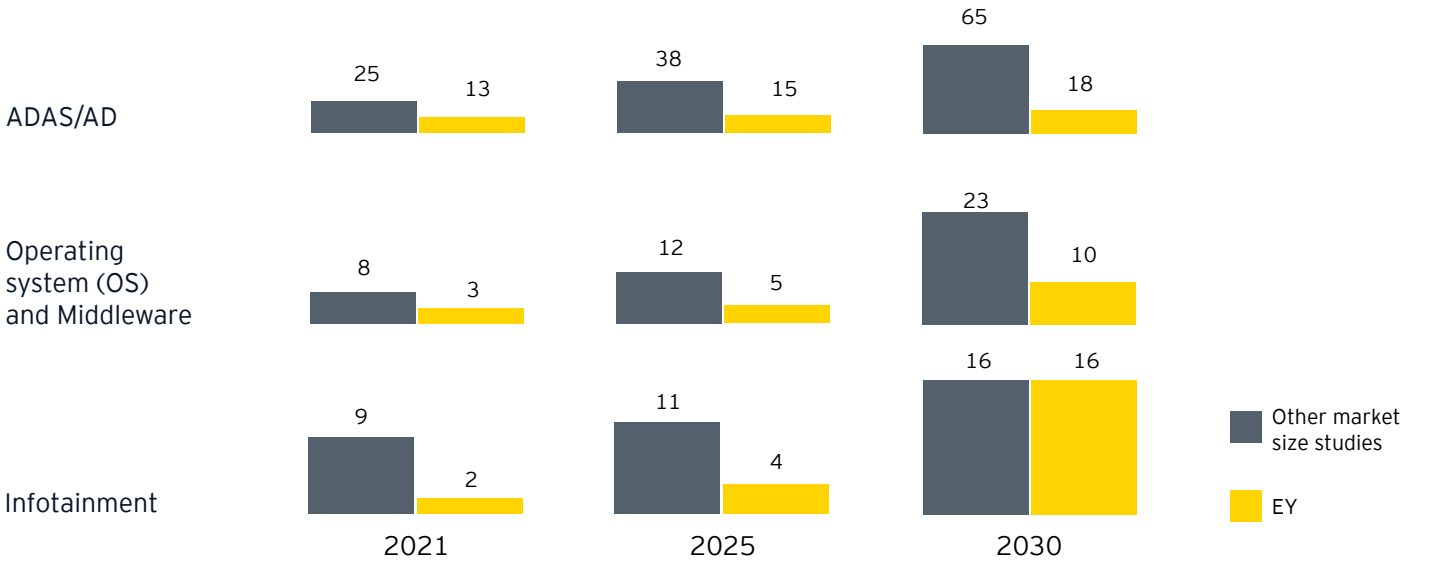
The same is true for digital infotainment functions. Here many digital services (games, entertainment, news, office) are already monetized via existing app store solutions or run in complete standalone pricing models, presenting automakers with the ultimate challenge to create a profitable application ecosystem around the car. Nurturing this car-centric ecosystem takes time, resulting in 64% smaller value pools in 2025, while returning to industry expectations in 2030.

> It is clear that important projected revenue streams, such as autonomous driving, are emerging more slowly than commonly predicted, forcing the industry to revise their assumptions.
>
> Jan Sieper, Partner Automotive Strategy

For automotive companies, this means factoring in potential slower realization of key value pools and an increased pressure on players and investments already made.

Portfolios and underlying technology trajectories require revaluation, calibration, and potential thinning of products and offerings under pressure.

Figure 3:
Comparison of key SDV value pools, 2021-30 ($b)
(Source: EY analysis EY SW value pool forecaster.)

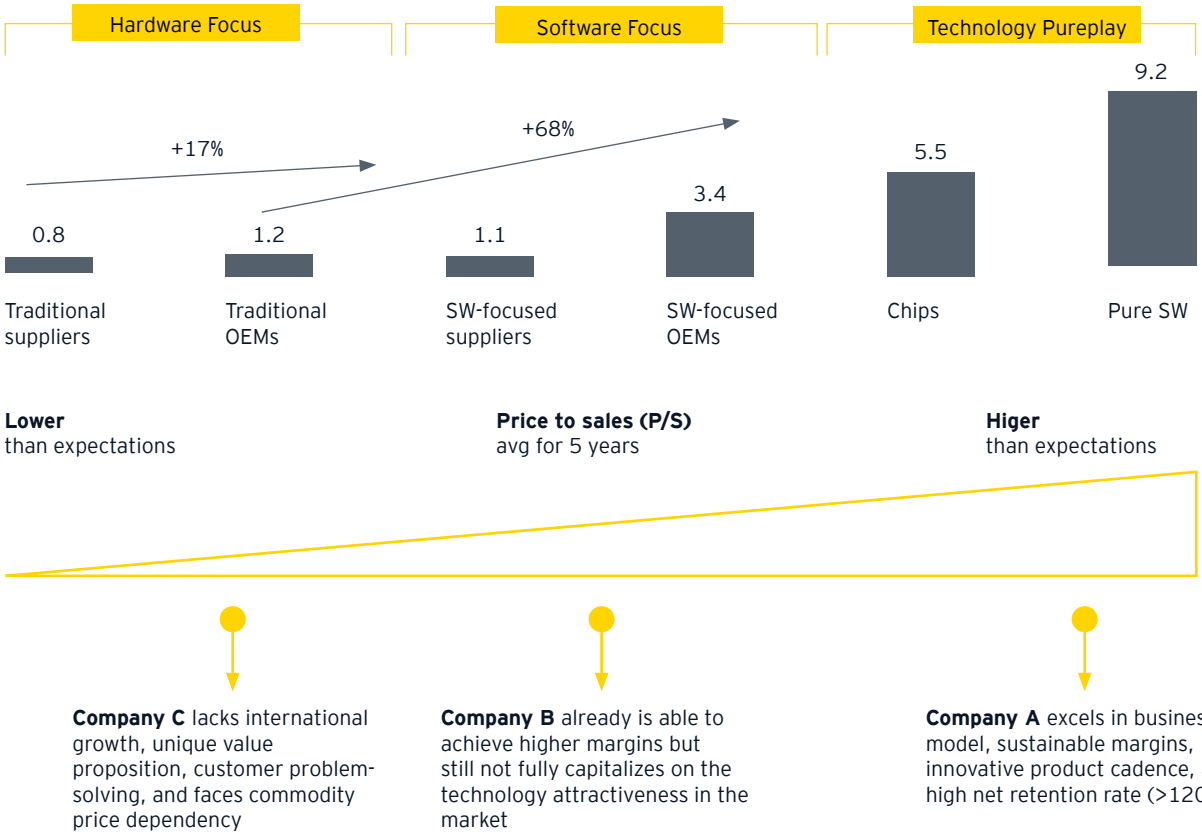


Strong software capabilities boost investor attractiveness and access to capital

The investor perception of software-heavy car companies with tech-like trajectories is much higher compared with hardware focused competitors, allowing automakers easier access to capital to finance the SDV transformation program. The ability to fund innovation through increased market capitalization is critical for established automakers and suppliers in times of declining internal combustion engine business. An initial EY analysis shows that a US$3 billion to US$5 billion investment on average is required for OEMs and suppliers to successfully execute on SDV transformation programs. The positive image of software-heavy companies shows the importance for automakers and suppliers to emphasize the need for a multifaceted demonstration of their performance and SW capabilities toward investors combined with comprehensive business narratives and a structured software roadmap. Astute OEMs who successfully establish and communicate a software-focused branding approach to their investors are reaping significant rewards, as they are valued an impressive 68% higher when compared with traditional automakers with a hardware-centric appeal. This enhanced valuation empowers them with greater access to capital. Embracing a software-driven strategy not only bolsters market positioning but also positions companies at the forefront of the automotive industry's evolution, where innovation and adaptability are key drivers of success.

> Software will play a key role in investors' perceptions and strongly influence future funding.
>
> Jan Sieper, Partner Automotive Strategy

Figure 4:
Benchmark of selected industry multiples
(Source: EY analysis EY SW value pool forecaster.)



OEMs reduce their partnership pipeline to those that enable use cases with clear revenue and profit roadmap

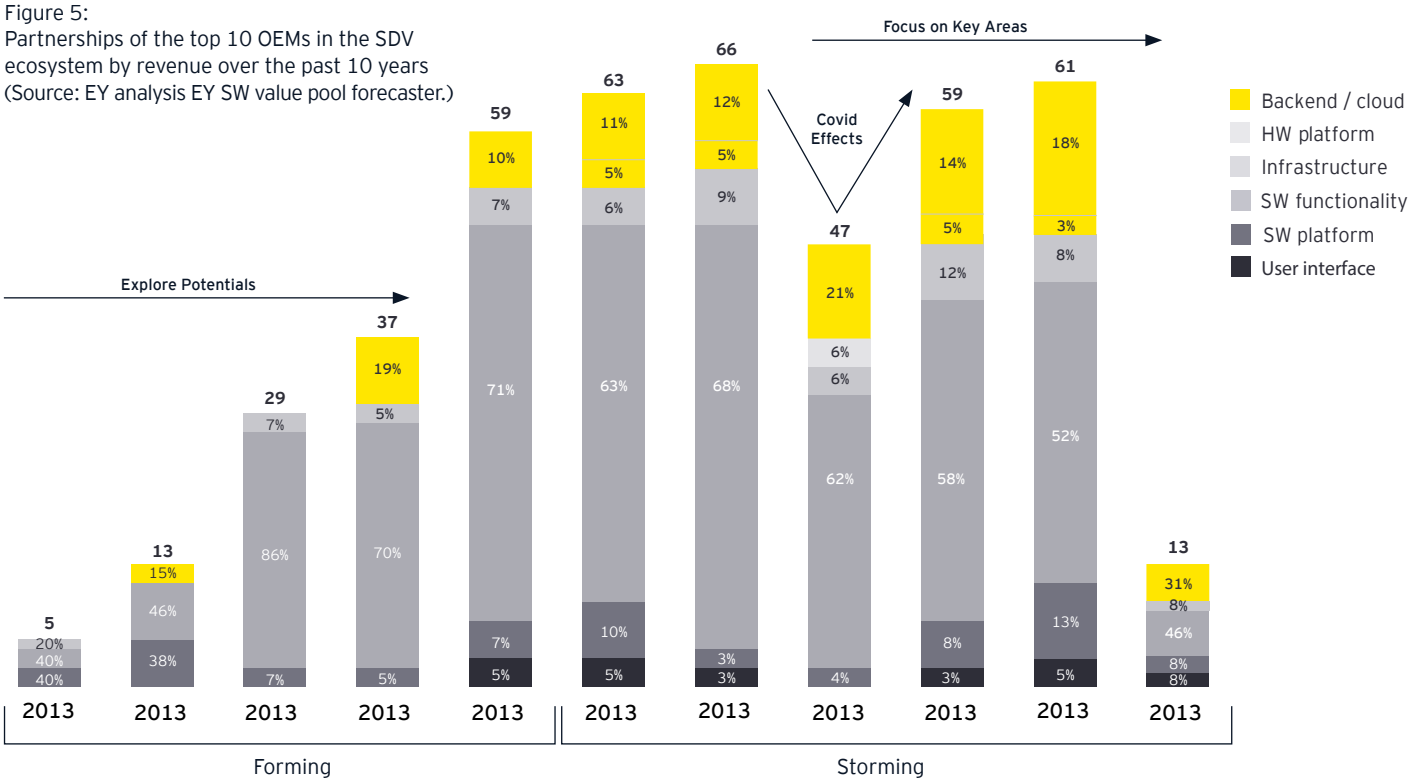
As technology stacks mature, core technology providers and platforms will consolidate, driving the commoditization of the ecosystem and forcing alternative solutions out of the market. As a result, the nature and sheer volume of partnerships will change: This means an expected overall 62% reduction in partnerships and a collaboration approach aimed at scaling and leveraging existing capabilities, rather than codeveloping new solutions. This trend is further driven by changing supply chain structures, where suppliers or supplier/technology combinations act as white label software and integration providers for automakers, thus reducing the pure number of partnerships under management for car makers.

However, to strategically drive this process automakers need to implement a rigorous collaboration approach that is aligned with growth, cost and complexity targets. This will help prioritize partnerships with clear scaling and revenue roadmaps. The development of the partnership landscape is set to bring about significant changes in the distribution of roles within supply chain structures, as well as in the capabilities and processes involved. This transformation will drive a heightened emphasis on effective collaboration among industry players to ensure the delivery of high-quality and seamless software solutions.

> The time for experimenting with partners is over; we expect to see fewer partnerships in the future and a much greater focus on scale and growth.

Constantin M. Gall, Managing Partner and Automotive Practice Leader Europe West

Figure 5:
Partnerships of the top 10 OEMs in the SDV ecosystem by revenue over the past 10 years (Source: EY analysis EY SW value pool forecaster.)



Automakers must reinvent themselves as integration powerhouses of the software world

The automakers that can build large-scale integration capability in the software world are best prepared to compete in the SDV battle. Owning integration capabilities and strategically driving them as a core competitive advantage reduces costs and time to market. To integrate effectively, OEMs need to have a laser-focused set of requirements about what technology they need and what type of "supplier" they want. This can be open-source communities, exclusive partnerships, classic project-based development from a traditional supplier or large-scale consortia. The range and nature are immense and so is the burden of making them work as a cohesive whole for OEMs. A clear understanding of the pros and cons of each option in terms of quality, speed, adaptability, and accountability helps avoid common pitfalls. Mastering integration means automakers must find scalable ways to manage and govern their partner networks.

Getting the size and intensity of the SDV transformation program right enables automakers to win long-term

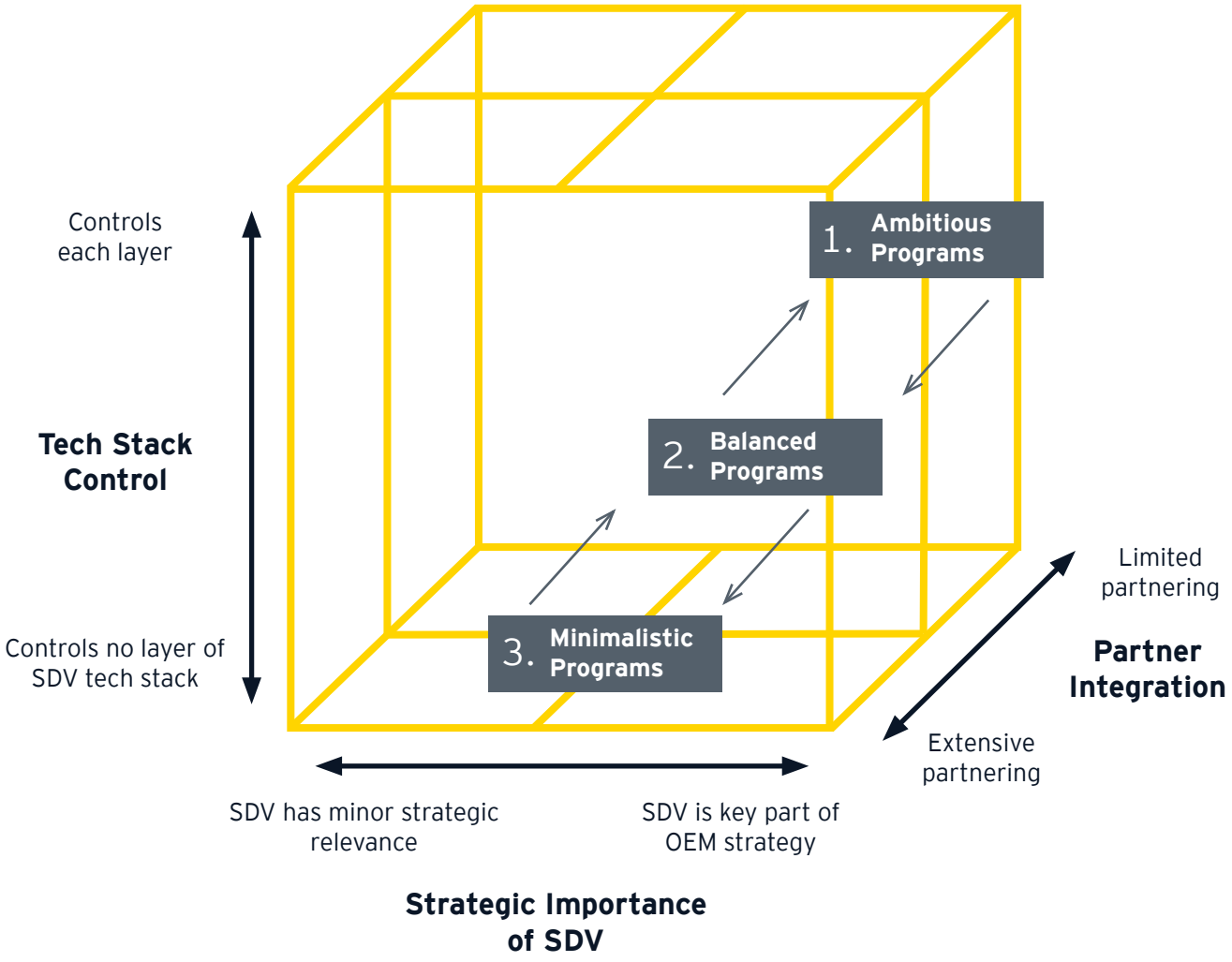
To right-size the SDV program will be key for OEMs to successfully navigate the transformation toward software. This requires having a clear picture to what extent software is part of the overall strategy, the desired control over tech stacks, and how this translates into an inclination to form partnerships. These factors must be coherently integrated into organizational design, talent management, and investments.

Ambitious programs with large parts of the value stack are developed in-house, high headcounts are required, typical investments >$4b. Balanced programs with selective layers of the tech stack are developed in-house, commodity is done in cooperation with suppliers or OSS, typical investment >$1b.

Minimalistic programs with little strategic ambitions in SDV context, integration of full stack white label platforms from 3rd parties' likely minimal investment required <$1b.

None of the above is a silver bullet and the intensity of the program must be aligned with the strategic software ambitions of the automaker, e.g., niche sports car manufacturers may join software platforms much later than mass market volume manufacturers because their customers value the car itself much more than the software ecosystem. Once started, however, the key imperative for automakers is to prepare for the full journey of transformation, otherwise the program will stall halfway through or lose momentum at critical junctures.

Figure 6: SDV program archetypes according to three dimensions
(Source: EY analysis EY SW value pool forecaster.)



Key execution enablers for industry incumbents to move into the performance phase

#3

Carmakers and suppliers do not suffer from a lack of "awareness" but instead a lack of rigorous implementation, monitoring and governance of their SDV transformation program. As a result, key stakeholders and external observers are left with the perception that there is no clear transformation agenda. The prioritization of three major steps will help to assess status quo and increase predictably to enter the performance phase.

Three Steps
to getting your organization ready for the performing phase

Figure 7:
Our three step approach to reach the performing phase
(Source: EY analysis EY SW value pool forecaster.)

Step 1: Know your SDV value pools and capability gaps

The "softwareization" of the car is creating tremendous opportunities for established automakers and suppliers along the entire technology stack. EY forecasts global automotive software value pools to grow at a CAGR of +15% (2021–30). Unlocking this new market potential means reconciling significant financial risk with the ability to capitalize on it. To understand how the SDV market with respective value pockets and its attractiveness will evolve in the future, EY teams has developed a broad quantitative model for relevant vehicle software and data value pools. Our market model contains more than 40 bottom-up calculated SDV use cases along the vehicle tech stack and enables business leaders identifying future strategic fields of play and backing investment decisions.

Our different value pool scenarios – prepare for the worst, work for the best

The automotive software space is unique in its interdependencies between base technologies (e.g., OTA), standardization of interfaces, evolving regulations, and the ability to hit the right price point at the right time, forcing players to have a laser-focused understanding of how their key use cases will play out in the best-case and worst-case scenarios.

Base scenario: This scenario reflects EY insights and professional views on technological development, legislation and customer willingness to pay, and serves as the basis for the bullish and bearish scenarios.

Bullish scenario: This scenario is based on a more optimistic view of connected car penetration, resulting in an average connectivity rate of 61% (13% higher than in the baseline) in the installed vehicle base in 2030.

One use case that particularly benefits from higher connectivity rates is in-car payment platforms, which ensure the monetization of digital services offered to the driver via infotainment systems.

Bearish scenario: The market is more pessimistic due to greater market volatility and more conflicting regulatory interventions that are slowing the pace of development of digital solutions (e.g., the number of connected cars remains lower than expected at 39% in 2030).

Understand emerging software value pools along the SDV tech stack

One use case that particularly benefits from higher connectivity rates is in-car payment platforms, which ensure the monetization of digital services offered to the driver via infotainment systems. Bearish Scenario: The market is more pessimistic due to greater market volatility and more conflicting regulatory interventions that are slowing the pace of development of digital solutions (e.g., the number of connected cars remains lower than expected at 39% in 2030).

Content apps:

Content applications are enabled by the underlying stack to create added value and revenues. They display insightful in-car content to the consumer and are no/less dependent on external factors (e.g.,in-car office, smart navigation, in-car advertisement, etc.).

Digital services:

Digital services are enabled by the underlying stack to create added value and revenues. They are not limited to in-car services but rather have a dependency on external factors and are connected to external "objects" to make the life easier for the consumer (e.g., fleet management, smart home integration, etc.).

Function and features:

This describes SW integrated into the vehicle to enable specific features. Customers pay a one-time/annual fee to unlock the required software to enable these features.

Service platforms:

Service platforms bring together supply and demand and facilitate transactions (e.g., maintenance routing platform, in-car payment platform, etc.).

Base & support:

Infrastructure, tools and software platforms to enable higher level SDV services.

Solution-purpose – look beyond the purpose of SDV use cases

The ultimate driving force behind any successful product or offering is the end-consumer and their unique needs. Organizations that truly grasp what challenges to address and how to provide support are more likely to emerge as leaders in the market. Understanding consumers and their underlying motivations for making purchases is essential. Services aimed at enhancing efficiency are poised to become a critical priority in the future market. The increasing demand for extended vehicle range and a growing emphasis on sustainability are significant factors driving the relevance of efficiency-oriented solutions. Recognizing this trend presents an opportunity for businesses to cater precisely to these emerging needs.

Efficiency:

Enhancing vehicle value and saving costs through services like battery optimization or over-theair updates.

Convenience:

Providing added value in terms of comfort and convenience, such as concierge services and in-car entertainment.

Safety & security:

Ensuring driver and passenger safety with critical services like. Autonomous Driving (AD) & Advanced Driver Assistance Systems (ADAS).

Business enablement:

Enhancing business potential for third parties by enabling in-car advertisements, granting access to customers, and fostering partnerships with OEMs and service providers.

Service enablement:

Establishing the foundation for customer-facing applications, functions, and digital services through vehicle operating systems, toolchains, and middleware, enabling seamless experiences.

Plan for future-proof SDV architectures

The future of automotive software will witness a shift from onboard to offboard centricity, as a portion of the computing power required for executing and processing data workloads moves to the cloud. This transformative development will reshape current automotive software architecture, necessitating a deeper understanding of the cloud ecosystem and secure data transfer. Preparing businesses for this change will enable them to generate the expertise needed to thrive in this evolving landscape. Certain features, like navigation systems, already demonstrate the ability to function effectively via the cloud as they can tolerate relatively high latency. Additionally, emerging use cases like smart charging are already leveraging cloud-based solutions for data processing and storage.

However, there are challenges in this transition, particularly concerning cybersecurity. Moving software to the cloud can raise concerns about vehicle vulnerability to hackers and black-hat intruders. For safety-related functions and features in need of real-time data exchange, such as autonomous driving, engine and brake regulation features, as well as data-sensitive services like voice recognition and diagnostic modules, the journey to full migration to the offboard environment may still be long.

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> Software will pla The car’s computing platform must last at least 10 years and support software innovation for that period, knowing what is in the car and what is not is key for a future proof architecture. y a key role in investors’ perceptions and strongly influence future funding.
>
> Jan Sieper, Partner Automotive Strategy

Identify capability gaps to better prepare your organization

Certain features, like navigation systems, already demonstrate the ability to function effectively via the cloud as they can tolerate relatively high latency. Additionally, emerging use cases like smart charging are already leveraging cloud-based solutions for data processing and storage.

A sample set of guiding questions for assessing market, organizational, and technology readiness:

Market:

- What is the go-to-market and delivery model for the use case?
- Is there a competitive advantage over existing competitors in the space?
- Is there a clear and scalable monetization roadmap?

Organization:

- Does the organizational and target operating model fit the targeted go-to-market and delivery model?
- Is the talent profile aligned with the target operating model?
- Is the capital available for (even short-term) investment needs sufficient to ensure the transformation’s impact?

Technology:

- Is there an HW/SW platform strategy? If so, how do new use cases align with it?
- Is there a roadmap in place to drive overall development time, cost and quality, to enable the technical backbone & underlying processes to deliver faster?
- How do you mix and match open-source and other types of code into a working solution?

Step 2: Prepare your people, organization, technology and capital for the transformation

In preparing for the upcoming transformation toward SDV, it's not only essential to recognize the potential opportunities and capabilities but also to ensure that people, organizations, technology, and capital are well prepared. Among incumbent suppliers and automakers there are common challenges for effectively commercializing SDV use cases. Despite optimistic forecasts, setting up a working business model is an ever-present challenge in the SDV space. There are two reasons for this: on the one hand, selling software products or interconnected hardware-software bundles is a completely new type of business for automakers and suppliers, with many more options to design and deploy business cases. On the other hand, the ecosystem itself is evolving rapidly, including standards, key players, and the technology itself, thus business models are also evolving. Given this, building a working business model requires an iterative exploration process rather than a simple fill-in-the-blank exercise on a business model canvas. Suppliers and OEMs that quickly gain confidence and certainty about the right business model are positioned best to thrive in the realm of profitable software business. To accelerate this process, a set of guiding imperatives specifically designed to accelerate the discovery of viable business models in the software-defined vehicle space can support a successful transformation.

> "Functioning business models in the SDV space do not just fall from the sky, but need to be developed in a systematic way, following the lessons learned with customers
>
> Jan Sieper, Partner Automotive Strategy

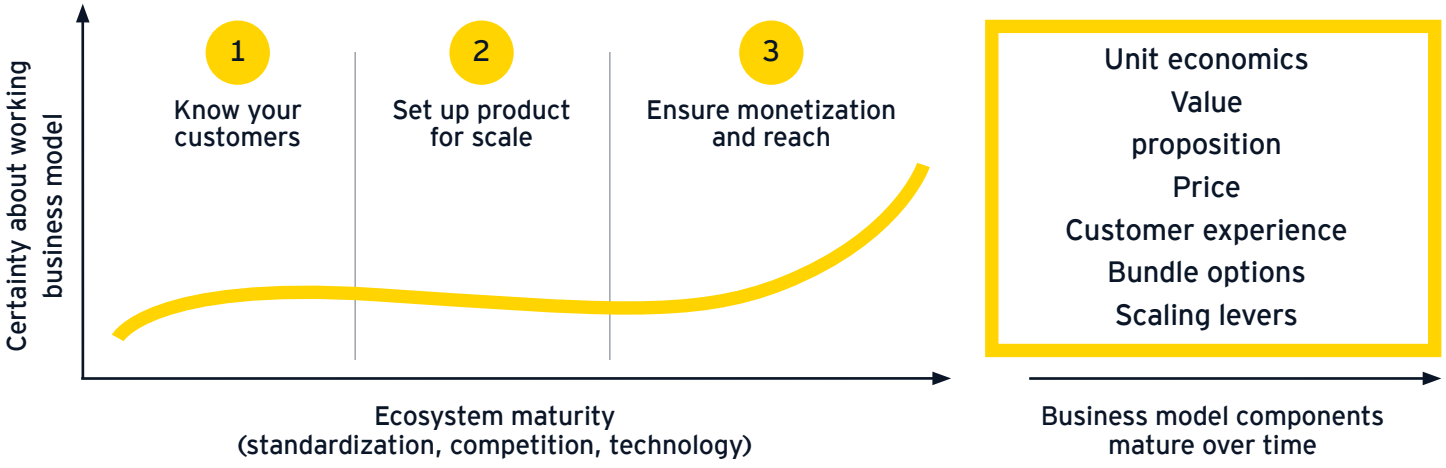

Figure 8: Business model maturity
(Source: EY analysis EY SW value pool forecaster.)

Know your customer and their problems

1

#

Develop a deep understanding of your customers and their pain points, and actively pursue the identification of your first key (pilot) customer.

#

Be aware about potentially required additional services due to increased complexity, e.g., consulting services, to unlock your full potential.

#

Establish an initial pricing and distribution model which will be further refined and nurtured throughout the development of your business model.

#

Work toward a concrete prototype that is tailored to the specific needs of your customers and demonstrates a personalization of your offering.

Set up product for scale

2

#

Acquire abstract knowledge about your general solution and conduct thorough testing across a diverse set of clients. This process enables you to gain valuable experience and insights, which in turn empowers you to scale your product offering effectively.

#

Engage in experimentation with innovative pricing models, pricing points, and product bundles to leverage the diverse range of cutting-edge SDV offerings.

#

Establish strategic partnerships to enhance reach and integration capabilities, unlocking the untapped potential of providing offerings that span the entire vehicle lifecycle.

Ensure monetization and reach

3

#

Drive unit economics to ensure the long-term success of the SDV business model. By focusing on optimizing the economics of each unit of your offering, you can create a sustainable and profitable business model.

#

Ensure and maintain high-quality standards throughout the customer journey, even as user numbers continue to rise.

#

Engage in up-selling strategies to deepen customer engagement and shift away from offering one-time products.

Ensure investor attractiveness

A well-developed investor case that aligns with the company's SDV vision and strategy increases the likelihood of securing the necessary capital to execute the SDV roadmap. Certainly, investor attractiveness is not a single activity, rather a development that needs to be planned and executed incrementally.

Put software at the center of your strategy development: Companies must place software at the center of their strategy development and provide a clear and compelling narrative outlining their future position in the SDV ecosystem including the actions and corresponding investments to achieve it.

Demonstrate SDV business scalability: Demonstrating a scalable business based on clear metrics is the silver bullet for unlocking tech-like growth rates and access to capital. The metric for this is almost always revenue growth over time, with profit expectations following closely behind.

Demonstrate superior software product offerings: Demonstrating to investors specific prototypes, early-stage products, or even large-scale systems that clearly align with the SDV strategy and demonstrate how to differentiate from the competition is another efficient factor to increase capital access.

Communicate potential SDV risks and mitigation strategies at all stages: SDV operations carry inherent risks such as regulatory challenges, safety concerns, cybersecurity threats, and legal liabilities. Investors want to see that the company has a solid plan in place to mitigate and effectively man- age these risks.

Implement tech reporting: Once suppliers and automakers have cultivated their key technologies in the SDV space, they need to begin rigorously tracking of key metrics, not only for internal portfolio management, but also to make them part of their investor communications.

Know who the partner with and exit dead-end partnerships

Partnerships serve as a cornerstone for propelling the growth for players in the SDV space. Similarly, the concept of coopetition, wherein automotive companies collaborate with selected SDV competitors while still engaging in competitive aspects, holds the promise of mutual gains. To ensure success, several key success factors should be considered and implemented when entering a cooperation.

Corporate vision and mission: A clear and shared SDV vision drives effective partnership collaboration and goal alignment.

Common vision: Establishing a shared SDV vision through open discussions and aligning expectations sets a solid foundation for collaborative partnerships, enabling both parties to work toward a common goal.

Partner-fit organization: Showcasing SDV capabilities, expertise, and shared values enhances partnership attractiveness, fostering compatibility and collaboration.

Joined partnership design: Designing a robust collaboration framework with defined roles, responsibilities, governance structures, performance indicators, and milestones is crucial for effective partnership management, ensuring alignment, communication, and decision-making throughout the partnership.

Partner selection: An extensive partner selection process, encompassing software synergy possibilities, is crucial for successful SDV partnerships, emphasizing complementary skills, technologies, and market access.

Establish a robust target operating model

Creating a robust target operating model (TOM) that seamlessly aligns with an organization's dual focus on hardware and software is a delicate art. Well-established hardware-focused governance processes must be skilfully refined to seamlessly integrate often shorter-cycle software processes. Integrating the different delivery speeds and requirements of the hardware platform (updated every +10 years) and software (updated in real time) requires a strong integrated TOM for the two domains, otherwise efforts are not synchronized, and product bundle incompatibilities occur at scale. Companies with high levels of software/ hardware integration and complexity will benefit from operational speed and efficiency as they optimize their operating model.

Follow a clear data strategy

Data plays a crucial role in a majority stake of automotive software and technology, acting as strong enabler and providing high-value consumer and product insights. To fully harness potentials, it is essential to have a clear management of data and dependencies in place, to harmonize processes as well as implementing user centric and modular architectures.

1

Limit dependencies to external stakeholders:

To ensure long-term flexibility, in-house data ownership is a preferred structure. However, this requires the implementation of strict governance processes to maintain data accuracy, quality, and security. Introducing standards, ensuring compliance, and aligning responsibilities are important measures to achieve these goals.

Harmonize data management processes:

Tech processes, tools and structures across entire organizations need to be harmonized. By streamlining digital systems and fostering collaboration between departments, organizations can eliminate barriers and promote a more efficient working environment.

2

3

Comply with regulatory requirements:

Data protection requirements in automotive are becoming increasingly crucial due to the growing use of data-driven systems. Customer data needs to be collected and processed in compliance with privacy regulations, such as GDPR in Europe and similar laws across the globe. Data requires careful protection from unauthorized attacks and cybersecurity and encryption measures need to be anchored in the development process of software.

Attracting, retaining and developing the right talent enables a real software mindset

OEMs and suppliers face the challenge of simultaneously mastering a variety of emerging technologies, such as artificial intelligence (AI), operating systems (OS), advanced core technologies, digital services, and cloud computing to make the SDV happen.

This evolution is forcing industry players to build talent across multiple domains in parallel. Adding to the complexity is the extensive network of partnerships that OEMs and suppliers are building within the SDV ecosystem. To actively drive these partnerships, expertise must be present in the organization, requiring companies to have the right people who can understand partner technologies and integrate them into the vehicle systems. As a result, OEMs and suppliers must excel at attracting, retaining and developing software talent to feature the right software mindset.

> The right talent is at the heart of the software transformation, and supplier and automakers need to attract and retain it to drive the change.

Constantin M. Gall
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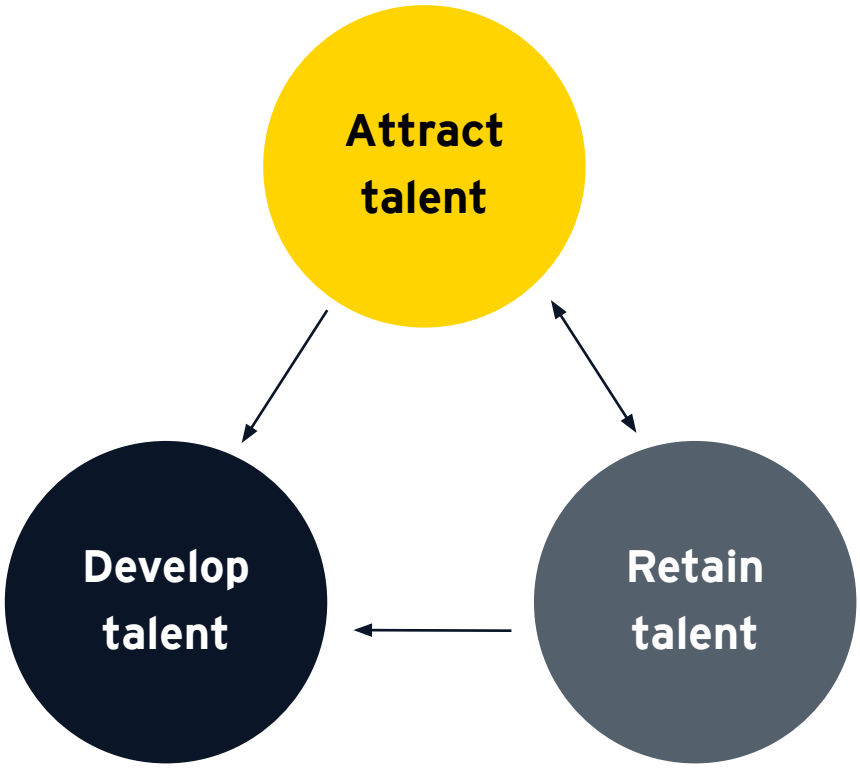
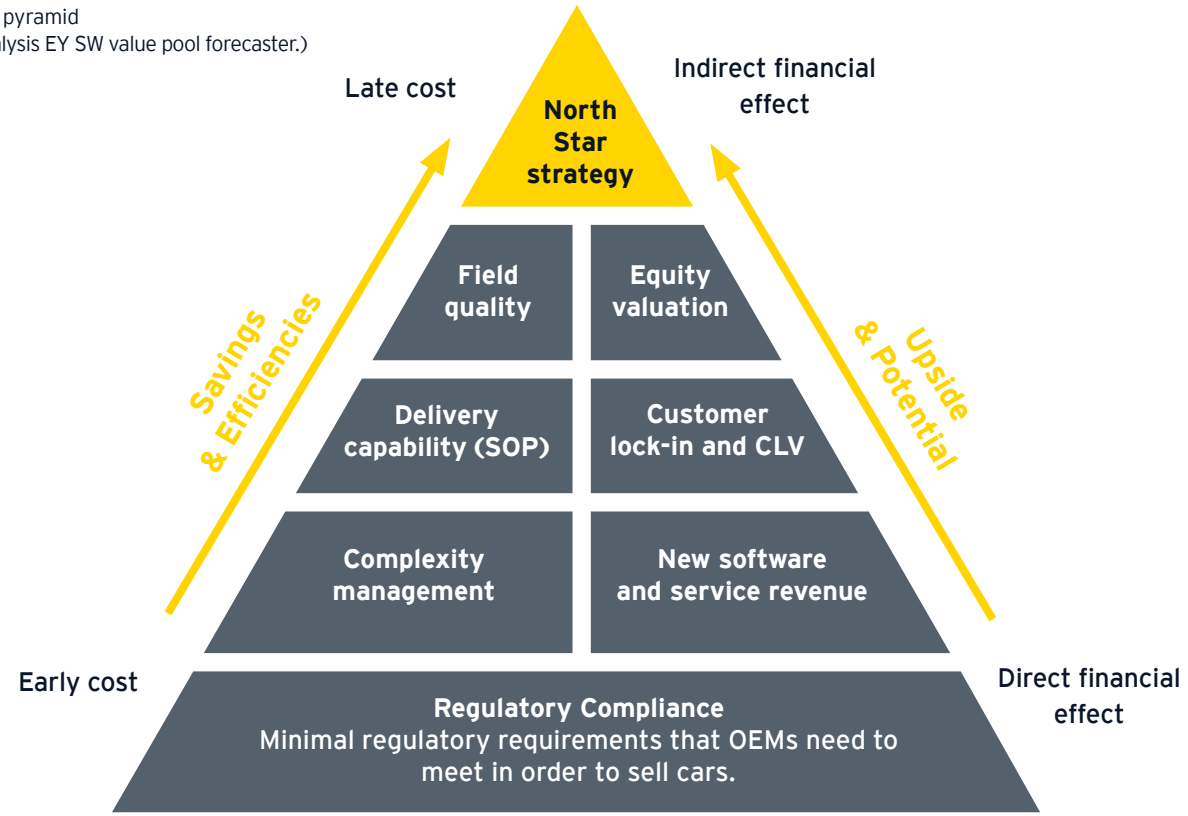


Figure 9:
Focus areas to manage software talent
(Source: EY analysis EY SW value pool forecaster.)

Step 3: Continuously monitor and adjust your transformation progress

The SDV transformation is not a one-time event, but an ongoing journey that requires continuous adjustments and careful considerations to pave the way for a successful transition. Once initial transformative implementation levers are set in motion, it becomes crucial to focus on sustaining momentum with a series of iterative steps aimed at driving sustainable growth and innovation.

Figure 10:
Software value pyramid
(Source: EY analysis EY SW value pool forecaster.)



Provide clear and measurable targets guiding the journey

Dealing with many moving parts requires a clear set of goals that serve as benchmarks for whether real progress is being made. However, the value of the SDV transformation is multifaceted and includes cost reductions (value risks) as well as new business opportunities (value potentials). Therefore, an integrated governance framework is key to guide activities and resource allocation.

Monitor targets continuously, counteract swiftly and decisively

Clear and defined objectives are only half the story for governance. The second important task is to incorporate them into a continuous monitoring routine to check whether transformation is on the right track and to take countermeasures in the event of deviations. While monitoring aspects can largely be handled through regular check points, e.g. steering committees and involved executives, the bigger issues can be observed in the decision-making processes to counteract deviation. As 90% of decisions are reversible and must be made quickly, automakers and suppliers must prioritize rapid decision making in most situations and empower their lower-level management with the tools and authority to do so to successfully navigate the transformation. As a result, many decisions are made too slowly or take too long to implement. A clear decision framework that specifies which decisions need to be made and how quickly is equally important. Automakers must decide on key aspects of the roadmap deep within the organization and move only a minimum of decisions upstream. This is especially important in fast-moving ecosystems such as SDV, where the pace of innovation constantly calls for a quick decision.

A guide borrowed from the technology industry helps to classify decision-making into two types:

1

One-way doors:

Once made, these decisions set a course challenging to retract. The primary focus for these decisions is maximum thoroughness as they typically require the full corporate decision-making process, which can be time-consuming. These include fundamental changes such as moving to a new software architecture or a major sell-off of capabilities.

2

Two-way doors:

While these decisions may feel significant, they can be retracted or adjusted with relative ease, as lightweight decision-making is often employed. These decisions are typically handled at maximum speed deep within the corporation and facilitated by a well-defined roadmap with several checkpoints. If any deviation is detected, the checkpoints allow for timely corrective counteraction. Examples include the change of pricing models, new features or changes in the target operating model.

Key takeaways

One thing is certain: Underestimating the software-hardware transformation is not an option for suppliers and automakers. However, the window of opportunity is closing, and the entire ecosystem is preparing to move from a more experimental storming phase to a profitable large-scale software business. This process does not happen overnight, and there is not enough capital left to make bad bets. That's why suppliers and OEMs need to assess where they are now, prepare their organizations for the next step, and make sure they don't run out of gas along the way:

#

Review your big bets:

Are they aligned with SDV strategy and with up-to-market forecasts? Get your software supply chain in place with the right set of partners to ensure efficient and robust software development and delivery at scale.

#

Be honest and reflect on whether your organization is ready to capitalize on the opportunities, be laser-focused, and identify additional investment needs. Know that there is still a long way to go and prepare your financial resources for contingencies.

#

Ramp up nonworking capabilities in your organization, business, target operating model, talent. Remember to keep things manageable with a clear roadmap and checkpoints on your journey.

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