Technological and infrastructural prerequisites for the deployment of the first shared Autonomous Vehicle Pilot Test Project in Malta

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Abstract. Automated vehicles are leading to a significant revolution in road transportation systems, with extensive challenges to mobility through several factors, including economic, legal, social, psychological, and technological aspects. Various countries around Europe have tested and piloted autonomous vehicles on their roads and subsequently published research on their approach towards reaching such goals and also on findings from their various projects. However smaller peripheral countries tend to fall behind, whenever innovative technologies are being researched and tested. Research on Malta's level of preparedness for the introduction of autonomous vehicles is limited. This research project deals with an analysis of the expected impacts of shared autonomous vehicles on the physical and digital road infrastructures and assesses the current infrastructure preparedness on a local scale. The project aims to provide Malta with a new mobility solution, that is sustainable and technologically advanced, that will at the same time increase the users' choices of alternative transport. Through various meetings and consultations with local stakeholders, it emerges that Malta is still in the very initial planning stages for the introduction of Autonomous Vehicles and that an immediate intervention on Malta's current physical and digital infrastructure is required to enable the actual implementation of shared autonomous mobility field testing. The outcomes of this research project include a roadmap and recommendations to local authorities, which shall pave the way for the first shared autonomous shuttle pilot project to take place on Maltese roads.

Keywords: Autonomous Vehicles, Shared Mobility, Pilot Project.

1 Introduction

1.1 Background

Autonomous Vehicles (AVs) are still a developing technology that may prove to be the next big evolution in personal and shared transportation. A fully autonomous vehicle does not require a human driver, since it is computer-driven, and relies almost entirely on its onboard sensors to make driving decisions. Some vehicles are already being deployed with autonomous functionality features, such as self-parking, lane-keeping aid and auto-collision avoidance features. However, until a vehicle can drive itself independently, it is not a truly autonomous vehicle. Most manufacturers will phase in various levels of autonomy until fully AVs are widely tested and eventually deployed on the road network and accepted by the public [1]. Through widespread pilot testing of AVs on the road networks, the existing physical and digital infrastructure can be assessed and the necessary infrastructure changes which will allow such vehicles to operate can be determined. Apart from infrastructure, regulation is currently being viewed as the main hurdle to the adoption of autonomous driving [2]. Local transport authorities, network operators and private companies must therefore prepare for these new technologies, which will have a radical change on how people travel and interact with their environment.

This research forms part of an ongoing research project named Malta's Introduction of Shared Autonomous Mobility (MISAM). It forms part of the first step of a research project that the University of Malta, Infrastructure Malta and Debono Group are jointly working on with the aim to draft the national roadmap to introduce AVs on the roads in Malta. The project aims to promote multi-modal travel by providing an additional mobility service, which will be inclusive, especially for the elderly and less mobile people. The project has a special focus on legal, governance, technological and infrastructural prerequisites. The results of this research shall lead to the deployment of the first autonomous shuttle pilot project in Malta. The research component is currently being concluded and the establishment of possible trial test locations, as well as the definition of the key parameters for the operation of the pilot project are being established.

MISAM is one of the only two current projects in Malta, which are focusing on the introduction of AVs. Another distinct AV-related research project is focusing on introducing a series of specific test routes to be eventually integrated with the rest of the Maltese public transport system. This is being led by Malta Public Transport in collaboration with Transport Malta and the University of Malta.

Both projects are actively seeking funding opportunities, which can lead to the actual deployment of the AV testing projects. The target is to have the first AV pilot project in Malta in operation by 2023, if funds are secured.

1.2 Malta's current state of Land Transport

Being a car-dependent society, private mobility forms an important facilitator of Maltese society. The use of the private car provides a lot of flexibility in the way people in Malta plan their activities. Over the last years, attempts to reduce car dependency by encouraging people to shift to other modes of transport were futile. It has been difficult to change such a car-dependent lifestyle by shifting to public transport since they are not as efficient and reliable compared to private mobility.

What makes Malta a more car-dependent place are the relatively short trips and the travel time that an individual is prepared to spend moving between places. According to Transport Malta, most trips, irrespective of purpose and distance, are done by car. In the 2010 National Household Travel Survey, it was found that 70 per cent of all trips are done by car [3].

With people highly dependent on private land transportation, road congestion has become a major concern in Malta. The predominance of road transport is confirmed by the high rate of motorisation, which was 780 licensed vehicles/1,000 inhabitants in 2020, with the value increasing to 927 vehicles/1000 inhabitants aged 18 years and over [4]. This has led to traffic congestion in some areas during rush hours. This results in delays resulting in a non-productive activity that induces commercial, economic and personal losses.

According to the National Transport Strategy 2050, the cost of traffic congestion in Malta is going to reach €1.28 billion a year in 2050, unless changes in the Maltese transport policies are put into place [5]. Moreover, there is also an increased waste of fuel, which leads to increased air pollution. In fact, 30% of total net CO2 equivalent emissions in 2017 and 2018 were caused by fuel combustion from land transport [4].

The rising number of motor vehicles is translating into an increased level of hazard on the road. As the number of registered vehicles is increasing year on year, the number of traffic accidents are increasing as well. In fact, in 2019 the number of reported traffic accidents on Maltese roads stood at 15,502, up from 14,070 in 2013. Moreover, 16 of them have resulted in the loss of life in 2019 and 12 fatalities in 2020 [4].

Apart from traffic congestion, Malta also faces problems of parking shortage. Current statistics [4] show that over one-fourth of all contraventions given out by wardens in 2020 were due to illegal, or unauthorised parking or stopping. This illustrates the challenges of the current parking situation. One can argue that it is becoming inefficient to make use of private mobility in areas of high demand since it is becoming very difficult to find a parking space. In Malta on-street parking is free of charge, except for the limited case of Valletta. Parking in public car parks carries a voluntary parking tip, while the price of parking in private car parks is higher in areas of high demand such as Sliema.

Despite the rapid increase in motorization and car dependence, over the past decades, not much has been done to reduce the related impacts. Forecasts for the coming years indicate that on-demand responsive transport can potentially play an important role in catering for the ever-changing needs of land-based mobility.

The role of shared AVs in the local mobility context. Globally, huge efforts are being made to introduce shared mobility services related to AV fleets. The deployment of shared AVs in Malta has the potential to address the previously mentioned prevalent issues. It is an attractive solution for Malta's current private car users to shift to shared mobility options, retaining the option to travel directly from point to point, and more crucially for the first and last-mile travel. Furthermore, shared AVs offer a unique opportunity to improve the safety and efficiency of Malta's transportation system and, can potentially foster the use of on-demand shared multimodal transport in Malta. However, although these AVs might not necessarily reduce traffic congestion in the short term, they will be able to assist the underserved markets. AVs possess the unique capability to provide ageing and transportation disadvantaged citizens with the opportunity to restore their personal mobility. Nonetheless, the societal implications of AVs are wide ranging and this is evident from the global research efforts being dedicated to this subject.

2 The role of Road Infrastructure in AVs

2.1 Background

AVs are leading to a significant revolution in road transportation systems, with enormous challenges to mobility through several factors including economic, legal, social, psychological, and technological aspects. For a country to allow AVs on its road network, it needs to assess the level of investment necessary for the transition to take place. Planning and design changes to road infrastructure will be necessary in order to ensure the efficient and safe circulation of AVs in urban centres and rural areas.

These infrastructure changes will require public investment and planning. Because a period of adaptation of the market to the AVs is foreseen, it is also considered that there will be a redundancy in the infrastructure that will allow the coexistence of both AVs and conventional cars [1]. However, given the technical requirements of AVs to monitor the surrounding environment, the need for a well-maintained road network will be essential.

Companies and researchers are developing automated vehicle technologies that can function reliably on today's roads, despite the imperfections and specificities of this existing infrastructure. As a result, AVs may not require significant infrastructure investments before being deployed on public roads. However, maintaining and improving road infrastructure could speed up deployment, avoid the costlier technology needed to cope with road imperfections, and increase the reliability of AVs. Policymakers will be asked to determine the amount governments should invest in modifying infrastructure to make AVs operation easier and prioritise that investment compared to other transportation needs.

Today's road and highway infrastructure has been designed to suit the needs of human drivers, which may not be optimal for vehicles driven by computers. Thus, the transition from human-driven to computer-driven vehicles requires changes to road markings, signage and signalisation. Lane width and road capacities may be impacted and access management arrangements may need to be modified, creating the potential need for new infrastructure interventions.

2.2 Physical road Infrastructure

A Smart Road infrastructure classification scheme (ISAD) has been developed through a European Union project 'Inframix' [6] whereby a particular stretch of road can be assessed for the capability of its infrastructure to provide additional digital support to AVs. This classification depicts how an AV can operate on conventional infrastructure and illustrates the benefits of adding digital infrastructure systems on the road network on the way AVs operate. There are five classes within the ISAD classification, denoted by A to E. A represents the highest infrastructure support level from various digital road infrastructure elements, and E represents no infrastructure support since no digital information is provided to AVs.

Requirements for AV operation. The main physical road infrastructure needs include the following areas: Pavement markings, traffic signage, maintenance, consistency and standardisation.

Road markings. Currently, on roads classified as ISAD E, AVs depend on their ability to decipher a lane or road surface. They use cameras and image processing to identify lane markings to determine vehicle position. As a result, pavement markings are significant for AVs [7]. Longitudinal pavement markings provide two functions for AVs to indicate the forward road lane alignment and locate the vehicle within the road cross-section [7]. Several demonstrations of automated vehicles have failed due to inconsistent pavement markings, underscoring the need for consistency [8]. Discontinuities make it difficult for the sensors to predict where the vehicle is in the lane, causing the vehicle to rely on other features such as the edge of the roadway, which is more difficult due to lower contrast and consistency [9]. Another concern is overlapping markings that occur when markings are repainted, but some evidence of the former remains. Although overlapping pavement markings frequently arise in construction work zones, they also occur along regular roadways.

The issue of variation in standards for road markings and signs can be mitigated during regular replacement cycles over the years ahead, should a set of common standards that exist today will be adopted and applied by all European nations. This means mainly ensuring simple consistency of the line marking widths well-maintained to ensure that they reflect enough light to be read by drivers and in-vehicle equipment in all-weather scenarios. It also means removing the unnecessary inconsistencies in fonts, colours, sizing and shape that have crept in when nations have implemented basic safety signs defined in international conventions such as "stop", "give way", speed limits and banned turns. It means understanding the importance of marking the edges of roads.

Traffic Signs. The notion of retro-reflectivity is also applicable to traffic signs. Similar to road markings, current AV systems are confused by damaged, faded, or non-compliant signs. Hence, AVs require traffic signs to be consistently placed and maintained at a much higher level than the current practice [10]. As AV systems are becoming more sophisticated, the systems will need enhanced signs that offer redundancies if one component, such as GPS fails [10]. Additionally, the infrastructure will need to support both human and machine vision for some time, requiring signing that is visible to humans and machines in any road conditions [10].

Pavement structure and Road surface maintenance. AVs are more likely to operate continuously in the middle of the carriageway by using the Lane-Keeping-system (LKS), which will accelerate the appearance of rutting and other pavement deterioration (e.g. potholes, cracking). So, certain areas beneath the AV operation track need to be strengthened consequently. In AV-dedicated lanes, higher stiffness and more deformation-resistance materials can be considered for the pavement structure. The maintenance frequency can also be increased in the future, if necessary.

Maintenance is an essential aspect of accommodating AVs. AVs can adjust vehicle speed more predictively through Vehicle-to-vehicle (V2V) and Vehicle-to-infrastructure (V2I) communications to avoid sharp braking, thus reducing the stopping distance design standard. The requirement for the coefficient of friction, which is represented by the Polished Stone Value (PSV) and the texture depth, can therefore be relaxed so that less stringent skid-resistance materials are possible for use in the surface wearing course in the future.

Poorly maintained road surface conditions pose a considerable concern for connected and autonomous vehicles (CAVs) since it is uncertain how imaging systems may understand these surface conditions. Poorly maintained road conditions can also make it difficult for an AV to predict the behaviour of the other road users. As noted by RSMA [9], a driver can judge the behaviour of a motorist who swerves around a pothole, but it is difficult for an AV to make the same assessment. As a result, the best recommendation is to maintain or implement timely maintenance, mainly when significant surface degradation, such as potholes, occur.

Access Management. Since AVs can potentially enhance ride-hailing and shared service usage, people will want to be picked up and dropped off as close to their destination as possible. Hence, AVs will increase the need for drop-off and pick-up points on the existing road network [10]. These drop-off and pick-up points will appear in areas beyond airports and public transport hubs, such as office buildings, commercial spaces, cultural and sports venues, and apartment buildings. At the site level, the priority will shift from parking to drop-off and pick-up areas.

Existing kerbside parking and service roads could be retrofitted into drop-off/pick-up areas, and footpaths will be redesigned to include dropper kerbs. One drop-off/pick-up area could serve multiple buildings or blocks in dense areas, just like bus stops are placed in strategic locations. With the increase in drop-off/pick-up areas, potential conflicts with non-motorised traffic on sidewalks and bike lanes may also increase.

These must be considered in the design of new road infrastructure projects and retrofit projects.

Current situation. Depending on its importance, demand and location, physical road infrastructure has to fulfil various sets of requirements. There is no such thing as one single standard for road infrastructure throughout Europe that could be easily amended to prepare for CAVs. Instead, the various road categories, their specific design requirements, traffic loads and complexities have to be assessed individually and from different angles. Road infrastructure in Europe is heterogeneous for diverse reasons. Geographic and climate conditions vary greatly from North to South but also traffic density, volume and transport issues within each of the countries differ depending on location and road category.

All the currently existing in-built AV sensors and algorithms, which are being used and constantly under research, require a structured road infrastructure to work. Vehicles are being designed for use in properly designed, equipped and constantly maintained road infrastructure.

*Malta's physical road Infrastructure state***.** The main difficulties encountered in Maltese road infrastructure include the lack of timely maintenance, particularly of the road asphalt surface, traffic signs and road markings; lack of lane markings particularly in residential and urban roads; non-standardized merging and diverging lanes; lack of standardization of road markings and traffic signage and the presence of potholes and random traffic calming measures. Furthermore, there are various shortcomings on how diversions during road/lane closures are currently presented to road users, and on how traffic management plans for road works are drawn up and implemented onsite.

Other challenges prevalent in Malta's infrastructure include unrestricted access to motorized vehicles even in prohibited areas and the lack of proper infrastructure for non-motorized vehicles such as bicycles and pedestrians. There is a lack of proper vehicular parking within the allocated parking spaces, with minimal enforcement leading to double parking, especially in busy town centres, and the lack of lay-by spaces that serve to pick up or drop-off passengers from private cars and taxis.

2.3 Digital road Infrastructure

Digitalisation has a vertical impact across the several layers of the road system. This will bring, in the medium to long term, profound challenges and disruptions to the existing status quo in terms of road construction, management, and particularly, operation of road systems [11].

The "Digital Road infrastructure" may be defined as "the digital representation of the road environment required by Automated Driving Systems, C-ITS and Advanced Road/Traffic Management System" [12]. In addition, the infrastructures include those for integrating afore-mentioned elements, i.e. the positioning infrastructures (e.g. satellite positioning, cellular and LAN positioning, roadside landmarks), communication infrastructures, and back-office processes (e.g. information management centres, servers and databases, data interchange servers, traffic flow sensors etc.). The connection between the physical highway infrastructure, digital mapping, digital traffic information, and AVs, including the concept of a local dynamic map, plays an important role [12].

Requirements for AV operation. The main digital road infrastructure elements include communication infrastructure, high-resolution mapping and data capture and information sharing, and inventory.

Increasingly, urban vehicles are becoming a moving sensor platform that provides background information to drivers and such information could be uploaded to the cloud. The sensor's data will be available to a network of AVs that exchange their information with each other in order to optimise a well-defined function. Thus, vehicles would become another device connected to the Internet. Ideally, when human control is removed, AVs should cooperate to allow handling traffic more efficiently, with lower delays, less pollution and better driver and passenger comfort. Vehicles can exchange information with other vehicles (V2V), with the roadside infrastructure, with the Internet, with a pedestrian and in the same way with any element within a smart city [13]. The term Vehicle to Everything (V2X) is used to refer to all these types of vehicular communication.

Nevertheless, due to the complexity of simultaneous control of hundreds of thousands of vehicles, current 4G technologies are not able to support such a large device density [10]). Some other critical features such as low latency and high throughput are necessary to achieve it. For instance, it would take about 1.5 m for a vehicle with 4G to apply its brakes. While a vehicle with 5G would only require 2.5 cm to do so, helping avoid accidents [13]. In the same way, if a vehicle enters an area with low coverage or is very populated, a 4G connection fails. However, a 5G telecommunications technology theoretically will always have coverage, allowing keeping the connection stable anywhere and anytime. Therefore, within the objectives of the Internet of Things and smart cities, vehicles play an important role that leads to the Internet of Vehicles, which apart of vehicle communication, is focused on the interaction on humans and different countries [10]. For example, AVs have to receive constant software updates in order to continue to work safely. They also need to interact with each other and with relevant infrastructure in order to function properly.

Various European countries have already made significant progress with the deployment of 5G coverage within their countries such as Germany, France, Ireland and Italy. However, more investment in standalone 5G development is needed to address the need for AV’s ultra-reliable and low-latency communications (URLLC), with communication interoperability when travelling between cross border countries.

Current situation. Malta's existing limitations in road infrastructure to cater for AVs are not only present on the physical side, but also feature in its digital infrastructure. One can state that presently only basic digital road infrastructure is present in Malta's road network, which can be used to communicate with other road users. Digital infrastructure features include variable message signs (VMS), ANPR cameras, and intelligent signal controls, which are monitored and controlled by Transport Malta, the national transport regulator. No roadside sensors, which can wirelessly communicate with modern vehicles are currently installed. Also, V2V is not yet available since the local telecommunication situation does not yet make it possible. Other challenges include the lack of timely updating of digital road maps, especially in respect of road closure notifications.

With regards to the local traffic control centre, its use is mainly to monitor traffic situations and study traffic flow for better planning and traffic management. It makes use of several cameras installed in strategic points. However, VMS messages are not altered dynamically so as to guide drivers to take alternative routes or inform them of hazards or accidents on the road ahead.

Malta's telecommunication companies have introduced the 5G service in 2021. Constant improvements on the network are being made to increase area coverage and eliminate black spots. The type of 5G being offered is not the standalone-type, meaning that is a boost on 4G in terms of speed as a throughput, however, latencies are still very high, making it possibly unsuitable for operating connected AVs. With standalone 5G which is currently developing, there will be high improvements on the latency, whereby low latency is the type of responsiveness necessary for AV use cases.

3 The way forward for a shared AV future in Malta

3.1 Local Stakeholders' perspectives

The deployment of AVs in Malta is an ambitious undertaking and can only be implemented after thorough consultation with local and foreign experts in the field of transport, and other interested and affected stakeholders. Stakeholders being consulted in this project are Transport Malta, the national transport regulator; Infrastructure Malta, the agency responsible for road infrastructure in Malta; telecommunication service providers; local authorities in the field of communication and digital innovation; insurance organizations and various high-level academics within the University of Malta with expertise in the fields of artificial intelligence, spatial planning and digital mapping.

Meetings were held with stakeholders to capture information related to familiarity and awareness of the implications of AV deployment, stakeholders' level of preparedness for such technology and their prospects for Malta to serve as a test-bed for AVs. Furthermore, these meetings allowed to achieve an understanding of Malta's current level of planning for AVs, from which a roadmap could be developed.

Transport Malta has started the review process of legislation, which can allow AV pilot projects on the Maltese road network. Representatives from the Ministry of Transport, Infrastructure and Capital Projects and Transport Malta started attending meetings of the Connected, Cooperative and Automated Mobility (CCAM) partnership, which aims to assess and understand the impacts and harmonise European research and innovation efforts to speed up the implementation of CCAM technologies. Furthermore, Transport Malta representatives are also attending the UNECE (GE.3), a group of experts drafting a legal instrument to allow the use of AVs in traffic conditions. Representatives from Infrastructure Malta are also attending the high-level meetings on connected and automated driving (HLM CAD), whereby industry experts meet to speed up automation in the transport sector.

In general, the telecommunication service providers were well aware that the development and successful deployment of AVs on the road network, depends on reliable and fast mobile telecommunications and the use of 5G technology shall play an instrumental role in this regard. They expressed their interest in collaborating in a possible future shared AV pilot project, by making the necessary investments to ensure an adequate network infrastructure coverage for an AV, possibly communicating with the trial control centre and with elements of the road infrastructure. It is understood that in order to achieve real-time data accuracy, a high density of base stations is needed.

The immediate need for a forum of interested stakeholders in this field is a necessary prerequisite for the actual deployment of a first pilot project to be successful. Similarly, a common framework is necessary for telecom companies to be able to install stations on current physical infrastructure and also to be able to expand their current infrastructure. At the moment, telecommunications service providers are developing their 5G infrastructure according to the demand and should potential use cases arise, this would drive companies to invest further.

The Malta Communications Authority (MCA), which regulates telecommunication networks and connectivity in Malta, is actively leading the way to regulate and implement 5G technology in Malta. Whilst all the regulatory and technical preparation for advanced 5G technology to be trialled and deployed in Malta is in place, so far the telecommunication service providers have only introduced a very basic form of 5G with only a few of its benefits. Industry operators and investors are possibly holding back from investing in advanced 5G since there is currently a lack of use cases that could benefit from advanced 5G technology. The MISAM project presents an interesting use case that may entice companies to invest in reliable and ultra-low latency 5G technology.

3.2 Priority recommendations for road infrastructure

Based on the research carried out to date, this study provides a number of recommended actions to Maltese transport and road authorities, which can be considered as the first stepping stones for the future of AVs on the Maltese road network.

Physical Road Infrastructure:

- AV-readable road signs and digital twins (e.g. VMS), and maintenance procedures to ensure their visibility by clearance of vegetation and other substances on the signs, as well as the correction of damages and malfunctions. The possible replacement of existing VMS with LED pulsating type displays, since the displays may not always be readable by the sensors of the AV since some frequencies will not match well with the capabilities of the AV sensors.

- The establishment of standards to ensure the digital replications of road signs in a way that enables AVs to utilise the information in HD maps.

- Road markings of sufficient retro-reflectivity, in different weather conditions and visibility. This should be in line with harmonisation efforts across Europe in respect of the colour and dimensions of the lane and carriageway edge markings. Their maintenance should be given top budget priority with all roads adequately marked and maintained so that markings are properly visible and not confusing.

- Consideration for additional lay bays and safe pick-up and drop-off points to accommodate minimum risk manoeuvres for AVs in mixed traffic conditions.

- Necessary changes in physical road design, when planning for new road construction projects.

- Harmonised planning and management of road work sites, in a way that makes them easy both for vehicle drivers and AVs to drive in a safe manner. The need for harmonisation on a European and global scale is necessary, especially for work zone protection and safety equipment, such as barrier types and their placement.

Digital Road Infrastructure:

- Constant updating of HD maps and including up-to-date and real-time road network data.
- Addressing cybersecurity issues for CAVs.
- Digital twins for road transport systems including road operational design domains (ODDs) and ISAD.
- Cooperative traffic management.
- Investment in human resources with digital expertise.
- Upskilling of the workforce.

4 Conclusion

The aim of this research project was to identify the gaps and determine the needs for road and transport authorities in Malta to make the necessary regulatory and technical preparations for the deployment of AVs.

The deployment of AVs in Malta can only succeed if local transport stakeholders are willing to work on a common front and in a constructive manner to agree on what should be done to introduce and facilitate this technology. This can only happen once policymakers and the private sector recognise that this technology will create a shift in the way people currently travel in Malta. The stakeholder consultations indicate that Malta is still in the very early stages of preparation, yet there is a consensus that the necessary regulatory and technical arrangements and amendments must be in place to kick start the introduction of AVs on Maltese roads.

A series of priority recommendations for the physical and digital road infrastructure have been proposed for the Maltese scenario. Nonetheless, there are numerous questions that still need to be answered and further recommendations will be identified in the final stages of the project, where focused meetings with stakeholders are being carried out.

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SUMMARY

Malta's number one listed challenge is traffic. The aim is to accelerate the move away from the private vehicle to multi-modal transport. A step forward will be Autonomous Transport, which represents a major innovation in the automotive industry and is expected to revolutionize the land transportation of the future, offering prospective benefits of enhanced safety, increased mobility, and reduced reliance on the human driver.

The main aim of the project is to promote Multi-Modal travel by providing an additional mobility service, which will be inclusive, especially for the elderly and less mobile people. The aim is to draft the national roadmap to introduce Level 4 and Level 5 Autonomous Vehicles on the roads in Malta. The project has a special focus on legal, governance, technological and infrastructural prerequisites. The results of this research shall lead to the deployment of the first autonomous shuttle pilot project in Malta.

This research evaluated the physical and digital infrastructure prerequisites and enablers necessary for the introduction of shared autonomous mobility in Malta. During the initial stages of AV deployment, Maltese roads are not equipped to provide digital infrastructure support to AVs, since no communication infrastructure is yet installed on the road network whereby vehicles can communicate between themselves and with the infrastructure. Hence, the need for effective, well-maintained traffic signs and road markings is essential and must be visible to AVs, day and night, and in all weather conditions.

Besides giving more information regarding AVs and assessing each stakeholders' awareness and familiarity with this technology, meetings with stakeholders served to compare and contrast the current view of stakeholders and also to understand concerns from each entity's point of view. In general, stakeholders were aware of the progress being made around the world, and it was clearly evident that they believed that Malta is not yet prepared to adopt these vehicles in the immediate future. The majority of stakeholders showed great interest in the MISAM project and requested collaboration in their respective fields, in order to bring forward the necessary measures to prepare Malta for the first AV trial project.

The first set of recommendations has been presented to local road and transport authorities, which is based on a review of the infrastructure prerequisites, informed by consultations with local stakeholders. Whilst MISAM is not yet concluded, recommendations shall be refined following feedback and together with the legal and governance aspects, these will form part of the recommended road map necessary to achieve the deployment of automated vehicle technology on Maltese roads.

8th International ATZ Congress Automated Driving 2022

Short profile of Speakers

Speaker 01

Manuel Cassar completed his Master of Civil Engineering at the University of Malta in 2017. His Master's dissertation dealt on taking a strategic approach for the deployment of autonomous vehicles within the Maltese road network - potentially the first research carried out on automated driving in Malta. He is a University of Malta researcher, forming part of the MISAM project which aims to set the groundwork for the deployment of an Autonomous vehicle pilot project in MAlta. Furthermore, he is a warranted architect and civil engineer who practises as a Civil Engineer in the local industry. Email: manuel.cassar@um.edu.mt

Speaker 02

Dr. Odette Lewis is an architect and civil engineer, who has been practising her profession since 2003. She holds a PhD from the University of Malta. Odette is a Senior Lecturer at the Department of Spatial Planning and Infrastructure in the Faculty for the Built Environment, at the University of Malta. She has worked on civil engineering projects within the public and private sectors, both in Malta and abroad. Her main research interests are the planning and design of road transport infrastructure; greener and smarter mobility options including autonomous driving and electro mobility; maximising public space to create people-friendly urban streets, cater for multi-modality and incorporate green and blue infrastructure.