FLORENCE SCHOOL OF REGULATION

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POLICY BRIEF

EUROPEAN TRANSPORT REGULATION OBSERVER

Making use in the public interest of data generated by connected vehicles

Cooperative, connected and automated mobility (CCAM) offers a unique opportunity to make EU transport systems safer, cleaner, more efficient and more user-friendly. In its most advanced form, CCAM services use automated connected vehicles, also known as self-driving cars and trucks, which can operate without human intervention. It prepares for the arrival of an entirely new generation of vehicles, unlocking opportunities and tools thanks to the data generated by these vehicles. EU member states, industry and the European Commission (EC) are collaborating to realise the EU's ambitious vision of connected automated mobility across the EU, considering the interests of public authorities, citizens, cities and industry. The EU Sustainable and Smart Mobility Strategy (SSMS) stresses the importance of connected automated systems in improving transport while contributing to enhanced sustainability and safety. The way vehicles operate is swiftly being integrated in the transport system, accompanied by policies and legislation pertaining to cybersecurity, liability, data use, privacy and connectivity. However, vehicles can only remain connected when crossing borders if coordination exists at the European level.

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For example, Regulation (EU) 2019/2144 aims to reduce the number of deaths and severe injuries by introducing safety technologies as compulsory safety features that all new vehicles must be equipped with. Regulation (EU) 2022/1426 lays down rules for the application of Regulation (EU) 2019/2144 regarding uniform procedures and technical specifications for the type approval of automated driving systems of fully automated vehicles.

Another relevant piece of legislation is the Data Act (DA). This is a horizontal regulation that applies to business-to-business contracts. It is therefore also applicable to transport as data are becoming an integral part of efficient safe transport systems. The DA increases legal certainty for transport companies and consumers engaged in data generation by establishing clear rules on the permissible use of data and associated conditions. At the same time, it mitigates abuse of contractual imbalances. It also enables public sector bodies to access and use data held by the private sector for specific public interest purposes. These interests range from refined urban planning to road and infrastructure management.

This 14th Intermodal Florence Forum discussed road safety and how to use data generated by connected vehicles to enhance it. The forum, co-organised by the Transport Area of the Florence School of Regulation together with the EC's DG MOVE, tackled the following questions. Why are vehicle data needed to make roads safer? Why should public authorities be involved? What are the potential benefits and constraints when it comes to connecting vehicle data? What are the key use cases? What examples are there of urban planning and road asset management?

Connected vehicle data: to regulate or not to regulate?

A comment by Matthias Finger and Elodie Petrozziello, Florence School of Regulation – Transport Area

The Florence Forum on connected vehicle data provided a most interesting and relevant case to clarify whether, where and what to regulate in the rapidly evolving digital space. Of course, we already have the EU Data Act, which provides a general-purpose framework for regulating data access and sharing, notably among devices. Connected cars certainly fall in this category. The question is whether further sector-specific regulation is needed when it comes to using data generated by connected vehicles in the public interest. To answer this question, it is useful to begin by recalling some general considerations about the potential of digitalisation in the general economic interest.

One of the main, if not the main, economic contributions of digitalisation is its ability to coordinate fragmented actors more efficiently than they would be able to do by themselves, and of course on a greater scale, i.e. coordinate actors that would not naturally collaborate. Digitalisation provides a systemic view and leads to system efficiency gains. In fact, the more fragmented the actors that need to be coordinated, the greater the efficiency gains that can be generated by digitalisation. Without a doubt, road transport, be it of passengers or freight, qualifies in this respect. There is no more fragmented system than cars and trucks, a system that surely needs to be more efficient, safer, quieter, cleaner, greener and overall smarter.

It should also be considered that road transport is already very digitalised, as cars and trucks are about to or have already become 'computers on wheels' generating huge amounts of data, which mostly go unused or at the least are not used to their full potential, and even less so used in the general interest. This is not to mention that the roads on which these 'computers on wheels' circulate are being equipped with cameras, smart traffic lights, sensors and many other data-gathering devices, again with totally underused data potential. If public authorities and stakeholders can easily access in-vehicle and infrastructure data it will benefit road safety and the competitiveness of the EU automotive industry. While there is some commercial sensitivity regarding the ownership and value of these data, the principles of FRAND access should apply. The real challenge lies in governance, and specifically in addressing trust gaps and stakeholder fragmentation. Clearly defining roles can help tackle this issue.

While these general considerations clearly speak in favour of regulation, and for that matter sector-specific regulation, it is still not clear which actors need to be regulated and how exactly. This is where a closer look at specific use cases is beneficial. In our Florence forum, two such particularly relevant use cases were examined in depth, namely the use of data in urban planning and in road asset management. Urban and even more so metropolitan transport systems certainly need to become more efficient, safer, quieter, cleaner and greener. To achieve this, vehicle data could and should be accessed and used not only to smarten urban mobility services but also to better integrate and manage urban mobility on a daily basis, to adjust the maintenance of urban transport infrastructure better to demand and for better metropolitan transport planning in the short, medium and long term. None would dispute that doing all this thanks to better access to vehicle and other data (e.g. data from road and parking cameras, street light sensors, police reports, buses, metros) is in the public interest. While city and metropolitan authorities would be the most natural users of connected vehicle data, given that they should uphold the public interest in most efficient urban mobility, it is, however, not clear whether they will be up to the task. Intermediaries may well be needed.

It also is essential to differentiate between data with a commercial value – such as insurance companies offering premiums for safe driving – and data that serve the public interest, like urban planning, maintenance and road safety. Consumers are willing to share their in-vehicle data if it benefits safety and serves the greater good. While the EC should regulate access to in-vehicle data, this should only apply to data related to the public interest. In the case of urban areas, 'connected vehicles' should also include e-scooters and there should be a focus on analysing near-misses to help prevent accidents. Since municipal authorities are closest to the sensitive issues of urban mobility, it is essential to empower them to make evidence-based decisions on building infrastructure.

A similar (use) case can be made for road maintenance. Indeed, roads and vehicles using them are also a system, more integrated management of

which would certainly yield enormous efficiency, safety, environmental and many other gains. Road operators are responsible for their maintenance. Therefore, effective planning, prevention and prioritisation can lead to significant savings. The aim is to encourage cooperation among all parties while addressing disparities in benefits – such as road users collecting data that could be valuable for infrastructure managers. It would be beneficial to establish a typology for data aggregation encompassing various levels of information: from raw data at the individual vehicle level to fleet data and aggregated mass data, together with knowledge and services provided by applications.

Therefore, the next logical question for a regulator pertains to the recipients of connected vehicle data. The recipients will be both already existing and future actors that are capable of using connected vehicle (and other) data in the public interest to make, in our case, urban mobility and road operations more efficient, safer, greener etc. It is tempting to argue that these actors will naturally emerge once connected vehicle data are accessible and shared. However, it seems a little naïve to regulate access to and sharing of connected vehicle data without having a clear idea of the recipients of these data, i.e. actors that, on the one hand, have a systemic view and, on the other, pursue or at least contribute to furthering the public interest, be it in terms of safety, convenience, environment, noise or land use. Therefore, the COM should not only pursue sector-specific regulation but also continue to consider cross-sectoral regulatory instruments.

Road Safety: Making Use of Data Generated by Connected Vehicles in the Public Interest

By Elodie Petrozziello, Florence School of Regulation – Transport Area

The European Commission (EC) has set its priorities for the next five years and focused on competitiveness, sustainability and digitalisation of transport. In particular, it must develop an action plan for competitiveness of the automotive industry, which is quite important and a matter also highlighted in the Draghi report and the mission letter to the Commissioner for Sustainable Transport and Tourism, Apostolos Tzitzikostas. The automotive sector accounts for 7% of Europe's GDP and is vital in the EU's export economy. However, there is a growing issue regarding the increasing size, weight and age of European cars. The European automotive industry is a generation behind in technology and research compared to Chinese and American vehicles. Currently, the trend is either to import Chinese vehicles in Europe or Chinese companies acquiring European manufacturers and producing vehicles within the tariff wall. As a result, using new technologies, such as AI, to optimise vehicle operations in terms of efficiency, liability and safety is essential. This situation involves multiple stakeholders who face different challenges.

The 14th Florence Intermodal Forum was held to explore gaps in the current regulatory framework and gain a holistic perspective to help identify various road safety shortcomings. It highlighted the intersection between vehicle data, consumer willingness to share information and regulatory frameworks. Discussions revolved around the need for clear rules regarding data sharing, recognising that consumers are ready to share data if there are specific protections, and the distinction between commercially valuable data and data serving the public interest. There are many challenges facing the European automotive industry, particularly in keeping pace with technological advances compared to competitors like the US and China. There was a broad consensus that the automotive industry must utilise vehicle data for road safety improvement and urban planning while addressing concerns about data privacy, cybersecurity and the costs associated with data production and management. These data must facilitate the work of public authorities (PAs) to ensure safety. The need for collaboration among various stakeholders, including PAs, was underscored to foster innovation and ensure equitable access to data for the greater good.

Benefits and constraints

Data are a valuable asset for road safety. To get as close as possible to the aim of Vision Zero – zero fatalities in road transport by 2050 – it is necessary to share and use safety-related information generated from connected vehicle data to ensure all road users can benefit from it. Connected vehicle data can enhance real-time traffic management by effectively responding to weather conditions and incidents. They can also monitor traffic speed and pinpoint areas where hazardous manoeuvres, such as harsh braking and swerving, are common. This information helps road managers gain insights into where vehicle sensors perform optimally and how infrastructure conditions can be improved to enhance the reliability of these systems, such as lane keeping and intelligent speed control. However, for the vehicle data to be relevant, PAs should define the owner of them – is it the driver or the car manufacturer? A balance should be struck between benefits and constraints. Vehicle data are potentially a 'super source' comparable to the exponential value of big data. However, companies lack understanding of what is needed to manage these data as data management is complex and requires new servers, tools and skilled professionals able to adapt to this exponential growth.

Once a data management approach is defined, it is possible to extract value from it. This process is time-consuming, costly and heavily varies according to the type of data and constraints. Data privacy and cybersecurity concerns must not be underestimated. Any future regulation considering the use of data for road safety purposes must meet requirements for privacy and security. Another constraint is data redundancy, which is particularly relevant in the automotive industry. Many vehicles cover the same route simultaneously, and the data they generate does not differ. Collecting, storing and indexing these data also have a cost. Moreover, there has been a significant increase in the cost of data production and data consumption due to a lack of common standards across the industry.

Some argued that sector-specific legislation is needed, as it can address current constraints. The challenges of having the data, anonymising them and ensuring they can be used and reused still

pose some risks. However, pragmatism is essential to strike a balance between the approaches of different stakeholders. It is helpful to recognise existing regulatory instruments for road safety before considering new legislation. Ensuring proper implementation of safety-related traffic information (SRTI) and real-time traffic information (RTTI) would yield similar benefits without imposing additional regulations on the market.

PAs play a crucial role, particularly concerning consumers. There are doubts about the value of data due to the vast amounts collected by manufacturers, who were uncertain about the next steps after the Data Act entered into force. However, these data have not yet led to meaningful services or benefits for car users. While data can improve safety, they need to be accurately defined. For example, there is insufficient data on advanced driver assistance systems (ADAS). The industry knows how many cars have these systems built in and the distances they travel, but it lacks clear information on their safety impact. Many believe it is up to PAs and the EC to ensure fair access to data for the common good, including safety.

Some vehicle manufacturers monetise data using software as a service (SaaS). For instance, consumers purchase a vehicle but must pay a monthly subscription to access features. Therefore, vehicle manufacturers have noticed that consumers are less inclined to pay for services in applications, with only a small portion of people willing to pay a subscription. Instead, consumers are more willing to share their data in exchange for services that provide them with real value. There is a large amount of generated data, and there are opportunities for AI to compute it. Moreover, there is much willingness to share anonymous data for safety purposes. It is essential to use data ethically, respect privacy and ensure GDPR compliance. There are numerous benefits from car data that extend beyond road safety. For example, improved navigation can reduce congestion and lower road risks and car locators can help track stolen vehicles. Safety and efficiency are top priorities for consumers when purchasing a car. Fuel efficiency and safety are two key factors. Many consumers look for real-time traffic updates, parking assistance and fuel efficiency, which are all indirectly linked to safety. Therefore, when it comes to sharing data, it is important to ensure they are anonymised rather than identify whose data they are.

When discussing the willingness of users to share their data, it is important to define with whom they are willing to share them. Indeed, connected vehicles communicate with different parties, from other vehicles to physical and digital infrastructure to platforms. Connecting vehicles at the infrastructure level is challenging, although this connection could deliver better infrastructure outcomes. This is due to a lack of understanding of data utilisation and production knowledge. In a nutshell, how these data are applied from a safety perspective needs to be considered. On the road authority side, it requires more research and more leadership.

Data utilisation differs according to their sources. For instance, mixing real-time data collected via video and camera detection can produce several real-time outputs like traffic forecasts and traffic lights. Some companies are investigating how to efficiently utilise data to prioritise the passage of emergency service vehicles by automatically switching traffic lights to green as they approach. The PA could also monitor the speed of vehicles to spotlight dangerous areas and kick-start resolutive measures. Nonetheless, speed data are straightforward and easily consumable. In contrast, data related to harsh braking and swerving require extensive analysis and processing before they can be useful to road authorities. These data come in various forms, including fleet penetration – how many vehicles are represented on the road. Understanding the causes behind these actions is crucial. For example, are drivers slamming on their brakes due to animals crossing the road, reflections from sunlight, water on the road or other factors? The aim of models is to triangulate these data with observable road features.

Safety goes hand in hand with competitiveness. The competitiveness of industry is expected to increase if autonomous automated driving is adopted to ensure fewer accidents. Data show discrepancies between the US and the EU. In the US, automated cars have accumulated two billion miles of driving data. Europe, on the other hand, is lagging behind. Regulation can boost the provision of services. Access to data for research purposes is often denied, even in the case of event data recorder (EDR) data. For example, organisations cannot access these data despite legislative efforts, and this limitation hampers road safety research. This issue is expected to become even more pronounced with the introduction of automated driving systems that are proposed to operate with limited functional-

ity. Navigating agreements and collaborations can lead to a fragmented landscape. This fragmentation makes it challenging to compete with tech giants entering the market based on business-to-business agreements. As a result, innovation in Europe could become increasingly difficult.

Over the last few years, there has been a shift in European industry as tech giants now handle services for many car models. This means it is harder for European industry to develop and innovate. An interesting case study is an innovative vehicle insurance model adopted in the Netherlands. It is 'pay-as-you-drive' insurance. The insured person can lower their premium if they can show that they drive safely. The insurance company is therefore allowed to monitor criteria like braking and speed. This approach was very successful in Rotterdam, where the provision of aggregated and anonymous driver behaviour data improved accident risk calculations and ensured that infrastructure was properly tailored. They highlighted several black spots, and over the last six years more than 250 authorities have accessed this database to support urban planning. Current legislation does not cover or encourage these types of initiatives enough. However, they empower users and foster innovation in both technical and environmental matters.

Moreover, acquiring and maintaining a vehicle involve many steps, from registration to repairing. The older a vehicle gets, the cheaper it becomes on the second-hand market. However, vehicle safety, security and environmental compatibility must be ensured over the life cycle, which averages 13 years. Car manufacturers have no platform to exchange views and evaluate. However, innovation goes beyond just data and information. It is necessary to tap into in-vehicle resources and consider the purpose and value of users.

Identifying where responsibility for safety concerns lies, particularly in relation to accidents, is a significant matter. The car manufacturer has a crucial role in this which has substantial implications for insurance purposes. For instance, if the car manufacturer is deemed responsible, the financial burden will not fall on the driver. At the same time, the road owner can also face consequences. Gradually, liability will shift from the driver to the vehicle, given the number of safety components installed in it. Nowadays, people rely on and trust the technology installed in their cars. For example, people rely on cameras and emergency brake systems to detect sudden obstacles when parking. Another matter concerns how the data and information gathered from these incidents are used. The aim is to leverage these data to enhance services and improve the user experience using the information extracted from traffic management and maintenance operations. It is important to note that data alone are not valuable unless they can be effectively utilised.

One should distinguish between data and information. Not all data can be classified as information. Information is often the outcome of processing data. Identifying the stakeholder in charge of combining data to extract information is also essential. However, data redundancy can slow down the process of creating information. Another factor to consider is that some individuals/vehicles are not connected to other vehicles and infrastructure. For instance, it can be challenging to connect pedestrians, cyclists and other forms of transport to the connected system. Therefore, defining what data are needed for what purposes is essential. A solution might be to establish an independent and trusted access point responsible for managing identification and authorisation protocols and determining who can access specific data types. Involved parties may include insurance companies, consumer protection associations and regulatory authorities that handle data transmission.

It is especially important to discuss data protection issues when PAs assess and evaluate large amounts of personal data. There is hope that sector-specific legislation will progress, particularly concerning PA investigations. National legislation allows access to vehicle data from the past ten years. However, data requests often cross borders, whether the data is stored in the cloud or held by manufacturers. These types of data are often not available. This leaves national PAs unable to verify whether vehicle equipment functions correctly during incidents. At the same time, when they discover that equipment is not working, they lack access to data that can explain why, despite having established legislation that grants PAs this access.

In Europe, inconsistent reporting standards make it difficult to compare data. For instance, the same incident might be recorded differently in France and Sweden depending on whether the person involved was taken to hospital immediately. It could be classified as a road injury in Sweden while in

France it might not. In Italy, the health system is organised at the regional level, leading to significant differences within the same nation. As a result, standardising feedback from the health system after an incident can be very challenging. Misinterpretations may also create additional problems rather than solutions, highlighting the lack of standardisation and homogenisation of the health system. Moreover, implementing DCASs (driving control and automation systems) in Europe is likely to reveal challenges, especially when navigation signage is outdated – for example, in Belgium, where a highway sign might still indicate a speed limit of 60 km/h. At the same time, the vehicle is programmed to adhere strictly to this. In addition, it will be interesting to observe the effects of the newly implemented General Safety Regulation (GSR), specifically regarding speed assistance systems. Drivers often disable this feature. This trend reflects a 'cry wolf' effect: drivers receive too many notifications from their vehicles, leading them to ignore critical alerts. In fact, within the first 20 seconds of activation many users instinctively turn it off, showing how regulation can have unintended consequences.

Recently published road safety data may seem impressive, but a closer look reveals complexities, especially regarding injuries and reporting of them in different countries. Statistical data show that the main causes of road accidents are speeding, distraction, driving under the influence and lack of respect for traffic signals. However, the causes of a large number of accidents are unknown. This lack of understanding is an issue for authorities and insurance companies. Current legislation is not pushing for a behavioural change, as a 1% decrease is not good enough. Moreover, cities and PAs struggle to enhance road safety as they rely on data from stakeholders but often lack the resources to utilise them effectively. While some road authorities are well-funded and capable, many are not. They typically lack the budget to invest in unproven data solutions, which makes it crucial to develop a reliable business model. Solutions might be found, particularly when it comes to road asset management and how these factors can connect on the road authority side. It is essential to encourage investment in this space. This situation presents an opportunity for the EC to assist local authorities and stakeholders in determining the right amount of data for informed decision-making.

Hence, stakeholders must share in-vehicle data, but there must be rules on sharing in terms of the standards – costs and commercial conditions must be defined. Consumers are ready and willing to share the data produced by utilising their vehicles. However, their willingness depends on the level of protection they are afforded. Data protection is important in this context, as clear rules will establish trust. A classification of data must be created to determine which data are shared with which public bodies – level-specific guidelines are essential. Furthermore, it is important to distinguish between data that are commercially valuable and data that are in the general interest. Data collected by insurance companies are an example of data with a commercial value – as they generate a cost for reckless driving. Data used in the general interest are particularly relevant for PAs, with urban planning being a key example of this. Examples of airbags not being activated in car crashes highlight a significant issue and serve the public good. Not knowing who caused a road fatality raises an important question: if the car can provide information, it can potentially 'snitch' on the driver. Authorities should clearly list general interest issues that justify legislative measures, leaving others to the market. The European approach cannot resemble that of the Chinese or American model. It must reflect a European data collection and centralisation methodology. Therefore, a trusted data pooling body is necessary for effective data sharing and addressing the general interest. Safety is not only an aim in its own right but it also drives European competitiveness. Pragmatism is essential to strike the right balance among interests.

Urban Planning: How can vehicle data for urban safety be best exploited?

Data management and road safety are connected. In the urban dimension, data management helps local authorities make more informed decisions in terms of safety, lower costs and saving time for public transport users. Technologies related to the vehicle itself, particularly those aligned with autonomous driving, are predominantly driven by original equipment manufacturers (OEMs) and their supply chains. While companies offer retrofitting solutions, OEMs hold the key to advances in this field. There are also solutions aimed at enhancing road safety, particularly for vulnerable users. These require a comprehensive approach to the entire lifecycle of road management, starting with design, identifying black spots and programming an

efficient maintenance strategy. Utilising real-time data can significantly aid in preventing incidents and improving overall safety, using historical information and predictive analytics.

Lately, cities have faced new challenges related to road safety. Although they are increasing 'active mobility' by building cycling infrastructure and incentivising walking, the number of incidents involving cyclists has not decreased. In Austria, for instance, it has increased. Another challenge is the number of people driving e-scooters on the pavement and creating a chaotic and unsafe urban environment. Some cities, like Hamburg, are exploring the inclusion of connected autonomous vehicles on the roads. However, cities need both physical and digital infrastructure to allow autonomous driving. With all these challenges also comes an opportunity to implement intelligent transport systems.

Some current projects involve AI and extensive data utilisation to improve the urban environment. For instance, the 'AI4Life' project collects data from hardware placed at road intersections identified as hotspots for accidents. Gathering information from existing cameras and augmenting this with sensors and IoT devices helps recognise patterns that may indicate when an accident is likely to occur. This allows cities to take proactive measures, such as adjusting traffic signals. Another project is 'SCREEN,' which addresses the lack of maintenance of city cycling infrastructure. The lack of maintenance leads to a decline in cycling. This project aims to develop solutions to gather data directly from bicycles by attaching a hardware device to them. The data collected concern the pavement, traffic lights, brakes etc. This platform can then categorise the condition of bike lanes – whether they are in good, medium or poor shape – and recommend necessary improvements to enhance cyclist safety. Finally, a third project is 'FOLLOW,' which focuses on individuals with disabilities, a subgroup of vulnerable users. People with disabilities often rely more on cars than they would like because they are uncertain whether a route is accessible. This platform acts as a route planner, providing them with information about the most accessible paths from point A to point B, thus encouraging walking and enhancing independence while reducing reliance on vehicles.

There should be efforts to promote access to strategic road traffic information (SRTI) and other data sources. While such data are often available due to EU initiatives, they are not always disseminated within local communities. Data utilisation in urban environments should follow a strategic and operational framework to achieve the aims of Vision Zero and a modal shift. On the operational side, it is essential to monitor road events and take action to address issues. Tactically, PAs need to determine the best locations for speed humps and how to measure the impact of interventions. However, some cities struggle to formulate what type of data they need and what actions to take. By providing this guidance, city authorities will know how to tackle road danger as they will know how to be more sustainable. However, this kind of project needs investment, as hardware – like cameras and connected infrastructure – needs to be installed. Cities must be empowered to act, connect with stakeholders and use available technologies. They should transition from analysing data from last year to examining data from the past five minutes, enabling them to take timely action based on this insight. However, there are still some barriers preventing PAs from achieving this. First, the local public authority often does not have specialised personnel to aggregate and analyse these data. Moreover, data are not standardised. For instance, there might be five different ways to geo-reference locations to provide the same information. There is also ossification in the data management schema, particularly regarding collision data. These data were once primary big data for cities, but the format and style of collecting collision data have not evolved to match the array of new insights available today.

Organisational challenges persist in any entity/company, but this is especially true of cities, where decision-makers and domain experts do not always collaborate. There is often a lack of the necessary feedback loop to make data-informed decisions. Likewise, there are financial considerations to make, as managing data means incurring costs not only for procurement but also for storage, processing, management and interpretation. Transforming data into information requires significant efforts, and this is where substantial value is created. Visualisation plays a part in this process, but simply displaying data on a graph or map does not always clarify how to act on it. Hence, the ultimate question is how much effort goes into this transformation and if the effort is proportionate to the final aim. It is ultimately about prioritisation.

The advantage of connected vehicle data is that, instead of waiting a long time for a collision report, authorities can see trends in key performance indicators (KPIs) – like speed reduction, mode

shifts and decreases in deceleration events – within a week, a month or a quarter. This creates a feedback loop that allows them to validate whether their interventions have made a difference. For example, many cities rely on a national collision database, which uses police reports to capture collision data. However, this method has its biases and reporting errors. To address this, cities can take a more holistic approach by incorporating data from connected cars and trucks – focusing on speeding and braking behaviour – and user-reported hazard events from apps. One compelling case shared by a participant in the forum involved a school zone identified as a risk factor. Despite having no recorded collisions, the data indicated speeding and braking behaviours around the school. This insight led the city to make design adjustments to the street, effectively reducing speeds and enhancing safety before any incidents occurred. Looking ahead, there are actionable steps to consider. Municipalities and local agencies need easier access to raw data inputs so stakeholders and local governments can conduct analyses. This will help generate insights regarding data representativeness and identify the data types necessary for improved decision-making.

Car manufacturers must consider the privacy, security and cybersecurity concerns consumers might have when using their vehicles. If something goes wrong, the liability lies with the manufacturers. Car manufacturers may encounter various requests related to road safety issues. One example is a request to access vehicle cameras, allowing individuals to check for any incidents on the road or to find available parking spaces. This type of request could violate the privacy of bystanders. The key is to address cybersecurity concerns holistically, ensuring that if the functioning of a door opening is affected, it does not mean it is also affecting the steering wheel. Moreover, some car manufacturers offer standard features on their native apps. For instance, remote air conditioning or the activation of cameras when someone touches the car, recording what happens to help identify anyone who may damage it. Car manufacturers are developing their systems by investing in R&I while learning from experiences that undermine security protocols. Thanks to these applications connected to cars, customers/drivers are empowered to use the data generated. They can have more information on their vehicle, which facilitates their journey, maintenance and fuel usage. Stakeholders and PAs might also be interested in purchasing these vehicle-generated data to improve their services or in developing third-party apps that can enhance drivers' experiences with the vehicle. However, most of these apps rely on a subscription mechanism for customers to turn raw data into information.

Furthermore, road signs in Europe differ from nation to nation. This is particularly difficult for car systems to recognise. If they were harmonised at the European level, the data collected by vehicles could be used to identify misplacement, for instance. There is a large distribution of crashes across the urban network. It is really difficult to identify black spots in locations where crashes happen and then be able to address them. There, the key is to empower local authorities to tackle problematic areas, although they are distributed across the network. Many mortal accidents occur when a car hits a pedestrian or cyclist. Vehicles equipped with systems could show authorities if there were issues in software recognition of the person crossing the road. Manufacturers can now access event data recorder (EDR) data in certain vehicle models, especially with the introduction of new general safety regulations. However, EDR data are only recorded when there is airbag deployment or very rapid deceleration, which typically does not occur in pedestrian collisions. As a result, data are not captured in these types of accidents, leaving authorities without vital information. This lack of data challenges efforts to enhance protection for vulnerable road users. Future in-vehicle technologies should also focus on 'near misses' rather than only on collisions. A much larger dataset of these near-miss events and the behaviour that led to them would provide a much more robust framework to solve them.

The role of middlemen in data management has developed fairly extensively. Many players attempt to monetise data, but most autonomous data providers have struggled to do so effectively. The primary issue is a lack of well-defined use cases for users, which diminishes the added value of the data. There is significant potential to be tapped into to ensure that users – cyclists, motorists or in any other capacity – have the safest possible urban environment. Some suggested that the EC should provide local municipalities with guidance so they can get access to these data through national access points or in programmes that are supported by regulation to allow a default playing field that the cities can build insights into, and then finally in terms of staffing. Although AI is not the ultimate solution,

it can help build applications that people can use to do that analysis, to translate, essentially, the requests that people have into technical analysis of the database. There are initiatives in which stakeholders use their data for the general interest by collaborating with local authorities. For instance, stakeholders might develop 'open street maps' on which sidewalks, zebra crossings, benches and traffic signs are clearly marked, which will enable pedestrians and people with reduced mobility to be safer when circulating in the city. It is important to guarantee a secure and accessible path for everyone and for people with disability, and families in particular. These projects must be communicated better to the larger public to ensure they are exploited and replicated in other cities.

KPIs and safety performance indicators highlight the dual need often present in road safety initiatives. On the one hand, there is a need for performance tracking, which involves understanding how cities progress toward road safety targets or sustainable urban mobility plans at the national or provincial level. Municipalities and provinces often hesitate to invest in data collection that might not align with the demands of higher authorities. They feel pressured to collect specific information dictated from above, leaving them reluctant to seek additional data that could be beneficial in their own decision-making processes. The role of national governments appears crucial to assist provinces and cities to progress in this area and in experimenting with what works and what does not. On the other hand, there is a need at the local authority level for relevant data to inform decision-making and drive effective actions. For example, the Netherlands has established a national data warehouse to consolidate various data sources. The Dutch PA has faced numerous challenges, making it difficult to make significant advances in performance monitoring. Large investments are not necessary. Rather, even small changes can have a significant impact. A successful example is the EU Road Safety Exchange Programme, in which national authorities address practical problems. The programme has triggered many legislative changes at the national level. Expanding this initiative to include more local and regional authorities in the next phase might be interesting. The TEN-T regulation is a powerful tool to address road safety issues. Currently, the mandatory safety KPIs required by this regulation are limited to the number of fatalities and serious injuries. In an urban context many more KPIs can be developed. The challenge is how to avoid over-regulating while preventing excessive administrative burdens. It is important to foster collaboration between the public and private sectors to create a wealth of opportunities for both. Moreover, digitalisation is barely included in the TEN-T regulation. By including this element, road safety through connectivity can be addressed and attract the right expertise.

The phrase 'you manage what you measure' highlights the idea that the structure of interventions is determined by the data collected. This has significant implications for various reasons. One key factor relates to how urban systems are designed. For example, if they are car-centric, the urban environment will naturally end up with more cars – maybe even more efficient or eco-friendly vehicles, but still cars. The European Declaration on Cycling incentivises the collection of different types of data. Research indicates that perceptions of safety are the primary barrier to adopting cycling, especially for women. PAs and stakeholders jointly need to gather data on the perception of safety barriers to make informed interventions. This leads to considering adopting a user experience approach rather than just focusing on existing data.

During this session, stakeholders emphasised the importance of not only the role of cities but also changing mobility patterns within them. It is crucial to recognise that the profile of fatalities and injuries is shifting. There is a concerning trend of people dying in accidents in which it is cars that are causing fatalities among pedestrians and cyclists. This shift can be attributed to the rise in soft mobility, which is a positive development but poses serious risks if it results in more fatalities. Therefore, discussion should not only involve connected vehicles but also connected road users. Cities should be empowered to implement the infrastructure they deem important for the town. Safety has an economic cost, but if a city cannot afford it it must be addressed via regulation. Market failures cannot hinder safety.

Road asset management – How can vehicle data best be exploited for road asset management and infrastructure maintenance?

Connected and cooperative vehicles are two different things. Connected vehicles involve collaboration among major service providers, map vendors, the automotive industry and road

operators to exchange data. The focus here is on safety without compromise and establishing a fair and trusted partnership. There is no standardised approach to data exchange as it is based on a contractual relationship which can last a few years. However, data are often presented in various formats and interfaces, making it difficult to interpret information from one supplier compared to another, even if they provide similar datasets. There is also no harmonisation of digital interfaces. This leads to different levels of data. Level 1 data consist of raw sensor data that remains within the vehicle. Level 2 data originate from a specific vehicle fleet. In contrast, Level 2+ data combine information from multiple vehicle fleets, although they typically only include indicators like loss of traction or activation of the anti-lock braking system (ABS). Level 3 data involve clustering and combining data to extract meaningful insights. This aggregated knowledge forms the basis for various services which enhance overall road safety and vehicle interoperability. Road operators contribute valuable knowledge about their sensor systems. When discussing data exchange in a connected world, the focus is on creating services within this Level 3 service domain. At this stage, the data remains within the OEM fleet until a specific service is generated, and only the service data are exchanged.

A different approach involves making data available from cooperative vehicles, which includes the cooperative element known as cooperative intelligent transport systems (CITS). In Europe, this concept is also referred to as cooperative connected automated mobility (CCAM). Europe is leading the world in this area as it is the only continent where CITS services are operational. Approximately 1.6 million CITS-equipped vehicles, including public transport vehicles and trams, are already on the road. Data exchange occurs through two systems using a hybrid communication approach. This method facilitates short-range communication and enables direct exchanges between infrastructure and vehicles, for example by directly sharing data at traffic lights and along motorways. Some companies utilise standardised message sets like cooperative awareness messages (CAM). A car transmits information – such as its location, speed and heading – ten times a second. This rapid transmission is crucial when one car needs to warn another about sudden braking. As a result, road infrastructure is constantly 'listening' for these messages. However, not all data are sent to a traffic control centre. Another type of messaging system is decentralised environmental notification messages, which are relevant especially when it comes to road assessment. If a car detects an accident or people on the road, a message is sent immediately.

Although road transport plays a dominant role in Europe, the infrastructure is quite dated. This means that the network is saturated, and this has a huge impact on mobility – i.e. congestion, accidents and dissatisfied users. Improved infrastructure maintenance is crucial. It is not just about traffic flow – poor road conditions can also lead to vehicle damage and increased wear on tyres and suspension systems. Heavy-duty vehicles are quite expensive and typically have a long lifespan. Therefore, it is in companies' best interest to avoid replacing them frequently, especially if they are not meeting existing standards. For instance, maintenance can be improved when potholes and worn-out roads are identified early. This approach also allows better road safety planning, including identifying 'black spots' where accidents are likely to occur before they happen.

There is noticeable tension in the asset management industry, particularly regarding data collection methods. There are two parallel approaches: a hardware-based approach that involves sensors, cameras and physical infrastructure, which provides rich and deep data, and another approach centred around connected vehicles, which generates wide but shallower data. This creates a challenge for asset managers at both the local and national levels to harmonise these disparate data types to create a comprehensive picture. Currently, these two approaches operate at different levels of understanding, which complicates deriving insights from them.

In the trucking business, many data can be shared on longer journeys. It is particularly relevant for the truck driver to know the time to the nearest charging station, also according to the traffic along the road. However, it is tricky for chargers to know in advance the usage. Bookings and reservations can partially address this. Connected systems with greater geographical scope can optimise charger usage. There is certainly a strong case for trucking when it comes to understanding the location of charging stations, congestion in these areas and whether there is a queue. It is also important to consider what chargers are available, as not all are suitable for trucks. However, much of these data are com-

mercially sensitive and authorities must strive to balance transparency and protecting this sensitive information. Furthermore, there are complexities related to drivers as legislation rightfully imposes resting times, but parking areas must be safe, secure, and equipped with charging.

Many cities, such as Amsterdam, are already using real-time vehicle data to manage traffic more effectively. Vehicles equipped with sensors can detect conditions like icy patches, heavy rain and fog, which may lead to accidents. This proactive approach can help prevent incidents. However, the challenge lies in a lack of PA investment in infrastructure. For effective real-time traffic management, it is essential to have the right infrastructure to communicate with vehicles, allow them to transmit data to the infrastructure and receive feedback to inform drivers. To fully realise the potential of vehicle data, it is essential to establish public-private partnerships built on a foundation of trust. Transport operators, as users, generate a significant amount of data. However, these data become truly valuable when established standards and interoperability exist between different systems, allowing a seamless data flow among various platforms and stakeholders. Until the Data Act came into force, access to these data had been limited. While stakeholders produced substantial amounts of data, there was no clear understanding of how they was distributed and used, and neither were they able to benefit from them fully. To address this, transport operators should be empowered to have more control over the data they produce. A lack of transparency poses many challenges, hindering the industry's confidence in the data economy.

The Data Act can play a crucial role by granting transport operators the right to access the data they generate. It also emphasises the delicate role of non-personal data produced by transport operators – such as load capacity, fuel consumption and driver behaviour. However, there are still gaps in the legislation. For instance, the current scope primarily covers raw data, which poses challenges for many small and medium-sized enterprises (SMEs) in the transport sector, as they often lack the capacity to process these data. There is also a loophole related to trade secrets that may allow some transport operators to keep certain data outside the scope of the act. For these reasons, sector-specific access to vehicle data could facilitate understanding of the industry. The rise in connected vehicles and emerging technologies like the internet of things (IoT) will generate even more data. Automated vehicles will heavily rely on data from their surroundings to function effectively.

Regarding PA access to these data, it is essential to provide access, but only for necessary functions. Data access should adhere to principles of legitimate use and minimisation. A good example is the Real Time Traffic Information (RTTI) Delegated Regulation, which outlines specific scenarios in which transport operators are required to make certain data available. Standardised protocols are also important to promote interoperability across systems, enabling smoother cooperation. Furthermore, strict cybersecurity policies and data privacy measures should be in place to safeguard data and build trust among stakeholders. Transparency in data usage is crucial, particularly regarding how data are transferred to third parties.

There is a significant disconnection between maintaining infrastructure and safety, and this issue affects countries worldwide. The data issue exacerbates these disconnections. Many road authorities purchase the same data twice: maintenance teams buy them to manage their assets, and safety teams purchase a similar dataset, albeit often with a different perspective. This duplication occurs due to a lack of comprehensive organisational procurement strategies by road authorities and licensing restrictions concerning how the data can be utilised. To improve traffic management and safety, better synergy in data usage is important. Integrating data sources can create economies of scale through their multiple applications. Global examples show road authorities investing in data to connect safety initiatives with asset management, marking an important step forward. Moreover, there is not enough information on how infrastructure reacts over time, and this is also because of climate change conditions. There seem to be several challenges related to the use of data by PAs. There is a lack of infrastructure capable of efficiently gathering raw data to communicate with connected vehicles. The existing infrastructure is often expensive, and processing these raw data can also incur significant costs. The relevance of data is determined by its application. When the same data can serve both preventative maintenance and strategic infrastructure redesign, there is a market failure. Unfortunately, siloisation persists, with each organisation developing its own SaaS products, often missing the importance of raw data integration. For instance, understanding

maintenance schedules can lead to better intersection redesigns. This issue is particularly evident in transport departments, in which operational and strategic teams frequently operate independently.

The main point is to increase service and efficiency. Infrastructure is generally monitored with sensors placed in various locations, such as bridges and tunnels. For instance, there is a European directive specifically addressing tunnel safety. Although many parts of the network are physically monitored, the information gathered from vehicles passing through tunnels is especially valuable. Some inspections are conducted regularly but not continually across the entire network. This means that critical information may be missed. For example, if someone patrols highways and passes a location ten minutes before an accident, they may not know the situation until it escalates. Data collected from vehicles can be useful in making important decisions in the sector, both for maintenance and managing events as they arise.

When talking about road assessment, it is crucial to differentiate between real-time data and older data. Expectations of roadwork information, especially for short-term projects, vary significantly. The initial use case that was thoroughly assessed focused on this cooperative work. OEMs want roadwork information delivered directly to vehicles in real time – information relayed within a tenth of a second. On the other hand, for data that is not time-critical, such as road surface inspections, the industry should explore gathering information regarding potential areas with slippery road conditions. The revision of the SRTI (Safety Related Traveller Information) delegated regulation should include safety-related traveller information such as the condition of road surfaces and potholes. Moreover, regions and rural areas face several challenges, including financing issues. The European focus is predominantly on transport networks, particularly motorways and urban nodes. Unfortunately, there are few national regulations addressing rural roads. The member states need to define the geographical scope that falls under road safety initiatives. It is crucial to consider the Road Infrastructure Safety Management Directive. However, most rural areas are not included in its provisions. The EC has been trying to assist member states by utilising some funds from the Connecting Europe Facility (CEF) budget. This budget is dedicated to network-wide assessments and may allow basic legal requirements to be exceeded. Without this, there would be little incentive to surpass the minimum legal standards. Nonetheless, there is a lack of historical data on rural roads. This is partly because there is no user-pay system for these roads. In many regions, there are also regional roads that are not funded based on user principles. Although no specific solution was proposed during the forum, participants were encouraged to explore possibilities to enhance European efforts for rural areas – ones which are not limited to the TEN-T and motorways, which are already well-equipped across Europe. Rural roads are where the most severe accidents happen.

The key is predicting and planning road asset maintenance. This enhances safety and lowers costs. The road industry faces asymmetries in the distribution of costs and benefits. The low level of cooperation among stakeholders is also a challenge. Cooperation is essential for traffic management, particularly in moments of crisis. The COVID-19 crisis showed how information was shared and monitored at the EC level regarding border crossing points, specifically concerning whether trucks were accumulating and being stopped for inspections. A satellite-based system was used to monitor border crossings across Europe to identify any issues affecting the single market. The EC must promote cooperation among all parties to recognise the overall benefits at the European level. However, fostering collaboration requires data sharing. To effectively share data, the parties involved must specify in advance the data they need and at which level they are needed. Addressing interoperability issues requires defining access levels for data and standardising the format. It is critical for regulators to establish interoperability criteria for data flows and sharing, ensuring that all parties can trust the system.

Conclusion

Connected vehicles are a unique data source that can significantly impact road safety. While failures in a system are inevitable, there should be mechanisms in place to catch these failures. Regulation plays a crucial role in addressing the usage of road data constraints. A standardised market for road signs should be pursued at the European level. This would allow a more uniform approach to testing autonomous vehicles. The differences are noticeable when comparing the case of urban planning to that of road asset management. In urban environments, the priority is efficient

and safe urban mobility, and an urban authority is typically responsible for planning. In contrast, for road maintenance operations the situation becomes less straightforward. Roads can fall under national or sometimes regional jurisdiction, and who has responsibility is often unclear.

PAs and stakeholders need to access in-vehicle data on both safety and on competitiveness. Once processed, data acquire market value, which should be exploited to enhance EU competitiveness. Over-regulating the industry would mean interfering with market dynamics. It is essential to distinguish between areas that require public regulation and ones in which the EC or national governments should refrain from intervening. Better governance frameworks should address national/EU fragmentation to ensure that all stakeholders can operate confidently in the system and work towards implementing a shared vision. Individual member states will not be able to implement national solutions for connected corporate automation. Another important point is the need for trust in sharing and utilising data effectively. If there is a consensus that a governance structure needs to be established at the European level, then establishing a European road agency might be a solution. It would give the private sector investment security.

In the forum stakeholders questioned whether new regulation is needed or deregulation is a priority. If regulation is the way to go, should it be at the local, national or European level? To answer this, the EC must identify the public interest. Surely, in road safety, digitalisation must be fostered as it brings efficiency gains at the systemic level by gathering road data. However, achieving this requires great cooperation and data sharing among the various stakeholders. Legislation should be seen as an enabler and not only as a sanctioning mechanism. The existing legislation in the European toolbox might be the solution to avoid overregulating. Legislation applicable for road safety might have non-specific purposes, such as being related to environmental concerns. The current regulatory framework is fragmented, and it has consequences in advancing technologies, i.e. automated driving in Europe. Some member states are piloting these technologies, while others lack any clear understanding of how to address the challenges posed by these innovations. Therefore, collaboration is essential to accelerate regulatory efforts and catch up with a generation of technological advances.

Sovereign and independent vehicle inspections need non-discriminatory access to safety- and emission-relevant data to guarantee whole life vehicle compliance

A comment by Gerhard Müller, International Motor Vehicle Inspection Committee (CITA)

The 14th Florence Intermodal Forum brought together key stakeholders to discuss road safety and the utilisation of data generated by connected vehicles for the public good. The event centred around critical questions regarding how vehicle data can be harnessed to enhance road safety across Europe.

The Commission recently published figures on road fatalities for 2023, which show stalling progress in reducing road fatalities in too many European countries. Around 20,400 people were killed in road crashes in the EU last year, a small 1% decrease compared to 2022. Despite some progress since the baseline year of 2019, few Member States are on track to meet the target of halving the number of road deaths by 2030.

These figures very impressively demonstrate how great the need for action is. In addition, sustainability has become even more important in recent times. Climate change is evident all over the world and pollutant limits are being exceeded far too often, especially in urban areas. Road traffic plays an essential role in this context.

Digitalisation, automation and emission-free powertrains are very promising to make road traffic safer and more sustainable.

Regulation (EU) 2019/2144 introduced safety technologies as compulsory safety features that all new vehicles must be equipped with. These driving assistance systems aim to reduce the number of deaths by 25,000 and severe injuries by 140,000 by 2037.

Highly complex emission after-treatment systems for vehicles with combustion engines, and alternative powertrains, e.g. electric and hydrogen vehicles, are needed to significantly minimise road transport pollution. At the same time, these new technologies create new risks that we must quickly learn to manage.

Only if vehicle testing and inspection methods keep pace with the development of new technologies can we manage risks, detect manipulations and maintain a high level of road safety and environmental protection throughout the life of a vehicle. Fair access to original vehicle data within the framework of sovereign and independent vehicle inspection is an indispensable prerequisite. Data are crucial to evaluate both safety and emission behaviour in vehicles, which are critical to the development of safer and more environmentally responsible transport systems.

Legislators around the world are therefore called on to create a legal framework for this as quickly as possible to clarify the following key issues regarding data:

Ownership of data

Generally, drivers should own the data generated by their vehicles, not OEMs. This distinction is important as it reflects a need for clear frameworks to protect the rights of drivers while ensuring responsible use of data in public safety initiatives.

A Trust Centre for non-discriminatory access to vehicle data for sovereign activities

Sovereign and independent vehicle inspections require access to original in-vehicle data to guarantee road safety and consumer protection. The Trust Centre concept separates duties between identification and authorisation of data users (Trust Centre) and processing data to authorised users (Data trustee server).

Coherent legislation across Europe

There is a call for at least EU-wide legislation to govern these developments, noting that national-level legislation would be insufficient. With vehicles crossing borders and new technologies rapidly evolving, a unified European approach is necessary to create consistent standards across the EU.

Improving competitiveness

There is a need to balance competitiveness with safety. The better the automated functions of vehicles are and the safer European vehicles become, the more competitive they will be on the global market. By focusing on safety improvements, European vehicles can not only

protect their users but also maintain a strong competitive edge.

European legislation must become more flexible and more quickly

The response of European legislation to the fast pace of technological advances in modern vehicles must become more flexible and quicker. The automotive industry is evolving rapidly, and legislation needs to keep up to ensure safety while fostering innovation.

The current revision of the roadworthiness package must take these requirements into account. Sovereign and independent vehicle inspections must be enabled to keep pace with the development of automated and connected road transport to guarantee safe and clean vehicles over the whole life cycle, also in the future.

Making Use of Data Generated from Connected Vehicles for Road safety

A comment by Monica Olyslagers, Global Innovation Manager, International Road Assessment Programme

The meeting on 'Making Use of Data Generated from Connected Vehicles for Road Safety' discussed road safety and how to use data generated from connected vehicles to enhance it. The focal questions discussed in the meeting explored why such data are needed, the potential benefits and challenges, and how they can be used in urban planning and road asset management. The European Commission (EC) has an important enabling role via regulation and legislation that can help achieve this potential.

Connected vehicle data are emerging as a valuable asset in improving road safety. Vehicles are becoming increasingly equipped with advanced sensors and communication systems and they generate vast amounts of data that can be harnessed to monitor various factors crucial to road safety. These include data related to vehicle speed, harsh braking, swerving, G-forces, weather conditions, intervention data (e.g. when advanced driver assistance systems such as pedestrian auto emergency braking have been triggered), emergency service alerts and traffic congestion. These data are already being used extensively to pinpoint places where there may be a higher likelihood of crashes, identify risky driving behaviour and better understand the factors contributing to crashes and near misses.

To maximise their potential, policy, regulatory and legislative approaches to connected vehicle data should be organised according to safe system principles. The safe system is a holistic approach to reducing road trauma in five areas: safe vehicles, safe speeds, safe road user behaviour, safe road infrastructure and effective road crash response.

How connected vehicle data can be best utilised is slightly different in each of the areas. The connections with the first three are quite clear. For safe vehicles, sensor data from autonomous and semi-autonomous cars can significantly contribute to the design and improvement of vehicle safety features. For safe speeds, real-time vehicle speed data can help authorities enforce speed limits more effectively, while also informing where speed management interventions, such as speed cameras and lower speed zones, are needed. For safe road user behaviour, connected vehicle data can provide insights into driver behaviour, such as reckless driving and frequent harsh braking, which can indicate dangerous areas or driver habits that need addressing through public safety campaigns or law enforcement.

Data are also relevant for safer roads. Connected vehicle data can be used as data inputs in established predictive road safety models, such as safety star ratings. Organisations like the International Road Assessment Programme (iRAP) are already utilising information about traffic speed, acceleration, deceleration and evasive manoeuvres in road safety assessment models that evaluate the 'built-in' risk of roads. This is used to identify and address locations with a high risk of fatal and serious crashes. Additional data made available by vehicle sensors, such as the presence of water on the road surface, can help identify and address a wider range of factors which contribute to the likelihood and severity of crashes.

Connected vehicle data can have the dual benefit of improving the safety of roads through improved maintenance and prioritisation. By analysing patterns in the data, road managers can determine where road maintenance is required, whether it is to repair potholes, replace worn-out signage or upgrade lighting at dangerous intersections. This type of data can also aid in traffic control measures, such as adjusting traffic light timings and redirecting traffic in case of crashes or congestion.

Last, real-time data from vehicles can improve post-crash responses, which rely on fast detection and responses to crashes, including being able to detect incidents and understand traffic conditions. In the event of a crash, connected vehicles can be used to alert emergency services and provide critical information about the location and severity of the incident. These data can significantly reduce response times and improve outcomes for crash victims.

Public entities play an essential role in facilitating use of these data. While private companies may collect vehicle data, it is public entities that are ultimately responsible for road safety, urban planning and traffic management. These entities need to access and process these data to improve policymaking, planning and decision-making processes for traffic control, speed limits, infrastructure maintenance and emergency response efforts.

Realising the full potential of these data relies on public entities, particularly at the local and municipal levels, having the capacity, knowledge and systems to ingest, process and utilise these data to its full potential. To address gaps, there are a growing number of commercial suppliers and consultants acting as bridges between data suppliers and consumers.

It also depends on having integrated data systems and procurement processes across entities that are collectively responsible for road safety: land-use planning, road managers, traffic management and emergency services. This is critical for standardised data structures, a common road network map, interactive software and ensuring that purchasing data and data services are efficient and meet the collective needs of these entities (including system compatibility, sharing and publication licensing, etc.).

Standardisation of data between suppliers and transparency about data sources are also important to give public entities confidence in the data they are using. If different data suppliers use different formats, public entities may struggle to aggregate and analyse the information efficiently, or switch suppliers. It also needs to be easy to check how representative the data are of the population (for example, data collected from high-end car manufacturers may be more concentrated in affluent areas and exclude other road users such as heavy vehicles and motorcycles).

The EC has an important role to play in ensuring that connected vehicle data can be effectively used for road safety. Through regulation and legislation, the EC can provide a framework that addresses data privacy concerns, ensures standardisation of data formats and promotes the sharing of vehicle data between private sector producers and public entities. In addition, the EC can promote best practices and encourage the adoption of connected vehicle technologies that enhance road safety. By focusing on the safe system principles, the EC and public entities can ensure that connected vehicle data contribute to safer vehicles, safer speeds, safer road user behaviour, safer roads and better post-crash responses, ultimately leading to fewer road fatalities and life-affecting injuries.

Urban Planning: How can vehicle data for urban safety be best exploited? The city perspective

A comment by Laura Val Ibort, EIT Urban Mobility

The European Commission's Vision Zero initiative sets ambitious targets: zero road fatalities by 2050 and a 50% reduction by 2030. While road fatalities in the EU have decreased by 12% over the past five years, progress has slowed, with 20,400 deaths recorded last year – only a 1% decrease from the previous year.

Urban areas present unique challenges for Vision Zero. Although speeds are lower, the complexity of traffic and the coexistence of multiple transport modes contribute to 40% of road fatalities and 56% of serious injuries. Other factors, including outdated traffic laws, unsafe behaviour and old road design, also play a role.

Leveraging Mobility Data for Urban Safety and Efficiency

Mobility data offer cities the ability to make data-driven decisions that enhance safety and efficiency. For example, the European Commission reports that real-time data navigation saves over 27 million hours of public transport users' time and reduces labour costs by up to €20 billion annually for car drivers.

Effective mobility data management empowers urban planners to make well-informed decisions and assess the impact of measures employed. Moreover, fostering innovation related to data on travel patterns, congestion and infrastructure usage can enhance transport systems and services.

In addition, data management technologies that gather real-time information from vehicles, sensors and smartphones can unlock opportunities for innovation in areas like smart cities (including digital twins), autonomous vehicles and sustainable transport solutions such as public transport, shared mobility and active mobility options.

The challenges in urban road safety

Mobility in European cities is undergoing a rapid change, with a shift towards active mobility options like walking, e-bikes, scooters and other micromobility vehicles, alongside the rise of autonomous vehicles. This evolving landscape poses significant safety challenges, especially for vulnerable road users such as pedestrians and cyclists, who made up nearly 70% of urban road fatalities in 2022.

To ensure the safety of all users, urban roads must be adapted for new transport modes and technologies, with a special focus on protecting the most vulnerable users.

Intelligent transport systems: opportunities for safer urban mobility

The challenges of new mobility patterns also bring opportunities to deploy intelligent transport systems (ITSs). ITSs can gather mobility data from various sources, including bicycles, scooters and pedestrians, thus enhancing protection for vulnerable users. ITS solutions enable cities to promote active, healthy and sustainable mobility while reducing road accidents.

To maximise the impact of ITSs, road infrastructure must integrate safety features across its life cycle – from design to maintenance and operations. ITSs support safer road design by optimising traffic management and collision prevention, and in maintenance they enable prompt issue detection and efficient repair scheduling. Safety auditing tools in ITS frameworks have reduced traffic accidents by 10-25% in a road's lifecycle and by up to 20% on existing roads. In daily operations, ITS technologies enable effective traffic monitoring, incident prevention and real-time information dissemination to road users, ensuring smoother traffic flow and improved safety.

Conclusion

Achieving Europe's Vision Zero targets for road safety will require joint efforts to address the unique challenges of urban mobility. While progress has been made, urban areas are struggling to reduce the rates of road fatalities and serious injuries due to complex traffic conditions and diverse transport systems. In some countries, like Austria, the rate of cyclist fatalities is even increasing.

Investing in gathering mobility data with intelligent transport systems can help cities make informed safety-focused decisions and protect vulnerable road users. By prioritising these areas, cities can create a safer more efficient environment that supports active sustainable mobility for all.

FSR Transport

The Florence School of Regulation (FSR) is a project within the European University Institute (EUI) focusing on regulatory topics. It works closely with the European Commission, and is a growing point of reference for regulatory theory and practice. It covers four areas: Communications and Media, Energy (Electricity and Gas), Transport, and Water.
The FSR-Transport Area's main activities are the European Transport Regulation Forums, which address policy and regulatory topics in different transport sectors. They bring relevant stakeholders together to analyse and reflect upon the latest developments and important regulatory issues in the European transport sector. These Forums inspire the comments gathered in this European Transport Regulation Observer. Complete information on our activities can be found online at: fsr.eui.eu

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