

# THE | AUTONOMOUS

## Navigating the Future: **SAFETY AND REGULATION IN THE REALM OF L3/L4 AUTONOMOUS VEHICLES**

Report from the Expert Circle  
Safety and Regulation

led by



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# 1 | ABSTRACT

After The Autonomous Main Event, in September 2022, a work group led by Kontrol and pswp has been formed and two workshops have been conducted with respective surveys concerning where the industry sees the major safety-related and regulatory challenges of L3/L4 autonomous vehicles. More than 80 experts from Asia, Europe and the US have participated in workshops and surveys, including companies such as Volvo, Infineon, Stellantis, Renesas, Huawei and many more.

Key findings have been that the topic is marked by regulatory and a technical complexity. The key is to bridge those two factors. Technology that is trustworthy and safe enough to earn users' trust must be brought into the market and on the roads.

The first traffic legislation was issued in Germany in 1932 with the clear target of harmonizing the interaction of all traffic participants. Now we face the situation that a new player is found on the road: the software-defined vehicle, i.e., the digital driver.

In this report you will find the summary and findings of the expert circle including the outcomes of discussions and surveys.

# 2 | INTRODUCTION

This report aims to navigate the intricate interplay of safety and regulation within the automotive industry, discussing the main challenges, through the lens of expert insight of the participants of the Expert Circle on Safety and Regulation, established as part of The Autonomous Main Event. As the automotive sector propels itself toward new frontiers, an urgent need arises for a comprehensive exploration of safety protocols and their regulatory foundations, with a particular focus on Level 3 (L3) and Level 4 (L4) autonomous vehicles.

Safety and regulation are more than mere checkboxes within the automotive landscape: they are the foundational pillars of the industry's integrity, expansion, and harmonious integration into society. Modern vehicles are not just mechanical entities; they symbolize modes of transportation that bridge geographical gaps, connect lives, and shape communities. The magnitude of their influence underscores the ethical duty of stakeholders to prioritize safety as an overarching imperative.

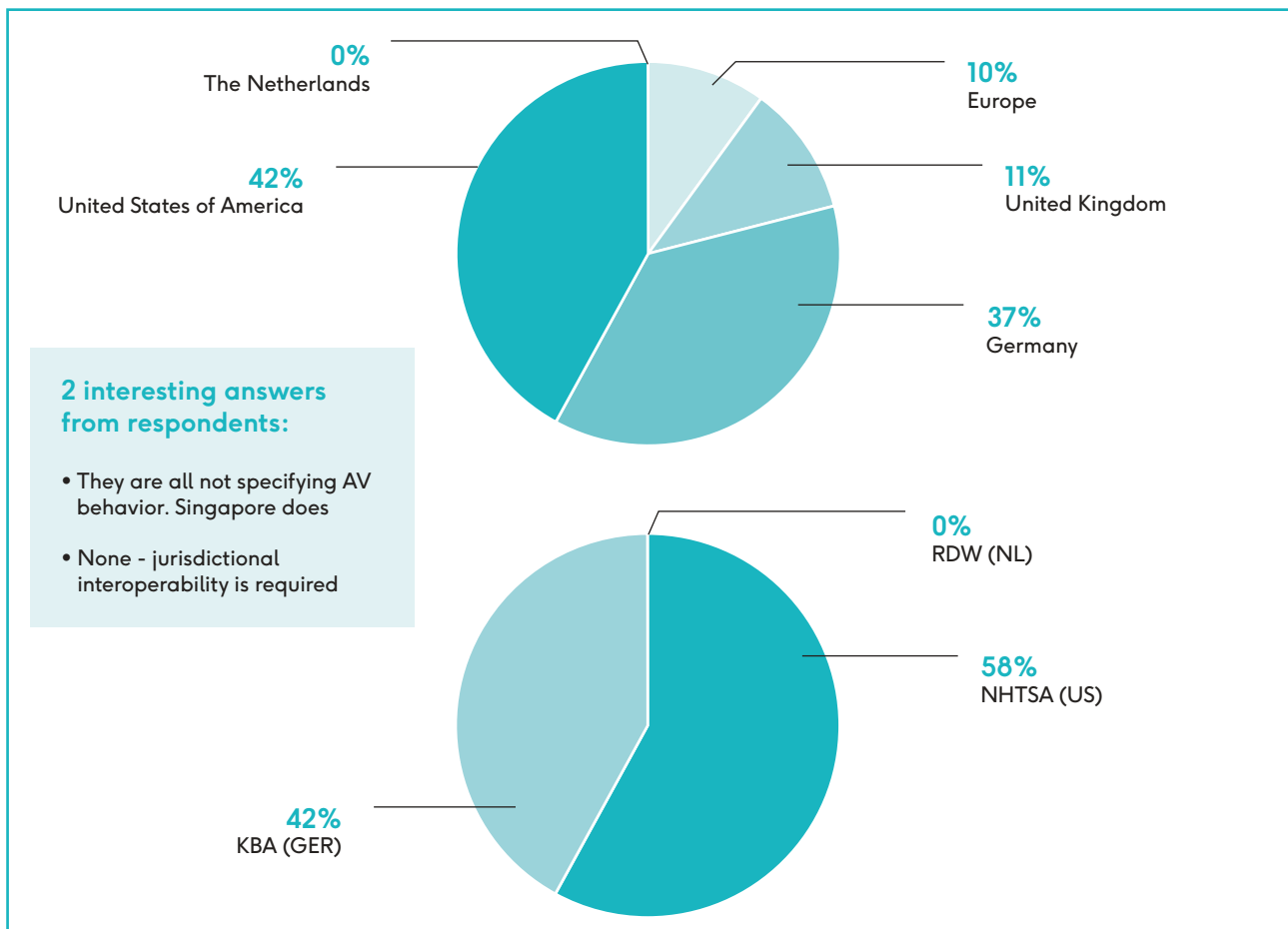
The inherent complexities associated with vehicular transportation – from potential accidents to the intricacies of human-machine interaction – necessitate a robust framework of safety protocols. This is particularly pertinent when examining L3 and L4 autonomous vehicles, which introduce novel dimensions of technology-induced risk. Within this rapidly shifting paradigm, regulations emerge as both legal and ethical guardians of public safety, fostering an environment that supports innovation and ensures the well-being of all stakeholders. In an era where vehicles evolve into intelligent, interconnected entities, regulation functions as the guiding force propelling the industry toward a technically advanced and safe future.

# 3 | REGULATORY FRAMEWORKS FOR AUTONOMOUS VEHICLES

As L3/L4 autonomous vehicles inch closer to becoming a reality, the establishment of comprehensive regulatory frameworks is critical not only for ensuring the safety of road users but also for fostering the responsible and harmonious integration of autonomous technology into our societies. This section explores the intricate global landscape of regulatory frameworks for autonomous vehicles, delving into the approaches of key regulatory bodies, including the National Highway Traffic Safety Administration (NHTSA), United Nations Economic Commission for Europe (UNECE), the European Commission, national approval authorities. It also considers the evolving legislative landscape within the European Union (EU) and national jurisdictions (e.g., Germany, California, Nevada), including Germany’s automated and autonomous driving acts and the European Union’s regulation of the type approval of vehicles with an automated driving feature.

The automotive industry operates in a highly complex regulatory landscape with varying vehicle compliance standards across different countries and regions. Compliance with these regulations is essential for automotive manufacturers to ensure safety and meet the legal requirements. However, this complexity poses significant challenges for companies operating in the industry.

**From your perspective, who is most innovative regarding legislation in autonomous driving? –Share of answers (Percent)**



For instance, safety standards and emissions regulations in Europe, based on UNECE regulations, differ from those in the United States and China. This variation requires automotive manufacturers to navigate and comply with multiple sets of regulations, adding to the complexity and compliance burden. Compliance is crucial to the automotive industry, with over 500,000 regulations and requirements that must be followed. Approximately 80% of these regulations pertain to safety, underscoring the importance of maintaining high safety standards. Furthermore, compliance officers within automotive companies face the daunting task of tracking more than 100,000 regulatory changes on the local level each year, spanning over 60 jurisdictions across key automotive markets.

## MASSIVE REGULATORY COMPLEXITY ON A GLOBAL SCALE

### 01 International Organization for Standardization (ISO)

- ISO 26262 - Functional Safety
- ISO 21434 - Cyber Security
- ISO 21448 - Safety Of The Intended Function (SOTIF)
- ISO PFR TR 4804 - Safety and Cyber Security for Automated Driving Systems

### 02 Supranational Level - United Nations Economic Commission For Europe (UNECE) and EU

- UNECE R155 - Cyber Security and Cyber Security Management System (CSMS)
- UNECE R156 - Software Update and Software Update Management System
- UNECE R157 - Advanced Lane Keeping System (ALKS)
- EU2019/2144

### 03 National Level



Germany



Sweden



Norway



Netherlands



France



USA



China

Manual processes related to regulatory requirements keep driving costs and slowing down development efforts

Given this regulatory landscape, automotive manufacturers must dedicate significant resources to ensure compliance and stay updated with the evolving requirements. The challenges associated with managing and adhering to these numerous regulations call for innovative solutions to streamline and simplify the compliance process.

The problem we have identified is the lack of efficient and reliable compliance solutions for Level 2 and higher automated driving systems (ADAS) in many jurisdictions. Germany has recently introduced legislation relating to L3 and L4 technology. However, the L4 legislation is not aligned with the business reality and the work split between automotive manufacturers and suppliers in L4 constellations.

While the development and deployment of autonomous vehicles hold great promise for increasing transportation safety, there are significant challenges to ensuring their safe and compliant operation. The complexity of regulatory requirements, the need for continuous monitoring, and the potential risks associated with autonomous driving systems are pressing problems for various stakeholders.

**>500k**

regulations and requirements **need to be followed** in order to ensure you are compliant

**80%**

or regulations **are focused on safety**

**>100k**

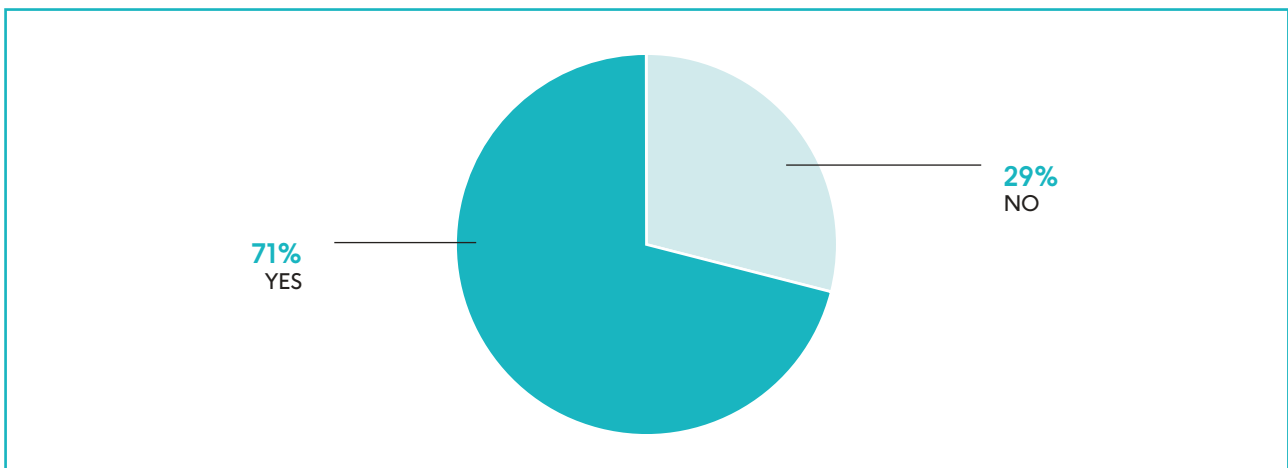
**changes** on local level to be tracked by Compliance Officers in **60+ jurisdictions** across key automotive markets per year

**Automotive Manufacturers** face the challenge of meeting stringent regulatory requirements while delivering innovative, cutting-edge autonomous driving systems. Compliance with safety standards, regulations, and guidelines is crucial to gaining regulatory approval and ensuring public trust in industry products.

**Suppliers of automated driving systems (ADS)** provide the key component, particularly for L4 vehicles, and thus play a key role in the development of driverless vehicles. Meanwhile, countries that have developed laws for L4 vehicles, namely Germany and the EU, do not view these suppliers as core regulatory stakeholders, creating an imbalance between business reality and regulation, resulting in the need for alignment on collaboration between ADS suppliers and automotive manufacturers.

**Regulatory Bodies** are responsible for establishing and enforcing standards for autonomous vehicles struggle to keep up with the rapid technical advancements. They face the challenge of developing and adapting regulations that strike a balance between encouraging innovation and maintaining public safety.

**Did you know that since September 2022, EU regulation has allowed for the approval of L4 vehicles? – Share of answers (Percent)**



**Service Providers and Operators** such as autonomous ride-hailing services, transportation authorities, and other operators are eager to deploy autonomous vehicles on the roads to improve efficiency and mobility. However, they require robust compliance solutions to ensure the safe operation of their autonomous vehicle fleets and compliance with national regulations. The current solutions available on the market often fall short of addressing their requirements effectively. Today, compliance is typically managed through a combination of manual processes, fragmented software tools, and subjective evaluations. This approach is time-consuming, prone to errors, and lacks the necessary scalability to handle the complexity of autonomous driving systems. It also poses challenges in terms of consistent data collection, real-time monitoring, and obtaining continuous compliance updates.

# NECESSITY OF NATIONAL RULES REGARDING PREDEFINED AREAS OF OPERATION

## Which geographic restrictions do national laws put in place regarding the operation of vehicles with automated driving functions?

National laws regarding the operation of vehicles with automated driving functions can vary significantly from country to country, leading to a complex landscape of geographic restrictions, often influenced by factors such as road infrastructure, traffic conditions, cultural norms, and legal frameworks. Below are some common geographic restrictions that might be enforced by respective national laws.

**Geofencing:** Many national laws require vehicles with automated driving functions to operate within specific geographic boundaries, known as geofenced areas. These areas are often defined based on factors such as road complexity, mapping accuracy, and level of available technology. Geofencing can limit the deployment of automated vehicles to well-mapped and controlled environments such as urban areas with well-marked roads and clear signage.

**Urban vs. Rural:** Some countries may restrict the operation of vehicles with automated driving functions to urban or suburban areas where road conditions are relatively predictable and infrastructure is well-maintained. This restriction might be due to the technology's limited capability to handle complex, unpredictable scenarios that are more common in rural settings.

**Highways and Motorways:** Some national regulations might permit the use of automated driving functions only on interurban highways or motorways, where traffic flows are more controlled and predictable. This restriction could be due to the technology's improved performance in highway scenarios compared to urban or congested environments.

**Specific Routes:** Certain countries might allow automated driving functions to be used only on specific routes that have been thoroughly mapped, tested, and approved by regulatory authorities. Such routes could be chosen for their simplicity and lower likelihood of unexpected obstacles.

**Prohibited Areas:** National laws may designate certain areas where automated driving functions are completely prohibited. Such areas could include pedestrian, school, and construction zones, and areas with high pedestrian traffic.

**Weather and Environmental Conditions:** Some regulations might restrict the use of automated driving functions in adverse weather conditions, such as heavy rain, snow, or fog, which can impact sensor performance and the vehicle's ability to navigate safely.

**National Borders:** Vehicles with automated driving functions might face restrictions when crossing national borders due to differing regulations and road conditions. Cross-border operations could be subject to additional approvals or requirements.

It is important to note that the specifics of these restrictions can vary widely based on the legal, technological, and cultural context of each country. As technology evolves and becomes more capable, national laws and regulations may adapt to accommodate a broader range of geographic scenarios, potentially expanding the areas of operation for vehicles with automated driving functions.

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Findings:

## Which geographic restrictions do national laws put in place regarding the operation of vehicles with automated driving functions?

### 01 Indication in vehicle-related legislation that approval is limited to certain geographic areas



EU Type Approval applies to vehicles for carriage of passengers/goods on a predefined area, route or in predefined parking facilities



Vehicles with operating permit under German law may only be operated in „designated area“ (festgelegter Betriebsbereich). Vehicle holders must apply for approval of designated areas.

### 02 Rules relating to definition of areas to operate vehicles with automated driving functions



Commission Implementing Regulation (EU) 2022/1426:

- No rules relating to definition of geographic areas
- However: Clarification that Member States are not obliged to predefine areas, routes or parking facilities (Recital 7)



Road Traffic Act and related Ordinance contain conditions for approval of designated areas. These rules apply to vehicles

- with Operating Permit under German law,
- with EU Type Approval (see FAQ published by German Type Approval Authority)

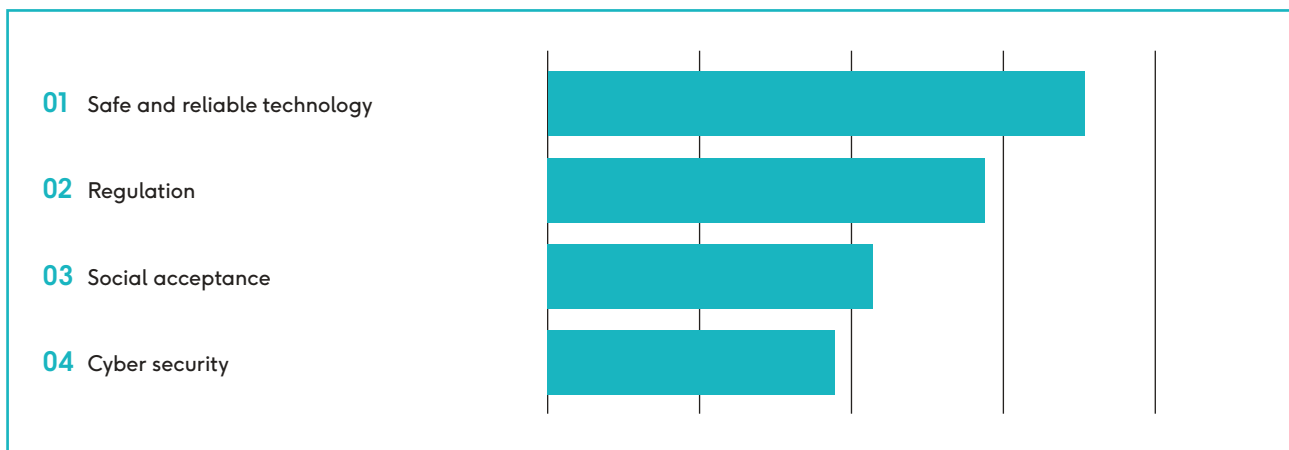
## BALANCING SAFETY AND INNOVATION

The automotive industry is not static; it is an ever-evolving ecosystem of technological advancements, consumer demands, and societal expectations. This dynamic nature presents both opportunities and challenges. While innovations like autonomous driving, electric propulsion, and connected vehicles hold the promise of reshaping transportation, they also introduce novel safety concerns that transcend traditional paradigms.

The very innovations that elevate the industry to new heights have the potential to outpace existing regulatory frameworks. Advanced Driver Assistance Systems (ADAS), once a futuristic concept, are now tangible features on many vehicles, altering the landscape of driver behavior and accident prevention. The convergence of artificial intelligence, data analytics, and vehicle connectivity further accelerates the industry's transformation. However, with great power comes great responsibility. Balancing the pace of innovation with the need for safety becomes an intricate dance, requiring a forward-thinking, adaptable regulatory approach.



## What is the biggest challenge for getting L3/L4 vehicles on the road? Can you rate from 1 (biggest challenge) to 4 (smallest challenge)?



While the concept of harmonized safety regulations on a global scale is laudable, the road to achieving this is riddled with challenges. Varying socio-economic, political, and cultural factors give rise to divergent regulatory landscapes across regions. In particular, different cultures might have differing perceptions of safety, possibly leading to different outcomes in the balance of safety expectations and driving comfort. The intricacies of regulatory adoption, adaptation, and enforcement are shaped by local priorities, market demands, technological progress of local industry, and legislative hurdles. The type and features of vehicles in high demand in a particular market can shape the regulatory landscape. High demand in one region for autonomous vehicles, might result in increased regulatory activity. Governments may also shape new rules to ensure their domestic industry has sufficient room to develop and implement ground-breaking technology in their respective fields of expertise.

Coordinating regulations across different regions demands a delicate balance between standardization and flexibility. Cultural nuances, road infrastructure disparities, and consumer preferences complicate efforts to create a uniform set of safety standards. The result is a mosaic of regulations that can impact vehicle design, manufacturing, and international trade.

Furthermore, the pace of technological advancement poses a challenge. Innovations like autonomous driving transcend conventional safety regulations, calling for new paradigms that remain universally applicable. The ability of regulatory bodies to adapt swiftly and collaboratively to these technological leaps will determine their effectiveness in shaping a safer global automotive landscape.

## THE INTERPLAY OF TRAFFIC LAWS AND VEHICLE SAFETY STANDARDS

The amalgamation of traffic regulations and vehicle safety standards forms the backbone of road safety, safeguarding lives and enhancing vehicular transportation efficiency. This section delves into the intricate interplay between traffic regulations and safety standards, unraveling how these regulations shape vehicle design, manufacturing, and operation to foster a safer road environment for all.

At the operational level, traffic regulations intersect with vehicle safety through parameters such as speed limits, lane discipline, and adherence to road signage. The alignment of operational behavior with traffic regulations is instrumental in averting accidents, reducing congestion, and minimizing the potential for dangerous driving practices. As autonomous vehicles emerge, traditional traffic laws must be recalibrated to accommodate their unique characteristics, interactions, and potential for transformative impact.

# ADAPTING TRADITIONAL LAWS FOR AUTONOMOUS DRIVING

The integration of autonomous vehicles into the existing traffic ecosystem requires a reimagining of traffic laws. While traditional traffic regulations have been designed with human drivers in mind, self-driving technology introduces new dynamics. The laws must be recalibrated to address the nuances of autonomous vehicles' interactions, decision-making algorithms, and their impact on traffic flow.

## CONSIDERATIONS OF LIABILITY AND RESPONSIBILITY

One of the central challenges in autonomous driving pertains to accident liability. Traditional traffic laws assign responsibility based on human error, but autonomous vehicles introduce complications, e.g., who is at fault when an autonomous vehicle is involved in an accident: the manufacturer, the software developer, the supplier of the ADS, or the human occupant? Establishing clear regulations that delineate liability and responsibility is essential to establishing a framework for legal and insurance issues.

## NAVIGATING RIGHT-OF-WAY AND INTERACTIONS

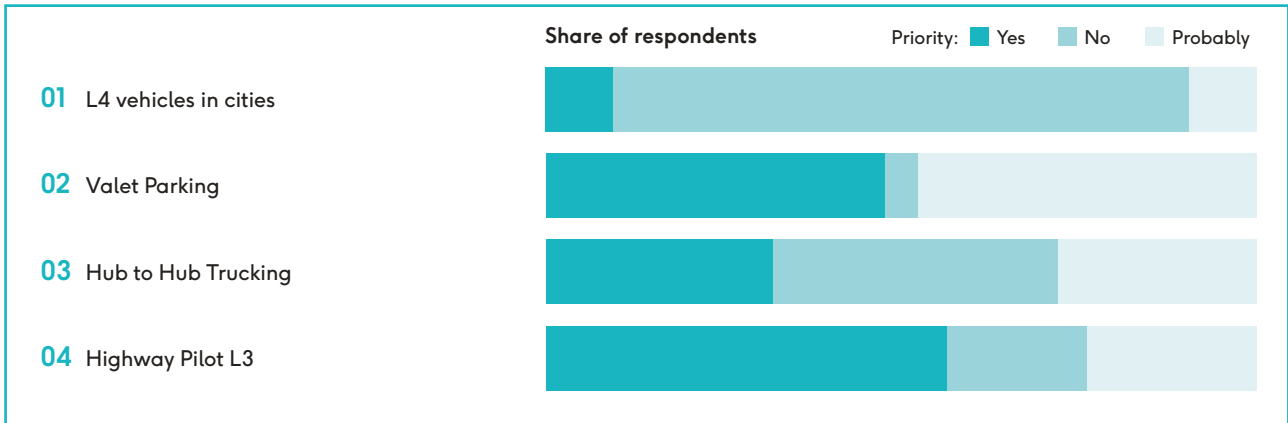
The concept of right-of-way, a cornerstone of traffic regulations, takes on a new dimension in the context of autonomous driving. Autonomous vehicles must be able to interpret and adhere to right-of-way rules in diverse scenarios. Regulations need to account for the nuanced interactions between autonomous and human-driven vehicles, ensuring that all road users can anticipate and respond to each other's actions.

Autonomous vehicles use sophisticated algorithms to make split-second decisions in potentially life-threatening situations. For instance, in scenarios where a collision might be imminent, the vehicle must decide the best course of action, whether swerving, braking or taking another evasive measure. These decisions, while aiming to minimize harm, bring to light important ethical dilemmas. A central question is how the algorithms determine the value of different lives in ambiguous situations. If faced with the potential of harming a pedestrian or risking the safety of its passengers, how does the vehicle decide? Although the vehicles' aim is to avoid harm and to ensure safety, there is no straightforward solution to tackle such dilemma situations.

Considering these moral complexities, there is a need for robust regulations that oversee the development, testing and deployment of autonomous vehicles. A core regulatory requirement for the development of algorithms should be the transparency of their decision making processes. Such transparency would also foster trust among the public. Furthermore, these vehicles should always adhere to societal norms and values to ensure that their actions are appropriate and ethical.

While there is much enthusiasm regarding the capabilities of autonomous vehicles, many experts remain skeptical about their rapid deployment in diverse environments. A common sentiment among the experts is that it is unlikely that we will see L4 vehicles operating seamlessly in cities within the next two years. Instead, many believe that the more immediate and practical use cases for L3 vehicles will be highway pilot systems. In addition, hub-to-hub trucking appears to be a promising avenue, with trucks autonomously moving goods between certain points, increasing transport efficiency.

## What do you think will happen in the next two years? Can you rate the likelihood?



# 4 | REGULATIONS FOR REAL-WORLD TESTING OF AUTONOMOUS VEHICLES

The concept of allowing self-driving vehicles onto public roads for testing highlights the interplay between advancing technology and ensuring public safety. Regulatory oversight is paramount in striking a delicate balance between these two poles. This section elucidates the multifaceted aspects of regulations governing real-world testing of autonomous vehicles, with a focus on setting standards for vehicle behavior, safety mechanisms, data collection, and the novel concept of digital homologation.

## HARMONIZING TECHNOLOGICAL PROGRESS AND PUBLIC SAFETY

The notion of allowing autonomous vehicles on public roads for testing underscores the dual responsibilities of advancing innovation while ensuring public safety. Regulatory oversight provides the ethical and procedural foundation for this delicate balancing act. It safeguards against rushing technological advancements that could compromise the safety of pedestrians, passengers, and fellow road users.

## SETTING STANDARDS FOR VEHICLE BEHAVIOR

Regulatory frameworks governing real-world testing must delineate clear standards for how autonomous vehicles should behave on public roads. This includes adhering to traffic rules, responding to traffic signals, yielding to pedestrians, and safely interacting with human-driven vehicles. By establishing consistent guidelines, regulators help ensure harmonious and predictable integration of autonomous vehicles.

Providing safe and reliable technology is seen as major challenge in the development of automated driving systems. Tests in normal traffic can improve safety and reliability. However, as the real-world conditions vary in the EU Member States, test drives should be run in several countries. Is there a test permit with an EU-wide scope?



#### EU Law

- No specific rules for vehicles with automated driving functions
- General provisions: **Exemption** for new technologies/concepts (Article 39 Regulation 2018/858)
  - **Manufacturer** applies for exemption
  - The level of safety and environmental protection must be at least equivalent to the requirements from which exemption is sought



#### German Law

- **Test Drive Permit to develop/improve automated driving functions** (Erprobungsgenehmigung, Sec. 16 Autonomous Vehicles Approval and Operation Ordinance)
- **Vehicle Holder** will be holder of Test Drive Permit
- Holder must submit development concept to authority (Kraftfahrt-Bundesamt)
- Holder and persons involved in test drives must have sufficient technical skills.

**Question:** What are sufficient technical skills? In what respect do they need to be present?

## MANDATORY SAFETY MECHANISMS

Safety is the cornerstone of real-world testing. Regulatory oversight should mandate robust safety mechanisms, such as the presence of trained safety drivers ready to take control at a moment's notice. Clear protocols for disengaging autonomous mode and invoking human intervention during emergencies are essential to mitigate testing risks.

## DATA COLLECTION AND DIGITAL HOMOLOGATION

Real-world testing generates a wealth of data, offering insights into system behavior, performance, and safety. Regulatory frameworks should encompass the collection of comprehensive data during testing. An emerging concept, digital homologation, utilizes digital simulations to validate a vehicle's performance before physical testing begins. This approach accelerates testing cycles and reduces the strain on public roads.

Regulations for real-world testing demand a collaborative approach. Developers, regulators, and industry stakeholders must work together to ensure that regulations remain relevant in a rapidly evolving field. This iterative adaptation is vital for responding to technological breakthroughs and addressing unforeseen challenges.

# 5 | HUMAN VS. DIGITAL DRIVER: NAVIGATING AUTONOMY AND RESPONSIBILITY

The emergence of autonomous vehicles has redefined traditional driving roles and responsibilities. As technology advances, the distinction between human and a digital drivers becomes increasingly pertinent. This differentiation goes beyond the physical act of operating a vehicle and reaches into decision-making, accountability, and safety.

## HUMAN DRIVER: A LEGACY OF CONTROL AND RESPONSIBILITY

For over a century, human drivers have been at the wheel of vehicles, responsible for making split-second decisions in response to changing road conditions and interactions with fellow road users. Human drivers possess the ability to apply moral judgment, interpret complex scenarios, and adapt to unpredictable situations. Their emotional intelligence, intuition, and understanding of social norms contribute to the complex fabric of road dynamics.

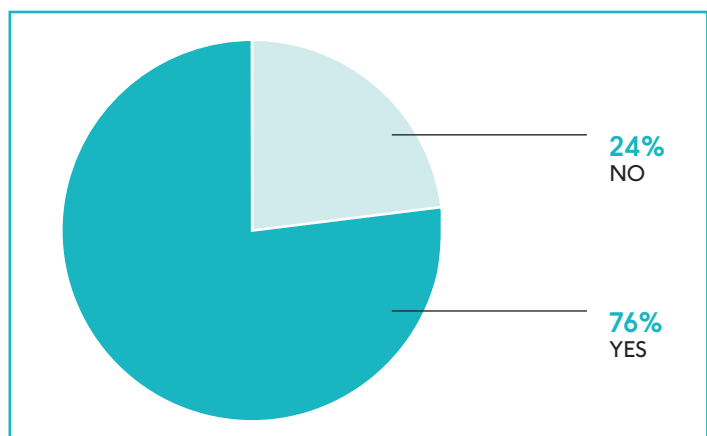
## DIGITAL DRIVER: THE PROMISE OF PRECISION AND AUTOMATION

In contrast, the emergence of autonomous technology introduces the concept of a digital driver – a sophisticated network of sensors, algorithms, and AI that guides the vehicle’s movements. Digital drivers are designed to process vast amounts of data in real time, enabling precise control, rapid decision-making, and adherence to programmed rules, promising the elimination of accident-provoking human error, thus providing a potential avenue to drastically enhance road safety.

## ROLES AND CAPABILITIES: A COMPARATIVE PERSPECTIVE

Human drivers excel in contexts that require empathy, creativity, and moral reasoning. They can interpret non-verbal cues from pedestrians, anticipate the actions of other drivers, and respond to dynamic and unpredictable scenarios. By contrast, digital drivers excel in tasks demanding lightning-fast analysis of sensor data, simultaneous monitoring of multiple inputs, and rapid execution of maneuvers to ensure safety.

Do you think that in the next 5 years, L4 technology still has to provide for a human driver outside the car, such as a tele driver or a technical supervision as a fallback to L4 vehicles, e.g., in case of failure of the automated / autonomous system?



# REGULATORY CHALLENGES: ACCOUNTABILITY AND ETHICAL DILEMMAS

As the transition from human to digital drivers unfolds, regulatory challenges surface and determining accountability in case of accidents involving autonomous vehicles becomes complex. Human drivers can be held accountable for their actions, but autonomous systems introduce questions about manufacturer liability, software malfunctions, and ethical programming decisions. Striking a balance between clear accountability and the complexity of digital systems poses a challenge for regulators.

## HUMAN-DIGITAL COLLABORATION – THE MIDDLE GROUND

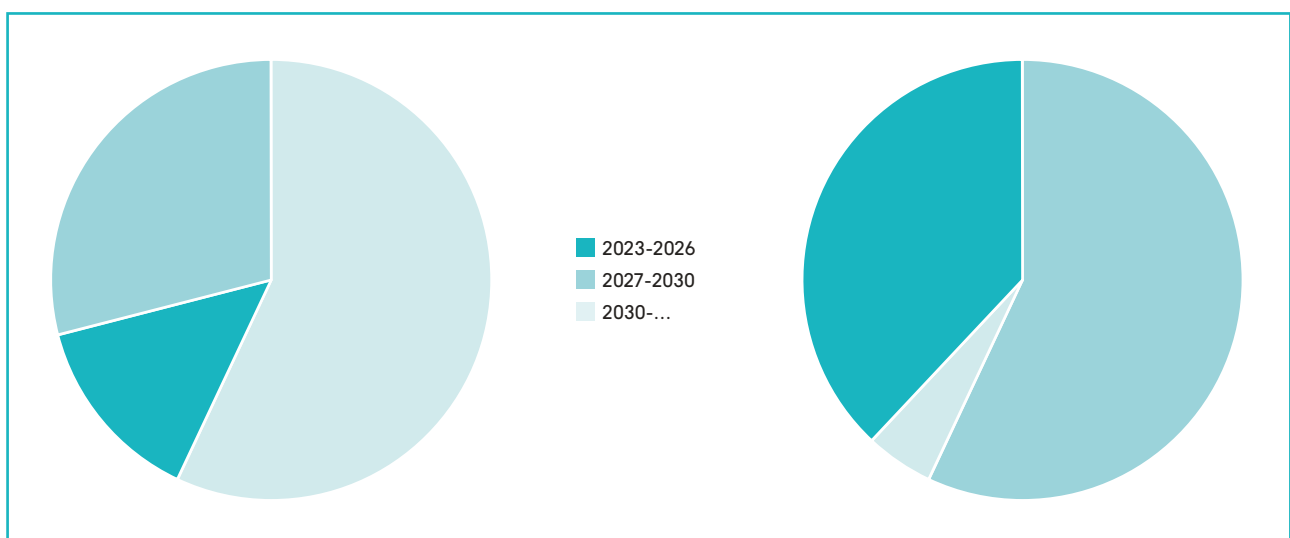
The evolving landscape of autonomous vehicles calls for a hybrid approach that leverages the strengths of human and digital drivers. This collaboration envisions scenarios where humans retain control in unpredictable situations or override digital systems in cases of ethical dilemmas. Ensuring that human operators remain vigilant and prepared to intervene is a safety-enhancing regulatory consideration.

## NAVIGATING COMPLEX INTERPLAY

The evolving roles of human and digital drivers underscore the nuanced interplay between human cognition and technological precision. The transition to a future with increased automation requires regulatory frameworks that can adapt to the evolving landscape. Striking the right balance between harnessing the strengths of both human and digital drivers, determining accountability, and addressing ethical considerations are pivotal to ensuring safe, responsible integration of autonomous vehicles. As society navigates this variegated terrain, the relationship between human and digital drivers will redefine the very essence of transportation and mobility.

**When do you expect L4 solutions for driving people (not goods) on public roads will be on the market?**

**When do you expect L4 solutions for the transport of goods on public roads will be on the market?**



## 6 | CONCLUSION

In the realm of L3/L4 autonomous vehicles, safety and regulation stand as the twin motors of the upcoming transportation transformation. As we traverse the path toward a world where machines share the responsibility of driving, the synergy between cutting-edge technology and rigorous regulatory frameworks is crucial. Against this landscape, our endeavors have illuminated an urgent need for a digital compliance platform to serve as a centralized hub, meticulously tracking all updates and evolving requirements and ensuring a robust, adaptable response to the dynamic nature of regulations. Moreover, it has become resoundingly clear that digital homologation is of paramount importance. This innovative approach merging digital simulations with real-world testing, accelerates the journey of autonomous vehicles toward market readiness, streamlining processes while maintaining the highest standards of safety and compliance. In unison, these advancements can forge a path toward a safer, more connected, and seamlessly integrated future of autonomous mobility.

With each advancement in autonomy, we inch closer to realizing the dream of safer roads, fewer accidents, and enhanced mobility. However, this journey is not without its challenges. Striking the right equilibrium between innovation and safety requires a delicate dance in which our global society cannot afford to falter.

Through the dedication of experts, collaboration of stakeholders, and vigilant oversight of regulatory bodies, we can harness the potential of L3/L4 autonomous vehicles while ensuring the well-being of every road user. These vehicles hold the promise of delivering unparalleled convenience, inclusivity, and sustainability. But beyond these promises, they must first earn our trust by proving themselves as responsible, reliable, and secure companions on our journeys.

In the conclusion of this report, let us recognize that we are on the cusp of a transportation revolution – one that hinges on our ability to harmonize innovation and accountability. The road ahead is challenging, but it is illuminated by the combined brilliance of engineers, policymakers, and the collective human spirit. With safety as our guiding star and regulations as our compass, we are charting a course toward a future where autonomy and responsibility coexist harmoniously, ensuring that the wheels of progress turn alongside the pursuit of a safer, more connected world.

## ABOUT THE AUTHORS:

**Andreas Lauringer (Kontrol):** Andreas Lauringer is the CEO of Kontrol, an innovative European deep tech company established in 2017. Kontrol's mission is to facilitate the certifiability and type approval of autonomous driving technologies. With a headquarters in Austria and additional offices in Germany, the USA, and China, Kontrol offers specialized assistance to companies by navigating intricate traffic laws, norms, standards, and court decisions, thereby expediting their product deployment.

With over 15 years of leadership experience in automotive sales and global program management, Andreas Lauringer has enjoyed a successful career at industry giants such as Continental and Magna.

Kontrol's flagship SAAS product, the Kontrol Hub, takes center stage on the cloud. It digitally transforms complex rules and regulations, making them accessible and manageable for efficient implementation in the realm of autonomous technologies.

**Benedikt Wolfers (pswp):** Benedikt provides legal advice regarding a large variety of regulated sectors, particularly in the automotive sector. He has extensive experience with new mobility concepts, including in the legal landscape for automated/autonomous and teleoperated vehicles in Germany, the European Union and worldwide. Benedikt has accompanied the new regulation on L3 and L4 vehicles in Germany, in the EU and on UNECE level and he advises on structures and approval procedures for L4 vehicles and ridesharing concepts in the EU. Benedikt also advises on the regulatory aspects of the emissions matter of an international automotive group in the EU and other UNECE contracting parties in Europe, Asia and Africa.

Beyond the mobility sector, Benedikt has advised on regulatory issues in the finance, energy, infrastructure and water sectors, especially during the financial and sovereign debt crisis on issues regarding the stabilization of financial markets, the establishment of bad banks and the creation of the EU-wide bank levy.

He has been listed in various rankings (Chambers Global, Legal 500, Handelsblatt, JUVE) as a „leading name in public commercial law“ for many years. For his advice on the stabilization of the financial market, Benedikt was named „Innovative Lawyer of the Year“ by the Financial Times of London. In 2022 he was named “Lawyer of the Year” by the German newspaper Handelsblatt.





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