Editorial

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The 2019 International Colloquium of Gerpisa in Paris concluded the program of research on the *New Frontiers of the Automotive Industry* started four years earlier in Puebla. During this period, the number of articles presented at the Gerpisa Colloquium focusing on 'new frontiers' topics – electric vehicles, autonomous driving, shared mobility and digital manufacturing – has increased steadily: from 12 in Puebla 2016 to 41 in Paris 2019. This is why this year, we have not one but two special numbers based on works presented at the colloquium: the present one, which focuses on autonomous vehicle (AV) technology; and a second one edited last year by Pardi and Calabrese (2020) and focused on electric vehicles and global value chains.

So, what have we learned from this international program and how does this special number contribute in this respect?

Today's mobility paradigm based on fossil fuels and individual mobility is reaching its environmental, economic, and social limit, to such an extent that the private car will be increasingly challenged as a solution to meet mobility needs. Consequently, the main objective now is to increase mobility and accessibility while reducing congestion, road accidents, and pollution and noise in cities.

When the supply of public transport is insufficient, reliance on individual solutions such as the autonomous car is unsatisfactory. There is a risk of increasing traffic by the number of vehicles on the road, and time-wasting due to congestion and still inadequate road infrastructure. Thus, efficient urban mobility is unlikely to be achieved without the provision of efficient, extensive, and accessible transport options, in a sense that urban

areas require robust mobility solutions that are well integrated in the overall urban planning system. Supposing that this new understanding of transport solutions is to be achieved, policy-makers, urban and mobility planners, and city stakeholders must undertake vital initiatives by adopting a multimodal and integrated approach.

Thereby, the development of these new mobility forms will not only cause a complete disruption of urban mobility services, but it will turn the table for the stakeholders involved in the car industry (manufacturers, energy companies, computer scientists and public authorities).

In this sense, several initiatives in the context of mobility-as-a-service (MaaS) have arisen, whose purpose is to offer users with seamless, tailored door-to-door multimodal mobility packages via a single interface of a service provider. Thereby, MaaS appears to focus on the changing role of the car, becoming a vehicle used but not owned, available to be booked for a point-to-point trip, with or without a driver in the future AVs come on stream in volume. Hence, AVs are inserted in the most significant historical change for society, the economy, automobile and public transport industry.

In this special issue on AVs, the aim was to shed a relevant and innovative light on autonomous mobility. As the implementation of more advanced sensors, radars, and navigation technologies in vehicles increases, there is now a potential for the mass deployment of a new form of shared, electrically operated, driverless vehicles for urban environments. In this sense, the technology itself is no longer the major hindrance. The main roadblocks that AVs are now facing are consumer acceptance and regulatory frameworks. Thus, urban centres could significantly benefit from the introduction of AVs, since – by being offered as a service – they can compete with automobiles by price, and even be more efficient than traditional public transport (taking 10 instead of 150 passengers), moving on flexible rather than fixed routes, and being on-demand rather than on schedule.

In this regard, several challenges remain unanswered and are discussed in this special issue, such as: What is the current level of the AVs' technology diffusion? What are the critical success factors for AVs insertion in a given country? What is the current global scenario of experimentations with shared AVs? What is the potential of advanced driver assistance systems for the aging global population? And what are some potential realistic usage scenarios for shared AVs?

This special issue is part of a forward-looking dynamic in the face of these rapid and complex changes in the urban space. By representing a potentially disruptive and beneficial change to the current transportation business model, AVs are bound to change the future of urban mobility, and such transformation will not only affect the means of transport but society as a whole. Nevertheless, it is still complex to understand how life will be affected by this disruptive innovation in a sense that the timing, scale, and direction of the AVs' impacts are unclear (e.g., issues with data privacy and cybersecurity), and the opportunities to influence investment decisions are also still limited.

However, we could share the point of view of J.L. Marchand, Deputy Director of Eurovia, "We should be able to say in the years to come in which network it may be accepted a particular type of vehicle with a particular level of intelligent service and we will not escape this reflection." Being so, these new AVs trends are concomitant with the generalisation of so-called service economics – where owning a car will no longer be seen as a priority for users; thus, vehicles tend to be increasingly shared and the 'mobility' function becomes the goal of market and business analysis.

This publication thus shows that the approach to the autonomous mobility offer is being reconfigured. The AV has become a 'commonplace' technical object and responds to a logic of individual use. On the other hand, there has now been a growing interest and focus on the collective and public means of mobility. In this sense, shared AVs seem to be a response to a specific need of large urban cities. Issues related to autonomous public transport, environmental concerns, market dissemination of the technology, aging demographics and new uses are transforming the way of thinking mobility in an urban space.

This special issue is composed of five complementary articles offering both a clear picture of the current situation of AVs and food for thought on their future evolution in the urban space. After a large perspective on the various experiments that have taken place around the world, the articles of this special issue question the process and the factors of diffusion of AVs and scenarios of their insertion in urban mobility.

The first article gives an overview on worldwide experimentations with autonomous shuttles for collective transport. Fabio Antonialli performs a comprehensive benchmark on these experimentations collecting data online on both academic and grey literature yielding a research corpus of 176 experimentations. Results show a European lead on both the number of experimentations and manufacturers. The majority of the deployments were aimed towards public transportation being short to mid-term trials, mainly offered free of charge to users. Regular-line transport was the prevailing operational mode adopted, meanwhile, on-demand services were present but incipient, mainly due to legal barriers and technological and infrastructural constraints. Eight main typologies of uses able to fulfil both private and public transport offerings were identified, being either focused on solving first and last-mile issues or micro transit commute. At last, the main common stakeholders were identified, as well as how different forms of value are created and distributed among them.

If the number of experimentations is an indicator of the growing interest in AVs, the question of their generalisation as a common mode of transport still remain open, since autonomous driving has a strong potential of changing the existing market paradigms and facing new challenges. Therefore, in the second article, João Paulo Nascimento da Silva, Kelly Carvalho Vieira, Joel Yutaka Sugano, Gabriel Pedrosa and Cledison Carlos de Oliveira, analyse which factors may leverage the diffusion of AVs. Their study addresses the diffusion of AV technology using the Rogers' innovations diffusion model in order to better understand the factors that can trigger a higher adoption rate and increase diffusion. The results indicate that research on this topic is still scarce and strongly dispersed, thus not yet prepared to form the defining characteristics of the innovations diffusion model. Yet, the article offers a theoretical framework and lay ground to future research issues.

In the same perspective, the third article from Bruna Habib Cavazza, Thais Assis de Souza, Rodrigo Marçal Gandia, André Luiz Zambalde and Isabelle Nicolaï examine the diffusion of AVs in Brazil and France via the innovation radar. The authors seek to identify the critical success factors, to propose a theoretical model of the innovation radar for the insertion of AVs as a product-service system in a country, and to map and discuss the radar in the context of Brazil and France. They address the gap between the development of AVs, the differences between two national contexts, and the lack of specific knowledge about how to manage disruptive innovation in countries. The author's intent to bring clear diagnosis about the innovation, allowing

the formulation of guidelines and actions for the capacity development of a country. The results obtained in Brazil and France is crossed with official data and statistics to corroborate the use of the innovation radar as a tool.

More specifically, the dissemination of autonomous driving technology could be facilitated by targeting populations with specific needs to which it would provide an adapted response. In this perspective, the fourth article written by Timo Günthner, Heike Proff, Josip Jovic and Lukas Zeymer show how relevant it may be to target aging societies. The authors analyse the potential for advanced driver assistance systems for elderly drivers – whose number is growing in many countries. Their literature review provides an overview of these advanced driver assistance systems which shows that they are a transitional technology to full autonomous driving and that they offer valuable market opportunities. Their study proves that there are market potentials for these systems in the 'silver market'. However, there is no simple linear relationship between age and willingness to pay. The results show that age has an influence on the willingness to pay for driver assistance systems although it may not be the only variable that influences willingness to pay and the promising 'silver market' needs a segmented analysis.

Current researches on AVs open the door to a wide range of hypothesis concerning their diffusion for individual transport as well as for public transport. Public transport may be undergoing an important transformation following the arrival of AVs. Researchers, think tanks as well as consulting companies have designed many scenarios based on trend analysis of three main dimensions: technology, regulations and uses. The user level of acceptance for autonomous driving represents a key point for any prospective study. Therefore, the fifth article aimed at proposing a use case daily scenario by focusing on the user. In this article, Sylvie Mira Bonnardel targets the objective of building autonomous mobility scenarios by interacting with the users, combining current user's opinion with their expectation and vision. The author analyses more specifically the implementation of AVs for micro transit and commuting by studying user opinions via two field surveys. Discussions with users help the author to build and test a use cases scenario and to picture personas whose characters may allow decision makers to better figure out the conditions to leverage the citizen's level of acceptance for robomobility.

References

Pardi, T. and Calabrese, G.G. (2020) 'Editorial', *International Journal of Automotive Technology and Management*, Vol. 20, No. 2, pp.131–136.