

Programme “Mobility of the Future” (Mobilität der Zukunft MdZ) – RTI Agenda and Roadmap for Personal Mobility (English Summary)

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Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT)
Unit III/I4 – Mobility and Transport Technologies
A-1030 Vienna, Radetzkystraße 2

Contact: DI Walter Wasner

Responsible for the theme „Personal Mobility“

within the programme Mobility of the Future (Mobilität der Zukunft – MdZ)

Content

DI Walter Wasner (BMVIT)

DI Julian Pöll (AustriaTech)

Dr. Silvo Korez (AustriaTech)

Dr. Dietrich Leihls (FFG)

DI Nora Spiegel (AustriaTech)

Michaela Enzenhofer, BSc (AustriaTech)

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This document is a translated summary of the German documents: FTI-politische Agenda und Roadmap zur Ausrichtung der Programmmaßnahmen „Mobilität der Zukunft“ (MdZ) im Themenfeld „Personenmobilität innovativ gestalten“ and the corresponding Theme-Cockpit document



Note on gender-neutral language

Gender-neutral language was used for natural persons, but not for legal persons such as grant recipients, which can be businesses or research institutions.

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1. Programme and thematic scope

The Research, Technology and Innovation (RTI) strategy of the Austrian Federal Government focuses on the further development and overall implementation of potentials in science, research, technology and innovation in Austria, in order to meet the major social and economic challenges of the future.

The Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT) has launched the innovation-oriented research funding programme Mobility of the Future (Mobilität der Zukunft, MdZ) in the year 2012. As a mission-oriented programme, Mobility of the Future aims at supporting the advancement of the mobility system, in particular where new approaches are needed to address mobility-relevant social challenges and where RTI measures have the potential for a transformation necessary to tackle related challenges.

Current developments in the field of personal mobility come along with societal change and have to be considered in the context of global trends and phenomena within the field of transport and beyond. Advancing digitalisation, automation and electrification or trends towards a sharing economy bring about profound changes in the system dynamics of personal mobility. The Research Programme Mobility of the Future focuses on the quest for integrated solutions designed to shape the personal mobility system of the future. This system must be sustainable (minimising the environmental impact), efficient (considering the resource input), affordable, safe, reliable and user-friendly and balance social, environmental and economic needs. This integrated approach helps to create systems that contribute significantly to ensuring mobility while minimizing the adverse impacts of transport.

The complex interactions inherent in transport systems require interdisciplinary research approaches aimed at developing both technological and social innovations. Thus, the programme focuses on new markets taking up solutions that can adequately serve the essential needs of society.

2. Key trends and developments in the field of personal mobility

The mobility of persons is the main contributor of domestic and transit traffic. In 2014, personal mobility was responsible for 85 %¹ of the transport performance (regarding travelled kilometres) on roads. In comparison, the traffic performance of personal mobility on railway amounted to 68,9 %². Since 1995, there has been a significant increase in personal mobility in regard to the traffic performance (in personal kilometres travelled) which by far exceeds the population growth and this upward trend is predicted to last³.

Trends in personal mobility

While the average number of trips per day has slightly declined within the last twenty years (from 3 in 1995 to 2,8 in 2013/2014), the distance travelled has increased notably from 28 km on average in 1995 to 34 km in 2013/2014⁴. Due to higher travel speeds and a shift towards faster modes, the average daily travel time has remained constant at 70 minutes⁴. Suburbanisation, urban sprawl and rural depopulation along with a growing level of motorisation, have accompanied these developments.

Motorised private transport poses a major challenge to mobility planning. Even though the rate of increase is smaller than before, the share is still growing. In particular, motorised private transport dominates in rural and peripheral regions and the modal share of walking in these regions has further declined over the last decades⁵. An increase in the share of public transport trips was only reported for Vienna⁵. Apart from spatial characteristics, trip purpose and personal characteristics influence people's mobility behaviour as well. Particularly, trips to work are far more dependent on car use than leisure trips⁵. A person's age and gender also impact the modal choice. Women report higher shares of walking than men while men's share of trips by motorised private transport exceeds the women's share by 13 %⁶. Forms of active mobility (walking and cycling) are more frequent among children under the age of 14 and senior citizens⁶. Considering the development over the last 20 years, it is apparent that within the group of senior citizens there has been a shift away from walking towards motorised private transport⁷. Within the group of pupils, a shift away from walking towards car passenger trips was recorded⁷.

Over the last two decades, multimodality and intermodality have also increased throughout Austria, especially in central districts on first-mile and last-mile trips. Here, the combination of motorised private

¹ Individual calculation based on Eurostat, National road traffic according to vehicle and road type (in million vehicle-kilometres) 2017, online

² IRG-Rail, Fifth Annual Market Monitoring Report, 2017, p.37 f.

³ BMVIT (Publication), Gesamtverkehrsplan für Österreich, 2012a, p. 38

⁴ BMVIT (Publication), Österreich unterwegs 2013/2014, 2016a, p. IVf.

⁵ BMVIT (Publication), Österreich unterwegs 2013/2014, 2016a, p.101

⁶ BMVIT (Publication), Österreich unterwegs 2013/2014, 2016a, p. III

⁷ BMVIT (Publication), Österreich unterwegs 2013/2014, 2016a, p. III

transport and public transport is predominant. In peripheral regions, the combination of cycling and public transport has increased. The potential extent of a shift towards intermodality also varies according to age and life situation. Within the younger population, personal flexibility, individuality and independence become more important, which benefits the establishment of alternative mobility services in the multimodal context. Particularly, sharing mobility can provide an efficient alternative to private car ownership for flexible users.

Spatial and societal developments and personal mobility

Personal mobility is highly dependent on spatial factors and societal developments. Current prognoses predict increasing urbanisation and growth of cities and their surroundings and make it vital to address the consequential challenges. Congestion, scarcity of space as well as air pollution and risk of accidents due to high traffic volumes pose major challenges in urban areas. To improve the accessibility and ensure equal opportunities for the rural and urban population the integration of innovative mobility choices and services is promoted through comfortable and sustainable mobility options. Particularly, on-demand mobility, sharing mobility and the use of intelligent multimodal services (in the form of "Mobility as a Service") shall provide seamless, affordable and efficient mobility options.

To address the challenges of new forms of work and leisure activities, various concepts to reduce traffic are being tested; for instance by promoting co-working spaces, home office and telework. Here, the adaptation of the technical infrastructure and the legal framework is a prerequisite to enable a more flexible form of work. Along with the changing working environment, the demographic change poses considerable challenges to the mobility system. An aging society and the increase of persons with limited mobility and cognitive limitations need to be considered to provide affordable, accessible and inclusive solutions for mobility.

Decarbonisation and personal mobility

To reach the emission reduction targets set in the Paris Agreement and the UN Sustainable Development Goals, a substantial decarbonisation of the transport sector is needed. On a national level, the integrated climate and energy strategy (#mission 2030)⁸ defines necessary objectives and fields of action. Within the realm of personal mobility, private cars are the main polluters and need to be at the centre of decarbonisation efforts. The reduction of trips by private motorised transport and the shift towards public transport and active mobility are the essential pillars. The combination of economic measures, optimisation of spatial planning and efficient mobility management on the private, commercial, communal and regional level as well as enforced telework and campaigns to raise awareness for sustainable mobility are needed to meet the reduction targets. Mobility research must help develop solutions to meet personal mobility demands that are safe, comfortable, sustainable and accessible to all. Public transport will play an essential

⁸ BMNT & BMVIT (Publication), #mission2030, 2018

part in urban areas. Innovative mobility solutions like Sharing Mobility, Micro-public transport and multimodal mobility will be explored for their potential to enable decarbonised mobility in rural areas.

Digitalisation and personal mobility

Digitalisation is currently transforming the transport sector, especially personal mobility is experiencing a period of transition. New digital infrastructures are being developed and new (often private) players are pushing digital and data-driven business models and services onto the market. Connected automated driving and Cooperative Intelligent Transport Systems (C-ITS) as well as the developments of cloud computing, Internet of Things (IoT), blockchain technologies and the use of artificial intelligence will have a considerable impact on personal mobility. Especially big data analytics can help to develop individualised, on-demand mobility services. Digital mobility applications and platforms can enable innovative multimodal mobility services and improve the usability of public transport, sharing and personal mobility by integrating real-time data in mobility planning and routing. Issues of data security and privacy have to be considered and addressed in future research.

3. Objectives and expected impacts

The mission-oriented programme Mobility of the Future addresses future strategic challenges in society, the environment and the economy by focusing on four key themes. Each of its four main-themes contributes to achieving the strategic or operational objectives to a different degree (high, medium or low/none). The strategic and operational objectives relevant for personal mobility are illustrated in the two following figures.

Figure 1: Contributions of the thematic fields to achieving strategic objectives (Prior strategic programme objectives for the theme of personal mobility)

Level of Objective	Strategic Objectives	Themes of Mobility of the Future			
		Personal Mobility	GoodsTransport	Vehicle Technology	Transport Infrastructure
Society	Usability and Access	●●			●
	Sustainable Transport	●●			
	Quality and Availability	●			●●
	Safeguarding Resources		●●		
Environment	Reduce emissions and immisions	●	●	●●	
	Reduce energy and resource use	●	●●	●●	●
	Balance human interest between human habitat and the ecosystem				●●
Economy and Research	Competitive Transport Sector	●	●●	●●	●
	Competence Leadership	●●	●●	●●	●
	International Cooperation	●	●	●	●

Expected contributions:

high ●●

medium ●

low/none

The theme Personal Mobility addresses the following strategic objectives:

- On the level *Society*, high impacts are expected within the objectives of usability and access to the transport system, sustainable transport modes and mobility patterns. Medium contributions are expected to the field of quality and availability of the transport infrastructure. Therefore, the societal impact level represents a main emphasis in the theme personal mobility.
- Medium impacts on the objective level *Environment* are anticipated on the one hand, concerning the reduction of emissions and immissions and on the other hand regarding the reduction of the energy and resource consumption.
- In *Economy and Research* a high impact is pursued especially by achieving competence leadership in the mobility sector. Medium impacts are expected within the objective of increased competitiveness of the transport sector and of strengthened international cooperation.

The research in the theme of personal mobility should contribute to the following operational programme objectives:

Figure 2: Contributions of the thematic areas to achieving operational objectives (Prior operational programme objectives for the theme of personal mobility)

Level of Objective	Operational Objectives	Themes of Mobility of the Future			
		Personal Mobility	GoodsTransport	Vehicle Technology	Transport Infrastructure
Supporting technological innovations	Develop technologies to create new potentials and ensure a competitive economy	●	●	●●	
	Timely development and implementation new technologies	●●	●	●●	●●
	Exploit potentials of other RTI-areas	●	●●	●	●●
Supporting solutions through social and organisational innovations	Innovations for new societal habits and behaviors	●●	●		
	Restructuring the organisation of the transport system		●●		●
	Support technological innovations through social und organisational innovations	●●	●●		
Strengthening links between RTI-policy and mobility policy	Alignment and implementation of objectives and decisions in the field of mobility	●●	●		●
	Implementation of complex system developments through cooperation with complementary partners			●●	
Enhancing knowledge and networks	Using system-specific knowledge and holistic views of coherences in mobility	●●	●●	●	●
	Synergies through strategic cooperation between industry, research and administration	●	●	●●	●●
	Disseminate innovations to raise awareness among citizens and economic players	●	●	●	

Expected contributions:

high ●●
medium ●
low/none

- Personal mobility-related research should contribute to technological innovations in the mobility sector by developing technology and exploiting potentials of other RTI-areas. High impacts are expected through timely application of new technologies.
- The focus of this research field lies on supporting new mobility solutions through social innovations in order to develop new societal habits and to change behaviour as well as to address technological innovations.
- Aligning and implementing objectives and decisions in mobility is anticipated to highly impact the strengthening of the links between the RTI-policy and mobility policy.
- Research field-related research should conduce to the enhancement of knowledge and networks in the field of mobility. The priority lies on the utilization of system-specific knowledge and on a holistic view of coherences in the mobility sector. Furthermore, synergies through strategic cooperation between industry, research and pubic administration should be identified together with disseminating innovations to raise awareness among citizens and economic players.

4. Programme interventions in personal mobility

The high complexity of mobility-related challenges is linked to the transport system itself (users, vehicles and infrastructure), but also to its close interaction with other related systems (energy, society, spatial development, ecosystem, etc.). The *Mobility of the Future* programme aims at developing comprehensive solutions for the mobility system. In this context, the interventions need to contribute to initiating processes of change in order to develop sustainable solutions in personal mobility and interdisciplinary research approaches aimed at supporting technological, organisational and social innovations.

Principles of Intervention

Based on the topic-relating intervention approach, the following five principles of intervention can be identified in the theme of personal mobility.

1. Support sustainable personal mobility by pursuing innovation and transition in research

The theme personal mobility is based on the major strategic and operational objectives and contributions to the *Mobility of the Future* programme. It follows a systemic approach to initiate and promote R&D on sustainable personal mobility and includes measures to improve and increase the effective learnings from the results. The innovations bring about new services and practices in mobility to initiate a comprehensive transformation of the transport system. They also significantly contribute to the achievement of medium-term objectives in the fields of decarbonisation, strengthening competitiveness as well as maintaining the quality of life. Furthermore, the increase of wealth by minimizing the undesirable effects of transport and reducing inequality in society is addressed. In order to comprehensively analyse sustainability, research should therefore focus on the increase of efficiency and feasibility and in particular questions on how to achieve a sufficient use of mobility services.⁹

2. Taking a comprehensive approach and focussing on the user

Research in the field of personal mobility needs to equally integrate technology-based and non-technological social innovations to develop needs-based products and services, convert new technologies to a societally advantageous way of use and induce the necessary shift in mobility behaviour. It is vital to benefit from technological opportunities of digitalisation and adapt mobility applications to people's needs while also detecting potential risks. The programme fosters creative, innovative projects with great novelty and risk taking.

⁹ Sufficiency describes the intended reduction of energy demand. Sufficiency policy aims at limiting production and consumption, e.g. through promoting alternative practices and mandatory measures from public authorities. (Linz, Suffizienz als politische Praxis - Ein Katalog, 2015, S. 5)

3. Supporting responsible, interdisciplinary and collaborative research

The programme supports responsible innovation¹⁰ and open innovation¹¹ from building knowledge to development and to the diffusion of new solutions in the transport system relevant for personal mobility (implementation, scaling) while considering coherences and interdependencies with other mobility-related fields such as health, spatial development or security. To enable integrated solutions the programme fosters comprehensive perspectives, solution approaches and entrepreneurship along with the necessary collaboration of actors between different disciplines and areas of research, economy, politics, administration and society.

4. Expanding knowledge – Strengthening the innovative capacity and solution expertise of Austrian actors

The improvement of knowledge and competence should especially benefit Austrian innovators and stimulate new innovators in mobility such as start-ups or spin-offs that can address future-oriented areas on a national and international level towards sustainable personal mobility. These findings should support knowledge-based approaches for mobility-related decision-makers in politics, administration and planning. In addition, the demand of socially beneficial mobility solutions should be stimulated. The interventions should generate new markets for innovative solutions in personal mobility and enable commercial as well as non-commercial uptakes.

5. Focussing on innovative fields of research and innovation

As part of pursuing an application-oriented research approach, the focus lies on three specific fields of research and innovation. These address key topics, research questions and specific missions deriving from current and future challenges and opportunities. New mobility services and behaviours within the context of multimodal lifestyles are addressed, ecologically sustainable and healthy forms of motion in the field of active mobility as well as equality in mobility to ensure and advance accessibility, availability and usability of the transport system for all user groups.

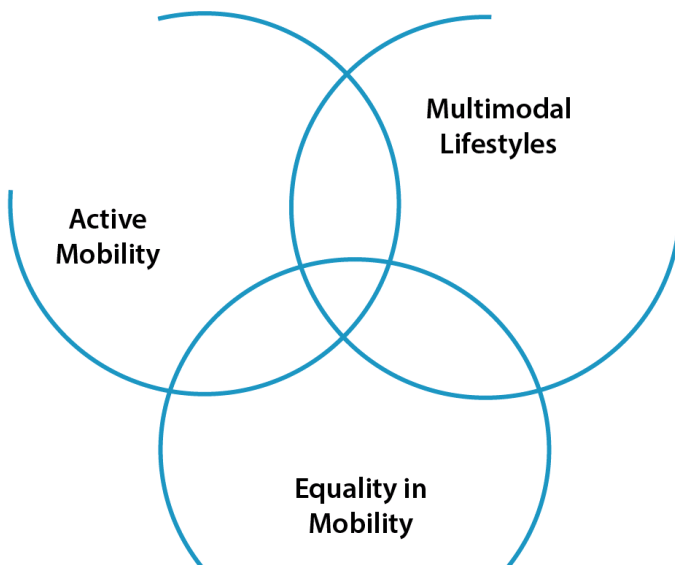
¹⁰ See https://en.wikipedia.org/wiki/Responsible_Research_and_Innovation

¹¹ See https://en.wikipedia.org/wiki/Open_innovation

5. Fields of research and innovation

The fields of research and innovation set the thematic framework of personal mobility and specify the focus of the programme's mission. These fields should be considered as integrative parts. They seamlessly merge into each other due to relevant aspects of content in multiple fields of research (See Figure 3).

Figure 3 : Fields of research and innovation



Active Mobility

Within the research field "Active Mobility", the programme Mobility of the Future contributes to the establishment of human powered mobility as the dominant form of short distance mobility. Research addresses the relevant modes of transport and mobility tools (walking, cycling etc.) and infrastructure and their connecting nodes to enable an optimal design of public space and analyses the necessary conditions, frameworks and mechanisms. To bring about this shift towards active mobility in daily routines and create a new culture of active mobility, innovations in generating awareness, motivation and empowerment are needed. Here, the programme generates essential results and supports solutions for different spatial structures and societal groups. To take advantage of potential synergies, research should intensify transdisciplinary approaches, combining methods and expertise from medicine, health, sports, security etc.

Multimodal Lifestyles

Within the research field "Multimodal Lifestyles", the programme addresses the optimal mix/combination of mobility forms as well as their complementarity with new mobility services and flexible mobility patterns. This shall induce the shift away from rigid patterns of mobility such as car-dominated mobility towards a more pragmatic and sufficient mobility behaviour. Especially research on alternatives to private motorised vehicles and their conventional use and research on multimodal and intermodal services and optimised use

of existing forms of mobility is required. Additionally, the essential requirements and challenges concerning quality (simple, seamless, comfortable etc.) and paradigms of use (sharing economy, reduction of transport volume) within the context of new technologies, such as automated mobility need to be in the focus of future research. To establish product innovations and behavioural innovations for the optimal support of a “multimodal mobility culture”, a broad approach is essential. In order to enable system innovations, interdisciplinary solution approaches in other domains like work, leisure and tourism need to be examined.

Equality in Mobility

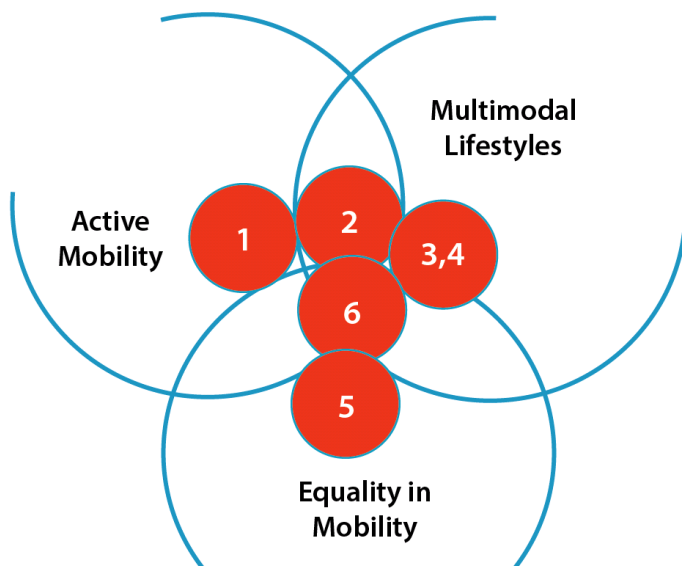
Within the research field “Equality in Mobility”, the programme Mobility of the Future contributes to guaranteeing the necessary societal functions of mobility to ensure the inclusion in society, enable self-determined mobility and provide adequate public services. Solutions for social and inclusive mobility systems that address the specific needs of disadvantaged groups of society are at the centre of this research field. Mobility concepts that provide accessible solutions free of cognitive and physical barriers, affordable and based on participatory processes to generate the optimal outcome shall be researched. Furthermore, challenges and opportunities of current and future societal developments (e.g. demographic changes) and trends (e.g. digitalisation and automation) are addressed within this field of research.

6. Research subjects for projects

Within the “fields of research and innovation” thematic research is supported through six research subjects in the programme (See Figure 3).

1. Active and healthy mobility for short and medium-distances
2. New paradigms of use and sufficient behaviour
3. New publicly available mobility services
4. Foundations and digital planning tools for connected mobility
5. Equal opportunities and needs-based mobility
6. Transformation of public spaces for mobility

Figure 4: Research subjects and location in the fields of research and innovation



In general, the research subjects address aspects relevant for one or several research and innovation fields as well as intersecting fields (Figure 4). Single and multiple research subjects or partial aspects of them form the basis of future programme calls in the research subject. As an example, relevant key aspects and contents of the respective research subject outline possible contents of the projects.

Each research subject is described systematically along a number of characteristics, such as relevant challenges, research questions and key content aspects. Eligible settings for research projects are indicated in the innovation cycle (targeted basic research, applied research & development, implementation & scaling). Depending on the research question and the state of knowledge, different subjects and areas can be relevant, as specified in the programme calls.

The research subjects relate to different policy and strategy-relevant aspects and problems that should be addressed by the research projects. Depending on the research subject of the research projects, different contributions to the achievement of the thematic programme objectives (strategic and operational programme objectives presented in Figure 1 & Figure 2) are expected.

Furthermore, important framework conditions and other relevant programmes or initiatives need to be taken into account in research projects related to personal mobility. Each of the six research subjects has an individual set of definitions, comprising key competences and relevant stakeholders as well as key projects and knowledge, especially from previous research programmes and calls. If relevant, research projects are also expected to utilize and apply new digital enabling technologies in personal mobility.

1. Active and healthy mobility for short and medium-distances

Challenges and research questions

Which innovative concepts, products and services enable and support active and healthy mobility? How can the observed reduction of active forms of mobility be overcome and how can the motivation for active physical movement be increased? How can active mobility become a lifestyle product and be diffused more broadly among the general public? How can healthy mobility forms be supported in everyday mobility? How is it possible to achieve significant effects through healthy mobility in closer proximity to the place of residence and in the regional context? How can new solutions be better communicated to the citizens? How can we activate hard-to-reach groups? Which new business models or cooperation mechanisms need to be developed? How can innovation promote active mobility along the entire mobility chain in combination with other means of transport? Which innovative products and services are suitable for specific groups (e.g. commuters, families, children or elderly people) or for specific spatial or temporal contexts?

Key aspects

Instrument kits based on behavioural economics, connecting health promotion and support of active mobility, models of intersectoral cooperation (e.g. medicine, insurance industry, social facilities, health facilities), innovations in mobility management, imparting of movement competence (population, institutions), detection of qualities and barriers for active mobility in the mobility chain, new concepts and technologies for commuting with active mobility and necessary framework conditions (e.g. time usage models), prioritization of active road users for instance in traffic control, designing transfer points in public transport, integrated application of new mobility tools (e.g. scooters) in public transport (e.g. taking them along), tools to better include active mobility forms in planning applications (multimodal traffic planning, mobility survey etc.).

Focus of the research subject and location within the innovation cycle

The subject focusses on research and development of new methods, concepts, products and tools; prototypical tests of components/systems as well as the framework conditions for broad deployment

(transfer, scaling). Within the innovation cycle, the research subject “Active and healthy mobility for short and medium-distances” is located in the phase of *development* and in the early stage of *implementation & scaling*.

2. New paradigms of use and sufficient behaviour

Challenges and research questions

How can an individually and societally accepted extent of mobility be achieved by harnessing new potentials in order to avoid or substitute traffic? How is it possible to accomplish societal acceptance for effective measures to induce a change in behaviour through a shift in mobility or a sustainable development and how can we initiate necessary transformation processes or accelerate them? How can routines such as using motorised private transport be broken? Which solutions objectively and subjectively lead to more mobility options and a high quality of life in order to avoid negatively experiencing self-limitation and sacrifice? Which services are needed to alternatively satisfy emotional demands (action, thrill, prestige, sense of community etc. beyond mobility of purpose)? Which innovations lead to new behaviours by exploiting potentials in efficiency gains through new technologies in mobility and prevent undesirable side-effects? Which solutions can motivate conscious and sustainable behaviour and can contribute to overcome cognitive dissonances? Which individual and institutional strategies are necessary to promote a holistic view of the interdependencies and equalizing factors that also reach beyond the mobility sector (e.g. consumption, travel)? Which measures regarding the context and the target group are effective and necessary for this purpose? Which digital innovations enable a reduction of the necessity of physical change of location or its extent? Which new potentials of impact and solutions are possible through “virtual mobility” and changing lifestyles (e.g. teleconferencing, teleworking, teleshopping etc.)?

Key aspects

Shift in mobility due to sufficient mobility and people’s acceptance, incentive measures, mobility consulting, mobility management, innovative measures from behavioural economics, concepts for new technologies and needs-based communication of system solutions for ensuring a sufficient use (e.g. in the field of automated mobility), preventive rebound management, individual vs. collective behaviour, mobility behaviour - digital user behaviour, new potentials for traffic avoidance through "virtual mobility" planning tools and concepts, role model effect and multipliers, virtual mobility as a "new mode"

Focus of the research subject and location within the innovation cycle

The subject's focus lies on targeted research of new knowledge bases (R&D-services), research and development of new methods, concepts, products and tools; prototype testing and demonstration of components/systems. Within the innovation cycle, the research subject "New paradigms of use and sufficient behaviour" is located partly in the phase of targeted *basic research* and predominantly in the phase of *development*.

3. New publicly available mobility services

Challenges and research questions

How can publicly accessible and usable mobility supply be realised by means of a user-friendly, multimodal, integrated and connected transport system in the future? What kind of new offers and services can provide comfortable, flexible, reliable, available, affordable mobility that does not rely on private car ownership or use? What concepts of multimodal mobility and shared mobility can bring about a shift within the vehicle fleet towards lower emissions, more energy efficiency, more electric powered vehicles and sufficient use? How can a positive impact on the entire transport system be achieved through sustainable patterns of use (e.g. high occupancy rate, minimized travelled mileage)? What are the models, frameworks and regulations that span across multiple fields of action (housing, work, leisure, tourism etc.) to promote multimodal and shared mobility? How can existing and new offers and services be interlinked synergistically and what new digital business models and operational models are possible? What are the necessary frameworks to safeguard fair and responsible use of public goods? How can the necessary cooperation between the relevant actors be supported? How can multimodal mobility options be provided throughout the entire mobility chain including first and last mile? How can barriers to build and use a multimodal and digitally assisted system be overcome for different users? How can automated and digital mobility offers complement multimodal mobility offers and be integrated in a holistic transport system? How can synergies between mobility of persons and mobility of goods be used?

Key aspects

New concepts and services of mobility, MaaS (Mobility as a Service), mixed forms of private transport and public transport, availability and usability of mobility data for continuous real-time information, capacity management, new transport modes and concepts for urban areas, rural areas, housing and mobility, coordination of services from public and private operators, multimodal mobility hubs, digitalisation of the new mobility chain, broad impact of sharing mobility to contribute to the change in mobility, non-routine trips, routine mobility & tourism, multimodal traffic management

Focus of the research subject and location within the innovation cycle

The subject's focus lies on the research and development of new methods, concepts, products and tools, as well as the prototype testing of components/systems and framework conditions for broad deployment

(transfer, scaling). Within the innovation cycle, the research subject “New publicly available mobility services” is located predominantly in the *development* phase and slightly branches out to the *implementation and scaling* phase.

4. Foundations and digital planning tools for connected mobility

Challenges and research questions

How can we create an adequate knowledgebase and which evidences are needed within the context of technological developments and societal changes in order to benefit from the potentials of digitalisation and connected mobility? Which competences and (improved or novel) tools are needed to guide and steer new developments in personal mobility from a holistic system perspective? How can evidence-based decision making, communication and processes of negotiation support the transformation of the mobility systems and generate a high rate of acceptance? How can technology-assisted methods and processes be supported by planning multimodal and connected traffic systems? What enables the essential systems for networks and cooperation of interdisciplinary actors and applications? How can availability and quality of the relevant data for future applications be ensured? How is it possible to improve the assessment and anticipation of supply and demand within the context of data analytics? How can integration of relevant quantitative and qualitative indicators (e.g. development of sustainability, ethical questions, gender etc.) be improved within decision making processes? Within the context of automated driving and other disruptive technologies, which behavioural impacts can be expected in regard to mobility, socio-economics and spatial aspects? What are the changes in patterns of mobility use (e.g. trip purposes, modal choice, multimodality, consumer behaviour, driving behaviour) and what are the relevant planning and system parameters, such as mobility time budget, speed, vehicle occupation rate or reliability? How can these changes be detected and considered in planning tools and measures to enable medium-term to long-term personal mobility systems that are future-proof, (partly) automated, multimodal and connected?

Key aspects

Impact estimation and impact analysis, systematic implications and system dynamics of automated driving, data base for multimodal planning applications and for multimodal traffic management, decarbonisation due to integrated mobility and spatial planning, planning of new offers and forms of mobility, modelling/visualisation/simulation within the context of scenario estimation, empirical models of behaviour, new mobility indicators and parameters, consideration of trade-offs between data security and new applications of planning data, interplay of fact-based and emotion-based decision making, planning of mixed transport systems (automated and non-automated transport modes)

Focus of the research subject and location within the innovation cycle

The subject’s focus lies on coordinated basic research on pertinent questions about emerging developments, research as well as the development of new methods, concepts, products and tools, and

furthermore the prototype testing of components/systems. Within the innovation cycle, the subject “foundations and digital planning tools for connected mobility” is located partly in the phase of targeted and more general *basic research* and addresses predominantly aspects in the *development* phase.

5. Equal opportunities and needs-based mobility

Challenges and research questions

In the context of societal and technological changes, how can adequate mobility choices for disadvantaged people be provided, so that they can actively participate in societal activities and inequalities are reduced? How can a digital divide in mobility be minimized or be prevented? Which offers and services that support physical mobility can be developed, in particular, for people with physical and mental/cognitive limitations or diseases/conditions with increasing prevalence rates (e.g. dementia, psychological conditions)? Which innovations facilitate a (digitally) accessible and affordable system? How can innovative solutions reduce or eliminate barriers within the transport system (vehicle and infrastructure)? What can innovative solutions for mobility contribute to the integration of people with migrant backgrounds? What is the potential contribution of technologies (e.g. automated mobility) and what pre-conditions for use do apply? Providing sustainable and integrative mobility (design for all) that is cost efficient and interoperable: what are the essential configurations, frameworks and models? How can these offers and services help break into new markets and offer competitive advantages domestically and transnationally?

Key aspects

Digital and technology-assisted mobility for public and multimodal transport systems, increased comfort and usability of public transport, intermodal trip chains (information, route planning, navigation, changing transport modes etc.) assisted mobility and the human factor, integrated transport, pick-up, drop-off and services, transgenerational models to ensure mobility choices, reachability of rural areas, community empowerment, design and configurations of infrastructure, wearable devices, inclusive mobility planning, automated mobility and equal opportunities (potentials, risks, impacts, application/deployment scenarios and framework conditions for people with limited mobility choices)

Focus of the research subject and location within the innovation cycle

The subject’s target lies on focused research on new knowledge bases (R&D-services), R&D of new methods, concepts, products, prototype testing of components/systems, as well as framework conditions for broad deployment (transfer, scaling). Within the innovation cycle, the research subject “Equal opportunities and needs-based mobility” is located in the phase of *development* and partly addresses the targeted *basic research* phase.

6. Transformation of public spaces for mobility

Challenges and research questions

How can quantitative sufficient and attractive spaces of movement be provided/created for sustainable and spatially efficient forms of mobility in urban spaces within a “human scale”? Which innovative methods, tools, components and designs support a fair allocation and reorganisation of space as well as suitable equipment/design? How can necessary processes of negotiation, decision-making and change be fostered in a complex multi-stakeholder environment? Which innovative concepts lead to more acceptance and contribute to the reduction of conflicts between different interests and traffic participants? How can we design public space future-proof and improve the adjustment of the local infrastructure to current needs and future demands of mobility? What requirements emerge through new means and forms of transport (e.g. sharing, e-mobility, automated driving and mobility in the third dimension) and how can spaces of the future be gradually prepared? How can the adaptability and resilience of the infrastructure concerning societal/technological changes and requirements (e.g. demographic change, climate change) be ensured? How can digital technologies enhance the attractiveness of public spaces to impose and promote societally favourable behaviours? Which new concepts of utilizing space and organising transport are consequently possible? Which new forms of cooperation, operator models, business models or management concepts between the public sector, economy and society are necessary?

Key aspects

Enhancement of objective/subjective security in public space, strategic/tactic methods of intervention and tools, assessment and impact analysis of exemplary infrastructure, features/configurations and design of urban spaces, usability and identification, temporary/spatial management and temporary use, multiple and multifunctional use, different functionalities of public spaces (functions of orientation, connection and comfort), systems to adapt spatial functionalities to specific situational needs and to steer behaviour, interaction between human and infrastructure, measures for organising and managing transport

Focus of the research subject and location within the innovation cycle

The subject’s target lies on research and development of new methods, concepts, products and tools; prototypical tests of components/systems as well as the framework conditions for broad deployment (transfer, scaling). Within the innovation cycle, the research subject “Transformation of public spaces for mobility” is located predominantly in the phase of *development* and partly in the phase of *implementation & scaling*.

7. Roadmap and actions

Research funds are provided based on biannual calls for proposals in a competitive process. Until the termination of the programme in the year 2020 two theme-relevant national calls are on schedule.

In the 12th Call of *Mobility of the Future* (fourth quarter of 2018 to first quarter 2019) a budget of about 5M€ is provided to address one lead project (lighthouse project) on “integrated mobility” and to support several R&D projects in the scope of research subject 1-3 and 6 of the research agenda, complemented by some related topics for tendered studies.

The envisaged 15th call scheduled for the second quarter of 2020 is intended to address a second lead project (lighthouse project) in the area of “transforming public spaces” and will address further focus topics of the research agenda, as well as follow-up projects resulting from previous calls and the 12th call.

The programme also cooperates with the JPI Urban Europe initiative by joining a transnational call in 2019 and with the ERA-Net Transport network.

The programme builds on knowledge generated by previous research projects and supports a set of accompanying measures. These measures comprise publications on project mid-term results, networking workshops and a future conference (Innovationsgespräche 2020+) in the course of the year 2019. Initiatives like the mobility labs¹² and an endowed professorship for Digitalisation&Automation complement programme support activities together with impact assessment actions.

¹² Urban Mobility Labs: <http://www.smart-mobility.at/en/initiatives/urban-mobilitylabs/>