Austrian Action Programme on Automated Mobility

2019-2022

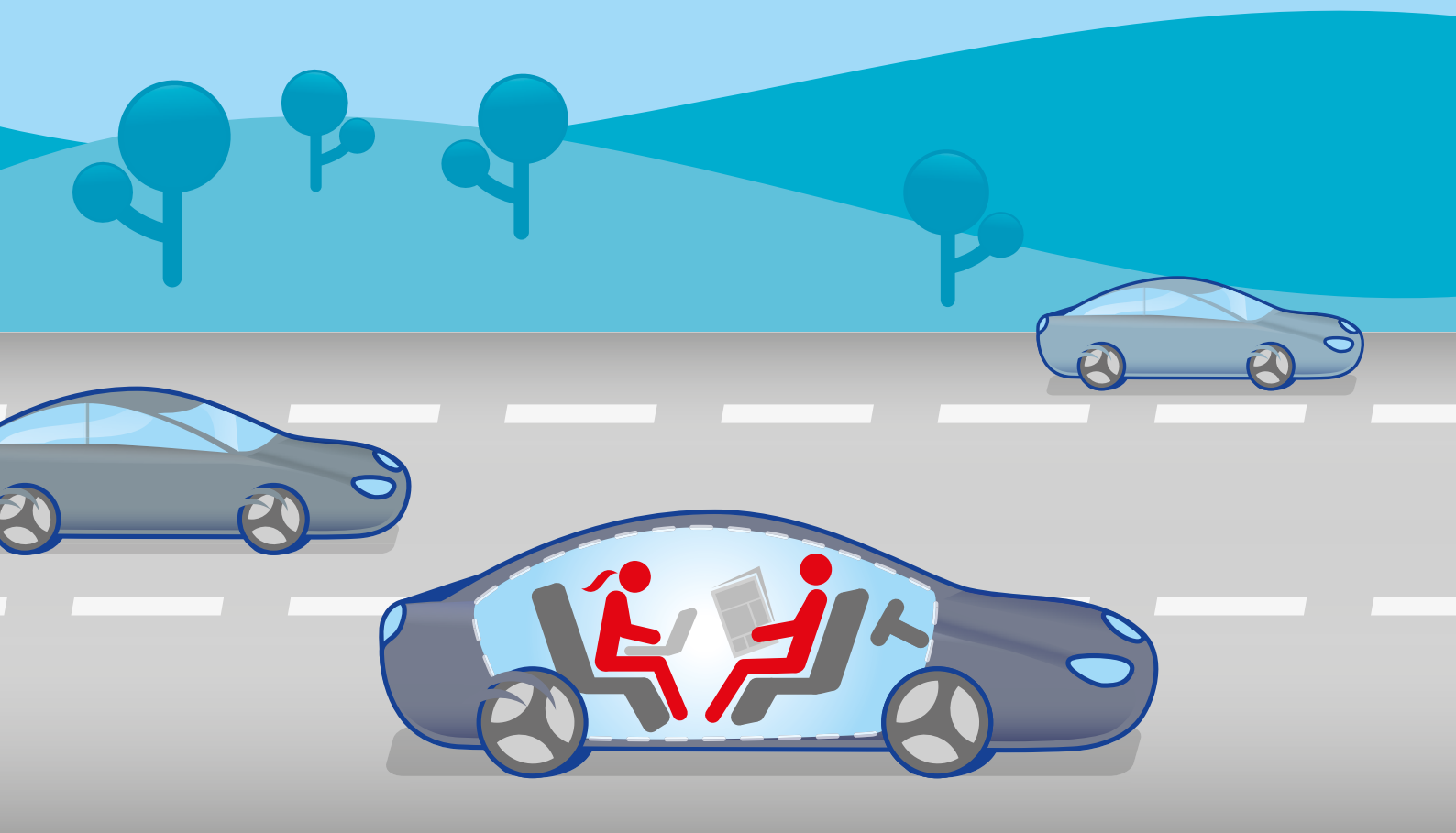# Contents

1
Automated and connected mobility in Austria

Increasing digitalisation, coupled with progressive automation, will dramatically transform mobility in tomorrow's world. Digitalisation simplifies access to mobility and enables new services. Partially automated driving systems and functions are already available on the market. The ongoing integration of communications technology has raised new expectations with regard to future forms of mobility. However, automation alone will not change the transportation system. Instead, it is important to use automated technologies and mobility services in such a way that the coming shift towards a service-oriented and climate-friendly mobility system receives meaningful support.

There is significant potential in automated mobility: enhanced road safety, greater transport efficiency and hence a contribution to reducing the carbon footprint, as well as immense opportunities for the economy as a whole (refer to Figure 1). Significant efforts are therefore being made around the world to develop and introduce new technologies, among them driverless vehicles and trains or drones. The progressive spread of information and communications technologies within the traditional automotive sector is accelerating this development. New actors are coming to the fore, some of whom are achieving remarkable progress. Companies are investing billions in automated mobility each year, but policy makers and the public sector have to secure the benefits for society at large. Hence, an important focus area in Austria is currently to learn from tests and pilot projects within the framework of clearly defined use cases (i.e. application areas such as automated shuttles) as well as to develop new forms of mobility. The government programme for 2017–2022 has, in response, set the target of strengthening Austria's position as a pioneering country and its status as a hub for research, development and production for automated driving in close collaboration with the automotive industry and the scientific community. Above all, the Austrian Ministry of Transport, Innovation and Technology (BMVIT) will continue to promote test tracks and relevant research projects.
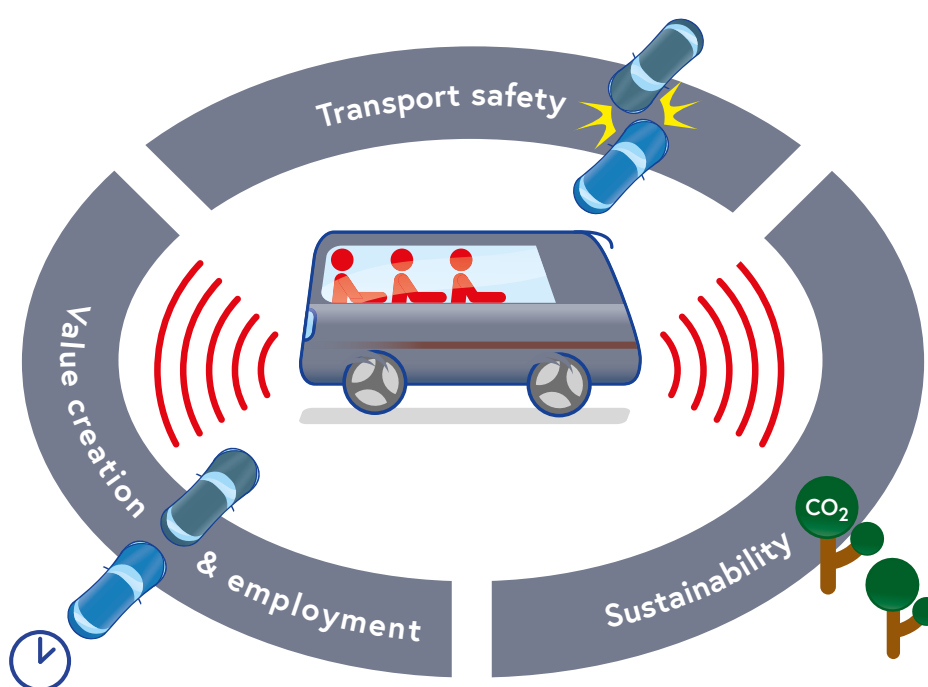

Figure 1: Potential of automated mobility ("What does BMVIT expect, and why are we providing support?")

The race between traditional automotive manufacturers and new actors, among them companies in the fields of software development and artificial intelligence, is taking up speed. It will probably not take long before automated vehicles and systems appear on the roads. The numerous research activities and tests of recent years have uncovered the challenges and key questions that until now have remained largely unaddressed. Among them are issues relating to the international harmonisation of standards, legal challenges, questions of human-machine interaction (HMI) and mixed transportation[1] comprising automated and non-automated vehicles, as well as other transport users. Discussions in this regard are likely to continue for decades.

The possible adverse effects and challenges are becoming increasingly apparent, including the possibility of making motorised individual transport more attractive, the necessity to define new vehicle categories, uncertainties in the context of interaction and inhomogeneous traffic volumes due to mixed transportation. While positive potential undoubtedly exists, the success of automated mobility can only be guaranteed through purposeful and sustained control of how these systems are used (refer to Figure 2). The public sector is called upon to pay increasing attention to the effects of deploying this technology and create appropriate framework conditions to ensure that automated mobility supports core targets like the decarbonisation of the transportation system or the Vision Zero for traffic safety. Ensuring that the Austrian industrial sector is prepared for the changing requirements will not only help to preserve competitiveness, it will also allow new actors to establish themselves successfully on the market and to position domestic products at the international level. Aside from promoting research and product development, it is equally vital to allow citizens to experience new technologies.

[1] Mixing of conventional (non-automated) and automated vehicles –
with any degree of automation – with all road users

best case

- Optimised traffic flow to enable predictive driving
- Reduction of congestion situations and easing of the negative impacts of traffic on the environment (enhanced environmental footprint)
- Increase in transport safety – reduction in accidents
- Access for people with reduced mobility
- Connection between public transport and individual transport
- New opportunities for first/last mile transports
- Reduction in the need for individual transport
- Decline in land usage and the opportunity to reclaim land
- An entirely new, emerging technology with the opportunity to integrate eco-friendly powertrains
- Symbiotic opportunities with shared uses, as well as multimodal approaches

worst case

- Enhanced comfort
- Switch from public transport to individual transport with the resulting environmental pollution and congestion
- Prolonged phase of mixed traffic with automated and non-automated vehicles
- (Considerable) investments in infrastructure (physical and digital)
- Data abuse, as well as hacking and cyber attacks regulations conditions can be created
- Accidents caused by lack of awareness and incorrect operation by users due to inadequate training

Figure 2: Best & worst case scenarios of automated driving ("Why must BMVIT act now and shape developments?")

By supporting the introduction of automated and digitised mobility systems, BMVIT is therefore committed, through the use of these technologies, to

- increase transportation safety for all transport users in the long term;
- enable an efficient, affordable, accessible and climate-friendly transportation system;
- create value-added potential, while securing and creating jobs on the domestic market. The benefits of these technologies for the national economy and society as a whole are particularly important.

A strategic and coordinated approach, accompanied by clearly defined measures, is mandatory to achieve societal objectives. This prompted BMVIT to publish the first Action Plan for Automated Driving "Automated – Connected – Mobile"[2] back in 2016. The first action plan enabled tests on public roads, created an initial legal framework and launched, i.e. supported a broad variety of research activities. Since then, Austria has made considerable contributions to projects and debates on automated mobility in Europe and internationally. The experience gained by implementing the first action plan highlights the necessity to continue pursuing tests and research. It further indicates the requirement to place a greater focus, for instance on the involvement of the public sector.

It is equally crucial to ensure optimised integration and advancement of the activities launched in the context of "rail automation" (pilot project Open Rail Lab) and to implement additional measures to promote connectivity among these modes of transport. This will support mutual learning between technologies and organisational issues in road and rail transport, especially for the promotion of end-to-end multimodal services.

This action programme – like the first – was prepared in cooperation with a large group of experts comprising around 300 stakeholders from the various sectors (industry, science, business, infrastructural operation, public authorities etc.) within the framework of online consultations, bilateral discussions and workshops (refer to Figure 3). It became apparent that, beyond the scientific and business communities, there is considerable interest in the issue of automated mobility within the public sector, as well as among infrastructure operators and end-users. Workshop results reveal that automated mobility and the associated activities have already achieved significant awareness at national level. Active participation in the development process of the new action programme by various experts is indicative of just how relevant the issue is for a range of sectors and administrative levels. So far, the actions and measures that have been put into practice have largely satisfied expectations and needs, especially from the perspective of research and industry.

Figure 3: Preparation process for the new action programme on automated mobility

Action plan "Automated – Connected – Mobile" 2016–18

04–05/18

Development of targets & measures

06/18

Consultations TRA + survey

11/18

01–03/18

Bilateral meetings with experts

05/18

Workshops with experts from different fields and with varying prior knowledge

04–06/18

Presentation & publication November 2018

The primary use cases defined in the first action plan, namely "Safety+ through an all-round view", "New flexibility" and "Well supplied" remain an important basis for the concrete measures over the coming years. Another focus area is creating uses for automated mobility that meet the needs of transportation which will involve the public sector and society as a whole (refer to Figure 4).
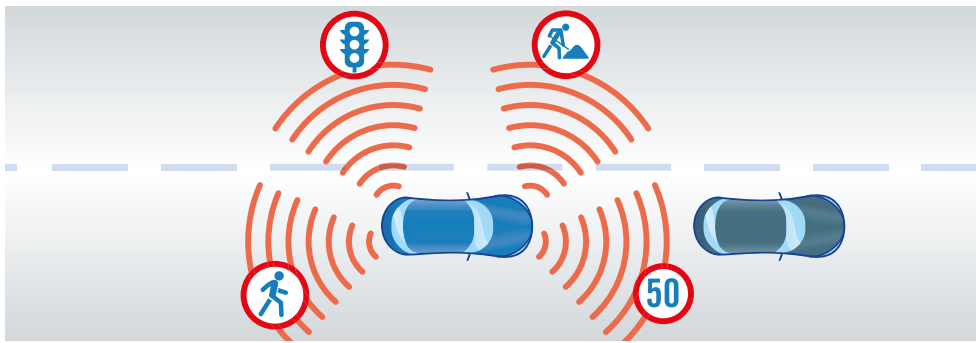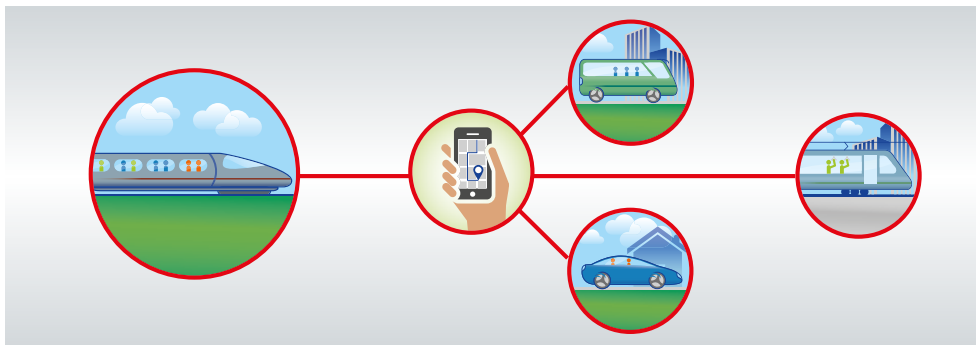
Use case: "Security+ through an all-round view"

Motto: "Safe travels from A to B"

Driver assistance systems use predictive sensors to intervene in traffic situations whenever danger is imminent. Information from other road users and from the infrastructure itself is used. This enhances road safety in the immediate environment of the vehicle.

Use case: "New flexibility"

Motto: "Connected modes of transport improve flexibility"

Automated vehicles offer new, user-specific options, especially as feeder systems to public transport nodes in urban and rural regions. On-demand services will increase the flexibility of mobility users and also ease the burden on the environment.
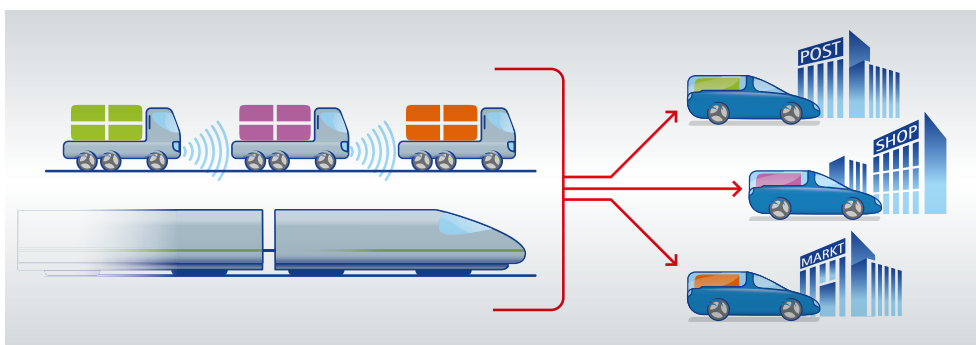
Use case: "Well supplied"

Motto: "Efficient freight transport through automation"

Increasingly automated freight transport and optimised feeder services with efficient long-distance transports and suitable concepts for the "last mile".

1.1 Automated mobility in Austria – Interim evaluation in 2018

1.1.1 Review

The first action plan "Automated – Connected – Mobile" defined nine sets of measures that were implemented in the period June 2016 – June 2018. This created initial access to automated driving and the associated systems. The action plan laid out Austria's strategy in approaching the issue of automated driving and involved building (inter)national networks of Austrian supplier firms and research institutions, the expansion of scientific excellence, amendments at the legal level, first measures for the management of digital infrastructure, as well as the establishment of test facilities combined with testing and development measures in a real environment.

Moreover, BMVIT invested around €25 million in this period to support the development of automated driving in Austria.

1.1.2 Implemented measures, milestones and activities

The following measures were implemented in the first action plan:

- Establishment of a first **legal framework for testing** on public roads through amendment of the Motor Vehicle Act (KFG) in 2016, as well as preparation of an ordinance on automated driving (version dated 19/12/2016)[3]. Publication in August 2018 of an inter-country comparison on the legal frameworks for the testing of automated vehicles[4].
- **Tests on public roads in Austria** (motorway pilot scheme with lane changing, self-driving minibuses and self-driving military vehicles).
- **Technology support for interdisciplinary R&D projects** within the framework of the Mobility of the Future Programme (MdZ), Information and Communications Technologies of the Future Programme (ICT) and the National Security Research Programme (KIRAS).
  - Establishment of first **test infrastructures in Austria**. ALP.Lab (Austrian Light Vehicle Proving Region for Automated Driving), Austria's first test infrastructure for personal vehicles, was constructed 2017 in Styria. Work on establishing another test infrastructure commenced in spring 2018. Located in the region of "Austria North", DigiTrans focuses on use cases for commercial and special vehicles, especially in the field of logistic hubs, as well as in the joint use of test infrastructures for automated driving.
  - Launch of **pilot projects** for driverless minibuses and their application in demand-oriented-based rural transportation (Digibus®Austria in Salzburg), as well as impact assessment for the use of energy-efficient and connected truck platoons (Connecting Austria) (refer to Figure 5).
  - Establishment of an **endowed chair** at the University of Natural Resources and Life Sciences, Vienna, to expand scientific excellence in the field of **digitalisation and automation.**

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[3] Automated Driving Ordinance (AutomatFahrV), December 2016. Available online at:
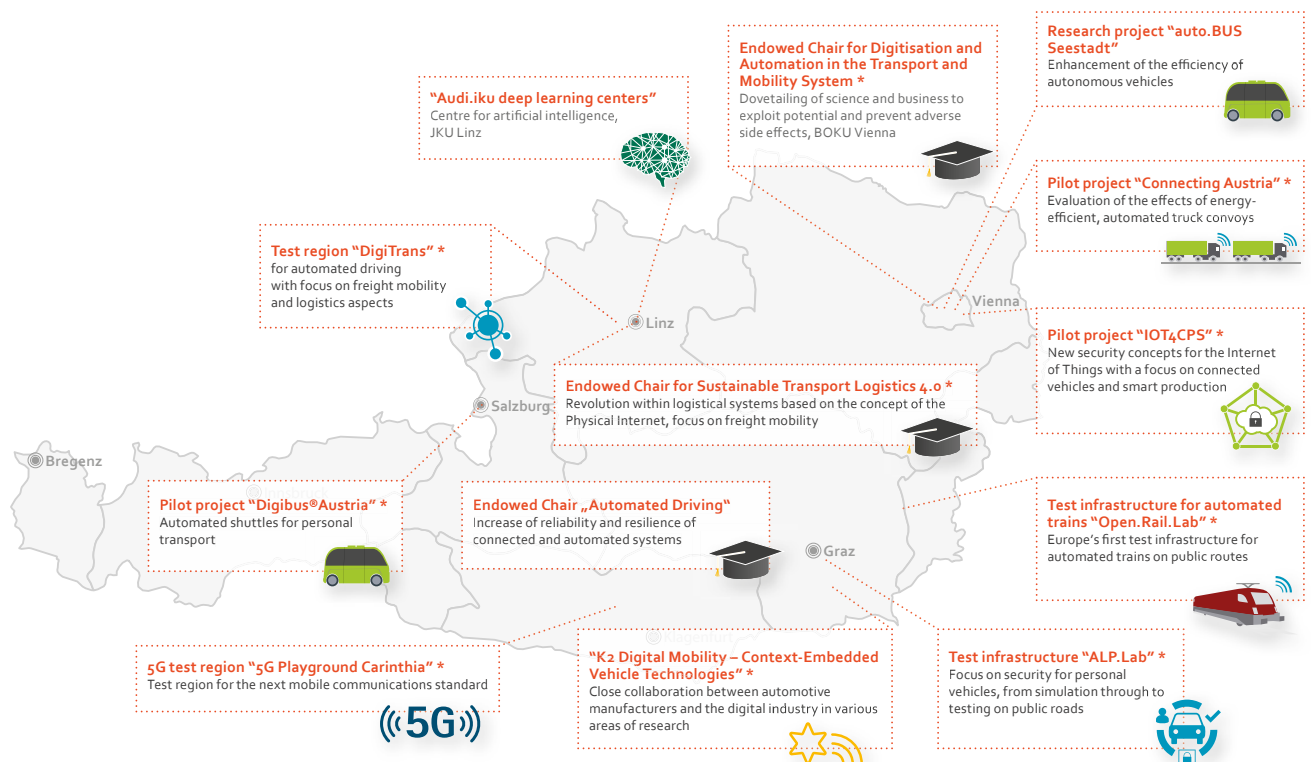   https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20009740
[4] Inter-country comparison – Legal frameworks for automated driving, August 2018. Available online at:
   https://www.bmvit.gv.at/verkehr/automatisiertesFahren/recht/index.html

- Establishment of an **endowed chair** at the Johannes Kepler University in Linz to expand scientific excellence in the field of the **physical internet within transport logistics.**

- Preparation to create a **test infrastructure for automated trains** on public routes in Burgenland. Within the Open Rail Lab research on new rail technologies will be promoted.

- Conducting of initial **impact analyses and studies** to investigate the effects of automated driving, for instance on future professional fields.

- Initial **integration of states, municipalities and cities** in the form of public authority workshops for joint discussions on the framework conditions for automated mobility.

- Representation of Austria's interests at the **European and international level,** as well as active involvement in European projects.

- Setting up of the national **Contact Point** Automated Mobility at AustriaTech.

- Establishment of a **Unit** for the Coordination of Activities within Automated Driving at BMVIT.

- Establishment of an **Interdisciplinary Panel of Experts** for the evaluation of test applications and to advise BMVIT.

* For findings and further information, visit:
https://open4innovation.at/de/ and https://www2.ffg.at/verkehr/projekte.php?lang=de

Federal Ministry
Republic of Austria
Transport, Innovation
and Technology

"Audi.iku deep learning centers"
Centre for artificial intelligence,
JKU Linz

Endowed Chair for Digitisation and Automation in the Transport and Mobility System *
Dovetailing of science and business to exploit potential and prevent adverse side effects, BOKU Vienna

Research project "auto.BUS Seestadt"
Enhancement of the efficiency of autonomous vehicles

Test region "DigiTrans" *
for automated driving with focus on freight mobility and logistics aspects

Pilot project "Connecting Austria" *
Evaluation of the effects of energy-efficient, automated truck convoys

Endowed Chair for Sustainable Transport Logistics 4.0 *
Revolution within logistical systems based on the concept of the Physical Internet, focus on freight mobility

Pilot project "IOT4CPS" *
New security concepts for the Internet of Things with a focus on connected vehicles and smart production

Pilot project "Digibus®Austria" *
Automated shuttles for personal transport

Endowed Chair „Automated Driving"
Increase of reliability and resilience of connected and automated systems

Test infrastructure for automated trains "Open.Rail.Lab" *
Europe's first test infrastructure for automated trains on public routes

5G test region "5G Playground Carinthia" *
Test region for the next mobile communications standard

"K2 Digital Mobility – Context-Embedded Vehicle Technologies" *
Close collaboration between automotive manufacturers and the digital industry in various areas of research

Test infrastructure "ALP.Lab" *
Focus on security for personal vehicles, from simulation through to testing on public roads

* The projects listed here are a selection of those supported by BMVIT in the area of automated driving in Austria.
In addition, BMVIT supports a large number of interdisciplinary projects in the fields of information and communications technologies, mobility and security research.

Figure 5: Selection of flagship projects in Austria

1.1.3 Analysis of the implemented measures

Global developments in the field of automated and connected mobility are progressing at a rapid pace. While the perspective was limited to vehicles and their functions just a few years ago, initial, large-scale tests and experiences have led to the current focus on a systemic approach, i.e. one that addresses the interaction between vehicles, infrastructures and humans. A number of new challenges are being gradually arising in this context – and they are no longer exclusively of technical nature. Instead, it has become increasingly important to investigate the role of automated mobility within a future, climate-friendly mobility system, societal acceptance and accessibility, as well as the legal framework. In turn, the public sector is therefore called upon to keep pace with, shape and support these rapid technological developments.

1.1.3.1 First tests in Austria: Lessons learned

The development of automated and digitised mobility systems takes place in several stages, extending from parking assistance systems and lane- and distance-keeping assistants, through to modes of automated transport. But a long phase of testing and experimentation will be necessary before its penetration is possible everywhere, at any time and under all circumstances. The use of data and efficient forms of communications are also coming to the fore with the progressive digitalisation related

to users, vehicles and infrastructure. This leads to an amalgamation of fast moving technologies with traditional and durable products, which in turn produces new requirements for their management. Accordingly, BMVIT laid an initial foundation for testing (and then using) innovative and revolutionary functions within a controlled and safe environment.

The creation of **legal frameworks** for tests on public roads in Austria is intended on the one hand to secure insight and on the other to collect experience for the public sector. Safety for all transport users is the primary concern at all times, so the test facilities are required to provide information on which measures are in place to ensure active and passive safety (functional safety, as well as safety & security). The submission of **test reports is mandatory** for all tests on public roads. Moreover, the clear definition of specific use cases guarantees that only systems that have been found to be sufficiently safe are tested. BMVIT receives advice from an interdisciplinary **panel of experts** for the assessment of this aspect.

Both national and international companies and research institutions have used this opportunity since autumn 2016 and are conducting **tests on Austrian roads** involving self-driving minibuses and personal vehicles equipped with lane-keeping and lane-changing assistants on the highway network.

Initial test reports of test drives clearly illustrate that the technology is still a long way from achieving the vision of fully automated systems. While a laborious and meticulous process is still necessary to teach minibuses basic functions like turning left or overtaking, work on the motorway aspect is gradually approaching complex issues like creating an emergency lane or overcoming roadworks on slip roads. In addition, the test reports highlight the requirement for further amendments to the legal framework and emphasise the need for safe interaction between humans and machines.

Among the **legal frameworks and regulations**, the Road Traffic Act (StVO) and the Motor Vehicle Act (KFG) specifically will require modification to accommodate progressive digitalisation and automation. This is why work is ongoing at the international level to create a uniform, harmonised solution. It will be necessary to separate tests from regular operations until this solution is in place. Transitioning from test to regular operations is currently an obstacle, and it must not take place until after the conclusion of verifiably safe tests. Hence, the need for international specifications is becoming increasingly obvious.

The main focus of development and testing for automated systems is shifting towards **virtual tests with simulations,** especially to demonstrate use cases in a holistic scenario in order to verify and validate the individual components and functions. This is a key requirement for testing on public roads. The complementary **test infrastructures and pilot projects** demanded by BMVIT allow testing on designated roads, as well as in public areas. They also include test beds and simulation environments to fulfil the need for virtual testing. Here, these facilities focus on applications whose series maturity is predicted for the near future, for instance the optimisation of public transportation for first/last mile shuttles, energy-efficient truck platoons and solutions in the area of personal and freight mobility. Work on establishing the facilities and putting them into operation started in 2017.

BMVIT has supported many interdisciplinary projects in the area of **research funding.** Among others, the topics of research include the development of new sensor technologies, the optimisation of traffic management, the assessment of future infrastructure, analyses of human-machine interaction, as well as digitalisation and automation in the field of rail transport based on Grades of Automation (GoA) levels[5]. A heightened demand is evident for the management of human-machine interaction and intelligent infrastructure.

Austria's industrial and research sectors are also active at the European level. Of the 17 Austrian entries to the Horizon 2020 – Automated Road Transport (ART) call, 15 were approved. This is significantly higher than the 58.3% general approvals ratio. Austria is therefore in third place, behind Germany and France. Overall, Austria comes in tenth within the framework programme. This pleasing result testifies once again to the expertise of the domestic scene.

While the main focus in 2016 was on the development of automated mobility in the context of its use on roads, there is now also strong interest in **automation within the framework of rail transport and freight solutions.** This prompted the initiative to create a **test infrastructure for self-driving trains on public routes.** The aim in this regard is to appraise the entire rail system, as well as communication with passengers and other transport users. Ultimately, this should culminate in the establishment of a more efficient – and at least equally safe – rail transport system.

[5] GoA is used to define the level of automation, based on the SAE levels for road transport.

1.1.3.2 First impact analyses: A systemic consideration of impacts and monitoring is necessary
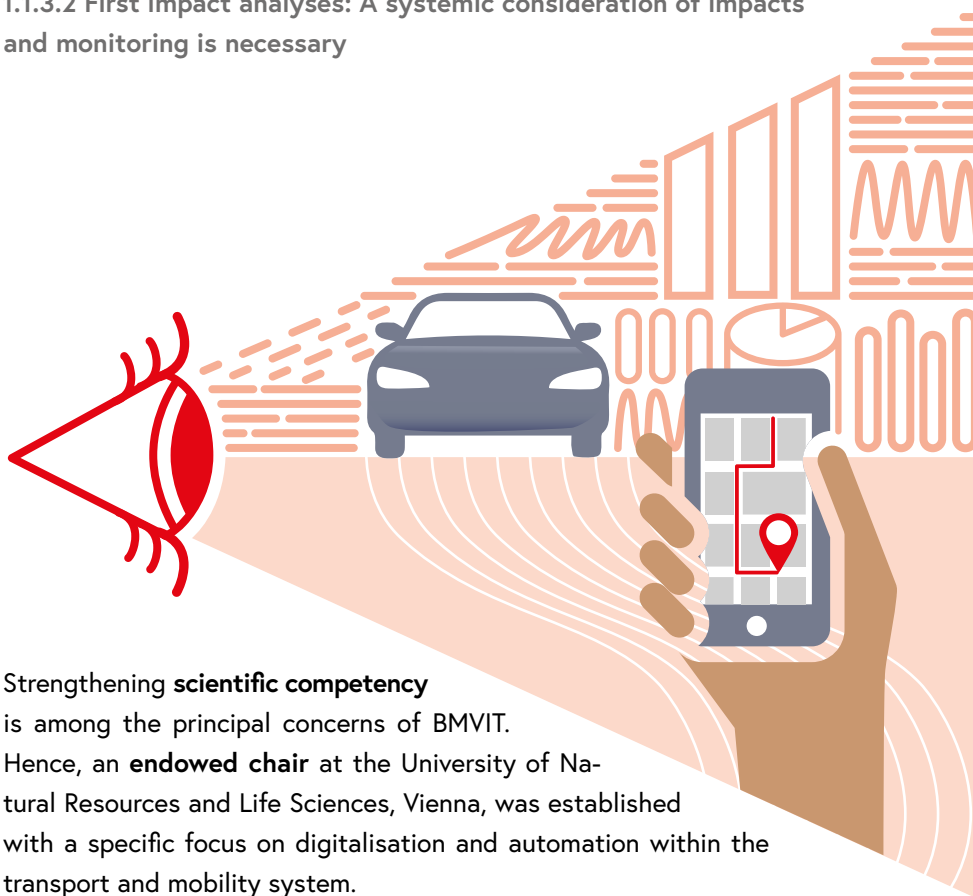
Strengthening **scientific competency**
is among the principal concerns of BMVIT.
Hence, an **endowed chair** at the University of Natural Resources and Life Sciences, Vienna, was established
with a specific focus on digitalisation and automation within the
transport and mobility system.

The first **R&D services, studies and impact analyses** commissioned by BMVIT explore the societal and organisational implications of progressive automation within the Austrian freight transport system, occupational profiles and opportunities for employment within an automated and digitised Austrian mobility sector in 2040, as well as system scenarios for automated driving and their impacts on mobility of persons.

Within the context of the R&D study on social and organisational impacts of increasing automation within the Austrian freight transport system[6], the impacts of automation on road and rail were estimated for the time horizons 2025, 2035 and 2045. Within the impact analysis anticipated changes in transport costs, travel times and qualities based on the various automation trends and regarding different components in the transport chain were considered. Results show that besides the rectification of inadequate legislative and normative frameworks and necessary rules for data security and protection, particular attention must also be paid to the harmonisation of regulations for the road and rail sectors in order to enable more cost-efficient rail operations.
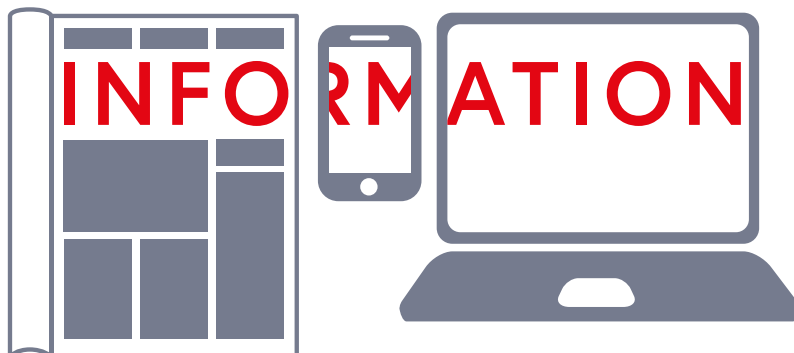
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[6] https://mobilitaetderzukunft.at/resources/pdf/projektberichte/SozA_Ergebnisbericht_barrierefrei_final.pdf

Against the backdrop of progressive automation and digitalisation, the study **"Occupational profiles and opportunities for employment in an automated and digitised Austrian mobility sector in 2040"**[7] explored the gradually apparent and imminent changes in occupational profiles with relevance to the Austrian mobility sector up to the year 2040, as well as the resulting opportunities and risks for employment and the quality of work. Three scenarios extending up to 2040 ("Forwards 2040", "Local Life" and "Digital Divide") were developed for the analysis, which were then discussed and evaluated with a broad variety of stakeholders from all modes of transport, including freight and personal transport. Discussion and evaluation of the three somewhat contradictory scenarios illustrated many parallels between them, hence permitting the establishment of an overall picture comprising all scenarios that outlined the areas of employment, occupational profiles, competencies, quality of work and gender issues within the mobility sector of the future. This insight was used to define clear calls to action for politicians and lobby groups (mobility and transport policies, FTI policies, labour market and social policies, education policies), as well as for companies.

Initial use cases for automated mobility of persons were also analysed in a number of research projects in order to investigate the potential of automated technologies. Their insight plainly reveals that developments, impacts and the interactions within automation for the area of mobility of persons are highly complex matters that are exposed to significant uncertainties. However, the research projects conducted so far have only tentatively identified and responded to the heterogeneous issues. Findings show that automated mobility is associated with substantial opportunities, but also with risks of negative developments, for instance rebound effects, and that adverse side effects and interactions require further research. Automated personal transport must therefore be investigated and developed within a holistic, systemic context. This is predicated on the establishment of a "predictive system vision" in order to achieve the desired effects and to recognise and minimise undesirable adverse interactions and side effects at a higher level (especially interactions between society, space and mobility) as well.

Initial activities have clearly shown that a far greater focus must be placed in future on impact analyses for automated mobility – in regard to impact levels as well as the equivalence of methods – in order to ensure that positive potential can indeed be exploited.

[7] https://mobilitaetderzukunft.at/resources/pdf/projektberichte/Mob_2040_Endbericht_2018_Septemberfinal.pdf

Practical testing of automated vehicles is a learning opportunity for the public sector as well. Hence, the test facilities are required to submit **test reports** after the end of the practical tests. As a result, empirical findings and insights can be made available to the general public as well. This guarantees presentation of the status quo and provides an important foundation for future decisions by the public authorities. All test reports are published on the BMVIT website.

The National Contact Point Automated Mobility within AustriaTech published its first **monitoring report** in early 2018 for the transparent presentation of Austria's overall activities within a national and international environment. In future, this format will report on new activities on an annual basis and hence enable an overview of current undertakings at the national and international level.

Especially local actors raised interest regarding the involvement in the strategic procedure and planning. This prompted the organisation of initial dialogue events between the **federal government, states, municipalities and cities.** Here, the first stage focused on the federal states in which test infrastructures or pilot projects are already in place. It is imperative to expand and strengthen collaboration between public authorities in particular, but also with the research and business communities and with society at large.

1.1.3.4 Austria's positioning within a European and international context

Research on the development of automated vehicles and mobility is underway at the global level. It is therefore important that national activities are closely coordinated with European and international initiatives. While intense work is currently proceeding on the articulation and development of first standards for specific vehicle capabilities and interaction (SAE Levels), for instance within the framework of a Trilateral Working Group (EU-USA-Japan), as well as the EU's Coordination & Support Actions (e.g. CARTRE), there are many parallel and uncoordinated international initiatives that are also in place – e.g. to define infrastructure requirements or the necessary communications technologies. This is prompted firstly by divergent national interests, i.e. different interests within the industrial sectors, and secondly by the rapid pace of

technological progress and the associated difficulties in defining planning perspectives for the public sector.

The United States and Asia (Japan, Singapore) have achieved significant advances in technology over recent years, although European automotive manufacturers and suppliers continue to dominate the industry in an international comparison (e.g. in regard to patents or research expenditure). The Netherlands, United Kingdom, Germany and Sweden lead the field in Europe for the introduction and development of automated mobility. Austria occupies a strong position in a European comparison thanks to the extensive initiative it now has in place. At the technological level, Austria stands out in the fields of image processing, simulation and (digital) transport infrastructure.

The differences between continents and individual countries are partly due to national strengths and interests, but also results from the mandatory inter- or supranational requirements to which the national legislator in the respective country is subject. For instance, America and some states in Asia are not bound to the Vienna Convention on Road Traffic and are not members of a federation of states like the European Union. The national legislators in these countries therefore have different possibilities to shape the process compared to their counterparts in the Member States of the European Union, where regulations for consumers and transport users are absolutely compulsory.

Intense efforts are currently underway to standardise automated systems at the United Nations level. For instance, the United Nations World Forum for Harmonization (UNECE) is working to develop new regulations for the management of data storage devices, authorisations, cyber security measures and a new classification system for vehicles.

At the **European level,** several Directorates-General are actively addressing automated mobility, with the aim of creating framework conditions for its safe and efficient use within the EU. The European Union (EU) sought to install a mutual procedure through the introduction of the Third Mobility Package by the European Commission in May 2018. Introduced as a standard procedure for a united Europe, the focus will be placed on defining uniform legal frameworks, the management of data storage devices, human-machine interaction and cross-border testing and learning over the coming years.

Austrian actors have already participated very successfully in European projects and initiatives and in many cases have been in charge of coordination tasks. Horizon 2020 projects like INFRAMIX[8] and TrustVehicle[9], which are led by Austrian partners and involve the participation of numerous national and international partners from industry and research, address the mixed transport scenarios and solutions that are considered most relevant. This strong and successful involvement in projects and processes (including STRIA, C-ITS Platform,…) is among the reasons why the EU symposium on Connected and Automated Driving in April 2018 was held in Vienna as another opportunity to raise awareness for domestic actors and initiatives.

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[8] www.inframix.eu

[9] www.trustvehicle.eu

Another noteworthy EU initiative by the Member States is the High Level Meeting on Connected and Automated Mobility. Since the start of 2017, the European Member States have met regularly with industry associations and the relevant Directorates-General of the European Commission to discuss standardised conditions for the introduction of automated driving. Working groups focus on specific topics such as ethical aspects or data access. Austria also plays a proactive role in the area of **cross-border cooperation.** An agreement on cross-border testing and cooperation was signed between Austria, Hungary and Slovenia in March 2018. This is accompanied by collaboration between important test infrastructures and road operators.

In a global comparison of countries that have been more active in the area of automated driving to date, **Austria** holds an upper mid-table place. This was confirmed by a KPMG study (end of 2017) and elsewhere[10]. The study lists the success factors as follows: willingness by the government to control and regulate development of automated driving; outstanding road conditions; a well-developed mobile communications network; as well as investments and innovation within the private sector.

A survey conducted during an international conference held in April 2018 in Vienna – Transport Research Arena and Connected Automated Vehicle Symposium – also underlines the significant relevance of Austrian activities. Two thirds of the international survey participants were aware of the (first) Austrian action plan on Automated Driving. Particularly noteworthy aspects in this context include the simple test procedure compared to other countries, the focus on specific use cases, and – as a particularly crucial factor – the inclusion of Austria's special competency in the field of digital infrastructure (especially C-ITS).

Within just a few years, Austrian companies and research institutions have managed to build remarkable expertise in the field of automated mobility and to focus from the beginning on system embedding and the best possible use of the technologies. Yet, this does not guarantee future success. Instead it calls for the clear definition of next steps, on the one hand to build on this pioneering role, and on the other to introduce automated mobility that best suits the requirements of the transport system.

[10] Autonomous Vehicles Readiness Index, KPMG, 2017, available at: https://imgs.factorynet.at/m/15182_1_0-0-0_.pdf

Figure 6: Selected platforms, initiatives and organisations that address issues of connected and automated mobility at the European level with the involvement of Austrian delegations

AUSTRIAN DELEGATIONS	High Level Ministerial Dialogue on CAD	Trilateral WG on Road Vehicle Automation	STRIA Roadmaps	CEDR	ASECAP	PIRAC: World Road Association	C-Roads	ERTRAC	ECTRI, ETRA	FEHRL, FERSI	ALICE	SHIFT2RAIL (IP2, IP5)	ACEA , CLEPA, EARPA	OECD International Transport Forum	EUROCITIES	UITP	UN-ECE	CEN
AIT						■		①	■	■	③							
ASFINAG			■	■	■	■	■	■										
AUSTRIATECH	■	■				■	■											■
BMVIT	■	■	■	■	■	■	■	■				■	■	■			■	
„OTHERS									②			④	⑤		⑥	⑦		⑧

① AIT as representative of FEHRL& ECTRI
② Austrian Road Safety Board (KFV)
③ AIT as representative of LRA
④ VirtualVehicleAustriaconsortium+ (VVAC+)
⑤ Association of the Austrian Vehicle Industry, ZKW Group Wieselburg
⑥ City of Vienna
⑦ Wiener Linien
⑧ Various

Full title of selected platforms

STRIA	Strategic Transport Research and Innovation Agenda **Roadmaps** der Generaldirektion Forschung & Innovation der EU Kommission
CEDR	Conference of European Directors of Roads
ASECAP	European Association of Operators of Toll Road Infrastructures
PIRAC	World Road Association
ERTRAC	European Road Transport Research Advisory Council

ECTRI	European Conference of Transport Research Institutes
ETRA	European Transport Research Alliance
FEHRL	Forum of European National Highway Research Laboratories
FERSI	Forum of European Road Safety Research Institutes
ALICE	Alliance for Logistics Innovation through Collaboration in Europe

ACEA	European Automotive Manufacturers Association
CLEPA	European Association of Automotive Suppliers
EARPA	European Automotive Research Partners Association
UITP	Union Internationale des Transports Publics
UN-ECE	United Nations Commission for Europe
CEN	European Committee for Standardisation

1.1.4 Outlook

The key issues that guided the first Austrian action plan essentially remain the same:

- How will automation change Austria's transport system, and how can we influence the development?
- Which requirements can be inferred for the future (digital) infrastructure in order to make automated driving a reality?
- What can be done to guarantee the reliability and security of new systems and technologies, among others in the context of data protection?
- How can Austria, with its strong automotive supplier and ICT industries, remain internationally competitive and strengthen its position in the future?

The national and international experience obtained in recent years now allows us to articulate these questions more precisely:

- How and with which framework conditions can the positive potential of automated mobility be realised? Which measures are necessary to place a focus on intermodal transport approaches? Which new services will emerge? How can the public sector shape the process to a greater extent? What should be done to focus on the human aspect and to ensure reconcilability with publicly accessible, affordable mobility and the necessary decarbonisation of the mobility system?

- How will systemic access to the interaction between vehicles and infrastructure be assured? How can future infrastructure be designed cost-efficiently? What should be done to enable traffic management without having to adapt the entire infrastructure to the requirements of new vehicle technologies? Are SAE levels still meaningful, or should there be a procedural switch to Operational Design Domains (ODD)? How can the opportunities presented by digital infrastructure be used expediently? Which new financing instruments and organisational necessities will arise?

- In regard to networking and data usage, how do we manage not only the technological challenges, but also consider the societal issues such as access to new technologies, impact monitoring or the necessary reliability and redundancy of services? Besides data protection requirements and the guarantee of privacy, how can we also ensure system access that affords reliable and tailored, automated mobility services based on comprehensively anonymised data and individual preferences? In addition to the technological and organisational issues concerning data categories, encryption or a blend of communications technologies, it is equally imperative to resolve issues such as transport safety vs. data security, or physical security vs. privacy, along the lines of societal trade-offs.

- What can be done to strengthen the Austrian value chain and competitiveness, while still focusing on society and the national economy? In what ways can the transformation within the automotive industry be accompanied and supported meaningfully in the context of ground-breaking service ecosystems in the mobility sector?

The overriding aspect, beyond all these questions, is the realisation that automated mobility is just one piece in the puzzle in creating a sustainable mobility system. Analysis of selected activities reveals: Austria is already very active in the area of automated mobility. Hence, this Action programme builds on these activities and aims above all to achieve the meaningful and sustainable integration of automated mobility within the transport sector, with a focus on both road and rail.

2
Automated mobility:
The next steps
(2019-2022)

2.1 Objectives

Technological progress, decarbonisation of the transport system, urbanisation and not least the demographic transformation are calling for new strategies and frameworks regarding the mobility and transport systems of the future. New technologies, new actors and new services enable new exciting opportunities for transport policies. All activities must be based on the core objective of ensuring liveable and high-quality public spaces. Testing and piloting, as well as the development, design and establishment of innovative forms of mobility (with a focus on automation and digitation) remain at the forefront of Austrian activities in the area of automated mobility. Currently there are four key trends: electrification of powertrains, increasing automation, shared mobility and multimodality in the context of publicly accessible mobility. Combining these trends can make a significant contribution to achieving the overarching societal and transportation goals in Austria.

Automated mobility is just one building block in a series of measures that are necessary to put social policies successfully into practice. But the anticipated positive effects of automated mobility will not appear automatically. Instead, current studies and forecasts stress that the difficulties associated with human-machine interaction may even cause accident numbers to rise during the introductory phase of automated systems. Another adverse effect could be that automated mobility enhances the attractiveness of motorised individual or road freight transport. This would lead to a significant increase in traffic volumes. Experts around the world are therefore agree that the public sector must act as a positive influence in these developments – by pursuing a comprehensively systemic approach and by defining incentives and legal frameworks – in order to reap the potential rewards of automated mobility.

Hence, the primary objective of BMVIT in introducing this Action programme is to ensure **meaningful and efficient use** of automated mobility within the transport sector and to **strengthen Austria's competitive position** within the international community. Before anything else, however, it is vital to ensure that **public spaces remain liveable.**

A focus is placed on the following premises:

* Testing and learning are the only way to create new things: The testing and piloting of automated mobility services in Austria that pay particular attention to the needs of users are central elements. Austria and the domestic economy should occupy a position at the forefront of innovative and sustainable mobility systems.
* In the long term, automated mobility should improve the (transport) safety of all transport users, whereby a particular focus must be placed on vulnerable transport users (especially cyclists and pedestrians), as well as on the needs of the different user groups. This is predicated on safe test operations.
* Automated mobility should foster and support the provision of new mobility services. Significant to this will be barrier-free access to mobility and the strengthening of publicly accessible mobility.

- CO_2 emissions in the transport sector are to be drastically reduced by 2030, and Austria's transport system is to be carbon-neutral by 2050. On no account must the use of automated mobility impede the achievement of these objectives.
- New forms of mobility will radically change the requirements placed on the domestic (supplier) industry, which is why it must be supported and promoted in the research, development and design of new forms and systems of mobility.
- Widespread deployment of automated mobility services requires trust and legal certainty. Hence, BMVIT will emphasise open communication and transparency of issues relating to automated mobility, as well as the development of suitable legal frameworks.
- The main focus in the rail sector will be on reducing the system costs, while preserving or enhancing system quality and safety.

2.2 Guiding principles

The only way to obtain experience is to test automated systems in different environments. Austria will therefore continue to focus strongly on – and promote – testing and piloting. The following guiding principles apply in this context:

1st guiding principle: Safe operation is not just the objective of testing, but its precondition

Automated mobility needs to satisfy many demands: economic and technical progress, prosperity, comfort, ecology and safety are competing goals of different actors. Active and passive system safety – and hence a reduction in the number of injuries and fatalities – must on all accounts be given precedence. At the same time, this means that it may be purposeful to reduce complexity and to trust in evolutionary development. Human-machine interaction will require particular attention in the coming years, especially the definition of steering and control tasks in the context of takeover requests or tele-operated driving, as well as the interaction between automated vehicles and other (vulnerable) road users, for instance cyclists and pedestrians.

2nd guiding principle: Systemic and incremental access in tests and regular operations

Developing the technologies required for automated mobility is highly complex and will still take a large number of detailed steps. Greater understanding of how technology can be meaningfully deployed is predicated on public tests and pilot projects, which receive support and funding in Austria. The following applies in this regard: The holistic system comprising vehicle, infrastructure and human behaviour must always be perceived as a whole. Test must be designed in such a way that repercussions on the transport system and humans are considered and taken into account in every way.

3rd guiding principle: Trust is built on responsibility

Responsibilities need to be clearly defined for each phase of the product life cycle and especially in the development of automated mobility. Only responsibility can engender trust in new technologies, and it is therefore a precondition for their widespread use. Third parties must never be exposed to circumstances beyond the rule of law. The introduction and use of automated mobility forms raises new challenges for established legal standards. Close cooperation between the public sector and the enterprises conducting the tests is absolutely essential to guarantee a responsible blend of flexible test facilities, legal certainty and sustainable and efficient use throughout the entire product life cycle.

4th guiding principle: Impact assessments are necessary when using public funds

The introduction of automated mobility that impacts the transport sector, as well as the investment of public resources in projects and pilots, must focus on their societal effects. Therefore, user analyses and measures to raise awareness must be conducted parallel to the roll-out of new technologies. Technologies cannot be established successfully unless they are fundamentally understood and accepted by users, which is why a process of raising awareness and fostering participation must accompany the development at all times. The development of new forms of mobility – including automated ones – allows the integration of innovative drive systems. Preference must be given to the connection of automated mobility systems with zero or low-emission drives, as they are consistent with the climate and energy objectives.
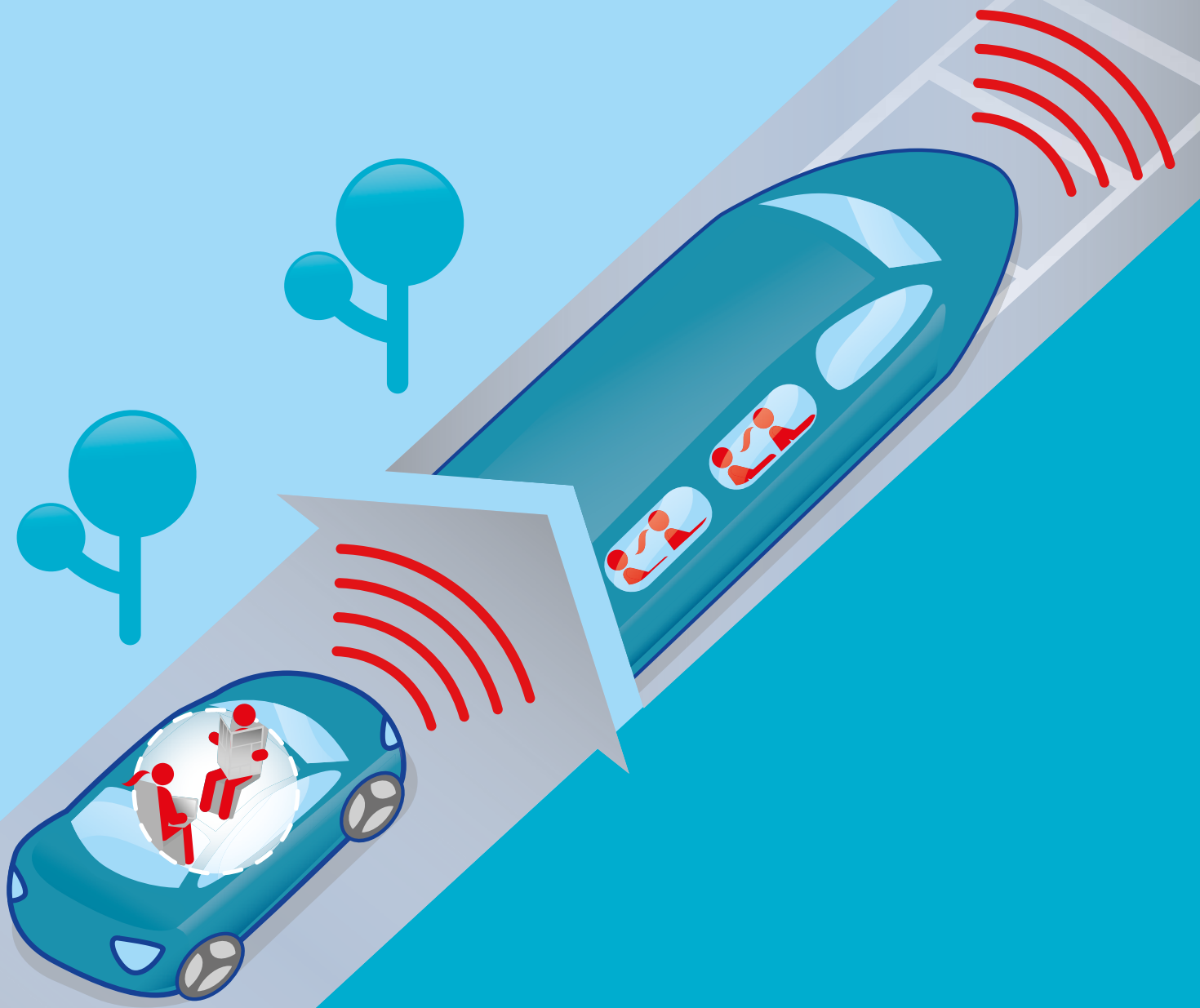
5th guiding principle: Candid treatment of data and information

Data and information must be managed as transparently as possible in order to foster the understanding of impacts associated with automated mobility. Data for research projects and scientific findings must be made accessible. In this regard, a clear distinction needs to be made between research and development on the one side, and commercial use on the other side. While research – under due compliance with data protection rules – requires large volumes of data, the management of data for commercial applications must be subject to tighter restrictions. At the same time, data access opens the door to new value-added potential. The public sector, transport safety researchers or transport planners should be able to source entirely anonymised data in order to ensure meaningful deployment of the technologies.

Here, incremental (evolutionary) and sudden (revolutionary) development stages and market implementations must be consistent with, and adhere to, safety aspects (guiding principle 1).

3
Action programme: Automated Mobility

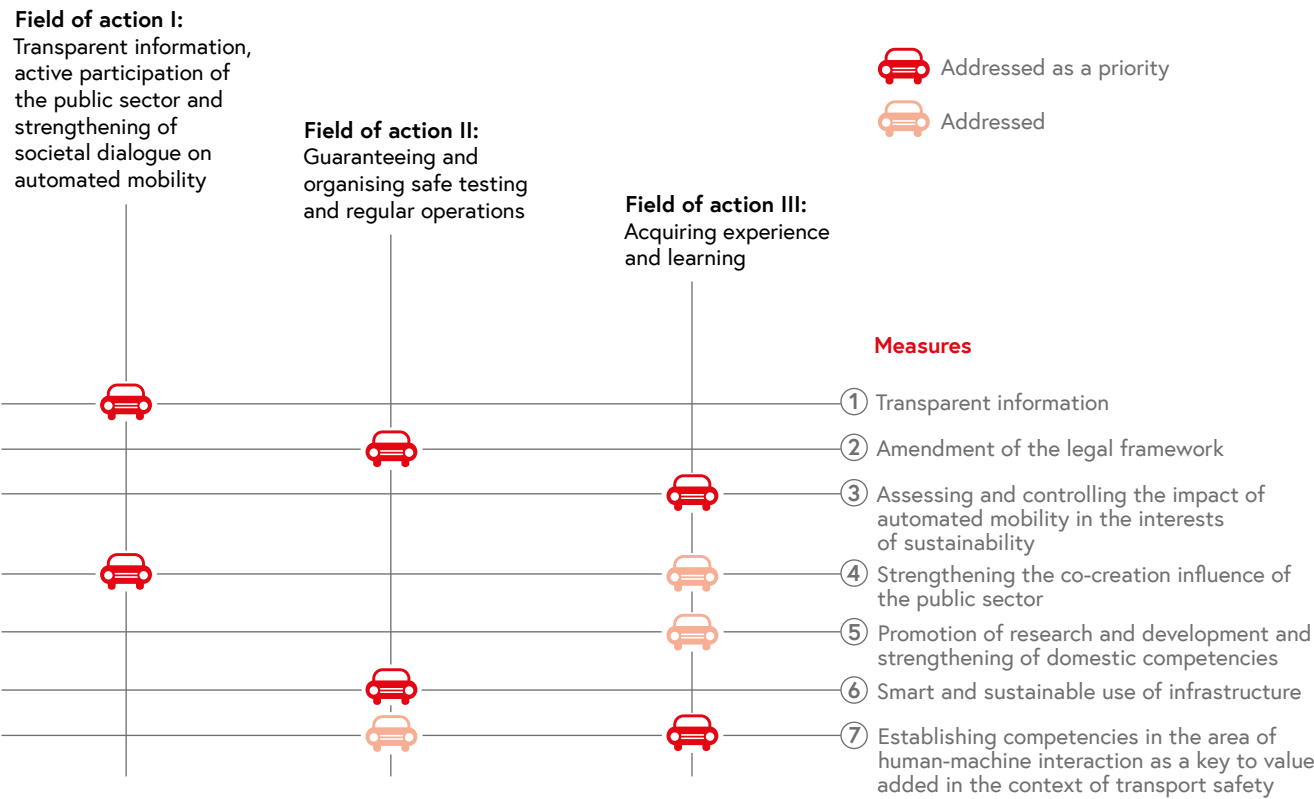# 3.1 At a glance – Summary of the most important points

Field of action I:
Transparent information, active participation of the public sector and strengthening of societal dialogue on automated mobility

Field of action II:
Guaranteeing and organising safe testing and regular operations

Field of action III:
Acquiring experience and learning

Addressed as a priority

Addressed

Measures

① Transparent information

② Amendment of the legal framework

③ Assessing and controlling the impact of automated mobility in the interests of sustainability

④ Strengthening the co-creation influence of the public sector

⑤ Promotion of research and development and strengthening of domestic competencies

⑥ Smart and sustainable use of infrastructure

⑦ Establishing competencies in the area of human-machine interaction as a key to value added in the context of transport safety

Figure 7: Overview on fields of actions and measures

The following diagram shows which reference levels (e.g. mobility services, infrastructure, vehicles) are addressed by the new Action Programme for Automated Mobility, as well as by other existing strategies and roadmaps.

Figure 8: Comparison between the Action programme for Automated Mobility and other strategies

Reference levels addressed in the action programme and other strategies, i.e. roadmaps

Reference levels addressed

Society

Measures in the Action Programme Automated Mobility

- Transparent information
- Legal framework
- Impact assessment and control
- Strengthening of public sector
- Promotion of R&D
- International Positioning
- Use of infrastructure
- Human-machine interaction

National strategies and roadmaps

- Work programme ITS Austria
- 5G Strategy
- C-ITS Strategy
- mission2030
- BMVIT RTI Roadmap Mobility of Persons
- FTI Roadmap Freight Mobility

International strategies and roadmaps

- EC Com: An EU strategy for mobility of the future
- CEDR CAD Strategy
- C-ITS Masterplan
- ERTRAC Automated Driving Roadmap
- STRIA Roadmap on Connected and Automated Transport

Addressed by the action plan or a strategy/roadmap

Partially addressed by the action plan or a strategy/roadmap

28

3.2 Fields of action

The broad-based process of consultations with experts that was conducted during the preparation of the action programme yielded three priority calls to action for continued development of automated mobility. The public sector's measures address all three calls to action, but can only cover part of the necessary developments in each case. A close partnership with industry, research and other stakeholders is vital in order to achieve goals such as a substantial increase in transport safety, the establishment of new mobility services or the exploitation of added value for Austria. The guiding principles set out here are intended to define the actions of all stakeholders.

Field of action I: Transparent information, active participation of the public sector and strengthening of societal dialogue on automated mobility

The deployment of automated mobility in a manner that impacts positively on the transport sector will only work through the inclusion and active participation of the public sector, as well as committed communication between local actors, the research and business communities and society at large. Projects and pilots should inform society with the broadest possible impact and provide citizens with the opportunity to share their concerns in regard to a sustainable mobility system. Aspects that require particular promotion include accessibility in order to highlight the needs of mobility-restricted persons. Humans must be at the center of the coming transformation of the mobility system. Regular dialogue must be ensured to promote cross-sectoral cooperation (science & research, industry and the public sector). Austria's positioning among the international leaders in the field of automated mobility – and hence the strengthening of networks and ongoing knowledge sharing with other countries – are of particular significance.

Field of action II: Guaranteeing and organising safe testing and regular operations
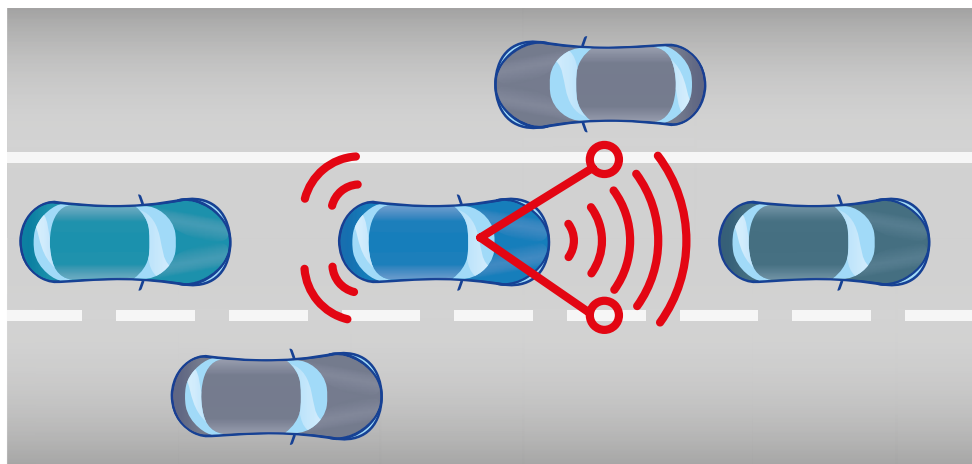
Greater (legal) certainty must be guaranteed in future through the amendment of current legal frameworks for automated and connected mobility in the road and rail sectors. This includes the preparation of framework conditions for the protection of consumers in the area of data privacy and security, as well as the enablement of secure and reliable management of automated systems. Training and education are becoming increasingly important, as is raising awareness for the management of progressive automation. These aspects must be structured in a transdisciplinary manner and adapted meaningfully to reflect different social environments. Other important areas include clear classifications for the secure use of automated systems within mobility, as well as the strengthening of international cooperation in operational issues (e.g. definition of Operational Design Domains as enhancements of the current SAE[11] Levels). It is also important to survey the requirements for additional infrastructure (physical and/or digital) and to introduce efficient control of digital and connected infrastructure based on national requirements. In this regard, it is not primarily a question of modifying infrastructure to suit vehicles, rather of ensuring end-to-end, efficient transport control through the integration of infrastructure operators and mobility providers.

[11] Society of Automotive Engineers

Field of action III: Acquiring experience and learning

Test infrastructures for automated mobility have been established around the world in recent years. In order to acquire a better understanding of the impact, it is essential to ensure that society can learn from the experience obtained through testing the use of new systems. The creation of experimentation environments for development, testing and connection is essential in this regard, as is the promotion of test infrastructures and pilot projects. Research and development in the area of technologies for automated vehicles (sensors, artificial intelligence, the IoT …), on operating and control systems for road and rail applications, as well as into human-machine interaction, will continue to require funding and support. The repercussions of automated mobility on our mobility system, transport safety, economic frameworks and the environment as a whole must be analysed and controlled purposefully as part of this process. Innovative business and operator models need to be supported and the transition from test to regular operations enabled. Particular attention will also be paid to cross-border learning and cooperation that allows knowledge sharing with other countries.

Hence, the basic agenda for the coming years is: To move from technology development toward experience and evidence and therefore to arrive at a meaningful and safe deployment of automated mobility within the transport sector. Important aspects in this regard include strong international inclusion of all activities and the integration of various components for the development of a sustainable and climate-friendly mobility system.

3.3 Measures

1 Transparent information

Automated mobility is developing in leaps and bounds, so questions of societal acceptance need to be addressed as a matter of urgency. Current pilot projects and test infrastructures deliver an important contribution. Knowledge transfer, the raising of awareness and dissemination need to be applied in order to ensure the accessibility of existing experience regarding the management of automated and digitised systems that is obtained in this context. Practical testing and experimentation bring technology to life and promote understanding of the current state of development, as well as the possible implications for our society. Connecting the R&D sector, the industrial community, the start-up scene, the public sector, infrastructure operators and society at large are key factors in creating a holistic appreciation of automated mobility.

Measure 1.1: **Enabling knowledge transfer and experience for the general public both inside and outside of tests and current pilot projects. Publishing of current insight and findings of funded projects, clear communication of the objectives and frameworks of transport policies, open discussions on recognisable trends, provision of regular overview of the status quo in Austria. Where possible, communication should take place in various high-impact formats (project events, test infrastructures, websites, information libraries, other media formats).**

Who: BMVIT, Contact Point Automated Mobility at AustriaTech, BMVIT-funded projects in partnership with the research and business communities, as well as associations

When: continuously

Measure 1.2: **Establishment of a Forum for Automated Mobility for regular networking and knowledge transfer. Frequent events should create a framework to present current research projects and their findings, to highlight developments and challenges within the industrial sector and to enable discussions with stakeholders from beyond the technology community. The main purpose in this regard is for the various transport operators – road, rail and aviation – to learn from each other.**

Who: BMVIT, Contact Point Automated Mobility at AustriaTech, in partnership with test infrastructures, projects and the research and business communities, as well as associations

When: from Q3/2019, in an annual rhythm

Measure 1.3: Regular surveys on the acceptance, knowledge levels and expectations in connection with driving assistance systems and new vehicle technologies, in order to infer further measures. Accompanying analyses and surveys both prior to and during pilot projects and tests, for instance comparative user surveys or sentiment mappings.

Who: Contact Point Automated Mobility at AustriaTech
When: from Q3/2019, in a two-year rhythm

Measure 1.4: Regular inquiry and presentation of current activities in the form of a monitoring report.

Who: Contact Point Automated Mobility at AustriaTech
When: annual

Measure 1.5: Development of a catalogue of authorised vehicle functions and application scenarios within the transport system that is understandable for consumers and the public at large.

Who: Contact Point Automated Mobility at AustriaTech
When: from Q3/2019, in a two-year rhythm

2 Amendment of the legal framework

The first legal framework for the testing of automated vehicles on public roads was created in late 2016. In addition to tests on private road sections and public roads, driving assistance systems (partial automation) are being incorporated successively into current vehicle models. In some cases they contradict existing regulations that continue to assume that a human being remains in control of e.g. driving actions. Due to the (current) lack of European and international harmonisation, national measures are increasingly important in order to nevertheless ensure the safe management of technology during the test phase. The legal separation of test and regular operations is intended at the national level to enable safe management for testing and experimentation with new technologies and hence to create an advantageous framework for competitive industrial and research sectors. Careful evaluation of the test findings will prepare the path for a safe transition from test to regular operations in future.

Measure 2.1: Reform of the current legal framework (AutomatFahrV, StVO, KFG) and updating of the Code of Practice to allow safe testing on domestic roads in future as well. This includes, in particular:

- Standardised and approved driving assistance systems that have been established on the market for many years – including parking assistance systems or cruise control with automatic lane-keeping – should be authorised for regular operations through the introduction of suitable amendments to AutomatFahrVerordnung subject to certain prerequisites.
- Based on the premise of maintaining transport safety, the legal and technical framework for including and implementing new use cases (platooning, tests on country roads) is to be defined and implemented. A legal foundation for the use of approved driving assistance systems mounted in series vehicles must also be created.
- Amendment of the Code of Practice to ensure consistency with legal requirements. Minimum technical standards for data security and protection will also be incorporated. Moreover, requirements for test drivers (proof of specific driving qualifications) will be specified in more detail, and the competent authorities will receive more extensive information.

Who: BMVIT, Contact Point Automated Mobility at AustriaTech
When: from Q1/2019, continuously

Measure 2.2: Legal and technical evaluation for the introduction of controlled test and experimentation spaces ("sandboxes") for testing and experimenting with new transport technologies in the public space. This aspect should exceed the scope of flagship projects and must be defined within national law (StVO, KFG, Driving License Act (FSG) etc.). Among the main purposes is to accelerate research and deployment of innovative new systems and ideas – as well as their actual impact on the transport sector – and to draw conclusions on amendment requirements within current legal statutes. In particular, the evaluation should explain the specific limits for Austria on so-called controlled experimentation spaces under administrative and constitutional law, as well as their technical feasibility. A second stage will involve reviewing the viability of the evaluation findings and, where technically and legally possible and meaningful, ensuring their sustainable implementation.

Who: Commissioning of (legal) expert opinions by BMVIT
When: from 2019

Measure 2.3: Active participation in amending international legislation in the field of automated and connected driving (at UN and EU level). Regular monitoring and evaluation of international law-making initiatives and relevant working groups should take place at the national level, in order to guarantee prompt implementation in national law.

Who: BMVIT
When: continuously

3 Assessing and controlling the impact of automated mobility in the interests of sustainability

Testing and introduction of automated mobility in tests, pilot projects and in downstream regular operations influence a variety of factors such as transport safety, the environment and the accessibility of economic circumstances (jobs, locations). Analysis and survey of potential impacts associated with different introduction scenarios – also of already measurable test scenarios – should enable planning perspectives, indicate risks and highlight opportunities. In this regard, it is important to point out when certain effects are anticipated and which framework conditions need to be defined in order to enable the desired impact and to prevent adverse effects. The assessment will be used as basis for downstream planning processes – by all actors – and outline the necessity of control mechanisms for Austria as a whole. Moreover, the management of automated and connected systems requires meaningful incorporation of training, education, advanced courses and additional measures for the enhancement of transport safety.

Measure 3.1: Establishment of end-to-end and continuous system monitoring based on practical experience and research findings (in consultation and cooperation with European and international initiatives) and provision of a relevant knowledge pool (including accompanying impact analyses).

Who: BMVIT (Mobility of the Future and others), FFG
When: from 2019
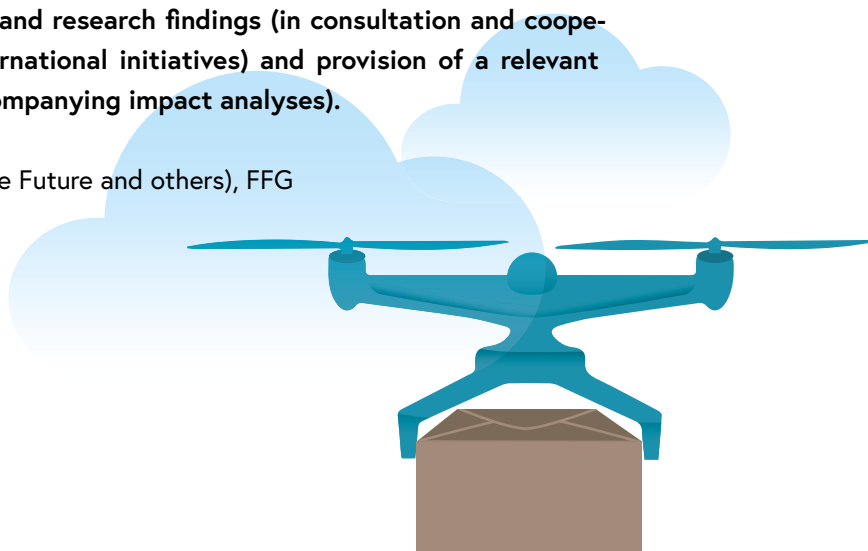
Measure 3.2: Based on current national and international projects (e.g. INFRAMIX, InterAct), impact analysis of increasingly mixed traffic within the mobility system (short and medium-term), as well as definition of necessary mechanisms for management of the rising degree of complexity (control, planning restrictions). Also included is the analysis and evaluation of failure scenarios for automated and connected vehicles on the highway network, with due consideration of various communications technologies and hybrid forms.

Who: AustriaTech (based on Inframix, ICT4Cart, C-Roads) & commissioning of a study by BMVIT
When: from Q3/2020

Measure 3.3: Models for a joint and transparent provision, use and sharing of data. Uniform data collection from national tests and projects, as well as annual reports (e.g. incidents, disengagements) by BMVIT. Definition and delimitation of corresponding data levels and categories in order to ensure the comparability of applications and tests. Ensuring the accessibility of available data for research and planning purposes, with due adherence to data protection and privacy requirements.

Who: Contact Point Automated Mobility at AustriaTech, accompanying study/studies for basic concepts
When: from Q2/2019, continuously

Measure 3.4: Flexible design of the Austrian Road Safety Programme 2021–2030 (VSP), with due consideration of the increasing automation in road transport and the consequent requirements for road users. Stronger consideration of automated mobility in the action plans launched within VSP.

Who: BMVIT in cooperation with the Road Safety Advisory Council (VSB)
When: VSP 2018–2020, action plans from 2020

Measure 3.5: Preparation of new education concepts within the driving school education system, as well as training concepts for safe management of assistance systems and automated driving functions.

Who: BMVIT in cooperation the Austrian Road Safety Board (KFV)
When: from 2019 amendment of the Transport Safety Package, continuously

4 Strengthening the co-creation influence of the public sector

The introduction of automated mobility technologies significantly influences the public space, public infrastructures and the entire mobility system. Experts agree that positive effects can only be achieved if the public sector plays a prominent role in shaping the process. In this context, the definition of interfaces and coordination mechanisms, as well as measures to forge networks between all actors, are intended to lay the foundation for the pooling of competencies. Among the relevant issues in this regard are questions of urban and regional planning, the use of space and access to mobility. The dialogue with federal states, cities, local authorities, citizens and the executive branch is therefore crucial. The inclusion of new projects, as well as established test infrastructures and pilot projects, should contribute to the efficient communication of current experience and the purposeful circulation of specific requirements to actors from the scientific and industrial communities, as well the public sector. Moreover, Austria's involvement in international committees, councils and working groups – represented by BMVIT, the Contact Point Automated Mobility and other actors – enables positioning within an international environment with due consideration of national interests.

Measure 4.1: **Support for concomitant topic management for the promotion of cooperation and knowledge transfer between Austrian and international flagship projects (test infrastructures, pilot projects, collaborative projects), as well as to enable cross-border knowledge transfer and to organise accompanying networking events as a means of quality assurance.**

Who: BMVIT, FFG, AustriaTech
**When:** from Q2/2019, continuously, 6-monthly

Measure 4.2: **Establishment of a Dialogue Forum for Automated Mobility under the lead of BMVIT, in cooperation with the federal states, other ministries and the Austrian Association of Cities and Towns, with the aim of preparing, i.e. defining joint priorities and responsibilities. Medium-term establishment of a joint coordination committee**

Who: BMVIT
When: from Q2/2019, coordination committee from 2020, 6-monthly
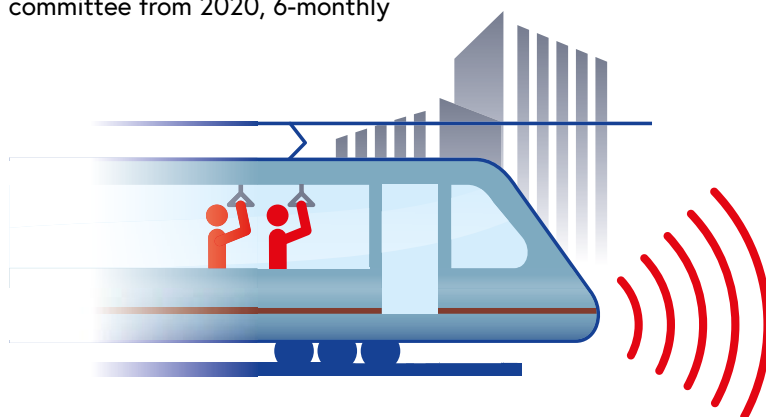
Measure 4.3: Informal dialogue "Stadt - Automatisiert" ("Automation in cities") within the D-A-CH region to focus on mobility scenarios, planning aspects and knowledge sharing between various stakeholder groups, with the aim of preparing and accompanying formal processes and urban initiatives on automated mobility. Preparation of positions, guidelines and communication strategies in the context of urban applications and tasks.

Who: Contact Point Automated Mobility at AustriaTech
When: from Q1/2019

Measure 4.4: Legal and organisational foundations for the testing of new intervention mechanisms and the implementation of cooperative innovation and procurement projects. Based on current structures, the legal, organisational and financial requirements should be put in place in order to define a stronger and broader framework for integrated test, validation and experimentation approaches, as well as to ensure the consistency of user experiences with relevant operator and business models. It is important to investigate how current FTI instruments (innovation labs, pilot projects, test infrastructures) can be best supported in the form of PPPs using new procurement instruments (innovation partnerships and other instruments of public procurement for the promotion of innovation (IÖB) etc.), as well as future European financing opportunities (CEF, EIB).

Who: AustriaTech in consultation with IÖB Coordination at BMVIT, FFG
When: from Q3/2019

Measure 4.5: International representation of Austria in European and international networks. Strengthening of Austria's position and presentation of national interests. Support for networks between road operators and knowledge transfer in an international setting, as well as with automotive manufacturers.
Key Austrian positions will be coordinated and prepared in a process of dialogue.

Who: BMVIT, Contact Point Automated Mobility at AustriaTech and others
When: continuously

5 Promotion of research and development and strengthening of domestic competencies

Based on stakeholder processes and national RTI roadmap initiatives, adequate calls for proposals for automated mobility research projects will be tendered in different funding programmes. This will further strengthen (trans-) national competencies and interdisciplinary research. Current research findings and insights gained from flagship projects as well as results from impact analyses are used as a basis to continue developing the roadmaps and new support initiatives for the research and development in innovative mobility systems.

Efforts in the coming years will focus on research and technology developments, as well as on innovative solution concepts for the road, rail and aviation sectors. In particular, this includes areas such as mobility of persons, freight mobility, vehicle technologies (including drones), transport infrastructure, information and communications technologies, the use of satellite-assisted technologies (especially the European Global Navigation Satellite Systems (EGNSS) – Galileo / European Geostationary Navigation Overlay Service (EGNOS) and Earth observation – Copernicus), as well as security research.

The concepts and implementation of FTI projects should build increasingly on current flagship projects such as test infrastructures or pilot projects, as well as on (free) data from the European aerospace infrastructure (Galileo and Copernicus) in order to ensure that activities are pooled and that the multiplier effects of current infrastructures and competencies are exploited as much as possible. The integration of European projects and cooperation with international partners enable a joint learning experience and contribute to the strengthening of competencies in Austria.

Measure 5.1: Promotion of interdisciplinary research and technology for automated mobility (including aviation) at the national level, as well as creation of knowledge and planning bases and support for the integration of Austrian actors and competencies at the international level.
The aim is to strengthen cross-sectoral/international collaboration and to integrate new actors. For this to happen, needs-based deployment of the FTI funding portfolio for R&D services must be ensured by means of cooperative R&D projects and pilot projects, also including test infrastructures and innovation partnerships.

Organisation of annual calls on the topic of automated mobility with the FTI programmes Mobility of the Future, Take Off, ICT of the Future, KIRAS and ASAP (Austrian aerospace programme) in the focus areas:

- Basic technologies (artificial intelligence, development and optimisation of chip and new sensor technologies, communication solutions, optimisation of human-machine interaction, HD maps, the Internet of Things etc.)

  Who: BMVIT/ICT, ECSEL
  Budget: € 10 million

- Transport technologies/systems (including digital transport infrastructure) for automating road transport, the rail system (expansion of test infrastructures) and drones/air taxis (including the establishment of test infrastructures for drones)

  Who: BMVIT/MdZ/Take Off
  Budget: € 34 million

- Innovative multimodal mobility solutions (especially scalable pilot applications) for automated personal and freight mobility (automated freight transport, first/last mile, modular vehicle concepts, the Physical Internet etc.)

  Who: BMVIT/MdZ
  Budget: € 8 million

- Application of satellite-based technologies (especially EGNSS – Galileo / EGNOS and Earth observation – Copernicus) as well as security-critical issues (safety, security, cybersecurity etc.)

  Who: BMVIT/KIRAS/ASAP
  Budget: € 6 million

- Societal issues (mobility-restricted persons and drivers, inclusion/ accessibility, planning bases and tools, acceptance etc.)

  Who: BMVIT
  Budget: € 2 million

Who: BMVIT, FFG
When: Starts with the autumn call, 2018–2022
Budget: in total around € 60 million

Measure 5.2: Implementation of an FTI portfolio analysis (national and international) to identify the current status of Austria's competency in the area of automated mobility.

Who: BMVIT, FFG
When: from Q1/2019

Measure 5.3: Continued development of the national roadmap on FTI priorities and focus areas based on international innovation roadmaps and processes (e.g. ERTRAC, STRIA and drawing on the national processes on ECSEL Austria and A3PS that took place in 2015/2016).

Who: BMVIT, ECSEL Austria, A3PS, AustriaTech (Contact Point Automated Mobility, FTI Hub)
When: from Q4/2019

Measure 5.4: Enabling of cross-border development and testing of automated systems and stronger participation in European and international initiatives. Specific bilateral and multilateral cooperation with neighbouring states (e.g. with Hungary and Slovenia) will be strengthened and enlivened by means of defined actions (e.g. joint calls). Other agreements with neighbouring states will be actively promoted in order to advertise domestic benchmark and flagship projects and competencies in an optimum way. Promotion of participation by Austrian actors in European and non-European projects and networks.

Who: BMVIT, FFG, AustriaTech, bi/multi-national research cooperation within the framework of the national and European R&D programmes (MdZ, ICT, KIRAS, Horizon 2020/Europe etc.)
When: from Q2/2019

Measure 5.5: Connection of Austrian actors and pooling of their expertise by organising networking measures to accompany the programmes. The definition of interfaces and coordination mechanisms, as well as measures to forge networks between all actors, are intended to enable the establishment of greater technical knowledge and the pooling of competencies. The purpose is to allow knowledge transfer to new actors, for instance the start-up scene. AustriaTech will act as the interface here, ensuring the establishment of networks and informing, i.e. including, the public sector of and in current developments. Evaluation of research findings is a key aspect in this regard.

Who: BMVIT, FFG, AustriaTech (Contact Point Automated Mobility, FTI Hub)
When: from Q1/2019

Measure 5.6: **Establishment of an FTI advisory council on automated mobility for all programmes. The purpose of establishing an FTI advisory council on automated mobility for all programmes is to create a platform for international experts who, based on their scientific and technical expertise, accompany from an international perspective the funded research and development activities in Austria and who help shape its direction by submitting recommendations.**

Who: BMVIT, FFG, AustriaTech (Contact Point Automated Mobility, FTI Hub)
When: from Q1/2019

6 Smart and sustainable use of infrastructure

The availability, adaptation and precise mapping of physical and digital infrastructure (elements) are vital to the purposeful use of automated vehicles in the road network. On the one hand it is a question of structuring current transport infrastructure so as to enable automated mobility. But on the other hand it is also essential to define the infrastructural requirements that automated mobility – physical and digital – must meet. The technologies that are already available in Austria, specifically in the area of C-ITS, as well as traffic management, monitoring and information, represent an internationally noteworthy unique selling position in the context of new mobility systems. The integration of information from the infrastructure, i.e. environment into the vehicle enables environment-sensitive driving quality by considering static and dynamic travel information. Digital infrastructure is highly important when ensuring conncectivity, information transfer ensuring connectivity, information transfer and sensor optimisation. Conventional physical infrastructure such as ground markings, signposts and such like will remain as a significant factor. But data and information systems will become more and more important in this context in order to allow an ideal interaction between digital and physical infrastructure. For instance, a real-time digital map of the physical infrastructure will be necessary so as to transmit to the vehicle information on the type and condition of the physical infrastructure as ideally as possible. Moreover, vehicles will transmit data on the condition of the physical infrastructure (e.g. on the characteristics of the road surface) to the infrastructure operator. This will require a suitable traffic management process and improved algorithms to use the inevitable flood of data and information both efficiently and meaningfully. The infrastructural requirements presented by mixed traffic comprising automated, partially automated and non-automated vehicles must be taken into account and analysed appropriately. The timeframe must also be factored in at all times when considering the requirements for the infrastructure (whether physical or digital), for instance by when particular functionalities need to be made available via the vehicle or the infrastructure, or which stakeholders need to be informed of which changes or developments or involved in the process, and by when? Moreover, the functional description of design and layout parameters needs to communicate where, when and under which conditions connected and automated vehicles (and their users) are authorised to travel on road infrastructures.

Measure 6.1: Survey of the influence that automated vehicles have on network availability and definition of the necessary modifications in regard to physical and digital infrastructure, as well as the traffic management processes.

Who: ASFINAG
When: Findings from 2019

Measure 6.2: Realisation of effective and efficient cooperation between public and individual transport through the provision of new mobility services. Analysis of the necessary design at the macro and micro level, e.g. public space and structural design, road space and lane design, mobility nodes and access options.

Who: BMVIT in cooperation with regions and cities
When: from Q2/2020

Measure 6.3: Development and implementation of a digital repository (static, dynamic data) to identify the needs in regard to physical and digital infrastructures, operationalisation of control necessities and classification of Operational Design Domains so as to be able to define the matching technological (functionality and relevant issues such as safety and security), as well as legal and organisational frameworks for the (downstream) regular operation of automated vehicles on the public road network.

Who: BMVIT, ASFINAG, federal government, states
When: from Q3/2019

Measure 6.4: Analyses of requirements of potentially connected, automated vehicle functionalities regarding the digital infrastructure, in particular C-ITS Day 1, Day 1.5 and Day 2 Services. Definition and articulation of a requirements catalogue and the corresponding framework conditions for infrastructure operators (highways and urban road networks).

Who: AustriaTech with selected stakeholders (including ITS Austria, C-Roads, TM2.0, ASFINAG)
When: from Q4/2019

Measure 6.5: Further development and deployment of C-ITS services for the support and integration of CCAD (adopted service definitions and message formats) on highways and urban road transport infrastructures including the necessary framework conditions for quality assurance.

Who: BMVIT,ASFINAG, AustriaTech, Cities
When: from Q4/2020

Measure 6.6: Definition of infrastructure support levels. The highway infrastructure can be divided into a number of categories based on physical and informational facilities. This map of Infrastructure Support Levels for Automated Driving (ISAD) can be used as an additional source of information to define and distinguish the operational environments for automated vehicles in the mixed traffic phase.

Who: ASFINAG
When: from Q2/2019

7 Establishing competencies in the area of human-machine interaction as a key to value added in the context of transport safety

Besides the transport procedures and organisation, the requirements placed on the behaviour of transport users are changing due to the increasing market penetration by and use of automated and connected systems. The issue of human-machine interaction (HMI) should be given more attention in the coming years in order to guarantee the safe use of automated systems. Among other things, this relates to the impacts of new vehicle and design concepts on system safety, the assurance and management of quality and trust, as well as the evaluation of user acceptance and the effectiveness of measures. Moreover, national and international cooperation and knowledge sharing should contribute to the strengthening of national competencies in the field of HMI and ensure their continued, long-term existence, especially in regard to unprotected transport users where optimised traffic safety is concerned. Acceptance and trust in innovative (automated) systems are, after all, the only way to exploit new value-added potential.

Measure 7.1: Specific studies on the definition of focus areas with relevance to traffic safety, as well as the development of methods in the context of human-machine interaction, in order to determine (A) how automated systems and humans interact in different subareas; (B) how new vehicle and design concepts (in the area of public and mixed traffic) impact system safety and system understanding, and (C) how (new) quality parameters, future trust principles and education and communication concepts may look like for future tasks involving participation in traffic, as well as (D) how meaningful value-added potential (especially in the area of transport safety) can be established and strengthened.

Who: Commissioned by BMVIT
When: from Q4/2019

Measure 7.2: Implementation of long-term naturalistic driving studies as preparatory and accompanying support for education and communication concepts for drivers, as well as driving exercises in connection with automated and assisted driving.

Who: Commissioned by BMVIT
When: Q1/2021

Measure 7.3: Knowledge sharing and communication on human-machine interactions with other sectors and application fields in the area of transport safety (also based on international experience; e.g. industrial robotics, aviation). The outcome will be a good practice guide.

Who: Commissioned by BMVIT
When: Q4/2019

Measure 7.4: Studies/monitoring to accompany pilot projects and test infrastructures with a focus on human-machine interaction and transport safety in the area of automated mobility. The purpose is to guarantee broader system benefits for the better understanding of human-machine interaction.

Who: Commissioned by BMVIT, process accompaniment and monitoring by the Contact Point Automated Mobility at AustriaTech
When: from Q2/2019

4
Summary
and outlook

The breakneck process of automation and digitalisation will transform our society. This can lead to opportunities in the mobility sector and contribute to the achievement of societal targets. But the positive effects will not come about by themselves, and will require firm control and coordination in the introduction of new technologies. In doing so, it can be ensured that the opportunities and benefits of automated and connected mobility will come to the fore and create added value for society as a whole.

With the 2016 Action Plan "Automated – Connected – Mobile", the Ministry for Transport, Innovation and Technology created the first framework for the management of automated vehicles at national level. Initial tests on domestic roads and a large variety of research projects have yielded insight and indicated the challenges. These findings need to be exploited in order to implement controlling measures that are geared at the meaningful deployment of automated mobility in Austria, while supporting the domestic research and industrial sectors in the development and testing of technology.

Faced with the rapid pace of progress in the area of automated vehicles for road transport and automated systems for rail transport, the calls to action defined in a broad-based stakeholder process are the central elements in this Action Programme and set out the framework of the outlined measures for implementation in the coming years. Initial research foci are also addressed with a view to automation within the aviation sector. Other forms of automated mobility systems, for instance for use on inland waterways, are not included at present. However, they will be incorporated in detail as part of downstream planning and Action Programmes at a later date.

4.1 Additional information:

- **BMVIT websites:**
  - About automated mobility
    (https://www.bmvit.gv.at/en/verkehr/automated/index.html)
  - Information library (https://infothek.bmvit.gv.at)
- **Austrian Research Promotion Agency (FFG)** (https://www.ffg.at/en)
- **BMVIT funding programmes:**
  - Information and Communications Technologies of the Future
    (https://iktderzukunft.at/en/)
  - KIRAS – Security Research
    (https://www.kiras.at/en/#category-filter:path=default)
  - Mobility of the Future (https://mobilitaetderzukunft.at/en/about/)
  - Take Off (https://www.bmvit.gv.at/innovation/luftfahrt/takeoff.html)
  - ASAP – The Austrian Space Applications Programme
    (https://www.bmvit.gv.at/innovation/raumfahrt/weltraumprogramm.html)
  - Open4Innovation – Platform for the provision of research findings and a
    knowledge base for companies, researchers and citizens:
    (https://open4innovation.at/de/)
- **Contact Point Automated Mobility – AustriaTech**
  (http://austriatech.at/en/activities/point-of-contact-automated-driving)

- **Open Rail Lab – SCHIG mbH** (www.schig.com) **or** (www.orl.at)
- **Monitoring Report on Automated Driving**
  - AustriaTech, 2018
    (http://austriatech.at/pdf/328)
- **Action Plans on Automated Driving**
  - BMVIT, 2016-2018
    (https://www.bmvit.gv.at/en/service/publications/downloads/
    actionplan_automated_driving_2016-2018.pdf)
  - A3PS ADAS-Roadmap (http://adas.a3ps.at/)
  - ECSEL Automated Driving Roadmap
    (http://ecsel-austria.net/ecsel-austria.html)

4.2 Annex A:

Selected initiatives, processes and organisations that address issues of connected and automated mobility at the European level with the involvement of Austrian delegations – refer to Figure 6

The **High Level Ministerial Dialogue** consists of transport ministers and representatives of the industrial, telecommunications and automotive sectors, as well as project management agencies. It meets on a 6-monthly basis. The aim is to create a uniform, pan-European framework for the use of connected and automated vehicles.

The **Trilateral Automation WG on Road Vehicle Automation** between the EU, the United States and Japan meets regularly to work on a variety of focus areas for connected and automated driving. The frequent meetings are organised by ERTICO.

DG RTD is responsible for preparing the **STRIA** (Strategic Transport Research and Innovation Agenda) roadmaps that address connected and automated mobility and other issues.
Link: https://ec.europa.eu/jrc/en/publication/brochures-leaflets/strategic-transport-research-and-innovation-agenda-stria-roadmap-factsheets

Road operators investigate matters of relevance to automated and connected mobility on highways within the **Cooperative & Automated Driving Work Group** at **CEDR** (Conference of European Directors of Roads).
Link: http://www.cedr.eu/

ASECAP, the European Association of Operators of Toll Road Infrastructures, is an alliance of motorway and expressway operators tasked with the (continued) development of the road network and with obtaining the necessary funds.
Link: http://www.asecap.com/

PIARC is a global network that promotes international cooperation between actors in the road sector. The task force TF B.2 Automated vehicles: challenges and opportunities for road operators and road authorities explicitly addresses automated mobility.
Link: https://www.piarc.org/en/

C-Roads is a pan-EU platform that allows Member States and road operators to focus on issues relating to the testing and implementation of C-ITS applications, with the aim of establishing cross-border interoperability.
Link: https://www.c-roads.eu/platform.html

ERTRAC (European Road Transport Research Advisory Council (CAD)) is the European technology platform for road transport. One of the six ERTRAC working groups focuses exclusively on connectivity and automated driving.
Link: http://www.ertrac.org/

ECTRI (European Conference of Transport Research Institutes) is a research association that has set itself the goal of implementing research foci in the field of sustainable and multimodal mobility at the European level. Transport research institutes and universities are represented.
Link: http://www.ectri.org/

The purpose of **ETRA** (European Transport Research Alliance) is to strengthen pan-European cooperation in the area of transport research. A collaboration platform is made available that allows the various organisations within transport research to work together.
Link: http://www.etralliance.eu/

Research collaboration between 30 members from the European Member States, as well as other international organisations, is the focus of **FEHRL** (Forum of European National Highway Research Laboratories). Their aim is to disseminate and implement innovative approaches in road construction and to foster general development of the road sector in Europe.
Link: http://www.fehrl.org/

ALICE is an alliance of European actors that is aimed at the strategic alignment of research, innovation and industrial development in the field of logistics and supply chain management. It already places a focus on automation.
Link: http://www.etp-logistics.eu/

SHIFT2RAIL is a pan-European initiative that seeks to drive research and development in the area of rail transport. The purpose is to introduce an innovative rail network that improves the standards of rolling stock travelling in Europe, for instance in the interests of improved comfort, lower noise emissions or larger capacities to accommodate rising passenger numbers. The two groups IP2/TD2.2 Automatic Train Operation and IP5/TD5.6Autonomous train operation are especially relevant in the context of automation.
Link: https://shift2rail.org/

ACEA (European Automotive Manufacturers Association) advocates the interests and positions of the European automotive industry, i.e. the vehicle manufacturers. ACEA focuses on vehicle-side aspects of connected and automated driving within the field of automation.
Link: https://www.acea.be/

CLEPA (European Association of Automotive Suppliers) is the association of European automotive suppliers. Its tasks include coordinating and articulating the objectives and visions of the automotive suppliers and representing their interests toward the EU.

Link: https://clepa.eu/

EARPA is an alliance of R&D organisations in the area of automotive research. It aims to organise close cooperation and hence to strengthen the position of R&D actors within this field.

Link: https://www.earpa.eu/earpa/home

The **OECD International Transport Forum** is a global organisation that also addresses issues of automated mobility at policy level. The incumbent transport ministers are the country representatives at the EU level. For instance, a round table discussion was held on the issue of truck platooning in June 2018.

Link: https://www.itf-oecd.org/

EUROCITIES is a network of European cities comprising representatives of the city administrations. The city of Vienna chairs the Smart and Connected Mobility working group.

Link: http://www.eurocities.eu/eurocities/working_groups/Smart-and-connected-mobility&tpl=home

UITP (Union Internationale des Transports Publics) advocates public transport and sustainable mobility solutions at an international level. It lobbies national decision-makers, international organisations and other relevant stakeholders. The focus is placed on fostering innovation and the use of new technologies, while upholding the objectives of transport and social policies.

Link: http://www.uitp.org/

UN-ECE (United Nations Commission for Europe) is responsible for the authorisation, i.e. approval of automated (and connected) vehicle systems and functions.

Link: https://www.unece.org/info/ece-homepage.html

CEN (European Committee for Standardisation) is one of three European standardisation committees that is officially recognised by the European Union and the European Free Trade Organisation. A voluntary organisation, CEN is in charge of developing standards at the European level.

Link: https://www.cen.eu/Pages/default.aspx

Glossary

ALP.Lab Austrian Light Vehicle Proving Region for Automated Driving – Austrian test infrastructure in Styria for automated vehicles, funded within the framework of the Mobility of the Future Programme and its call for test tracks for automated driving in 2016.

ASAP Austria's aerospace programme (Austrian Space Applications Programme) supports the high-tech aerospace sector in Austria in order to achieve outstanding international standards within the entire area of aerospace: from space research and science, through to technology development and applications for space technologies such as earth observation, telecommunications and navigation.

AustriaTech Federal Agency for Technological Measures Ltd.

Automated driving In principle, the automated vehicle must possess the same capabilities as a human driver. It must be able to recognise and understand its environment for which it uses sensor technology. Secondly, it must process the information it acquires in this way and then plan its driving strategy. The on-board computer uses software and smart algorithms, as well as communication with infrastructure and other road users, to fulfil this task. Thirdly, its transmission, steering and braking force must move the wheels in such a way that the planned driving strategy is put into practice.

BMVIT Austrian Ministry of Transport, Innovation and Technology

Connecting Austria Connecting efficient and automated cargo transport from the motorway to the city – Austrian pilot project that investigates requirements for the operation of automated, energy-efficient truck platoons, funded within the framework of the Mobility of the Future Programme, 9th call, Vehicle Technology and mobility of persons.

Digibus®Austria Austrian pilot project for automated driving in local public transport, located in Salzburg, it tests and seeks to optimise the operation of a driverless bus, as well as human-machine interaction.

DigiTrans Test region for automated driving in "Austria North" with a focus on digitalisation and logistics aspects, funded within the framework of the Mobility of the Future Programme, 9th call, Vehicle Technology and mobility of persons.

EGNOS European Geostationary Navigation Overlay Service

EGNSS European Global Navigation Satellite Systems

EU European Union

FTI (Austrian) research, technology and innovation policies

GoA Grade of Automation – based on the SAE levels for road transport, GoA creates a framework for defining the different levels of automation.

HMI Human-machine interaction means the interaction between human beings and machines by means of an interface.

ICT Information and communications technologies

KFG Motor Vehicle Act

KIRAS Austrian support programme for security research

MdZ Mobility of the Future – National research programme

MIV Motorised individual transport

Mixed transport Mixing, i.e. joint use of conventional (non-automated) and automated vehicles – in any degree of automation – with all other transport users.

ODD Operational Design Domain – Functional description of the design and layout parameters of a (road) infrastructure stretch for which usage authorisation or opportunity for automated/connected vehicles or driving functions is granted due to aspects relating to the infrastructure, users, vehicles and laws, as well as due to weather and other environmental conditions.

Open.Rail.Lab Austrian test infrastructure for automated trains and their systems on a public route between Oberwart and Friedberg (Burgenland, Austria)

Platooning Virtual coupling of two or more trucks with reduced minimum spacing. This may be orchestrated or take place spontaneously and can include vehicles by different manufacturers.

SAE (J3016) The SAE J3016 standard describes the classification and definition of terms for road vehicles and systems that enable (fully) automatic driving. It was published by SAE International (previously: Society of Automotive Engineers) and has been in force since January 2014. The classification defines six levels and describes their minimum requirements. A vehicle may move between the levels, depending on its features and their use.

Take Off Austrian Aviation Research Programme to strengthen competitiveness within the Austrian aviation and supplier sector, as well as competency and cooperation between Austrian companies and research institutions.